Appendix G
Draft Clean Water Act
Section 404(b)(1) Guidelines Analysis

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Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
BMP	Best Management Practice
Borough	Kenai Peninsula Borough
CFR	Code of Federal Regulations
CIRI	Cook Inlet Region, Incorporated
CNF	Chugach National Forest
CSU	Conservation System Unit
dBA	A-weighted Decibels
DNR	Alaska Department of Natural Resources
DOI	United States Department of the Interior
DOT&PF	Alaska Department of Transportation and Public Facilities
DPOR	Division of Parks and Outdoor Recreation
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
Forest Service	Forest Service, U.S. Department of Agriculture
Guidelines	Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material
KNWR	Kenai National Wildlife Refuge
KRSMA	Kenai River Special Management Area
LEDPA	Least Environmentally Damaging Practicable Alternative
LOS	Level of Service
MP	Milepost or mile point
mph	Miles per Hour
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
Resurrection Pass Trail	Resurrection Pass National Recreation Trail
RV	Recreational Vehicle
SEIS	Supplemental Environmental Impact Statement
SWPPP	Stormwater Pollution Prevention Plan
TCF	The Conservation Fund
TCP	Traditional Cultural Property
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
VPP	Visual Prioritization Process
VQE	Visual Quality Evaluation

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1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) and the Federal Highway Administration (FHWA) have identified the need to improve the Sterling Highway in the Cooper Landing area (milepost [MP] 45 to 60) to meet current design standards for rural principal arterial roads. The highway serves as the primary land transportation link between the eastern and western Kenai Peninsula and between Anchorage and the communities of the western Kenai Peninsula. It also serves local traffic within the community of Cooper Landing and provides access to the confluence of the Kenai and Russian rivers, one of the most popular recreation destinations in Alaska. The Sterling Highway traverses the Kenai River valley between rugged mountains and, in the project area, passes through portions of the Chugach National Forest (CNF) and the Kenai National Wildlife Refuge (KNWR).

Many activities that affect wetlands and water bodies are subject to the jurisdiction of the United States Army Corps of Engineers (USACE). Under Section 404 of the Clean Water Act, USACE has authority to permit the discharge of dredged or fill material in waters of the United States (U.S.), while the authority to permit work and the placement of structures in navigable waters of the U.S. is delegated to USACE under Section 10 of the Rivers and Harbors Act of 1899. The Environmental Protection Agency (EPA) developed regulations known as the Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (Guidelines) in conjunction with USACE. The Guidelines describe restrictions on discharges; those are circumstances under which discharges of dredged or fill material into waters of the U.S. may not be authorized. As USACE evaluates the application of a proposed project for a Department of the Army Permit, USACE must determine the compliance of the proposed project with the Guidelines. In 1992, DOT&PF and FHWA agreed with USACE that they would include a draft analysis of compliance with the Guidelines for their projects evaluated with an Environmental Impact Statement (EIS) (USACE, FHWA, DOT&PF 1992). This document is the analysis for the Sterling Highway MP 45–60 Project to comply with that 1992 agreement.

FHWA and DOT&PF have identified the Juneau Creek Alternative as the preferred alternative, so this document analyzes that alternative for compliance with the Guidelines. The Juneau Creek Alternative is the "proposed project." Note that FHWA will make its final decision after the Final EIS (FEIS) is issued, in a Record of Decision. This Guidelines evaluation builds on the alternatives and impact analyses presented within the FEIS, with a focus on the specific decisions required by the Guidelines. To decide whether or not to issue a permit, and if so with what conditions, USACE may use the information presented here and in the main body of the FEIS, in DOT&PF's permit application, in FHWA's Record of Decision, and information generated during its permit application review process including public comment.

Under Subpart B of the Guidelines, USACE will submit the proposed project to four tests (or 'restrictions on discharge') that the proposed project must pass (in addition to other requirements) to be issued a Section 404 permit. These tests (with reference to the pertinent paragraph of the Guidelines) include:

- **40 Code of Federal Regulations (CFR) 230.10 (a)**: Whether there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse

environmental consequences. The alternative identified by this test is referred to as the *least environmentally damaging practicable alternative* or the LEDPA.

For projects with a basic project purpose that is not water-dependent, it is presumed that a practicable alternative exists that does not involve special aquatic sites unless the applicant (in this case DOT&PF) demonstrates otherwise.

- **40 CFR 230.10 (b):** Whether the discharge would violate any applicable State water quality standards, Section 307 of the Clean Water Act, the Endangered Species Act (ESA), or federal laws concerning marine sanctuaries.
- **40 CFR 230.10 (c):** Whether the discharge would cause or contribute to significant degradation of the waters of the U.S.
- **40 CFR 230.10 (d):** Whether appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

The USACE's evaluation of a proposed project under all four of these tests constitutes a determination of compliance with the Guidelines.

The specific findings that USACE must make to conclude that the proposed project complies with the Guidelines, and the locations in this document where evidence is presented to support those findings, are presented in Table 1-1.

Table 1-1: Findings needed to conclude that the proposed project would comply with the Section 404(b)(1) Guidelines

Citation to Regulation and Finding[a] Needed for Compliance with the Guidelines	Location in this Document Where Evidence is Presented
40 CFR 230.10 (a)	
There is no practicable alternative to the proposed discharge that achieves the basic project purpose that does not involve special aquatic sites.	Section 3.1
There is no practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem that would not have other significant adverse environmental consequences.	Section 3.2
40 CFR 230.10 (b)	
The discharge will not violate State of Alaska water quality standards.	Sections 4.1.2, 4.1.6, and 4.1.7
The discharge will not violate Clean Water Act Section 307 toxic effluent standards or prohibitions.	Sections 4.1.2, 4.1.6, and 4.1.7
The discharge will not jeopardize the continued existence of endangered or threatened species or their critical habitat.	Section 4.1.9

Citation to Regulation and Finding[a] Needed for Compliance with the Guidelines	Location in this Document Where Evidence is Presented
The discharge will not violate standards set by the Department of Commerce to protect marine sanctuaries.	Not applicable. There are no marine sanctuaries near the project area.
40 CFR 230.10 (c)	
The discharge will not cause or contribute to significant degradation of waters of the U.S. through adverse effects on human health or welfare, through effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.	Sections 4.1.10, 4.1.11, 4.1.12, 4.1.13, 4.1.14
The discharge will not cause or contribute to significant degradation of waters of the U.S. through adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems.	Sections 4.1.9, 4.1.10, 4.1.11
The discharge will not cause or contribute to significant degradation of waters of the U.S. through adverse effects on diversity, productivity, and stability of the aquatic ecosystem, such as the loss of fish or wildlife habitat, or loss of the capacity of wetlands to assimilate nutrients, purify water, or reduce wave energy.	Sections 4.1.9, 4.1.10, 4.1.11, 4.1.12
The discharge will not cause or contribute to significant degradation of waters of the U.S. through adverse effects on recreational, aesthetic, and economic values.	Sections 4.1.14, 4.1.15, 4.1.16, 4.1.17
40 CFR 230.10 (d)	
Appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Section 5

[a] These requirements are paraphrased from the regulations.

After a synopsis of the project's purpose and need and a description of the proposed project, this document further describes key findings USACE must make and the factors it must evaluate, identifies locations of relevant information in the FEIS, presents a synopsis of the relevant information, and states FHWA's and DOT&PF's opinions on each of the findings. In limited instances, this analysis identifies information that DOT&PF and FHWA will need to develop during the permit application review process to fully demonstrate compliance with the Guidelines—primarily additional detail on the design and construction of the proposed project and refined impact mitigation measures only possible to evaluate after additional design information is available.

2 Purpose of and Need for the Project, and the Proposed Project

This section summarizes Purpose and Need for the project. Additional information can be found in Chapter 1 of the FEIS.

2.1 Existing Conditions

The Sterling Highway is the only road connecting western Kenai Peninsula communities (Homer, Kenai, Soldotna, and others) with the rest of Alaska and the rest of the National Highway System. That highway system supports the statewide economy by providing efficient overland travel between local cities, major cities, and the ports and airports. The Sterling Highway also serves increasing local traffic in Cooper Landing, including a large influx of summer visitors.

The project area, depicted in Map 1.1-1 of the FEIS, includes the western end of Kenai Lake and follows the Kenai River Valley downstream for approximately 11 miles, nearly to the western edge of the Kenai Mountains. Because the portion of Sterling Highway in the project area is bounded by rugged mountains and is situated in the narrow Kenai River Valley, the highway remains narrow and curvy. This portion of the highway lacks shoulders and recommended sight distance to see around corners and over hillcrests. Many driveways and side roads connect directly to the highway, creating conflict points as drivers enter and exit the highway. Because of the communities it serves and the popular recreational destinations along the route, the highway is heavily traveled and congested, particularly in summer. The types of vehicles traveling the highway include motor homes, trucks hauling freight, and vehicles towing boats, all of which contribute to slow travel and difficult passing. Additionally, many of the travelers in summer are visitors who are unfamiliar with the area.

2.2 Project History

DOT&PF has been planning and studying improvements in the present project corridor since the 1970s, which demonstrates that the need for improvements has long been recognized. However, those improvements have not yet been accomplished. A Draft EIS and Section 4(f) Evaluation that assessed reconstruction of the Sterling Highway from the Seward Highway junction (MP 37) to the Skilak Lake Road intersection (MP 58) was issued by FHWA in 1982 (the Sterling Highway MP 37–60 Project). The EIS was not completed and the project was put on hold. In 1994, DOT&PF and FHWA issued a second Draft EIS and Section 4(f) Evaluation for that project, and later decided to split the project into two separate ones. The MP 37 to 45 segment was analyzed under a separate environmental document and construction was completed in 2001.

The current FEIS effort evaluates the Sterling Highway between MP 45 and 60.

2.3 Project Purpose

DOT&PF and FHWA propose to improve the Sterling Highway from its intersection with Quartz Creek Road to its intersection with Skilak Lake Road. The highway is classified as a "rural principal arterial," which is part of a rural network of continuous routes that serve travel with statewide or interstate characteristics and that connect urban areas (paraphrased). The purpose of the project is to bring the highway up to current standards for a rural principal arterial to efficiently and safely serve through-traffic, local community traffic, and traffic bound for recreation

destinations in the area, both now and in the future. In achieving this transportation purpose, DOT&PF and FHWA recognize the importance of protecting the Kenai River corridor.

2.4 Project Needs

The project would address three interrelated needs:

- **Need 1: Reduce Highway Congestion.** The construction of multiple driveways and connecting side streets over time, combined with a curvy, constrained alignment with little passing opportunity and increasing traffic volumes, has led to considerable congestion that is forecast to worsen in future years. As a result, the highway performs below a desirable level of service for a rural principal arterial.
- **Need 2: Meet Current Highway Design Standards.** Characteristics of the MP 45 to 60 segment of the Sterling Highway do not meet current design standards for a rural principal arterial road. The existing highway includes curves, shoulders, guardrail, and clear zones that do not meet current design standards.
- **Need 3: Improve Highway Safety.** Due to the interrelated effects of highway congestion and outdated highway design characteristics, segments of the highway in the project area have a higher-than-average number of traffic crashes and a greater severity of crashes when compared to the statewide average.

After a description of the historic and projected traffic volumes below, details are presented on the problems that this project would address.

When the Sterling Highway was constructed as a pioneer road to Kenai in the late 1940s and paved in the 1950s, it served a much smaller population than it does now and relatively little tourism existed. Since the highway's construction, the population of the Kenai Peninsula Borough (Borough) has increased more than tenfold and the popularity of recreation activities within the project area has risen dramatically. Traffic continues to increase in the project area as a result of both the increasing population base and an increase in summer tourism, but the highway's capacity to accommodate traffic remains at the 1950s level.

Traffic volume data presented in Section 1.2.2.1 of the FEIS show that between 1991 and 2012, the annual average daily volumes increased 1, 13, 19, and 26 percent, respectively, in the four highway segments analyzed, from east to west (Quartz Creek Road to Snug Harbor Road, Snug Harbor Road to Russian River Campground, Russian River Campground to Russian River Ferry Entrance, and Russian River Ferry Entrance to Skilak Lake Road). Summer recreationist traffic results in peak volumes that are high during June, July, and August, with traffic during those months comprising 54 percent of all annual traffic.

Table 2-1 below shows projections of average daily traffic in 2043 based on a compound annual growth rate of 1.0 percent as described in Section 1.2.2.1 of the FEIS. Present year-round and summer traffic volumes are projected to nearly double.

Table 2-1: Future traffic volume forecast

	Annual Average Daily Traffic Volumes		Summer Average Daily Traffic Volumes	
Segment	**2012[a]**	**2043[b]**	**2012[a]**	**2043[b]**
Quartz Creek Road to Snug Harbor Road	3,033	5,604	4,953	9,152
Snug Harbor Road to Russian River Campground	3,270	6,042	5,340	9,867
Russian River Campground to Russian River Ferry Entrance	3,456	6,386	5,644	10,428
Russian River Ferry Entrance to Skilak Road	3,140	5,802	5,128	9,475

[a] 2012 traffic volumes come from actual counts.

[b] 2043 volumes were forecast using a 1 percent annual growth rate based on the 20-year linear trend line growth.

Source: Lounsbury (2014)

2.4.1 Traffic Congestion

Traffic engineers measure highway function using level of service (LOS). Traffic congestion affects the LOS. Congestion occurs when a platoon of cars forms and drivers are unable to travel at steady, reliable speeds and is measured by the percentage of time spent following the slower vehicle. The cause of congestion can be various including when trucks or recreational vehicles (RVs) climbing a hill must gear down to carry the heavy vehicle up the grade and no passing lanes exist, where curves are sharp and vehicles must slow down to safely maneuver, where there is little room between oncoming traffic and the ditch and drivers are feeling stress (white knuckle conditions), or where side streets or driveways cause drivers to slow or stop to wait for opposing traffic before making their turns. Because of the curvy alignment, narrow roadway, and poor visibility to see around curves, there are very few passing opportunities available in the project area. The growing population of Southcentral Alaska and of Kenai Peninsula communities served by the Sterling Highway, along with the increasing traffic and the limited passing opportunities, result in more time spent following other drivers, higher congestion, lower travel speeds, and consequently a lower LOS.

The highway's many curves require speed limit advisory signs for speeds of 45, 35, and 30 miles per hour (mph). There are many intersecting side roads and driveways in the project area that cause highway traffic to slow or stop to wait for vehicles to enter or leave the highway. The needs to both serve through-traffic and provide access among local destinations are relevant to roadway design decisions. Through-traffic movement is hampered by the provision of access via driveways, which results in slow-moving vehicles at intersections. Local access is hampered at busy times by a steady stream of through-traffic that makes it difficult to get on the highway. Traffic congestion is exacerbated on this section of the Sterling Highway by the presence of many large RVs, RVs pulling trailers, tractor-trailer trucks, and tourist buses merging on and off the highway from multiple access points.

Even at lower-volume times, congestion causes unsafe passing attempts or crashes when one vehicle hits stopped cars or goes off the road to avoid them. Winter road conditions also cause

some drivers (e.g., those without studded tires, or towing a trailer) to drive more slowly than others and lead to congestion.

The 2012 LOS and projected 2043 LOS were determined and compared to national standards, by highway segment, using letter grades to signify LOS categories ranging from LOS 'A' (best) to LOS 'F' (worst). The American Association of State Highway and Transportation Officials (AASHTO) standard for rural arterials is LOS B, but LOS C is considered appropriate by DOT&PF in mountainous terrain, and flexibility is afforded to the highway designer to provide the highest LOS that is practical. DOT&PF typically strives to achieve at least LOS C on its highways. Table 2-2 below summarizes the existing and projected 2043 LOS. Presently, 76 percent of the highway does not meet the LOS C standard, and 100 percent of it is projected to not meet that standard in 2043.

Table 2-2: Existing and forecasted level of service (summer traffic conditions)

Project Area Segment	Direction[a]	% Total Length[b]	2012 Existing	2043 Forecast
			LOS[c]	LOS
1	EB	8.0	D	D
	WB	8.0	D	D
2	EB	4.0	D	D
	WB	4.0	D	D
3	EB	6.0	D	D
	WB	6.0	D	D
4	EB	8.0	D	D
	WB	8.0	D	D
5	EB	12.0	D	D
	WB	12.0	D	D
6	EB	12.0	C	D
	WB	12.0	C	D

[a] EB = eastbound; WB = westbound.

[b] The project corridor is approximately 15 miles long. "Total Length" includes both directions of travel and therefore is approximately 30 miles.

[c] LOS C: Noticeable increases (from LOS B) in platoon formation, platoon size, and frequency of passing impediments. Traffic flow is susceptible to congestion due to turning traffic and slow-moving vehicles. Time spent following may reach 65 percent.

LOS D: Unstable traffic flow. Passing demand is high, with passing capacity near zero. Platoon sizes of 5–10 vehicles are common. Motorists are delayed in platoons nearly 80 percent of their travel time.

Source: Lounsbury (2014).

2.4.2 Highway Design Standards

AASHTO provides standards which are often expressed as a range of values, and leaves final selection of the roadway's actual design criteria to engineers based on local conditions and needs. Within the project area, the Sterling Highway does not meet current standards for a rural principal arterial. This contributes to the congestion and relatively poor LOS. Table 2-3 below summarizes the Sterling Highway's present level of compliance with AASHTO design standards.

Table 2-3: Existing Sterling Highway MP 45–60 and rural principal arterial design standards

	Design Standard[a]	Distance Not Meeting Standard	Percent Not Meeting Standard
Design Speed (mph)	60	15 miles at 55 mph or less including 4 miles at 40 mph or less	100
Minimum Curve Radius (feet)	1,330	21 of 43 curves less than standard radius	49
Lane Width (feet)	12	13.7 of 15 miles less than 12-foot-wide lanes	91
Shoulder Width (feet)	6–10	15 of 15 miles less than 6-foot-wide shoulders	100
Clear Zone (feet)	30–32	14 of 15 miles less than 30-foot-wide clear zone	95

[a] The design standards are guidelines spelled out in AASHTO (2004) and adopted by DOT&PF and FHWA and, in this case, are specific to "rural principal arterial" highways. The design standards frequently represent a range of values, allowing designers latitude based on local conditions. The *Alaska Preconstruction Manual* states "Interstate rural design speed for level terrain is 70 mph, for rolling terrain is 60 mph, and for mountainous terrain is 50 mph." DOT&PF has identified 60 mph as the appropriate design speed for the project corridor.

The Sterling Highway's existing design can be attributed to the road being constructed to fit the existing topography. The existing alignment does not account for new safety standards, larger vehicles, or more traffic. The highway was constructed at a time when automobiles were slower, trucks were generally smaller, and RVs and tourist buses were much fewer and smaller.

The "design speed" means the speed at which the highway should be physically traversable, with adequate ability for a driver to see the road ahead, negotiate curves, and drive comfortably. Design speeds should reflect the speeds that drivers expect to travel, and are determined by the physical limitations of the roadway and surrounding traffic. Highway design engineers have identified 60 mph as an achievable and desirable design speed to match driver expectations and conditions of the adjacent highway segments. The design speed often differs from—and should not be confused with—the posted speed limit. DOT&PF anticipates that the posted speed limit will be 55 mph.

The minimum curve radius that allows for a 60 mph design speed is 1,330 feet. There are 43 curves on the existing alignment in the project area, and 21 of them (49 percent) do not meet this standard. Curves tight enough to warrant a 35 mph posting may contribute to single-vehicle run-off-the-road crashes and truck rollovers. The curvy existing road impedes the ability of drivers to see upcoming hazards and reduces the time available to stop or slow down when hazards become visible. Similarly, the visibility required to pass safely is hindered. Although 90 percent of the highway in the project area is designated "no passing," frustrated motorists pass in areas where it is prohibited.

Lane width defines the area where vehicles can safely maneuver without encroaching into the path of oncoming traffic or onto the shoulder. AASHTO (2004) standards for rural principal arterials call for 12-foot-wide lanes with 6- to 10-foot-wide shoulders. Narrow lanes and narrow or non-existent shoulders constrain drivers' maneuverability when encountering oncoming vehicles, pedestrians, stalled vehicles, guardrails or ditches, and other obstacles. This in turn leads to reduced driver comfort and corresponding slower driving speeds and may contribute to crashes when drivers do not slow down or are impatient to pass others who have slowed. Insufficient

shoulders also contribute to run-off-the-road crashes, which are the majority of severe injury crashes in the project area.

A clear zone is the area alongside the road from the outer edge of the outer lane that is clear of obstructions such as trees and rock outcroppings and where side slopes are moderate. The AASHTO (2004) design standard for a rural principal arterial for the clear zone is 30 to 32 feet. In the project area, the existing clear zones are minimal. The clear zone is intended to allow drivers who might leave the driving lane to recover control of the vehicle or to bring the vehicle to a rest with minimal damage. For drivers who remain within the roadway, the clear zone also provides for visibility and opportunity to see wildlife or people moving toward the road and gives drivers time to safely slow down or stop if they perceive a hazard.

2.4.3 Highway Safety

One way to gauge the safety of a highway is to analyze crash rates and severity and compare them to other highway segments in the state, accounting for different lengths and traffic volumes of the segments. Compared to statewide averages, two of the six road segments comprising the MP 45–60 project area had crash rates (measured per million vehicle miles) well above the average and four had rates that were well below the average. With respect to severity, between 2000 and 2009, the project area in all years except 2006 had a higher percentage of major injury and fatality crashes than the statewide average.

Factors that reduce highway safety include: sharp curves that limit visibility and ability to pass; narrow shoulders with steep drop-offs; narrow lanes; inadequate clear zones that limit moose visibility and increase the chance of vehicles hitting fixed objects after they run off the road; and driveways and street intersections that cause vehicles to turn across traffic, wait in the travel lane to turn, and move slowly while accelerating or decelerating.

2.5 Proposed Project: Juneau Creek Alternative

As the Juneau Creek Alternative is the preferred alternative for the proposed Sterling Highway MP 45–60 Project, these terms are synonymous for the purposes of this document. The proposed project would construct approximately 10 miles of new alignment north of Cooper Landing and the Kenai River and straighten and widen approximately 4 miles of the existing highway at both ends of the project. The proposed project would be 14.6 miles long (compared to 13.9 for the existing alignment in the project area). The proposed project would not require any new bridges over the Kenai River, would have the least longitudinal encroachments into the Kenai River of the four build alternatives (Chapter 3.13 of the FEIS), and would avoid additional impacts within the Kenai River Special Management Area (KRSMA).

The proposed project and other build alternatives would be engineered based on highway design standards for rural principal arterials. It would consist of a two-lane highway with paved shoulders, passing lanes, and turning lanes. Travel lanes would be 12 feet wide, paved shoulders would be 8 feet wide (adequate for safe bicycle and pedestrian use), passing lanes would be 12 feet wide, and all major intersections would have right- and left-turn lanes. An obstruction-free clear zone 30 feet wide would be developed and maintained on each side of the traveled way (travel lanes). The proposed road design would typically employ 6:1 side slopes within the clear zone on which a vehicle that has run off the pavement can recover and return to the highway or safely stop. These would transition to steeper slopes beyond the clear zone. To avoid or limit impacts to wetlands and

other waters, and where prudent from an engineering and safety perspective, the final design may selectively employ guard rails, modify the alignment slightly, and/or steepen slopes to reduce cut and fill. The steepest slopes recommended for embankment stability are 2:1 side slopes or 1.5:1 riprap slopes plus a guard rail at the outside of the shoulder.

The existing highway would connect with the new highway segment using T-intersections. The only driveways or side roads that would constructed on the new alignment would be a driveway to a new trailhead for the Resurrection Pass Trail and a pullout/winter trailhead for Bean Creek Trail. Two access points would be reserved for potential future access to State Management Unit 395 via ramps at one or both locations where the highway crosses over (or under) existing Forest Service, U.S. Department of Agriculture (Forest Service) logging roads. A driveway would be reserved off the south side of the highway for future access to Cook Inlet Region, Incorporated (CIRI) Tract A. The design and construction of these reserved access points would need to undergo their own permitting and environmental approval process.

Map 3.20-3 in the FEIS shows the cut and fill limits for the proposed project and for the other alternatives evaluated in the FEIS. It also depicts streams and the locations and types of wetlands in the vicinity of the existing alignment and build alternatives. Greater detail is available in the project's preliminary plan sets (engineering drawings) for each alternative available on the project's web site (www.sterlinghighway.net).

The proposed project and the other build alternatives would follow the existing highway alignment from MP 45 to MP 46.3, at the eastern end of the project. In this area, and other improvable areas on the existing highway's alignment, the road would be straightened and widened to meet current rural principal arterial standards and incorporate passing and turning lanes, standard side slopes, and clear zones. Widening the road prism would require placing fill and removing existing earth to construct the proposed design grade and typical highway cross sections.

The proposed project would diverge from the existing highway alignment at MP 46.3, and climb the hillside and traverse a natural bench, including some wetlands. Approximately 3 miles west of where it diverges from the existing highway, near the west end of the existing Slaughter Ridge Road, it would diverge northwestward from the G South Alternative and cross Juneau Creek Canyon with a new bridge south of Juneau Creek Falls. It would cross several more wetlands before reaching its high point, 1,800 feet west of Juneau Creek. Some of the measures to mitigate recreation impacts (trail connections, parking) would be partially located within wetlands. The alignment would then descend the hillside, cross some narrow wetlands, traverse lands within the existing Mystery Creek Wilderness in the KNWR,[1] and rejoin the existing highway. The existing

[1] An agreement ratified by the Russian River Land Act gives CIRI and the U.S. Fish and Wildlife Service (USFWS) the ability to trade lands that directly affect the project area, and in particular the land status of the KNWR in the area where the Juneau Creek Alternative enters the Refuge. The agreement identifies "lands within the Kenai National Wildlife Refuge located north of, and immediately bordering the Sterling Highway" as the area of KNWR authorized for exchange.

In 2017, CIRI informed the U.S. Department of Interior (DOI) of their desire and willingness to engage the DOI on a land exchange. DOI subsequently informed FHWA that "if the Juneau Creek Alternative is selected the Service will promptly commence negotiations with CIRI to enter into the land exchange authorized by the Russian River Land Act, Public Law 107-362." Because of these recent commitments, FHWA has determined that the land exchange is a reasonably foreseeable future action (see Section 3.27.4.3 of the FEIS), and considered it in the least overall harm analysis that identified the Juneau Creek Alternative as the preferred alternative (see Section 4.8 of the FEIS).

highway would be modified to connect with the new alignment at a T-intersection at MP 55.8. Modifying the 'old' highway to construct that intersection would require crossing KNWR lands and require fill in wetlands that the other build alternatives would not. The proposed project would then follow the existing highway for the remaining 3 miles to the end of the project, with widening, straightening, and wetland impacts similar to those of the other build alternatives.

The proposed project would not replace any existing bridges but would construct one new bridge over Juneau Creek Canyon, south of Juneau Creek Falls. The new Juneau Creek Bridge would be located farther upstream than the Juneau Creek Bridge proposed for the G South Alternative. The bridge length would be approximately 1,200 feet with a main span of 825 feet, and it would be 62 feet wide. There would be no piers below the Juneau Creek Canyon rim, and no access into the canyon would be required for bridge construction.

The proposed project would cross the Juneau Falls Recreation Area—an area around the Juneau Creek Falls withdrawn by the Forest Service to preserve its use for recreation—and the Resurrection Pass Trail. No connection between the new alignment and other roads would be provided.

During permitting and design of the proposed project, the alignment would be refined and specific locations for deviations from the standard cross section would be identified. At that time, designers and environmental staff would analyze each location where wetlands or waterbodies would be affected and further consider how the impact could be avoided or minimized. They would consider slight realignments, determine where steeper side slopes or vertical walls and guard rails should be used to minimize placement of fill in wetlands or waterbodies, and select measures to maintain existing drainage patterns to the extent feasible. At each stream, they would determine which type of culvert would suffice to maintain natural stream function and hydrology to the maximum extent that is feasible. Avoidance and minimization measures that would be incorporated into the proposed project are presented in detail in Chapter 5 of this document. Again, these would be refined during permitting and final design.

Construction Sites. Several construction staging areas and sites for disposal of woody debris and soils would be required, as well as relatively small staging areas adjacent to the new bridge. Use of the staging and construction sites would be temporary, during construction only, but in some cases permanent effects could occur. The conceptual locations of proposed staging areas east and west of the Juneau Creek Bridge are partly in wetlands.

The trade is anticipated to swap up to approximately 50 acres of land in the project area north of the highway within the KNWR for approximately 50 acres of land near the confluence of the Killey and Kenai rivers. This trade would effectively move the Refuge and Wilderness boundary north of the highway, removing the Section 4(f) designation from the traded portion of the refuge. This Draft 404(b)(1) guidelines analysis assumes the proposed project would occur only if such a land exchange occurs.

3 Alternatives Analysis

As was described in Section 1, under Subpart B of the Guidelines, the USACE must submit an applicant's proposed project to four tests, each of which it must pass, in order for the USACE to issue a Section 404 permit. This chapter evaluates the proposed project with respect to the first such restriction:

> …no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10 (a)).

In addition, because the basic project purpose is not water-dependent, an alternative not involving special aquatic sites is presumed to be available unless the applicant clearly demonstrates otherwise.

This chapter analyzes the availability of alternatives that do not involve special aquatic sites, then discusses whether there is a practicable alternative that is less environmentally damaging than the proposed project.

3.1 Alternative Not Involving Special Aquatic Sites

The USACE defines the "basic project purpose" and uses it to determine water dependency. An activity is defined as not water dependent if it does not require access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose (40 CFR 230.10(a)(3)). DOT&PF and FHWA suggest that the "basic project purpose" (as the term is used by the USACE) is to improve highway transportation through the MP 45–60 area as described in Chapter 1 of the FEIS. Highway transportation does not require access or proximity to a special aquatic site to achieve its goal so the basic purpose of the project is not water dependent. If an activity or project is not water dependent, alternatives that do not involve impacts to special aquatic sites are presumed to be available, and to be less damaging, unless clearly demonstrated otherwise.

Chapter 2 of the FEIS describes the alternatives development process. DOT&PF and FHWA evaluated alternatives that would make use of the existing highway, in part to avoid and minimize impacts to wetlands and other special aquatic sites by using existing highway embankment where practicable. DOT&PF typically upgrades any road on its existing alignment unless there are substantial problems that require consideration of a change in alignment. The existing highway alignment would need to be straightened and widened in several locations to meet current design standards and the project's stated purpose. Where wetlands occur on both sides of the highway, such as between MP 51 and MP 52 and at MP 56 and MP57, widening of the existing road prism to meet design standards and improve safety could not be done without placing fill in wetlands.

The Kenai River Walls Alternative was an attempt to design an alternative that would be a full reconstruction of the highway using its existing alignment and not creating any new crossings of the Kenai River. Retaining walls would be required on both sides of the roadway between MP 49 and MP 50.5, the northern one on the edge of the Kenai River. Even with the use of vertical walls to widen the existing highway, impacts to wetlands would still be unavoidable, such as at MP 51.3; this alternative was deemed unreasonable, with excessive cost and an unprecedented design.

Additional information related to attempts to keep the proposed improvements completely on the existing alignment are documented in Chapter 2, Section 2.5 and in published technical reports on the project web site, including the, *Existing Alignment Report* (November 2013); *Evaluation of Juneau Creek Alternative Variants* (September 2012); *Soil Nail Walls – Kenai River Wall Alternative* (June 2003); *Recommendations from Evaluation Criteria and Alternatives Analysis* (September 2003); and *Evaluation Criteria and Alternatives Analysis* (May 2003). Of note, the alternatives analysis specifically evaluated avoidance and minimization of wetlands as one of the criteria considered. The analysis was completed and shared with USACE as a cooperating agency on the project. More information on the process to develop avoidance and minimization alternatives is described in the next section.

Because even small parts of the project cannot be accomplished without affecting wetlands, as illustrated in the documentation above, a build alternative that would meet the project's purpose without placing fill in wetlands does not exist. **There is no practicable alternative to the proposed discharge that would achieve the basic project purpose that would not involve special aquatic sites**.

3.2 Least Environmentally Damaging Practicable Alternative

The next step is to determine whether there are practicable alternatives to the proposed project that would have less adverse impact on the aquatic ecosystem.

3.2.1 Alternatives Identification Process

Improving the Sterling Highway in the Cooper Landing area has been the subject of several efforts since the 1970s. Although the current EIS effort builds on previous work, the development and evaluation of alternatives started anew with this EIS. The process summarized below thoroughly considered minimization of adverse effects on various elements of the environment, including the aquatic environment, while identifying alternatives that could achieve the project purpose and meet the transportation needs.

3.2.1.1 Involvement of Agencies in Project Development

The following summary of agency involvement demonstrates the high level of agency participation in the development, refinement, and analysis of the alternatives evaluated in the FEIS.

The current alternatives development effort began in 2000. DOT&PF and FHWA discarded old route preferences, reexamined the purpose of and need for the project, and undertook substantial public and agency involvement to examine current issues and determine the scope of the EIS, including development of alternatives. The scoping process is described in the *Scoping Summary Report* (HDR and Jeanne Lawson Associates 2006) and Chapter 5 of the FEIS.

A primary component of the EIS process has been involvement of key stakeholders, including government agencies, and the consideration of comments, concerns, and input into the analysis. DOT&PF and FHWA have consulted with government agency staff on numerous occasions, both in writing and in person, since 2001. Nine agency meetings were held between 2001 and 2013 to address various topics, including project purpose and need, evaluation criteria, project alternatives development, level of service, information needs, remapping of the Kenai River floodplain, the National Environmental Policy Act (NEPA) process, engineering options, outstanding agency

questions, waterbody and wetland permitting, wildlife effects, and Alaska National Interest Lands Conservation Act (ANILCA) issues.

A preliminary Draft Supplemental EIS (SEIS) was provided to Cooperating Agencies in August 2014 for their review and comment. USACE, EPA, Forest Service, U.S. Fish and Wildlife Service (USFWS), Alaska Department of Natural Resources (DNR), and Alaska Department of Fish and Game (ADF&G) provided comments. DOT&PF and FHWA revised the preliminary Draft SEIS in response to comments, and the Draft SEIS was released for public review in March 2015. Each of the above-listed agencies also provided comments on the Draft SEIS, and DOT&PF and FHWA have responded to those comments and revised the document to produce the FEIS. The identification of the preferred alternative was determined in large part by agency and stakeholder comments on the importance of impacted resources.

3.2.1.2 Screening Process

To identify reasonable alternatives for the EIS, DOT&PF and FHWA screened potential alternatives for their ability to meet the stated Purpose and Need and other evaluation criteria. The evaluation criteria were developed by DOT&PF and FHWA with input from USACE and other government agencies, community and interest-group stakeholders, and the public, including an Agency Consultation Committee and the Stakeholders Sounding Board. The final evaluation criteria consisted of the following:

- Consistency with the project's purpose and need;
- Potential physical environment effects, including impacts on natural resources (Kenai River, wetlands, fish, wildlife, vegetation, stormwater runoff), aesthetics, and noise during project construction and operation;
- Potential social environment effects, including impacts to cultural and historical properties, trails, recreational properties, private property, economics, and subsistence, and consistency with local, regional, statewide, and Federal plans;
- Potential transportation-related effects, including impacts on vehicle traffic during construction and operation, freight movement, and the transportation system;
- Cost factors, including total project costs, annual operation and maintenance costs, and 20-year life-cycle costs; and
- Engineering feasibility.

After much consideration of possible variations on multiple alternatives put forth through the EIS process, DOT&PF and FHWA issued a full range of alternatives for public and agency review and comment. The *Evaluation Criteria and Alternatives Analysis* (HDR 2003a) and subsequent recommendations (HDR 2003b) document the selection of reasonable alternatives to carry forward for evaluation in the FEIS. Table 3-1 lists the alternatives discussed and evaluated in the analysis and identifies those that were carried forward as reasonable alternatives and evaluated in the FEIS.

Table 3-1: 2003 results from *Evaluation Criteria and Alternatives Analysis*

Alternative	Carried Forward for Evaluation in the SEIS?
No Build Alternative	**Yes**
Resurfacing, Rehabilitation, Restoration Alternative (3R)	No
Kenai River Alternative	No
Kenai River Walls Alternative	No
Cooper Creek Alternative	**Yes**
Russian River Alternative	No
G North Alternative	No
G South Alternative	**Yes**
Juneau Creek "F" Wilderness Alternative	**Yes**[a]
Juneau Creek "F" Forest Alternative	No
Juneau Creek Wilderness Alternative	No
Juneau Creek Forest Alternative	No

[a] This became the Juneau Creek Alternative in the SEIS, with the crossing of the Juneau Creek canyon moved north.

Source: (HDR 2003a, HDR 2003b)

3.2.1.3 Post-2003 Refinement of Alternatives

After 2003, DOT&PF and FHWA conducted further engineering refinement of the alternatives carried forward for analysis in the FEIS. This included further work for all alternatives to balance cut and fill of earth material for a more efficient construction process, examine bridge types, estimate costs, assess impacts, consult agencies, refine engineering, and develop impact mitigation measures and enhancements. The involvement of Federal Wilderness within the KNWR on the Juneau Creek Alternative prompted reexamination of the "Forest" alternatives and another alternative that could avoid Wilderness was identified and carried forward as the Juneau Creek Variant Alternative.

A segment of the existing highway between MP 49 and 50.5 has several curves that do not meet current standards for a rural principal arterial. In this area the hillside rises abruptly from the winding Kenai River and its floodplain. To avoid the need to make extraordinary cuts into a high bluff comprised of unstable soils or filling into the Kenai River, all build alternatives would be routed around this area, per recommendations made by civil and structural engineers over the last 30 years.

Refinements of alternatives resulted in the following alternatives that would be fully considered in the FEIS:

- No Build Alternative
- Cooper Creek Alternative
- G South Alternative
- Juneau Creek Alternative
- Juneau Creek Variant Alternative

Map 2.4-2 in the FEIS shows all of these alternatives together on one map, and Map 3.20-3 shows the locations of wetlands and waterbodies associated with these alternatives, along with the cut and fill limits for each alternative.

Because the alternatives were developed and screened with consideration of minimizing effects on the aquatic environment, the reasonable alternatives carried forward for the FEIS analysis suffice for USACE's alternatives analysis.

3.2.2 Alternatives to the Proposed Project

The alternatives evaluated in the FEIS are described in detail in Chapter 2 of that document and are briefly summarized in the sections below so it can be determined whether any alternative represents a practicable alternative that is less environmentally damaging than the proposed project.

3.2.2.1 No Build and No-USACE-Action Alternatives

If FHWA and DOT&PF selected the No Build Alternative, or if USACE did not authorize a Build Alternative, DOT&PF would continue to maintain the road in place. The highway would remain essentially unchanged, with one lane in each direction, limited shoulder space, tight curves, limited sight distance, and a posted speed limit of 35 mph in some areas. Some major highway maintenance would be expected to occur by 2043, including replacement of pavement (twice), improvement of a curve at MP 45 as part of a programmed project, and replacement of three project area bridges due to age.

DOT&PF could maintain the existing highway *except* within the Kenai River without USACE action because discharges of fill for maintenance of serviceable transportation structures are exempt from the need for a Section 404 permit (33 CFR 323.4(a)(2)). Placement of fill associated with maintenance-only activities (further described in the USACE regulations) not covered under the above exemption, including most activities within the Kenai River, could be done under Nationwide Permit Number 3 (unless it is not reissued upon its expiration in 2017). Whether the bridges over the Kenai River (subject only to Section 10) could be replaced without USACE authorization is not a Section 404 question so is not addressed further. With respect to Section 404, the No-USACE-Action and No Build Alternatives are the same.

3.2.2.2 Cooper Creek Alternative

The Cooper Creek Alternative is identical to the proposed project and other build alternatives from MP 45 to 46.3, at the eastern end of the project, and from MP 55.8 to 58.2, the western half of the project. The Cooper Creek Alternative would be 14 miles long.

The Cooper Creek Alternative would follow the existing highway for most of its length and is the only alternative that would entail a new alignment south of the existing highway. Approximately 10 miles of the existing highway would be rebuilt to meet current rural principal arterial standards. This alternative would build approximately 4 miles on a new alignment, skirting a portion of Cooper Landing to the south. In addition to the Schooner Bend Bridge replaced under the G South Alternative, the Cooper Creek Alternative would replace the Cooper Landing Bridge and construct a new bridge over Cooper Creek. This alternative, like all other build alternatives, would entail acquisition of public and private land for highway right-of-way; the Cooper Creek Alternative would include a total acquisition of eight occupied residential parcels (Section 3.4.2.3 of the FEIS).

The Cooper Creek Alternative would follow the existing alignment from MP 45 to the Cooper Landing Bridge. The Cooper Landing replacement bridge would cross the Kenai River slightly upstream (east) of the existing bridge. It would be 78 feet wide and 670 feet long. Preliminary bridge design indicates that three or four piers would be required in the Kenai River for this bridge (depending on the bridge type). Any part of the existing bridge not used in the new bridge would be removed. A temporary bridge would need to be installed during construction.

The new 4-mile-long segment would diverge south of the existing highway near the existing highway's intersection with Snug Harbor Road (MP 47.9). The new segment would traverse wetlands then climb the hillside for approximately 0.8 mile. The highway would reach a natural bench and traverse westward for approximately 1.2 miles. The new road would pass over the existing Cooper Lake Dam Road before descending across the Cooper Creek drainage. This alternative would construct a new bridge to cross over Cooper Creek approximately 0.5 mile upstream (south) of the existing Cooper Creek Bridge. The proposed new Cooper Creek Bridge would be approximately 62 feet wide and 840 feet long. It would be located high above the Cooper Creek valley bottom and would easily accommodate passage of moose and other wildlife. No bridge piers would be located in the creek. On the west side of the Cooper Creek valley, the new alignment would cross the existing Stetson Creek Trail and include a pullout at that crossing to provide secondary trail access in addition to the trailhead along the existing highway. The highway would descend the hillside for one-third mile and level out, rejoining the existing alignment at MP 51.3. The Cooper Creek and G South alternatives rejoin to share the same alignment again at MP 51.6 and rejoin the proposed project's alignment from MP 55.8 to the end of the project at MP 58.2.

Construction Sites. Several construction staging areas and sites for disposal of woody debris and soils would be required, including temporary access roads beneath the Cooper Creek Bridge and relatively small staging areas adjacent to new and replacement Kenai River bridges. At this conceptual level of project design, no staging is anticipated in wetlands.

3.2.2.3 G South Alternative

The G South Alternative would construct a new 5.5-mile-long segment north of the existing highway and the Kenai River to skirt Cooper Landing between MP 46.3 and 51.6. In addition, it would widen and straighten approximately 8 miles of the existing highway along both ends of the project area. The G South Alternative would be 14 miles long (compared to 13.9 for the existing alignment in the project area). It would replace one existing bridge over the Kenai River and construct two new bridges, one over lower Juneau Creek and one over the Kenai River. It would avoid the Resurrection Pass National Recreation Trail (Resurrection Pass Trail) and KNWR, and it would bypass the community of Cooper Landing north of the Kenai River.

The G South Alternative would depart from the existing highway alignment at MP 46.3 and climb the hillside at 5.2 percent grade for 1.25 miles to a maximum elevation of 776 feet, then traverse a natural bench (same bench traversed by proposed project), including some wetlands, for approximately 2.4 miles. The route would descend to cross the extension of Slaughter Ridge Road (Forest Service road), Bean Creek Trail, Bean Creek, and an adjacent wetland. The Forest Service road and trail would be rerouted slightly and placed in an underpass under the new highway. A summer trailhead parking area off the highway and a pullout along the highway would be constructed for access to the Bean Creek Trail. The new segment would descend at a 5.9 percent

grade to cross lower Juneau Creek on a new bridge. An eastbound passing lane 2.2 miles long would be included on this hill.

The new Juneau Creek Bridge would be approximately 1,300 feet long and 62 feet wide. This crossing would be constructed where the Juneau Creek canyon begins to open into the Kenai River Valley. At its highest point, the bridge would be approximately 200 feet above the canyon floor. Preliminary bridge design indicates that three to eight piers would be required for this bridge, none of which would be in the creek.

The highway would cross some wetlands in the lower Juneau Creek Valley on its descent to the Kenai River, across the river on a new bridge, and rejoin the existing highway corridor at existing MP 51.6. The new Kenai River Bridge would be about 500 feet long and 78 feet wide. Preliminary bridge design indicates that two or three piers would be needed in the river. To enhance wildlife passage, the bridge has been shifted south and raised, which increases wetland effects but reduces impacts to riparian vegetation directly adjacent to the river. A temporary parallel bridge would likely be necessary to construct the new bridge.

The G South Alternative would widen and straighten the existing highway from MP 51.6 to 58.2 to meet current rural principal arterial standards. The most substantial wetland impacts along the existing alignment would occur between MP 51.2 and 52.2, and between MP 55 and 57.

The Schooner Bend Bridge would be replaced approximately 80 feet downstream (south) of the existing bridge to improve road geometry, avoid an eroding bend in the Kenai River, and allow the old bridge to accommodate traffic during construction. The proposed bridge would be approximately 325 feet long and 50 feet wide. Preliminary design indicates that one or two piers would be required in the Kenai River for this bridge. The old bridge would be entirely removed once the new bridge was in operation.

Construction Sites. Several construction staging areas and sites for disposal of woody debris and soils would be required, as well as relatively small staging areas adjacent to each new or replaced bridge. Use of staging and construction sites would be temporary, during construction only, but in some cases permanent effects could occur. At this conceptual stage, some temporary staging is anticipated in wetlands only at the new Kenai River bridge crossing and possibly in wetlands adjacent to Juneau Creek.

3.2.2.4 Juneau Creek Variant Alternative

The Juneau Creek Variant Alternative would construct a segment approximately 9 miles long on a new alignment to skirt Cooper Landing on the north side of the Kenai River. Approximately 5 miles of the existing road would be improved on the existing alignment to meet current standards. The Juneau Creek Variant Alternative would be 14.2 miles long.

The Juneau Creek Variant Alternative is similar to the proposed project. The major difference between the Juneau Creek and Juneau Creek Variant alternatives is that the proposed project was created on the best alignment for engineering and traffic purposes and would cross the Mystery Creek Wilderness in the KNWR; the Juneau Creek Variant Alternative was specifically developed to avoid KNWR and its Wilderness.

The Juneau Creek Variant Alternative would not replace any existing bridges and would construct one new bridge over Juneau Creek, with the same design as proposed under the proposed project. Beginning at a point approximately 1.5 miles west of the Juneau Creek Bridge, the variant would

diverge from the proposed project, cross some different wetlands, and then rejoin the existing alignment at MP 55 of the existing highway. The old highway would be connected to the new highway using a T-intersection and a grade separation (bridge). The Juneau Creek Variant's intersection of the old and new alignments would not require fill in wetlands, but it would affect wetlands where the highway would be reconstructed on the existing alignment between MP 55.0 and 55.5. It would require fill in a bend of the Kenai River at MP 55.4 that no other alternative would.

Construction Sites. Construction staging areas would be the same as those described for the proposed project.

3.2.3 Practicability

Table 3-5 at the end of this section summarizes key factors that are pertinent to determining practicability of the alternatives and identifying the LEDPA. Those factors are explained in the following sections with references to pertinent sections of the FEIS.

This section addresses the practicability of the alternatives evaluated in the FEIS. The Guidelines define a **practicable** alternative as one that is "available and capable of being done after taking into consideration **cost**, **existing technology**, and **logistics** in light of **overall project purposes**" (40 CFR 230.10 (a)(2)) (emphasis added). The subsections below provide information relevant to individual elements of the definition of "practicable" and present DOT&PF's and FHWA's view on the availability of practicable alternatives.

3.2.3.1 Consideration of the Overall Project Purpose

Achievement of the 'overall project purpose' is a factor in identifying what alternatives to the applicant's proposed project are practicable. While giving substantial deference to the entity seeking a permit for a project, USACE defines for itself the overall project purpose. USACE's overall project purpose might differ slightly from an applicant's stated purpose, in particular to ensure that it is broad enough that a range of alternatives can be identified that would meet it. In this case, USACE might define a less technical purpose, such as:

> provide land transportation infrastructure that can safely and efficiently support present and future through-travel and year-round local access between MPs 45 and 60 of the Sterling Highway.

Clearly, **the no-build alternative does not achieve the project purpose**. It does not add shoulders or clear zones, it retains narrow lanes, and half of the curves do not meet the minimum standard for 60 mph travel; thus it does not improve safety. It retains 123 intersections or pullouts, each of which reduces travel efficiency and safety. Under the No Build Alternative, none of the highway segments would provide an acceptable LOS (efficient travel) by the design year of 2043. **The No Build Alternative is not practicable in light of the overall project purpose** and will not be discussed further in this analysis.

All four build alternatives would improve highway safety by bringing the highway up to current minimum design standards for this road and provide passing lanes (of which zero currently exist). Each alternative would have substantially fewer pullouts and intersections with driveways or side roads than the 123 intersections under current conditions. Such roadway improvements are anticipated to reduce the rate of crashes in the project area by separating local traffic, which makes

frequent stops and turns, from faster moving through-traffic in a portion of the project area, with the degree of reduction varying among alternatives.

While all four of the build alternatives would satisfy the purpose of and need for the project, they would achieve the overall project purpose to different degrees, as illustrated below. Table 3-3 at the end of this practicability discussion presents key metrics that represent various facets of highway safety and efficiency. The following paragraphs highlight those that are particularly relevant to determining how well each of the alternatives achieves the project purpose. The effects of project alternatives on transportation are discussed in detail in Section 3.6 of the FEIS.

Over 80 percent of the lengths of the proposed project (Juneau Creek Alternative) and the Juneau Creek Variant Alternative would provide an adequate LOS C during peak summer weekends in the design year 2043, as compared to 69 percent and 61 percent under the G South and Copper Creek alternatives, respectively. All curves on the four build alternatives would meet design criteria for 60 mph travel. All curves but one on the proposed project and the Juneau Creek Variant and G South alternatives would also meet the more desirable design criteria for 65 mph travel, whereas four curves on the Cooper Creek Alternative would be insufficient to meet desirable design criteria.

The percentage of highway length with passing lanes would be highest under the proposed project (Juneau Creek) and nearly as high for the Juneau Creek Variant (43 percent and 40 percent, respectively). The other two build alternatives would provide considerably fewer opportunities for passing. The percentage of the highway length with passing lanes on the Cooper Creek and G South alternatives is 28 percent and 25 percent, respectively.

The proposed project and the Juneau Creek Variant Alternative both would have the fewest (12 and 13) intersections or pullouts remaining along their lengths, as compared to the G South (23) and Cooper Creek (47) alternatives. By separating local and through-traffic through most of the project area, reducing intersections, and reconstructing the highway to meet other current design standards, the proposed project and the Juneau Creek Variant Alternative would fully meet the overall project purpose and would do so better than the other two build alternatives.

In summary, the proposed project (Juneau Creek Alternative) would best resolve congestion problems by providing the most opportunity for passing, the least number of intersections and driveways, and the greatest percentage of the alignment predicted to operate at LOS C or better. It has the least number of curves overall (one below desirable). A lower percentage of its length is at grades at or above 5.9 percent compared to the G South and Cooper Creek alternatives. In light of the overall purpose of the project, the Juneau Creek Alternative would adequately resolve the problems that are identified as the needs for the project.

The Juneau Creek Variant Alternative is nearly as good at resolving congestion problems as the proposed project. But in comparison to the Juneau Creek Alternative, it has just slightly less opportunity for passing, one more intersection, slightly less of its alignment operating at LOS C or better, and one additional curve. While it does not have any stretches at or above 5.9 percent grade, it is the most “hilly” of the alternatives, with 26 percent of the alignment above 5 percent grade. The Juneau Creek Variant Alternative would also meet the overall purpose of project.

The Cooper Creek Alternative is rated the worst at resolving congestion problems, as it would provide the second to lowest opportunity for passing, the greatest number of driveways and side roads, and the smallest percentage of its alignment predicted to operate at LOS C or better of any

of the alternatives. The percentage of highway length with passing lanes is slightly more than the G South Alternative but considerably less than the proposed project and Juneau Creek Variant Alternative. It would have the most curves (with four remaining below desirable curvature) and has the greatest percent of its length at steep grades (above 5.9 percent) compared to the other alternatives. The Cooper Creek Alternative would retain 47 intersections and pullouts along its length, thereby eliminating only about 40 percent of the existing intersections. Through-traffic would bypass 2 of the 3 miles of the central commercial area of Cooper Landing, remaining along 1 mile in that area. The Cooper Creek Alternative would not fully provide for safe and efficient through-travel and local access because it would mix those types of traffic within the central commercial area, as illustrated by the 36 additional intersections it would have compared to the proposed project; its achievement of the overall project purpose would be low. In light of the overall project purpose, the Cooper Creek Alternative's low ability to resolve the problems identified as the needs for the project **contributes to the Cooper Creek Alternative not being practicable.**

The G South Alternative is somewhat better than the Cooper Creek Alternative at resolving congestion problems, although it would provide the least opportunity for passing than any alternative. As compared to the Cooper Creek Alternative, the G South Alternative has better geometry, with fewer curves (all curves except one would be in the desirable range) and 8.4 percent more of its alignment is predicted to operate at LOS C. The G South Alternative has more steep sections (above 5.9 percent grade) than the Juneau Creek alternatives but less than the Cooper Creek Alternative. The G South Alternative would bypass through-traffic around the full MP 47–50 central commercial area. The G South Alternative would separate local and through-traffic in the most congested area and eliminate most (about 80 percent) of the existing intersections. The G South Alternative would meet the overall project purpose.

Based on the above information, the No Build Alternative is not practicable. In light of the overall project purpose, the Cooper Creek Alternative's low ability to resolve identified problems contributes to it not being practicable.

3.2.3.2 Cost

USACE considers project cost when determining whether a potential alternative is practicable. Table 3-2 presents the costs of each alternative over its 20-year design life, including the cost of major environmental mitigation measures. Cost as a factor in selection of the preferred alternative is discussed in the context of Section 4(f) compliance (see "Section 4(f) of the Department of Transportation Act" in Section 3.2.3.4 below) and Section 4.8.7 of the FEIS.

Given the level of engineering completed, DOT&PF and FHWA consider the costs of the alternatives to be similar for the purpose of alternative selection.

Based on the above information, cost does not render any of the build alternatives impracticable.

Table 3-2: Costs by alternative
(costs in millions of dollars)

	Juneau Creek Alternative	Cooper Creek Alternative	G South	Juneau Creek Variant Alternative
Project Development [a]	58.9	64.3	60.7	60.7
Direct Construction	221.2	244.3	250.9	227.6
Construction Cost	**280.1**	**308.6**	**311.6**	**288.2**
Operations and Maintenance and Periodic Major Activities, over 20 years	**24.2**	**23.7**	**23.8**	**24.3**
Total Expenditures, 20 years	**304.3**	**332.3**	**335.4**	**312.6**

[a] Project Development costs include mitigation, design, utility, permitting, right-of-way acquisition, and indirect costs.
Notes: Numbers are rounded and may not add up exactly. All dollar figures represent 2015 dollars.

3.2.3.3 Existing Technology

Existing technology for slope stabilization has informed the selection of alternatives deemed reasonable and carried forward for evaluation in the FEIS. Alternatives remaining completely on the existing alignment were dismissed as unreasonable in large part because of the inability to cut into slopes that cannot reasonably be stabilized with existing technology. As described below, geotechnical concerns remain for some of the alternatives but they are not insurmountable. Information on these geotechnical issues is presented in Sections 2.5.1, 3.12.1.2, and 3.12.2 of the FEIS; a memo addressing full use of the existing alignment (HDR 2013); and two geotechnical reports (R&M 2005, DOT&PF 2014).

Section 3.12.2.3 of the FEIS describes geotechnical constraints of the Cooper Creek Alternative. This alternative would follow benches along the south side of the Kenai River Valley and would cross Cooper Creek upstream of the existing bridge. A cut approximately 2,500 feet long and up to 120 feet high through the Cooper Creek bluff would be required on the east side of the creek. Geotechnical field reconnaissance completed by DOT&PF (2014, 2015) found highly-erodible layers of silt, gravel, and sand in all of the test holes. Soil slides are known to occur within the Cooper Creek canyon. Although the Cooper Creek Alternative has been developed to minimize cuts in soils suspected of being of this unstable type, additional investigation would be required to support a highway design that mitigates slide risk. It is possible that side slopes would be constructed at lower angles than normal, employ occasional benches, use "anchored reinforced vegetation system" erosion control products, and/or be buttressed with rock in areas where these soils are identified, to keep erosion and slides in check. This alternative presents some geotechnical risk, particularly at the east Cooper Creek Bridge approach, but standard engineering investigations during project design are anticipated to be able to develop the information needed to mitigate risks through design.

Geotechnical issues do not pose unusual constraints to the G South Alternative.

Geotechnical concerns of the proposed project (Juneau Creek Alternative) and the Juneau Creek Variant Alternative are presented in Section 3.12.2.5 of the FEIS. These alternatives would cross the Juneau Creek canyon via a new bridge. A rock stability investigation revealed few areas of relatively stable rock along the canyon rim. Substantial rockfalls, landslides, and fractured rock within the canyon walls characterize most of the canyon (R&M 2005). Rock fractures deposit large blocks that slide downslope over time to form steep talus slopes. Material at the base of the slopes is eroded by Juneau Creek, perpetuating continued rock fall from steep slopes. The rock is platy in structure and is therefore more susceptible to fracturing and sliding downslope. Fractured rock was observed more than 200 feet back from the canyon rims. The proposed crossing location was selected because it demonstrated stable canyon walls compared to areas farther downstream. Further field investigations would determine more precisely how far back the bridge abutments would need to be located from the canyon rim and where any piers would be located, to ensure placement in competent rock. While refinement of the bridge design may be necessary, engineers are confident a bridge can be built in this location.

Based on the above information, existing technology does not render any of the build alternatives impracticable.

3.2.3.4 Logistics

This section addresses part of the practicability definition: "…available and capable of being done based on …logistics…" The Guidelines state, with reference to availability, "…an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered" (40 CFR 230.10(a)(2)). Logistics limit the availability and capability to accomplish three of the build alternatives. Those logistical constraints are described below under categories of land use designation, private property acquisition, Section 4(f), noise, and construction-phase traffic.

All build alternatives would incorporate private and public lands into a new and expanded highway right-of-way, conferring some interest in land ownership to DOT&PF. Federal land would remain under Federal ownership (except in the case of the land exchange which would transfer ownership to CIRI, as described below), and a highway easement would be conveyed to the State. DOT&PF would acquire the non-Federal lands needed for the right-of-way. Private land owners and the Borough would be compensated for lands required for highway right-of-way at fair market value. Except as explained below, most of the land that would be required for any of the build alternatives is vacant and could reasonably be obtained.

Land Use Designation

Proposed Project (Juneau Creek Alternative) and Wilderness designation. The Juneau Creek Alternative would cross KNWR lands, including land that is currently designated as Wilderness according to the Wilderness Act by the ANILCA. The United States of America owns the KNWR, and the USFWS manages it. The existing Federal conservation status of land crossed by this alternative constrains the route's logistical availability for a highway. Use of KNWR lands, including designated Wilderness, requires issuance of a transportation easement under ANILCA

Title XI[2]. Under ANILCA, use of Wilderness requires approval by the President of the United States and Congress.

However, an agreement ratified by the 2001 Russian River Land Act gives CIRI, a regional Native corporation, and the USFWS the ability to trade "lands within the Kenai National Wildlife Refuge located north of, and immediately bordering the Sterling Highway". CIRI has requested that USFWS initiate a 50-acre land trade in the project area north of the highway (CIRI 2017). The DOI (USFWS 2017) subsequently informed FHWA that "if the Juneau Creek Alternative is selected the Service will promptly commence negotiations with Cook Inlet Region, Inc. (CIRI) to enter into the land exchange authorized by the Russian River Land Act, Public Law 107-362." Because of these recent commitments, FHWA has determined that the land exchange is a reasonably foreseeable future action, and for the purposes of this Section 404(b)(1) analysis has assumed that the land exchange will occur. The FEIS evaluates the effects of this land trade in Section 3.27.4.3.

The trade is anticipated to swap up to approximately 50 acres of land in the project area north of the highway within the KNWR for approximately 50 acres of land near the confluence of the Killey and Kenai rivers. This trade would effectively move the refuge and Wilderness boundary north of the highway, removing the Section 4(f) designation from the traded portion of the refuge (CIRI property would be considered private property not subject to Section 4(f)). The boundary shift would also alter or remove the requirement to process the use of this area through ANILCA because the project would no longer be using land from designated Wilderness.

Assuming the land exchange occurs and the Wilderness boundary is shifted to the north, it is reasonable to believe that the corridor of land traversed by the Juneau Creek Alternative could be obtained, thereby substantially reducing logistical constraints associated with this alternative.

Proposed Project (Juneau Creek Alternative) and Juneau Creek Variant Alternative and the Resurrection Pass Trail. The proposed project and the Juneau Creek Variant Alternative would both cross the Resurrection Pass Trail on Forest Service lands. The Forest Service manages the Resurrection Pass Trail as a conservation system unit (CSU) within the CNF. A State of Alaska Attorney General legal opinion (Lynch 2017) indicates the State's contention that it is not a CSU but is managed as a CSU. The EIS provides information for the Forest Service as if it were a CSU, and assumes that the proposed project would require issuance of a transportation easement under ANILCA Title XI. For the Resurrection Pass Trail, the Title XI authorization process would require "each Federal agency concerned" (in this case, USACE, FHWA, and the Forest Service) to make a decision to approve or disapprove the project with the same "detailed findings supported by substantial evidence" as referenced above. The decision must be made within 4 months of the publication of the FEIS. If the decision by any one of the Federal agencies were to not approve the transportation system, the application would be denied, but DOT&PF could appeal to the President of the United States, who would have 4 months to approve or deny the application and publish findings in the Federal Register. If the President disapproved the project, DOT&PF could challenge the decision through the courts. The ANILCA Title XI process to acquire a

[2] ANILCA Title XI includes several procedural requirements that apply to the approval or disapproval of the authorization of any transportation or utility system by any Federal agency. Among those are specific timelines relative to completion of an FEIS. The Title XI processes differ for Wilderness areas and areas not designated as Wilderness.

transportation easement through non-Wilderness poses an only slightly less daunting challenge to either of the Juneau Creek alternatives. **The Forest Service has confirmed the importance of the Resurrection Pass Trail throughout the EIS process; achieving Forest Service support for an alternative crossing the trail presents a logistical constraint to the availability of the proposed project (Juneau Creek Alternative) as well as the Juneau Creek Variant. However, mitigation to account for impacts to the Resurrection Pass Trail has been jointly developed with the Forest Service, and based on consultation, is acceptable.**

Private Property Acquisition

Juneau Creek Variant Alternative and Alaska Native Claims Settlement Act (ANCSA) Section 14(h)(1) selected land. See Sections 3.1.1.5, 3.9.1.3, 4.8.9 and Map 3.9-1 of the FEIS. The Juneau Creek Variant Alternative would cross land owned by CIRI. CIRI's claims made under Section 14(h)(1) of ANCSA for "existing cemetery sites and historical places" were resolved through the Russian River Land Act passed by Congress. An agreement ratified by the act allowed CIRI to select the 42-acre Tract A (north of the literal Russian River confluence with the Kenai River) and 20-acre Tract B (east of Schooner Bend Bridge) because of the cultural significance of these areas, including the archaeological and cemetery sites they contain. Portions of Tract A, in particular, have been identified by the Kenaitze Indian Tribe as sacred and spiritual. These tracts have been identified in the agreement as the site of future development of a visitors interpretation center (joint with the Forest Service and USFWS, overlooking the river confluence), Sqilantnu Archaeological Research Center, administrative offices, lodging and restaurant for the public, housing for staff, public trails, and other potential development. As a result of the act, CIRI also received title to a broad area (approximately 500 acres) of the archaeological estate of the Sqilantnu Archaeological District. CIRI, the Kenaitze Indian Tribe, and the Forest Service have indicated Tracts A and B have very high cultural value as core lands of the Sqilantnu Russian River Confluence Site—a Traditional Cultural Property (TCP)—and as part of the broader Sqilantnu Archaeological District.

The Juneau Creek Variant Alternative would acquire approximately 12 acres of the 42-acre Tract A as well as bisect the remainder into two 15-acre parcels. Although the alternative has been carefully placed to avoid known burial sites, it would be close to those sites, and it would substantially alter plans laid out in the agreement ratified by Congress in the Russian River Land Act to establish an archaeological curation site and visitors center. The Forest Service, CIRI, and Kenaitze Indian Tribe are all on record as stating such impacts "cannot be mitigated." It is doubtful that DOT&PF could obtain the part of Tract A needed to construct the Juneau Creek Variant Alternative. An Act of Congress would likely be needed to resolve the property ownership issues in this area and appropriate and acceptable compensation for the unique characteristics of Tract A, which would be difficult, if not impossible, to identify. **The logistics of obtaining and effectively compensating for bisecting this property pose an impediment to the availability of this property. Because the Juneau Creek Variant cannot be reasonably obtained, it is not available; therefore, the Juneau Creek Variant Alternative is not practicable**.

Cooper Creek Alternative and residential property. The Cooper Creek Alternative would require acquisition of parts of 38 privately-owned parcels; 16 would be total acquisitions including eight residences requiring relocations and eight vacant residential parcels or lots with accessory buildings on them. The total assessed property values of the total acquisitions range from approximately $140,000 to $315,000. There are limited numbers of residential properties available for sale in Cooper Landing, and available housing may not be adequate to accommodate the

relocations at the time of displacement. In 2013, three comparable residences in the $200,000 to $350,000 price range were available in Cooper Landing. In January 2016, a search of local listings identified only two residential listings in the Cooper Landing area—one only accessible by boat or floatplane and unlikely to be considered comparable, and the other listed for $489,000. Presently, comparable properties to relocate eight households are not available in Cooper Landing.

If adequate housing were not available in Cooper Landing, replacement properties would need to be sought in Moose Pass, and the larger communities of Seward, Sterling, and Soldotna—the latter three distant from Cooper Landing and dissimilar communities. Federal and State laws require fair compensation and, in a situation in which comparable properties were not available on the market, 'housing of last resort' would be implemented (Section 3.4.2.3 of the FEIS). Eight households represent almost 3 percent of the households in Cooper Landing that would require relocation and comparable housing is unlikely to be available. This poses a substantial logistical constraint to the availability of the Cooper Creek Alternative. **Based on the logistics of relocating eight households in Cooper Landing where comparable housing is unlikely to exist, the Cooper Creek Alternative is not available and therefore not practicable**.

Section 4(f) of the Department of Transportation Act

See Chapter 4 of the FEIS for a full explanation of Section 4(f) of the Department of Transportation Act and analysis of Section 4(f) impacts, from which much of the following analysis is drawn. Map 4-1 and others in Chapter 4 of the FEIS illustrate the Section 4(f) properties in the project area. Section 4(f) prohibits use of certain parks, recreation areas, wildlife refuges, or historic properties for transportation projects unless there is "no prudent and feasible alternative" or the impacts are "*de minimis*." Section 4(f) of the Department of Transportation Act states:

> The Secretary (of Transportation) may approve a transportation program or project…requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) only if—
>
> (1) there is no prudent and feasible alternative to using that land; and
>
> (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

The law allows for its requirements to be satisfied if the impacts on 4(f) properties would be only minimal ('*de minimis*'). Any impacts discussed below are greater than minimal.

The term "feasible and prudent [avoidance] alternative" (from the first quoted block above) is defined in the FHWA Section 4(f) regulations in 23 CFR 774.17: "an alternative is not feasible if it cannot be built as a matter of sound engineering judgment" and is not prudent if it would be "unreasonable to proceed with the project in light of its stated purpose and need," if it would result in other impacts that would be "severe" or has costs of "extraordinary magnitude," among several other measures. Impacts to 404(b)(1) special aquatic sites from any of the build alternatives would not be "severe" in the context of linear transportation projects in Alaska or the high proportion of Alaska lands that are special aquatic sites.

FHWA has determined there are no feasible and prudent alternatives that avoid use of Section 4(f) protected properties. In the situation where all alternatives have unavoidable 4(f) impacts, Section 4(f) requires an analysis to determine which alternative would have the "least overall harm" and requires FHWA to select the alternative that has the least overall harm. The following is a summary of the analysis presented in Chapter 4 of the EIS and incorporates the most important issues from that analysis. The Least Overall Harm Analysis considers and balances several factors, all of which (as well as others) are also evaluated in the Section 404 permit decision making process albeit in a different order and with different emphasis on the various factors (factors paraphrased below):

- the relative significance of each Section 4(f) property;
- the ability to mitigate adverse impacts to each Section 4(f) property;
- the relative severity of remaining harm (after mitigation) to each Section 4(f) property;
- the views of the officials with jurisdiction over each Section 4(f) property;
- the degree to which each alternative meets the purpose and need for the project;
- substantial differences in costs among the alternatives; and
- the magnitude of any adverse impacts to resources not protected by Section 4(f).

The evaluation of least overall harm presents a summary of the key factors used in weighing the harm caused to Section 4(f) properties and to non-Section 4(f) resources based on the seven factors. Section 4.8.8 of the FEIS synthesizes all of the previous information presented and weighs and balances the most important and distinguishing differences among the alternatives.

The Least Overall Harm Analysis identifies the KRSMA (Kenai River Special Management Area) as having the highest significance[3] of any of the Section 4(f) properties used or impacted by any of the alternatives. The KRSMA is an important salmon migration and spawning area and hosts Alaska's most popular salmon sport fishery. Salmon returning to the Kenai and Russian rivers are important for commercial fishing in Cook Inlet. Within the project area, KRSMA activities include raft and boat trips on the Kenai River for scenic viewing and sport fishing, as well as fishing along the banks. This area has the highest usage of any of the Section 4(f) resources in the project area, and is critical to the economy of Cooper Landing, the Kenai Peninsula, and Southcentral Alaska. The Kenai River and its health influence other Section 4(f) properties and non-Section 4(f) resources. As a result of these findings, the use of KRSMA, impacts to the river, and views of agencies and others related to the river were a primary factor in FHWA's Least Overall Harm Analysis decision process. Potential impacts to the next tier of Section 4(f) properties, ranked as "higher significance" (Sqilantnu Archaeological District, Confluence TCP, Resurrection Pass Trail, and KNWR) were also important considerations in the evaluation process.

The first section of the Least Overall Harm Analysis evaluation considers the use, significance, ability to mitigate, and agency views. The evaluation goes on to summarize the degree to which each alternative meets the project's purpose and need, by considering transportation metrics and

[3] In the Draft SEIS and Draft Section 4(f) Evaluation, DOT&PF and FHWA had considered KRSMA to be one among several "higher" significance properties. Data and input on the Draft SEIS from agencies with jurisdiction and other consultation since that publication have led DOT&PF and FHWA to reclassify the KRSMA (the Kenai River) as the property with the "highest" significance.

distinguishing differences in the build alternatives' ability to protect, or impact, the Kenai River. The next section considers the magnitude of impacts to non-Section 4(f) resources for each alternative, and the following presents the relative difference in cost amongst the build alternatives.

Based on balancing the seven factors discussed above, updated analyses in the FEIS, public and agency comments received throughout the NEPA process, the Least Overall Harm Analysis presented in Chapter 4 of the FEIS (Section 4.8.9) concludes that the Juneau Creek Alternative is the alternative that would have the least overall harm and is therefore the preferred alternative for this project.

This determination is largely due to the following:

- The Juneau Creek Alternative would avoid use of KRSMA, the Section 4(f) property with "highest significance" in the project area. This alternative also would have the least length along the Kenai River (thereby minimizing the risk of spills directly into the KRSMA as compared to other alternatives). The Juneau Creek Variant Alternative would also avoid using KRSMA, but has greater length along the Kenai River than the Juneau Creek Alternative. Both the G South and Cooper Creek alternatives would use KRSMA property, have impacts associated with new or replacement bridges, and have considerably greater length along the river and therefore would have greater potential for direct adverse impacts to the KRSMA.
- The Juneau Creek Alternative is preferred by DNR (Division of Parks and Outdoor Recreation [DPOR]) and ADF&G, the agencies with direct management jurisdiction over KRSMA. It is also supported by the EPA, because it avoids impacts to the river and reduces the risk of spills into the river.
- The Juneau Creek Alternative is consistent with the policies and standards of the *Kenai River Comprehensive Management Plan*, which recommends that "public road construction on projects in upland areas should be located away from the Kenai River." This suggests that the Cooper Creek Alternative would be the least consistent with this plan. The plan further identifies that the "only recognized additional bridge crossing of the Kenai River in the management area is the proposed Funny River Bridge." This indicates that the G South Alternative, which would require a new bridge across the Kenai River, would be inconsistent with the approved management plan for KRSMA.
- The Juneau Creek Alternative would have the least impact on the Sqilantnu Archaeological District and Confluence TCP, both of which are "higher significance" properties in the project area. The Juneau Creek Alternative would use less acreage from these properties than the G South Alternative, and it would affect the least number of known sites. Moreover, the Juneau Creek Alternative is preferred by the tribal entities (CIRI and Kenaitze Indian Tribe) that have co-management jurisdiction over these resources. The Juneau Creek Variant Alternative is considered not mitigable by CIRI, Kenaitze Indian Tribe, and the Forest Service. Both the G South and Cooper Creek Alternatives would affect nearly three times as many known sites, and those alternatives are not supported by CIRI and Kenaitze Indian Tribe due to concerns about impacts to the Kenai River (the river is included as a part of the Confluence TCP and Sqilantnu Archaeological District). Kenaitze Indian Tribe considers protection of the Kenai River an important aspect of the tribe's cultural heritage.

- While the Juneau Creek Alternative would use property from the Resurrection Pass Trail (a property with "higher significance" in the project area), FHWA has undertaken all possible planning to minimize harm to the trail. Although the use and impacts cannot be avoided, the proposed mitigation has been jointly developed with the Forest Service (the agency with jurisdiction), and based on consultation, is acceptable.
- The Juneau Creek Alternative would use property from the KNWR to construct the connection from the new highway to the old highway on the south side of the current highway's alignment. FHWA has conducted the all possible planning to minimize the harm to that use.
- The Juneau Creek Alternative would best satisfy the Purpose and Need for the project. It would have the highest percentage of its length predicted to operate at or better than LOS C as compared to the other alternatives. It would have the most opportunities for passing using dedicated passing lanes. This would reduce the percentage of time spent following other vehicles (a measure of congestion) by the greatest amount, and it would improve safety by reducing the tendency for drivers to make unsafe passes. It would have the least number of intersections and driveways (which cause congestion and create conflict points that reduce highway safety). It also would have the lowest number of curves, which have been a concern and the cause of accidents on the existing highway.
- The Juneau Creek Alternative would best protect the Kenai River; an objective of the project committed to in the Purpose and Need Statement. This alternative would move 70 percent of the traffic farther away from the Kenai River for a longer distance as compared to the other alternatives. In addition, it would have the least impact on essential fish habitat (EFH), and the lowest number of crossings of anadromous fish streams (along with Juneau Creek Variant Alternative). It would reduce the visual and noise impacts of traffic along the Kenai River and would not impose new, wider bridges over the Kenai River that would affect aesthetics for river users.
- The Juneau Creek Alternative would have the least impact on the community of Cooper Landing. It would have the lowest number of relocations and private parcel acquisitions (tied with the G South and Juneau Creek Variant Alternatives) in the community of Cooper Landing. It would route the majority of traffic completely out of the developed area of Cooper Landing, thereby avoiding noise, traffic, dust, and construction impacts to the community and destinations along the existing highway (many of which are Section 4(f) properties) better than the other alternatives. However, routing highway traffic out of the community, it will have business impacts, especially to highway dependent businesses like gas stations.
- The Juneau Creek Alternative would be easiest to construct, because it would have the most work taking place off of the existing highway; other alternatives would require greater use of construction detours and pilot cars on the existing highway and would require working in and around community and recreation destinations with heavy traffic, thereby affecting travelers and businesses to a much greater degree and creating greater construction challenges and costs.
- While the Juneau Creek Alternative would have the greatest impact on wildlife in terms of habitat acreage (because of the length of new roadway across important roadless habitat),

DOT&PF and FHWA completed a wildlife mitigation study to refine proposed mitigation and has coordinated that mitigation with agencies responsible for managing wildlife in the study area. The project will employ several dedicated wildlife crossings of the highway to provide for movement of wildlife.

The Least Overall Harm Analysis and the LEDPA analysis each weigh multiple environmental factors in light of the project purpose to identify the alternative posing the least environmental damage or harm. FHWA has concluded that the Juneau Creek Alternative poses the least overall harm. Logistically, compliance with Section 4(f) limits the availability of any build alternative that does not pose the least overall harm (that is, the Juneau Creek Variant, G South, and Cooper Creek alternatives). **An alternative that cannot be identified by both analyses as the least harmful is not practicable, and FHWA has determined that the Juneau Creek Alternative has the least overall harm.**

Noise

Section 3.15 of the FEIS describes the analysis of noise impacts using FHWA's standard procedures for highway traffic and construction noise. There would be some noise receptors adversely affected under the No Build Alternative simply as a result of the increase in traffic over the design period considered in the FEIS. Each of the build alternatives would have traffic noise impacts on one trail; noise impacts on a broad recreational feature like this cannot typically be mitigated cost-effectively. While the Cooper Creek and G South alternatives would both have traffic noise impacts on the Kenai River Recreation Area (also not recommended for mitigation), that impact would be same as the impact of the No Build Alternative in 2043. The Cooper Creek Alternative is the only build alternative with traffic noise impacts to residential or commercial land uses under FHWA noise analysis procedures. The Cooper Creek Alternative would affect three residential receptors (one of which would be relocated anyway) and one commercial property (for which FHWA would not provide mitigation). The residential noise impacts of the Cooper Creek Alternative in Cooper Landing are, by FHWA Noise Policy definition, great enough to require consideration of noise abatement measures and implementation of such measures unless found to be not reasonable or not feasible. DOT&PF and FHWA were not able to identify effective noise abatement methods for these affected properties because the need for driveways would require breaks in the noise abatement barriers, rendering them insufficiently effective. **The inability to mitigate the noise impacts to two residential receptors presents a logistical constraint on the availability of the Cooper Creek Alternative. These unmitigatable impacts contribute to the finding that the Cooper Creek Alternative is not practicable.**

Construction Traffic

The logistics of providing local accessibility and through-travel while efficiently constructing a highway would be most challenging on road segments that would be reconstructed along the existing alignment, particularly within the community of Cooper Landing. Construction-related traffic impacts are described in Section 3.6.2.2 of the FEIS. Construction of any of the alternatives would occur over three to four construction seasons—including the summer season with substantially more traffic—with some work possible year round. Impacts would include increased congestion, traffic delays, queuing for one-way travel, short detours, and nighttime closures. Dump truck trips within and adjacent to the construction zone could number on the order of 200 truckloads each day, in each direction, during construction.

Under the Cooper Creek Alternative (Section 3.6.2.3 of the FEIS), approximately 11.5 of 15 miles of the existing highway would be rebuilt, meaning that construction activities and the traveling public would share the road for 11.5 miles of reconstruction, for nearly a mile within the central commercial area of Cooper Landing. The Cooper Landing Bridge replacement would require installation of a temporary bridge to convey traffic during construction. The bridge replacement would likely take two construction seasons, causing highway traffic delays within the central commercial area of Cooper Landing as well as closures and restrictions at the Cooper Landing Boat Launch. The Schooner Bend Bridge replacement would be less disruptive because the existing bridge could be used while the new bridge was built. **Construction impacts within the core area of Cooper Landing contribute to the finding that the Cooper Creek Alternative is not practicable.**

Under the G South Alternative (Section 3.6.2.4 of the FEIS) approximately 9.4 of 15 miles of the existing highway would be rebuilt so construction activities and travelers would share the road for the duration of two fewer miles of construction than for the Cooper Creek Alternative. In addition, the Cooper Landing Bridge would not be replaced so highway and boat launch traffic there would not be disrupted. Construction of a new bridge over the Kenai River west of Juneau Creek would have limited effects on highway traffic as would the Schooner Bend Bridge replacement because they would both be built off of the existing alignment.

Under the Juneau Creek and Juneau Creek Variant alternatives (Section 3.6.2.5 of the FEIS), approximately 5.5 and 6.3 miles, respectively, of the existing highway would be rebuilt, meaning construction activities and highway travel would occur simultaneously along the same route for about half the distance of the Cooper Creek Alternative. These alternatives would not include new or replacement Kenai River bridges.

Summary of Logistical Constraints on Practicability

Assuming the land exchange occurs and the Wilderness boundary is shifted to the north, it is reasonable to believe that the corridor of land traversed by the Juneau Creek Alternative could be obtained, thereby substantially reducing logistical constraints associated with this alternative. The logistical constraints posed by the Juneau Creek Alternative crossing of the Resurrection Pass Trail would influence but not preclude the availability of this alternative since the FHWA and DOT&PF would provide mitigation to account for such impacts. **Assuming the land exchange under the Russian River Land Act occurs, logistical constraints would not render the Juneau Creek Alternative unavailable; therefore, the proposed project (Juneau Creek Alternative) is practicable.**

Similar to the proposed project, logistical constraints associated with the Juneau Creek Variant Alternative's crossing of the Resurrection Pass Trail do not preclude the availability of this alternative, since impacts would be mitigated through coordination with the Forest Service. However, the logistics of identifying adequate compensation for the loss of cultural value of bisecting CIRI Tract A mean that this property cannot reasonably be obtained. **The highway alignment for the Juneau Creek Variant Alternative is therefore not available and that alternative is therefore not practicable**.

The **Cooper Creek Alternative is not practicable considering the logistics** of: (1) **relocating** eight households in a small community that does not have a sufficient supply of comparable replacement housing; (2) constructing the highway without FHWA **funding** because FHWA

cannot approve the Cooper Creek Alternative under Section 4(f); (3) **mitigating noise impacts**; and (4) **constructing** and reconstructing the highway while maintaining travel within a core business district of the community.

The G South Alternative would similarly have logistical limitations regarding constructing the highway without FHWA funding. However, as FHWA could identify the G South Alternative as its preferred alternative should the land exchange under the Russian River Land Act not to occur, logistic constraints were not found to completely limit the practicability of **the G South Alternative; therefore, the G South Alternative is practicable.**

3.2.3.5 Practicability Analysis Summary

As stated above, **the Juneau Creek Variant Alternative is not practicable** due to logistical constraints that preclude acquisition of ownership interests for parts of the alternative. Since portions of the alignment under the Juneau Creek Variant Alternative are not available, the alternative is not practicable.

The **Cooper Creek Alternative is not practicable given its low ability to meet the needs that drive the overall project purpose**: it improves the safety and efficiency of local access and through-traffic, but it would continue to route 100 percent of the traffic through part of the community's central commercial area. The alternative would have 42 driveway or side road intersections along its length. Four curves along the alignment would meet just the minimum project standard for design speed. These factors limit the alternative's achievement of the overall project purpose. **The availability of the Cooper Creek Alternative is also logistically constrained** by the need to relocate eight households within a community that presently lacks comparable replacement properties, by its not being the alternative that poses the least overall harm under Section 4(f), by its unmitigable noise impacts, and by the need to construct through the Cooper Landing commercial area while maintaining traffic. The Cooper Creek Alternative would cause a substantial disruption of the community while only marginally achieving the overall project purpose. **The Cooper Creek Alternative is not available and capable of being done after taking into consideration logistics in light of the overall project purpose, and it is therefore not practicable.**

The Juneau Creek (proposed project) and G South alternatives are the only remaining reasonable and practicable alternatives.

The G South Alternative would have a moderate (medium) ability to address the needs that drive the overall project purpose. It would bring the highway up to current design standards, with all proposed curves meeting the minimum design criteria for 60 mph travel and all curves but one with a design specified for 65 mph travel. It would substantially reduce the number of driveways and side road intersections on the highway alignment. Almost 70 percent of the alignment would achieve at least LOS C on summer weekends of the design year 2043. The G South Alternative does not have the logistical constraints of property ownership.

Table 3-3: Practicability of alternatives

Section 404(b)(1) Guidelines Factor	Juneau Creek Alternative – Proposed Alternative	Cooper Creek Alternative	G South Alternative	Juneau Creek Variant Alternative
Consideration of the project purpose *(see Section 3.2.3.1)*				
Meets AASHTO standards for lane and shoulder width, clear zone, maximum grade, curve radius	Yes	Yes	Yes	Yes
Traffic bypass of central commercial area (MP 47–50) of Cooper Landing	Through traffic bypasses entire central commercial area. Local/recreation accessibility improves substantially.	Through traffic bypasses two-thirds of the central commercial area. Local/recreation accessibility improves some.	Through traffic bypasses entire central commercial area. Local/recreation accessibility improves substantially.	Through traffic bypasses entire central commercial area. Local/recreation accessibility improves substantially.
Congestion relief: Percent of length with passing lane	43	28	25	40
Congestion avoidance: Number of intersections of driveways and side roads	12	47	23	13
Level of Service: Percentage of alignment at or better than Level of Service C (2043 summer weekend)	83	61	69	82
Total number of curves meeting minimum standard (60 mph design speed) out of total number	21/21	27/27	25/25	22/22
Number of curves meeting 'desirable' standard (65 mph design speed), out of total number	20/21	23/27	24/25	21/22
Level to which alternative meets overall project purpose in light of protecting the Kenai River	High	Low	Low	High
Level to which alternative meets the project purpose in light of transportation metrics	High	Low	Medium	High
Cost *(see Section 3.2.3.2)*				
Approximate total cost (USD)	$304.3 million	$332.3 million	$335.4 million	$312.6 million
Does cost alone make this alternative impracticable?	No	No	No	No
Existing technology *(See Section 3.2.3.3)*				
Geotechnical constraints	Fractured rock at Juneau Creek bridge abutment locations	Unstable soils at large cut near Cooper Creek	None	Fractured rock at Juneau Creek bridge abutment locations
Does existing technology alone make this alternative impracticable?	No	No	No	No
Logistics *(See Section 3.2.3.4)*				
Would traverse Wilderness in the Kenai National Wildlife Refuge requiring untested Alaska National Interest Lands Conservation Act Title XI process, approval of the President, then joint resolution of Congress	No (Assuming land exchange occurs)	No	No	No
Would cross the Resurrection Pass Trail, requiring Alaska National Interest Lands Conservation Act Title XI process	Yes	No	No	Yes
Would traverse Tract A, a highly-valued 14(h)(1) selection (for cemetery and sacred sites) under the Alaska Native Claims Settlement Act and subject of the federal Russian River Lands Act	No	No	No	Yes
Would require residential relocations for Cooper Landing homes, for which comparable housing may not exist	No	Yes Residential relocations needed.	No	No
Section 4(f) Least Overall Harm Analysis selects this alternative, considering all factors	Yes	No	No	No

Section 404(b)(1) Guidelines Factor	Juneau Creek Alternative – Proposed Alternative	Cooper Creek Alternative	G South Alternative	Juneau Creek Variant Alternative
Traffic Noise Impact above Noise Abatement Criteria in 2043, compared to 2043 No Build alternative impacts	Bean Creek Trail affected	Unmitigatable impact to 2 residences that would not be relocated, 1 commercial property. Stetson Creek Trail affected.	Bean Creek Trail affected	Bean Creek Trail affected
Efficient construction while maintaining safe and efficient travel	Simultaneous construction and travel on 5.5 miles of highway, none within Cooper Landing	Simultaneous construction and travel on 11.5 miles of highway; 2 miles within Cooper Landing. Bridge replacement on existing alignment, within Cooper Landing.	Simultaneous construction and travel on 9.4 miles of highway, none within Cooper Landing	Simultaneous construction and travel on 6.3 miles of highway, none within Cooper Landing
Do logistics alone make this alternative impracticable?	No Assumes that the land exchange occurs and the Wilderness boundary is shifted north. Crossing the Resurrection Pass Trail would require mitigation but not preclude practicability of alternative.	Yes, logistics substantially limit its practicability. The need to relocate households limits alternative's availability. Logistically, it is not possible to mitigate two residential noise impacts. Alternative is not the one with the least overall harm under Section 4(f). Construction within community and replacement of bridge on existing alignment are logistically challenging.	No, but logistical constraints on federal funding associated with FHWA determination of least overall harm under Section 4(f) is limiting.	Yes Inability to mitigate impacts to CIRI Tract A makes it not practicable. Crossing the Resurrection Pass Trail would require mitigation but not preclude practicability of alternative.
Summary of practicability *(Section 3.2.3.5)*	This alternative does not face project-limiting logistical challenges, poses the Least Overall Harm under Section 4(f), and has the highest ability to meet the overall project purpose. Therefore, this alternative is **practicable**.	Logistics pose substantial constraint to the availability of this alternative. The alternative's achievement of the overall project purpose is marginal. In light of the overall project purpose, given the logistical constraints, the alternative is **not practicable**.	This alternative does not face project-limiting logistical challenges, and has a moderate ability to meet the overall project purpose. This alternative is **practicable**.	This alternative is not available based on the logistics of gaining authorization to cross Tract A and the Resurrection Trail. Therefore, this alternative is **not practicable**.

The proposed project (Juneau Creek Alternative) would have a considerably higher ability to meet the overall project purpose than the G South Alternative. It would better resolve congestion problems by providing the most opportunity for passing, the least number of intersections and driveways, and the greatest percentage of the alignment predicted to operate at LOS C or better. It has fewer curves than the G South Alternative (one below desirable), and a lower percentage of its length is at grades at or above 5.9 percent.

The Juneau Creek Alternative would also avoid use of the KRSMA, the Section 4(f) property with "highest significance" in the project area. It would not require any additional bridges over the Kenai River and would move the highway away from the river, which would minimize the risk of spills directly into the river and KRSMA. The Juneau Creek Alternative is preferred by DNR (DPOR) and ADF&G, the agencies with direct management jurisdiction over KRSMA. It is also supported by the EPA, because it avoids impacts to the Kenai River and reduces the risk of spills into the river. In light of the overall purpose of the project, the Juneau Creek Alternative would adequately resolve the problems that are identified as the needs for the project while minimizing impacts to the Kenai River. It is the alternative that FHWA has determined would pose the least overall harm, so FHWA's approval and funding would not be constrained by Section 4(f) concerns. Based largely on these factors, this alternative has been identified as the proposed project.

3.2.4 Least Adverse Impact on the Aquatic Ecosystem

FHWA and DOT&PF suggest that the G-South and Juneau Creek alternatives are both practicable. Should the USACE disagree, it may wish to consider additional information to identify the least environmentally damaging practicable alternative. This section distills information from the FEIS that is most pertinent to identifying which of reasonable alternatives evaluated in the FEIS would have the least adverse impact on the aquatic ecosystem—the part of the first restriction on discharge printed in bold type below.

> …no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge **which would have less adverse impact on the aquatic ecosystem**, so long as the alternative does not have other significant adverse environmental consequences (40 CFR 230.10 (a)).

The aquatic ecosystem as defined in 40 CFR 230.3 as "waters of the United States, including wetlands that serve as habitat for interrelated and interacting communities and populations of plants and animals." Waters of the United States in the project area include all wetlands, the Kenai River and Kenai Lake, which are Federally listed traditional navigable waters, and all major streams in the project, which are tributaries to Kenai River and Kenai Lake (Section 3.20 of the FEIS). This section thus summarizes impacts to each of these resources considering the requirements in 40 CFR 230.10. The information presented in this section is summarized in Table 3-4 at the end of this section.

3.2.4.1 Wetland Impacts

Table 3-4 shows the acreage of wetlands and ponds that would be cut or filled by construction of each of the build alternatives (Section 3.20.2.3 of the FEIS). The Cooper Creek Alternative has the lowest total wetland/pond acreage, with the impacts distributed equally among wetland types. The G South Alternative has the next-to-lowest acreage of wetland impact, with approximately equal acreage of impact to each wetland type as the Cooper Creek Alternative except for forested

wetlands, of which 16 more acres would be affected. The greatest acreage of wetland lost would result from the Juneau Creek and Juneau Creek Variant alternatives, with substantially more loss of emergent wetlands and of forested wetlands relative to the other two build alternatives. On this measure, the Cooper Creek Alternative would have the least adverse effect to wetlands, followed by the G South Alternative.

Table 3-5 also shows the acreage of wetland and pond impacts by level of wetland function (Section 3.20.2.3 of the FEIS), based on the wetland functional assessment. The Cooper Creek and G South alternatives would affect the least high-functioning wetland area—approximately 4 and 6 acres, respectively—and the Juneau Creek alternatives would affect substantially more high-functioning acreage—approximately 19 acres each. The Cooper Creek Alternative would affect about 5 acres of moderately-functioning wetlands, whereas the other three build alternatives would each affect about 20 acres. The effects on low-functioning wetlands by all build alternatives are minimal. The G South Alternative's impacts are proportionately weighted away from high-functioning wetlands, but the Cooper Creek Alternative affects the least total high-functioning wetland acreage.

The FEIS presents a measure for comparing indirect impacts to wetlands, using the wetland acreage within 300 feet of the cut and fill limits as a representation of wetland acreage potentially degraded by the project in terms of water quality, wildlife habitat, or hydrologic change. The Cooper Creek Alternative is bordered by the least wetland acreage, G South is intermediate, and the Juneau Creek alternatives have twice as much wetland acreage within 300 feet as the G South Alternative has. Indirect impacts to the Kenai River and other waterbodies within 300 and 500 feet of the proposed limits are discussed below.

3.2.4.2 Impacts to Other Waters of the U.S.

During the EIS process, key stakeholders and government agencies commented on potential adverse impacts to the Kenai River, which is a resource of significant biologic, social and economic importance to the State of Alaska. The Kenai River and its major tributaries—Kenai Lake, Kenai River, Bean Creek, Juneau Creek, Cooper Creek, Russian River, and Fuller Creek—provide important migration corridors and spawning, rearing, feeding and overwintering habitats for 34 salmonid and other fish species (FEIS Section 3.21). All five species of Pacific salmon and EFH for these species occur in the Kenai River, and over one million salmon return to the Kenai each year to spawn. Because of its high productivity, the Kenai River system is the most fished river in Alaska, and contributes to a major commercial fishery and some of the largest recreational fisheries for Chinook, coho, and sockeye salmon in the state. The Kenai River and its riparian corridor also provide key foraging, resting, and migration habitat for dozens of wildlife species (FEIS Section 3.22). As discussed in Section 3.2.3.4, the KRMSA, which consists of the submerged lands of the Kenai River and Kenai Lake, is designated as having the highest significance of any parks, recreation areas, wildlife refuges, or historic properties in the project area.

Bridge Impacts. Replacement and installation of new bridges and instream bridge piers would have adverse effects on aquatic ecosystems. Impacts from construction would include noise, vibration, increased turbidity, and clearing of riparian vegetation. Aquatic bypasses (coffer dams) would likely be placed in the river during pier construction of the new bridge, placement of temporary pilings, and removal of those pilings. USFWS, in its capacity as a cooperating agency

on the FEIS, has indicated that shading from new or wider bridges would have long-term impact to fisheries habitat, and year-round introduction of contaminants on the bridges would impact water quality. The construction of new bridge piers would eliminate EFH in the Kenai River, and temporarily impede boat traffic. The G South and Cooper Creek alternatives would require bridging the Kenai River. The G South Alternative would replace the Schooner Bend Bridge and build a new bridge over the Kenai River near MP 51.6, and require up to three new piers in the Kenai River. The Cooper Creek Alternative would replace the Schooner Bend Bridge and Cooper Landing Bridge, and replace up to six piers in the Kenai River. The Juneau Creek alternatives would not replace or build new bridges over the Kenai River. The Juneau Creek alternatives would not require coffer damns or temporary fill in the Kenai River. The Juneau Creek Alternative would include a bridge that fully spans Juneau Creek.

Hazardous Material Spill Impacts. Potential adverse impacts to aquatic resources from hazardous material spills are more likely to occur where a roadway is narrow and winding, without shoulders, and close to the waterbody. The impact of such spills would be more pronounced in the Kenai River as a spill would not only be harmful to aquatic life and water quality of the river, but also to the economic stability of the community and commerce of Cooper Landing that is dependent on clean water and healthy fish populations (FEIS Section 3.5). The proximity of all traffic to the Kenai River would retain the risk that a spill on the highway could pollute the river, because the risk of a spill entering the Kenai River diminishes the farther from the Kenai River the spill occurs. The FEIS tabulates the percentage of each build alternative's length that is within 500 feet and 300 feet of the Kenai River and its major tributaries (Section 3.13.2 and 3.17 of the FEIS). The Cooper Creek Alternative has the greatest potential of risk of water quality impacts due to spills: about 10 percent more of that alternative would be within 500 feet or 300 feet of the Kenai River and its major tributaries than would the G South Alternative (Table 3-4). The percentage of the Juneau Creek alternatives near those key waters is about half that of the G South and Cooper Creek alternatives. This is a measure of the potential for a pollutant spill to reach important waters upon which the EPA based its preliminary opinion of the LEDPA; that is, the EPA considered the Juneau Creek alternatives less damaging to the aquatic environment than either the Cooper Creek or G South Alternative because of their greater distance from the Kenai River.

The old highway still would exist but would carry 30 percent of the traffic. The overall amount of traffic in the project area is expected to be the same under all alternatives. While a risk of spills still would exist where the old highway was near the Kenai River, the risk would be substantially reduced in those segments because overall traffic would be reduced. Almost all tanker truck traffic would be expected to use the new highway; only trucks making local fuel deliveries would be expected to use the old highway. Because 70 percent of traffic is expected to follow the new alignment, and because the Juneau Creek Alternative overall would be located much farther from the Kenai River and major tributaries, the Juneau Creek Alternative would have less potential to affect those by accidental pollutant spills than would the other alternatives.

Floodplain Impacts. Impacts to the 100-year floodplain of the Kenai River would occur under the G South and Cooper Creek alternatives (Section 3.19 of the FEIS). Encroachment into the floodplain of the Kenai River would negatively affect floodplain functions, including temporary storage of floodwaters; attenuation of stream flows during flood events; and absorbing and distributing excess water and associated suspended solids, nutrients, and pollutants. Encroachment into natural floodplain habitats also negatively affects recharge to groundwater, linkages in the food chain and nutrient cycle, and riparian habitat extent and connectivity. The G South

Alternative would have approximately 7 acres of fill encroachment into floodplains versus Cooper Creek Alternative's 5 acres of fill. The Juneau Creek alternatives would have little to no floodplain encroachment. Note that the encroachment analysis is based on official floodplain maps that were developed using "approximate" methods

Essential Fish Habitat Impacts (EFH). Each alternative has the potential to affect anadromous EFH in the Kenai River and its major tributaries. Permanent impacts to EFH reduces the availability of necessary habitat that is required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem (Section 3.21 of the FEIS). The Juneau Creek Alternative would affect the least acreage (0.2 acre) and the effects of the other alternatives would be greater (0.6 to 0.8 acre; Section 3.21.2 of the FEIS). The Cooper Creek Alternative would require rerouting a reach of anadromous fish stream with EFH that the other alternatives would not, and the Juneau Creek Variant Alternative embankment would impinge on the Kenai River where other alternatives would not.

Culvert Crossing and Stream Realignment Impacts. Each build alternative proposes building new culvert crossings or replacing existing crossings. Culvert crossings, particularly new ones, have the potential to permanently change stream flows that could affect fish passage under the highway (making it potentially more difficult or easier for fish to pass), and eliminate or reduce in stream and riparian habitat. Where old culverts under the existing highway would be replaced with new culverts built to modern standards and often at larger diameter, it is possible that fish passage would be established where it had previously been cut off. The G South Alternative would construct one new culvert crossing in a fish-bearing stream. The Cooper Creek Alternative would construct five new culverts, and the Juneau Creek alternatives would each replace one existing culvert.

The Juneau Creek alternatives would have the greatest number of small drainages that are non-anadromous fish habitat newly routed through a road embankment in culverts, with 41 such crossings each. The G South Alternative would have an intermediate number (32) and the Cooper Creek Alternative the fewest (10) (Section 3.13.2 of the FEIS). The opposite trend exists for drainages presently routed through the road prism in culverts that would be put in longer replacement culverts. However, without considering the condition of the existing culverts, it is not possible to say whether routing through a longer culvert would be an adverse effect.

Vegetation Removal. Vegetation removal and maintenance in a cleared condition may affect downslope waterbodies by reducing water quality and producing a more dynamic flow regime. The G South and Cooper Creek alternatives would require removing a similar acreage of vegetation (211 to 190 acres, respectively), less than the acreage for the Juneau Creek and Juneau Creek Variant alternatives (approximately 260 acres) (Section 3.20.2.3 of the FEIS).

3.2.4.3 Summary of Alternative Impacts to Aquatic Ecosystems

While the Cooper Creek Alternative requires filling the least wetland acreage, it would have the greatest length of highway near the Kenai River and its major tributaries, would require replacing two bridges over Kenai River, would impact the floodplain of Kenai River, and would require reroute of one anadromous fish stream. The G South Alternative affects more wetland acreage than does the Cooper Creek Alternative; most of that difference is moderately-functioning wetlands rather than higher-functioning ones. The G South Alternative would require building a new bridge and replacing an existing bridge over Kenai River; would have the second greatest length of

highway near Kenai River and its major tributaries; would impact the greatest amount of Kenai River floodplain; would require five culvert crossings, four of which would be new; and would cross the highest number of small drainageways.

The Juneau Creek alternatives would impact more wetlands than other alternatives. However, the Juneau Creek Alternative would have the least overall adverse impacts to the Kenai River and its major tributaries, to floodplain and riparian habitat along the Kenai River, and to fisheries resources of any one of the build alternatives, followed closely by the Juneau Creek Variant. Both alternatives would avoid construction or replacement of any bridges over the Kenai River, and the Juneau Creek Alternative would move the greatest length of highway away from the Kenai River. Moving the highway farther away from the Kenai River and its anadromous tributaries reduces the long-term spill risk of hazardous substances (see Section 3.17 of the Final EIS) and substantially reduces the potential for temporary in-river impacts during construction. The Juneau Creek alternatives would have little to no effect on floodplains of the Kenai River or its major tributaries. The Juneau Creek alternatives would not require new crossings or re-alignment of anadromous fish streams. The Juneau Creek Alternative is preferred by DNR (DPOR) and ADF&G, the agencies with direct management jurisdiction over KRSMA, because this alternative will have the least impact on the KRSMA. It is also supported by the EPA as the LEDPA, because it avoids impacts to the Kenai River and reduces the risk of spills into the river.

The G South, Cooper Creek, and Juneau Creek Variant alternatives would have the most negative impacts on the Kenai River, its floodplain and major tributaries, and KRSMA. In consideration of all requirements in 40 CFR 230.10, and given the biologic, recreational, and economic importance of the Kenai River and KRSMA, these alternatives are considered to have more significant adverse effects on fish species and other aquatic and wildlife dependent on aquatic ecosystems; in-stream and riparian habitat; aquatic ecosystem diversity; productivity and stability; and recreational, aesthetic, and economic values.

Therefore, the FHWA and DOT&PF have determined that the Juneau Creek Alternative would have the least adverse impact on the aquatic ecosystems.

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Table 3-4: Summary of alternatives' impacts on the aquatic ecosystem

Aquatic Ecosystem Impact Category		Juneau Creek Alternative – the Proposed Project	Cooper Creek Alternative	G South Alternative	Juneau Creek Variant Alternative
Wetlands					
Total wetland or pond acres filled		39.2	10.1	27.4	38.6
Wetland type filled (acres)	Forested	24.7	2.0	17.8	24.7
	Deciduous shrub	4.8	1.7	3.9	4.0
	Shrub bogs/fen	2.5	3.4	2.7	1.7
	Emergent	6.1	0.8	0.8	6.3
	Pond	1.1	2.2	2.2	1.9
High-functioning (Category 1) wetlands filled (acres)		18.8	4.1	6.2	18.6
Moderately-functioning (Category 2) wetlands filled (acres)		19.7	5.5	20.3	19.7
Wetland area within 300 feet of new or widened road (acres)		172	16	87	160
Other Waters of the U.S.					
New bridges with piers in river or creek		0	0	1 (2-3 piers in Kenai River)	0
Kenai River bridges replaced[1]		0	2 (4-6 piers in Kenai River)	1 (1-2 piers in Kenai River)	0
Floodplain encroachment (acres)		0	5.4	6.6	0
Potential risk of water quality impacts due to spills (% of road length within 500 or 300 feet of major fish waters)	Within 500 ft	25	56	45	26
	Within 300 ft	15	43	33	16
Anadromous fish habitat effects	EFH acres altered	0.2 acre	0.8 acre	0.6 acre	0.8 acre
	Creeks rerouted	0	1	0	0
	Culvert crossings	1 (existing)	5 (4 new)	5 (1 new)	1 (existing)
Culverted drainages (new or altered)[2]		20 replacement culverts 41 new culverts	48 replacement culverts 10 new culverts	39 replacement culverts 32 new culverts	20 replacement culverts 41 new culverts
Vegetation removal (acres)		262	190	211	257

Aquatic Ecosystem Impact Category	Juneau Creek Alternative – the Proposed Project	Cooper Creek Alternative	G South Alternative	Juneau Creek Variant Alternative
Summary of relative effects on the aquatic ecosystem	Most wetland loss. No bridging of Kenai River. Least highway length near fish waters. Least alteration of anadromous fish habitat. No floodplain encroachment. Least new crossings of fish-bearing streams. Most new drainage crossings.	Least wetland loss. Two bridges replaced over Kenai River. Greatest highway length near fish waters. Greatest area of EFH alteration. Moderate floodplain encroachment. Least wetland and small drainageway impact.	Moderate-low wetland loss. One new bridge over Kenai River. Second-highest highway length near fish waters. Most floodplain encroachment. Moderate for anadromous fish effects.	Moderate-high wetland loss. No bridging of Kenai River. Most new drainage crossings. Greatest area of anadromous fish habitat alteration. No floodplain encroachment. Moderate for other measures.

[1] The FEIS is not considering the effects of existing bridges on the 'old' highway that would eventually need to be replaced, except as cumulative effects.

[2] Some drainages were combined into one culvert.

3.2.5 Other Significant Adverse Environmental Consequences

Each of the alternatives discussed in the FEIS would have significant adverse environmental consequences that are not associated with the aquatic ecosystem. These are described in this section to help USACE consider the part of the first restriction on discharge shaded in bold below.

> "…no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, **so long as the alternative does not have other significant adverse environmental consequences**" (40 CFR 230.10 (a)).

These consequences merit consideration during identification of the LEDPA if USACE thinks there are practicable alternatives other than the proposed project.

The information presented in this section is summarized in Table 3-6 at the end of this section.

3.2.5.1 Archaeological Historic Properties

Under its general regulatory policies, USACE considers impacts to historic properties within the "permit area," defined as "those areas comprising the waters of the United States that will be directly affected by the proposed work or structures and uplands directly affected as a result of authorizing the work or structures" (33 CFR 325 Appendix C). The USACE permit area is generally contained within the direct and indirect Areas of Potential Effect. Select resources and the effects on them are briefly summarized below; they are more fully described in Sections 3.9, 4.2, and 4.5 of the FEIS.

There are many historic and archaeological properties in the project area as discussed in the FEIS. All of those identified in the FEIS are subject to Section 106 of the National Historic Preservation Act and are eligible for listing on the National Register of Historic Places. Two cultural properties within the Area of Potential Effect are of higher significance (Table 4.8-7 of the FEIS): the "Sqilantnu Archaeological District" and the "Confluence Traditional Cultural Property (TCP)."

The Sqilantnu Archaeological District encompasses a large portion of the entire project area. There are thousands of known cultural features in several hundred contributing historic properties within the Sqilantnu Archaeological District. Resources in the district have potential to reveal important information about Dena'ina people's occupation of the area. The district is recognized for its association with significant events in the prehistory of the Dena'ina and other Native people.

Within the Sqilantnu Archaeological District and within the Areas of Potential Effect of the project alternatives are two TCPs, one of which is the Sqilantnu Russian River Confluence Site TCP (Confluence TCP). The Confluence TCP is wholly contained within the Sqilantnu Archaeological District and is a contributing element of the district; therefore, impacts to the Confluence TCP are a subset of the impacts discussed for the broader district. The Confluence TCP is culturally significant for its association with the confluence of the Kenai and Russian rivers and the broader cultural practices and traditions of the Kenaitze community. It encompasses multiple sites of particular importance to the Kenaitze community, including CIRI Tract A, which contains a known burial site. The significance of these areas is indicated by CIRI's selection of portions of this area as places of cultural and historical significance under provisions of Section 14(h)(1) of ANCSA. Significance also is indicated by the identification of the confluence area in the Russian River Land Act: "Congress (finds that these lands) contain abundant archaeological resources of significance

to the Native people of the Cook Inlet Region, the Kenaitze Indian Tribe, and the citizens of the United States." The archaeological historic properties (approximately 103 have been delineated within the TCP boundaries) are considered a rich source of information that mostly has yet to be fully investigated.

Within the Confluence TCP, each of the Juneau Creek alternatives would impact several contributing archaeological historic properties. While the Juneau Creek Alternative would pass along the northern edge of the TCP, the Juneau Creek Variant Alternative would pass through the spiritual center of the TCP. The Juneau Creek Variant Alternative would acquire approximately 12 acres of the 42-acre Tract A and bisect the tract into two remaining 15-acre parcels. Although the alternative has been carefully placed to avoid known burial sites, it would be close to those sites, and it would substantially alter the property. The Forest Service, CIRI, and Kenaitze Indian Tribe are on record as stating the impacts of crossing Tract A cannot be mitigated. **The adverse consequences of the Juneau Creek Variant Alternative on cultural resources would be substantial.**

Under the Juneau Creek Variant Alternative, the setting, feeling, and association of the TCP would be substantially altered in this area, because the highway would pass through the central area of importance (as roughly symbolized by Tract A). This would divide the TCP and alter its character; in this area, a new highway would virtually eliminate the pre-road condition of the river, trails, and forest. It would reduce the association of the current environment with the traditional Dena'ina culture in this area. The Juneau Creek Alternative would be aligned farther to the northwest. Its physical impacts would be similar but the location of those impacts would preserve Tract A in its entirety. Disruption to the setting, feeling, or association of the TCP would be an important change in the area but an incremental change.

With respect to the Sqilantnu Archaeological District as a whole, the Juneau Creek Alternative would affect nine archaeological historic properties and the Juneau Creek Variant Alternative would affect 20 such properties. Both of these alternatives would provide new public foot access to lands north and west of the Cooper Landing community that are mostly undeveloped, though accessible by road and trail. Approximately seven known contributing properties have potential to be affected by pedestrians who might use new public trailhead parking near Juneau Creek or highway shoulders for access to roadside lands. These alternatives would construct a new highway through a portion of the archaeological district that is dense with archaeological sites and of particular importance to the Kenaitze Indian Tribe. The setting would be altered substantially. The Juneau Creek Variant Alternative in particular would alter the feeling of a bench area overlooking the Russian River confluence that is considered sacred. The Juneau Creek Alternative would be farther away and would create less impact to setting, feeling, and association than the Juneau Creek Variant Alternative.

The effects of the G South and Cooper Creek alternatives on the Sqilantnu Archaeological District and the Confluence TCP would be similar to each other. Compared to the Juneau Creek alternatives, and particularly the Juneau Creek Variant Alternative, they would have relatively less effect on the setting, feeling, and association of the Sqilantnu Archaeological District as a whole or the Confluence TCP as a whole. Both follow the existing alignment in the MP 51–56 area, through the center of the Sqilantnu Archaeological District and Confluence TCP, and would impact multiple archaeological sites. The G South and Cooper Creek alternatives would use land from 26 and 28 archaeological historic properties, respectively, that contribute to the district by

partially or completely eliminating them, or by burying them with highway embankment material. Widening and straightening would slightly alter setting, feeling, and association of the Confluence TCP by changing the nature of the highway, and result in a small change in character of the TCP. However, because these alternatives stay on the existing alignment for a greater length, the overall effect to the setting is less than the Juneau Creek alternatives which introduce a new highway alignment for a greater length. Compared to the Juneau Creek Variant Alternative alone, the G South and Cooper Creek alternatives would have substantially less effect on the setting, feeling, and association of the Sqilantnu Archaeological District as a whole or the Confluence TCP as a whole.

3.2.5.2 Kenai National Wildlife Refuge and Wilderness

The procedures that constrain the availability of this land are described above in Section 3.2.3.4 under "Juneau Creek Alternative and Wilderness designation." Potential adverse consequences to the KNWR and to designated Wilderness related to their Section 4(f) status are addressed in Section 3.2.3.4 under "Section 4(f) of the Department of Transportation Act" but, like archaeological resources, the potential adverse consequences merit evaluation apart from their special protection under the Department of Transportation Act. The Juneau Creek Alternative would cross the KNWR; part of the refuge land crossed is currently within the Mystery Creek Unit of Wilderness designated by Congress. The Cooper Creek, G South, and Juneau Creek Variant alternatives would avoid traversing KNWR. The potential project effects on these resources are briefly summarized here and are more fully described in Chapter 4 and Sections 3.2.2 and 3.2.5 of the FEIS.

The KNWR purposes are to preserve all wildlife populations and their habitats "in their natural diversity," to protect associated waters, to meet treaty obligations, and—compatible with wildlife and habitat—to provide for science/education and recreation. Wilderness is managed for its own set of functions under the Wilderness Act as land that:

> ……retains its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation…

The Juneau Creek Alternative would use approximately 33 acres of land from KNWR by crossing the refuge outside of the existing highway right-of-way, 19 acres of that land are currently designated as Wilderness. About half of that highway right-of-way would be cleared of forest vegetation and would be effectively lost as wildlife habitat. Designation as Wilderness means the USFWS manages this area so that natural processes dominate and the "imprint of man's work [is] substantially unnoticeable" (Wilderness Act, 16 U.S. Code [USC] 23). Mechanized tools, buildings, and roads typically are forbidden. Wilderness is an important and sensitive concept among many in the public.

The "other" 14 acres of land from KNWR are located south of the existing highway easement to enable the "old" highway to connect with the new alignment.

The effects of the Juneau Creek Alternative on 33 acres of KNWR resources and wilderness values would be substantial. However, assuming the land exchange occurs and the Wilderness boundary is shifted to the north, the Juneau Creek Alternative will not affect designated Wilderness, and only impact 14 acres of refuge lands.

3.2.5.3 Resurrection Pass National Recreational Trail

The Juneau Creek and Juneau Creek Variant alternatives would both cross the Resurrection Pass Trail. The procedures that constrain the availability of this land are described in "Juneau Creek and Juneau Creek Variant alternatives and the Resurrection Pass National Recreational Trail" within Section 3.2.3.4, and the 4(f) regulatory impacts are presented in "Section 4(f) of the Department of Transportation Act" within Section 3.2.3.4 of this document. The importance of project effects on recreationists is briefly presented here. The trail and effects on it are described in detail in Section 4.5.4.2 of the FEIS.

The Resurrection Pass Trail is a 38-mile route from the community of Hope to the Sterling Highway. The majority of the trail is historic. The trail has high recreation value, being heavily used by hikers, hunters, skiers, snowmobilers, mountain bikers, sport fishers, horseback riders, and others year-round. It is used for day hikes and single overnights, as well as by through-hikers and -bikers completing the entire trail. Residents enjoy the lower portion of the trail for repeated day hikes.

The Juneau Creek and Juneau Creek Variant alternatives would cross the Resurrection Pass Trail near Juneau Creek Falls on a new bridge located 3.4 miles northeast of the trail's existing Sterling Highway trailhead. The highway west of the trail crossing would roughly parallel the trail over most of the 3.4-mile trail segment leading up to the crossing but noise and visual impacts associated with the highway would be negligible for most of that distance. Most trail users would probably use the new trail crossing location along the highway alignment for access.

Trail users would be affected in the immediate vicinity of the new highway crossing, but also along the 3.4 miles downhill from the crossing and north of the crossing well into the 9 miles of the upper Juneau Creek valley. Placing a trailhead on the new highway corridor, 3.4 miles uphill from the existing trailhead, would effectively reduce the overall trail trip length by 9 percent for those using the entire trail. Use of the lower segment of trail would change because the existing Juneau Falls destination would essentially become road-accessible and hiking that trail segment would not be leading into the back country.

The trail portion north of the new highway would become much more accessible because the 700-foot elevation climb to that location would be eliminated and the distance to the relatively flat terrain of the upper valley and to Juneau Falls would be shortened. Access to four Forest Service backcountry recreation cabins and three lakes in the upper Juneau Creek valley would be substantially eased, which would benefit people presently inhibited from attempting to access this area and be an adverse impact to those that value the backcountry camping and cabins experience there precisely because of the effort it takes to reach the area. Reducing the long-distance trail experience by 9 percent would be an adverse impact to users for whom the Resurrection Pass Trail is one of few accessible, point-to-point, long-distance trails in Alaska. The new highway alignment would introduce new highway traffic noise deeper into the Juneau Creek valley.

The Cooper Creek and G South alternatives both would avoid any crossing of the trail.

3.2.5.4 Consideration of Property Ownership

Section "Property Acquisition" within Section 3.2.3.4 described the constraint that the need for relocations places on availability of the Cooper Creek Alternative. Here, the social effect is emphasized. The **Cooper Creek Alternative would displace eight households** (2.7 percent of the households in Cooper Landing) and comparable housing is not presently available in Cooper Landing. **Displacement of eight households, likely including some relocations to other communities, would represent a substantial adverse consequence to the human social environment.** None of the other build alternatives would displace households. The Cooper Creek Alternative also would use portions of many other private parcels, removing yard space, tree buffers, and undeveloped portions of properties that are valued by the owners and permanently altering driveways, sound levels, and the character of properties. While owners would be compensated for the fair market value of their property, the non-monetary impacts on individuals and the community would be high.

3.2.5.5 Community Character and Cohesion

Changes in community character resulting from the build alternatives are discussed in Section 3.3.2 of the FEIS. Residents and others expressed a range of opinion regarding effects on community character. All of the build alternatives would have positive effects on community character as a recreation- and tourist-oriented town because they would divert 70 percent of the highway traffic around some or all of the central business area of Cooper Landing (MP 47–50). Traffic conflicts along with the dust, noise, and visual effects of steady traffic in summer would be decreased. There would be a decrease in congestion, which would improve the travel experience for visitors, pedestrians, and residents, as well as local businesses that use the existing road in their daily business. Removing the through-traffic would make it easier for local residents to travel to and from community facilities and between neighborhoods and developed areas, which could improve community function and character within Cooper Landing, increase positive social interactions, and enhance the small town atmosphere. Improving the small town atmosphere could generally enhance Cooper Landing's reputation as a good place to visit.

The Cooper Creek Alternative would divert traffic around only part of the community. All of the traffic would still pass through the MP 47–48 part of the central business area and the highway would separate the MP 48–50 area from the part of the community along Snug Harbor Road. The Cooper Creek Alternative would also require highway widening through the community, which would increase the walkable distance between some homes and the highway and would decrease yard and driveway area. **Based on the comments received on the Draft SEIS, the adverse community impacts of the Cooper Creek Alternative would be substantial to the residents that live there.**

The other build alternatives would largely avoid direct community impacts and would benefit community character by routing 70 percent of the traffic around the core of the community. Travel within the community would be eased and the town would be quieter, calmer, and safer.

3.2.5.6 Wildlife Habitat

All four build alternatives would affect wildlife due to habitat loss, fragmentation, and a decrease in habitat quality; changes in behavior and movement to avoid the new highway; and potential injury or mortality from vehicle collisions. Habitat loss and fragmentation could displace bear and

moose, and more secretive species such as wolves, lynx, and wolverines, which prefer undisturbed habitat for foraging, denning, and resting. Physical features of the highway, especially steep embankments or retaining walls, may function as barriers to movement for moose, resulting in less use of their current range. Impacts to wildlife are described in detail in Section 3.22 of the FEIS and are summarized in Table 3-5 below for each build alternative.

The G South, Juneau Creek, and Juneau Creek Variant alternatives would eliminate and fragment habitat in a relatively undisturbed area north of the Kenai River, to varying degrees. The G South Alternative would eliminate 211 acres of habitat, while the Juneau Creek and Juneau Creek Variant alternatives would eliminate 262 acres and 257 acres, respectively. Impacts under these three build alternatives would extend into the Juneau Creek drainage, an important movement corridor and food resource for several wildlife species, and identified by an interagency team as important habitat for brown bears. A 2014 aerial survey identified five bald eagle nests within 660 feet of G South, one bald eagle nest within 660 feet of the Juneau Creek Variant, and no nests within this distance of the Juneau Creek Alternative. The G South Alternative would impact less wildlife habitat than the Juneau Creek alternatives, with the exception of potential impacts to nesting bald eagles.

The Cooper Creek Alternative would have the least impact to habitat compared to the other three build alternatives, with the exception of potential impacts to nesting bald eagles. The Cooper Creek Alternative would eliminate 190 acres of wildlife habitat south of the existing highway, extending into the Cooper Creek drainage. This alternative would not bisect as much undisturbed habitat as the other build alternatives, and brown bear use of the Cooper Creek corridor is lower than at other streams in the project area. The Cooper Creek Alternative likely would have less new noise impact on wildlife than the other three build alternatives because its segment built on a new alignment would not be as long. Seven bald eagle nests were identified within 660 feet of the Cooper Creek Alternative during the 2014 survey.

Table 3-5: Summary of build alternative impacts to wildlife habitat

	Alternative			
	Cooper Creek	**G South**	**Juneau Creek – the Proposed Project**	**Juneau Creek Variant**
Total length of alternative (miles)	14.2	14.2	14.7	14.3
Total length of new highway segment (miles)	3.5	5.6	10	9
Vegetated habitat loss in the project area (acres)	190	211	262	257
Length of alternative within bear use area (Map 3.22-1 of the FEIS)	2.7	3.5	4.3	4.4
Length of double highway barrier to movement within bear use area	0.15	0.9	3.9	3.6
Additional habitat avoidance area created by new alignment (acres)[a]	605	1,468	2,834	2,640
Length of alternative within moose habitat predicted use area (miles)	3.1	3.2	5.1	5.1
Quality of habitat lost	• Impacts Kenai River corridor and bench from Kenai Lake to Cooper Creek • Impacts areas and streams that have less intense brown bear use compared to other parts of project area	• Impacts high-quality brown bear movement and feeding corridors along Kenai River and lower Juneau Creek • Could permanently deter bear movement to and from these areas, and feeding in these areas	• Impacts high-quality brown bear movement corridor on bench area west of Juneau Creek and access to feeding/resting areas along Kenai River • Could permanently deter bear movement to and from these areas, and feeding in these areas	

[a] Acreage calculated using a 3,280-foot (1,000-meter)-wide roadway avoidance corridor, placed around the alignment centerline (500 meters to each side). See Section 3.22.3.2 of the FEIS.

Sources: Combes (2008), Larsen (2008), Waller and Servheen (2005).

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Table 3-6: Summary of other significant adverse environmental consequences

Environmental Impact Category	Juneau Creek Alternative– the Proposed Project	Cooper Creek Alternative	G South Alternative	Juneau Creek Variant Alternative
Sqilantnu Archaeological District - # of contributing properties affected	9	28	26	20
Confluence Traditional Cultural Property - Change in setting, feeling, and association of culturally important lands; other effects	Moderate; affects lands outside existing highway corridor but fewer individual properties affected	Moderate	Moderate	Major; affects lands outside existing highway corridor and near human burials; bisects Tract A
Kenai National Wildlife Refuge - wildlife habitat, designated Refuge, wilderness values (acres used)	14 (0 acres Wilderness, assuming land exchange occurs)	0	0	0
Resurrection Pass National Recreational Trail effects	Highway bridge crosses and effectively shortens trail	None	None	Highway bridge crosses and effectively shortens trail
Private, non-Native-Corporation property acquisitions necessary	Parts of 4 parcels, 0 requiring residential relocation	Total acquisition of 16 parcels, 8 requiring residential relocation. Parts of 22 parcels, 0 requiring residential relocation.	Parts of 4 parcels, 0 requiring residential relocation	Parts of 4 parcels, 0 requiring residential relocation
Community character and cohesion	Improved with removal of through traffic	Partly improved with removal of through traffic	Improved with removal of through traffic	Improved with removal of through traffic
Wildlife habitat impacts	Impacts high-quality brown bear movement corridor on bench area west of Juneau Creek and access to feeding/resting areas along Kenai River. Minimizes impacts to Kenai River and riparian corridor by moving highway farther away.	Reduces habitat south of the existing highway in the Cooper Creek drainage. Greatest impacts to Kenai River and riparian corridor.	Impacts high-quality brown bear movement and feeding corridors along Kenai River and lower Juneau Creek. Impacts to Kenai River and riparian corridor.	Impacts high-quality brown bear movement corridor on bench area west of Juneau Creek and feeding/resting areas along Kenai River. Minimizes risk to Kenai River and riparian corridor by moving highway farther away.
Summary of other significant adverse environmental consequences	Substantial adverse effects on archaeological historic properties, Resurrection Trail, and brown bears. Least adverse effects to Kenai River.	Substantial adverse social effects from acquiring property, and on archaeological historic properties. Substantial adverse effects to Kenai River.	Substantial adverse effects on archaeological historic properties and brown bears. Substantial adverse effects to Kenai River.	Severe adverse effects on archaeological historic properties. Substantial adverse effects on Resurrection Trail and brown bears. Least adverse effects to Kenai River.

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3.2.6 Least Environmentally Damaging Practicable Alternative

USACE determines which alternatives are practicable, and which among those is the least environmentally damaging. DOT&PF and FHWA suggest that the Juneau Creek Alternative—the proposed project—is one of two practicable alternatives; in addition, it is the least environmentally damaging of the alternatives and is the LEDPA.

The Juneau Creek Variant Alternative is not practicable because it requires use of land that is logistically unavailable. The Juneau Creek Variant Alternative would bisect CIRI conveyance Tract A, a highly significant archaeological historic property that is at the heart of the Confluence TCP. The adverse effect of the alternative cannot be mitigated. The Juneau Creek Variant Alternative would not result in the least overall harm under Section 4(f).

The Cooper Creek Alternative is also not practicable. The Cooper Creek Alternative would only marginally solve the identified transportation problems that drive the overall purpose of the project; its ability to meet the project purpose is low. The availability of the Cooper Creek Alternative is also constrained by logistics. Eight households would need to be relocated in the small community of Cooper Landing where comparable replacement housing does not presently exist. In addition, the noise impacts to two residential properties and one commercial property could not be mitigated. The Cooper Creek Alternative is also not the one FHWA has found to cause the least overall harm under Section 4(f) which means FHWA could not select or fund that alternative. The logistics of this alternative are further encumbered by the need to construct within the central commercial area of Cooper Landing. **In light of the Cooper Creek Alternative's low achievement of the overall project purpose and logistical constraints, the Cooper Creek Alternative not practicable.**

DOT&PF and FHWA suggest that the G South and Juneau Creek alternatives are both practicable. The Juneau Creek Alternative would eliminate about 50 percent more wetland acreage than the G South Alternative. However, the Juneau Creek Alternative would avoid construction of a new bridge and replacement of an existing bridge across the Kenai River, and avoid the need for temporary fill and coffer dams associated with their construction. The proposed Juneau Creek Alternative alignment would move the highway farther away from the Kenai River and its anadromous tributaries, thereby reducing the risk of hazardous substance spills into the Kenai River over the long term as well as during construction. The Juneau Creek Alternative would have the least overall adverse impacts to the Kenai River and its major tributaries, riparian and floodplain habitat along the Kenai River, and fisheries resources of any one of the build alternatives as it would move the greatest length of highway, away from the Kenai River. The Juneau Creek Alternative is preferred by DNR (DPOR) and ADF&G, the agencies with direct management jurisdiction over KRSMA. It is also supported by the EPA, as the LEDPA because it avoids impacts to the Kenai River and reduces the risk of spills into the river. **Given the biologic, economic, and recreational importance of protecting the Kenai River and specifically within the KRSMA, FHWA and DOT&PF have determined that the Juneau Creek Alternative would have the least adverse impact on aquatic ecosystems.**

The G South and Juneau Creek alternatives would have varying degrees of adverse environmental consequences**.** The G South Alternative would have moderate impacts to archaeological historic properties, but considerably more than the Juneau Creek Alternative. Both alternatives would avoid displacing households, would largely avoid direct community impacts, and would benefit

community character by routing 70 percent of the traffic around the core of the community. The G South Alternative would have no impact on KNWR, while the Juneau Creek Alternative (assuming that the KNWR land exchange is achieved) would impact 14 acres on the south side of the existing highway easement. The Juneau Creek Alternative would require crossing of the Resurrection Pass Trail, while the G South Alternative would avoid it. Both the G South and the Juneau Creek alternatives would have important impacts to wildlife habitat/movement corridors. While the Juneau Creek Alternative impacts greater acreage of wildlife habitat, the G South Alternative's crossing of Juneau Creek valley has potential to introduce more human activity into important bear habitat (see Section 3.22.3.2 of the FEIS for full discussion of wildlife mitigation proposed for each of the alternatives). Finally, the G South Alternative would have greater adverse effects to the in-stream and riparian habitat of the Kenai River and KRSMA compared to the Juneau Creek Alternative.

If upon review of a permit application USACE determines other project alternatives are practicable, this analysis should lead to a determination that the **Juneau Creek Alternative—DOT&PF and FHWA's proposed project—is the LEDPA.**

4 Findings Related to Significant Degradation of the Aquatic Ecosystem

The restriction on discharge described in 40 CFR 230.10(c) specifies that no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the U.S. Findings with respect to significant degradation are to be based on factual determinations, evaluations, and tests described elsewhere in the Guidelines. The restriction on discharge described in 40 CFR 230.10 (b) prohibits permitting of discharges that would violate state water quality standards, toxic effluent standards, or prohibitions; or would jeopardize a listed threatened or endangered species (paraphrased). Information needed to determine whether the proposed project would comply with these restrictions is summarized in this chapter.

In USACE's decision-making process, if the applicant's proposed project is determined to be the LEDPA, the findings with respect to the other restrictions on discharge are made just for that proposed alternative. Therefore, this chapter presents the information needed to determine compliance just for the Juneau Creek Alternative.

Activities associated with the proposed project, which fall under the jurisdiction of USACE under Section 404, are those that involve discharge of dredged or fill material into waters of the U.S. The following are the project activities that are considered in the factual determinations because they would entail discharge of dredged or fill material into waters of the U.S. and thus fall under Section 404 jurisdiction:

- Crossing of approximately 63 smaller streams and drainages using culverts;
- Placement of permanent fill in approximately 39 acres of wetlands and ponds;
- Placement of additional fill for river bank stabilization in one location along the edge of the Kenai River at the western edge of the project area; and
- Placement of temporary fill in 5.9 acres of wetlands and waterbodies for construction staging and temporary access.

Table 4-1 lists in the first column the topics of the factual determinations to be made under 40 CFR 230.11 and the evaluation factors described in 40 CFR 230.20 through 230.61, along with the Guidelines reference. The second column lists the locations in the FEIS where each of the topics is discussed in more detail. This chapter discusses the proposed project—specifically, its Section-404-jurisdictional features—with respect to each of these factors in the order they are listed in Table 4-1. That analysis is used to determine whether the proposed project would cause significant degradation of the aquatic ecosystem.

Table 4-1: Factual determination and technical evaluation factors crosswalk to FEIS information sources

Factual Determination or Evaluation Factor (pertinent 40 CFR paragraph reference)	Location in the FEIS Where Information is Presented
Substrate (230.20 and 230.11(a))	3.12-Geology and Topography 3.20-Wetlands and Vegetation
Water (230.22 and 230.11(b))	3.13-Water Bodies and Water Quality
Current patterns and water circulation (230.23 and 230.11(b))	3.13-Water Bodies and Water Quality
Normal water fluctuations (230.24 and 230.11(b))	3.13-Water Bodies and Water Quality
Salinity gradients (230.25 and 230.11(b))	Not applicable
Suspended particulates/turbidity (230.21 and 230.11(c))	3.13-Water Bodies and Water Quality
General evaluation of dredged and fill material (230.60 and 230.11(d))	3.17-Hazardous Waste Sites and Spills 3.26 - Irreversible and Irretrievable Commitments of Resources
Proposed disposal site evaluation (230.11(f))	Not applicable
Threatened and endangered species (230.30 and 230.11(e))	3.22-Wildlife
Fish, crustaceans, mollusks, and other aquatic organisms in the food web (230.31 and 230.11(e))	3.20-Wetlands and Vegetation 3.21-Fish and Essential Fish Habitat
Wildlife (230.32 and 230.11(e))	3.22-Wildlife
Special aquatic sites (230.40 through 230.45 and 230.11(e))	3.1-Land Ownership 3.20-Wetlands and Vegetation 4.0-4(f) Evaluation
Municipal and private water supplies (230.50)	3.11-Utilities 3.13-Water Bodies and Water Quality
Recreational and commercial fisheries (230.51)	3.8-Park and Recreation 3.21-Fish and Essential Fish Habitat 4.5.3-4(f) Impacts of the G South Alternative
Water-related recreation (230.52)	3.8-Park and Recreation 3.21-Fish and Essential Fish Habitat 4.5.3-4(f) Impacts of the G South Alternative
Aesthetics (230.53)	3.15-Noise 3.16-Visual Environment
Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves (230.54)	3.2-Land Use Plans and Policies 3.8-Park and Recreation 3.9- Historic and Archaeological Preservation 4.0-4(f) Evaluation
Secondary Effects (230.11(h))	3.13-Water Bodies and Water Quality 3.17-Hazardous Waste Sites and Spills 3.20-Wetlands and Vegetation 3.21-Fish and Essential Fish Habitat 3.22-Wildlife 3.8-Park and Recreation
Cumulative Effects (230.11(g))	3.27-Cumulative Impacts

4.1 Direct effects

4.1.1 Substrate (230.20 and 230.11(a))

The substrate of aquatic resources located in the project area is described in Sections 3.12 and 3.20 of the FEIS and summarized below. The project area is located in a deep glacial valley that trends east-west through the Kenai Mountains. The terrain varies from steep and mountainous to level benches bordered by steep side slopes above the floodplain of the Kenai River, to floodplains. Alluvial and till benches, as well as the original glacial valley floor, have been carved deeply by erosion from the Kenai River and its tributaries. Soils in the project area range from thin soils on steep topography to deep soils on alluvial benches that may be either well-drained or overlie deposits of relatively impermeable glacial till that causes poor drainage. The well-drained soils of all depths are generally sandy loams. In addition, there are some poorly drained wetland areas with sphagnum peat deposits.

The proposed project would impact aquatic substrates through permanent placement of approximately 770,000 cubic yards of fill in 39.2 acres of waters of the U.S. to construct roadway embankment, culvert crossings, and riverbank stabilization. In addition, the proposed project would temporarily impact 5.9 acres of waters of the U.S. through placement of temporary fill for staging areas and through temporary disturbance (e.g., soil compaction, minor re-grading, and erosion) by construction equipment operation around cut or filled areas. The project would construct one new bridge that would span Juneau Creek. Retaining walls would be used on these alternatives in the area west of Juneau Creek and between Juneau Creek at the intersection with the existing highway. The impacts associated with this alternative would primarily be aesthetic. However, construction of the new bridge crossing may require excavation and/or blasting, which would change the topographic contours and remove rock and soils.

4.1.2 Water (230.22 and 230.11(b))

Water resources located in the project area are described in Section 3.13 of the FSEIS and summarized below. Major water bodies within the project area are Kenai Lake and the Kenai River and its tributaries: Fuller Creek, Russian River, Juneau Creek, Cooper Creek, and Bean Creek. In addition, the project area includes 4,405 acres of wetlands and ponds, and dozens of smaller streams and drainages (Section 4.1.12). In 2006, the lower 19 miles of the Kenai River was listed by the State of Alaska as impaired under Section 303(d) of the Clean Water Act due to exceedance of State of Alaska Water Quality Standards established for Total Aromatic Hydrocarbons attributed to unburned gasoline released from older, two-stroke boat motors used for sport and personal use fisheries. The impairment area is downstream and entirely outside of the project area. The existing highway does not meet current stormwater management standard practices for drainage and stormwater runoff; however, no cases of nonpoint pollution that exceed permissible limits for roadway runoff have been documented within the project area.

Long-term direct impacts on waterbodies and water quality would result from construction of culverts, and from placement of fill in waters, including wetlands, for new roadway embankment. Waterbodies adjacent to the fill footprint may experience both temporary and long-term indirect impacts to water quality from road runoff. Soil exposed during construction may be more prone to erosion, which may result in short-term turbidity and sedimentation increases in the Kenai River

(for riprap placement at one site on the river) and other streams in the project area. Long-term indirect effects could include increased stormwater runoff into project area waterbodies because the project area would have less vegetation and more paved surface area. However, impacts to water quality from roadway runoff are expected to be negligible in the project area due to the relatively low traffic volumes and proposed mitigation. Additional river bank stabilization could result in sedimentation patterns where the river bank would be different from natural river banks, which erode or accumulate material and allow the river course to change over time. However, because the areas of river bank stabilization are principally areas where armoring is already in place, these changes are expected to be minor. The amount of riprap fill would be minimized through the use of steeper slopes and retaining walls where feasible.

Both temporary and long-term water quality impacts would be minimized by the use of best management practices (BMPs) and the implementation of an approved Storm Water Pollution Prevention Plan (SWPPP), and incorporation of stormwater treatment design features developed in accordance with the DOT&PF's Alaska SWPPP Guide (DOT&PF 2011d) and the Alaska Department of Environmental Conservation's (ADEC) *Storm Water Guide* (ADEC 2011a). Proposed mitigation measures are described in Section 5. The Clean Water Act assigns responsibility for control of non-point sources of pollution to the states. Certification of compliance with applicable effluent limitations and water quality standards required under provisions of Section 401 of the Clean Water Act will be considered conclusive with respect to water quality considerations unless the EPA advises of other water quality aspects to be taken into consideration. Based on evaluation of potential impacts including consideration of the State of Alaska's 401 certification process and implementation of avoidance and minimization measures, no long-term water quality impacts are expected to result from the proposed project.

4.1.3 Current Patterns and Water Circulation (230.23 and 230.11(b))

Water bodies located in the project area are described in Section 3.13 of the FEIS and summarized in Section 4.1.2 above. Long-term direct impacts on current patterns and water circulation would result from construction of new and replacement culverts, placement of fill in waterbodies including wetlands for new roadway embankment, and one longitudinal fill in the Kenai River; new fill could alter or redirect flow and increase stormwater runoff. Runoff would enter streams, stream reaches, and drainages not previously receiving storm water pollutants. Impacts from new sources or increased levels of storm water runoff are not anticipated to substantially affect water quality in surface waters, including surface waters that may be used as drinking water by homeowners or by recreationalists, whether they are managed under formal surface water rights or not. Similarly, runoff from the highway is not expected to substantially impact wells and wellhead protection areas. However, these impacts would be minor because the proposed project would maintain all existing surface water courses and existing surface water drainage patterns to the extent that is practical. Construction of a new, full span bridge over Juneau Creek would not require piers or fill below ordinary high water of Juneau Creek or near the creek. No adverse effects to Juneau Creek are expected.

Installation of 41 new culverts along the proposed project alignment could alter natural flow patterns in streams at the location of the crossings, and possibly immediately upstream and downstream. However, these impacts would be minimized through proper culvert sizing and placement. Furthermore, replacement of 20 existing culverts is expected to lead to better

management of water flows than existing culverts because knowledge and design standards have improved since the culverts were first installed. Additional river bank stabilization could alter water circulation because stabilized river banks would not experience the same degree of erosion or sediment accumulation as natural river banks. However, because the areas of river bank stabilization are principally areas where armoring is already in place, these changes are expected to be minor. The amount of fill would be minimized in such areas through the use of steeper slopes and retaining walls where feasible.

Impacts to current patterns and water circulation would be minimized by the use of BMPs and minimization of fill in existing surface water courses. Additional measures, including contouring reconstructed stream banks at stream crossings to approximate original conditions, would also be implemented to minimize potential impacts. Proposed mitigation measures are described in Section 5. Based on evaluation of potential impacts and implementation of avoidance and minimization measures, impacts to current patterns and water circulation are anticipated to be minor.

4.1.4 Normal Water Fluctuations (230.24 and 230.11(b))

Water resources located in the project area are described in Section 3.13 of the FEIS and summarized in Section 4.1.2 above. Long-term direct impacts on water fluctuations would occur as a result of construction of new and replacement culverts, from placement of fill in waterbodies, including wetlands for new roadway embankment and placement of additional fill for river bank stabilization in one location along the edge of the Kenai River. New fill could increase stormwater runoff and alter the timing of surface water movement, including flood flows, in the project area. These impacts would be minor, as the proposed project would maintain all existing surface water courses and natural drainage patterns to the extent that is practical, and the highway, including bridges and culverts, would be designed to accommodate predicted high water flows. Impacts to water fluctuations would be similar to those described for current patterns and water circulation in Section 4.1.3 above.

Impacts to water fluctuations would be minimized by the use of BMPs and minimization of fill in existing surface water courses. Proposed mitigation measures are described in Section 5. Based on evaluation of potential impacts and implementation of avoidance and minimization measures, impacts to water fluctuations are anticipated to be minor.

4.1.5 Salinity Gradients (230.25 and 230.11(b))

All waterbodies within the project area are fresh. The project area is located approximately 70 miles upriver from its outlet into Cook Inlet, the closest saline waterbody. As a result, the proposed project would have no effect on salinity gradients.

4.1.6 Suspended Particulates/Turbidity (230.21 and 230.11(c))

Water resources of the project area are described in Section 3.13 of the FEIS and summarized in Section 4.1.2 above. Long-term impacts on suspended particulates and turbidity in project area waterbodies could result from construction of new and replacement culverts, placement of fill in waterbodies including wetlands for new and wider roadway, and placement of additional fill for river bank stabilization in one location along the edge of the Kenai River. Such impacts could

result from increased stormwater runoff into project area waterbodies because the project area would have less vegetation and more paved surfaces. Runoff would enter streams, stream reaches, and drainages not previously receiving storm water pollutants. Impacts from new sources or increased levels of storm water runoff are not anticipated to substantially affect water quality in surface waters, including surface waters that may be used as drinking water by homeowners or recreationalists, whether they are managed under formal surface water rights or not. Similarly, runoff from the highway is not expected to substantially impact wells and wellhead protection areas. Overall, impacts from roadway runoff are expected to be negligible in the project area due to the relatively low traffic volumes.

Additional river bank stabilization could result in minor changes in sedimentation where the river bank would be altered from natural river banks, which erode or accumulate material and allow the river course to change over time. However, because the areas of river bank stabilization are principally areas where armoring is already in place, these changes are expected to be minor.

Waterbodies adjacent to construction activities may also experience temporary water quality impacts because areas actively under construction may have exposed soil, which is more prone to erosion. Specifically, bridge construction and removal, culvert installation, and river-bank stabilization may result in short-term turbidity increases and sedimentation in the Kenai River and other streams in the project area.

Both temporary and long-term water quality impacts will be minimized by the use of BMPs and the implementation of an approved SWPPP. Proposed mitigation measures are described in Section 5. Based on evaluation of potential impacts, including consideration of the State of Alaska's 401 certification process, and implementing avoidance and minimization measures, impacts related to changes to suspended particulates and turbidity are expected to be minor.

4.1.7 General Evaluation of Dredged and Fill Material (230.60 and 230.11(d))

The factual determinations within the Guidelines require a determination of the degree to which the material proposed for discharge could introduce, relocate, or increase contaminants. This determination considers the material to be discharged, the aquatic environment at the proposed disposal site, and the availability of contaminants. Nineteen known hazardous waste and spill sites exist in the project area. Of these, 17 have been closed, closed with institutional controls, or designated as No Further Action by the ADEC. It is anticipated that the remaining two open sites would be resolved and closed prior to any construction. Existing hazardous waste sites and spills located in the project area are described in Section 3.17 of the FEIS.

Based on preliminary engineering, the approximate type and volume of fill material needed for proposed project construction includes 671,000 cubic yards of borrow/aggregate, 11,000 cubic yards of riprap, and 55,900 cubic yards of asphalt/concrete (Section 3.26 of the FEIS). Borrow/aggregate material for the proposed project would be obtained from cut activities proposed along the proposed alignment or from commercial material sources. Riprap and asphalt/concrete would be obtained from commercial sources.

Borrow/aggregate material obtained within the project area would be evaluated as part of further investigation into known and suspected contaminated sites for the proposed project following the FHWA Record of Decision on the FEIS (Section 3.17). This would include a Phase I Environmental Site Assessment conducted in accordance with the American Society for Testing

and Materials Standard E1527-05 to identify recognized environmental conditions that could affect the preferred alternative such as the likely presence of hazardous materials. If the Phase I Environmental Site Assessment determined that hazardous material presence was likely, a Phase II site investigation would be conducted to determine additional details regarding the site and develop an approach to design and construction to avoid and minimize contamination to the extent practicable.

Hazardous materials used during project construction would be stored and handled according to State and Federal regulations. As part of standard specifications for highway construction, the contractor would develop a Hazardous Material Control Plan and a Spill Prevention, Control, and Countermeasure Plan. Detailed BMPs and housekeeping measures regarding hazardous materials would be outlined in a site-specific Hazardous Material Control Plan, which is a required part of the contractor's SWPPP.

Additional aggregate fill material as well as riprap and materials to mix the asphalt/concrete for the project would be obtained from clean areas within cuts in the proposed alignment or from permitted, existing commercial material sources. There is no reason to believe the existing material sources would contain contaminants.

Based on evaluation of the information above, there is no reason to believe that any of the material to be discharged into waters of the U.S. would contain contaminants. DOT&PF would further minimize the potential for impacts related to contaminants in fill material by ensuring that any rock material imported for placement in and along the Kenai River is clean prior to use.

4.1.7.1 Chemical, Biological, and Physical Evaluation and Testing (230.61)

DOT&PF suggests that the fill proposed for placement during construction meets the testing exclusion criteria because there is no reason to believe that the proposed fill material would be a carrier of contaminants. Further, for areas where there may be a higher probability that the materials proposed for discharge are a carrier of contaminants, there are controls in place, as described above, to reduce potential contamination to acceptable levels at the disposal site and to prevent contaminants from being transported beyond the boundaries of the disposal site into waters of the U.S.

4.1.8 Proposed Disposal Site Evaluation (230.11(f))

Proposed disposal site evaluations consider potential mixing zones in light of the depth of water at the disposal site; current velocity, direction, and variability at the disposal site; degree of turbulence; water column stratification; discharge vessel speed and direction; rate of discharge; dredged material characteristics; number of discharges per unit of time; and any other relevant factors affecting rates and patterns of mixing. The Guidelines state that the mixing zone associated with each specified disposal site shall be confined to the smallest practicable area consistent with the type of discharge dispersion being used. There are not open water disposal sites proposed as part of the project. Riprap placed for bank stabilization along the Kenai River would remain at the site on which it was placed.

4.1.9 Threatened and Endangered Species (230.30 and 230.11(e))

Threatened and endangered species determinations consider the extent to which the proposed fill would result in impacts to listed threatened and endangered species including direct mortality, destruction or alteration of habitat, or facilitation of incompatible activities.

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended, 16 USC§1531 *et seq.*), FHWA initiated informal Section 7 consultation with letters to both USFWS and the National Marine Fisheries Service requesting concurrence that endangered, threatened, or candidate species or their habitat would not be affected by the project. USFWS and National Marine Fisheries Service responded with letters of concurrence stating that no ESA-listed species occur in the project area, thus concluding the Section 7 consultation (Balogh 2006, Mecum 2006). Recent review of the USFWS and the National Oceanic and Atmospheric Administration (NOAA) websites verified that no ESA-listed species are present in the project area (USFWS 2013, NOAA 2013). Therefore, the proposed project would not affect listed threatened or endangered species.

No State-listed endangered species are known to occur in the project area as of August 2013 (ADF&G 2013); therefore, the proposed project would not adversely affect State-listed endangered species.

4.1.10 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web (230.31 and 230.11(e))

Aquatic organism determinations consider the extent to which the proposed fill would result in impacts to the structure and function of the aquatic ecosystem and the organisms, including fish, invertebrates, and other aquatic organisms, which it supports. Aquatic organisms present in the project area are described in Section 3.21 of the FEIS and are summarized below.

Within the project area waters, the Kenai River drainage supports 18 species of resident and anadromous fish during some part of their life cycles. The Kenai River and several tributary streams are known to provide EFH for Chinook, sockeye, coho, pink, and chum salmon. Wetlands adjacent to fish-bearing streams support resident and anadromous fish and provide nutrients to the aquatic ecosystem. The proposed project would eliminate 39.2 acres of wetlands, including 4.2 acres of wetlands identified as potential fish habitat[4] and 37.4 acres that support organisms in the aquatic food web (Section 3.20). The proposed project would also eliminate or alter approximately 0.2 acre of known riverine EFH by placing riprap for bank stabilization in the Kenai River and installing culverts in Fuller Creek. The crossing of Bean Creek would use a fish passage culvert placed above the documented anadromous fish reach. Impacts to fish and other aquatic organisms from the relatively minimal loss of habitat are expected to be minor.

In addition to eliminating stream and riparian habitat, culverts permanently alter stream flow, may affect fish passage (making it potentially more difficult or easier for fish to pass), and reduce habitat quality where natural habitat would be altered. Impacts to fish-bearing streams would be

[4] Fish habitat, as considered in the wetland functional assessment, includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams, (2) wetlands with surface water and a defined and consistent inlet and outlet, (3) wetlands bordering streams and ponds that may provide shade over areas of open water enhancing fish habitat, and (4) wetlands that have plant species that annually produce large quantities of biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

minimized by installing culverts designed to maintain fish passage. Where old culverts under the existing highway would be replaced with new culverts, they would be built to modern standards, which could in some cases improve fish passage.

Although in-stream work would be timed to minimize potential adverse effects to fish eggs incubating in the streambeds, placement of culverts in fish-bearing streams could temporarily affect anadromous and resident fish populations by increasing turbidity or sedimentation downstream. Sedimentation could suffocate incubating eggs downstream as well as affect rearing and foraging of juvenile fish. Direct disturbance of habitat from in-water work and siltation downstream could temporarily displace fish. Where streams would need to be temporarily diverted during culvert installation, the streambed would be temporarily altered. Construction in or near fish habitat would temporarily impair the habitat function. Impacts to fish would be minimized by limiting in-water work to a window that would avoid critical life cycle impacts. Impacts specific to water quality are discussed in Section 4.1.2. Proposed mitigation measures are described in Section 5.

The bridge across Juneau Creek would not require placing permanent fill below the ordinary high water mark and therefore would not eliminate EFH.

4.1.11 Wildlife (230.32 and 230.11(e))

This section considers the extent to which the proposed fill would result in impacts to resident or transient wildlife species associated with the aquatic ecosystem including potential loss or alteration of wildlife habitat. Wildlife associated with aquatic ecosystems includes mammals, birds, and amphibians. More than 175 species reside in or seasonally use the Kenai River basin (USFWS 2014). Section 3.22 of the FEIS identifies wildlife species known or likely to occur in the general area and summarizes population information, management status, habitats, selected life histories, mortality factors, and current conditions in the project area.

The proposed project would affect wildlife due to habitat loss, fragmentation, and a decrease in habitat quality; changes in behavior and movement to avoid the new highway; and potential injury or mortality from vehicle collisions. Affected wildlife habitat would include wetlands and other waters of the U.S., riparian and forested areas, shrub thickets, and meadows. The proposed project would eliminate 39.2 acres of wetlands and ponds, of which 36.9 acres are identified to support wildlife according to the project's wetland functional assessment. Brown bear and moose are two of nine species selected for in-depth analysis in the FEIS because of their status with State and Federal agencies and because of their susceptibility to project impacts (Ruediger 2004).

4.1.11.1 Mammals

The project would eliminate 262 acres of vegetated brown bear habitat and 275 acres of moose habitat, including 36.9 acres of wetlands and ponds identified as supporting wildlife (according to the wetland functional assessment). Approximately 25 percent of this habitat would be eliminated from areas identified by wildlife and land managers as important migration corridors and food resources for bears, moose, and other wildlife. A minor but permanent additional loss of mammal habitat would occur with the placement of riprap and fill for culverts below the ordinary high water mark at stream crossings.

Riparian areas support preferred browse species for moose and provide important moose calving and wintering habitats. Brown bears on the Kenai Peninsula heavily use areas within approximately 6,560 feet (2,000 meters) of salmon spawning areas. The 10-mile segment of roadway built would add an infrastructure barrier to wildlife movement that does not exist between approximately MP 50 and 53 on the north side of the Kenai River. Approximately 3.9 miles of this new east-west barrier to wildlife movement would be roughly parallel to the impediments created by the existing highway and the Kenai River, presenting a parallel, double roadway barrier to brown bear movement with the old highway, thereby reducing bear habitat quality. Construction activities in the vicinity of anadromous fish streams could temporarily displace bears that typically fish in these waterways and increase competition among bears at other fishing sites. Impacts to fish, a primary food source for bears, are discussed in Section 4.1.10 above. The proposed project would fragment undisturbed habitat and alter wildlife movement[5]. During and after construction, habitat quality would potentially be reduced. While the proposed new bridge at Juneau Creek would span the lower Juneau Creek drainage and allow bear passage up and down the stream corridor, highway approaches likely would alter bear movements in and out of the canyon. Physical features of the highway, especially steep embankments and retaining walls, may function as barriers to movement for moose, resulting in less use of their current range. Habitat fragmentation and avoidance of habitat improvement areas and other areas predicted for use by moose could add to the nutritional stress on moose during winter.

Increased noise pollution may cause wildlife to avoid this drainage, resulting in increased densities elsewhere in potentially lower quality habitat or exposure to increased predation. These alternatives would also bisect an area of moose habitat located between MP 51 and 56, north of the current alignment. Increased noise could result in avoidance of these areas. The proposed project would result in lower traffic noise impacts to moose habitat along the Kenai River, approximately between MP 48 and 54. While this area would continue to experience traffic noise from the existing highway alignment, the traffic volume and predicted noise would be less.

Habitat loss and fragmentation could displace secretive species, such as wolves, lynx, and wolverines that prefer undisturbed habitat for foraging, denning, and resting. Mitigation of impacts to wildlife are described in Chapter 5 below and in Section 3.22.3 of the FEIS.

4.1.11.2 Birds

A variety of waterbirds, raptors, landbirds, and upland game birds occur, at least seasonally, within the project area. Many of these bird species depend on wetland, pond, and riverine habitats during all or part of their life cycles. The proposed project would eliminate 262 acres of bird habitat, including 36.9 acres of wetlands and ponds identified as wildlife habitat in the wetland functional assessment. The project would also eliminate habitat along streams due to vegetation clearing, riprap placement, and culvert installation, resulting in a small loss of breeding and nesting areas, particularly for waterbirds. Other impacts would include disturbance and displacement from construction activities and direct mortality from collisions with vehicles and structures. Some

[5] Of particular concern is restriction to brown bears that move between salmon streams on either side of the Kenai Mountains, including lower Juneau Creek and the Kenai River within the project area. The Juneau Creek drainage also provides valuable escape cover from predators.

individuals could experience lowered productivity resulting from nest or brood abandonment, and erratic sleeping and feeding patterns resulting from disturbance.

A 2014 aerial survey identified eight active bald eagle nests along the existing highway[6]. USFWS recommends 330-foot primary and 660-foot secondary buffer zones between bald eagle nests and disturbance activities (USFWS 2007). There are no documented bald eagle nests within 660 feet of the proposed roadway alignment. The improvements to the existing highway would eliminate some riparian habitat that could affect bald eagle nesting, roosting, and foraging areas in the project area. Prior to construction, a survey would be conducted to reassess the activity of the nests in the project area and to determine whether new nests have been constructed. DOT&PF would work with USFWS to determine a mitigation plan, including potential monitoring, to avoid and minimize impacts on nesting bald eagles. Mitigation of impacts to birds are described in Section 5 below and in Section 3.22.6 of the FEIS.

4.1.11.3 Amphibians

Wood frogs likely occur in the project area wetlands and hibernate under forest litter and snow (MacDonald 2003). Widening segments of the existing Sterling Highway and building the new segments of the proposed project would eliminate 39.2 acres of wetlands and ponds, as well as fragment remaining habitat. New culverts would reduce the quality of habitat for wood frogs, although requirements for fish passage would be met wherever necessary and these would also minimize impacts to wood frogs.

4.1.12 Special Aquatic Sites (230.40 through 230.45 and 230.11(e))

Special aquatic sites are areas that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. Special aquatic sites located within the project area and potential impacts to these areas are described in Sections 3.1 and 3.20 and Chapter 4 of the FEIS, and are summarized below.

4.1.12.1 Sanctuaries and Refuges (230.40)

The project area overlaps approximately 2,885 acres of the KNWR. Outside the existing Sterling Highway right-of-way and parallel power transmission line, the portion of the project area within the KNWR is primarily undeveloped land. The KNWR area north of the power transmission line is the Mystery Creek Wilderness, a Federally designated Wilderness area. South of the highway and Kenai River is another KNWR Wilderness unit, the Andrew Simons Wilderness. The proposed project would use approximately 33 acres of land currently designated as KNWR, a Federal refuge. However, assuming the land exchange occurs and the Wilderness boundary is shifted to the north, the proposed project would impact 14 acres of lands within KNWR.

[6] Bald eagles nesting in this area may be habituated to the noise and movement from traffic on the existing highway since they consistently nest in this area.

4.1.12.2 Wetlands (230.41)

Wetlands in the project area are described in Section 3.20.1 of the FEIS and summarized below. Approximately 10 percent of the project area is composed of wetlands (429 acres) and ponds (11 acres). Wetlands identified within the project area are palustrine and generally located adjacent to streams, on floodplains, and on benches on the mountain slopes. Table 4-2 details the mapped acreage of wetland types present in the project area. Most wetlands in the project area are connected by tributaries to the Kenai River system and likely perform important hydrological, ecological, and water quality functions as well as provide services to humans.

Table 4-2: Mapped wetlands and ponds and impacts of the Juneau Creek Alternative

Wetland Type	Total Mapped Wetlands (acres)[a]	Permanent Direct Impacts (acres)	Temporary Construction Impacts (acres)
Forested Wetland	223.5	24.7	3.6
Deciduous Shrub Thicket Wetland	63.0	4.8	0.8
Shrub-Dominated Bog/Fen Wetland	64.0	2.5	0.5
Emergent Wetland	78.6	6.1	1.0
Pond	10.6	1.1	0.3
Total	**439.7**	**39.2**	**5.9**

[a] Acreage differs slightly from those reported in HDR (2010c) due to minor updates of project area wetlands mapping conducted since 2010. The total mapped area is 4,557 acres including 3,814 acres of uplands and 303 acres of Kenai Lake and River.

Wetland impacts resulting from the proposed project are described in detail in Section 3.20.2 of the FEIS and summarized below. The Juneau Creek Alternative would result in the loss of 39.2 acres of palustrine wetlands through the placement of approximately 742,460 cubic yards of gravel fill (Section 3.20.2.6 of the FEIS). A 300-foot margin around the cut and fill limits represents an approximate area potentially indirectly affected, for example by changes to drainage patterns, increases in pollutant inputs, and changes in plant species composition as a result of disturbance and introduction of non-native species;. Approximately 172 acres of wetlands are located within this area of indirect impacts. Finally, 5.9 acres of wetlands would be temporarily impacted during construction as a result of temporary fill for staging areas or being within a 10-foot margin around cut and fill limits (Section 3.20.2.3 of the FEIS).

The wetland functions expected to incur the greatest impact, based on acreage, are food chain support, wildlife habitat, sediment retention and pollution removal, and groundwater recharge (Table 4-3). Note that acres lost by function does not match acres lost by type (Table 4-2), because a given wetland may perform multiple functions. DOT&PF and FHWA have proposed a categorization of wetlands based on the results of the functional assessment, with wetlands performing multiple functions at moderately high levels being assigned to a category indicating higher ecological value and wetlands performing certain highly valued functions also being assigned to higher-value categories. Category 1 represents the more highly valued wetlands,

Category 2 is for moderately-valued wetlands, and Category 3 includes the most common, relatively low-value wetlands. Most of the wetlands that would be affected by the proposed project are in Category 2 (approximately 20 acres) and Category 1 (approximately 19 acres) (see Table 4-4).

Table 4-3: Direct wetland impacts by wetland function

Wetland Function	Acres
Groundwater recharge	28.1
Groundwater discharge	10.8
Stream flow moderation	5.3
Shoreline, stream bank, and soil stabilization	2.9
Sediment retention and pollution removal	37.5
Food chain support	37.4
Wildlife habitat	36.9
Fish habitat[7]	4.2
Human non-consumptive values and uses	2.5
Human consumptive values and uses	0.0
Uniqueness and heritage	7.6

Table 4-4: Direct wetland impacts by wetland management category

Wetland Management Category	Acres
Category 1	18.8
Category 2	19.7
Category 3	0.7

Measures to mitigate impacts to wetlands are discussed in Section 5 below and Section 3.20 of the FEIS.

4.1.12.3 Riffle and Pool Complexes (230.45)

Riffle and pool complexes present in the project area are described in Section 3.21 of the FEIS and summarized below.

Within the project area, riffle and pool complexes are present in Bean, Cooper, and Fuller creeks. The proposed project would directly impact approximately 0.06 acre of riverine habitat, likely including riffle and pool complex habitats, as a result of the installation of culvert crossings of Bean and Fuller creeks. However, there would be minimal permanent loss of riverine habitat resulting from these culvert crossings and the required culvert design features would preserve fish

[7] Fish habitat includes (1) wetlands with open water and ponds that are adjacent to mapped fish streams; (2) wetlands with surface water and a defined and consistent inlet and outlet; (3) wetlands bordering streams and ponds that may provide shade over areas of open water, enhancing fish habitat; and (4) wetlands that have plant species that typically produce large quantities of annual biomass (e.g., leaves, stems, and seeds) that fall to the ground, decompose, and are exported to downstream aquatic habitats.

passage. Riffle and pool habitats in Bean and Fuller creeks adjacent to the fill footprint and installed culverts may experience both temporary and long-term indirect impacts as a result of changes in water quality from road runoff, alteration of stream flow, or other changes in habitat quality. The potential for these impacts on riffle and pool complexes in Bean and Fuller creeks would be minimized by the use of best management practices and the implementation of an approved SWPPP. Proposed mitigation measures are described in Section 5 below and Section 3.21 of the FEIS. Riffle and pool complexes in Cooper Creek would not be directly or indirectly impacted by the proposed project.

4.1.12.4 Other Special Aquatic Sites (230.42 through 230.44)

There are no known mud flats, vegetated shallows, or coral reefs within the project area and no impacts to these special aquatic sites are anticipated.

4.1.13 Municipal and Private Water Supplies (230.50)

Private and municipal water supplies present in the project area are described in Section 3.11 of the FEIS and are summarized below.

Cooper Landing and the surrounding area are rural and do not have a highly developed utility infrastructure. No municipal water supplies exist within the project area. Two-thirds of homes in the Cooper Landing area, as well as the school, use individual water wells, and are completely plumbed. A few property owners in the Cooper Landing area use surface water sources as their drinking water, including Slaughter Creek specifically. Impacts from new pollutant sources or increased storm water runoff are not anticipated to substantially affect water quality in surface waters that may be used as drinking water by homeowners. Similarly, runoff from the highway is not expected to substantially impact wells and wellhead protection areas. The few Cooper Landing homeowners who use surface water sources as drinking water may feel they need to drill a well or install a filtering system.

4.1.14 Recreational and Commercial Fisheries (230.51)

There are no commercial fisheries in waters within the proposed project area. Recreational fisheries are discussed in Sections 3.8, 3.21, and 4.5.3 of the FEIS and are summarized below. Potential impacts to aquatic organisms, including fish, are described in Section 4.1.10 above.

The project area draws recreation users from around the State and tourists from around the world for a wide variety of recreational pursuits, including sport fishing. The upper Kenai River and its tributaries (including the Russian River) support 34 species of fish. The Kenai River is considered a sport fishing "paradise" and is the most heavily used river in Alaska for freshwater sport fishing. The Kenai River recreational fishing effort is approximately 15 percent of the statewide total (DNR, ADF&G, KPB 1997). Approximately 325,000 to 415,000 angler-days were recorded on the Kenai River annually between 2005 and 2009, although this value may underestimate actual use because of the number of anglers who park on the road and hike in as opposed to those using developed recreational access. Heavy use of the project area by recreational fishers has resulted in portions of the river becoming "overwhelmed by users during the peak fishery periods," damaging habitat near popular sites and along fragile stream banks, where the "number of users far exceed site capacities," especially on undeveloped public land and at public facilities (DNR, ADF&G,

KPB 1997). Some of the recreational fishing is led by commercial fishing guides that operate on the Kenai River. Not only is the Kenai River popular with fishers; the Russian River is the most popular clear-water sockeye salmon fishery in Alaska, with a 10-year average of 60,965 angler-days per year for sockeye salmon alone.

As described in Section 4.1.10, impacts to aquatic organisms including fish are expected to be minor. Furthermore, as discussed in Section 4.1.7, the proposed project is not anticipated to introduce contaminants into the aquatic ecosystem. The proposed project would result in long-term effects (both beneficial and detrimental) to the recreational character of the project area. Most through-traffic would follow the new highway north of Cooper Landing and north of the primary recreational portion of the upper Kenai River (MP 51–55). The proposed project would avoid most recreation resources along the existing highway in the greater Cooper Landing area. Access to recreation-oriented sites located on the "old" highway would be easier because the 70 percent of traffic that is through-traffic would be separated on the new highway, as discussed in Section 3.8.2.5 of the FEIS.

Recreation-oriented sites located along the rebuilt sections of the existing alignment would benefit from a wider, straighter road with shoulders and turning lanes but still would be subject to conflicts between through-traffic (70 percent of the traffic) and recreation/local traffic (30 percent of the traffic).

Removing the main highway and the majority of traffic from the MP 51–55 core area would reduce visual and noise impacts to recreational fishers and river access points. Most recreational fishing would be accessed from the "old" (existing) highway. Travelers on the "old" highway in this core area would benefit from lower congestion, traffic noise, dust, and exhaust, as well as increased safety and ease for pedestrians, bicyclists, and drivers. Because the new highway segment would be moved to the north of and away from the existing highway, access to the prime fishing holes in the Kenai River in this area would not be adversely affected. Since the proposed project would not replace or construct new bridges in the Kenai River, restrictions on Kenai River use and temporary closures of the river to boating would not be necessary. Section 3.8.2.5 and Chapter 4 of the FEIS provide extensive discussion of measures proposed to mitigate impacts to recreation anticipated to result from the proposed project. These measures are also summarized in Section 5 below.

4.1.15 Water-related Recreation (230.52)

Water-related recreation is discussed in Sections 3.8, 3.21, and 4.5.3 of the FEIS and are summarized below. Potential impacts to recreational fisheries are discussed in Section 4.1.14 above. In addition to recreational fishing, other water-related recreation that occurs in the project area includes boating, ice skating, snowmobiling, picnicking and camping, and sightseeing. Water-based recreational facilities within the project area include pull off and access points along the existing Sterling Highway, Quartz Creek Road, and Snug Harbor Road; boat launch points; and the Sportsman's Landing-Russian River Ferry area. The productive fisheries and scenic qualities of project area waterbodies, including Kenai Lake and the Kenai River, are key components of the overall recreational character of the project area. The area supports numerous additional recreational facilities, including commercial services, lodges, guide services, public campgrounds and picnic areas, trailheads, and the KNWR visitor contact station.

Impacts to water-related recreation would be similar to those described for recreational fishing in Section 4.1.14 above. The proposed project would not replace bridges over the Kenai River or result in any new bridges over the Kenai River. The highway would be widened adjacent to the river in a few locations, and riprap rock armoring of slopes subject to river erosion would be visible to Kenai River floaters and bank fishers. The Juneau Creek Alternative therefore would have some impact to KRSMA and its activities. The fill area at the edge of the Kenai River west of MP 55 would have almost no impact on normal river processes but would impact recreationists who would see the riprap from the river rather than the vegetated slopes.

Overall, water-based recreation would be only very minimally impacted by construction. Boaters on Kenai Lake near MP 45 of the Sterling Highway and on the Kenai River between approximately MP 55.5 and 58 would see adjacent construction activity, but these alternatives would not involve any river closures or navigation impacts.

Long-term effects would include changes in the recreational character of the Cooper Landing and upper Kenai River area as a result of routing through traffic (approximately 70 percent of the traffic) along the new highway alignment north of and farther away from the Kenai River; decreased traffic congestion; and increased visibility of the highway from some locations on the Kenai River. Note that 100 percent of traffic in the MP 51–55 core area for recreation would remain adjacent to the Kenai River, retaining visual and noise impacts to recreational users of the river.

Section 3.8.2.5 and Chapter 4 of the FEIS provide extensive discussion of measures proposed to mitigate impacts to recreation anticipated to result from the proposed project. These measures are also summarized in Section 5 below.

4.1.16 Aesthetics (230.53)

Existing aesthetics of the project area are discussed in Sections 3.15 and 3.16 of the FEIS and are summarized below.

4.1.16.1 Visual Aesthetics

The glacially carved Kenai River valley frames the visual environment of the project area. Steep mountains and the unique turquoise color of Kenai Lake and the Kenai River are the predominant features seen from the project area. The existing Sterling Highway runs through boreal and riparian forest, interspersed with longer views in areas where the trees have been cleared or where the road follows the banks of the Kenai River. Bridge crossings of the Kenai River afford views of both the river and the surrounding valley. Foreground views from the Kenai Lake outlet and the Kenai River are of riparian forest and human development; mountain uplands and peaks can be seen in the background.

Potential impacts to visual aesthetics were evaluated using the Visual Resource Analysis method developed by FHWA in conjunction with the American Society of Landscape Architects (FHWA 1981). This method involved dividing the project area into eight distinct landscape units. Key views were selected for each landscape unit to allow evaluation of representative scenes in each unit. Key views were evaluated based on vividness, intactness, and unity with each view receiving an overall Visual Quality Evaluation (VQE) rating of low, moderate, or high. Existing VQE ratings of key views in the project area range from moderate to high. Potential impacts were also assessed using a Visual Prioritization Process (VPP) developed by FHWA and the Forest Service. The VPP

was used to quantitatively score the magnitude and potential visibility of each alternative based on visual impacts associated with roadway construction elements in the landscape.

The proposed project would impact existing views within the project area through long-term changes associated with roadway elements such as cleared forest, cuts, fills, a new bridge over Juneau Creek, and changes in lighting. While the proposed project would deviate the most from the existing corridor (approximately 10 miles of new roadway alignment), it received the lowest overall VPP score of 460 points because cuts and fills would be typically less visible.

The proposed project is anticipated to affect five Key View VQE ratings relative to current conditions. The project would reduce two Key View VQE ratings by half a point (i.e., high to high/moderate and moderate to moderate/low); one Key View VQE would be reduced by one point (i.e., high/moderate to moderate/low) and two would be reduced by 1.5 points (i.e., high to moderate/low). Impacted viewer groups include residents; trail users; viewers from the Kenai Princess Lodge; motorists; and visitors/recreationalists, including hikers, boaters/floaters, and fishermen.

Temporary impacts associated with project construction include increased visibility of newly placed fill and riprap due to vegetation removal and the presence of bare earth. Visual impacts during construction would also include movement of construction equipment, including cranes for bridge construction.

Section 3.16 of the FEIS lists measures proposed to mitigate impacts related to views. These measures are also summarized in Section 5 below.

4.1.16.2 Noise

The proposed project would result in changes in highway traffic noise levels and the location of noise sources. These would result from changes in traffic volumes, changes in roadway alignments, and changes in sound shielding. Highway traffic noise was evaluated in compliance with FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) and DOT&PF Noise Policy (DOT&PF 2011a). The noise associated with the project was evaluated relative to the current condition (defined as 2012) and relative to future conditions without the project (the No Build Alternative) in the design year of 2043 (when traffic volumes would be higher).

The results of the traffic noise modeling for existing conditions indicated that one residence (Receptor 106) and one recreation receptor in the Kenai River Recreation Area (KRRA2) currently experience highway traffic noise equal to or above DOT&PF Traffic Noise Impact thresholds. At specific receptors, changes in noise levels under the proposed project would range from a decrease of 6 dBA to an increase of 21 dBA as compared to existing conditions. One trail site (on the Bean Creek Trail) is predicted to have a substantial increase in noise levels (21 dBA above existing levels) in 2043 under the proposed project. However, under the proposed project the noise levels at this recreational receptor (BCT1) are predicted to remain under Traffic Noise Impact thresholds for the design year 2043. The receptor locations modeled on the Resurrection Pass Trail are not expected to have a substantial noise increase, as defined by FHWA's methodology, but the character of the audible experience along the trail in the Juneau Falls area would change (a 12 dBA increase at the point modeled). See also Section 4.5.4.2 of the FEIS.

Section 3.15 of the FEIS lists measures proposed to mitigate impacts related to noise. These measures are also summarized in Section 5 below.

4.1.17 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

No national and historical monuments, national seashores, research sites, or similar preserves designated under Federal or State laws or local ordinances to manage for aesthetics, education, research, historical value, or scientific qualities are within the project area except the KNWR and KRSMA. The Confluence TCP could potentially be considered with this land use designation; it would be minimally affected by the proposed project. The KNWR was addressed in Section 4.1.12.1; part of it is designated Wilderness. Assuming the land exchange that would transfer a 50-acre section of land to CIRI ownership and shift the Wilderness designation to the north (as discussed in Section 3 above and in Chapter 4 of the FEIS), the proposed project would impact 14 acres of KNWR lands, but no acres of designated Federal Wilderness.

The Alaska Legislature established the KRSMA as a unit of the State park system. In much of the project area, the park is the land below ordinary high water of the Kenai River and Kenai Lake; within the boundaries of the KNWR it is the water column only. It was established in recognition of the importance of the Kenai River for fish habitat and both commercial and sport fishing but it also serves rafting, viewing scenery, viewing wildlife, picnicking, and camping (DNR, 2010).

The proposed project would move the highway farther away from the Kenai River and its anadromous tributaries, thereby reducing the risk of hazardous substance spills into the Kenai River over the long term as well as during construction. The proposed project would have the least overall adverse impacts to the Kenai River, riparian habitat along the Kenai River, and fisheries resources of any one of the build alternatives as it would move the greatest length of highway away from the KRSMA. The proposed project would reduce the risk of spills into the Kenai River within the KRSMA as compared to existing conditions.

Because the proposed project would cross the Resurrection Pass Trail and include a new trailhead 3.4 miles up the trail from the existing trailhead, the use pattern of the trail would change (see complete discussion of the trail at Section 4.5.4.2 of the FEIS). These changes, including greater accessibility to areas now considered remote, could mean changes to backcountry dispersed primitive recreation experiences off the trail. Off-trail areas now considered hard to get to would be easier to access, and it is likely more people would use them. This could increase encounters with other parties, resulting in reduced feelings of solitude and remoteness, and could result in greater wildlife disturbance or hunting pressure in some areas. However, most current use is along the trail system, and this pattern likely would continue.

The proposed project would impact currently proposed additions to the KRSMA east of Bean Creek by inserting the highway and its associated noise and visual impacts, in what is currently a mostly undeveloped area and placing Bean Creek in a culvert. Community concepts for formalizing loop trails in this area for skiing and for summer hiking are still developing; the highway in this area could require alteration of these plans.

A new trailhead for the Resurrection Pass Trail and a pullout east of Juneau Creek near the Bean Creek Trail would be constructed to provide access not only to the trails but to off-trail areas that

were previously difficult to reach. Access to the Resurrection Pass Trail and upper Juneau Creek valley would change by placing a trailhead 3.4 miles from the existing trailhead.

Temporary impacts would include construction noise and, in a few locations, construction equipment working on the edge of the Kenai River (e.g. bank stabilization). Temporary construction activity would interrupt the Art Anderson Slaughter Gulch and Birch Ridge trails and access to these trails. Temporary trail closures likely would occur for safety purposes. In general, during construction, noise and dust from operation of heavy equipment, chainsaws, pile drivers or rock drilling equipment, and rock blasting equipment are likely near trails and would negatively affect the usually quiet trails. Because the new highway segment would be moved to the north of and away from the existing highway, access to most Kenai River campgrounds would not be adversely affected.

Use of areas proposed for disposal of cleared vegetation and excess soil, and for construction equipment staging, may temporarily affect park users. For example, the construction contractor may desire access to the alignment via West Juneau Road. If the Forest Service granted access, the road could be temporarily closed to recreational horseback riding used to access the Resurrection Pass Trail. If there were substantial construction use in winter (considered unlikely), such construction use could temporarily close the road to snowmobile access to the Resurrection Pass Trail. Use of the road for construction access would require a Forest Service special use permit subject to Forest Service stipulations.

4.2 Secondary and Cumulative Effects on the Aquatic Ecosystem

Factual determinations of secondary effects on the aquatic ecosystem include consideration of effects that are associated with the placement of fill material but that do not result from the actual placement of fill material. Factual determinations of cumulative effects on the aquatic ecosystem include consideration of changes that are attributable to the collective effects of a number of individual discharges of dredged or fill material.

4.2.1 Secondary Effects on the Aquatic Ecosystem

Secondary or indirect effects may include changes in water quality as a result of erosion, increased stormwater runoff, or siltation; changes in wildlife behaviors and movements as a result of habitat fragmentation or changes in habitat quality adjacent to fill, and changes in the quality of wetlands and other aquatic sites through introduction of non-native plant and animal species. These potential secondary effects are discussed in conjunction with direct effects in Section 4.1 above.

Placement of fill to construct the proposed project could result in secondary effects related to changes in the risk of vehicle crashes that could result in pollutants entering the Kenai River or adjoining wetlands and connected waterways. The risk of tanker trucks containing fuel or other chemicals overturning or otherwise spilling their loads was a substantial concern voiced by residents and others during scoping for the FEIS. The *Kenai River Comprehensive Management Plan* (DNR, ADF&G, KPB 1997) recommends that "public road construction projects in upland areas should be located away from the Kenai River" and advocates for a general setback standard of 300 feet for all non-water-dependent public facilities adjacent to the river. Currently, 77 percent of the Sterling Highway in the project area is within 500 feet, and 56 percent of the highway is within 300 feet, of the Kenai River and its tributaries. These waterbodies are categorized as Tier I

waterbodies whose water quality is at or above criteria and existing uses are protected. An additional 1.5 percent of the highway is within 500 feet of a Tier II stream (Tier II waterbodies have water quality better than criteria and a higher level of protection is afforded) and 1.3 percent is within 500 feet of wetlands that are hydrologically connected to a Tier I or Tier II streams. The risk of spills along the existing highway is also heightened because the highway does not meet current standards created, in part, to help prevent vehicles from leaving the roadway or overturning.

The proposed project would reduce the risk of hazardous material releases impacting the Kenai River by routing 10 miles of the Sterling Highway farther from the river. In total, the proposed project would decrease the percentage of the Sterling Highway within 500 feet of a Tier I waterbody from 77 to 23 percent and the percentage within 300 feet of a Tier I waterbody from 56 to 12 percent. However, the percentage of the highway within 500 feet of a Tier II waterbody would increase from 1.5 to 15.7 percent and the percentage within 500 feet of a hydrologically connected wetland from 1.3 to 6.9 percent.

The proposed project would reduce the risk of spills along existing portions of the highway as well as on the new alignment, which will be farther away from the Kenai River, by incorporating design features meant to improve safety conditions that may have contributed to spills and crashes adjacent to the Kenai River. These include upgrading the road design to include wider lanes, shoulders, and standard-design curves, as well as clear zones to allow room for recovery instead of a crash or rollover. Shoulders would improve emergency response capabilities to minimize spill-related impacts should a hazardous material spill occur along the Sterling Highway. However, the increased average vehicle speed along the improved highway may increase the severity of any crashes and resultant spills. Overall, construction of the proposed project would reduce the risk of hazardous material releases impacting the Kenai River.

4.2.2 Cumulative Effects on the Aquatic Ecosystem

Section 3.27 of the FEIS includes extensive discussion of potential cumulative effects associated with the proposed project, including the temporal and geographic scopes of analysis, past and present actions, and reasonably foreseeable future actions. Cumulative impacts related to aquatic resources, including waterbodies and water quality, wetlands, wildlife, and water-based recreation, are summarized below. Cumulative impacts to fish and EFH are not discussed because while the proposed project has potential to impact these resources, implementation of mitigation measures during construction and design to minimize permanent in-water changes would result in minimal impact.

The proposed project, in combination with past, present, and reasonably foreseeable future actions, has the potential to impact waterbodies and water quality through increased non-point source pollution from new development. The proposed project would result in an increase in impervious surfaces, which would increase runoff into project area waterbodies (Section 4.1.2). Construction activities could also temporarily increase turbidity and sedimentation. Reasonably foreseeable future actions could further affect waterbodies by encroaching on project area waterbodies, altering stream channels, and altering runoff volumes and timing. As a result, the proposed project, combined with the past, present, and reasonably foreseeable future actions, would have a cumulative impact on water bodies and water quality. However, impacts of the proposed project would be minimized because new roadway sections would be designed and constructed to meet

the current standards for stormwater drainage and stormwater runoff. Furthermore, the impact of reasonably foreseeable future actions would be minimized through Borough requirements that residential and commercial development be set back from streams and vegetation clearing, and that grading activities be limited adjacent to waterbodies (Ordinance 2013-18).

The proposed project would impact wetlands through the placement of fill in wetlands (39.2 acres) and has the potential to indirectly affect wetlands adjacent to fill (172 acres; Section 4.1.12). These impacts combined represent approximately 2 percent of wetlands in the geographic scope of analysis. Approximately 160 acres of wetlands exist in the location of the reasonably foreseeable future actions; however, it is anticipated that only a small portion of these wetlands would be impacted by development. The 160 acres of wetlands in the reasonably foreseeable future action locations represents 1.6 percent of the wetlands within the geographic scope of analysis. As a result, the proposed project, in combination with past, present, and reasonably foreseeable future actions, would not have a substantial cumulative adverse effect on wetlands.

The proposed project, in combination with past, present, and reasonably foreseeable future actions, has the potential to impact wildlife species through the continued loss, modification, and fragmentation of wildlife habitat as a result of land clearing and development, and increased wildlife mortality from vehicle collisions, defense of life, and property kills due to increased development and road density. The proposed project would cross the Juneau Creek drainage, an area identified by the interagency working group as important habitat for brown bears and moose near Bean and Juneau creeks. The proposed project would also result in moderate road density (Section 4.1.11). Development associated with reasonably foreseeable future actions would result in further loss, modification, and fragmentation of habitat although some reasonably foreseeable future actions, such as the Cooper Creek Restoration Project, may enhance the quality of bear habitat in some portions of the project area. As a result, the impacts of past, present, and reasonably foreseeable future actions, combined with the impacts of the proposed project, would result in a cumulative impact on brown bears, adversely impacting local abundance, distribution, ecology, and movement patterns. However, the cumulative impact of the proposed project over the No Build Alternative is anticipated to be relatively small. Impacts would be further minimized as a result of the design of one or more wildlife crossings and other measures to accommodate wildlife movement as part of the proposed project. Furthermore, DOT&PF would reserve access rights for the segment built on a new alignment so no additional side roads or driveways would be permitted, preventing inducement of further development that could cause further habitat fragmentation and wildlife movement constriction.

The proposed project, in combination with past, present, and reasonably foreseeable future actions, has the potential to impact water-based recreation resources within the project area through alteration of the existing aesthetic experience of recreational activities and changes in access to recreational facilities (Section 4.1.14). Reasonably foreseeable future actions are not anticipated to affect water-based recreation, including recreational fishing. As a result, the proposed project, in combination with other past, present, and reasonably foreseeable future actions, would not have a substantial cumulative adverse effect on water-based recreation.

The proposed project, in combination with past, present, and reasonably foreseeable future actions, has the potential to impact aquatic resources within the project area. However, these impacts are anticipated to be negligible to relatively small and would be unlikely to be considered significantly adverse.

5 Measures to Mitigate Impacts

The fourth restriction on discharge (or test) in the Guidelines is:

> "…[n]o discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem" (40 CFR 230.10(d)).

Subpart H of the Guidelines provides criteria that the USACE uses in evaluating avoidance and minimization measures. This section details the measures that have already been taken, and those that are planned, to avoid and minimize adverse effects on the aquatic ecosystem. It also presents DOT&PF's draft proposal to compensate for the unavoidable losses of aquatic resources.

DOT&PF has considered the need to avoid impacts to wetlands and other waters of the U.S. and to minimize unavoidable impacts throughout project development. At each stage of the project, beginning before alignments were laid out, alternatives were considered with respect to wetlands and other waters to minimize harm by avoiding and minimizing placement of fill into them. Impacts to wetlands, ponds, water quality, fish habitat, and specifically the Kenai River were key criteria considered during screening and evaluation of potential alternatives and selection of the reasonable alternatives to evaluate in the FEIS. DOT&PF prepared field-verified mapping of wetlands and other waters along each of the reasonable alternatives to aid in refining those alternatives to further minimize effects.

5.1 Avoidance

Section 3.1 of this document demonstrates that complete avoidance of impacts to special aquatic sites is not possible for a build alternative that achieves the project purpose.

Potential adverse effects to wetlands and waterbodies were among the many factors of the natural and social environments, technical feasibility, achievement of the project purpose, logistics, and cost that have led FHWA and DOT&PF to select the Juneau Creek Alternative as the proposed project. The Juneau Creek Alternative would eliminate approximately 50 percent more waters than the G South Alternative. However, the Juneau Creek Alternative would avoid construction of another bridge across the Kenai River and move the highway farther away from the Kenai River and its anadromous tributaries, thereby reducing the risk of hazardous substance spills into the Kenai River over the long term as well as during construction. By moving the highway farther from the Kenai River, the Juneau Creek Alternative would have the least overall adverse impacts to the river, riparian habitat along the Kenai River, and fisheries resources of any one of the build alternatives. The Juneau Creek Alternative would avoid impacts to the Kenai River within KRSMA, with the exception of bank stabilization in one location.

Starting where the proposed project diverges from the existing highway at MP 46.3, the alignment traverses wetlands on the mountainside and a bench above the Slaughter Ridge Road area. It first crosses just the northeast tip of a wetland on a bench. From there westward, wetlands extend north and south of the present alignment, making complete avoidance impossible. The present alignment balances the constraints of extensive wetlands, steep hillside, Slaughter Ridge Road, and residential development to the south, and the need to cross Bean and Juneau creeks. The Juneau Creek Alternative would cross Juneau Creek Canyon with a new bridge south of Juneau Creek Falls. The proposed bridge would span Juneau Creek, thereby avoiding impacts below ordinary

high water. The proposed project avoids the need for access into the canyon during bridge construction. Although the proposed project avoids placing fill in the wetlands along Juneau Creek, it must cross wetlands in the Juneau Creek valley, including west of Juneau Creek. Some of the measures to mitigate recreation impacts (trail connections, parking) would be partially located within wetlands.

The alignment would then descend the hillside, cross some narrow wetlands, traverse the Mystery Creek Wilderness in the KNWR, and rejoin the existing highway. The existing highway would be modified to connect with the new alignment at a T-intersection at MP 55.8. Modifying the 'old' highway to construct that intersection would require fill in wetlands that the other build alternatives would not. The proposed project would then follow the existing highway for the remaining 3 miles to the end of the project, with widening, straightening, and wetland impacts similar to those of the other build alternatives.

Wetlands between MP 56.4 and 56.8 cannot be avoided while remaining on the existing highway alignment because wetlands exist both north and south of the existing embankment.

Project-wide avoidance measures incorporated into preliminary project design are summarized below.

- In designing the roadway to meet current design standards for a rural principal arterial road, the existing highway alignment was incorporated for use to avoid unnecessary impacts to undisturbed wetlands.
- Multiple bridge design configurations were investigated to identify options to avoid impacts to waters of the U.S. The new Juneau Creek Bridge was designed to span the stream to avoid placing fill below ordinary high water of this anadromous fish stream.
- No new bridges would be constructed or existing bridges would be replaced over the Kenai River.

Avoidance measures that would be incorporated into final design that may avoid impacts to wetlands include:

- DOT&PF would investigate additional measures – including small alignment modifications, steepening side slopes and refining where passing lanes begin and end – to avoid and/or minimize impacts in wetlands and other waters.
- DOT&PF would examine the return loop area south of the existing highway near MP 55.6 for opportunities to reduce the size of the loop and avoid and/or minimize impacts into wetlands and other waters.

Avoidance measures that would be implemented during construction are listed below. DOT&PF would continue to identify additional avoidance measures as the project design is refined.

- Staging areas and temporary construction roads would be located in uplands to the extent practicable. It is anticipated that some wetland area adjacent to Juneau Creek would need to be used temporarily during bridge construction.
- Cleared vegetation and unusable soils would not be permanently deposited in wetlands.

- Construction limits would be clearly staked prior to construction to ensure that ground disturbance avoids adjacent wetlands and other waters of the U.S. Grubbing would be avoided outside of the construction footprint.
- At no time would the construction activities result in a migration barrier for adult or juvenile salmonids or other fish. Construction would be timed to avoid critical fish spawning and migration periods. Specific timing windows for in-water work would be established during permitting. These mitigation measures would minimize the potential for impacts related to food availability for bears and other wildlife.

5.2 Minimization

The following measures have been incorporated into the preliminary design of the project to minimize impacts to wetlands and other waters of the U.S.

- The area at MP 57 has been redesigned to pull the highway back from the river. Riprap is still necessary, but the highway has been shifted farther from the river. Passing lanes have been reduced in this area as well, minimizing width.
- Construction staging and disposal areas have been sited to minimize impacts on wetlands and waterbodies. Complete avoidance of the wetland area currently shown within construction footprints would be reevaluated during project design.

The following measures would be incorporated into the design of the project to minimize impacts to wetlands and other waters of the U.S.

- During final design, DOT&PF would investigate additional measures – including small alignment modifications, steepening side slopes and refining where passing lanes begin and end – to reduce the roadway footprint in wetlands and other waters.
- The final roadway design would be based on the minimum-width fill footprint necessary to provide a stable road base and would be designed with a low-profile embankment as feasible to limit the fill footprint that would extend into wetlands or other waters of the U.S.
- The Juneau Creek Bridge drainage would be designed to direct rainwater runoff beneath the bridge and promote retention of natural vegetation buffer between the Resurrection Pass Trail and the bridge abutment.
- Design would include standard engineering considerations to avoid and minimize the potential for erosion near surface drainage ways.
- Anadromous fish stream crossings would be designed to minimize impacts on stream function and hydrology, and to provide passage to both anadromous and resident fish. All road structures crossing anadromous fish habitat would be designed to meet the ADF&G–DOT&PF Memorandum of Agreement requirements for fish passage. Anadromous fish stream culverts would be bottomless arch culverts or would be fully embedded with streambed material where possible.
- Riprap would be used as appropriate to stabilize toes of slopes at ponds and stream crossings and would incorporate vegetation where practicable.

- Culverts would be installed through fill slopes in appropriate locations to maintain existing flow patterns for surface water.
- Roadside swales would be designed to keep surface water within the natural drainage basins. Grassy swales would be part of the roadway design to accept stormwater runoff to help maintain water quality in fish habitat by filtering potential pollutants from runoff before it enters streams or the Kenai River.
- Road slopes would be revegetated. Topsoil would be applied to the surface of road slopes to promote revegetation. Native plant species would be used for vegetating road slopes to protect the integrity of the existing plant communities, except non-native annual grasses would be used to provide initial soil stabilization.
- A number of existing undersized or perched culverts were identified during a field investigation to identify small streams and drainages in the project area, as summarized in the *Hydrology and Hydraulics Summary* (HDR 2006). Replacement of existing culverts that are undersized or perched is expected to improve fish passage to upstream habitat in some locations on highway segments that are reconstructed.

The following measures would be incorporated into project specifications for implementation during construction to minimize impacts to wetlands and other waters of the U.S.

- Staging areas and temporary construction roads would be located in uplands to the extent feasible; however, it may be necessary to locate staging areas required for river or creek crossings in wetlands. Temporary fill may be required at these sites. Where temporary fill would be required, the construction contractor would be required to place temporary fill on geotextile mats or other suitable materials of sufficient thickness to facilitate the removal of the fill when no longer needed for construction. Wetlands would be stabilized against erosion once protective mats were removed. Wetlands that had been temporarily filled would be restored by reseeding and revegetating the disturbed areas as necessary with native plant materials.
- Stream banks at all culverts and bridge crossings would be recontoured to approximate original conditions and reseeded with native vegetation to minimize erosion. Seeding of the disturbed areas would conform to Section 618 of DOT&PF's *Standard Specifications for Seeding*. DOT&PF would work with ADF&G to incorporate vegetation to the extent practicable into any areas along anadromous fish streams that would require riprap, with the aim of minimizing long-term habitat loss. Slopes with the potential to impact the Kenai River would be stabilized as soon as practicable.
- To lessen the potential impact of vegetation removal along the Bean Creek Trail, trailside areas disturbed by vegetation removal along the trail would be reseeded.
- To minimize the spread of invasive plant species, only Alaska native plant species would be used for reseeding and vegetating disturbed areas, per DNR's *A Revegetation Manual for Alaska*. Additional measures would be incorporated to minimize the potential spread of existing invasive plants.

- To minimize the potential to spread or introduce invasive plant species, only clean fill material, such as mulch, topsoil, and seeds, would be used during construction and maintenance activities.
- The contractor would be required to use contaminant-free embankment and surface materials in construction.
- No vehicles or equipment would be fueled or serviced within 100 feet of wetlands or fish-bearing streams, with the exception of "low-mobility" equipment used for pile driving, drilled shaft construction, or other bridge construction. A plan would detail the process for fueling this equipment within 100 feet of wetlands or fish-bearing streams. Fueling and service vehicles would be equipped with adequate materials (e.g., sorbent pads, booms, etc.) to immediately contain and commence clean-up of spilled fuels and other petroleum products. Fuel would be stored a minimum of 100 feet from any wetland or water body.
- To minimize and prevent spills or leakage of hazardous materials during construction, standard spill prevention measures would be implemented in accordance with the contractor's approved Spill Prevention, Control, and Countermeasures Plan. Spill response equipment would be readily available and construction personnel would be trained in spill response.
- Erosion and sedimentation control measures would be employed prior to ground disturbing activity. Permanent erosion control measures would be employed as early in construction as practical.
- BMPs developed in accordance with DOT&PF's *Alaska Storm Water Pollution Prevention Plan (SWPPP) Guide* (DOT&PF 2011b) and ADEC's *Alaska Storm Water Guide* (ADEC 2011) would be employed to control erosion and capture sediment that is moved by stormwater. The Contractor would be required to develop and follow stipulations identified in the SWPPP, along with those in the ADEC Section 401 Water Quality Certification. These stipulations typically become part of the USACE Section 404 permit and enforceable by the USACE. Specific BMPs related to anadromous fish habitat would include installing temporary erosion and sediment control measures (e.g., minimizing the amount of soil exposed during construction by preserving native topsoil or phasing construction, maintaining natural buffer areas, controlling stormwater discharges and flow rates, and protecting steep slopes until plants can bind the soil and stabilize it), and sustaining predevelopment flow rates to protect stream habitat (ADEC 2011).
- Silt fences would be used adjacent to waterways just beyond the estimated toe of fill.
- Ditch check-dams would be used to reduce erosion during construction.
- Sedimentation basins would be used during construction, as necessary.
- Temporary diversions within fish-bearing streams would be subject to permitting stipulations and would be designed so that stream flow would not be impeded and fish passage would not be compromised. Any kind of in-stream diversion would be limited to late October through December to avoid salmon spawning and rearing life cycles, although this timing window may be adjusted in permit stipulations. Following completion of construction, all streams would be restored to natural conditions. These mitigation

measures would benefit bears, birds, and other wildlife by reducing impacts related to food availability.

- Stipulations would be included in the required SWPPP and ADEC Section 401 Water Quality Certification that would also address the removal of erosion and sediment control measures. For example, the DOT&PF 2016 Construction General Permit, Appendix C, defines final stabilization as either when a uniform perennial vegetation cover with a density of at least 70% is achieved, or when equivalent non-vegetation permanent stabilization methods have been employed.
- Temporary material storage piles would not be placed in the 100-year floodplain during the rainy season unless the following conditions were met: (1) storage would not occur when flooding was imminent; and (2) if storage piles consisted of erodible material, they would be covered with plastic tarps (or similar) and surrounded with compost berms or other erosion control devices.
- To meet requirements of the Migratory Bird Treaty Act, clearing of vegetation would occur before or after the bird nesting season (from May 1 to July 15 in Southcentral Alaska).

The following measure would be incorporated into maintenance of the proposed project to minimize impacts to wetlands and other waters of the U.S. over time.

- To monitor and manage the potential spread of invasive plant species during road maintenance activities (e.g., mowing in summer, applying sand and gravel in winter), DOT&PF would implement the following BMPs: regularly cleaning vehicles and equipment; revegetating disturbed areas with native, local, and/or non-invasive plant species; identifying locations of known invasive plant infestations, recording and reporting locations of invasive plants to the statewide exotic plants database managers, and managing uninfested areas before moving toward infested areas; coordinating with local groups that are managing invasive species; timing mowing to prevent seed production of invasive plants, as practicable; and using weed-free materials whenever possible.

5.3 Compensatory mitigation

DOT&PF's preferred method of mitigation as outlined in the Final EIS is payment to an in-lieu-fee provider; however, there is no provider or mitigation bank with a service area that includes the project area.

The DOT&PF will coordinate with the USACE throughout the permitting process to develop compensatory mitigation for unavoidable impacts to jurisdictional wetlands and other waters of the U.S., should such mitigation be deemed necessary.

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