IV. ENVIRONMENTAL CONSEQUENCES

A. Land Use Impacts

Most of the Borough's 22,000 square miles are patented to the State. The Matanuska-Susitna Borough received 355,210 acres through the Municipal Land Entitlement Act of 1978. Small parcels of Borough land and private land holdings are located along the Glenn and Parks Highways. The Alaska Native Claims Settlement Act (ANCSA) provided for a land settlement to the Native villages of Chickaloon and Eklutna, and for the regional Native for-profit Cook Inlet Region, Incorporation (CIRI). Within the Borough, CIRI is entitled to 211,287 surface and 316,282 subsurface acres. Some of these selected lands are in or near the project area.

Several State Parks exist in the project area and are located at: Kepler-Bradley Lakes, Moose Creek, near King Mountain, Bonnie Lake, Long Lake, and near Matanuska Glacier (Figure 4). At Caribou Creek, there is a State Recreational Mining Area, created through State Legislation in 1990. An extensive trail network used for recreation and other utilitarian purposes traverses the Borough region, comprising hundreds of miles. Trails identified as historic include the Chickaloon River Trail, the Chickaloon-Knik-Nelchina Trail System, the Boulder Creek Trail, and the Old 98 Trail (Figure 4).

Approximately 132,500 acres along the Glenn Highway are within the Matanuska-Susitna Moose Range (Figure 4). The Department of Natural Resources (DNR) and ADF&G prepared a twenty year comprehensive management plan for the State-held Range lands in 1986. The management intent of the Range is to enhance moose habitat and other fish and wildlife habitat, while providing for outdoor recreation, timber harvest, grazing, and mineral, oil and gas extraction, and surface transportation. Coal mining in the Wishbone Hill and Castle Mountain localities is already proposed. Planning priorities also include preservation of area scenic values and the continuation of dispersed outdoor recreational activities. Guidelines within the management plan are established for realignment and/or reconstruction of the Glenn Highway.

The Matanuska-Susitna Borough (MSB) does not have a comprehensive Borough land use plan. However, a MSB Transportation Plan was approved in 1984 and a Coastal Management Plan in 1987. The MSB is developing comprehensive plans for both the

Palmer Core and Chickaloon areas. Land use within the Borough is divided between settlement areas along the highway systems and remote areas. Uses in settlement areas include residential subdivision, local businesses, commercial and industrial services, recreational, timber processing, tourism, and agriculture. In the remote areas, typical uses include recreation, hunting, fishing, mining, commercial trapping, and bush settlement.

Heavy demand is placed on this region for providing public hunting and fishing opportunities. Although it appears that the heaviest user group represents State residents from outside the Borough, but communities of Chickaloon and Matanuska Glacier are dependent on resource harvesting activities. This was emphasized by members of the Chickaloon/Moose Creek Native Council (Sept. 5, 1989). Harvest areas used by both communities are shown in Figures 5-1 and 5-2.

The proposed highway improvements appear consistent with primary management goals for land use in the project area. Substantial development is not likely to occur as a result of this project. Recreational and tourism opportunities and use of the project area may increase because of the improved roadway conditions. Opportunities for wildlife and scenic viewing from the roadway would be enhanced. The improved roadway would provide better access to hunting, fishing, and gathering/foraging localities.

The Matanuska Moose Range Management Plan addresses the reconstruction and proposed realignments of the Glenn Highway and lists trails, roads, and potential scenic turnouts and pullouts within the Range. The Department would maintain public access to existing roads and trails. An extensive list of trails which are accessed off the Glenn Highway is included within the Matanuska-Susitna Borough Comprehensive Development Plan, Trails Inventory (Appendix F).

Locations for wayside and turnout sites were coordinated with MSB, the MSB Parks and Recreation Board Wayside Committee, DPOR, and ADF&G. Where feasible and desirable, trailheads and scenic turnouts and pullouts would be provided throughout the project. A viewing area adjacent to the junction of Glenn Highway and Fishhook-Willow Road is currently under construction with the Glenn Highway, MP 35 to MP 54 3R project. Pulloff recommendations include near Granite Creek (MP 63), east of King's River (MP 67.5), the Weiner Lake area (MP 87.5), and near Caribou Creek (MP 107.5). As agreed with local agencies, the Department will continue coordination to incorporate these features where possible during the design phase.

B. Farmland Impacts

There are no prime or unique agricultural lands, as defined in the Farmland Protection Policy Act, located within the project area. (Debra A. Swanson, U.S. Department of Agriculture, Soil Conservation Service, August 1, 1989)

C. Social

Matanuska-Susitna Borough population has had substantial gains over the 1960 total of 5,188 residents (Table 2). From 1970 to 1985, the Matanuska-Susitna Borough grew two to three times faster than Anchorage. The reduction seen in 1987 population statistics was attributed to a statewide recession. Year 2015 mid-range population estimate for the Borough is 72,000 (ISER, 1989). Over 80 percent of the Borough population currently lives in the Palmer-Wasilla core area.

According to the 1980 census, 94.5 percent of the surrounding communities inhabitants are white, while 5.5 percent are minorities. Chickaloon Traditional Village Council records in 1987 indicate approximately 160 Native members.

Table 2
Matanuska-Susitna Borough Population

YEAR	POPULATION	INCREASE /DECREASE
1960	5,188	
1970	6,509	+25%
1980	17,816	+174%
1985	41,093	+131%
1987	39,684	-3%

(Population statistics from DCRA and ISER)

Housing and settlement types vary according to distance from Anchorage. Around the suburban Palmer region, single home and multi-unit residential lots are typical. Farther north is designated rural with single home residential lots and lodges (Mat-Su, 1985). Residential and commercial activities in the rural region tend to cluster around recreation and tourism areas.

Since this project would utilize the existing roadway whenever possible, the proposed project would not create any new division of neighborhoods or change land use patterns. There would be a need for additional right-of-way to accommodate the proposed facility in some areas. This would necessitate relocation of residential and business properties (refer to Section D, Relocation). The proposed project relocations would not adversely affect any special class of people (i.e., minority, ethnic, handicapped, elderly) more than others.

All Build Alternatives would improve the existing highway thus increasing capacity and enhancing traffic safety. During construction, highway users could experience minor delays and inconvenience. Noise levels from construction would be temporary.

In the Palmer area (MP 35-42.1), the Build Alternative would require some changes in travel patterns. To improve safety conditions and traffic flow, the preferred alternative is a four-lane facility with a depressed median, having partial control of access. Two additional travel lanes would reduce traffic congestion. The median would restrict left-turn movement onto the highway for driveways and some streets. Intersections would be provided for major connecting arterials and other access points where traffic is substantial. Frontage roads would be constructed to separate local traffic from the higher speed through traffic (Figures 3-2 and 3-3). Disadvantages such as readjustment to new traffic patterns and increased travel time would be minimal.

For the most part, public and community facilities are located away from the Glenn Highway in the Palmer vicinity. The exception is the Stephen Fire Hall located at approximately MP 51. This facility's access would not be affected.

Strip development in the rural communities is more pronounced than in the suburban setting of Palmer. Local traffic must merge with through traffic to access community buildings, residences, and business establishments. Passing sight distance is limited in some of these areas. The provision of climbing lanes and a smoother profile throughout the project corridor would provide increased opportunities to pass slower traffic. Improved pullouts would provide areas for emergency stops and scenic viewing.

D. Relocations

A Conceptual Stage Relocation Study was conducted by the Department based on the preliminary right-of-way. Affected residential dwellings and businesses were determined during field inspection (Table 3). Altogether, 30 single family residences and 16 business properties may be impacted with this project (Figure 6).

For the purposes of this document, all affected properties are listed as relocations. These include structures within the designated right-of-way, as determined by preliminary design, and those having the potential loss of access rights. In several cases, relocation may be provided by moving existing structures back on the lots. Other properties may receive alternate access. The final determination of all impacts on specific properties would be made during the detailed design phase.

Table 3
Conceptual Stage Relocations

Area	Residences	Businesses
Palmer (MP 35-42.1)	16	12
MP 49-60.5	3	
Sutton (MP 60.5-64.5)	6	1
Chickaloon (MP 76)	1	
Hicks Creek (MP 96)	1	
MP 97	1	
Matanuska Glacier (MP 101.5-105)	3	2
Total	30	17

Displacement would not produce long-term effects; sufficient vacant land for residential and commercial development is available throughout the project. Vacant housing and business structures are estimated to be greater than 20 percent in the Borough core area, resulting from the 1986-1988 recession (ISER, 1989). Approximately 27 percent of the employed population within the Matanuska-Susitna Borough commuted to Anchorage in 1988. For this reason, distance to jobs and other destinations may not be a critical factor for relocation. It is recommended that one full building season be allowed for relocation on this project.

An inventory of about 150 repossessed homes exists in the Palmer/Wasilla area. Most are 800 to 1,200 square foot size ranch style houses. As most structures are

movable, they could be considered for rural areas where replacement housing is limited. Larger homes may require new construction if the occupants do not want to relocate to urban areas.

Business dislocation and economic effects on communities and neighborhoods are always areas of concern. For this project, relocation impacts should be minor as some buildings can be moved back on the property. Replacement commercial property is available along the Glenn Highway for other displaced businesses.

According to the Conceptual Stage Relocation Study, there would not be adverse impacts on any particular social group from relocation. Displaced occupants of the single family residences would be primarily middle income families. The proposed project relocations would not adversely affect any special class of people more than others.

The final disposition of all relocations will be done in full conformance with applicable State and federal laws (A.S. 34.60, Uniform Relocation Assistance and Real Properties Acquisition Practices Act of 1971, and Public Law 91-646). Special relocation advisory services will not be required for this project because there were not any unusual conditions identified. Based on this Conceptual Stage Relocation Study and previous studies, surveys and investigations, the Department does hereby assure that there will be adequate replacement housing.

E. Economic

Matanuska-Susitna Borough trends for suburbanization and commercial development in the 1970's and early 1980's have subsided. A statewide recession during 1986-1988 left an excess capacity of retail building space, supply of service and retail personnel, and housing.

The total labor force in the Borough was 17,572 in July of 1986 (ADOT&PF, 1987), the annual growth rate is 3.2 percent. For the most part, Borough growth is dependent on employment opportunities in Anchorage and elsewhere in the state. According to ISER, approximately 37.9 percent of the Borough's workforce was employed outside the Borough in 1987 and is projected to increase to 48 percent by 2015. Presently, an estimated ten percent of newly created jobs in Anchorage go to Mat-Su Borough residents.

Visitors from outside Alaska benefited the Palmer and Wasilla economies by spending an estimated 4.3 million dollars, according to an Alaska Division of Tourism report for October 1985 to September 1986. Although no figures are available, it is probable that additional expenditures in the rural areas are substantial. Tourism by Alaska residents is difficult to estimate; these visitors are more likely to make day-trips.

Industrial development in the Borough is concentrated around Wasilla, the vicinity of the Palmer Industrial Park, and gravel sites scattered throughout the Borough. The Borough exports large amounts of gravel and sand to Anchorage over the Alaska Railroad.

Subsurface coal resources of the Matanuska coal field are extensive. Coal potential for the entire Matanuska coal field has been estimated as high as 2.4 billion tons (DOWL, 1982). Beginning in the 1990's, the Japanese company Idemitsu-Kosan hopes to mine coal in the Wishbone Hill area for fifteen years. This venture would provide employment for an estimated 200 individuals and yield approximately 1 million tons of coal per year. Coal mining is also proposed at Castle Mountain, north of Chickaloon, by Hobbs Industries. This 21-year venture is scheduled to begin in late 1991.

Since the Glenn Highway is the primary transportation link between Anchorage, Palmer, Glennallen, Valdez, and Canada by way of the Alaska Highway, this highway is important to the local and regional economies. During construction of the roadway there would be minor delay and inconvenience to highway users. Temporary road closures and detours are expected. As a result, travel times would increase somewhat. Construction contracts would define when traffic can be delayed. Impacts resulting from construction activities are discussed in Section U. of this document.

Overall, economic opportunities may increase because of improved traffic flow and highway capacity for commuters and travelers. The proposed action would not change land use patterns. There would be relocations resulting from construction of the project because of the need for additional right-of-way. However, relocation of displaced businesses and residents should occur within the same local government boundaries. Local employment opportunities would result from the construction activities and local businesses may benefit as well.

Where feasible and desirable, the proposed project would include provisions to improve or relocate existing turnouts for scenic viewing opportunities and provide better access to popular recreational areas (refer to Section A, Land Use). The project would not impact park facilities, with the exception of the Long Lake State Recreation Site (SRS) (refer to the Draft Section 4(f)/6(f) Evaluation for a discussion).

Improved approaches would be provided at the Kepler-Bradley SRS entrance and at the secondary access via Colleen Street. The roadway alignment would be shifted south of the Moose Creek SRS, thus removing through traffic away from the park and reducing noise levels at the facility. At King Mountain SRS and Bonnie Lake SRS, approaches would be improved. The proposed realignment at Long Lake would remove through traffic away from existing park development and reduce noise levels at the lake, providing future development options adjacent to the new roadway. Roadway improvements would be made on the existing highway which traverses the Matanuska Glacier SRS. At the Caribou Creek Recreational Mining Area, the approach would be improved. The proposed realignment was included within the legislative act which created the public recreation area.

F. Pedestrian and Bicycle Facilities

The Matanuska-Susitna Borough (MSB) does not have a comprehensive trails development plan. However, in 1984, MSB compiled a Trails Inventory, which was updated in 1987. Within this document, separate paths are recommended to provide for safety of pedestrians and bicyclists in Palmer school vicinities. No school facilities exist within the immediate project area: Palmer High School is reached by Hemmer Road, 3/4 mile west of the Glenn Highway; Palmer Central Junior High and Sherrod Elementary Schools are located along Chugach and Gulkana Roads respectively, east of South Colony Way. There are no requirements for dedication of pedestrian or non-vehicular access within the MSB 1987 Comprehensive Development Plan for Public Facilities.

With this project, the existing pedestrian underpass at Auklet Avenue in Palmer would remain. A dirt path exists in the right-of-way in the Palmer area, a paved pathway exists in Sutton. A wider shoulder would be provided by this project. This would provide pedestrian and bicyclist area adjacent to the travel lanes. A proposed pathway in Palmer between Wasilla-Fishhook Road and West Arctic Avenue is currently included in the MSB Capital Improvement Plan (CIP) priority list.

G. Air Quality Impacts

The proposed project is located within an attainment area for air quality. The State Implementation Plan (SIP) does not contain any transportation control measures for the project corridor, therefore, the project is not subject to conformity review as outlined in 23 CFR 770. Some temporary impacts on air quality are expected to occur during construction activities and are discussed in the Construction Impact Section of this document.

H. Noise Impacts

The project involves both urban and rural areas. There are no ordinances or land use controls which address noise generated by vehicles using the highway or prevent mixed development of noise sensitive and non-sensitive locations in the project area. Residential zoning exists north of the Old Glenn Highway/West Caribou Avenue, mixed commercial and residential to the south.

A traffic noise analysis was completed for the proposed project using the FHWA Highway Traffic Noise Prediction Nomograph (Hard Site) Model. Four noise receiver locations were evaluated for Palmer and two for Sutton (Figure 7). These analyses are based on existing and design year peak hour highway traffic and utilize average traffic speed, estimated number of vehicles according to vehicle type, and receiver distance from the highway centerline. The nomograph does not account for reflections from buildings or surface terrain variations. Traffic data used for this analysis are found in Appendix B. Analyses results are shown in Tables 4 and 5.

Table 4
Noise Analysis
Palmer

Receiver	Existing dBA (Leq)	Build dBA (Leq)	No Build dBA (Leq)
1	63.5	68.0	66.5
2	65.5	71.5	71.5
3	68.0	70.5	70.5
4	67.0	70.0	70.0

Receiver 1, the historic Matanuska Colony Patten Farm near MP 40, was identified by the State Historical Preservation Office (SHPO) as being potentially affected by traffic noise resulting from the proposed project. This site is approximately 280 feet west of the existing centerline of the Glenn Highway. The terrain in this area is relatively level.

With the proposed four-lane facility, the Patten Farm structures would be roughly 220 feet from the centerline of the southbound lanes and 120 feet from the proposed frontage road. A stand of trees exists to the south of the farm building complex on the southeast corner of the property. A portion of these trees may be removed as a result of the proposed action. The study indicates that noise levels in design year 2015 would increase at this site by 3.0 to 4.5 dBA, without or with the project. Generally, a 3 dBA change in noise levels is barely perceivable to the human ear in a field situation.

Receiver 2 is located at the corner of West Fern Avenue and Rhonda Way, within the Golden Glenn Estates, 170 feet west from the existing highway centerline and 90 feet from the proposed four-lane facility. This subdivision is located on a hillside overlooking the highway. The hillside is presently forested. With the proposed action, cuts would be made into the hillslope and trees removed to accommodate the two southbound lanes. Based on the analysis, the predicted increase in noise levels would be about 6 dBA in the design year.

Based on the analysis, the predicted increase in noise levels at Receiver 2 would be about 6 dBA in the design year, causing a noise impact. The Department considers an increase of 10 or 15 dBA over the existing noise levels as being substantial.

The two remaining Palmer sites were selected from the north Palmer area. In this section of rolling terrain, the existing highway would be repaved and there would be no change in alignment. Receiver 3, the Seventh Day Adventist Church, is on West Beaver Avenue, approximately 90 feet downhill from the existing centerline of the Glenn Highway. Receiver 4 is the historic Puhl-Bacon Farmhouse, a Matanuska Colony structure, 100 feet west of the existing roadway centerline near Scott Road. Distances between the receivers and the centerline would not change with the project. At both sites, noise levels increases would be minimal, ranging from 2.5 to 3 dBA.

Noise levels in Palmer approach and exceed the FHWA Noise Abatement Criterion of 67 dBA for Land Use Category B, which includes residential development. When FHWA noise abatement criteria are approached or exceeded, a noise impact is said to exist. Future traffic noise levels could increase with the proposed project; additional lanes would provide increased traffic capacity. In some areas, the noise source would be moved closer to receivers. However, future noise levels are expected to intensify regardless of the selected project alternative, including the No-Build, due to the anticipated increase of traffic levels.

Abatement includes changes in horizontal and vertical alignment, reduced speed or other modes of traffic control, and construction of earthen berms and/or noise barriers. No noise abatement measures are likely to be implemented for the proposed project. This recommendation is based on studies conducted to date and existing area conditions: there are no land use controls along the project corridor, and noise barriers would not be cost effective because of the low density residential development. If during the formal design, conditions substantially change, the need for noise abatement measures would be reevaluated.

Two noise receiver locations were evaluated for the rural community of Sutton. The existing alignment would be used for the upgrading of the two lane roadway, therefore, receiver distance from the source would not change for the design year. There are no land use controls or zoning within the rural communities in the project area.

The sites from Sutton were selected randomly. Receiver 5 is located near the intersection of Park Road, approximately 100 feet north from the centerline of the Glenn Highway. Receiver 6 is 130 feet south of the roadway and across from the future site of Sutton's historic park. According to the nomograph, an increase of 1 to 2 dBA would occur, representing nondetectable changes in noise levels.

Table 5
Noise Analysis
Sutton

Receiver	Existing dBA (Leq)	Build dBA (Leq)	No Build dBA (Leq)
5	66.0	68.0	68.0
6	65.0	66.0	66.0

According to the Department of Parks and Outdoor Recreation (DPOR), the existing highway introduces traffic noise on the west end of Long Lake where the Long Lake State Recreation Site wayside is located.

Although highway traffic is not heavy in the Long Lake area and is not expected to increase substantially, commercial trucks comprise 19 percent of the total vehicle volume. Loudness of traffic noise increases with the greater numbers of trucks. Conditions such as the steep grades along the 8,500-foot length of the Long Lake hill cause heavy laboring of motor vehicle engines, or the use of jake brakes to slow descending vehicles. At a distance of 50 feet, trucks typically emit noise levels ranging between 82 and 94 dBA. The park wayside is immediately adjacent to the highway.

With the proposed action, the highway would be moved from the exposed location on the cliff and be located 450 feet south of the existing park facilities. Truck traffic noise at the wayside and on Long Lake would be reduced for three primary reasons: 1) the park facility and the lake would be separated from the highway by a buffer zone; 2) noise would be absorbed in the lower elevation valley corridors by vegetation and no longer be reflected off steep cliff walls onto the lake; and 3) the reduced grades, which would not exceed 3.5 percent through the park, would lessen the need for the heavy laboring of motor vehicle engines or the use of jake brakes. Due to limitations with prediction models, the decrease in noise levels at the wayside cannot be quantified.

Temporary increases in noise could be expected throughout the project during the construction phase. Impacts would be mitigated by scheduling construction activities for hours which would cause the least impact on residences, and noncritical wildlife seasons.

I. Water Quality Impacts

The Matanuska River and its tributaries comprise the primary source of surface water in the project area. This river system is sustained by snow and glacial melt water, the sediment load (silt and glacial flour) is one of the highest in the state. According to the Matanuska-Susitna Borough Coastal Management Plan (1987), the Matanuska River contains high concentrations of sulfate. The U.S. Geological Survey (USGS) Water Resources Division concludes that this is a natural occurrence

and is attributed to large deposits of calcium sulfate and gypsum which exist in the Talkeetna Mountains (Bill Long, USGS). Further investigations are not proposed by the Department because storm water runoff from the proposed roadway to the Matanuska River is expected to be minimal.

Springs occur along the base of the mountains in the Borough and the largest is located near Palmer. Aquifers are located in glacially deposited sand and gravel lenses. The City of Palmer has municipal water, well depths vary 30 to 295 feet. Residents of remote areas tend to rely more on surface water sources or very shallow wells.

A plan to control erosion and sedimentation would be developed prior to construction (refer to Section U, Construction Impacts). However, temporary degradation of water quality may result from construction. No significant or long-term impacts to water quality or potable water sources are expected to result from the proposed project.

J. Permits

The proposed project would require the following Federal and State permits and certification:

1) Department of the Army, Corps of Engineers, Section 404/10 Permit

2) Alaska Department of Environmental Conservation, Section 401 Permit

3) Alaska Department of Fish and Game, Title 16 Permit

4) Alaska Division of Governmental Coordination, Coastal Consistency Certification

5) Matanuska-Susitna Borough, Flood Hazard Area Land Use Permit

In addition to the above permits which would be obtained by the Department, the following may be acquired by the contractor if needed: Air Quality and ADNR Water Extraction Permits. U.S. Coast Guard Section 9 permits may also be required pending navigability determinations of the Matanuska River and its tributaries. The work would also be done under the Environmental Protection Agency National

Pollutant Discharge Elimination System general permit for construction activities in Alaska. The Contractor would be required to submit the Notice of Intent and prepare and implement the necessary Storm Water Prevention Pollution Plan (SWPPP).

K. Wetlands

Wetlands as defined by Executive Order 11990 are involved in the project area (Figure 8). The project borders the Matanuska River and crosses several tributaries and adjacent wetlands. Riverine and palustrine wetlands would be involved, the majority being palustrine wetlands which are located throughout the project corridor.

The palustrine system includes shallow, nontidal wetlands. Dominant vegetation of this wetlands class include spruce, shrubs, persistent emergents, and emergent mosses or lichens. Wetlands within stream or river channel areas are classified as Riverine. Several anadromous streams are crossed in the project area: Moose Creek, Eska Creek, Granite Creek, King's River, Chickaloon River, and Caribou Creek.

These wetlands are important habitat for a variety of furbearers, birds and migratory waterfowl, large mammals (especially moose), and provide habitat for freshwater and anadromous fish. Other functions of wetlands include: floodwater attenuation, sediment trapping, nutrient retention, groundwater recharge, and recreational use. Proposed wetlands involvement would have an overall net loss of functional values.

Approximately 520,700 cubic yards (cy) of fill material would be placed on nearly 34.2 acres of palustrine and riverine wetlands. Of this total, about 22.3 acres would be impacted in areas where the roadway would be realigned. Table 6 shows acreage involvement and fill amounts per realignment.

In those portions of the Glenn Highway where widening and reconstruction activities would occur along the existing alignment, approximately 11.9 acres of wetlands and 163,700 cy of fill would be involved. In riverine wetlands (Matanuska River) approximately 98,000 cy would be placed along 4.2 acres. Palustrine wetlands would involve placement of about 65,700 cy in 7.7 acres. Wetlands, as determined by the U.S. Fish & Wildlife Service, are shown in Figures 8-1 through 8-8.

All alternatives, including the No-Build, would impact wetlands. Maintenance of the existing highway would require riprap to armor roadway embankments to counter erosion by the Matanuska River. The proposed project corridor was located to avoid and/or minimize wetlands involvement (refer to the Only Practicable Alternative Finding, Appendix G).

Table 6
Realignment Wetlands Involvement

Realignment Area	Acreage approximate	Fill (cy) approximate	Wetlands Type
Moose Creek	0.01	1,200	Palustrine
Ida Lake	1.81	70,000	Palustrine
Chickaloon River	1.61	22,900	Palustrine
Long Lake	17.32	222,100	Palustrine
Hicks Creek	0.72	22,700	Riverine
	0.14	4,700	Palustrine
Pinochle Hill	0.71	15,000	Palustrine
Caribou Creek	0.19	1,300	Palustrine
	0.15	5,300	Riverine
Subtotals according to wetlands type:			
	1.34	39,200	Riverine
	20.98	290,800	Palustrine
Total:	22.32	330,000	

Mitigation alternatives, to minimize loss of wetland functional values, will be evaluated according to FHWA Publication No. FHWA-RE-88-028, "Applying the Section 404 Process to Federal Aid Highway Projects", which is consistent with 40 CFR 1508.20 (NEPA) stated below:

a) Avoiding the impact altogether by not taking a certain action or parts of an action.

b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

e) Compensating for the impact by replacing or providing substitute resources or environments.

In the Long Lake area, alternatives are restricted by severe terrain. Avoidance of wetlands east of the Long Lake SRS is not possible. There are clusters of scrub/shrub broad-leafed deciduous bogs (PSS1), emergent vegetation marshes (PEM1), and unconsolidated bottom open water ponds (PUBH) which appear to be hydrologically connected. A bird survey of a portion of these wetlands was conducted by USF&WS and Department staff in July of 1992. The USF&WS concluded that the area provided habitat for snipes, a migratory bird that lives chiefly in marshes and having general distribution, and moose. No unique bird or mammal species or unusual concentration of other animals were observed during the survey. In this locality and elsewhere along the project corridor where impacts are unavoidable, the following mitigation plan is proposed:

1) As agreed to with agencies, abandoned roadway segments would be revegetated with willow or other suitable species for moose browse (provided the areas are not next to a road). In the Long Lake area, the old roadbed would be converted into a recreational trail. On the east side of the Long Lake State Recreation Site (SRS), the roadbed would be dead-ended near Wiener Lake with a parking area and scenic overlook.

2) A mining reclamation plan would be implemented during and upon completion of all gravel extraction activities. The plan shall comply with the requirements of 11 AAC 97 and Title 27 of the Alaska Statutes. The materials sites would be rehabilitated immediately after all usable material is removed. Slopes would be terraced to prevent erosion and facilitate revegetation, and, except for bedrock slopes, would be revegetated.

3) All culverts would be placed in and aligned with the natural stream or drainage channels and hydraulic gradient. Any realignment or channelization of fish streams and drainages would be done in accordance with the Alaska Department of Fish and Game's "Fishstream Protection and Enhancement Strategies." Cross-culverts would be placed at appropriate intervals to maintain surface and subsurface wetland drainage. Proposed roadway facilities and bridge structures would be

designed and constructed to accommodate fish passage while meeting floodwater flow requirements. Bridges would be wide and high enough to allow movement of moose, with the exception of the Eska Creek crossing (MP 61). At this site, the creek bed is narrow and shallow, and only requires a minimally sized structure for the road crossing.

4) All erodible slope cuts, fill embankments, and other exposed earth work would be stabilized to prevent erosion. Proposed road alignments would be shifted whenever possible to avoid or minimize impacts to wetlands. Slopes consisting of soils would be seeded to reestablish vegetation. Direct loss of habitat in the wetland margins would be partially regained in time when slopes become revegetated.

5) Flattened roadway embankments and clear zones would help reduce wildlife/vehicle conflicts by making animals more visible to traffic and facilitate wildlife crossings. In areas of new alignments, roadway tangents would improve drivers' sight distances to avoid animals encountered along the highway. To identify any critical moose crossing zones, a Reimbursable Services Agreement (RSA) will be developed with ADF&G during the project's design phase (refer to Section M, Wildlife Impacts). Signing cautioning motorists of moose in the area would be incorporated into the project to reduce these conflicts.

6) To reduce potential disturbance of side slopes along the stream corridors, use of heavy equipment and tree/vegetative clearing would be minimized within the riparian zone. Vegetative cover would be reestablished on disturbed areas within the riparian zone.

Mitigation for project effects on wetlands and wildlife habitat would be chiefly through avoidance and minimization measures. Due to the abundance of similar habitats in the vicinity, compensatory mitigation is not proposed at the current time. The ADF&G and USF&WS could not identify any needed mitigation projects in the project area, but have requested that the project impacts be reassessed prior to final design for each roadway segment to determine the need for any compensatory mitigative measures in the future. The reevaluation would include a field review with State and federal resource agencies.

Due to the passage of time between document approval and actual design of the various project segments, ADOT&PF will have to reevaluate its approved environmental document. Should project scope, affected environment, impacts and

mitigation change, additional environmental documentation is required.

All practicable and appropriate measures to minimize wetlands impacts would be incorporated into the project design and construction. Best Management Practices for erosion and sediment control and stream crossings would be employed. However, temporary degradation of water may occur during construction activities. No significant impact to wetlands would result from this project.

L. ~~Water Body Modification~~

The total extent of water body modifications along the Glenn Highway would not be determined until the design phase. For the most part, fill would not be placed within streams. Riprap would be placed along eroding Matanuska River banks which are threatening roadway embankments. Impacts to streams would be minimized through coordination with appropriate resource agencies and, during construction, employment of Best Management Practices.

M. Wildlife Impacts

Moose are year-round residents in the Matanuska River Valley area. Projections for the 1986 moose population of the Moose Range ranged between 426 and 986 (DNR, 1986). The ADF&G Habitat Maps (1985) show winter range moose distribution throughout the project corridor. A known concentration is around the east side of Long Lake, within the Long Lake SRS. This area is within the 1962 fire burn of approximately 1,000 acres (Jack Louis, Bureau of Land Management) and is in early stages of forest succession. The ADF&G indicates that fire increases available moose browse for 25 to 30 years following disturbance. According to statistics from the Alaska State Troopers, there were 33 moose road kills in the MP 35 to MP 109 project area between October 1991 and August 1992. Accident clusters are seen at the western terminus (MP 35), near Farm Loop Road (MP 51), at MP 70, and in the Chickaloon area (MP 75-79).

Brown and black bear inhabit the area. A high concentration of bear exist in the eastern third of the Moose Range. Dall Sheep have a widespread distribution and are concentrated in the Sheep Mountains which are east of Caribou Creek. Wolf inhabit middle and upper limits of some drainages. Other wildlife species which are present include wolverine, mountain goat, caribou, coyote, land otter, fox, marten, beaver, mink, weasel, lynx, hare, red squirrel, and porcupine.

Several important raptors such as the peregrine falcon, gyrfalcon, and bald and golden eagles, inhabit the area. A number of species of migratory waterfowl utilize the wetlands. Rock, white-tailed, and willow ptarmigan, and spruce grouse are present. A bird survey was conducted by USF&WS and Department staff in wetlands along the proposed Long Lake realignment in July of 1992. Birds were not present at the wetlands, but chickadees, juncos, and thrushes were seen in surrounding woodlands. The USF&WS concluded that snipes, a migratory bird that lives chiefly in marshes and having general distribution, probably inhabited the wetland areas.

Anadromous fish includes sockeye, pink, chinook, coho, and chum salmon, char, and Dolly Varden. The Matanuska River is a major spawning drainage system of the Cook Inlet. Nearly every stream in the area provides spawning habitat. Freshwater fish includes rainbow trout, arctic grayling, white fish, burbot, suckers, and two species of stickleback. Small lakes supporting these freshwater stocks are numerous and include Seventeen Mile Lake, Long Lake, Bonnie Lake, Fish Lake, Ida Lake, and Kepler-Bradley system Lakes.

Impacts to wildlife resulting from construction of the proposed project would include a minor loss of habitat. The proposed realignment borders the identified 1962 fire burn but does encroach wetlands east of the Long Lake SRS that provide moose habitat. To identify any critical winter moose crossing zones, a Reimbursable Services Agreement (RSA) will be developed with ADF&G. Moose surveys will be conducted over a multi-year period prior to final design.

Throughout the project, the proposed wide roadway embankments and clear zones would facilitate crossing of wildlife by making them more visible to traffic. In areas of new alignments, roadway tangents would improve drivers' sight distances to avoid animals encountered along the highway. Signing cautioning motorists of moose in the area would be incorporated into the project to reduce these conflicts. Bridges would be wide and high enough to allow movement of moose, with the exception of the Eska Creek crossing (MP 61). At this site, the creek bed is narrow and shallow, and only requires a minimally sized structure for the road crossing.

The ADF&G and USF&WS have requested that the project impacts be reassessed prior to final design for each roadway segment to determine the need for any additional mitigative measures. The assessment would include a field review with State and federal resource agencies.

Stream crossings would not involve placement of fill or piers within the streambeds. However, riprap would be required to armor roadway embankments eroding into the Matanuska River. Scheduling of construction would be addressed in the construction contracts. Stipulations would consider impacts to wildlife, including sensitive calving, lambing, and spawning seasons.

N. Floodplain Impacts

Floodplains ~~as defined by Executive Order 11988~~ would be involved with this project. The known 100-year floodplain for the Matanuska River extends through Sutton. Designated by the Matanuska-Susitna Coastal Management Plan because of flood hazards (Mat-Su, 1987), the Western boundary of the Knik/Matanuska River Floodplain AMSA (Area Meriting Special Attention) is approximated by the Glenn Highway. In August, 1971, extensive flooding occurred along the Matanuska River and several tributaries including Moose, Granite, and Eska Creeks, and Kings River. The Matanuska River area was subjected to severe flooding and erosion in July and August of 1989, as a result of high rainfall levels, prompting the governor to declare the situation a state disaster.

National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM) are not available for the Matanuska Valley area. Therefore, coordination will not be required with the Federal Emergency Management Agency (FEMA).

Two hydrologic regimes exist in the Glenn Highway project area. In the lower part of the Matanuska Valley from Palmer to the Chickaloon River, streams draining the south slopes of the Talkeetna Mountains have high runoff rates caused from frequent, high intensity storms. Resultant heavy precipitation rapidly enters streams and rivers due to the steep slopes and impervious soils. Stream flooding is frequent, and usually occurs in August and September.

The second hydrologic regime is in the upper Matanuska Valley, east of the Chickaloon River to the Gulkana Basin. This area receives less precipitation. Floods occur in the upper valley during August and September, but are of less magnitude than the lower Matanuska Valley.

The existing roadway follows the Matanuska River floodplain (refer to the Only Practicable Alternative Finding, Appendix G). To avoid future potential flood damage, the intent of the proposed action is to relocate the facility out of the

floodplain whenever possible and include measures to minimize unnecessary encroachments. Construction would not promote any incompatible development with floodplains, area facilities would accommodate 100-year flooding events. Elsewhere, bridges and culverts would be designed to withstand a 50-year flood.

The Glenn Highway Erosion Control, MP 61-78, project was constructed during the Summer of 1992. With this project, roadway embankment was armored with riprap to prevent further erosion in this area along the Matanuska River.

O. Wild and Scenic Rivers

There are no Wild and Scenic Rivers located within the project area.

P. Coastal Zone Impacts

A major portion of the project corridor is within the coastal management boundary described in the Matanuska-Susitna Borough Coastal Management Plan (MSBCMP), and within the Knik/Matanuska River Floodplain Area Meriting Special Attention (AMSA).

The Borough's coastal district includes approximately 4,000 square miles, containing 200 square miles of offshore area and 75 miles of coastline. Coastal management boundaries extend to the 1,000-foot contour level on major drainages and primary tributaries. This district includes the Matanuska River and Moose Creek, extending eastward until the Bonnie and Long Lakes area (approximately MP 85). The width of this extended boundary includes the 100-year floodplain or 200 feet on each side from the ordinary high water mark, whichever is greater.

The designation for the Knik/Matanuska River Floodplain AMSA results from the area's severe flood hazard potential, waterfowl and wildlife resources and habitat, and areas of substantial recreational opportunities. Total area of the AMSA is approximately 54,000 acres. Boundaries of the Knik/Matanuska River Floodplain AMSA coincide with the known 100-year floodplain for the Knik and Matanuska Rivers. For the Matanuska River, this floodplain extends through Sutton and is bordered to the west by the Glenn Highway.

Proposed activities and improvements are consistent with the policies and provisions of the MSBCMP which were developed under the standards and guidelines (6 AAC 80

and 6 AAC 85) of the Alaska Coastal Management Program (ACMP). There is no management scheme for the Knik/Matanuska River Floodplain AMSA. A formal consistency determination will be made during the permitting phase of this project.

Q. Threatened or Endangered Species

The only threatened or endangered species in the project corridor is the American peregrine falcon (Falco peregrinus anatum). Peregrine falcons are not known to nest in the vicinity but sightings are reported during migration periods in Palmer and along the Glenn Highway. A survey of proposed realignment areas was conducted by the U.S. Fish and Wildlife Service (USF&WS) in July of 1989. There were no peregrine nesting sites located in the Glenn Highway project area (pers. comm., Michael Amaral, U.S. Fish & Wildlife Service).

An additional bird survey was conducted by USF&WS and Department staff in wetlands along the proposed Long Lake realignment in July of 1992. Birds were not present at the wetlands, but chickadees, juncos, and thrushes were seen in surrounding woodlands and an eagle was perched in a tree overlooking Long Lake. The USF&WS concluded that snipes, a migratory bird that lives chiefly in marshes and having general distribution, probably inhabited the wetland areas.

R. Historic and Archaeological Preservation

Historic and archaeological resources within the project vicinity were identified and evaluated in accordance with the requirements of 36 CFR 800.4. According to 36 CFR 800, Protection of Historic Properties, federally assisted projects must take into account the effects on properties included in or eligible for the National Register of Historic Places (NRHP). These potential impacts of the proposed project are discussed in the Alternatives Section.

Within the Palmer vicinity, several historic sites are within or immediately adjacent to the project corridor. Those considered eligible for the NRHP are the Hecky Barn (ANC-473) and Matanuska Agricultural Colony structures: Patten Farm (ANC-472), Puhl-Bacon Farmhouse (ANC-057), and Bailey-Estelle House and Barn (ANC-036). Those considered not eligible are the Husby House, Lucas House (ANC-023), Campbell Outbuilding, and Eckert Barn (ANC-173).

Section 106 Coordination with the State Historic Preservation Office (SHPO) and the Matanuska-Susitna Borough (MSB) determined that the project as proposed would have no effect on two properties: the Puhl-Bacon Farmhouse, and the Bailey-Estelle property; a no adverse effect on the Hecky Barn, and would have an adverse effect on the Patten Farm. (Minor amounts of right-of-way would be required from the property.) The adverse effect would not substantially impair the historic integrity of the Patten Farm or the Matanuska Agricultural Colony District, and, therefore, according to 23 CFR 771.135(f), Section 4(f) requirements do not apply.

Mitigation for the Patten Farm was formalized within a Memorandum of Agreement and include a vegetative buffer along the eastern property line. Continued access will be provided on the existing driveway via the frontage road. The Advisory Council of Historic Preservation concurrence on the project effects and proposed mitigation is included within Appendix E.

Around the community of Sutton there are historic sites adjacent to the project corridor that would not be impacted by the proposed project. Approximately 1,000 feet west of the Chickaloon Way intersection and 80 feet north of the highway (outside the proposed right-of-way) shoulder are four Athabaskan grave houses (ANC-255). Located on the east corner of the intersection, and within the proposed Sutton Alpine Historical Park, is a coal washing plant foundation (ANC-256). This site is not considered eligible for nomination to the NRHP but is recognized locally.

In 1989 and 1990, field crews from the Office of History and Archaeology (OHA) conducted cultural resources reconnaissance surveys. Altogether, seven archaeological sites in the Long Lake District (ANC-017, ANC-731, ANC-732, ANC-736, ANC-737, and ANC-739) and the Pinochle Hill area (ANC-735) were identified as being within or adjacent to the proposed right-of-way. Archaeological data is not included in this public document because of the resource sensitivity.

Four sites, ANC-017, ANC-732, ANC-736, and ANC-737, appear to be eligible for the NRHP under Criterion "D"; these sites "may be likely to yield information important to prehistory or history" (36 CFR 60.4)." The SHPO has determined that previous area development activities had disturbed sites ANC-731, ANC-735, and ANC-739, destroying their integrity.

Section 106 Coordination with SHPO and ACHP determined that the project as proposed would have no effect on ANC-017 and ANC-732; and would have no adverse effect through data recovery [36 CFR 800.9(c)(1)] on ANC-736 and ANC-737. Although site ANC-732 is within the proposed right-of-way, it is outside the cut/fill limits. The site would be staked and avoided by all mechanized equipment during construction. According to 23 CFR 771.135(g), Section 4(f) requirements do not apply to archaeological resources that are important for potential prehistoric/historic information when data recovery is proposed.

The proposed data recovery/mitigation will be fully developed and coordinated with SHPO and ACHP when the design phase is completed, and implemented prior to and in coordination with those project activities that could disturb archaeological resources. Refer to Appendix E for the excavation strategy of sites ANC-736 and ANC-737.

Should any other archaeological, historic, architectural, and/or cultural resources be identified during the construction of the project, all work which would impact these resources would be halted and SHPO would be contacted immediately.

S. Hazardous Waste Sites

A preliminary reconnaissance survey to identify underground storage tanks within the proposed right-of-way was conducted by Department staff on March 13, 1990. Three sites were located (Table 7). No hazardous waste sites were identified.

Altogether, 6 underground tanks are known to exist within the project area. Information regarding the status of the tanks at these sites is not available. However, one of these tanks is within the highway right-of-way at Hick's Creek. It appears that the last fuel delivery at the abandoned tank may have occurred approximately 20 years ago. Private contractors conducted an investigation of this site in 1989. Probes indicated that the tank is empty of any liquids and there was no smell of fuel evident in the organics sample. Coordination with DEC is ongoing at this site. No additional investigations are proposed during preliminary design. However, it is likely that tank closure according to DEC quidelines will be completed before this segment of the highway is upgraded.

Table 7
Underground Storage Tank Locations

Site	Number Tanks
Palmer: Tesoro (Sta. 1590 Lt)	2
Sutton: Dolfi Residence (Sta. 2370 Lt)	1
Matanuska Glacier: Long Rifle Lodge (Sta. 545 Rt)	2
Hicks Creek:** Hicks Creek Lodge (Sta. 258 Rt)	1

** Previously identified by the Department of Environmental Conservation (DEC)

A Hazardous Material Control Plan will be developed by the Contractor to address containment, cleanup, and disposal of all construction-related discharges of petroleum fuels, oil, and/or other hazardous substances. The plan shall comply with the requirements of 18 AAC 75 and Title 46 of the Alaska Statutes. A specification requiring the use of material "free from contamination" will also be incorporated into the contract. Coordination with the DEC, EPA, and appropriate agencies will continue throughout the project.

T. Visual Impacts

According to the MSB Comprehensive Development Plan, the Glenn Highway is a particularly scenic drive and encourages more stopping. More improved and maintained pullouts and waysides are needed along the roadway. There should be sufficient pullouts, waysides, and campgrounds to meet the recreation needs of persons living in the Borough and those coming into the Borough for recreation purposes. There should be adequate signage along the road to identify sites, including trailheads and waysides, of scenic, historic, or recreation interest. Trailheads and waysides should be developed along the Glenn Highway. Pullouts and waysides should be constructed along the major highways, particularly the Glenn Highway east of Sutton.

Rugged mountain scenery along this portion of the Glenn Highway is some of the most spectacular in the state. Travelers are presented with the panorama of the Matanuska Glacier, views of Castle Mountain in the Chickaloon area, Granite Peak

near Sutton, the Matanuska River, and the Chugach Range to the south. There are abundant opportunities year round for wildlife viewing as well.

The project would not diminish the visual quality of the highway. Where feasible and desirable, trailheads and scenic turnouts and pullouts would be provided, mainly utilizing the old roadbed. The Matanuska Moose Range Management Plan addresses the reconstruction and proposed realignments of the Glenn Highway. Guidelines and recommendations are provided within the document for scenic turnouts and pullouts, and access to trails and recreational facilities within the Range.

Locations for wayside and turnout sites were coordinated with MSB, the MSB Parks and Recreation Board Wayside Committee, DPOR, and ADF&G. A viewing area adjacent to the junction of Glenn Highway and Fishhook-Willow Road is currently under construction with the Glenn Highway, MP 35 to MP 54 3R project. Pulloff recommendations include near Granite Creek (MP 63), east of King's River (MP 67.5), the Weiner Lake area (MP 87.5), and near Caribou Creek (MP 107.5). As agreed with local agencies, the Department will continue coordination to incorporate these features during the design phase where appropriate.

Abandoned roadway segments lacking potential for off-road parking or scenic turnouts would be scarified and seeded for revegetation. All disturbed areas, with the exception of rock faces, would be seeded after construction.

U. Construction Impacts

Construction impacts would extend over many seasons and necessitate blasting operations, road closures and traffic detours. Scheduling of construction periods would be coordinated with agencies and local governments. Proposed activities would occur at a time with the least amount of impact to the public, with regards to transportation and safety, and to wildlife, especially during sensitive calving, lambing, and spawning seasons. Construction activities would be suspended during winter, therefore, it is likely that only minor construction impacts to moose would occur.

Traffic congestion would be the primary impact resulting from construction. Heavy traffic occurs along the Glenn Highway during commuter rush hour periods and the summer months when tourism and recreation activities in the area peak. Short-term closures, detours, or temporary delays would be scheduled to minimize disruption

to the travelling public. Traffic would be maintained on the existing road while realignment segments are constructed. A construction traffic control plan would be developed as part of the design plans. The Department will work with the MSB Emergency Services Division to incorporate provisions for emergency response vehicles within the plan.

Air quality would temporarily degenerate slightly as a result of dust and exhaust from construction activities. An erosion and sediment control plan and/or other protective measures would be developed prior to and employed during and after construction. Best Management Practices would be employed. Temporary degradation of water and increased noise levels may occur during construction.

Phased construction would occur over many years because of the length of the proposed action. Project segments would be prioritized according to funding availability, roadway deficiencies, and public need. The phases will be determined at a later date.

As discussed earlier, the proposed project would be constructed under the NPDES general permit (GP) for construction activities in Alaska. The Contractor will be responsible for performing all work in accordance with the GP conditions. A stormwater pollution prevention plan would be implemented by the Contractor as required by the GP.