vicinity of sensitive receptors will be limited in the contract to the weekday hours between 7 A.M. and 10 P.M.

The contractor could be called upon to take other mitigating measures, including:

1) Provision of temporary enclosures for particularly noisy equipment or activity sites

2) Early construction of permanent noise abatement barriers if such are required in the contract, and if the early action is feasible and effective

3) Performance of proper maintenance and inspection of noise control equipment

4) Routing of haul roads away from schools, hospitals, and residential areas where possible

F. Water Quality Impacts

Stream and lake waters in the highway corridor are of a high natural quality, characteristic of lightly populated, mountainous regions. Stream flow originates from glacial melt and precipitation. There are seasonal fluctuations, with higher flows and higher water tables in the summer and early autumn during the rainy season.

Kenai Lake is the principal surface water feature in the region. It is an oligotrophic (poor in plant nutrients, abundant in oxygen) lake, fed by mountain streams, the largest of which drain from glaciers in mountains east of the lake.

The glacial "flour" (very fine, permanently suspended rock particles) that gives Kenai Lake it's opaqueness and distinctive color, causes almost year-around turbidity in the lake and downstream river waters. Annually, or more often, flooding causes bank erosion, clouding streams with soil sediments.

In contrast with murky Kenai Lake, Tern Lake is shallow, with clear water, its sources being very local streams and groundwater.

Daves Creek flows out of Tern Lake, and joins Quartz Creek five miles downstream. Crescent Creek and Dry Creek also enter Quartz Creek. All four of these streams flow uncontaminated into Kenai Lake under non-flood conditions.

Kenai River emanates from the lake. Downstream, Bean Creek, Juneau Creek, Cooper Creek, and Russian River pour clean water into the turbid Kenai River.

The other unnamed creeks and rivulets of the watershed within the highway corridor are also unclouded most of the time, although iron staining occurs in some ponds and slower streams. Groundwater functions naturally to recharge streams and lakes in the drainage area.

There are three principal uses of waters within the highway corridor: domestic water supply, recreation, and fish and wildlife. All require a high standard of water quality, the protection of which is necessary to the continuation of these uses.

Groundwater from individual, private wells is the only source of potable water in the Cooper Landing area. Groundwater yields in the area are low to moderate, ranging up to 150 gallons per minute.

Recreational uses of water include boating, fishing, and sightseeing; all depend on aesthetically clean water to be satisfying activities for users. Most people consider the waters in this area too cold for swimming; summer high temperatures usually reach only about 53°F (12°C).

The chemical, physical, and biological integrity of surface waters are the most important factors in considering the water needs for fish, wildlife, and the ecosystems they depend upon.

There are other uses of water in the highway project study area (Table 1, App. C-30). Commercial uses include restaurants and auto repair shops. Presently, placer mining and ore processing utilize minor amounts of water. A relatively large user is the Cooper Lake hydropower project. The highway project will utilize water as a dust depressant, as well as for gravel washing for select road building materials.

Sediment from soil erosion is the most common form of water pollution in the project area. Chemical and biological contaminants are rare or of low concentration.

Iron and chloride in some lowland streams may be high for some uses, but waters of mountain or glacial streams are low in dissolved solids (less than 250 milligrams per liter (mg/l), compared to the maximum of 500 mg/l allowed by Alaska's Water Quality Standards). No data are available on bacteria levels or dissolved oxygen in stream waters, but because there are conditions of low suspended solids concentrations and swift flow (usually causing high levels of 10-12 ppm dissolved oxygen), biological activity in the Kenai River and tributaries is probably not oxygen-limited at this time. No contamination of wells or surface waters is known to have occured in the Cooper Landing area (see Stream Measurements ...at Cooper Landing, Table 2, App. C-31).

Although the groundwater is noted to have a high iron content, all domestic and commercial supplies are from individual wells. Little specific documentation is obtainable on groundwater quantity and quality, nor is it known how deep or in what direction the groundwater flows, other than what can be deduced about these conditions from topographic maps.

Annual stream discharge rates are summarized in Table 3, App. C-32. Minor lowland drainages thaw and experience their highest rates of runoff in May. Streams such as Quartz Creek and Juneau Creek, draining higher elevations, have their highest flow from snow melt in June or July, or from high intensity precipitation during late summer or fall. The higher discharges from the larger glacial streams do not usually occur until later in the season, beginning in late June.

Suspended sediment loads in all streams are lowest during the low stream flow period in March and April. Most of the smaller non-glacial streams are still frozen at that time.

Snow River carries huge amounts of sediment into the Kenai River system; up to 2,010 milligrams per liter (mg/l) at flood periods (Table 6). The heavier sediments settle in the lake, leaving only some of the powder-like fines in suspension to be carried into the Kenai River. Suspended sediment concentrations for the Kenai River at Cooper Landing vary from 2 mg/l to 72 mg/l during high flow and high lake level periods. (The higher values of suspended sediment concentrations are associated with strong wind-generated wave action which causes suspension of beach and shallow lake bed sediments).

TABLE 6

SUMMARY OF SUSPENDED SEDIMENT DATA

Stream	Number of Samples	Sediment Concentration (Milligrams per leter)		Sediment Discharge (Tons per day)	
		Minimum	Maximum	Minimum	Maximum
Snow River near Seward	20	10	2,010	5.8	17,000[1]
Kenai River at Cooper Landing	24	2	72[2]	5.0	474

[1] Maximum Estimate unsupported by data on Snow River

[2] Less than 100 mg/l of sediment concentration is considered "low"

Table provided by Stan Jones, Hydrologist, U.S. Geological Survey, Water Resources Office, Anchorage.

No suspended sediment data have been collected on the Kenai River or its tributaries between Cooper Landing and Skilak Lake, or on the non-glacial streams above the outlet of Kenai Lake.

Water is the Kenai Peninsula's most precious resource. Without it few of the many other resources and amenities of the region would exist. Compatibility with the complex water regime will therefore be a highly significant factor throughout all phases of the highway project.

Several potential sources of water pollution from the highway project exist on the various alternative routes. The following is an overview of pollution caused by highway construction activities and vehicle operation.

Impacts on water quality from the highway project will be limited mostly to temporary increases in turbidity from instream and stream

margin construction. More damaging long-term erosion and sedimentation is possible with the many cut and fill sections that are part of the construction proposal on each of the alternative routes. Suggestions for mitigation with both temporary and permanent measures are addressed later in this section.

Widening the highway from 24 to 40 feet will create 60 percent more pavement surface with an attendant increase in area of rapid (as opposed to delayed) runoff during rainstorms and quick snow-melt periods. Maintenance personnel consulted on this matter (Pers. comm. with John Horn, ADOT/PF Maintenance & Operations Supervisor, Anchorage, and Ed Hollier, Hwy. Maintenance Foreman, Soldotna) did not expect the increased surface area to cause serious erosion and sedimentation problems beyond present conditions. More concern was expressed about possible problems caused by alteration of drainage patterns, ie., ditch and culvert icing and ditch erosion.

Of all the water quality criteria addressed in this report, the physical element of erosion resulting in stream sedimentation has the most potential for impact in the highway corridor. Erosion and/or stream sedimentation potential is defined in Tables 7A-D, with a list of the parameters contributing to impact, and a comparison of four sections of Alternative "B" (on the existing highway) with four parallel alternative routes.

TABLE 7-A

EROSION AND/OR SEDIMENTATION POTENTIAL -- COMPARISONS OF ALTERNATIVES

	ALTERNATIVE "B" STA. 1668-1682	NO-ACTION	JUNEAU CREEK ALTERNATIVE
Erodible soils	present	presently eroding maintenance problem	Possibly present, probably less erodible[1]
Linear extent of cut	1,450 feet	300 feet	1,000 feet (all through cut)
Slope steepness	2:1, with drainage from wooded area above	1:1 with drainage from above	2:1, wooded area above is not as steep
Ditch grade at toe of slope	0.5% maximum	Similar to Alternative "B"	2% maximum
proximity of slope to potential receiving waters	60 - 80 feet	50 feet	1,000 feet
Additional sediment-ation potential	800 feet of instream fill	continually eroding slope	instream and stream edge work at 6 locations

NOTE: See discussion of No-Action Alternative on p. 96 and on Table 1-d, p. 48.

TABLE 7-B

EROSION AND/OR SEDIMENTATION POTENTIAL -- COMPARISONS OF ALTERNATIVES

	ALTERNATIVE "B" STA. 1700-1730	NO-ACTION	COOPER LANDING OR BEAN CREEK ALTERNATIVE, STA. 1700-1726
Erodible soils	present	present	possibly present; probable less erodible
Linear extent of cut	2,300 feet, including 800 feet of through cut	1,900 feet	No cut. All fill slopes and bridge crossings of river
Slope Length	130-250 feet	30-150 feet	50 feet (fill)
Slope Steepness	2:1, with drainage from wooded area above	1.5:1, with drainage from above	2:1 maximum fill slope
Ditch grade at toe of slope	2% maximum	Similar to Alternative "B"	No ditches
Proximity of slope to potential receiving waters	70-100 feet	70-90 feet	-----
Additional sedimentation potential	350 feet of instream fill	No additional	Instream and stream edge work at 4 locations.

NOTE: See discussion of No-Action Alternative on p. 96 and on Table 1-d, p. 48.

TABLE 7-C

EROSION AND/OR SEDIMENTATION POTENTIAL -- COMPARISONS OF ALTERNATIVES

	ALTERNATIVE "B" STA. 1730-1812	NO-ACTION	BEAN CREEK ALTERNATIVE STA. 1726-1812
Erodible soils	present	present	possibly present, probably less erodible[1]
Linear extent of cut	3,000 feet	less extensive	5,060 feet, including 800 feet of through cut
Slope length	50-100 feet	shorter	50-130 feet
Slope Steepness	2:1, with drainage from wooded area above	2:1+, with drainage from above	2:1, with drainage from wooded area above (except in through cut)
Proximity of slope to potential receiving waters	100-300 feet	40+ feet	50-200 feet
Additional sedimentation potential	fills across 3 drainage ways, 2 of which are perennial. 800 feet of instream fill (minimal encroachment)	No additional	Instream and stream edge work at 6 locations, including fills across 4 drainage ways, 3 of which are perennial (including Bean Creek)

NOTE: See discussion of No Action Alternative on p. 96 and on Table 1-d, p. 48.

TABLE 7-D

EROSION AND/OR SEDIMENTATION POTENTIAL -- COMPARISONS OF ALTERNATIVES

	ALTERNATIVE "B" STA. 2017-2100	NO-ACTION	QUARTZ CREEK ALTERNATIVE
Erodible soils	present	presently eroding--maintenance problem at 3 locations between Sta. 2000-2100	probably present
Linear extent of cut	2,450 feet in erodible soil; 1,200 feet in rock	-----	1,800 feet; also extensive fill
Slope length	30-120 feet	-----	30-80 feet
Slope steepness	2:1[2], with drainage from wooded area above	2:1	2:1, with drainage from wooded area above
Ditch grade at toe of slope	0.5% - 1.5% maximum	Similar to Alternative "B"	0.7% - 2.5% maximum
Proximity of slope to potential receiving waters	70-350 feet	350 feet from worst slope to creek	120-600 feet
Additional sedimentation potential	instream & stream edge work at 3 locations. One wet slope will require special treatment[3]	Continually eroding slope	Instream & stream edge work at 5 locations

1 Soil type, moisture content, and mechanical characteristics of soils on Alternative "B" cut slopes are known or redily available because they are presently exposed; whereas soils characteristics are not known about the other routes where they have not yet been extensively exposed or sampled.

2 May be steeper in rock cuts.

3 Worst wet slope will be avoided with either action alternative (Sta. 2025+00, App. C-59, sheet 26-B). Slope requiring treatment on Alternative "B" is at Sta. 2080, App. C-59, sheet 28-A.

NOTE: Because the are usually of select material with low erodibility, fill slopes are not included in this analysis of erosion/sedimentation potential, except where they encroach on water bodies.

See discussion of No Action Alternative on p. 96 and on Table 1-d, p. 48.

Alternative "B" construction appears to present more potential for erosion problems, because it entails longer lengths of slopes in cut areas with erodible soils. Cut sections on the Juneau Creek and Bean Creek routes may involve less erodible soils, and through cuts on those routes would be exposed only to precipitation on the slopes themselves. Bean Creek, however, has more cut area than the Cooper Landing "B" Alternative. All of these erosion problems are capable of being mitigated, some at greater cost than others.

The "No Action" Alternative would generally have less impact on water quality, with some exceptions. Possible impacts that could be attributed to "No Action" would include: chemical spills from vehicle accidents caused by hazardous curves and poor surface conditions on the existing highway; continued erosion from old, unstable cut slopes that, if abandoned in favor of a new route, could, at some locations, be reduced in steepness and rehabilitated with vegetation.

The harmful biological effects of stream disturbance are well documented (Ref. 19, Impacts of Construction Activities in Wetlands of the United States, and Ref. 46, Ecological Effects of Highway Fills on Wetlands). The alternatives for highway routes that require fill in streams, ponds or lakes will be most stressful for biological systems, with the most evident damage being inflicted on sport fisheries. For instance, significant siltation of fish spawning beds results in mortality by suffocation of eggs and fry that live in the gravel.

Fisheries are affected just as significantly, but less directly, by sediment deposits on bottom flora and fauna that are part of the habitat and food chain upon which fish depend. Attached algae is eliminated through smothering, and vascular plant productivity is reduced by interference with the free exchange of oxygen and carbon dioxide. Shifting sand and silt among bottom gravel eliminates areas suitable for the attachment or hiding of aquatic insects, and drastically reduces the total productivitiy of these forms. Extensive sedimentation can eliminate aquatic habitats by filling shallows and promoting drier conditions.

Chemical changes in the water may occur from natural or man-caused contamination. Chemical pollution of surface waters from highway causes is most likely to occur during the construction phase. Refueling of construction vehicles will require care to avoid spills and possible pollution of ground or surface water.

Although commercial and residential development could be induced by construction of the Bean Creek Alternative without access control, there is a factor that reduces the possibility of sewage effluent from such development contaminating well-water supplies. A Borough/State health regulation allows only one on-site sewer system on each one-acre lot. Most of the existing lots along Slaughter Creek Road are 1½ to 2 acres in size, with houses spaced about 250 feet apart. Further subdivision of these lots would not, in most cases, meet the minimum lot size requirement.

Analysis was made by the Alaska Department of Environmental Conservation of runoff waters from snow removed from streets in different parts of Anchorage and dumped beside a stream. It was found that road salts in the snow did not reach the stream in sufficient concentrations to pollute the creek. From this it would seem reasonable to assume that the road salts used on Sterling Highway, distributed in lower concentrations along the roadside, would not create a water polution problem. Experience in some of the northern United States, however, where the practice of road deicing on high-volume routes has been in effect for 50 years or more, warns of the hazards of long-term and heavy salt use. Groundwaters in some parts of the country now contain concentrations of sodium chloride making it unusable for drinking supplies.

The reduced curvature and wider roadway of the proposal will lessen the need for deicing and sanding for safer vehicle handling, forestalling a possible water pollution problem.

From studies made in urban areas of the United States, it is known that chemicals from vehicle fuels and worn parts are deposited on roadways, and that these residues can be toxic in the high concentrations that occur in runoff waters from heavily travelled urban highways. It can be assumed that such pollutants are present on the Sterling Highway, but no data has been collected to determine levels of concentration. The concentration of such pollutants is believed to be very low, and proportional to the relatively light volume of traffic. They are probably absorbed by roadside soil and vegetation before reaching water bodies or groundwater.

Accidental chemical spills from trucks overturning is a possibility not to be overlooked on the poor alignment of the existing highway. The chance of accident will be reduced, however, by the improved conditions of curvature, sight distance and grade that are features of each action alternative.

Mitigation

Erosion and sedimentation will be controlled by stringent mitigative efforts during the design and construction phases of the project.

In many cases, accelerated erosion can be anticipated and plans made to prevent damage to the terrain and turbidity in surface waters. Some measures will become permanent features of the highway project, others will be temporary procedures applied only during construction. Roadway design that avoids drastic changes in the natural and stabilized patterns of drainage is a key to prevention of excessive erosion damage. Other important factors in the design process include:

*Specification of temporary and permanent erosion control measures on the plans and special provisions. These could include many of the Water Quality Protection Methods listed in Appendix C-33.

*Selection of alignment and grade to minimize cut and fill sections to blend with the natural landscape, and reduce erosion and costly

maintenance. The roadway should allow ground and surface water to pass through the highway right-of-way with minimum disturbance to streams.

Extensive information on techniques for mitigation of erosion and sedimentation is available (Ref. 1, 2, 14, and 47).

Adequate monitoring of water quality during construction will help to assure "good housekeeping" practices by the contractor to avoid unnecessary erosion and chemical pollution, excess habitat destruction, and accumulation of undesireable construction litter. The timing of all in-stream construction activities will be coordinated with the Alaska Department of Fish and Game.

Monitoring of the streams will be conducted by the Regional Environmental Section staff during phases of construction that could affect water quality. Visual inspection will be made of stream waters, comparing the appearance of the stream above the construction site with the appearance of downstream waters. Indication of abnormal turbidity, or any other changes that would reduce water quality to levels below those stipulated by State Water Quality Standards, could halt construction until the problem is identified and corrected.

The effectiveness of monitoring this project is limited since baseline data for several water quality elements, against which future changes may be evaluated, is incomplete in the study area.

G. Stream Modification Impacts

The effects of fill construction and bridging on riparian and wetland environments are complex, and are addressed in several sections of this E.I.S. This section will include consideration primarily of hydraulic changes that result in impacts to wildlife and other resources. Direct impacts from destruction of habitat by bridge and roadway construction is also acknowledged (See Wetlands Impacts Section and Floodplain Involvement Section).

None of the proposed alignment alternatives will create significant changes in backwater elevations during 100-year flood conditions.

Longitudinal fills, even though used with discretion, may cause a minor increase in flow velocities and erosion potential on the stream bottom or unprotected banks. But, fills proposed with the project are of limited length and width and should not cause marked flow constriction.

On the other hand, bridges and approach fills could also increase velocities in constricting flood flows, and could create obstructions to

flood waters, because bridges are built across the direction of stream flow. It is possible that, under outburst flooding conditions during winter, bridge pier or abutment placement could cause excessive ice damming with resultant flooding, as indicated by the Corps of Engineers (Flood Hazard Evaluation, App. C-39). These, and other potential flood-plain impacts will be considered for all discharges during the design of any bridges that may result from the selection of a given alternative.

A hydraulic study, including delineation of the 100-year flood limits, will be undertaken to achieve compatible design of all encroachments on the stream should any action alternative become the preferred alternative. Either fill or bridges will be involved in any but the "No Action" Alternative.

Wildlife agency biologists are united in their concern for aquatic habitat that could be altered or destroyed by fill materials (see App. A, letters from ADF&G, FWS & NMF). They also concur in their preference for fills instead of bridges, where a choice must be made. While acknowledging the impacts from fills, they feel the proposed fills are less of a threat on this project than bridges to fish and wildlife habitat.

Reconstruction of Sterling Highway, including any stream modifications, will include provisions for increasing and enhancing public recreation activities while providing for the natural biologic and

hydrologic characteristics. The highway design is being coordinated with the Forest Service, Fish and Wildlife Service, National Marine Fisheries, and the Alaska Department of Fish and Game.

The most significant channel alterations would be made on the Alternative B" alignment, where there would be fills parallel to the Kenai River. Bridge construction would probably involve less extensive encroachments into the river at any one location.

A fill approximately 850 feet long and up to 30 feet wide would be placed in the south margin of the Kenai River channel immediately east of Cooper Creek (near Station 1665). The proposed fill is smoothly oriented parallel to the movement of the current. No projections would be made into the river to disrupt the normal flow of the current, which is quite strong and deep along this shoreline.

The 240-foot-wide river will be narrowed at this point by 30 feet with the addition of fill materials. The constriction will marginally increase the velocity of flow and the erosive power of the river. The effects of these changes will be examined in the hydraulic study of the proposal.

Aquatic habitat will be altered, if not eliminated by covering the stream bottom with fill and riprap. Not enough is known about the existing characteristics of the river bottom to fully assess these impacts.

The alternative to filling into the river at this point is to span the river at two locations with the Juneau Creek Alternative alignment, adding a third bridge across Juneau Creek. Encroachment into the river channel would be minimal, depending on the design of the bridges. The floodplains of both the river and the creek would be crossed by fills for the bridge approaches. Design of the fills would also take into consideration the possibility of flooding, as well as maintenance of the existing subsurface water regime of the creek (see Floodplain Involvement Section).

Another channel alteration would result from widening an existing fill that is located just west of Cooper Landing near Milepost 49-1/2 (Station 1715). The proposed fill is 340 feet long with the "B-1" Alternative, and 300 feet long with the "B" Alternative. The width of the fills is the same with either of these alternatives -- about 40 feet maximum.

The river channel may be slightly less constricted (by about 15 feet) with the "B" Alternative due to differences in the two route alignments where they contact the river bank. The main channel at this particular river bend is near the center of the stream, rather than close to the outside of the bend, as is usually the case. The impact of the fill on the hydraulics of the river may therefore be less than it appears on the Plans and Profile sheets 16-B_A and 16-B_3, App. C-59. Should Alternative "B-1" or "B" become the preferred alternative, a hydraulic study will reveal the effects of these changes.

Design of a structure to contain the "B-1" or "B" fill would mitigate somewhat the effect of filling into the river. A retaining wall will be built to support the fill. This structure will limit encroachment on the river and eliminate bank erosion in the river bend.

The area presently occupied by the existing highway could be graded to form a vehicle pullout and rest area that is not feasible with the current alignment.

Crossing the tributary stream west of Milepost 49 would require realignment of the creek through a culvert with either Alternative "B-1" or "B".

The fill section on Alternative "B" through Cooper Landing may encroach on a very narrow (from 0-15 feet) sliver of the river's southern edge. Loss of aquatic habitat would be minimal, and erosion potential and sedimentation would be reduced by the use of riprap at the water's edge. Hydraulic changes are expected to be undetectable.

The use of two bridges crossing the river bend from Cooper Landing, or three bridges from Bean Creek, could be alternatives to additional stream fill on the highway side of the river (see Fig. 5).

The three-bridge Bean Creek Alternative would include a limited fill encroachment on the river and floodplain with the upstream bridge, and possibly more piers beneath that structure than either of the other bridges in this vicinity. Two culverts -- one for the mainline and one for the service road connection -- would be needed for crossing the tributary stream west of Milepost 49. It would also require bridging Bean Creek, or realigning the creek through a culvert beneath a deep fill. The fill would cause over 200 feet of Bean Creek's aquatic habitat at the mouth of the creek to be lost, in addition to terrestrial habitat. Fish passage might have to be accomodated with baffles in the culvert.

In addition to the two bridges on the Cooper Landing Alternative (Fig. 5), this alignment would involve over 200 feet of additional sliver fill (Station 1736 to 1746) into the river, compared with the "B-1" and "B" routes. The impact of sliver fill is of least concern from the standpoint of sedimentation and damage or loss of aquatic habitat.

There is virtually no difference between Alternative "B" and Alternative "B-1" in their effect on the river and floodplain (see App. C-59, Sheets 18-B and 18-B_A) at the site of the existing highway bridge. The constriction created by the proposed bridge abutments at the lake outlet (Station 1800-1804) would remain essentially the same as it is at present. The "B-1" fill to the abutment on the Cooper Landing side of

the bridge would destroy over two acres of terrestrial habitat, of which less than half an acre is on the floodplain, immediately adjacent to the existing highway fill. The "B-1" fill would also eliminate an existing boat landing, which would have to be replaced.

The double crossing of Quartz Creek with the Quartz Creek Alternative (Station 2047 to 2081) would involve extensive fills on the floodplain (see Wetlands Involvement, Table 9), but little encroachment on the creek itself at normal water levels.

Alternative "B" would not change the stream or the floodplain in this vicinity. Near vertical rock faces adjacent to the roadway will be blasted, and some type of retaining wall constructed to provide the width required for the new highway without filling into Quartz Creek.

The existing bridge over Quartz Creek at Station 2171 is situated on a reach of the stream that has been aggrading for many years. This is apparently a natural phenomenon not attributable to the presence of the bridge. The buildup of rocks and gravel beneath the bridge has made it necessary for Highway Maintenance forces to use heavy equipment in the creek to keep the stream channel open to prevent flooding and damage to the roadway. A higher roadway fill and new bridge are proposed. This will allow the stream to raise its bed without jeopardizing the highway. In addition, culverts may be installed near Station 2078 for high water drainage through the road fill. Some losses of aquatic and wetlands habitats will result, but no further manipulation of the stream channel will be necessary for the life of the project, barring emergencies.

TABLE 8

SUMMARY OF STREAM MODIFICATIONS

Stream and Location (App. C-59)		Modification and Mitigation
Kenai River	Sta. 1266, Sheet 1	Riprap at north edge of river
Kenai River	Sta. 1362, Sheet 4	Fill in backwaters and stream. Retention with bin wall recomm.
Kenai River	Sta. 1381, Sheet 5	Fill supported with crib wall. (No encroachment)
Kenai River	Sta. 1408, Sheet 6	Fill retained with bin wall.
Kenai River	Sta. 1412, Sheet 6	Fill in river protected with riprap.
Kenai River	Sta. 1417-1424, Sheet 6	Fill in ponds. Slope steepening
Kenai River	Sta. 1451, Sheet 7	Fill supported with bin wall. (No encroachment).
Kenai River	Sta. 1477, Sheet 8	Fill in backwater and stream mouth -- culverted.
Kenai River	Sta. 1619 & 1622, Sheet 12-B	Bridge abutments (2) and fill. (See text)
Juneau Creek	Sta. 1669, Sheet 14-A	Bridge abutments (2) and fill. (See text)
Kenai River	Sta. 1672 & 1675, Sheet 14-A	Bridge abutments (2) and fill. (See text)
Kenai River	Sta. 1661-1672, Sheet $14\text{-}B_3$	Fill in river protected by riprap. (See text)
Kenai River	Sta. 1708, 1711, 1715, 1720, Sheet 16-A	Bridge abutments (4) and fill (See text)
Kenai River	Sta. 1729 & 1735, Sheet 16-C	Bridge abutments (2) and fill. (See text)
Tributary Stream	Sta. 1728, Sheet 16-C	Stream realignment through culverts -- (2) mainline and Serv. road (See text)

TABLE 8, CONTINUED

SUMMARY OF STREAM MODIFICATIONS

Stream and Location (App. C-59)		Modification and Mitigation
Bean Creek	Sta. 1751, Sheet 17-C	Stream realignment through culvert (See text)
Kenai River	Sta. 1725, Sheets 16-B_A, 16-B_3	Fill in river protected by riprap and retaining wall. (See text)
Tributary Stream	Sta. 1731, Sheets 16-B_A, 16-B_3	Stream realignment through culvert (See text)
Kenai River	Sta. 1736-1746, Sheets 16-A, 16-B_A, 16-B_3, 17-A_2	Sliver fill protected with riprap. (See text)
Kenai River	Sta. 1800 & 1804, Sheets 18-B, 18-B_A	Bridge abutments (2) and fill (See text)
Quartz Creek	Sta. 2011, Sheet 25-A	Fill supported with crib wall. (No encroachment)
Quartz Creek	Sta. 2047-2048, Sheet 27-A	Fill and bridge abutments (2). (See text)
Tributary Stream	Sta. 2050, Sheet 27-A	Realignment in culvert recommended.
Quartz Creek	Sta. 2081, Sheet 28-A	Bridge abutments (2) and fill. (See text)
Quartz Creek	Sta. 2061, Sheet 27-B	Fill supported by crib wall. (No encroachment)
Quartz Creek	Sta. 2167-2174, Sheet 31-A	Fill in backwater and stream, protected by riprap; bridge abutments (2). (See text)
Daves Creek	Sta. 2233, Sheet 33-A_2	Fill requiring culvert extension.
Daves Creek	Sta. 2244, Sheet 33-A_2	Fill requiring culvert extension. May require baffles for fish pass.
Daves Creek Tributaries	Sta. 2307-2330, Sheets 35-A, 36-A_2, 36-C	Fill over streams and wetlands requiring culverts or other treatments to maintain flow (See text).
Daves Creek Tributaries	Sta. 3-5, Sheets 36-C 37-C	Fill over streams and wetlands requiring culverts or other treatments to maintain flow (See text).

No alternative has been found to the alignments in the Seward Wye portion of Alternative "B" which would avoid the stream modifications involving the Daves Creek tributaries. Culverts and large rock fill foundations will help to maintain flow of water through the road fill sections, but losses of wetland habitat will be unavoidable (Wetlands, p. 111).

Most of the proposed stream modifications are listed in Table 8 with brief descriptions of the encroachments and mitigative measures that may be taken. Other, unspecified locations will require culverts for minor stream crossings and drainage. Losses of aquatic habitat are unavoidable, but limited in extent, when streams are confined and straightened by culverts. Care will be taken during construction to assure that culverts are not "perched" to create barriers to fish, and that it will not cause erosion problems such as "head cutting". Exceptionally long culverts with steeper gradients may contain baffles to create pools where fish can rest during passage, as specified by the Alaska Department of Fish and Game.

H. Coastal Zone Involvement

The project is not within the Coastal Zone boundaries as defined on the map (U.S. Geological Survey Kenai quadrangle, 1:250,000 scale) of Interim Coastal Zone Boundaries of Alaska, November 1979, produced by the Office of Coastal Management, Division of Policy Development and Planning, Office of the Governor, and confirmed by Bill Donaldson,

Alaska Department of Fish and Game Coastal Zone Management Office, Anchorage. The State Interim C.Z. Boundaries will remain in effect pending adoption of the Kenai Peninsula Borough Coastal Development Program (App.C-45 and Ref.28).

1. Wetlands Impacts and Mitigation

Wetlands are a significant natural feature along the Sterling Highway corridor. Their value to man and the environment is well established. The streamside wetlands in the corridor are a flood control element, reducing the velocity of flooding waters, and, in turn, minimizing property damage otherwise inflicted by faster rising waters and erosion rates.

Sedimentation of main stream waters and fish spawning areas is reduced when sediments are caught in wetland vegetation as the water slows down. This flushing action helps to maintain a higher level of stream water quality. Toxic and nutrient materials (sometimes washed from roadways) are trapped in wetland plant roots and sediments, which act as a filter.

Plant food productivity is maintained in wetlands, which also function as nurseries for immature fish. Both resident and migrant wildlife utilize wetlands for food and cover.

Wetlands are also of aesthetic importance, since they form a segment of the natural scene visitors enjoy in this region of the Kenai Peninsula.

Most of the affected wetlands would be impacted only at their margins. There, such primary wetland functions as flood control, erosion control, wildlife habitat, and water pollution abatement would be least impaired. The first three functions are particularly important in the watersheds of this area (water pollution is not a problem currently) because of the high recreational value, and the fish and wildlife resources that depend on wetlands for food, propagation and sediment control. These functions would not be adversely affected due to the limited extent of encroachment on wetlands that would occur with most of the highway alternatives. The two proposals having the greatest potential for significant highway impact on wetlands are described on p. 116; the Quartz Creek Alternative, and the portion of Alternative "B" near the Seward Highway Wye where Daves Creek wetlands would be involved.

Wetlands in the Kenai National Wildlife Refuge have been classified and mapped by the U.S. Fish and Wildlife Service, but a wetlands inventory has not been completed in the Chugach National Forest. Wetlands affected by the project have been located for the purpose of comparing alternatives. The three types of wetlands systems (Ref. 17) existing within the highway corridor are:

1. Palustrine - Includes vegetated wetlands traditionally called "marsh", "swamp", "bog", "fen", and "prairie". Small, shallow, permanent or intermittent ponds are also in this group. Palustrine Wetlands may be situated shoreward of lakes or river channels; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers.

2. Riverine - Water is usually, but not always, flowing in this system. Upland islands or Palustrine wetlands may occur in the channel, but are not included in the Riverine System. Palustrine Wetlands may occur adjacent to the Riverine System, often on a floodplain.

3. Lacustrine - This system includes permanently flooded lakes and reservoirs (e.g., Kenai Lake). There are typically extensive areas of deep water and there is considerable wave action. Islands of Palustrine wetland may lie within the boundaries of the Lacustrine System.

Much of the wetland acreage involved on the project is open water, in either riverine or palustrine ecological systems of the Kenai River and Quartz Creek. Lacustrine involvement is limited mostly to the Tern Lake area. Emergent vegetation is prominent in the features of these systems throughout the corridor. In the palustrine systems, scrub/shrub species have been inventoried on the Wildlife Refuge (Ref. 59), and the Quartz Creek valley has forested wetland areas as well.

Executive Order 11990, Protection of Wetlands, defines wetlands, and permits federal actions (including highway construction) to encroach on wetlands only if there is no practicable alternative. Also, all practicable measures must be taken to minimize harm from construction in wetlands.

Wetland involvement was evident during the earliest stages of project development, and affected resource agencies were notified. Input from the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the Alaska Department of Fish and Game play an integral part in the following analysis of wetland impacts and proposed mitigative measures.

Some impacts to wetlands in the corridor are unavoidable with all but the "No Action" Alternative. No practical alternatives are available to avoid some wetlands, since the roadway is being widened, and wetlands exist on both sides. The Sterling Highway is being widened to comply with AASHTO standards for rural primary highways. Where the roadway will be realigned, some wetland impacts will be mitigated through design efforts coordinated with appropriate State and Federal agencies. Many wetland encroachments were avoided during the preliminary design and agency review process.

Depending on the final route selection, an aggregate of between 15 and 18 acres of wetlands will be covered by roadway fill material. This direct habitat loss is the most important and the most unavoidable impact. A portion of the lost habitat will be partially regained when slopes become naturally revegetated in time, providing cover and food for some animal and bird species at the wetland margins. Enhancement with planted grass and browse species is possible on some of the proposed highway slopes.

TABLE 9

WETLANDS INVOLVEMENT -- COMPARISON OF ALTERNATIVES

Milepost 37 to 60		
Alternative "B" (straightest "B" align.)	15.56 acres	incl. 2 bridge replacements and 1 new bridge
No Action Alternative	Ø.ØØ acres	--
Milepost 42½ to 49½		
Quartz Creek Alternative	2.36 acres	incl. 2 new bridges
Alternative "B"	.05 acres	--
Milepost 47½ to 49½		
Bean Creek Alternative	.52 acres	Incl. 3 new bridges
Alternative "B-1"	.61 acres	incl. 1 bridge replacement
Alternative "B"	.58 acres	incl. 1 bridge replacement
Cooper Landing Alter.	.42 acres	incl. 2 new bridges
Milepost 50¼ to 52		
Juneau Creek Alternative	.19 acres	incl. 3 new bridges
Alternative "B"	.32 acres	incl. 1 bridge replacement

Kenai Wildlife Refuge	1.31 acres of wetlands involved
Chugach National Forest	14.23 acres of wetlands involved (with Alternative "B")

Implementation of mitigative measures developed at the design or construction stages will avoid the worst effects of fill emplacement such as sedimentation and modification of water levels and flow regimes (App. C-33).

The straightest series of alignments on Alternative "B", plus two bridge replacements (Quartz Creek and Cooper Creek), and one new bridge (Kenai River at Cooper Landing), would require an estimated 15.56 acres of wetlands to be covered (Table 9). Replacing sections of Alternative "B" with the Juneau Creek, Bean Creek and Quartz Creek Alternatives (the

best combination of alignments from the standpoint of through traffic) would result in the involvement of 17.65 acres of wetland, eight new bridges, and one bridge replacement. The most significant impact would be on the wetlands of the Quartz Creek Alternative, where fill would cover more than two acres of moose winter habitat. Flood control capacity of the wetlands on the floodplains could also be impaired by this extensive fill. On Alternative "B", where the construction proposal crosses Daves Creek wetlands and tributaries west of the Seward Wye, impediment of surface water flow is second only to destruction of habitat as the most serious potential impact. Mitigation is suggested in the previous section on Stream Modifications, p. 101.

The use of cribwalls, riprap (armoring), through culverts, and other means of preventing or alleviating harm to wetlands will be applied wherever it is practicable. In some cases, minor changes to the alignment of the proposal can reduce impacts to wetlands. The fill in Tern Lake, for example, would be less harmful if all material were placed on the side involving only the small isolated wetlands north of the roadway, rather than encroaching further on the main body of the lake.

The wetlands or aquatic habitat associated with the edges and channels of streams are impacted by bridge and culvert construction, or by fills into the streams. These impacts are also discussed in the Stream Modification Impacts Section, but acreage of these wet-

lands is included in the summary on Table 9. Wetlands of minor streams and drainages are not individually acknowledged, but they can be located on the Plan and Profile drawings of the project. Mitigation of impacts to streams is also treated in the previous section, with a summary on Table 8. Mitigation measures for stream modification usually apply also to impacts on associated wetlands.

The encroachment indicated by the preliminary slope limits at Station 1362 on Alternative "B" may be mitigated by steepening the slope or installing a cribwall. (Cross-sections indicate less encroachment at this location than the photo-map). The stability of fill material used here may allow the embankment to be steeper than has to be assumed for preliminary design.

A similar situation exists with encroachments on open water at Stations 1391, 1408 and Stations 1412 to 1415.

Encroachments on the ponds at Station 1417 to 1424 will be unavoidable if a safe curve is to be developed just west of this point. The slope will be steepened to minimize burial of aquatic habitat. Although some types of habitat will be impacted, these ponds would appear less important than others as fish rearing waters because they have no surface connection with the river. Contrary to this assumption, juvenile fish sampling in these ponds in July 1981 netted 94 sockeye

salmon and 14 dolly varden char juveniles. The question remains as to whether this is an unusual occurance or if juvenile fish regularly find some high water passage into the ponds.

The necessity of creating a safer highway curve and avoidance of the river channel forces the unavoidable elimination of a small pothole left of Station 1452 (App. C-59, Sheet 7).

Wetlands will also be broached unavoidably between Stations 1464 and 1600 where a safe highway alignment or avoidance of the river channel is necessary. These mainly involve several small drainage crossings which will be realigned in culverts beneath the road prism.

The Juneau Creek Alternative involves wetlands at the margins of Kenai River and Juneau Creek, as well as the streams themselves where bridges are proposed. There is evidence that the area in the vicinity of the confluence of the two streams is probably regularly flooded, but it has not been included as wetland in the inventory summarized on Table 9. Impacts to wetlands on this alternative would also be unpreventable, but could be lessened with special construction such as multiple culverts, large rock fill, or, in the case of Juneau Creek, longer bridges.

Wetlands impacted by Alternative "B" on the opposite side of the river would consist of the stream itself. The existing rip-rapped

roadbed would be expanded to provide for a wider roadway and a safer curve, necessitating a fill into the river and a replacement for the Cooper Creek bridge.

Wetlands would have to be filled at Station 1685 and 1694 on Alternative "B" for the realigned and wider roadway. A raised, and therefore wider roadbed is necessary to prevent floodwaters from covering the highway as in the past.

Impact on wetlands east of Station 1707 is unavoidable with any of the alternatives. The Cooper Landing and Bean Creek Alternatives involve the stream bed and river banks for bridges. Alternatives B-1 and B require extension of an existing fill into the river to achieve a safer highway alignment. The severity of the fill impact would be moderated somewhat with a retaining wall. The stream at Station 1728 on the Bean Creek alignment would be placed in culverts beneath two fills, as opposed to single crossings with the other alternatives. Two additional streamside wetlands would be impacted on the Bean Creek Alternative as well.

Use of the Schooners Bend materials site left of Station 1513 would not directly impact wetlands. About an acre of wetlands within the site has black spruce underlain by peat, silt, and clay; materials unsuitable for construction use. The wetland area will be avoided, but gravel is proposed to be removed from adjacent, suitable materials. Most of the useable materials are in benches uphill from the wetlands.

J. Floodplain Involvement

The project will involve floodplains as described in Executive Order 11988, Floodplain Management. Although it is a policy to avoid longitudinal floodplain encroachments in highway construction, there would be unavoidable encroachments on the floodplains of Kenai River and several of its tributaries with most of the alignment alternatives. With some noted exceptions, encroachments will not be significant due to their limited extent.

The natural and beneficial floodplain values will not be significantly affected, except where habitat is actually covered by fills or bridges, or where these structures create a barrier to the movements of animals that inhabit the floodplain. Such impacts are unavoidable with alignments on the Juneau Creek and Quartz Creek Alternatives. Designs of fills and bridges will take into account the need to perpetuate the natural patterns of water flow over the surface as well as groundwater movement. Significant changes in backwater levels for 100-year flood flows will be avoided entirely (See Stream Modification Impacts).

The Kenai River's flow for the 100-year flood has been calculated at 27,000 cfs, and the limits for such floods has been roughly mapped by the Federal Emergency Management Agency, Insurance and Mitigation Division, (App. C-43) to show the relationship to land use in the area. The river has inundated private property along its banks in recent years (with the extreme flow of record at 23,100 cfs in 1974) giving a measure of what can be expected from a 100-year flood.

The "flood hazard evaluation" of the project by the Department of the Army, Alaska District Corps of Engineers, outlines concerns for potential flooding problems with particular alternative highway alignments (App. C-39-42). All bridge designs will allow for these concerns.

None of the alternative road alignments will directly or indirectly support incompatible floodplain development, as no new access to private properties on floodplains will be created. The stream modifications inherent in the various alternatives will not cause flood related impacts to any homes or businesses, as the completed modifications will pass the 100-year flood waters. Mitigation of floodplain encroachments is discussed for each location in Stream Modification Impacts, p. 101 (summarized in Table 8), and in Wetlands Impacts, p. 111.

There are no practicable alternatives to the construction of encroachments in the base floodplains other than "No Action". Alignments farther removed from the margins of the Kenai River or Quartz Creek, for example, would cause erosion, terrain modification, resource losses, and visual impacts from excessive cuts or fills, or longer bridges across intervening gullies that drain into those stream valleys.

Department of the Army and U.S. Coast Guard permits will be obtained as required for work involving fill materials in the river or wetlands, and for bridges spanning navigable streams.

K. Natural Resources Impacts

Wildlife

The highway project will impact wildlife both directly and indirectly. The degree of impact will depend on how much the project departs from existing conditions. There will be less impact on wildlife with minimal changes to the roadway alignment, than if major encroachments are made into currently undisturbed habitats.

Alignment changes and new bridges create direct physical impacts by altering the terrain of wildlife habitats. Indirect impacts are associated with introduction of access for human activities that are disturbing to wildlife. Animals may become accustomed to some of the changes and activities introduced by humans, but in many cases the effects on wildlife are irreversible.

Fish and wildlife agencies have expressed the most concern for resources in water habitats -- streams and wetlands -- and anadromous fish populations -- in their analysis of highway impacts that may result with this project. Impacts to fish, and mitigation of those impacts, are addressed in the sections on Water Quality, Stream Modification, and Wetlands Impacts. No threatened or endangered species are present in the project area (App. C-58).

Impacts from human activity on land adjacent to the highway can be expected to increase with the Quartz Creek and Juneau Creek Alternatives. Whether access is prevented or not, noise, glare, and activity on the highway itself would affect the habits of some animals (App. C-46). Increased access to these relatively remote areas can lead to disturbance of wildlife by human encroachment on the habitat. Direct mortality on the roadway would probably be no worse than on other roads after animals become accustomed to the new highway location.

Dall sheep and mountain goats range through the corridor in the alpine zones, but the only ungulate that would normally be affected at the elevations of the highway is the moose. The most significant negative effects on moose would occur with the Quartz Creek Alternative. Two acres of winter habitat would be lost, and more would be made less accessible by the new highway (See Wetlands Impacts, p. 116).

Bird habitat is most important in the mature forests (App. C-47) which would be affected to an extent by each of the action alternatives. The most significant losses of mature forest habitat would occur with the Juneau Creek, Bean Creek, and Quartz Creek Alternatives. Wetland bird habitats would be impacted by each of the action alternatives also.

Game animals, the furbearers, and small mammals, and birds that are known to inhabit the area, include those listed on Table 10 and App. C-48.

TABLE 10

WILDLIFE IN THE KENAI LAKE AREA*

WATERFOWL (loons, grebes, ducks, cranes)
SHOREBIRDS

BIG GAME
- Dall Sheep (Ovis)
- Barren-ground caribou (Rangifer)
- Black bears (Ursus)
- Brown/Grizzly bears (Ursus)
- Wolves (Canis)
- Moose (Alces)

SMALL GAME
- Spruce grouse
- Willow ptarmigan
- Snowshoe Hare (Lepus - See rodents)

FURBEARERS
- Beaver (Castor)
- Wolverine (Gulo)
- Lynx (Lynx)
- Coyote (Canis)
- Martin (Martes)
- Mink (Mustela)
- Weasel (Mustela)
- Muskrat (Ondatra)
- Land Otter (Lutra)
- Red squirrel (Tamiasciurus)

NONGAME
- Birds (hawks, eagles, owls, kingfishers, woodpeckers, and perching birds)
- Rodents and Shrews
  - Voles (Clethrionomys, Microtus)
  - Shrews (Sorex, Microsorex)
  - Snowshoe hare (see small game)

* (Condensed from Kenai Area Wildlife Inventory, Walker, Chugach National Forest, February 1979, Ref. 62)

Timber

Direct impacts on the timber resource in the highway corridor, ie., forcing the harvest of timber because it conflicts with the highway location, will be negligible. In some locations, the highway could enhance utilization of the resource by providing better access to timber stands. Lack of access has impeded timber harvest on the Peninsula. Access is cited by the Forest Service (App. C-53) as very important to existing roads in the Quartz Creek valley, and to the Sterling Highway west of Cooper Landing.

The timber that is cut to clear the highway construction limits will be utilized for house logs, poles, posts and firewood. Disposal will be either by sales arranged by the Forest Service, or free use permits.

Wilderness Impacts

A "Wilderness Attribute Rating System" applied to lands in the Chugach National Forest labeled the areas traversed by the Sterling Highway as "non-wilderness" (Ref. 44). The highway corridor contains roads and other developments not compatible with wilderness values.

In the Kenai National Wildlife Refuge, however, "wilderness" status has been applied to lands just north of the highway project. (Refuge lands south of the Kenai River are now "wilderness" as well). The highway right-of-way will not contact the wilderness land boundary nor affect it detrimentally any more than at present.

Energy

An energy analysis was computed for comparison of project alternatives. The analysis was adapted from a methodology developed by J.A. Apostolos, W.R. Shoemaker, and E.C Shirley.

Traffic counts were used to calculate the fuel consumed in 1979, and traffic projections were utilized in estimating fuel uses by 1984 and 2004. The parameters used in formulating the fuel comsumption consisted of vehicle mileage, road gradient, fuel type, and vehicle class.

The results of the anlaysis are listed on Table 11. Juneau Creek and Quartz Creek Alternatives result in minor energy savings while the Bean Creek Alternative results in a minor increase in fuel consumption. This study indicates that vehicle fuel consumption on this project will not have a significant bearing on the alternatives selected.

TABLE 11

FUEL CONSUMPTION

	1979	1984	2004
Alternative "B" and No Action	474,520 gals	634,356 gals	1,863,344 gals
Juneau Creek Alternative	N/A	1,015 gals saved	30,037 gals saved
Bean Creek Alternative	N/A	253 extra gals	710 extra gals
Quartz Creek Alternative	N/A	59 gals saved	175 gals saved

* ALL TOTALS list the fuel as equivalent annual gallons of gasoline.

L. Land Use Planning Impacts

Growth of the Cooper Landing community is limited by the availability of private property for development. Most land along the project corridor is under the control of the Federal government (Chugach National Forest or the Kenai National Wildlife Refuge). Future land transfers from State to Kenai Peninsula Borough ownership may provide land for private as well as municipal development in Cooper Landing. However, this would be contrary to the Borough Comprehensive Plan goals and objectives of inhibiting the sale of additional land for development (Ref. 25).

The improved traffic circulation provided by reconstruction of the existing highway along the Alternative "B" alignment through Cooper Landing will enhance commercial and residential activity in the community, but it is not expected to induce growth above normal population increases. Alternative "B" would continue to provide access to adjacent scattered private holdings. Where traffic demands call for a safer facility, ingress and egress will be improved by turning lanes. These improvements will not induce growth where land area is limited.

Shifting traffic to the Bean Creek side of the river, without partially controlled access on the new highway, would tend to create new highway-oriented business sites and associated residential growth. (Sites suitable for development adjacent to the proposed highway are limited by topography.) Social and economic impacts (see Social and

Economic Impacts Section) would be felt by residents and businesses on both sides of the river. On the other hand, with access control, vehicles would be limited to specific ingress/egress points on the new road, providing only indirect access to private lands abutting the highway. This would tend to discourage business development. The presence of a new throughway would not, without commercial development, attract new homes.

The Juneau Creek Alternative would not provide access to any private land, and the Forest Service has no plans for development in the area.

The Sterling Highway is the sole method of access for the majority of people in the highway corridor, serving the recreational, residential, commercial and industrial demands of the corridor as well as those of the western Kenai Peninsula. The highway improvement is a response to those demands for access, travel safety and convenience. Increasing demand for living space and recreational facilities, not improvement of the highway, will be the factor that determines growth of the area.

The importance and uniqueness of the Sterling Highway is recognized in the Kenai Peninsula Borough Comprehensive Planning Program Recommendations. A project to enhance this regional road connection will not encourage community or roadside growth above what it would have been without the road improvement, except as noted in the case of the Bean Creek Alternative.

Density of development is controlled by Borough subdivision regulations and the Alaska Department of Environmental Conservation. A minimum of one acre (40,000 square feet) is required for each house using on-site sewage facilities.

Community planning in the area has not yet progressed to the point of land use regulation in the form of zoning. The Comprehensive Plan, prepared in 1971, was adopted by the Borough in 1974. In 1979, an Advisory Planning Commission of Cooper Landing citizens was formed to make land use recommendations to the Borough Planning Commission.

Federal land management agencies acknowledge the highway as an integral part of their planning for resource utilization.

The following studies and programs exemplify Forest Service planning policy:

1. Roadless and Undeveloped Area Evaluation II (RARE II) includes consideration of "other National Forest lands";

2. Chugach Moose-Fire Management Program is oriented largely to the valleys containing highways;

3. Chugach National Forest Land Use Plan addresses land ownership, occupancy, and transportation, as well as natural resources in the Forest.

Recreation is seen as a major resource that brought 200,000 visitor days of travel along the highways and roads in the Forest in 1972. Off-highway recreational use amounted to an additional 300,000 visitor days. The Forest Service anticipates increased recreational use of the Forest.

The U.S. Fish and Wildlife Service promotes the provision of access from the highway for sport fishing and other recreational activities on the Kenai National Wildlife Refuge (pp.A-41, A-51). Refuge managers have proposed a plan for a system of pull-outs for vehicle parking while visitors hike, fish and sightsee along the Kenai River. They have recommended reducing speeds in this scenic segment of the Refuge; however, a lower speed limit would conflict with the purpose of this primary commercial highway to carry traffic at safe and reasonable speeds through the area. A parallel roadway to accomodate faster (or slower) traffic is not feasible for economic reasons, as well as the additional destruction of resources.

Meanwhile, the wider, well-designed alignment of the proposed highway will better accomodate the legal speeds at which the public tend to travel than does the existing substandard road. Elimination of indiscriminate roadside parking and camping by limiting access to specific points will also enhance the legitimate use of the highway and the general corridor.

M. Historic/Cultural Site Impacts

Historical/Archeological Significance

Cultural reconnaissance surveys of the project corridor were conducted by archeologists of the U.S. Forest Service in October 1978, and in autumn of 1979 by the Alaska Department of Natural Resources, Division of Parks. These studies located cultural sites and assessed potential impacts to cultural resources within the area of the proposed project.

A number of the historic and aboriginal sites surveyed are eligible for nomination to the National Register of Historic Places, according to the State Historic Preservation Officer (SHPO). Several of these sites, being directly impacted by proposed construction, are subject to Section 4(f) evaluation. Negotiations are continuing with the SHPO and the Advisory Council on Historic Preservation (ACHP) to identify cultural sites, evaluate impacts and agree upon appropriate mitigation measures, pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended. Council comment will be included in the Final EIS.

Further in-depth archeological testing at several locations along the project is recommended by archeologists of the Forest Service, the Fish and Wildlife Service, and the State Division of Parks.

Impacts

With the exception of the No Action Alternative, cultural resources will be impacted in varying degrees by each of the alternative routes. Ground disturbance caused by roadway excavations and fill placement comprise some of the primary impacts. Secondary impacts include increased public accessibility and unforeseen erosion problems.

Alternative "B" affects environmental and archeological concerns to a lesser degree than other possible alignments. Within the portion of the corridor containing the highest concentration of historic/cultural sites, the choice of highway alignments is severely limited. On potential alignments other than the existing highway, the land is steep, requiring extensive terrain alteration, or construction would damage developed recreation facilities and other areas known to contain historic/cultural features.

Mitigation

In instances where cultural sites cannot be avoided during the process of highway construction, mitigation of the impact will involve excavation to recover the important data for which the property is considered eligible for inclusion in the National Register. Mitigation will be developed with the SHPO and ACHP.

Careful survey and salvage of sites prior to construction would prevent the loss of archeological data that would otherwise be destroyed. Work stoppages on the project to accomodate emergency excavations will also be reduced. As all sites are not obvious even to the trained eye, discoveries may be made during construction. These will be dealt with in accordance with established procedures for sites found during construction.

To facilitate immediate identification and protection of cultural resources, and to minimize "down time" on the project, an archeologist will be assigned to the project and immediately available to the Project Engineer to evaluate the significance of any sites found during construction, and to provide guidance in the appropriate treatment of such sites. Data recovery work on known sites could be arranged to coincide with the construction schedule to make efficient use of the archeologist's time.

N. Construction Impacts

The public will experience temporary inconveniences during the construction phase of the project.

Construction activities will create additional traffic. Hauling of heavy equipment and materials to the project site could alter or complicate traffic flows on the Seward and Sterling Highways. There will be

detours on rough roads, along with occasional delays for equipment operation or rock blasting. One of the route options (Alternative B) for reconstruction of the existing bridge at Cooper Landing would require a temporary bridge to accomodate traffic. Otherwise, bridge construction would not require detours. A traffic control plan will be prepared as part of the construction contract to mitigate any traffic delay or detour impacts.

Air quality may decrease temporarily as construction activities raise above-normal amounts of dust. Control of suspended particulates will be carried out according to the material site mining plan and contract specifications for dust suppression.

Additional noise will result from heavy equipment operation and blasting for rock excavations. Specific impacts are outlined in the Noise Impact Section.

Stream sedimentation is the most serious potential construction impact. Several locations among the alternatives would be inclined to erode without preventive measures. In-stream and stream bank work for bridges and retaining walls will also increase opportunities for stream sedimentation. Both temporary and permanent mitigation is addressed in the Water Quality Impacts Section. An erosion control plan will be an integral part of the construction contract specifications.

Placement of fills in wetlands to widen the roadway will require careful work and mitigative measures to avoid harming the aquatic ecosystem. Interception of flows, sedimentation, and thermal changes are some of the effects to be avoided during construction.

Disposal of excess materials from excavations will, according to the contract, be at sites approved by the property owners (or land managers), and left in "an acceptable condition" including grading and revegetation.

Borrow materials for road construction will be obtained from one or two sources on or near the project. Rock excavation sites will provide much of the base materials required (Fig. 3). The material sources, impacts that can be expected from their use, and measures to minimize these impacts, are described on following pages.

Material Source Impacts

Reconstruction of Sterling Highway under any of the action alternatives will require substantial amounts of suitable, frost-free borrow material. The 21-mile-long project will be balanced between cuts and fills using materials from the right-of-way for rough grading to the extent possible, and additional gravel for finishing the roadway. Borrow will be obtained from sites located on, or as near as possible,

to the project. About 350,000 cubic yards of various grades of crushed rock, including aggregate for asphalt, will be needed for base and surfacing.

Two suggested gravel sources, located at nearly opposite ends of the project, contain about 377,000 cubic yards of suitable material.

The proposed primary source (M.S. #21-2-050-1) is off the Sterling Highway, west of Schooners Bend on the Kenai River. It is located at the trailhead of Resurrection Pass Trail, about five miles east of the Beginning of Project. The site, not yet open for mining, contains about 227,000 cubic yards of material, of which two-thirds will be unavailable for mining. This unused area will be used as a buffer zone to screen the mined area from the highway.

Supplementing that source is an existing pit (M.S. #31-1-703-1) off the Seward Highway in Moose Pass, approximately two miles east of the Seward Wye. Of about 150,000 cubic yards of proven material remaining at this site, a considerable amount is committed to other projects. The renewed Forest Service permit allows the pit to be expanded up to 400,000 cubic yards. If suitable materials are found in the unopened area, this pit could provide for some of the needs of the Sterling Highway project. Its use is limited by location and the impacts of long-distance hauling.

A third source is a pit (M.S. #31-1-021-1) proposed for development and use during paving of portions of the Seward Highway. It is a 40-acre site at Mile 42 Seward Highway, containing about 500,000 yards of proven material. A large portion of this material could be available for use on the Sterling Highway project. The limitations of this site include commitments to other projects, and the considerable haul distance (5 to 26 miles).

Alternative Sources

More than 17 gravel sources (maps and descriptions on file) were studied prior to the Forest Service tentative decision to mine the Schooners Bend site. Alternative sources have poor quality materials, insufficient quantities, or are unavailable because of other commitments for gravel or land use. Economic factors such as length of haul and damage to highways used for hauling beyond the project limits were also considerations.

Only sources on State or Federal lands were contemplated for material extraction. Materials discovered, and tested by the State on private property are subject to sale and removal by the owner prior to project approval and awarding of a contract. Also, according to the Forest Service, negative impacts would be greater using many smaller pits than one or two sizable sources at strategic locations.

Alternative sources have not been found within ten miles in either direction from Schooners Bend. Existing pits are subject to shortages of material, unsuitability of material, and limited availability. The latter restriction stems from U.S. Fish and Wildlife Service policy requiring that materials taken from Wildlife Refuge pits be used at locations within the Refuge.

Site Description

The Schooner Bend site is a 32-acre area of which 19 acres will be mined. The Resurrection Pass Trail bounds the site on the east and north, while the Chugach Electric Association powerline runs through the site, roughly parallel to the Sterling Highway. A service access road parallels the powerline.

Vegetation on the site is varied, with black and white spruce as the dominant species. Birch, aspen, willow, and cottonwood also occur, usually as a result of soil and moisture conditions. Ground cover is fairly uniform with mosses and cranberry dominating and grass areas occurring in isolated locations. Drier areas have only lichen and scattered stunted tree growth.

Topography on the site is relatively level with at least three old river terraces along the northern portion of the site with an elevation change of approximately 100 feet. The upper-most terrace extends north,

beyond the boundaries of the proposed site. This terrace has not been tested for material but expansion is possible in this direction if necessary. Present testing indicates the best gravel is found in these terraces.

Present use on the site is limited. No developed recreation facilities exist on the site although the Resurrection Pass Trail and Trailhead are adjacent to the proposed gravel source. Any recreation use of the site is limited to the "edges" -- Trail and Trailhead and along the powerline access corridor.

The Visual Resource Inventory within the Land Management Plan for the Chugach National Forest identifies the corridors of both Sterling Highway and the Resurrection Pass Trail as "special areas of concern". This means the visual resource is considered critical, and any modification of landscape features in these areas should be carefully planned and executed. The development of a gravel pit will not meet the visual quality requirements of the Forest Land Management Plan, but through location, shape, and screening the apparent impact can be minimized.

Visual screening will consist of a 300-foot wide remnant of natural forest between the highway and the pit area. A similar screen will be left between the pit and the Resurrection Pass Trail and Trailhead area. In addition, a single access road to the pit will be curved to block line of sight between pit and highway.

A mining plan, including landscaping and revegetation requirements specified by the Forest Service, will be implemented during and after mining to return the area to a natural appearance. This will include terracing the pit to conform to the existing natural terraces and ensure compatability with future uses. Potential uses include campground, overflow parking area, or wildlife habitat. Seeding with grasses, liming, fertilizing, and planting with indigenous brush and tree species will also be part of the landscaping plan.

Prospective contractors will be required to supply a mining plan prior to use of the material site. This plan should include, but is not limited to, the following information and definition of measures to mitigate environmental impacts to the site and the surrounding areas:

1. Proposed excavation contours should be identified on a map. Excavation depth will not approach closer than one foot to the water table.
2. Equipment will be maintained to avoid oil leaks or spills. Used oil will be disposed of in a manner acceptable to the Alaska Department of Environmental Conservation (ref. Waste Oil in Alaska, ADEC, 1979) if the change is made on the material site. Only equipment stationary on the site shall be maintained there.
3. The contractor shall prepare an accidental (oil) spill cleanup plan.
4. Work areas will be treated for dust suppression.
5. Slopes will be graded to at least a 2:1 ratio, smoothed, and revegetated immediately after all usable material is removed. Revegetation will be with indigenous grasses and shrubs.
6. There will be no on-site sewage disposal.
7. Contractor must exercise extreme caution if operating within the CEA easement in order to avoid damage to the electrical facilities.
8. The haul road surface will be maintained to reduce dust and noise.

Social and Economic Impacts

Development of the Schooners Bend site will not directly cause changes in the lifestyle of Cooper Landing residents or groups. Development will not cause changes in local taxes, property values, employment, or travel patterns. The gravel production should not negatively impact schools or churches, businesses, or any minority groups. Site development will preclude other uses of the property, including recreation, until exhaustion of materials and rehabilitation have been completed.

The nearest residents will be at least 800 feet west of the site, but probably more than 1,200 feet away, depending on the extent of pit development. The distance and intervening screen of forest will greatly reduce the noise and air impacts of the operation on the residents. Hazards and inconveniences for humans in the area will increase slightly due to additional trucks on the highway.

The haul road from the pit to the highway will be exclusively for gravel site operations, with no unauthorized vehicles or personnel allowed on the road.

Quality of groundwater used by the nearest residents should not be affected with implementation of the Forest Service protective measures regarding fuel transfers and limitations on pit depth.

There will be no relocation impacts related to proposed use of Schooners Bend materials site.

Indirect impacts resulting from material site development at Schooners Bend are practically all positive social/economic impacts. Extracted materials will be used for highway improvement projects allowing safer and more efficient transportation routes. Local and private uses of the gravel will be permitted to a limited extent, resulting in further benefits to the community and residents. Timber from the pit area will be disposed of via a commercial firewood sale or advertisement as a free use area.

Air Quality

Fugitive dust from rock crushers, earth-moving equipment and trucks is an impact addressed in the mining plan. One function of the wide vegetative screen will be to help filter airborne contaminants before reaching the trail, parking lot, or highway.

Carbon monoxide (CO) emissions of equipment operating in the pit as well as on the highway will not significantly decrease air quality in the highway corridor. Diesel engines emit less CO than gasoline engines. The Forest Service will enforce mitigation measures such as dust suppression within the pit and on the haul road.

Noise

Development and operation of the mineral extraction site could impose temporary noise impacts on the Resurrection Pass Trail, or the residence 800 to 1,200 feet west of the site. These are the only noise-sensitive receptors within range of the gravel site. Ambient noise levels within the site area (400 feet from the highway) are estimated to be in the range of 56 to 59 dBA (L_{eq}) under present traffic conditions.

Noise from gravel extraction operations could reach levels of about 69 to 74 dBA (L_{eq}) at the Resurrection Pass Trail above the pit area.

Truck noise from the haul road could produce L_{eq} noise levels of 67 dBA at about 30 feet from the source. This noise level is based on estimates for minimum traffic of eight autos and 25 heavy duty trucks per hour.

The residence could receive as much as 60 to 64 dBA from the gravel pit operation, depending on the distance from the noise source, the effectiveness of screening by vegetation, and other factors subject to great variation. Adding that noise to that expected at the site from Sterling Highway traffic in 1984 (about 60 dBA at the house) would result in approximately 65 dBA, still below the FHWA maximum standard for residential uses.

Mitigation measures to abate noise originating from the gravel extraction operation could include mufflers or temporary enclosures for machinery, or other measures referred to in the Noise Impacts Section (p. 74). Relocation of the Resurrection Pass Trail is also an option.

Noise impacts will not be a factor on weekends or from late fall to early summer when operations will be suspended.

Water Quality

The gravel mining operation would not influence open water or streams. Groundwater was not encountered in test pits to 12 feet deep, however, groundwater supplies could be affected by a fuel spill in the excavation area. Preventive measures should be specified in the mining plan and enforced by the Forest Service.

Wetlands

The small area of wetlands within the material site area has unsuitable materials and is recommended for exclusion from the excavation area.

Natural Resources Impacts

The existing natural land form of the Schooners Bend site will be altered appreciably during extraction of at least 75,000 cubic yards

of material. With the exception of the buffer zone around the site, and the archeological sites, vegetation will be completely removed along with 18 inches of organic cover. Ground elevation will be lowered during site use. Rehabilitation of the site will include redistribution of organic materials, shaping contours to gentle relief and revegetation with grass, shrubbery and trees according to a Forest Service landscaping plan.

Historic/Cultural Site Impacts and 4(f) Involvement

One of the materials sources is within an area which is eligible for the National Register of Historic Places (see Historic/Cultural Site Impacts Section, p. 131). Eligibility for the National Register requires a Section 4(f) Evaluation.

O. Permits

All permits required by government agencies will be acquired prior to highway construction. These may include, but will not be limited to the following: Corps of Engineers 404 Permit for water and wetlands encroachments, and Coast Guard navigable waters permit; Permits for waste water and solid waste disposal, open burning, surface oiling; Right-of-Way, Easement, and Utility Permits; Permit for Use of Timber or Materials; Anadromous Fish Protection and Critical Habitat Area Permits; Antiquities Act Permit for archeological work; Federal Aviation Administration airport clearance.

P. Draft 4(f) Evaluation

A description of the proposed Sterling Highway reconstruction project, as well as a statement of the project's purpose and need, is presented in the first two sections of this draft E.I.S. The portion of the project under scrutiny for its effect on Section 4(f) land is the western 3.32 miles within the Kenai National Wildlife Refuge.

In addition, the discovery of cultural sites on highway right-of-way within the Refuge and Chugach National Forest requires evaluation of 4(f) impacts to those resources.

4(f) Involvement on Kenai National Wildlife Refuge

The present highway through the Refuge is located on an existing 300-foot right-of-way easement, granted to the State of Alaska, Department of Highways, by the Secretary of Interior in 1971. The proposed project involves construction of cut slopes that will in some cases extend outside of the right-of-way on the north side (Figure 10), requiring easements for additional right-of-way.

This 4(f) evaluation addresses specific parcels of land that must be acquired on the northern periphery of the right-of-way. Effects of the highway on other portions of the Refuge, within and without the right-of-way, are discussed in the body of the draft E.I.S.

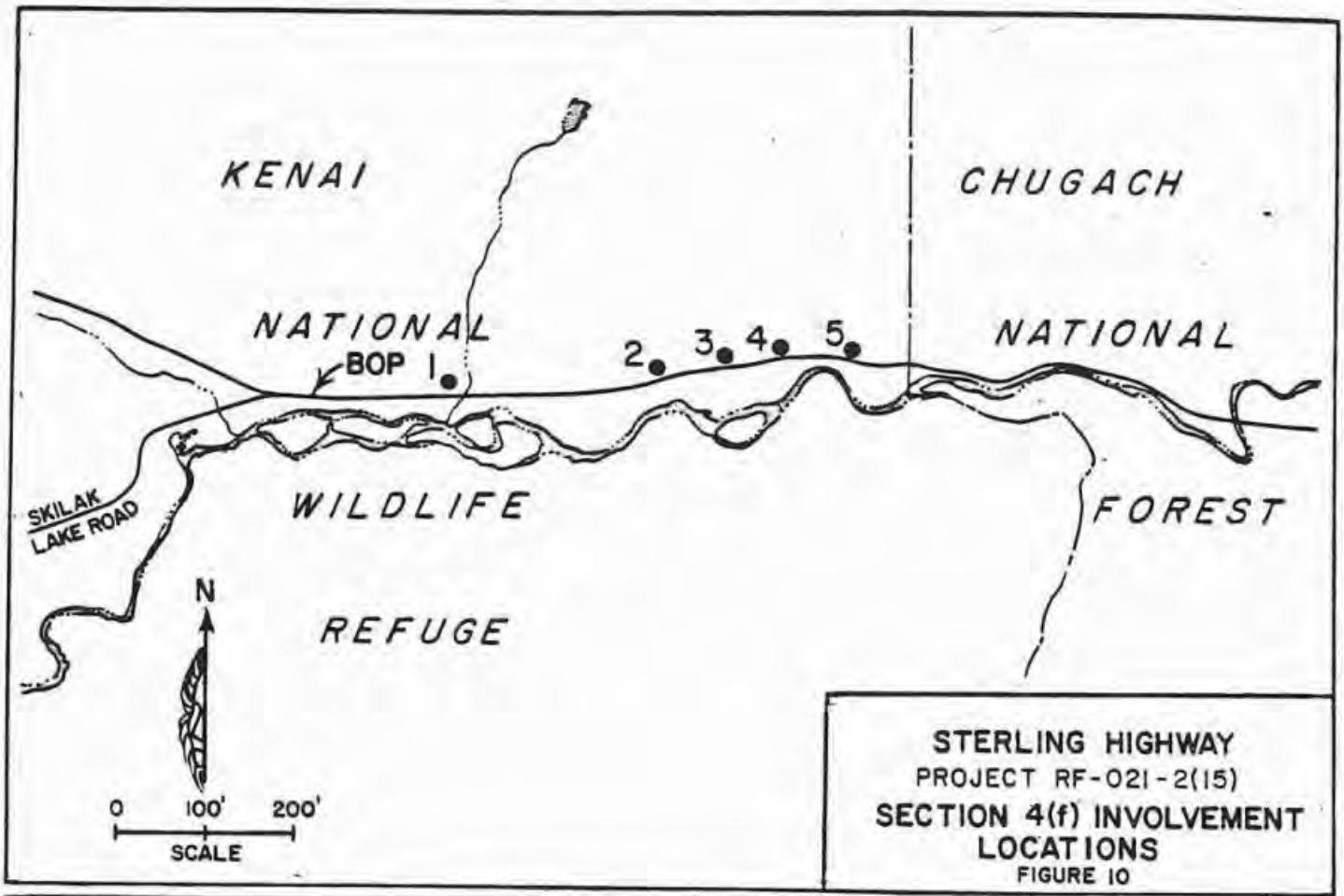
The five parcels of right-of-way to be added cover 3.79 acres of steep upland with no prominent drainage features. Slopes vary from 24° to 40°. The tops of the cut slopes are from 100 feet to 140 feet above the elevation of the road. These parcels are all heavily vegetated with hardwoods and some spruce trees.

Recreation and historic/cultural resources are affected by the 4(f) properties. The property is "recreational" only in the broadest sense, in that it functions as wildlife habitat and part of the scenic view from the highway. Historic/cultural resources are known to be directly involved at only one 4(f) parcel. Effects on other historic/cultural sites in the Refuge are described in the draft E.I.S.

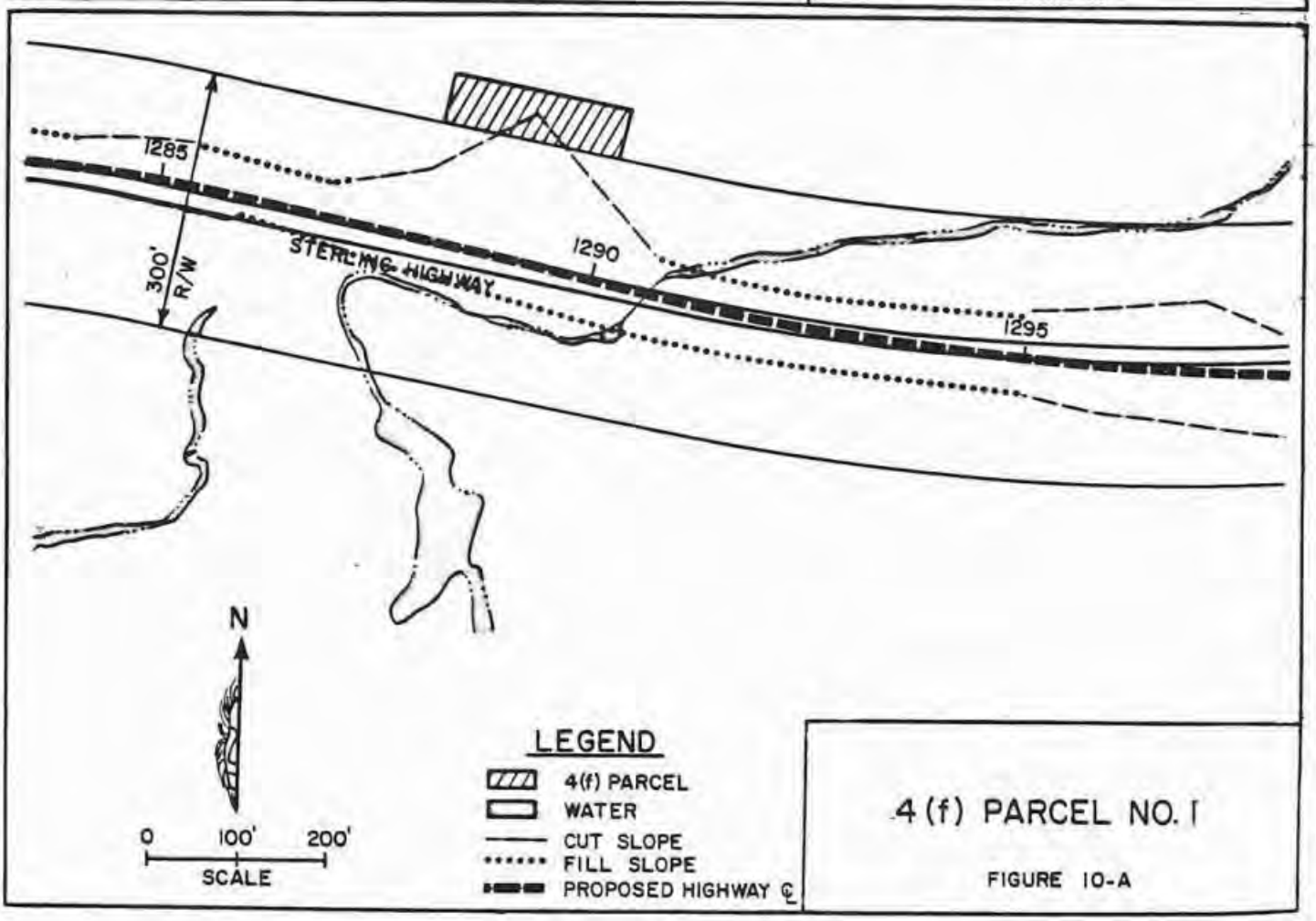
Available recreational activities on the property would include hunting, hiking, and wildlife viewing. The property itself is viewed as part of the natural scene by people driving by.

Facilities such as trailhead parking lots and interpretive area pullouts planned by the Fish and Wildlife Service are all oriented to the roadway itself and do not directly involve the 4(f) properties, except possibly as the properties might be viewed from these facilities.

The Fish and Wildlife Service cites highway traffic counts which, interpreted in terms of average vehicle occupancy, record approximately 1,500,000 visitors through the Refuge on the Sterling Highway each year. Heaviest use of the area is during the summer fishing season.

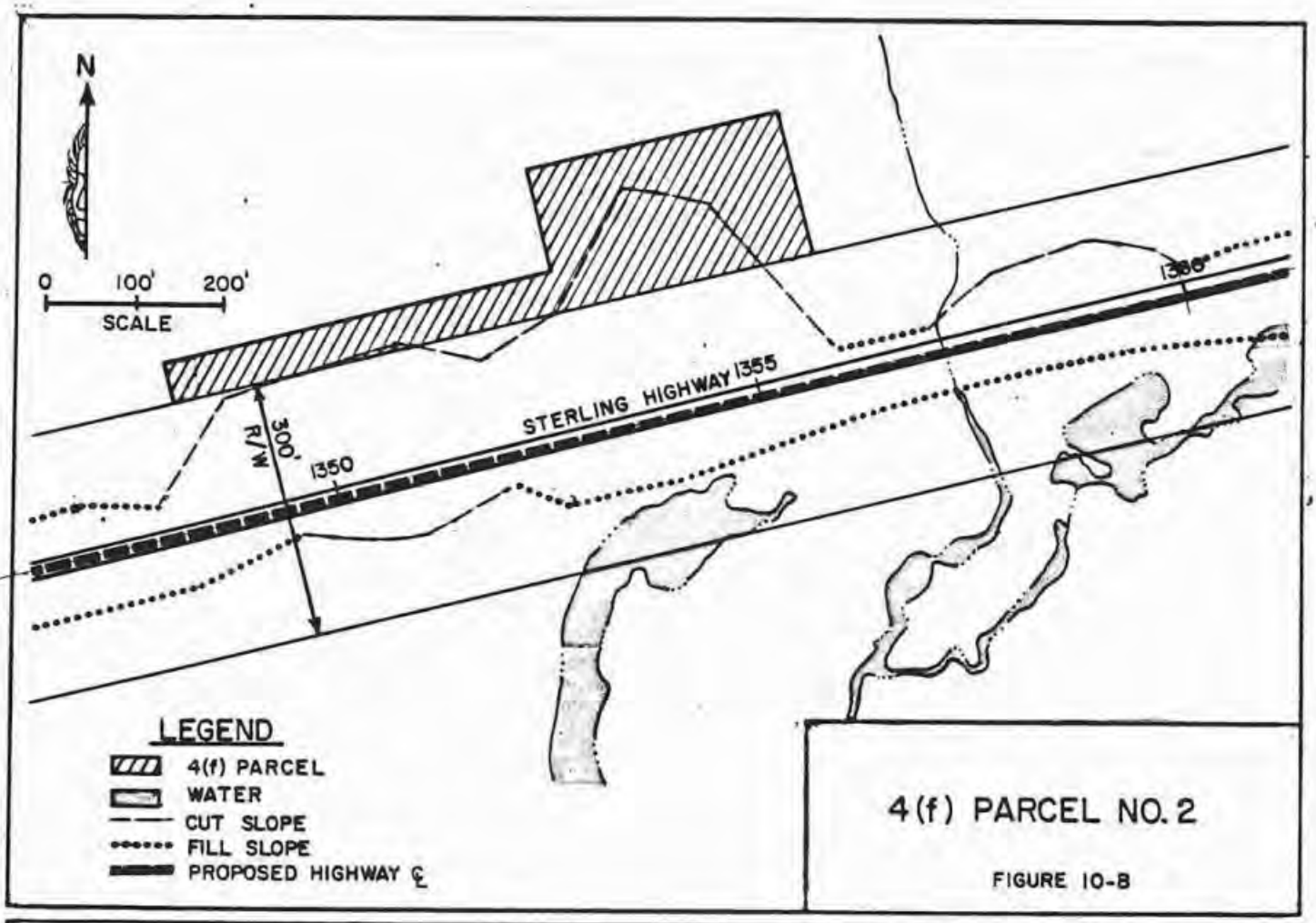


STERLING HIGHWAY
PROJECT RF-021-2(15)
SECTION 4(f) INVOLVEMENT LOCATIONS
FIGURE 10



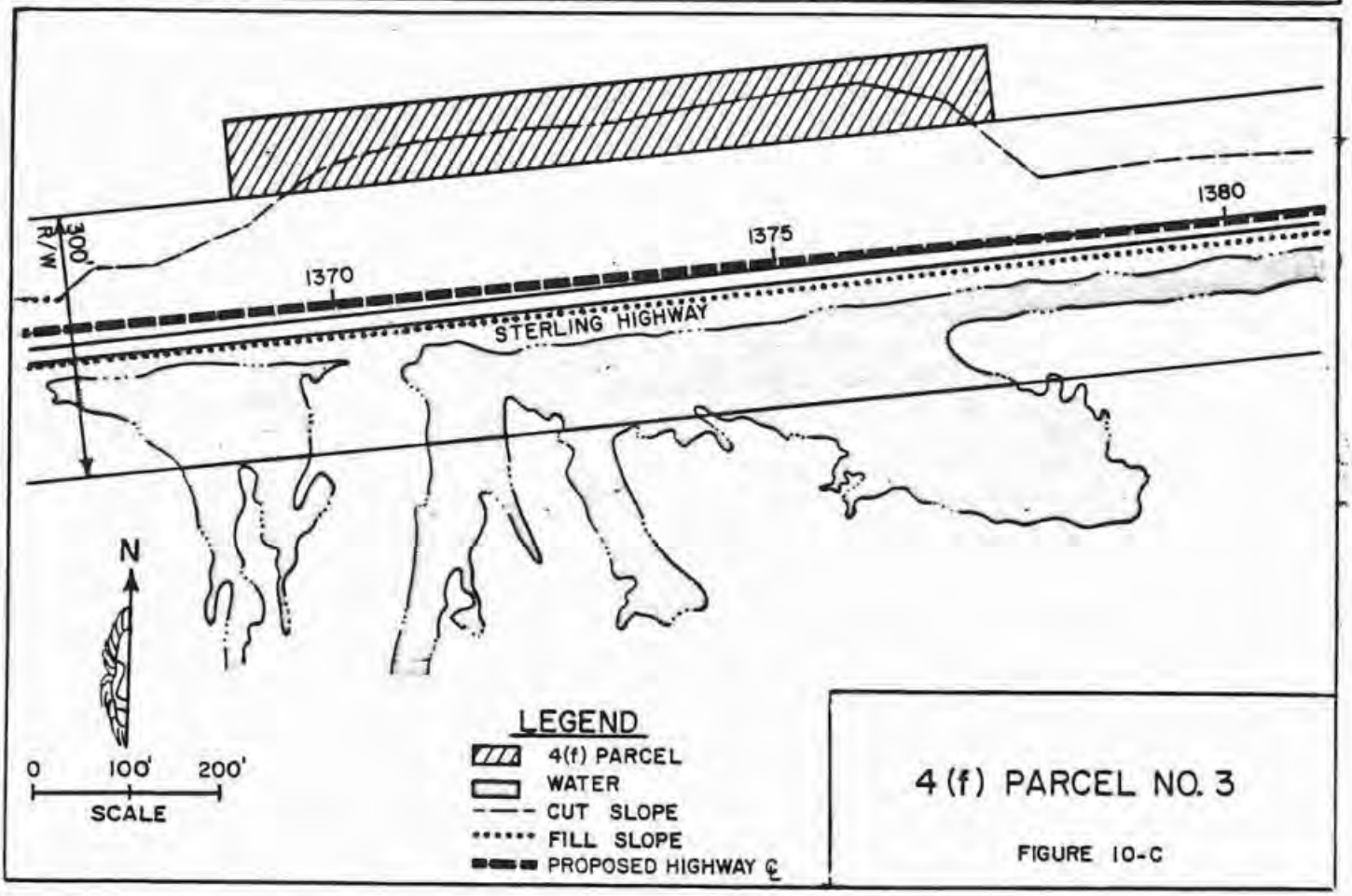
4(f) PARCEL NO. 1

FIGURE 10-A



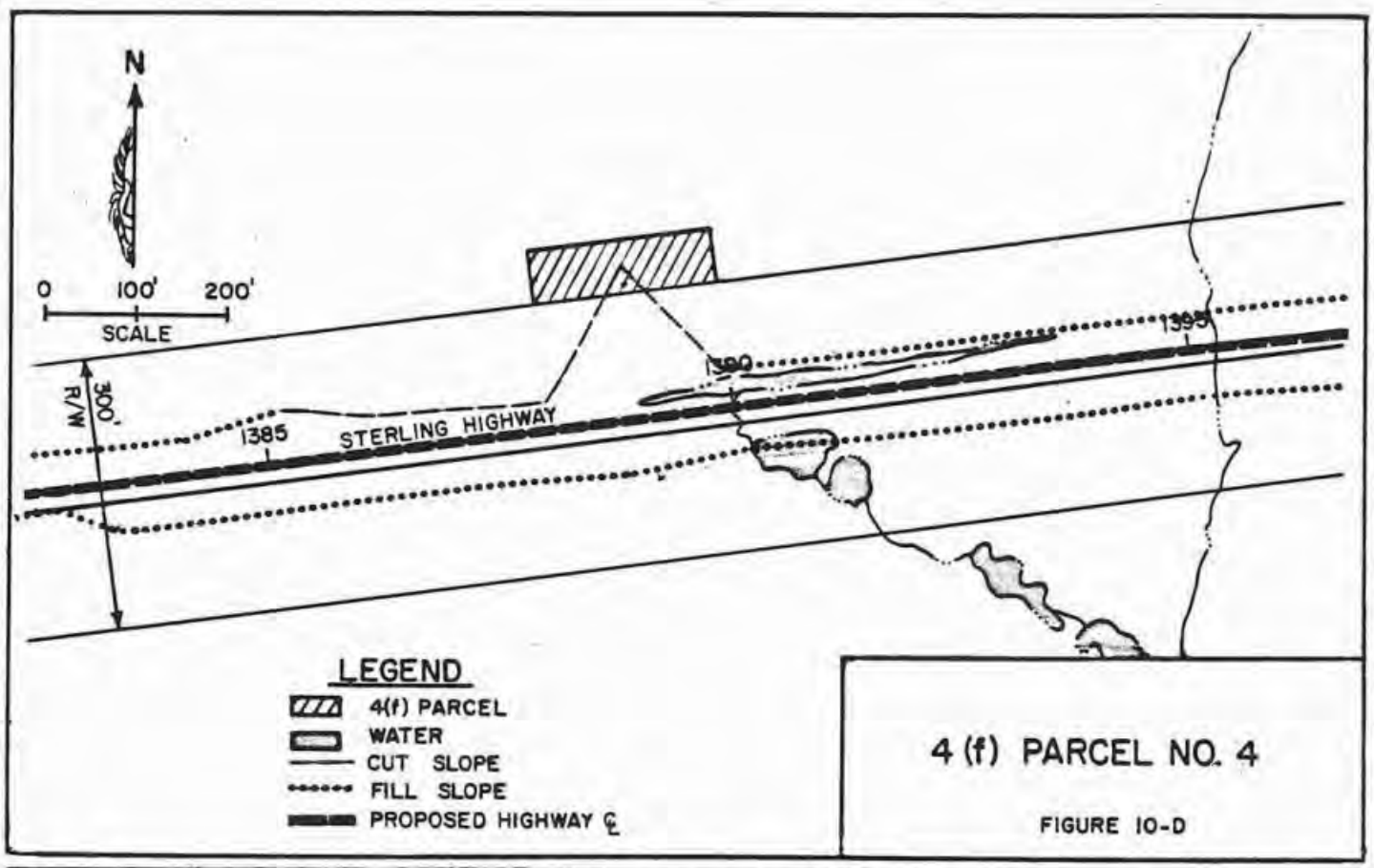
4(f) PARCEL NO. 2

FIGURE 10-B



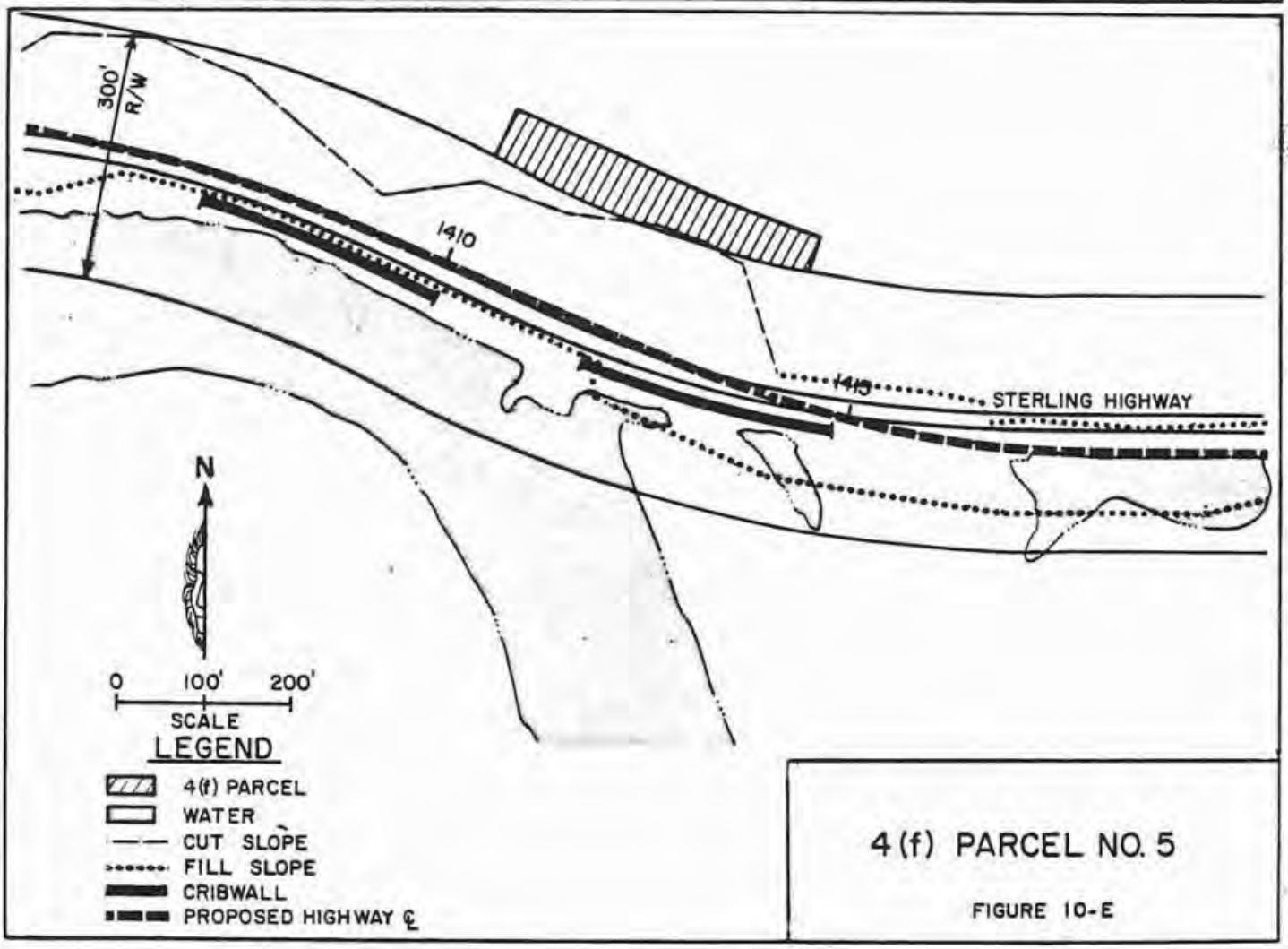
4(f) PARCEL NO. 3

FIGURE 10-C



4 (f) PARCEL NO. 4

FIGURE 10-D



4 (f) PARCEL NO. 5

FIGURE 10-E

Compared to the southern, river-oriented side of the highway with its fishing and boating activities, the steep, upland side has little attraction for visitors. The closest relationship of the 4(f) properties to other lands in the Wildlife Refuge is its function as an integral part of this very scenic corridor, and as a buffer between the highway and activities farther to the north.

Physical access to these properties is available only on foot, as vehicular use is impractical on this terrain, and is prohibited off the highway within the Refuge.

The additional parcels are owned by the Federal government, being located on the Kenai National Wildlife Refuge (formerly "Moose Range") which is part of the National Wildlife Refuge System administered by the U.S. Fish and Wildlife Service, Department of the Interior.

The steep (24^{o} to 40^{o}) slopes of the 4(f) parcels limits their usefulness for human activity, but adjacent wildlife habitat is protected by the lack of such activity.

Several types of environmental impact can be expected from the proposed extension of the highway backslopes. Loss of habitat for some animal, bird, and insect species is inevitable and may be irreversable for some. Users of adjacent lands may experience short periods of air quality degradation from dust while the new slopes are being graded. Noise of equipment will be a temporary intrusion over and above normal

traffic noise. The greatest impact of construction on the 4(f) parcels will be the alteration of the natural scene with clearing of the existing trees and shrubs during construction, with the raw soil temporarily intruding upon the naturalness of the present view from the road. Prior to revegetation the steep slopes will be temporarily susceptible to erosion from precipitation-caused runoff. Siltation of downslope waters could also result from intense rain storms or rapid snow melt.

Most people will experience less of the effects of noise and air degradation from construction work on the 4(f) parcels than they will on other portions of the project. The separation of the 4(f) properties from the roadway, both horizontally (100'+) and vertically (100'-140'), will provide considerable protection to visitors passing by on the road or (for instance) fishing in the river beyond. The magnitude of air and noise impacts will also be alleviated somewhat by the relatively short time span they will be effective (the construction period).

Much of the lost habitat, as well as the land's natural appearance will be restored with time as natural revegetation supplements the interim revegetation used to protect exposed earth. The significance of all impacts must also be considered in terms of the area affected. Less than four acres of land outside the existing right-of-way will constitute the 4(f) taking and only a fraction of that will actually be disturbed by earth moving equipment (Figure 10). Adjacent lands on the

Wildlife Refuge will be farther removed from the construction activity and after-effects of the project, with undisturbed remainders of the 4(f) lands situated as a buffer in between.

Although some impacts will result in irretrieveable losses of resources and time, several options are open to mitigate other impacts.

A variety of methods are available for the restoration of degraded terrestrial environments, where erosion and surface water siltation are a threat.

Slope stabilization and sediment retention techniques for both temporary and permanent application include: revegetation with grasses and/or herbaceous and woody plants; sodding, mulches, mattings, and chemical stabilizers; diversion ditches, terraces, and serrated cuts; settling basins and other sediment traps. Site specific plans for the most practical use of these and other methods will be prepared concurrently with highway construction plans.

The cut slope grading which apparently will unavoidably disturb one designated historic/cultural site, may be mitigated or minimized by retrieval of significant information before construction commences. Further on-site investigation must be made before retrieval methods can be prescribed.

Evaluation of Alternatives to Avoid 4(f) Lands

There are two alternatives which would avoid the necessity to take Section 4(f) property: the "No-Build" alternative, which would preclude all significant highway improvement, or placement of fill materials into the riverside wetlands to achieve the necessary roadway width.

The pros and cons of the No-Build alternative are discussed in the Alternative Section of this Draft E.I.S.

The proposal (Line "A^2", Plan and Profile, App. C-59) is designed to avoid as completely as possible any impact on the wetland habitat of the river, and the streams, backwaters and ponds between the river and the existing highway. There will be some minor incursions on wetlands, but encroachments on fish spawning or nursery habitat is largely avoided by the proposed alignment. The importance of the wetlands has been recognized and emphasized by all concerned agencies. Fitting a roadway of the proposed design into the existing right-of-way would require extensive fill into the wetlands. Other designs (narrower roadways) would not fulfill the needs and purposes of the project, as described in the first section of the Draft E.I.S.

Coordination

Preliminary coordination by the Alaska Department of Transportation and Public Facilities with the U.S. Fish and Wildlife Service, D.O.I.,

was commenced in late 1978 with a request for review of project plans. FWS personnel have made several field reviews, and have submitted written reports, since that time. FWS and other federal and state agency representatives attended a field review with an ADOT&PF representative in October, 1979. An additional coordination meeting was held between ADOT&PF and FWS personnel in October, 1980, to review updated project plans which reflected changes requested by FWS. Agency input has been ample and specific, particularly from FWS. The proposed centerline placement is largely the result of the foregoing coordination. Wetland and riverine environments were considered most critical by the resource agencies. Upland shifts in the centerline were preferred over wetland involvement whenever possible. Coordination with all agencies continues.

4(f) Involvement of Cultural Resources

Cultural resources located on both National Forest and Wildlife Refuge lands are eligible for nomination to the National Register of Historic Places. Eligibility for the Register, and being in conflict with proposed highway construction, subjects these sites to Section 4(f) evaluation. Several sites are known to be involved to the extent that mitigation of impacts will be necessary (see Historic/Cultural Site Impacts, p. 131). The actual form and extent of mitigation is under development between the ADOT/PF, the FHWA, the SHPO, and Cook Inlet Region, Inc. Documentation of the mitigation will be made available to the statutory review agencies upon request but is not included in this public document at the request of Cook Inlet Region, Inc. owing to the sensitive and unprotected nature of the sites.

V. COMMENTS AND COORDINATION .

Agency coordination and public involvement for the proposal began in 1975 with comments received from agencies and Cooper Landing residents on the repaving project that was planned at that time. By 1977, the project had been segmented, and the section from Milepost 37 to 60 was upgraded to a reconstruction proposal. In February 1978 a Notice of Environmental Evaluation and Preliminary Engineering Study on Project RF-021-2(15) was circulated to 24 groups and agencies (App. A-1).

There were ten initial responses to the Notice. The fact-gathering process elicited additional correspondence. Specific comments by the respondents are addressed in the narrative, as indicated by bracketed page numbers on the margins on the Mailing List in App. A.

A public meeting was held in Cooper Landing on October 25, 1978, where the alternative routes were explained and residents responded with questions and comments to attending ADOT/PF personnel.

Public Notices of Wetlands and Floodplains Involvement were published in May 1980, and January 1982, respectively, in Anchorage and Kenai Peninsula newspapers by the ADOT/PF. No comments have been received in response to the published notices. The Final EIS/4(f) Statement will include any citizen or agency input received prior to publication.

Coordination with government agencies led to a field review on October 9, 1979, which generated a significant quantity of information. Attending were representatives of the Forest Service, Fish and Wildlife Service, Alaska Department of Fish and Game, and the Forest, Land and Water Management Division of the Department of Natural Resources.

The Federal Highway Administration (FHWA) published a Notice of Intent in the Federal Register, Vol. 45, No. 115, on Thursday, June 12, 1980. As of this writing, there has been no response to the Notice of Intent (p. C-3).

Responses to Notice of Environmental Evaluation and Subsequent Correspondence

The U.S. Forest Service has a wide scope of concerns about the Project: access for timber harvest and recreation; impacts of highway construction on the scenic environment, campgrounds, archeological sites, wetlands, and fisheries; provision for pedestrians and bicyclists. These concerns are addressed in many portions of this Draft EIS, as annotated in the Forest Service letter, p. A-7. In addition, a detailed analysis of a major Forest Service concern, materials source impacts, is contained in the Construction Impacts Section (p. 133). Bridge designs will include consideration of the need for additional roadway width to accomodate pedestrians and bicyclists. Replacement of signs that have to be moved, prevention of unnecessary survey markings, and arrangement for inter-agency cooperation to improve campground facilities will be handled during the construction phase.

References on p. A-8 and A-9 to "Route A" are designated in this document as the Quartz Creek Alternative. On p. A-11 and A-12, "Route A" is currently designated as Juneau Creek or Quartz Creek, depending on the milepost location.

The Alaska Department of Environmental Conservation had no comment. Coordination of environmental concerns such as water and air quality will continue through the ADEC Southcentral Regional Office (p. A-15).

Impacts on aquatic and terrestrial habitats are of greatest importance to the Alaska Department of Fish and Game (p. A-16). They are also concerned that the sportsman's environment should be safe, accessible and aesthetic. These issues are addressed in this Draft EIS. Instream work will follow consultation with the ADFG during project design, with Anadromous Fish Permits being obtained wherever they are required. Specific applications of mitigation/enhancement measures for disturbed habitat will also be determined at the design stage. "Cooper Creek Alternative", p. A-17, is the Juneau Creek Alternative in this Draft EIS.

Division of Parks, Alaska Department of Natural Resources, had no immediate comment (p. A-22) in their response to the Notice. After intensive field investigations (under a reimbursable services agreement with the Alaska Department of Transportation and Public Facilities), State archeologists identified specific sites with which the highway project would conflict. Discussion of this topic begins on p. 131.

The concerns of the Division of Forest, Land and Water Management, Alaska Department of Natural Resources, regarded impacts of alternative alignments in the mid-community portion of Cooper Landing, and wetland and stream impacts. These are addressed in the report, as noted on their letters, pp. A-24-26. On p. A-26, "...alternative route "A"... is a reference to the Juneau Creek Alternative in this document.

U.S. Fish and Wildlife Service, managing agency of the Kenai National Wildlife Refuge, has a wide range of interests in the effects of the project, particularly where wetlands are involved. Their concerns are expressed in their correspondence beginning with p. A-33, where the pages of this Draft EIS which address specific comments are noted.

1) The mitigation of construction impacts, and plans for controlling access to specific day use pull-outs and parking lots will be developed through coordination between ADOT/PF and FWS staffs during the project's design phase. Items such as the replacement of signs can also be accommodated at that time.

2) Although it is not a designated scenic highway, the scenic qualities of this portion of the Sterling Highway make it deserving of special attention to render it safe for Refuge visitors, and to enhance every opportunity for viewing and otherwise enjoying the recreational resources of the Refuge. Well planned pull-outs, in addition to the improved highway, will satisfy the recreational and

safety needs. A speed limit lower than the federally established 55 mph maximum, however, would jeopardize the integrity of the highway and its capacity for carrying traffic.

The Draft Section 4(f) Evaluation for the portion of the project on the Kenai National Wildlife Refuge was reviewed by the U.S. Fish and Wildlife Service (p. A-33, A-56).

References in the Fish and Wildlife Service letter (A-54) to alternatives have been redesignated in this Draft EIS as follows: "Alternative B_3", to Alternative B; "Alternative C" to Bean Creek Alternative; "Alternative 14-A" to Juneau Creek Alternative.

Heritage Conservation and Recreation Service, U.S. Department of Interior, responded with comments about coordination, bicycle traffic and public access needs, and 4(f) situations (p. A-57). These topics are all addressed in this Draft EIS.

Department of the Army, Alaska District, Corps of Engineers, advised of the need for regulatory permits for construction involving streams and wetlands (p. A-59). These are addressed on p. 145.

Joyce E. Olsen of Cooper Landing voiced concern (p. A-60) for appropriate highway routing and design, and for the quality of life in her community. Development of the project has brought about revisions

of alternatives in the mid-community area that are explained in this Draft EIS. Alternative "A", referred to by Mrs. Olsen, has been re-designated as Alternative E (pp. 12 and 24A).

Charles and Elsye Taylor were concerned that their home would be taken for construction of the highway on the initial alignment proposals (p. A-62). Adjustments to the centerlines result in alignments which would leave their house intact, although the yard near the river would be affected by the Juneau Creek Alternative.

The mayor of Kenai Peninsula Borough, Donald Gilman, wrote in behalf of Max Hamilton and Mr. and Mrs. Taylor (above) about the highway right-of-way cutting through their property for the proposed improvements (p. A-63). There will be little, if any, additional right-of-way take at this location.

1) Highway Study Alignments maps and revisions were submitted to the Kenai Peninsula Borough Planning Commission for review in 1979 and 1980. The Borough planning staff has been very helpful in providing information for this Draft EIS, but there has been no comment on the plans from the Planning Commission.

The suggestions by Betty J. Fuller, Cooper Landing resident, are covered in this Draft EIS as noted on her letter (p. A-64).

Delbert S. Allen expressed opposition to any alignment which would change his property lines (p. A-65). The right-of-way for the Bean Creek of Cooper Landing Alternatives would not directly affect his house.

The initial response from National Marine Fisheries Service (NMFS), U.S. Department of Commerce, National Oceanic and Atmospheric Administration, noted that significant impacts to fisheries, fishery habitat, wetlands and upland habitat would result with some of the alternatives. Later correspondence (p. A-68) is quite specific concerning impacts and recommended mitigation. Much emphasis is given to minimizing wetlands encroachments and erosion. "Sheet" numbers referenced in the NMFS letter (p. A-68) are the Plan and Profile map sheets of App. C-59.

Correspondence between the Forest Service and FHWA (Ref. 11) addresses the applicability of Section 4(f) of the Transportation Act of 1966 to the project. The Forest Supervisor found that Section 4(f) applies because the project passes through a part of the Forest that was proposed for nomination to the National Register of Historic Places. (The area has since been found to be eligible for nomination.) The Forest Supervisor determined that the project would have no adverse effect on historic/cultural resources within or adjacent to the project right-of-way as long as FHWA follows the recommendations of the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

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Information and Description

Project Description, Alternative Alignments and Information

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