3437

BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

APPLICATION FOR LICENSE FOR MAJOR PROJECT

SUSITNA HYDROELECTRIC PROJECT

VOLUME 13

D R A F T

EXHIBIT E

CHAPTER 7

CHAPTER 8

CHAPTER 9

HARZA-EBASCO
SUSITNA JOINT VENTURE

Alaska Power Authority

BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

APPLICATION FOR LICENSE FOR MAJOR PROJECT

SUSITNA HYDROELECTRIC PROJECT
DRAFT LICENSE APPLICATION

VOLUME 13

EXHIBIT E
CHAPTER 7 - RECREATIONAL RESOURCES
CHAPTER 8 - AESTHETIC RESOURCES
CHAPTER 9 - LAND USE

November 1985

NOTICE

A NOTATIONAL SYSTEM HAS BEEN USED
TO DENOTE DIFFERENCES BETWEEN THIS AMENDED LICENSE APPLICATION
AND
THE LICENSE APPLICATION AS ACCEPTED FOR FILING BY FERC
ON JULY 29, 1983

This system consists of placing one of the following notations beside each text heading:

(o) No change was made in this section, it remains the same as was presented in the July 29, 1983 License Application

(*) Only minor changes, largely of an editorial nature, have been made

(**) Major changes have been made in this section

(***) This is an entirely new section which did not appear in the July 29, 1983 License Application

VOLUME COMPARISON

VOLUME NUMBER COMPARISON

LICENSE APPLICATION AMENDMENT VS. JULY 29, 1983 LICENSE APPLICATION

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B	Entire	Project Operation and Resource Utilization	2	2 & 2A
	App. B1	MAP Model Documentation Report	3	2B
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C	Entire	Proposed Construction Schedule	5	1
D	Entire	Project Costs and Financing	5	1
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E	1	General Description of Locale	6	5A
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EXHIBIT E - CHAPTER 7
RECREATIONAL RESOURCES

1 - INTRODUCTION (**)

1.1 - Purpose (**)

The purpose of the Susitna Hydroelectric Project recreation plan is to provide organized recreational development for project waters and adjacent lands. The plan has been designed to meet four primary objectives:

- o To offset recreational resources lost by construction of the proposed Project.
- o To estimate and provide for the recreation user potential for the project area;
- o To accommodate project-induced recreation demand; and
- o To control public access on project lands and waters, consistent with the planned construction and operation of the Project and compatible with the scenic, public recreational, cultural, and other environmental values of the project area;

1.2 - Relationships to Other Reports (*)

The recreation plan is based in part on physical aspects of the Project as described in Exhibit A, project operations as described in Exhibit B, and the proposed construction schedule as described in Exhibit C. While the recreation plan constitutes mitigation, it would become part of the project features, and has impacts of it own. Recreation planning has been coordinated with development of other sections of Exhibit E, primarily Chapter 3, Fish, Wildlife, and Botanical Resources; Chapter 4, Historic and Archeological Resources; Chapter 5, Socioeconomic Impacts; and Chapter 9, Land Use, so that impacts can be assessed and mitigation measures determined.

1.3 - Study Approach and Methodology (**)

1.3.1 - Approach (**)

Recreation planning was guided by the framework provided by FERC regulations regarding recreation resources. These factors included: the design and operational characteristics of the Project, management objectives of resource agencies and Native landowners, inherent natural resource opportunities and constraints, and recreation use patterns and demand. These factors were considered throughout the six steps of the planning approach discussed below.

The general approach to the planning effort involved review of pertinent recreation literature, discussions regarding recreation-related plans and concerns of state and federal agencies and Native corporations, the completion of recreation and resource use surveys to support demand evaluation efforts, and field reconnaissance to evaluate and verify locations of proposed recreation sites. The results of the study effort are documented in this chapter.

The results of past studies and agency plans both for the Project and those of a more general nature were used. Particular emphasis was given to the Susitna Hydroelectric Project Subtask 7.08 Report, (TES 1982b). Results of more recent resource user surveys (ISER 1985) and a recreation use survey along the Denali Highway (Harza-Ebasco 1985c) were also considered in the development of the recreation plan.

1.3.2 - Methodology (**)

Figure E.7.1.1 illustrates the study methodology employed in developing the project's recreation plan.

Step 1 - determined study objectives and developed a detailed work plan. This activity included review of all relevant agency documents and their objectives and interviews with key agency personnel.

Step 2 - included the parallel activities of inventorying existing recreation facilities and plans and estimating future recreation demand with and without the Project.

Step 3 - consisted of an inventory of potential recreation sites within the project area. This activity involved a review of relevant project documents and previous studies and extensive onsite investigations.

Step 4 - evaluated recreation opportunities at the potential sites identified in Step 3. The sites were evaluated by defining the qualitative and quantitative aspects of their recreation potential based on information from Steps 2 and 3.

Step 5 - consisted of a further refinement of the opportunity evaluation and constituted the recommended recreation plan and alternatives for the Project.

Step 6 - developed an implementation plan, including plan phasing, demand monitoring, and estimated costs.

A detailed discussion of specific methodologies employed is found in the introduction to each section.

1.4 - Project Description (**)

The Susitna Project is comprised of two major dams constructed in three stages as described in Exhibit A. Facilities in addition to the dams would include storage reservoirs, penstocks and underground powerhouse, transmission lines, a railroad, access roads, two temporary single-status construction camps, two temporary married-status construction camps, a permanent village and a landing strip (Figure E.7.1.2). The project transmission lines would connect to the Anchorage-Fairbanks Intertie, a separate project completed in 1984. Project construction and operational features considered relevant to recreation are discussed below for each stage.

1.4.1 - Construction (**)

(a) Watana Dam and Reservoir - Stage I (**)

The completed Watana Stage I reservoir would be 44 river miles long, with a typical width of 1 mile and widening at Watana Creek to approximately 3 miles. The surface area would range from 21,000 acres at normal maximum pool to 12,000 acres at minimum pool. Construction of the Project would require a 41.6-mile access road and an airstrip near the site. A temporary single-status construction camp, (ultimately housing 2,315 workers during the peak construction period) and a construction village (ultimately housing 310 families or 1,023 people) would be developed.

(b) Devil Canyon Dam and Reservoir - Stage II (**)

The Devil Canyon Stage II phase of the Project would consist of a 645-foot high thin arch concrete dam, a 600-MW powerhouse, and a reservoir with a surface area of 7,800 acres. The reservoir would be 32 river miles long and confined in a narrow canyon generally 0.25 to 0.5 mile wide. It would extend to the toe of the Watana Dam at normal maximum pool level.

A 37-mile access road would be developed between Watana and Devil Canyon, including construction of a high-level bridge across Devil Canyon. A 12.2 mile railroad would be constructed from Gold Creek to Devil Canyon for transporting construction materials. A single-status camp for 1,412 workers and a married-status village for 160 workers (528 people) would be constructed. Final reservoir filling would occur over a two-month period in the year 2004. The construction camp and village would be removed once construction is completed.

(c) Watana Dam and Reservoir - Stage III (***)

During Stage III, the Watana Dam would be raised 180 feet from el. 2,025 to el. 2,205 and the Watana Reservoir would be raised from its normal maximum water level of el. 2,000 to el. 2,185. The Stage III reservoir would have a surface area of 38,000 acres during normal maximum pool level with an average width of approximately 1 mile and a maximum width of approximately 5 miles. The reservoir would be 48 river miles long. The access road north from the Denali Highway, already in place to serve Stages I and II would be utilized for Stage III. Access from the west would be provided by utilization of the existing railroad from Gold Creek to Devil Canyon and the existing access road between Devil Canyon and Watana. The construction work force for implementing Stage III would peak at about 1,383 workers in the year 2009. Reservoir filling would begin in 2011.

1.4.2 - Operational Characteristics of the Project (**)

(a) Watana Stage I Dam and Reservoir (**)

The Watana Stage I Dam and power plant would begin operating in 1999. Exhibit B and Exhibit E, Chapter 2, Section 3.6 provide detailed information on operation of the Project. Through the months of May, June, July, and August, under normal maximum operating conditions, the Watana reservoir water levels would increase from a low of el. 1,850 ft. in April and May to the peak elevation in early September (el. 2,000). At maximum drawdown in April, 9,000 acres or 14 square miles normally covered by the reservoir would be exposed. The size of the areas may range from a few hundred feet in canyon areas to a few square miles in flatter areas such as Watana Creek.

During operation of Watana Dam, the fluctuations in flows that occur under natural conditions would be both moderated and redistributed. Under natural conditions, average monthly flows in the Susitna River range from a minimum of 1,100 cfs in March to a high of 28,000 cfs. in June (Gold Creek Station). Flows with the Stage I project would be increased during the winter over natural conditions and decreased during the summer. Flows would be increased over natural conditions during eight months (September through April), and would be decreased during the remaining months. Downstream of Talkeetna, the same general patterns would pertain, although the effects would be proportionately much less as the Chulitna and Talkeetna Rivers join the Susitna River. Exhibit E, Chapter 2 provides a detailed discussion of project flows.

(b) Devil Canyon Dam and Reservoir - Stage II (**)

The Devil Canyon Dam and power plant would begin operating in the year 2005. The reservoir drawdown at Devil Canyon would be less than that of Watana Reservoir. The pool would normally remain at el. 1,455 between September and May. At project completion (year 2005) a 20-foot drawdown to el. 1,435 would occur in average years. In later years, the maximum drawdown would be ten feet during average years. In dry years, the pool may be drawn down 50 feet to el. 1,405 in July and remain there through October.

Susitna River flows downstream of the Project during Stage II would be more stable than during Stage I. The minimum average flows in April would be near 6,000 cfs as compared to 4,000 cfs in Stage I and 1,100 cfs under natural conditions. The maximum monthly average discharge would be similar to Stage I.

(c) Watana Dam and Reservoir - Stage III (***)

The Stage III Watana Dam would begin operating in the year 2012. Stage III drawdowns during average years would be approximately 100 feet. The reservoir water level would normally be at its maximum level of el. 2,185 in September and October and would normally draw down throughout the winter to approximately el. 2,080 in May. In dry years, the reservoir level would range from a maximum level of el. 2,150 to a minimum of el. 2,065. The surface area at el. 2,065 would be 26,000 acres. At minimum pool, the exposed areas of the reservoir shoreline would total 12,000 acres or 19 square miles. The size of these areas would range from a few hundred feet in canyon areas to a few square miles near Watana Creek.

During Stage III, Susitna River flows downstream of Devil Canyon would be more stable than during Stages I and II. Minimum average monthly April flows would be increased from 1,100 cfs under natural conditions to 4,000 cfs in Stage I, 6,000 cfs in Stage II, 6,600 cfs in the early years of Stage III operation and to 9,000 cfs when the Project is operating near full capacity. Maximum average monthly flows (occurring in a wet year) would be decreased from 51,000 cfs under natural conditions to 35,000 cfs in Stage I, 37,000 cfs in Stage II, 37,000 cfs in the early years of Stage III, and to 22,000 cfs as the Project nears full capacity.

2 - DESCRIPTION OF EXISTING AND FUTURE RECREATION WITHOUT THE SUSITNA PROJECT (**)

2.1 - Statewide and Regional Setting (**)

2.1.1 - Background (*)

Recreational environments and the people who recreate in Alaska are different in many ways from those in the lower 48 states. Therefore, to understand the recreation issues of the Susitna Project, it is necessary to identify the recreation issues and needs facing the state and to understand the attitudes of Alaska residents and tourists.

The open spaces of Alaska contain some of the most spectacular scenery in the nation. Less than a decade ago, Alaskans enjoyed virtually unlimited potential for outdoor recreational opportunities. However, as land status changes take place, available public recreation land and opportunities are being reduced.

The 1971 Alaska Native Claims Settlement Act will transfer 44 million acres of public lands to private ownership with in the next few years. While the conveyance is still in progress, many selected lands include established recreation areas. In addition, the state legislature has directed the Alaska Department of Natural Resources (ADNR) to make state lands available to the public for settlement or agriculture. This ongoing process has removed 20,000-100,000 acres each year from public ownership.

The federal government set aside another 100 million acres through the Alaska National Interest Lands Conservation Act (ANILCA), adding 43.6 million acres to the National Parks System and 53.7 million acres to the National Wildlife Refuge System. Two million acres were placed in Bureau of Land Management (BLM) conservation and recreation areas. Fifty-six million acres of the National Park refuges and National Forest land were given wilderness protection. These lands represent many beautiful and sensitive areas of Alaska and expand the area of protected status lands available for outdoor recreation. However, for the most part, these lands are remote and not easily accessible by either out-of-state visitors or residents.

The Alaska Parks and Outdoor Recreation Division (APORD) of the ADNR, which was formed in 1971, currently controls three million acres of state land and water. ADNR's policies and programs reflect the recent land status changes. In 1979, ADNR began the Public Interest Land Identification Project to evaluate surface

use values of state lands. This ongoing project identifies areas for wildlife habitat, agriculture, recreation, forestry, and settlement and locates sites for future state parks and recreation areas. A statewide inventory of local, state and federal recreation facilities done in 1977 shows that approximately 157 million acres of Alaska's 367.7 million acres are now classified as public recreation. This inventory is presented in Table E.7.2.1.

2.1.2 - The Southcentral Region (*)

The project's study area lies within the southcentral region of Alaska. Since recreational planning for the Project must fit within the framework of existing and future regional recreation, it is important to understand the regional recreational patterns and trends as well as the APORD plans for the region.

The southcentral region extends from the hydrographic divide of the Alaska Range on the north to the Matanuska-Susitna Borough boundary on the west, Kodiak Island on the south, and the Alaska/Canada border on the east. It abounds with ocean shorelines, freshwater lakes, free-flowing rivers, massive mountains, wildlife, and glaciers the size of states. The diversity of landscapes and resources offer a wide variety of outdoor recreational opportunities, making it an attractive recreational environment. Figure E.7.2.1 shows existing and proposed regional recreational facilities.

More than half of Alaska's population lives within the region of southcentral Alaska. The Municipality of Anchorage, the largest city, has an estimated 1985 population of 247,237. The region's economy is based on commercial fishing, mining, forestry, petroleum, tourism, support services, and other private business. In addition, this region contains a more developed transportation system than other portions of the state. Although there are relatively few roads in the region compared to most of the lower 48 states, paved highways and gravel secondary roads provide access to many of the cities and villages within the region. These roads provide access to many of the recreation lands in the region. Because of the limited number of roads, use of planes to reach areas not accessible by road is prevalent. The region has an extensive airport system ranging from the international level to gravel strips and water bodies. The Alaska Railroad and ferry systems also serve portions of the region. All of these transportation systems, combined with the population concentrations, make the southcentral region's recreational opportunities more accessible and consequently more heavily used than in other portions of Alaska.

2.1.3 - Existing Regional Facilities (*)

The Alaska state parks system includes 82 park units. Of these, 53 are in the southcentral region. Table E.7.2.2 describes the distribution of facilities throughout the state by region. Outdoor recreation development in the southcentral region is primarily located to serve the population centers of Fairbanks and Anchorage and the Railbelt area connecting them. Figure E.7.2.1 indicates the location and extent of public recreation lands in the region.

The largest and most popular attraction in the southcentral region, for both out-of-state tourists and state residents, is the Denali National Park and Preserve. It is located about 220 miles north of Anchorage and 125 miles south of Fairbanks on the Parks Highway. It offers visitors views of Mt. McKinley and other major peaks in addition to the abundant wildlife. The park attracted over 250,000 recreational visitors in 1981. Facilities and services in and adjacent to the park include several lodges, visitor centers, campgrounds, trails, raft trips, horseback riding, general store, cabins, convention facilities, gas and bus service. The adjacent Denali State Park, accessed by the Parks Highway, abuts the project's study area. It contains over 324,000 acres and offers a major roadside campground, trails, picnic grounds, and canoeing and fishing areas.

Seventy miles from Anchorage, Nancy Lake State Park has 23,000 acres and 130 lakes and ponds. It is heavily used by Anchorage residents for water-related recreation as well as hiking, picnicking and camping (100 units). Chugach State Park, adjacent to Anchorage, provides extensive hiking and cross-country skiing opportunities. The park covers 494,000 acres and provides for camping (91 units), hiking, picnicking, hunting, boating, and fishing.

Lake Louise, located northeast of Anchorage and reached from the Glenn Highway, is a popular fishing, boating, and hunting area. The state operates a campground at Lake Louise. The lake is a destination point for boaters and provides access into the upper Susitna and Tyone Rivers. Boaters also float down the Susitna River from the Denali Highway bridge and motor up the Tyone River into Lake Louise.

North of the Susitna Project area, the BLM manages the 4.4-million acre Denali Planning Block. This area encompasses much of the Denali Highway and includes several archeological districts listed in the National Register of Historic Places. BLM maintains three developed campgrounds, picnic areas and boat launches along the highway and canoe portages in the Tangle Lakes area. Two of the developed campgrounds are at Tangle Lakes. The

other campground is at Brushkana Creek. In addition, people use pullouts and borrow areas along the highway for camping, including one near the Clearwater Creek crossing.

The Chugach State Park to the east of Anchorage and the Chugach National Forest to the southeast absorb a large portion of recreation demand in the southcentral region. Many southcentral region residents also use the Kenai Peninsula, southwest of Anchorage, for recreation. The Kenai Peninsula contains much public land including the Kenai National Wildlife Refuge and the Kenai Fjords National Park. The peninsula offers world-famous king salmon and halibut fishing, big game hunting, scenic driving, skiing, and lake and saltwater recreation.

Numerous private facilities in the region provide additional formal and informal recreational opportunities. These include remote lodges, cabins, restaurants, airstrips and flying services, guide services, whitewater rafting, and other boat trips.

Talkeetna, located on the confluence of the Susitna and Talkeetna Rivers, serves as the world-wide operations center for Mt. McKinley mountaineering expeditions. In addition to mountain climbing, other recreational activities which serve as Talkeetna's economic base include hunting, fishing, guiding, flightseeing, tours, and sightseeing.

A listing of other existing and proposed relevant regional recreational opportunities is included in Appendix E1.7.

2.1.4 - Existing Regional Recreation Use (*)

Outdoor recreation is a way of life in Alaska. According to a survey conducted in 1981 regarding recreation demand in Alaska (Clark and Johnson 1981), the wide variety of recreation opportunities available is a major reason for people moving to and staying in Alaska. Only self-reliance is considered more important than recreation. Proximity to the wilderness was the third most important reason Alaskans gave for moving to Alaska.

The percentage of Alaska's population that participates in outdoor recreational activities is among the highest in the nation. Table E.7.2.3. ranks the percentage of participation in various inland activities within the region. Southcentral residents ranked their favorite recreation as fishing, tent camping, hunting, trail-related activities, baseball and bicycling in that order (ADNR 1981). In contrast, tourists in the area have indicated driving for pleasure as their favorite activity followed by camping, hiking, and sport fishing (ADT 1981).

Table E.7.2.4 outlines the total visitor count summary for Alaska State Parks from 1978 to 1980. Data for the Susitna River basin is included in the Mat-Su and Copper Basin State Park districts.

Over 389,000 visitors from outside the state came to Alaska for pleasure trips in 1977. This represents a 13 to 15 percent annual growth rate since 1964. Recreational growth rates are difficult to predict with confidence, since they rely on many variables, including world economic conditions. However, the State Division of Tourism projects that in 1985 up to 1 million tourists would visit Alaska. The reasons tourists give for being interested in Alaska were studied in a poll by GMA Research Corporation in 1980 (ADT 1981). Their study concluded that the main reasons for tourists' interest in Alaska were as follows:

- Scenery, mountains, forest, outdoors (40 percent),
- Unique, different from other places (25 percent),
- People, Native cultures, Eskimos (10 percent),
- Unspoiled wilderness (10 percent), and
- Other responses: curiosity, adventure, vastness, wildlife, fishing, hunting (15 percent).

In terms of numbers of visitors, the most important areas in Alaska for out-of-state tourists are the Gulf of Alaska, Anchorage, and the Denali National Park and Preserve.

2.1.5 - Regional Recreation Trends (*)

Southcentral Alaska has experienced overcrowding in many or most existing recreational areas near Anchorage as a result of increasing population growth and limited access to other portions of the state. Assuming that the present recreational participation rate remains constant, this region would continue to experience a substantial annual increase in demand equal to the rise in population. However, recreation participation in the United States and Alaska may increase faster than the population if current trends continue, which may result in longer trips at greater distances from urban centers. In recreational areas which receive up to 50 percent of their users from Anchorage and Fairbanks, intensity of use had increased three-fold in the late 1970s and the recreational season lengthened by several weeks (ADNR 1982a).

According to the state's Southcentral Regional Plan, sports fishing license sales increased 40 percent from 1975 to 1980 (ADNR 1982a). Increased use of accessible streams has caused overcrowding in popular fishing areas throughout the region and in particular in streams nearest urban centers. Interest in boating is also rising. Sales of motorized boating equipment

increased substantially in the late 1970s. The Knik Kanoers and Kayakers Club of Anchorage has reported rapid growth in the number of members in recent years. In addition, there is also evidence, as well, of a rapid increase in winter recreation, as indicated by surveys of winter recreation equipment sales over the last seven years (Clark and Johnson 1981).

A statewide 1981 public survey (Clark and Johnson 1981) polled southcentral residents to determine the recreational needs and priorities of the region. Twenty-five percent of the residents responded that they would most like to do more fishing, 12 percent said more tent camping, 7 percent said more hunting, and 8 percent said more motorboating. They indicated that bad weather, lack of free time, closed seasons, overcrowding, and high transportation costs were the most common reasons that prevented increased participation in those activities. When asked what priorities the State Parks Department should have for future development, residents stated that the department should acquire more campgrounds and hiking trails; should develop more recreation trails, backpacking campsites and boat trails; and should maintain, but not expand, the size of existing wilderness areas.

Also in the 1981 survey, 61 percent of the southcentral residents reported that they would like more recreational opportunities at weekend travel distances, and 62 percent would like more community recreational development. When asked how many hours they would travel for weekend recreation each way, 17 percent said over 4 hours, 11 percent said over 5 hours, and 20 percent were willing to go over 6 hours from home for a weekend trip.

The features that Alaskan residents most desired in out-of-town recreational areas included (ADNR 1981): 1/

- o Fishing areas (95 percent),
- o Water access (91 percent),
- o Developed camping and picnic sites (91 percent),
- o Undisturbed natural areas (88 percent),
- o Hunting areas (87 percent), and
- o ORV trails (7 percent).

2.1.6 - Future Facilities in the Region (**)

In 1982, the APORD published an aggressive plan to expand recreational opportunities within the southcentral region (ADNR 1982a). The plan attempted to respond to all existing

1/ The percentages represent the percent of the survey population in favor of features.

unsatisfied demands and projected needs of the region (see Figure E.7.2.1 and Appendix E1.7). Existing recreation facilities along the George Parks Highway are considered by the state to be inadequate to handle the current recreation demand.

APORD development priorities include several recreation sites that affect the Susitna Project's recreation plan. They are included in Appendix E1.7 and are described below.

Denali State Park has been studied as the site of the Tokositna Resort which would offer first-class hotel facilities, cultural attractions, commercial developments, indoor recreation, alpine skiing and other winter sports, in addition to the outdoor recreation already offered in the park. While this project is no longer under active consideration due to uncertain feasibility, preliminary studies estimated a potential for over 2 million visitor nights and 300,000 visitor days by 1985.

The state has recently entered into an agreement with the National Park Service (NPS) to propose the joint development of a visitor center in Denali State Park. A hotel has also been proposed to be financed by the private sector. This project would accommodate additional regional recreation demand. Recreation use would be expected to increase within the Denali State Park boundary as well as to the south side of Denali National Park and Preserve.

In other areas of Denali State Park, additional picnic areas, campgrounds, boating facilities, and trails are being developed. Along the eastern portions of the park, trailheads have been designated in conjunction with railroad stops; these trails would connect into the westermmost portion of the Susitna study area.

In the Lake Louise Recreational Area, state expansion plans propose to add 300 acres to the existing 50 and include several campgrounds, boating facilities and canoe portage trails. This development is a high priority item, since the lake area and existing improvements are experiencing heavy use. Construction of additional campsites was initiated in 1985. The adjoining Susitna Lake and Tyone Rivers have been identified as boating recreation areas for possible campground development at a later time.

The APORD has proposed legislation to designate the Talkeetna River as a State Recreation River. The proposed recreation area would extend from the river mouth at Talkeetna up to the confluence of the Talkeetna River and Prairie Creek. This designation would provide for publicly owned buffers between 1/4 and 1/2 mile on either side of the Talkeetna River for the protection of recreational and natural values and opportunities associated with the river corridor. Amendments requiring

multiple use of the buffer are being considered as part of the legislation (Wiles 1985 Pers. Comm.). The Talkeetna River forms part of a float trip that begins in the study area on the Susitna River at the Denali Highway and continues through Stephan Lake and Prairie Creek to the Talkeetna River. The Talkeetna River is also reached by boaters originating on the Tyone River or Lake Louise area by flights directly into Stephan Lake.

Recreation developments recently committed for construction include the Montana Creek State Recreation Site. Plans for Montana Creek, located at Mile 96 off the Parks Highway, include the construction of trails, a railroad underpass and parking to support the heavy fishing demand. The APORD has also proposed development of the Willow State Recreation Area, located approximately 27 miles north of Wasilla. This development would include trails, campgrounds, parking and a boat launch on the Susitna River.

Several other proposed new parks and park expansions given a high priority by ADNR are listed in Appendix E2.7.

The NPS is proposing improvements to existing Denali National Park facilities to accommodate the substantial increased demand experienced in the past several years. As outlined in their draft general management plan (NPS 1985), the NPS is planning to construct a new hotel, visitor access center and youth hostel. Some of the existing campgrounds within the park, however, would be eliminated if the management option preferred by the Park Service is selected (NPS 1985). This option also proposes active promotion of recreation use of the south side of the park with its base of operations at a visitor center located in Denali State Park. These plans, if developed, are expected to accommodate portions of the regional recreation demand, particularly by tourists. Demand for developed camping, however, is expected to increase as a result of the reduction in campgrounds.

2.2 - Susitna River Basin (**)

2.2.1 - Background (*)

During the past decade, the middle Susitna River basin has been studied and evaluated by numerous state and federal agencies. It has not met the criteria required for inclusion in any of the following recreation and conservation programs:

- o National Park - Preserve System;
- o National or Historic Landmark Status;
- o Wilderness Preservation System;
- o National Trail System;

- o National Forest System; or
- o State Park System.

The area has not been studied for inclusion in the National and Scenic River System. No further studies are known to be under consideration. Both the state and Native corporations have selected lands in anticipation of development and use.

2.2.2 - Existing Facilities and Activities In the Study Area(**)

The middle Susitna River Basin encompasses over 39,000 square miles. For purposes of the recreation plan, the area studied is defined by the Alaska Railroad and the Parks Highway on the west, the Denali Highway to the north, the Susitna River to the east, and a line approximately 20 miles from the Susitna River on the south. This area covers approximately 3,600 square miles.

This portion of the middle Susitna River Basin is not a developed recreational resource. The level of use is presently restricted primarily by the difficult access and distance to population centers. Small planes which are the most common form of recreational access, use the few gravel airstrips which exist in the area. Floatplanes also land on larger lakes and rivers. Vehicular access consists of a few all-terrain vehicular (ATV) trails and rough roads used for mining activities and access to scattered homesteads. Boat access also occurs to a limited extent, since water craft can put in at the Denali Highway and float or motor along the Susitna River primarily above Vee Canyon. Boaters can also motor the Susitna River upstream from Talkeetna to Devil Canyon. Some boaters also use the Tyone River for access into the area.

As a result of these limitations, people primarily utilize the area on weekends or on other overnight visits. Most of the relatively few trails and structures that exist within the area are associated with the small local population located primarily along the Alaska Railroad. Existing facilities are very dispersed, and activity occurs at a low level of intensity (see Figure E.7.2.2 for existing recreation patterns).

(a) Facilities (**)

(i) Public Facilities (***)

The only public recreational facilities that presently exist within the study area are the roadside facilities on the Denali and George Parks Highways. Along the Denali Highway, the BLM maintains a small roadside campground and several picnic areas. The facilities most relevant to the

Susitna Hydroelectric Project's recreation plan are the 16-site campground at Brushkana Creek and the boat launch at the Denali Highway bridge over the Susitna River. A boat launch, canoe portages, and two campgrounds also exist at Tangle Lakes.

(ii) Private Facilities (***)

Existing private recreational developments within the study area include clusters of small seasonal cabins and lodges. Most of the private facilities are surrounded by privately owned Native land. Chapter 9, Land Use, includes a table that identifies all structures within the area and lists their use, mode of access, location, and condition. The major concentrations of seasonal residences, cabins, and other structures are near Portage Creek, High Lake, Gold Creek, Chunilna Creek, Stephan Lake, Clarence Lake, and Big Lake. Most are used in association with hunting and fishing. Some of these locations are accessible by ATV trails, but most are located near dirt airstrips and large water bodies accessible by plane. Those structures being utilized for recreational activities are identified in Figure E.7.2.2.

The Portage Creek drainage has a number of mining claims with some summer cabins. The area contains approximately 12 cabins and several other structures including cabin platforms. Other developments at Chunilna and Gold Creek are primarily mining establishments. There are three small cabins along the Susitna River banks which are maintained for seasonal hunting, trapping, and fishing use.

Three lodges are located in the study area. They are High, Tsusena, and Stephan Lakes Lodges. Stephan Lake Lodge, located south of the Susitna River, is the largest of the three lodges. It includes ten main structures and seven additional outlying cabins. Serving a predominantly European clientele, it offers a variety of outdoor recreation activities in a remote setting including hunting, fishing, and float trips down the Talkeetna and upper Susitna Rivers and Prairie Creek. None of these lodges are located within the impoundment area.

High Lake Lodge is the second largest lodge complex with nine structures (see Chapter 9, Land Use - Existing Structures). It is located northeast of the

proposed Devil Canyon damsite at High Lake. Historically, this lodge has provided guests with services that are similar to Stephan Lake Lodge for hunting and fishing activities in a wilderness area. Several small outlying cabins located along Portage Creek and the Susitna River have been utilized by visitors to High Lake Lodge while on hunting and fishing trips. The lodge is currently utilized by Susitna Project personnel doing field research.

Tsusena Lake Lodge is located north of the proposed Watana damsite and Tsusena Butte and adjacent to Tsusena Lake. This lodge, with three structures, is used primarily by the lodge owners and members of their families and friends. The majority of use occurs during the summer and fall months with little or no use during the winter months.

(iii) Trails (**)

Existing trail systems in the project area were built for access by prospectors, hunters, trappers, and fishermen (see Table E.7.2.5 and Figure E.7.2.2 for a listing and a location of major trail locations, condition, and use.) At present, these trails accommodate horses, tracked vehicles, rolligons, dogsleds, and hikers. They connect the few scattered recreational developments and mining settlements in the area and the camp used for researching the area's hydroelectric potential. Trails radiate from these scattered structures out to airstrips, lakes, and adjacent fishing streams.

The BLM is currently developing regulations for the management of the public trails and access sites located on easements within lands selected by Native corporations. A total of six easements have been identified within the study area. These include an access trail 50 feet wide from the Chulitna wayside on the Alaska Railroad to public lands immediately east of Portage Creek; a state one-acre access site and trail easements on Stephan Lake; and an access trail running east from Gold Creek.

The following trail information was reported in the unpublished Area Notes (ADNR 1980) prepared as part of the Upper Susitna Basin Recreation Atlas.

The Snodgrass Lake trail begins at the Denali Highway near the Susitna bridge and proceeds south to the lake. The trail reportedly receives use during the summer, autumn, and winter. Recreational activities include: moose, brown bear, and caribou hunting; fishing; camping; off-road vehicular use; picnicking; wildlife observation; berry picking; snowmobiling; overnight camping; and cross-country skiing.

The Portage Creek trail follows a sled road from Chulitna to Portage Creek. Hikers access the trail at the Alaska Railroad stop near Chulitna. The trail is used in the autumn, summer, and winter months and is popular with hunters of moose, caribou, brown bear and black bear, as well as hikers, campers, fishermen, photographers, and berry pickers. Portage Creek also receives a light level of fishing effort. Most of this trail traverses CIRI-selected lands.

The Butte Lake area is used during summer, winter, and autumn months. There is a trail, also identified by Terrestrial Environmental Specialists (TES 1982a) in its Susitna Land Use Report, that connects the Denali Highway and Butte Lake. This trail is used by skiers, snowmobilers, hikers, fishermen, berry pickers, and campers. Some grayling and lake trout fishing occurs on Butte Lake. Duck, geese, and swan are found in the Butte Lake area.

Recent mining activity near the abandoned community of Denali, located north of the Susitna River/Denali Highway bridge, has required upgrading of an ATV trail from the townsite to the Denali Highway. The ATV trail continues from the highway south to the confluence of the Susitna and Maclaren Rivers where it then continues east up to the Maclaren River and then turns south. This trail connects to other trails leading to Lake Louise or Crosswind Lake and ultimately to the Glenn Highway. It is used by off-road vehicle drivers; snowmobilers; hunters of caribou, moose, and brown bear; fishermen; and possibly dog sledders.

(b) Activities (*)

Aside from the use of isolated lodges, cabins and trails, the predominant recreational pattern in the study area is dispersed and non-site-specific. Activities include: hunting, fishing, food gathering, rock hounding, camping,

hiking, cross-country skiing, photography, bird watching, and power and non-powered boating. Total use of the 3,600-square-mile project area for recreation in 1980 was estimated at 6,700 user days (Table E.7.3.1). Assumptions and methodology for estimating recreation use are presented in Appendix E4.7.

(i) Sports and Trophy Hunting (*)

The most popular big game in the study area include Dall sheep, moose, caribou, black bear, and brown bear. Hunting levels in the study area in 1980 were estimated at 800 user days (Table E.7.3.1). Many hunters fly into the area's larger lakes and utilize the small lakeside cabins for hunting trips. Hunters use ATV vehicles and horses to gain access to more remote areas. One of the three lodges in the area, the Stephan Lake Lodge, serves as a base for hunting groups that fly in for guided trophy hunts. The lodge typically has 80-90 guests per season (Harza-Ebasco 1985d).

(ii) Fishing (*)

Fishing frequently occurs in association with other activities such as hunting, boating, and camping. Fishing in the study area was estimated as 1,500 user days in 1980 (Table E.7.3.1). Anglers have long enjoyed high-quality fishing in area lakes, streams and rivers. Fishermen commonly fly into the larger lakes for all-day or weekend trips. Lake fishing is concentrated at Fog, Clarence, Butte, Watana, Tsusena, Deadman, Big, and High Lakes. Stream fishing occurs mostly along the Susitna River, tributaries downstream of Devil Canyon, such as Portage Creek, and creeks accessible by road such as Brushkana Creek at the Denali Highway. The Tyone River is also fished, with access provided by Lake Louise or the Susitna River from the Denali Highway bridge.

Salmon migrate up the Susitna River to Portage Creek just below Devil Canyon. Both guided and non-guided fishing trips are popular here. Considerable salmon fishing also occurs in Stephan Lake and Prairie Creek as boaters travel downstream to the Talkeetna River from Prairie Creek. Other popular salmon fishing spots include Chunilna Creek and Indian River. Lack of road access is an important limiting factor on fishing, and little stream fishing occurs in the adjacent lands.

There are many popular salmon fishing areas farther downstream on the Susitna River and its tributaries. The Deshka and Yentna Rivers are popular fishing areas as are the Alexander Slough, Willow Creek, Sheep Creek, and the Talkeetna River (R&M 1985).

(iii) Food Gathering (**)

Many of the residents of towns near the project study area go berry picking according to an ADF&G survey conducted in 1984. Of the 405 households surveyed, 65 percent engaged in berry picking. This includes berry picking in all locations including the study area. The survey included residents of Cantwell, Paxson, Sourdough, Glennallen, Lake Louise and residents along the east Glenn Highway (Stratton and Georgette 1984). Most of the berry picking in the project area occurs along the Denali Highway. Results of a survey of recreational activities of Railbelt residents indicate that an estimated 92 percent of the residents that participate in berry picking, day hiking, and picnicking limit the extent of their activity to areas within approximately ten miles of the Denali highway (ISER 1985). Data on the amount of berry picking occurring within the study area are not currently available.

(iv) Boating (**)

Summer boating occurs on the Susitna River upstream and downstream of Devil Canyon and on many of the area's larger lakes. River boat and guide services from Talkeetna and from lodges provide boat access to the Susitna River and plane service to area lakes. The Susitna River is used primarily for sport fishing. Other uses include sightseeing, transportation, whitewater boating, and access to remote parcels and hunting areas.

The Susitna River downstream of Devil Canyon is used by a variety of craft including airboats, jetboats, rafts, kayaks, canoes, and propeller-driven boats. Most of the boating activity on the river occurs on the portion of the river below Talkeetna (ADF&G 1985). The portion between Gold Creek and Talkeetna (37 miles) has been a popular whitewater route because it is more remote than the downstream reaches, provides a relatively short trip for weekend use, and has been accessible by train. The Alaska Railroad, however, has recently limited bringing

boats on the train to collapsible kayaks only. Boating activity on the portion between Devil Canyon and Gold Creek is relatively light because it is only accessible by air, by boat from downstream reaches, or by boating through Devil Canyon Rapids, which is only done by expert kayakers. Riverboat tours travel up to this portion of the river for fishing and viewing Devil Canyon.

Most boaters on the Susitna access the river from boat launches at Talkeetna, Sunshine Bridge, Willow Creek, and Susitna Landing located on the Kashwitna River. The only other road access to the river is at the Denali Highway, approximately 200 river miles upstream of Talkeetna. Susitna Landing is the most heavily used boat launch because of its proximity to popular fishing destinations such as the Deshka and Yentna Rivers (ADF&G 1985). Navigation use of the river downstream of Devil Canyon is discussed in greater detail in Exhibit E, Chapter 2.

The portion of the Susitna River above Devil Canyon (130 miles) provides a remote boating and canoe route. This portion is classified as easy to medium difficulty or Class I to II on the international whitewater scale because of its fast current (Harza-Ebasco 1985b). Although use is relatively light, this portion is attractive to boaters because of the limited access, the abundant wildlife, and the river canyon scenery. Some boaters float the river from the boat launch on the Denali Highway to the Tyone River and motor up to Lake Louise at the Tyone River's source. Other boaters continue down the river to the gaging station above Vee Canyon where they pull out and portage to Clarence Lake for fishing. An estimated two to three expeditions of two to four whitewater boaters per year continue on through the Vee Canyon Rapids to the Stephan Lake Portage for access to Prairie Creek and the Talkeetna River. Vee Canyon rapids consist of Class III to IV rapids within a narrow double-curved canyon (Harza-Ebasco 1985b). Vee Canyon is approximately 2 miles long and 40 miles upstream of the Watana damsite.

The upper Talkeetna River in the southern portion of the study area is a popular Class III and IV rafting and whitewater kayaking trip. The Talkeetna River is not easily accessible by land. In addition to the

boaters portaging in from the Susitna River, it is reported that four to five parties per year, consisting of three to six persons, are air-lifted into Stephan Lake. They float Prairie Creek to the Talkeetna River and down to the town of Talkeetna where they enter the Susitna River or pull out. The trip usually takes two to three days from Stephan Lake (Harza-Ebasco 1985b).

A few individuals continue down the Susitna River through the rapids of Devil Canyon each year. This stretch of river, which passes through 11 miles of a narrow vertical canyon, is considered world class whitewater. Devil Canyon contains four sets of rapids which are generally considered by kayakers to be a Class VI rapids on the international whitewater scale. The Canyon provides approximately five miles of Class VI rapids, defined as the "limit of navigability, life-threatening to skilled boatsmen with good equipment." According to an experienced kayaker, Devil Canyon is one of approximately six known stretches of river in the world that maintain the outer limits of navigability for at least four miles (Harza-Ebasco 1985b). The first successful recorded running of the rapids occurred in 1978. An estimated 27 kayakers from various parts of the world have attempted it since that time, and at least one person has died in their attempt (Harza-Ebasco 1985b).

(v) Winter Sports (**)

Cross-country skiing takes place in the area, particularly near the Denali Highway. Occasional tour packages have been offered by local private lodges. Cross-country skiing in the study area was estimated at 100 user days in 1981 (Table E.7.3.1). Snowshoeing is also done for recreation in the area. A limited amount of recreational trapping takes place on the south side of the Susitna River near Stephan and Fog Lakes as well as on the north side near Tsusena Creek and Clarence and High Lakes. In the winter, dogsleds and snowmobiles travel through the area. Their activities are reportedly centered around Trapper Creek and Talkeetna to the south.

2.2.3 - Future Activities and Facilities In the Study Area (**)

Should the Susitna Project not be developed, major constraints which have limited recreational activities in the past would continue to exist, although Native corporations may seek to develop their lands for recreational uses. Unless vehicular access is developed into the study area, no major shift in the existing recreational patterns is anticipated. Some increase in use is expected, however, as there is a rising population and additional per capita participation in most activities. Recreational use of the study area is anticipated to increase from an estimated 6,700 user days in 1980 to an estimated 12,500 recreation user days each year by the year 2000 (Table 7.3.1). Projected use levels in the year 2000 for hunting, fishing, camping, kayaking, and cross-country skiing are 1,300, 2,500, 8,000, 370, and 220 user days, respectively. Appendix E4.7 provides the methodology and assumptions used in developing use estimates.

The parties that would control future recreational activities and development in the study area include the state, the BLM, several Native corporations, and private landholders. The policies of these groups concerning the land parcels they control, along with overall increased pressures for recreational opportunities from Alaska residents, would largely determine future land use patterns. The exact nature of specific activities and developments is difficult to predict.

(a) Private Landowners (**)

The Native corporations have selected much of the land adjacent to the Susitna River and along Portage Creek and the Talkeetna River. Development possibilities which have been discussed include mineral extraction and recreation-home land development (Bedard 1984). Access appears to be the prime determinant for development decisions. At present, two small, improved vehicular trails provide access to both the northern and southern sides of the Susitna River.

The CIRI Native Village corporations are the largest private landowners in the project area and have the greatest potential to impact the area. In the absence of the Project, Natives may develop their mineral and timber resources, lease cabin sites on lakes and rivers, and open up the Stephan and Fog Lakes region by bringing a road east from the Parks Highway (Bedard 1984).

With the Project, however, Tyonek Village Corporation proposes that there may be specific opportunities to develop recreation resources, thus creating corporate income without

having to heavily impact the land. Suggested developments include a lodge and cabins at Fog Lakes, with associated trails and water-based recreation; a lodge at Stephan Lake with a brown bear viewing site established along Prairie Creek; a network of canoe and hiking trails from Stephan Lake to the Talkeetna and Susitna Rivers; and primitive trail access from the proposed bridge at Devil Canyon to Portage Creek, Chulitna Pass, and the Alaska Railroad, with a lodge at Otter Lake (Bedard 1984). Realization of these plans would complement the proposed project recreation plan and would increase the number of people using the Susitna area for recreation.

The demand for recreation-home lots within the region has been analyzed by the ADNR. They have projected a demand for 29,000 acres of new lots by the year 1990 within the Matanuska-Susitna-Beluga study area, which includes the project area. This is an exceptionally high demand level relative to resident population figures and reflects the region's popularity for recreation-homesites with Alaskans from other areas. The lands selected by Native corporations near the Susitna River meet all of the aesthetic criteria for prime lots according to the study (ADNR 1982b). However, without improved road access and considering the land's building limitations, the property was given a rating of moderate capability, and sales are unlikely to be significant. Presently, the majority of homesite parcels being sold in the project study area are in the Indian River and Chulitna Butte areas located approximately 12 miles northwest of the Devil Canyon damsite.

The existing use of private lodge owners in the area are small and are not expected to increase substantially without the Project.

(b) BLM Plans (**)

The BLM manages substantial holdings, generally north of the Susitna River and along the Denali Highway (shown in Figure E.7.2.1). The BLM plans for this area, called the Denali Planning Block, reflect its goal of increasing recreational use. Plans include road improvements to the Denali Highway and additional roadside improvements such as new campgrounds, picnic areas, and pull-outs. The BLM is projecting an increase of the average annual daily traffic (AADT) along the highway to 130 in the year 2000; the existing AADT is 50 cars.

None of BLM's recreation objectives stated in their 1980 Land Use Plan for Southcentral Alaska (BLM 1980) have been

substantially modified. However, difficulties imposed by limited budgets continue to delay implementation. Proposed BLM recreation plans within the project area and their status are as follows:

- Wayside camping areas (2-3 within the project area between Cantwell and the Susitna Bridge) on the Denali Highway are still planned, but no implementation is expected within three years.

- Brushkana Campground is scheduled for maintenance only, with no plans for immediate rehabilitation.

- The Maclaren River water trail would consist of a brochure, trailhead and boat launch/access. It is scheduled within the next six years.

- Interpretive signs along the Denali Highway are still planned. Interpretive signs in wayside camping areas would be implemented as the campgrounds are installed.

- Studies of outdoor recreation vehicle (ORV) use are to continue, but evaluation of the work at the Tangle Lakes ORV area needs more field input before it is completed. There are no immediate plans to establish an ORV area within the project area.

BLM lands have recently been opened to mineral exploration and mining entry which would attract additional people to the area. If significant deposits are discovered, access to the area would increase, which would greatly affect future recreational patterns.

3 - PROJECT IMPACTS ON EXISTING RECREATION (**)

The Susitna Project would have both direct and indirect impacts on existing recreational patterns. Direct impacts are those which result from physical changes to the existing recreation settings. Impacts to these settings might either increase or decrease the desirability and probability of continued recreational use. They may also make new types of activity possible. Indirect impacts are those resulting from changes in recreational use of the project area, including increased demand due to construction workers and the general public. Section 3.1 deals with direct impacts and discusses each major project development separately. Construction and operational impacts are also identified in each case.

3.1 - Direct Impacts of Project Features (**)

Construction and operation of the Project would impact recreational resources by increasing activity, altering portions of the Susitna River and adjacent land, and restricting or increasing access. These activities would result in the following types of impacts: (1) changes in the nature of the recreation experience, (2) changes in hunting opportunities, (3) changes in fishing opportunities, (4) and changes in other recreation opportunities.

Changes in recreation opportunities within the project area are likely to occur without the Project because of the on-going process of land conveyance to Native corporations. The Native landowners have stated that access to their lands will be limited in the future. The Native corporations have selected much of the northwest and southern portions of the study area.

Increased activity in the area would affect fishing and hunting activities by disturbing fish and wildlife and would change the perceived image of the area from a pristine setting to a more disturbed and developed setting. Increased activity from project construction and operation would include the presence of workers and their families, the transportation of personnel and materials to and from the site, and the disruption caused by operating heavy equipment in the area. The effects of such activities on fish and wildlife are discussed in more detail in Exhibit E, Chapter 3.

The impoundments would alter the river, changing its image from a wild, river with challenging rapids to large reservoirs. The impoundments would change the river's recreational use from a floatable river to a reservoir requiring power for access.

Improved access would benefit recreation by increasing hunting, fishing, hiking, camping, and other recreation opportunities of the project recreation area. The anticipated increase in use from improved

access and the resulting potential adverse impacts on resources are discussed in Section 3.2 under indirect impacts.

Direct impacts that are unmitigatable are the loss of the remote character in portions of the project area and inundation of Class IV whitewater rapids at Vee Canyon and the Class VI whitewater rapids at Devil Canyon.

Detailed discussions of resource impacts are in Exhibit E in Chapter 3, Fish, Wildlife and Botanical Resources, and Chapter 8, Aesthetic Resources.

3.1.1 - Watana Stage I Development (**)

(a) Construction (**)

Development of the Watana Stage I would require construction of two cofferdams and diversion of the river. It would include clearing forests, dredging the river, excavating borrow sites for damfill material, and blasting and other heavy construction activities at the damsite. The reservoir area would be cleared of trees prior to inundation. It is anticipated that it would take one year to fill the Stage I impoundment area.

The direct impacts of construction activities extend beyond the areas being physically disturbed. A substantial change in image would result as the remote character of the area changes to one of heavy construction. This is an unavoidable impact of development and can only be partially mitigated by careful management of remaining lands.

During construction of Watana Stage I, the project work areas would be closed to the public. Thus, the small amount of public hunting and fishing that occurs in the construction area would be displaced. Boaters travelling down the Susitna would have to portage around the construction area. Without the Project, however, these activities would most likely be restricted by the Native landowners.

It is likely that all recreational access by project personnel to surrounding areas would be minimized during construction by an air/bus worker transportation policy and by limited free time while on-site. Potential impacts of project workers is discussed in Section 3.2.2 under Indirect Impacts.

The impoundment would inundate moose, brown and black bear habitat. Winter browse and carrying capacity for between

300 and 600 moose, habitat for approximately 30 to 50 black bear, and spring forage for brown bear would be eliminated (Harza-Ebasco 1985a). While no direct correlation can be drawn between these losses and a reduction of hunter days, it can be expected that, in the long term, hunter success rates would decline due to decreases in the numbers of big game and increased competition among hunters.

Dall sheep and caribou populations are not expected to be affected by construction of project facilities. Impacts on Dall sheep using the Jay Creek mineral lick are not expected to be significant since peak sheep use of the lick is in May and June, not during the August and September sheep hunting seasons (ADF&G 1984). Specific impacts and mitigation for these losses are discussed in Exhibit E, Chapter 3. In addition, the 21,000-acre reservoir would inundate approximately 6 structures, 3 of which are used seasonally by hunters, fishermen, and other recreationists who arrive by boat or plane.

Impacts on fishing would result from creation of the reservoirs (see Exhibit E, Chapter 3). Inundation of the lower reaches of clear-water tributaries in the impoundment zone would eliminate existing grayling habitat. Affected tributaries include Deadman, Watana, Kosina, and Jay Creeks. Salmon and rainbow trout would not be affected by the impoundment since their natural range ends at Devil Canyon rapids, which block upstream salmon and trout movements.

The existing level of boating activity both downstream from Devil Canyon to Talkeetna and upstream from the Watana Dam would be largely unaffected during construction until vegetation clearing, gravel removal, and burning begin. When Watana reservoir filling begins, water levels downstream would decrease during summer recreation months. Based on river navigation studies completed in 1985 (R&M 1985), this reduction is not expected to appreciably affect river boating downstream of the dams.

The Stage I Watana Dam and Reservoir would change existing boating patterns on the stretch of the Susitna River within the reservoir boundary. The reservoir would inundate 40 miles of the 125 mile route along the Susitna River between the Denali Highway and the Stephan Lake Portage. During much of the year, the Vee Canyon rapids would be inundated (see following discussion under operations).

The inundated portion of the Susitna River (40 miles) would change in character from a remote and undisturbed river environment with occasional rapids to a flatwater condition.

With a loss of current, boaters would need manual or mechanical propulsion to navigate the reservoir. Devil Canyon rapids, located downstream (see description in Section 2.2.2), would remain runnable through most of the Stage I construction period since flows would be similar to those under without-project conditions. The rapids would remain runnable until filling of the Stage I reservoir begins sometime in 1998. Boaters desiring to kayak these rapids during the construction period would either need to fly in and hike to the river below the damsite or, if floating the river, be allowed to portage the dam on project property or obtain portage through private lands.

(b) Operations (**)

After Stage I construction, portions of the land areas associated with the Watana Stage I Dam would be utilized for operation facilities and a permanent townsite. Land not required for operation would be rehabilitated. Rehabilitated areas may return to use as recreational areas. Operations areas may be permanently unavailable for public recreation except for the temporary visitor center proposed at the Watana damsite. Guided tours of the project facilities would be provided. Although the presence of operations workers and their families would continue to impact recreational resources, the recreational facilities proposed for the permanent village would minimize recreational use of the area by workers. There would be an estimated 87 workers and their families at the permanent village. Additional information on recreation of project workers is discussed in Section 5.4.6.

Once operation of the Watana Stage I begins, the public would gain access to the area via the Denali Highway to Watana Dam access road. This would increase recreational opportunities for residents of the region. The expected increase in use and resulting impacts are discussed in Section 3.2 under Indirect Impacts.

During Stage I operation, the reservoir drawdown would reach its low point in April and May. The reservoir would fill from June through August, reaching its highest point in early September. Lake shorelines exposed during low water would have large mudflats, steep banks, tree stumps, and slumping soils. This situation limits the development of the reservoir as a major recreational opportunity. A lack of fish population, silty waters, and cold water temperatures in the reservoir reinforce this limitation. Moreover, safety would also be a concern for reservoir

boaters since the reservoir's size may lead to hazardous boating conditions during periods of high wind.

Vee Canyon, a notable natural feature located 38 miles upstream of the dam, would have its Class III rapids (international whitewater classification) inundated seasonally by the Stage I reservoir. During typical or average water years, the canyon rapids, located approximately at el. 1,950 feet, would be exposed from January through June, approximately 1 month longer than dryer years. As a result, Vee Canyon rapids may still be runnable during Stage I by boaters in June.

The effects of project flow on boating downstream of Devil Canyon are discussed in Exhibit E, Chapter 2. After construction of the Stage I dam, flows would be too low except during high flow years to safely run the Devil Canyon rapids. Construction of Devil Canyon Dam would begin during Stage I operation, which would also limit access to the rapids.

3.1.2 - Devil Canyon Stage II Development (**)

(a) Construction (**)

Construction of Devil Canyon Dam and related features would require cofferdams, diversion of the river, land clearing, blasting, and a major concrete mix plant at the damsite.

The Devil Canyon reservoir, unlike Watana, would be relatively narrow, and largely confined within the canyon walls, particularly in the downstream reaches. Devil Canyon would require less clearing of vegetation than the Watana reservoir. The major impacts resulting from its creation would be the loss of 11 miles of Class VI river rapids. An additional 32 miles of river canyon upstream from Devil Canyon would also be inundated.

With the exception of temporary impacts on water quality during cofferdam construction, no water quality-related recreational impacts are foreseen. Filling would take about two months and, depending on season and rainfall, would not appreciably affect flow rates.

No impacts of the Devil Canyon Dam construction are anticipated on downstream fishing and boating activity. The Devil Canyon Reservoir would inundate the lower reaches of clearwater tributaries which would eliminate existing grayling habitat. Affected tributaries include Tsusena, Devil, Fog, Chinook and Cheechako Creeks.

The primary impacts of Devil Canyon construction on adjacent land-based recreation would be the conversion of a remote area to a construction area. The impoundment area currently supports numerous game animals whose habitat would be eliminated (see Watana Stage I construction impacts for specific impacts on wildlife habitat). In addition, construction noise and dust and the disruption caused by heavy equipment operations, along with the presence of large numbers of construction workers, would disturb wildlife habitats and recreation environment.

(b) Operations (**)

Operation of Devil Canyon would cause only minor changes in flows from Watana operation flows below the dam, and it is not expected to further affect river recreation.

The Devil Canyon reservoir may be more attractive for recreation than the Watana reservoir, because of the smaller drawdowns and steeper sides which would result in a minimum amount of mudflats. The presently proposed operating schedule would lower the reservoir on the average less than 10 vertical feet. During average water years this would occur in July and August. The maximum drawdown would be approximately 50 feet, which would occur between August and October of extremely dry years (see Exhibit E, Chapter 2).

After construction, the temporary village and camp would be closed and resident operators would be located at Watana Village, thus eliminating the continued impacts of the work force at the Devil Canyon site.

3.1.3 - Watana Stage III Development (***)

(a) Construction (***)

Direct impacts of Watana Stage III construction on fishing, hunting, and boating have been discussed previously for Stage I construction. The Stage III impoundment would inundate a total of 48 miles, or 8 miles in addition to the 40 miles discussed under Stage I. Additional tributary creeks would also be inundated, thereby affecting fishing. These include Oshetna and Goose Creeks.

An additional impact of Stage III would be the reduced access by the closing of Watana damsite area to the public. The closed area would include the Watana access road from the Devil Canyon access road intersection to the damsite.

This would curtail use of the temporary visitor center that was constructed and opened after Stage I construction. It is expected that the visitor center would remain open on a permit basis to interested groups. Boat launches developed above and below the damsite after Stage I construction would also be closed for the Stage III construction duration, since the haul roads and borrow areas they use would be needed for construction.

Stage III construction would consist of a peak work force and dependents population of 2,007 in the year 2009. These workers and dependents would reside in the camps and village developed for Stage I construction. Since the access roads would be open to the public after Stage I construction, the present assumption is that no Applicant-provided transportation program would exist during Stages II or III to limit workers from using personal vehicles. As a result, competition with the public for use of recreation sites developed along the access roads during Stages I and II may exist. This may cause overcrowding of some facilities, such as trailheads. Pressure on area fishing streams along the access roads is also likely to increase as a result of workers driving out after work or on their day off.

Without a transportation program limiting personal vehicle use, competition for recreation sites off-site may increase as well. This is most likely to affect recreation sites out of the camp/village day-use zone such as the Tangle and Paxson Lakes campgrounds located off the Denali Highway approximately 150 miles from the Watana damsite.

(b) Operations (***)

After construction, the Watana reservoir would be raised to el. 2,185 from el. 2,000. This is estimated to occur over an approximately 5-year period starting in the year 2011. Raising the reservoir to this elevation would permanently inundate Vee Canyon rapids as well as the Goose Creek and Oshetna River tributary mouths used for grayling fishing by people floating or flying into the area.

Reservoir vertical drawdown, while less than in Stage I, would expose more mudflats due to the raised water elevation inundating flatter slopes near the crest of the canyon. These mudflats would be particularly extensive in the Watana Creek drainage and would impede access to and from the reservoir until they are inundated in September each year.

After construction, the public would be provided access across the dam to a permanent visitor center overlooking the damsite.

3.1.4 - Watana Access Road (*)

(a) Construction (*)

Access improvements to be made for the Watana dam construction include upgrading 21.3 miles of the existing Denali Highway from Cantwell to the access road intersection, and 41.6 miles of new road from the Denali Highway to the damsite.

During Stage I construction, approximately 96 large construction vehicle trips per day and 10 bus trips for construction workers per day are anticipated on the new road. An additional 96 trips are anticipated from resident construction workers and dependent excursions during the work week. AADT on the project access road is projected to be 202 vehicle trips during Stage I. During Stage II there would be an estimated 161 AADT, including 24 construction vehicle trips and 137 worker and dependent trips. During Stage III there would be an estimated 235 AADT, including 70 construction vehicle trips and 165 worker and dependent trips (see Exhibit E, Chapter 3, Section 4.3.3).

The new access road would provide vehicular access into a large area previously open only to off-road vehicles and hikers. The entire route would be open year-round, allowing access along the Denali Highway segment which is currently closed each winter by snow.

These road improvements and access into new areas would impact the existing recreational patterns and recreational resources in several ways. First, winter snowplowing along the Denali Highway would cause an increase in winter recreationists using the area for cross-country skiing, snowmobiling, dogsledding, and other winter sports. The Denali Highway improvements may also make the areas adjacent to the highway more attractive to recreationists during the summer months. The increased Denali Highway traffic (276 AADT during peak years) of commuters, truck drivers, and new local residents would introduce other potential users to the recreational opportunities adjacent to the highway. Increased recreational activity can be expected to follow existing recreational patterns and would take the form of increased roadside camping in old gravel pits along the road, as well as hunting, fishing, and hiking.

The new Watana access road passes through an area which presently has a very low level of recreational activity. The effects of increased recreational activity resulting from the access road is discussed in Section 3.2. Construction activities would not directly affect any major recreation, since the hunting, fishing or hiking that might have occurred would easily be absorbed by the surrounding area. A more important concern is the alignment chosen for the new road. The final road location would avoid specific areas which are known to be sensitive environments and which would experience undesirable pressure from recreationists if made too easily accessible. These areas are discussed in more detail in Chapter 3 of Exhibit E.

The final access road alignment would also avoid disrupting areas which are known to be popular recreation settings and those which are identified in this plan as important potential recreation settings. For example, Tsusena, Butte, Deadman, and Big lakes include several existing recreational structures.

The present proposed alignment has been adjusted through consultation so that no known recreational settings would be negatively impacted by the access road.

(b) Operations (*)

The Watana access road would not be open to the public during Stage I construction. When work is completed on Watana in 1999, a decision would then be made regarding public access. Presently, it is assumed that the road would be officially opened for public use in the spring of the year 2000.

Once the Watana road has been constructed and project personnel begin traveling back and forth, the road would attract the general public and off-duty construction workers and families. Unless some kind of control point and/or physical barrier are placed at the Denali/Watana road junction to limit access, recreational activities such as roadside camping, hunting, and fishing along Denali Highway would likely occur prior to the official year 2000 opening. While these activities would not be inconsistent with existing recreational patterns, if overused, they could result in degradation of recreational resources such as fishing streams, wildlife, and their habitats.

3.1.5 - Devil Canyon Access Road (*)

(a) Construction (*)

This 37-mile road connecting the Devil Canyon damsite to the Watana damsite would be built beginning in 1995. The road traverses steeper terrain than the Watana access road. The selected road corridor would affect the private recreation lodge at High Lake. Passing within one mile of the lodge, the new road would improve access to the lodge, but also change the character of the facility from a remote fly-in facility to an auto-oriented facility. Construction would also have an important impact on game which is a prime visitor attraction for the lodge. No other recreational activities presently occur in this area.

Several borrow sites would be required to construct this road. Impacts that these excavations and the road path itself would have on the existing recreational resources are primarily visual and are discussed in Chapter 8, Aesthetics.

(b) Operations (*)

After Devil Canyon dam construction is complete in the year 2005, the Devil Canyon road would be opened to the public. Operations personnel would also travel to the Devil Canyon dam from the permanent townsite at Watana. Devil Canyon dam is expected to be more of a tourist attraction than Watana because of its concrete-arch design and impressive setting. The road would function as an important recreational facility in that regard. Impacts of the public in this road corridor are similar to those in the Watana road; i.e., increased use of a previously remote area. Portions of the Devil Canyon access road corridor are adjacent to lands selected for Native ownership. These lands may be closed to public use by the Natives. The effects of increased access are considered indirect impacts and are discussed in greater detail in Section 3.2.

3.1.6 - Gold Creek - Devil Canyon Railroad (*)

(a) Construction (*)

Construction of a railroad spur to the Devil Canyon damsite would have little effect on existing recreational patterns since the areas which it would cross are largely unused. As with the case of road construction, care must be taken not to degrade the recreational setting. The major sources of

impact include cut-and-fill operations, vegetation clearing, borrow excavations, and stream crossings.

(b) Operations (*)

After construction at the Devil Canyon damsite is completed, the rail spur would be used for occasional supply transportation to the damsite.

If access similar to the existing whistle stops along the Alaska Railroad were to be provided, a substantial number of recreationists could be expected to utilize the railspur. The existing state rail line to which the project railroad would be linked is currently used by recreationists to gain access to Denali State Park and surrounding lands to camp, hike, fish, hunt, and boat. Rail access to the Devil Canyon damsite would take two hours less time than would be required by car.

3.1.7 - Project Transmission Lines (**)

(a) Project Area (*)

The east-west connection from the two powerhouses to the existing Intertie transmission line would be constructed near the Devil Canyon access road. Construction and maintenance access would not be continuous along the transmission line. Short construction trails would connect towers to the Devil Canyon road.

The presence of 100-foot tall towers and cleared corridors would reduce the area's appeal as a remote area. The impacts of the transmission corridors on existing recreation patterns are primarily visual and are discussed in Chapter 8 of Exhibit E.

(b) Intertie and North-South Stubs (**)

Project transmission lines paralleling the existing Intertie transmission line between Willow and Healy are not anticipated to disrupt existing recreational patterns during construction or operation. The transmission lines would visually impact recreationists in certain locations along the Parks Highway and from boats on the Nenana River near Denali National Park. The north transmission line stub from Healy to Fairbanks would be similar in the impacts on existing recreation.

The south stub (Willow to Anchorage) transmission line would also have few impacts on existing recreation patterns. It

would, however, cross the proposed Willow State Recreation Area and the historic Iditarod Trail. During detailed design, ADNR personnel would be consulted to refine tower locations through the Willow Recreation Area to avoid impacts to campsites and other developed facilities. Proper setbacks would be maintained for the Iditarod Trail crossing.

Positive impacts would also result, since cleared transmission corridors are commonly used by hunters and hikers. To the extent that these activities take place, recreation would be positively impacted.

3.2 - Project Recreational Demand Assessment

(Moved to Appendix E4.7)

3.2.1 - Increased Access and Use (***)

Indirect impacts would result from the Project as access to and recreational use of the study area increase. Recreational use of the study area would begin rising once the project access roads are opened to the public. Once the Stage I reservoir is filled in 1998, obstacles to boat access such as the Vee Canyon rapids would be inundated, which would facilitate boat access from the Denali Highway. Currently, most boaters travel only to the Tyone River or to Goose Creek above Vee Canyon, with the exception of the occasional whitewater boaters that continue on through the Vee Canyon rapids. With completion of the Devil Canyon - Stage II in the year 2005, an additional 37 miles of access road would be opened to the public. Stage III construction would not substantially increase access over Stages I and II.

The recreation demand analysis presented in Appendix E4.7 estimates that with the Project there would be approximately 43,000 to 50,000 recreation user days each year by the year 2000 (see Table 7.3.1). Without construction of the Project, recreation use in the study area would be an estimated 12,500 recreation user days each year by the year 2000. Thus the Project would result in an additional 30,500 to 37,500 user days each year, representing a 245 to 300 percent increase over without-project conditions. Most of the expected increase in use would occur with the opening of the Denali Highway to Watana Dam access road. Opening of the Watana to Devil Canyon access road and visitor center would further increase access and thus recreational use. The opening of the permanent Watana damsite visitor center after completion of Stage III would account for a relatively small portion of the expected increase in visitors.

Another factor that would influence future recreational activities in the project area is the conveyance of lands in the project area to Native corporations. It is expected that once conveyed, these lands would be either closed to public use, or subject to acquisition of entry permits from the Native corporations, with or without the Susitna Project.

3.2.2 - Impacts of Increased Use (***)

Indirect project impacts resulting from the increased use would consist of two types, one being the change in the general character and image of the study area and the second being the impacts from fishing, hunting, and other recreation activities.

(a) Image of the Study Area (***)

The influx of hunters, fishermen, hikers, campers and sightseers would change the character and image of the study area from a primitive, remote area to one of a more accessible, well-used area, especially near the access roads and damsites. Entry patterns near project facilities would change from primarily fly-in trips to trips dominated by road and vehicular access. The Project would enhance the experience for the user group that accesses fishing and hunting sites via roads. The experience would be adversely affected for the user group that desires a remote fly-in experience. The enhancement of opportunities to users by opening a new area to vehicular access would be greater in magnitude than the adverse impact of the Project to the few existing remote fly-in users.

(b) Fishing Impacts (***)

The increased fishing activity in the study area resulting from improved access would increase pressure on some existing fish populations. Fishing pressure is currently very light in the project area due to its remote location.

Fishing use is expected to increase from 1,500 user days in 1980 to 4,800-5,200 user days with the Project by the year 2000, as compared to an estimated 2,500 user days in the year 2000 without the Project. After Stage I completion, fishing pressure on Deadman and Brushkana Creeks would increase substantially since the Watana access road parallels portions of these streams. The trophy-sized grayling found in Deadman Creek are likely to be depleted in the absence of more stringent fishing regulations. The access road would also provide easier access to and increase fishing pressure in area lakes, such as Big and Deadman Lakes. These lakes are currently accessed by plane. After

Stage II completion, Tsusena, Jack Long, and Portage Creeks would be accessible from the Watana to Devil Canyon access road or the rail spur. Opening up access to these streams would increase fishing pressure on the salmon and arctic grayling populations found in Jack Long and Portage Creeks. The primary sport fish in Tsusena Creek are Arctic grayling and Dolly Varden.

Backcountry trails proposed in the recreation plan (Section 5.4) are not expected to create substantial fishing pressure on area streams and lakes because of the dispersed use expected. Access across the Watana Dam could increase fishing use in the Fog Lakes area, depending on the plans of Native landowners. The Project is not expected to substantially increase access to fishing locations downstream from Devil Canyon Dam. Primary access would continue to be by boat to tributary mouths.

Streams near the construction camps and permanent village would receive increased fishing pressure from construction workers and their families. During Stages I and III construction (1991 to 1999, and 2006 to 2012), streams such as Deadman Creek could be overfished unless additional management restrictions are instituted. During Stage II construction (1996 to 2005), streams near the Devil Canyon camp and village, such as Portage and Jack Long Creeks, may be over fished. Access to and fishing of these streams, however, is likely to be subject to Native landowner approval. During Stages II and III (1996 to 2012) workers may have access to private vehicles and therefore are likely to fish at other locations near the access road such as Deadman Lake and Brushkana Creek.

(c) Hunting Impacts (***)

Indirect impacts from project-related access would have substantial effects on hunting. Road access would increase hunting in an area that previously was accessible, for the most part, only by air. Big game hunting is expected to increase from 800 user days in 1980 to 2,200 to 2,400 user days in the year 2000. Without-project hunting projections are 1,300 user days for 1980 (Table E.7.3.1). This would substantially increase hunting pressure on unpermitted big game species such as moose and bear. Harvest of Dall sheep and caribou are strictly controlled in the study area and thus increased hunting pressure is not expected. In the long term, bear and moose populations are likely to be reduced by overharvesting, if not actively regulated. This is particularly true for brown bear, since the proposed access road passes through prime

brown bear habitat. Unregulated ATV use off the access road could result in considerable impact on game populations near the road. Access into the project area is likely to disperse existing heavy use that occurs along the Denali Highway, thereby reducing crowding and related use impacts that now occur in areas such as Butte Lake.

The project reservoirs are also expected to increase access for hunting, particularly in drainages above Watana Dam such as Watana and Kosina Creeks. When public access to the reservoir is provided at the dam, hunting via boat is expected to increase in the project area. Float planes may use the reservoirs to gain access to adjacent areas for hunting. Impacts on Dall sheep at the Jay Creek mineral lick from hunters using the reservoir are not expected to be significant, since peak sheep use of the mineral lick is in May and June while the hunting season for sheep is in August and September, and since the numbers of sheep taken is regulated by individual permit.

During Stage I, most project workers would not have access to private vehicles for hunting because of the worker transportation plan currently proposed. Firearms would not be allowed within the project boundaries, including the camps. Consequently, hunting by project workers would be limited to those who return to the area with firearms during their out rotation cycle. During Stages II and III, workers may have private vehicles and, thus, would be more likely to hunt in the area, although the prohibition of firearms would still limit hunting to those who can obtain firearms off-site.

(d) Other Activities (***)

Access provided by the Project may also increase trapping of the beaver population in the Deadman Creek and Deadman Lakes area and the fox population that inhabits the area near the proposed access road. However, due to low beaver prices, increases in harvest of beaver may not be extensive. Trapping which does occur would likely result from recreational trapping. The remoteness of the region and general winter conditions that prevail in the area, however, would probably discourage much use by the weekend trapper. Trapping of fox may not be substantially increased since populations are very low and few fox are trapped presently (Harza-Ebasco 1985a). Access related to the project area may be beneficial to existing trappers as the project's access roads would allow easier access to existing traplines.

Non-consumptive activities expected to occur as a result of the Project, such as camping, hiking, and sightseeing, would result in minor disruptions to wildlife populations. Disturbances would be greatest within the "recreation development zone" (see Section 5.1) along the access road and near the damsites. Over time, it is expected that wildlife would avoid these areas. Since no recreation facilities are proposed near critical habitats, such as eagle nests, disturbances to wildlife from non-consumptive activities would not have significant adverse effects. Collisions between wildlife and the increased traffic along the access road are not expected to be a significant problem (see Exhibit E, Chapter 4.3.3).

During Stage I, workers would be limited to areas within walking distance, since private vehicles would not be allowed. Deadman Creek would probably be the most frequent destination for workers leaving the camp for recreation. During Stages II and III, workers would have access to vehicles and may choose to leave the camps during their free time. This may result in minor disturbances to existing resources, especially along the access road.

4 - FACTORS INFLUENCING THE RECREATION PLAN (**)

Development of the Project's recreation plan was influenced by the following major considerations:

- o Characteristics of project design and construction,
- o Characteristics of the study area,
- o Recreational use patterns and demand,
- o Land ownership status,
- o Management objectives of interested agencies and Native groups,
- o Public interest,
- o Financial obligation and responsibility of the Applicant, and
- o Mitigating adverse impacts of recreational use.

Section 4.1 lists the key implications of project design and operation that would influence recreational use of the project area. The primary aspects of the study area and the region's recreation trends that influenced development of the plan are also summarized below (Sections 4.2 and 4.3). Section 2 provides a more detailed discussion of the project setting and recreation trends. Sections 4.4 through 4.7 describe the land ownership status in the study area, objectives and policies of the landowners and resource management agencies, public interest in the recreation plan and the Applicant's financial obligations and responsibility for providing project-related recreation.

Since increased use of the project area for recreation would impact fish and wildlife resources, minimizing these impacts was a major consideration during plan development. This consideration overlaps with some of the agency policies and objectives listed under Section 4.5. The approach used for mitigating impacts of the recreation plan is described Section 4.6.

4.1 - Characteristics of the Project Design and Operation (***)

The Watana and Devil Canyon Reservoirs would change the fast-flowing Susitna River to a flatwater condition between Vee Canyon and Devil Canyon.

Watana reservoir would not be very attractive for development of shoreline facilities because of the large drawdowns expected (over 125 feet during average years of Stages I and II operation). The drawdowns would create mudflats which would be unattractive and difficult to cross. Drawdowns at Devil Canyon would be 10 feet during July of average water years. Water levels in both reservoirs would be relatively high during the hunting season in September, which is expected to be the highest use period on the reservoirs. Where canyon sides are steep, unstable banks would be a greater problem than drawdown. Large bank slumps, landslides, and scales would be unattractive and potentially dangerous. Both reservoirs would be cold

and silty. Watana, in particular, would be large enough that wind and choppy conditions could constitute potential hazards for small boat recreationists.

Both Watana and Devil Canyon dams would have an inherent curiosity value which would attract one-time visitors. Watana, in particular, would not be regarded as a major, sustained attraction for repeat visitors. Devil Canyon Dam, the high-level canyon bridge, and the railroad spur would have more inherent long-term potential as a recreation attraction.

The Denali Highway to Watana Dam access road would be open to the public following completion of Stage I construction. The dead-end nature of the access road would discourage casual drive-through tourism and sightseeing. Tourists would, however, be attracted to both dams and powerhouse facilities. Therefore, planning includes considerations for public observation of operations and interpretive information.

4.2 - Characteristics of the Study Area (***)

The Susitna Project area, compared with many other places in the United States, is an outstanding recreation resource. However, in comparison with other resources in Alaska, most of the project area is not exceptional. Recreation facilities in the study area would not constitute a major national or international tourist attraction such as Denali National Park. There are many lakes and streams in the project area which would be used for recreation if road access were provided and which would most likely be more attractive for recreation than the proposed reservoirs.

The image of the project area would continue to be one of a relatively distant location from population centers since road access to the dams would be over five hours one way from both Fairbanks and Anchorage. Travelling this distance for weekend recreation trips, however, is not uncommon for Alaska residents (See Section 2.1.5). Climate, distance from population centers, and sunlight-shortened days would limit the area to predominantly summer recreation (mid-June to mid-September).

4.3 - Recreation Use Patterns and Demand (***)

As discussed in Section 2, recreation trends in Alaska have unique characteristics due to the size of the state, the sparse population, the lack of roads, and long distances between facilities. The large areas with untouched wilderness conditions and abundant wildlife have attracted new state residents who enjoy the primitive recreational experience.

Future recreational use in the study area with the Project was estimated to be 43,000 to 50,000 recreation users annually by the year

2000 (Table E.7.3.1). Individual activity levels were projected to be 2,200 to 2,400 hunting user days; 4,800 to 5,200 fishing days; 12,000 to 14,000 camping days; 12,000 to 14,000 hiking days; and 350 cross-country skiing days. The with-project demand estimates were based on factors listed in Sections 4.1 and 4.2, recreation trends discussed in Section 2, and additional assumptions listed in Appendix E4.7. Since the Project would open access to the study area and constitute an attraction in itself, the with-project demand projections ensured that the plan would accommodate the increased use.

Demand estimates are based on the assumption that the recreation facilities in the study area and the Project would primarily be an in-state attraction and would not be a major national or international tourist attraction such as Denali National Park. However, if the state and private companies actively promote the Project for tourism and include it on tour circuits, then use could substantially increase over present estimates.

4.4 - Agency, Landowner and Applicant Plans and Policies (***)

Existing and future policies of the Applicant, the study area landowners, and the government agencies involved with recreation and resource management were important considerations in developing the recreation plan. Ultimately over 250,000 acres within the project area would be in private ownership. The following list provides a summary of assumptions on future policies specific to the study area that guided development of the plan. This list is followed by a more comprehensive list of the individual agencies' and landowner goals and objectives regarding resource protection and recreation development in the region.

4.4.1 - Assumptions Regarding Future Management Policies (***)

The Applicant would allow public use of the project access roads as follows:

- The Denali Highway to Watana Dam access road would be open after completion of Watana Stage I (1999).
- The Watana Dam to Devil Canyon Dam access road would be open after completion of Devil Canyon Dam (2005).
- The Watana damsite would be closed to the public during Stage III construction (2006-2012) and open along with access across the dam after completion (2012).

The Applicant would allow use of the Watana Stage I reservoir in 1996 after Stage I completion and the Devil Canyon Stage II reservoir after Stage II completion in the year 2005. During Stage III construction (2006-2012), the reservoir would be open

to the public except for the damsite and immediate vicinity. In addition, the Applicant would not propose facilities or provide money for development of facilities on private land, unless free public access and use is assured.

Native corporations would pursue a course of paced development of their lands, including selected mineral development, recreation home development, and commercial recreational development. These uses are assumed to be complementary to this recreation plan and are not anticipated to cause conflicts.

Existing private lodges would continue to operate in a manner and scale similar to current operations. While some changes undoubtedly would occur, they would not be of sufficient scale to substantially influence demand projections.

Harvest limits of fish and wildlife resources within the study area would not be controlled by the Applicant, but would continue to be regulated by the ADF&G Boards of Game and Fish. Access would be by consent of landowners. ADF&G may modify regulations to protect resources within the project area appropriate to the general levels of projected demand.

Post-construction public use of the railroad for recreational use is likely, but is contingent on plans of the Alaska Railroad.

The Denali Highway would be upgraded as currently proposed by the Alaska Department of Transportation (See Section 4.4.2(g)). The road would be kept open in the winter from the intersection with the Watana Dam access road west to the Parks Highway at Cantwell.

4.4.2 - Management Objectives (**)

(5.1 in 1983 License Application)

In addition to the Applicant a number of federal and state agencies and several Native corporations have interests in this plan. Their stated goals and objectives for recreation development and resource protection are presented below.

(a) The Applicant (**)

The following is a list of the Applicant's general recreation objectives:

- The plan should attempt to meet the demands of project-induced recreation with facilities that are appropriate to the project area.

- The plan should respond to the identified site opportunities and constraints.

- The plan should make use of roads, materials and facilities developed during construction or already existing. This would require coordination with the construction plan and schedule. Such construction roads and facilities should, wherever possible, be designed to conform with recreation requirements.

- The plan should be compatible with acceptable public safety and environmental health requirements.

- Recreation should be designed and operated in such a manner so not to create unreasonable demands on construction or operation resources for the Project or other public services.

- An area-wide systems approach should be taken in programming recreational activities and facilities which complements existing regional facilities and provides a balance of recreational opportunity.

(b) Alaska Department of Natural Resources (**)

The following statewide goals are stated in ADNR's Alaska Outdoor Recreation Plan (1981):

- Provide for and enhance Alaska's outdoor recreation land base to meet the needs of present and future generations of Alaskans and visitors to the state.

- Establish state and local recreation programs and respond to a diversity of outdoor recreational needs as expressed through an assessment process and based on full public participation.

- Integrate outdoor recreational values and diversity of recreational opportunities and programs into coordinated interagency programs, community programs, and private sector developments.

- Promote and balance the development of outdoor recreational opportunities in proximity to, or within, urban and rural communities.

- Recognize and provide for the needs of special populations.

- o Strengthen the capabilities of public agencies to establish, operate and maintain outdoor recreation programs through technical and financial assistance programs.

- o Support the development and expansion of tourism in Alaska and its role in outdoor recreation.

- o Preserve, maintain, or enhance Alaska's scenic resources, environmental quality, natural areas and cultural and historic identity.

- o Foster the growth and development of a strong, central role of the state in meeting outdoor recreational needs through a system of park and recreational units and historic and recreational trails and waterways.

Discussions with ADNR staff have identified the following project-specific objectives:

- o Selected sites should be intrinsically suitable and the best sites available for recreation, not merely areas available by virtue of project development.

- o The Susitna Project recreation plan should become an integral, logical extension of an overall state recreational network.

- o Construction and operations costs would require contributions by the Applicant.

- o ADNR welcomes the provision of recreational opportunities in the state by private entities such as Native corporations.

The Susitna Area Plan is a comprehensive land use plan developed by the ADNR, the ADF&G, and the Matanuska-Susitna Borough for the southcentral region of Alaska (ADNR 1985). The 15.8 million acre southcentral region extends from the Cook Inlet north to Denali National Park and includes the entire project area. The Susitna Area Plan provided the regional goals concerning recreation. Listed below are portions of the Susitna Area Plan goals relevant to the project recreation plan:

(i) Recreation

Recreation Opportunities. Provide well-designed, maintained and conveniently located recreation facilities for Alaskans and out-of-state visitors by: 1) developing a state park system of recreation

areas, trails, historic parks, rivers and sites in close proximity to population centers and major travel routes; 2) providing multiple purpose recreation opportunities on land and water areas; 3) assisting communities to establish parks and trails within population centers; and 4) encouraging commercial development of recreation facilities and services where public recreation needs can most effectively be provided by private enterprise. In addition to developed recreation areas and multiple-use lands, the state will attempt to provide some minimally developed or undeveloped recreation opportunities if suitable areas are identified.

Resource Protection. Encourage long-term public appreciation of Alaska's natural and human history and perpetuation of Alaska's distinctive identity by: 1) protecting significant natural and cultural features, and 2) assisting other land managing agencies to perpetuate natural and historic features.

Economic Development. Increase recreation industry employment by: 1) rehabilitating and maintaining recreation facilities, 2) increasing the number of attractions through additions to the Alaska State Park system, and 3) developing cooperative interagency visitor information centers.

(ii) Management Guidelines

Public Use Cabins. The Department will develop administrative procedures for managing a state public use cabin program, set priorities for cabin sites, and seek a budget for construction and maintenance and for program management.

Private Recreational Facilities on Public Land. Lodges, tent camps, or other private facilities designed to be run as private, profit-making recreation facilities will be permitted or leased under certain conditions. Final approval of a permit or lease for the facility will be given only after consultation with ADF&G and the Division of Parks and Outdoor Recreation.

Promotion of Under-Utilized Areas. Promote use of under-utilized recreation areas to take pressure off overcrowded recreation areas.

Maximum Use of Sites. Achieve maximum use of recreation sites consistent with maintaining high quality recreation experiences, environmental quality, and safety.

(iii) Land Allocation Summary

Rivers or streams that provide public recreational opportunities generally will be protected through retention of publicly owned buffers extending at least 200 feet each side of the stream. On rivers where a larger buffer is desired to allow a wider variety of recreational opportunities, a publicly owned buffer of between 200 feet and 1/4 mile on each side of the stream is retained in public ownership. Rivers in this category include portions of the Upper Susitna and Tyone Rivers. Some rivers are deemed to have such exceptional recreational values that wider corridors are desired to protect these values. Rivers in this category are proposed for legislative or administrative designation to protect their recreational uses. There are seven rivers within the Susitna basin proposed for such designation along all or part of their length: Kroto/Moose Creek, Lake Creek, the Talachulitna River, Alexander Creek, Lower Yentna and Susitna Rivers, Sheep Creek, and the Talkeetna and Kashwitna Rivers.

Lakes with important public recreational values will be protected through retaining in public ownership at least 50 percent of the land within 500 feet of the lake, a significant portion of which should be suitable for recreational activities.

The Susitna Area Plan designates large areas to support dispersed recreation activities such as cross-country skiing, hiking, tent camping, snowmobiling, and dog mushing. This is done in part through retention in public ownership of the majority of state-owned land in the study area. The plan also designates land to support developed recreation facilities such as campgrounds and picnic areas at sites throughout the Susitna Basin. Additionally, the plan recommends purchase of land presently in private ownership in several areas where public recreation demand is particularly heavy.

To ensure continued opportunities for public use of trails, those recreation and historic trails of regional and statewide significance generally will be

protected through public ownership of trail corridors. Trails with statewide or regional significance; i.e. the Iditarod Trail, will be protected through publicly owned corridors of at least 50 feet each side of the centerline. Among the many trails identified and protected by the plan are those in a proposed trail system through the Talkeetna Mountains. This trail system would link many trails used for recreation and mining in the Talkeetna Mountains to trails in the Hatcher Pass area and to others in the west along the Susitna River.

In addition to protecting a system of trails in public ownership, the plan attempts to improve road access to a number of areas with potential for expanded public recreation. In very few instances do recreational benefits by themselves justify road construction. Therefore, the plan generally proposes roads that serve a variety of uses, including settlement.

(c) Alaska Department of Fish and Game (**)

(4.1.3 in 1983 License Application)

While ADF&G has not issued a specific formal statement of objectives regarding project-related recreation, discussions in consultation meetings have identified the following objectives:

- Protect the trophy-class grayling population in Deadman Creek from over-fishing;
- Protect the Nelchina caribou herd from highway traffic-related impact;
- Maintain important fishing resources downstream from Devil Canyon;
- Protect the back country from unregulated access along project access roads; and
- Regulate hunting and fishing activities of the construction work force.

(d) U.S. Bureau of Land Management (*)

(4.1.4 in 1983 License Application)

Statements of BLM objectives are found in the agency's BLM Land Use Plan for South-central Alaska: A Summary (1980). This plan acknowledges development of the Susitna Project and the access corridor from the Denali Highway which can serve to "...facilitate public access to the back country." Specific policy statements relevant to the project recreation plan include:

- Protect the shelter cabins built along the Cantwell-Valdez Creek Trail by the Alaska Road Commission during the 1920s. (Three are located near the junction of the project access road and the Denali Highway);
- Protect caribou migration routes from adverse effects of human activity;
- Create protective buffer strips around lakes and water bodies used by waterfowl;
- Protect the portions of the caribou range that have a strong lichen component from fire;
- Protect Dall sheep winter range and lambing areas from all activities not consistent with maintaining the population;
- Identify and protect salmon spawning areas; and
- Allow saddle- and pack-horse grazing in the Brushkana Creek-Denali Highway and the Susitna River-Denali Highway areas upon lease application and determination of carrying capacity to benefit local guides.

Two off-road vehicle (ORV) study areas are designated in the project vicinity, comprising most of the BLM land between the Susitna River and the Denali Highway. These areas are presently open to ORV use, as are all BLM lands in the area, except Tangle Lakes. The Clearwater Creek drainage has been closed by the State Board of Game to mechanized hunting. In addition, recent federal action has opened major portions of the Denali Planning Block to mineral exploration and mining entry.

(e) Cook Inlet Region Inc. (CIRI) and Village Corporations (**)

(4.1.5 in 1983 License Application)

Major portions of the Susitna Project area have been selected by CIRI under the Alaska Native Claims Settlement Act (ANCSA) of 1971. Portions of that area will be reconveyed to CIRI village corporations. When the process of reconveyance and patenting is complete, the village corporations will own surface estate to significant portions of the lands; CIRI will own subsurface estate to those lands and also surface and subsurface estate to the lands in their master selection which the villages did not select for themselves. These lands will be in private ownership, not public.

Discussions with the village corporations and CIRI have led to the following understanding of their objectives:

- o CIRI will defer to the village corporations regarding the development of recreational facilities;
- o Native corporations must find and develop economic uses of their lands, including recreational uses, to meet future tax liabilities;
- o Native corporations want to actively participate in the recreational planning, decision-making, and management process;
- o Native corporations do not necessarily want to lose landownership in order to provide public recreation;
- o Public use must be carefully managed to avoid over-use and environmental degradation;
- o Trespass must be regulated;
- o The state must assume liability responsiblity for any project-related recreational use of Native lands; and
- o The Native corporations would benefit from provision of technical recreational planning assistance subsidized by the Applicant.

The Native corporations have expressed a willingness to participate in a cooperative recreational planning process to assure provision of recreational opportunities while meeting Native objectives.

(f) Matanuska-Susitna Borough (*)

(4.1.6 in 1983 License Application)

The project area is located in the Talkeetna Mountains Special Use District of the Matanuska-Susitna Borough. As such, any development is subject to a permit from the borough.

In 1982, the borough also published a draft Trails System report designed to identify trails that should be preserved or established in the borough. None are identified in the immediate vicinity of the project area. The borough does not manage any recreation areas, but rather participates in joint planning with the ADNR. In some instances, they have provided lands and monies to the state for park development.

(g) Alaska Department of Transportation and Public Facilities (*)

(4.1.7 in 1983 License Application)

The Alaska Department of Transportation and Public Facilities (ADTPF) is currently proposing to upgrade the Denali Highway between the Richardson and the George Parks Highways. A need for improvements has been identified on the basis of a traveler survey, numerous interviews, and predicted future traffic. Upgrading 134 miles of roadway would correct roadway structure deterioration and substandard elements and would accommodate recreational use demand along the highway according to the Denali Highway Environmental Assessment (1981). Proposed project activities include minor road realignment and widening, paving and pavement repair, bridge and culvert replacement, and turnout and stream access improvements. No relocation was considered necessary in the Denali Highway Location Study Report (1981).

4.5 - Public Interest (***)

During earlier studies of recreational needs for the Susitna Project, the University of Alaska distributed a Concept Plan Survey to the public to solicit public input into the recreational planning process. Questionnaires pertaining to public preferences for activities and levels of development, as well as their perceptions of recreational potential in the project area, were mailed to potential users in Anchorage, Fairbanks, and other areas of the Railbelt. An abbreviated form was also used at public workshops to gain additional information regarding public interests and desires regarding

recreational development. The survey and its results were published in The Recreation Plan for the Susitna Hydroelectric Project (University of Alaska 1981). Early concept plans incorporated into these questionnaires do not reflect later engineering and schedule planning decisions and project modifications; however, those survey portions which identify public opportunity spectrum preferences continue to be valid.

Respondents to the survey were given a choice of five alternative recreation development approaches, ranging from minimal development to highly developed and managed. Results of 549 responses favored the minimal development end of the spectrum.

Other surveys not as specific to the Project as the one above, but still of interest and considered in the recreation planning process, included:

- Alaska Public Sector Survey (Clark 1981),
- Denali Highway ORV Study (Johnson 1976),
- Denali Highway Recreation Survey (Harza-Ebasco 1985c),
- Department of Transportation Public Comment on the Denali Highway Improvement Plan (ADOTPF 1981a), and
- Susitna Hydroelectric Project Resource User Survey (ISER 1985).

4.6 Mitigation of Recreation Use Impacts (***)

There were several considerations made during the recreation planning process to mitigate the impacts of the proposed recreation sites. Avoidance of sensitive natural habitats and cultural resource sites was a major consideration in the final siting of proposed recreation plan facilities. Each potential recreation site was examined during initial studies by an interdisciplinary group to define the suitability of potential recreation sites. Sensitive habitats, environments, or cultural resources identified at the time were avoided if possible.

Some sensitive sites could not be avoided because of their accessibility as a result of the project design. The approach in these cases was to use recreation development to direct use to the most durable locations within the area being impacted. Areas considered sensitive included fisheries or spawning grounds, critical wildlife habitats such as eagle nests, and animal dens, and identified cultural resources sites. Environmentally sensitive areas such as wetlands, steep slopes, and poor soils were also avoided.

As discussed in Section 6.4, the recreation plan provides for monitoring of recreational use and modification of the plan if necessary. If unanticipated impacts to area resources should occur, the existing or planned facilities can be modified to mitigate the impacts as agreed upon by the Applicant and landowners.

5 - RECREATION PLAN (**)

The intent of the Susitna Project's recreation plan is to satisfy the recreational demands created by hydroelectric development and to accommodate public use of the project area. The plan is intended to fit within the framework of existing regional recreational plans. The Susitna Project's recreation plan was developed after evaluation of the recreational opportunities and constraints within the study area, the regional recreational needs, and the identified management objectives of landowners and resource management agencies. It accommodates these diverse concerns in a manner that protects the study area's scenic, cultural, and environmental qualities.

5.1 - Recreation Plan Management Concept (***)

The large scale typical of the Susitna Project and the general unsuitability of the reservoirs for recreation required that an area-wide management concept be developed as a basis for the detailed programming of recreational activities and facilities. The recommended management concept described below has been designed to be compatible with economic goals of adjacent landowners as well as with resource protection goals of state and federal agencies. The proposed recreation management concept is shown in Figure E.7.5.1. The concept was based on the factors and assumptions discussed in Section 4.

Three management zones have been identified for the project area. These zones, derived from the Alaska Division of Parks Management Framework Report (ADNR 1982c) are: recreational development, natural, and back country/wilderness.

The recreational development zone is the zone in which the majority of developed facilities and intensive activity would occur. This zone includes an area 1/4 to 1/2 mile on each side of the access road and areas surrounding the damsites. Impacts on the existing resources would be greatest in this zone. The natural zone is a transitional area adjacent to the development zone and along existing trail corridors. It would serve as a buffer between the development and backcountry zones and would be subject to some use impact as visitors spread throughout the project area. The back country zone is the remainder of the project area where management effort would focus on maintaining the remote recreation experience. This zone would be less accessible than the other zones and thus would incur the least impacts. The development guideline for these three zones is listed in Table 7.5.1.

This recreation plan management concept is only a recommendation to guide future recreation development. Because it goes beyond project boundaries, the management concept would need to be agreed upon among various agencies and landowners. Such agreements would allow identification of management objectives, major issues, and management

constraints of the Applicant, agencies and landowner groups so that the plan can be implemented.

5.2 - Recreation Plan Guidelines (***)

Policies and development guidelines for use of the project area have been developed as part of the recreation planning process. The plan's policies and guidelines were based on the agency objectives and other factors discussed in Section 4 and the overall management concept described in Section 5.1. Listed below are the general policies regarding future use and development of the recreation plan and detailed guidelines regarding the types of facilities to be provided.

5.2.1 - Reservoirs (***)

Other than boat access, the reservoir edge would not be developed for recreation due to fluctuating water levels and the availability of numerous other lakes and streams in the project area suitable for recreation. Public access to the reservoirs would be provided to both the reservoirs upstream of the dams and to the river downstream of each dam for use by boaters travelling down the Susitna and for boaters desiring access to the reservoirs.

5.2.2 - Rail Spur and Airfield (***)

Since post-construction public use of the railroad and airfield are contingent on state or private management, these facilities are not actively considered in the initial recreation plan, but could play a more prominent role at a later period if tourism is actively promoted.

5.2.3 - Trail Development (***)

A principal objective of the recreation plan would be to establish trails in appropriate portions of the project area, since hiking trail development is a recreational priority of the state.

Except for interpretive trails, the recreation plan would follow a policy of no developed trails. Use impacts would be monitored and if they become too great, trail routes and routine maintenance would then be instituted.

Within the areas designated as natural zones, trail development would consist of clearing and bridge construction across major streams.

Information pamphlets would be developed describing trails and access points in the backcountry zones and notes of interest such as waterfalls, good camping locations and fishing spots.

Developed trails would be added within the recreation development zone to support interpretive programs near the damsites or for relatively short, heavy-use trails, such as to Tsusena Butte or Devil Creek Falls. Bridges would be provided across major streams.

All trailheads would contain a trail entry sign, trail information sign, and a trail register.

Trail designations would be subject to finalization of land ownership and public easements.

5.2.4 - Interpretive Programs (***)

Interpretive programs would be established for both damsites to accommodate public interest in the project facilities as well as the Alaskan environment.

Interpretive programs could consist of displays and diagrams of conditions before the Project and of the construction process. The Devil Canyon interpretive program would include a movie of the former Devil Canyon whitewater experience.

Interpretive trails would be located near visitor centers and would stress native flora and fauna.

Interpretive programming for the visitor centers would begin at the beginning of the Stage I construction period.

5.2.5 - Scenic Viewpoints (***)

An important part of the Susitna recreation experience would be related to scenic viewing while traveling the access roads. Attractions would include views of the immediate mountains; vistas of the Wrangell Mountains, the Alaska Range and Mt. McKinley; and views of wildlife. Trailheads and viewpoint pull-outs would be coordinated with access road designs and would be built when the roads are constructed.

5.2.6 - Campgrounds (***)

Developed campsites would consist of recreational vehicle (RV) spurs, tent pads, grills, tables, and benches; semi-primitive campsites would include tent pads, grills, and tables.

The operating budget would include stocking firewood at developed campgrounds.

5.2.7 - Fishing Lakes

The operating budget would provide for stocking identified lakes with native fish species.

5.2.8 - Concession Potential

Concessionaire arrangements that may exist with the plan include:

- o Visitor center souvenir shops and food service
- o Airport management and storage
- o Railroad spur public transit in support of tourism
- o Boat rental
- o Powerhouse tours

5.3 - Recreation Opportunity Evaluation

(Moved to Appendix E3.7)

5.4 - The Recreation Plan (**)

The recreation plan focuses on the concept of providing developed recreational facilities adjacent to the access roads and damsites and minimal facilities away from them. The facilities are phased to coincide with construction and operation of the three-staged Project. The plan also considers the recreational needs of the temporary construction camp workers and ultimately the needs of permanent village residents.

The recreation plan includes the following sites and proposed facilities. Figure E.7.5.2 displays the entire plan and indicates general locations of the recreational facilities. All sites are shown with a key letter and phase number relating to text and maps. There are ten additional maps which detail locations of individual recreation sites (Figures E.7.5.3 through E.7.5.10). Table E.7.7.1 lists recreation facilities by site according to the phase of development. Appendix E6.7 provides photographs of some of the recreation sites.

The four phases of the recreation plan and the proposed recreation sites within each are described below. The timing of the phases relative to the three stages of construction is discussed in Section 6.1. The site location, proposed facilities, expected use and present land ownership status are described briefly for each site. Appendix E3.7 summarizes the inventory and recreation opportunity evaluation for each site.

5.4.1 - Phase One: Watana Stage I Construction (**)

Phase one consists of recreational features intended to mitigate the impacts of recreational opportunities lost because of construction activities and associated land closures; to provide recreational opportunities for project construction workers; and to provide the general public with some early recreational benefits derived from the public investment in Watana. Development of phase one would begin with the start of project construction.

Recreation sites proposed for phase one would include the following:

(a) Site A - Susitna River/Denali Highway Bridge Boat Launch (***)

An existing boat launch site, located at the Denali Highway crossing of the Susitna River would be upgraded according to state standards (Figure E.7.5.10). The site is presently used by people boating the Susitna River for a backcountry float trip or for access to areas for hunting. Parking for 10 vehicles and trailers would be provided. Two signs explaining the Susitna Project construction and the potential boating hazard at Watana and Devil Canyon due to construction activity would also be included.

Construction of this facility may need to be coordinated with the adjacent Native landowners since much of the area surrounding the Denali Highway bridge has been selected for Native ownership.

(b) Site B - Watana Construction Camp and Townsite Worker Recreation Plan (***)

This plan is discussed in detail in Section 5.4.6. Some of the outdoor recreation developed for the workers would be available for public use after construction. These would include trails, such as the one proposed to Deadman Creek Falls (Figure E.7.5.6). Development of the Deadman Creek Falls trail would be dependent on final landownership selection. Presently the location is on land selected by the state but suspended due to the land selection process.

(c) Site C - Middle Fork Chulitna River/Caribou Pass Trail (***)

A trailhead with six vehicle parking spaces would be constructed on an existing public easement off the Parks Highway near Broad Pass (Figure E.7.5.9). A trailhead sign

and trail register describing the 17-mile primitive trail to Caribou Pass would be placed at the trailhead. This trail would accommodate hunters and hikers that presently access the Chulitna Mountains. The trail would also eventually connect with other trails constructed in later phases, linking the Parks Highway to project access roads.

The middle fork of the Chulitna River is located primarily within lands that have been selected by or conveyed to the Native corporations. Development of this trail would depend on final disposition of the land.

(d) Site D - Project Entry Sign (***)

A project entry sign and five vehicle parking spaces would be constructed at the intersection of the Watana access road and Denali Highway (Figure E.7.5.8). The project entry sign would serve as a roadside interpretive display for motorists. The sign would consist of a three-panel display explaining the Watana Dam, Devil Canyon Dam, and general information about the site and Project. Information regarding public access and recreation would be noted. The entry sign would be constructed within the access road right-of-way.

5.4.2 - Phase Two: Watana Operation/Devil Canyon Construction (**)

Phase two consists of recreation features intended to mitigate the impacts of recreation lost due to the operation of Watana Dam and construction of Devil Canyon Dam. Additionally, the phase would provide for the recreational use potential of the Project, accommodate project-induced recreational demand, allow public access to project lands and waters, and protect the environmental values of the project area. Recreation sites proposed for phase two would include the following:

(a) Site E - Watana Damsite Temporary Visitor Center and Boat Access (***)

A temporary visitors center with 10 vehicle parking spaces would be constructed on the north side of Watana Dam (Figure E.7.5.6). This visitor center would consist of an 800-square foot wooden structure housing displays of the Watana construction process and area setting. The center would also be the headquarters for powerhouse tours. This visitor center would function until the permanent visitor center is built after Stage III construction. A developed interpretive trail 1/2 mile long and picnic site constructed near the dam would complement the visitor center. The

visitor center is expected to receive use by the general public.

Boat access to the Watana Reservoir and to the Susitna River downstream of the dam would be provided via construction haul roads and construction of two boat lanuches. Parking for 10 vehicles and trailers would be provided at each location. Signs placed at the downstream boat access would warn boaters of Devil Canyon construction downstream. These facilities would be used by boaters accessing the Watana reservoir, boaters floating the Susitna River to Stephan Lake/Prairie Creek, and hunters accessing the upper reaches of Watana reservoir.

Since these facilities would be constructed within project boundaries, landowner approval would not be required.

(b) Site F - Tsusena Creek/Caribou Pass Trail (***)

A trailhead off the Watana access road with parking spaces for 5 vehicles would have an information sign describing this 26-mile primitive trail up the Tsusena Creek valley to Caribou Pass (Figure E.7.5.7). Total trail length from trailhead to trailhead would be approximately 43 miles. Once completed, users could drive to the trailhead off the project access road and then hike to the Parks Highway.

Most of the trail would be on land owned by the state or the BLM. The 8-mile portion of the trail located within federal lands selected by the Native corporations would require designation as a public easement.

(c) Site G - Susitna Entrance Campground (***)

This developed campground would be adjacent to the Watana access road (see Figure E.7.5.8). The campground road would provide access to 10 developed campsites located adjacent to a lake. The lake would be stocked with native fish species, if feasible, as an added recreation attraction to the site. This campground would accommodate part of the demand for vehicular camping within the project area created by the Project and new access into a previously remote area. Development of this facility would need to be coordinated with BLM recreation plans since they are the land manager for the site.

(d) Site H - Deadman/Big Lakes Trail (***)

Access to Deadman and Big Lakes, which together are approximately 1,800 acres in size, would be provided via

a trailhead with parking spaces for 6 vehicles off the Watana access road and a primitive trail 4 miles in length. The trail would provide a day hike from the access road trailhead for visitors hiking or desiring to fish for grayling in Deadman Creek or in the lakes (Figure E.7.5.7).

Since these facilities are located on federal lands selected by the state, landowner approval would not be required.

(e) Site I - Stephan Lake Portage Campsite (***)

The Stephan Lake portage campsite would consist of eight semi-primitive campsites adjacent to the Watana reservoir for boaters to overnight before they portage to Stephan Lake. There is currently a trail public easement that starts at the Susitna River and connects with two small lakes before ending at Stephan Lake. The campsites would be constructed within the project boundary. Campsite construction would include brushing and leveling campsites and providing grills (Figure E.7.5.5).

(d) Site J - Devil Canyon Construction Camp and Village Worker Recreation Plan (***)

This plan is discussed in detail in Section 5.4.6. Unless agreements are made with Native landowners to retain certain camp or village facilities, recreation facilities constructed for the Devil Canyon construction work force would be dismantled after construction (Figure E.7.5.3).

5.4.3 - Phase Three: Devil Canyon Operation/Watana Stage III Construction (***)

Phase three consists of recreational features intended to mitigate the impacts of recreation lost because of the operation of Devil Canyon and construction of Watana Stage III. Phase three would also accommodate induced demand of the Devil Canyon project and provide public access to project lands and waters. During phase three, the Watana damsite area (including interpretive trails and boat launches near the Watana damsite) would be closed to the public.

Recreation sites proposed for phase three include the following.

(a) Site K - Devil Canyon Damsite Visitor Center and Boat Access (***)

The Devil Canyon setting and dam would be a major recreational attraction of the Project. A 5,000-square-foot concrete visitor center with parking spaces for 15

vehicles would be located at the canyon's edge on the south side of the river (Figure E.7.5.3). This location would allow visitors to cross the canyon over the high level bridge and view the dam, bridge and canyon together. The visitor center would include displays of the Project and the setting, including movies of the Devil Canyon whitewater experience. The center would also include a souvenir shop, audio visual room and possibly food service. Picnic sites and a 0.75-mile developed interpretive trail would be located near the center.

Boat access to Devil Canyon reservoir and to the Susitna River downstream of the dam would be provided via construction haul roads and construction of two boat launches. Parking for 10 vehicles and trailers would be provided at each location. The boat access would allow boaters to float from the dam downstream to Talkeetna, would allow boating in the reservoir, and would provide boat access to hunting areas and fishing locations along the reservoir.

Since the boat access, visitor center and trails would be located within the project boundary, landowner approval would not be required.

(b) Site L - Devil Creek Falls Trail (***)

A seven-mile developed trail would lead from a trailhead with six vehicle parking spaces off the Devil Canyon access road to overlooks of Devil Creek Falls and Devil Canyon reservoir (Figure E.7.5.4). This trail is expected to receive moderate levels of use because of the scenic attractions of the falls and rock outcrops (See Appendix E3.7) and relatively short trail length.

Presently the location is on federal land selected by the state and Native corporations. The development of this trail would depend on the final disposition of the land.

(c) Site M - Tsusena Butte and Tsusena Creek Falls Trails (***)

As with Devil Creek Falls trail, these two trails are also expected to receive moderate levels of use because of their short lengths and attractions. Both trails would be accessed from one trailhead with parking spaces for eight vehicles off the Devil Canyon access road. In addition, a four-mile primitive spur trail would be constructed connecting the trailhead with the Tsusena Creek/Caribou Pass Trail (Site F) (Figures E.7.5.6 and E.7.5.7).

The Tsusena Butte Trail would be a 2.5-mile developed trail with a 1,600-foot rise in elevation. Once on top, hikers would have a 360-degree panorama of the surrounding region. A photographic interpretive display would be constructed orienting hikers to points of interest. The trail south from the trailhead would consist of a five-mile primitive trail following Tsusena Creek to Tsusena Creek Falls.

The trail north to Tsusena Butte would be located on state land. The trail south to Tsusena Falls is presently located on federal lands selected by the state and Native corporations. Development of this trail would be dependent on final disposition of the land.

(d) Site N - Mermaid Lake Campground (***)

Mermaid Lake Campground would be a developed campground near the Devil Canyon access road approximately five miles from the Devil Canyon damsite (Figure E.7.5.4). Its 12 campsites would be located adjacent to Mermaid Lake and would accommodate vehicular campers. A fish stocking program would be initiated in the lake, if feasible, as an added recreation attraction. Presently the site is located on federal land selected by the state and Native corporations. Development of this site would depend on final disposition of the land.

(e) Site O - Devil Canyon Dam Overlook (***)

A 3/4 mile developed trail would lead from a trailhead with parking spaces for 5 vehicles to a promitory approximately 1 mile northwest of the damsite. The overlook would be about 700 feet above the dam crest and would provide an excellent overview of the Devil Canyon setting, as well as vistas of Mt. McKinley. An interpretive display and benches would be provided at the overlook. During Watana Stage I construction, the location of the overlook would need to be coordinated with locations of the Watana transmission lines (Figure E.7.5.3).

Since the trail and overlook site are within the project boundary, landowner approval would not be required.

5.4.4 - Phase Four: Watana Stage III Operation (***)

Phase four consists of recreational features to accommodate increased recreation demand in the vicinity of the Watana damsite, and to provide additional linkages to recreation facilities established in phases one, two, and three. The Watana damsite boat launches would be reopened during this phase. In

addition, the temporary visitor center would be dismantled and its contents relocated in the permanent visitor center.

Recreation sites proposed for phase four include the following:

(a) Site P - Watana Permanent Visitor Center (***)

Public access would be provided across the dam to a visitor center located on a promitory above the Watana quarry site with parking spaces for 15 vehicles (Figure E.7.5.6). Integration of the design of the visitor center with the quarry site would be an important aspect of the interpretive program.

The 3,000-square foot visitor center would include displays of the Watana construction and project setting and area wildlife. A souvenir shop and food service may be provided depending on concessionaire arrangements. Also, depending on agreements with Native landowners, the visitor center may provide a museum of selected cultural resource materials found in the project area. A one-mile developed interpretive trail and picnic areas would be located near the visitor center. Since, these facilities are presently located within the proposed project boundary, landowner approval would not be required.

5.4.5 - Recreation Plan for Construction Camps, Villages, and Permanent Townsite (**)

(a) Housing Facilities (***)

During construction of the Project, personnel would be housed in temporary camps for single status workers and temporary villages for workers with dependents living on-site. Camps and villages would be constructed at both the Watana and Devil Canyon damsites. A permanent town is planned to be constructed near the Watana damsite at the end of the Stage I construction period for operations personnel and dependents. Resident populations of single-status workers and families for the above housing facilities are shown in Table E.7.5.2.

Current construction plans call for five separate communities: two single-status camps, two family-status villages and the permanent town. The temporary camps and villages are designed to be largely self-contained. Recreation programs sponsored by the camp management would occur largely within these areas.

During Watana Stage III construction, the camp and village would be in the same location as Stage I, and may utilize some of the same buildings and support facilities, depending on their condition.

(b) Workers and Resident Activities (**)

Operation of the camps and the length of work days and work weeks would influence the amount of leisure time available and also the amount and types of recreation required. Presently, the work pattern is planned to be 2 or more weeks on and 1 or 2 weeks off, with 2 10-hour shifts each day and 6 or 7 days each week, subject to final contract negotiations.

During Stage I, workers would be taken to and from the site by some combination of air and bus transportation. During their weeks on rotation, they would live in the construction camp or village. At the end of each rotation, workers would be transported off-site. During Stages II and III, when the access road is open to the public, there would be no worker transportation provided.

Without a worker transportation plan, some workers may choose to live in Cantwell or elsewhere during Stages II and III and commute to the site on a daily basis. It is assumed, however, that the majority would live at the camp and commute to their families' places of residence only periodically. This recreation plan is intended to meet the needs of construction and operation workers in residence at the construction camps. It is not intended to address the recreational needs of workers while not at the site.

Because of the relatively long work schedules and work shifts, leisure activities of workers are expected to focus on the recreational facilities at the camps and villages. Leisure time would be limited primarily to the hours after the workers' daily shift.

Hiking and fishing are outdoor activities that are expected to occur during the summer months. During Stage I these activities would be limited to locations within walking distance since use of private vehicles would be limited during that period. Workers may hunt from the access roads open to the public during Stages II and III if the road is not closed to public hunting. However, firearms or hunting would not be allowed on project property during construction.

(c) Recreation Programming (**)

The type, number and quality of recreation facilities and available opportunities are important factors in determining the ability of the Project to attract and keep construction and operation workers. Other considerations which are managerial in nature includes food quality and management styles.

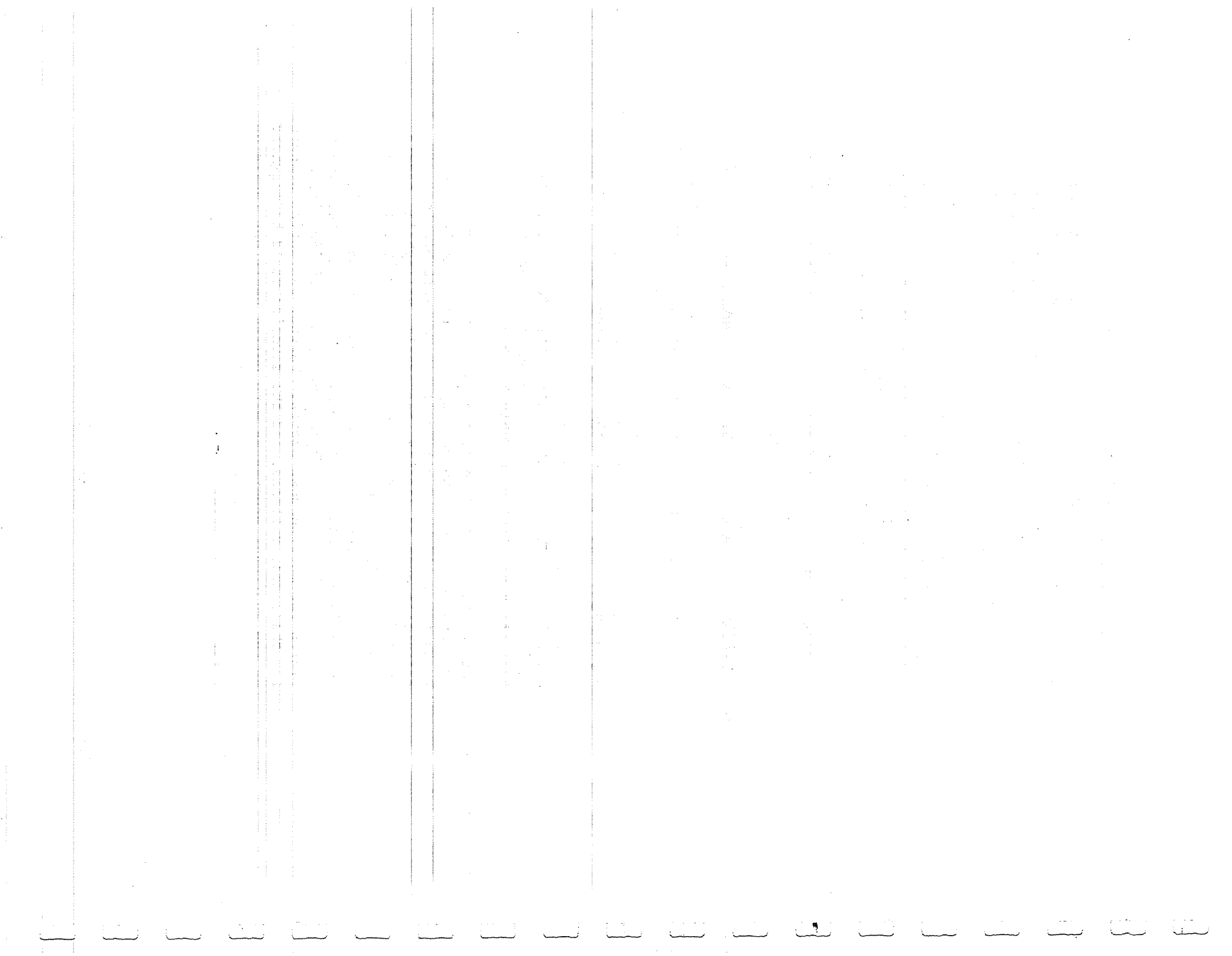
Construction camp support facilities are typically programmed for less than peak work force because of the peak's relatively short duration. In addition, a percentage of the work force would always be off duty and therefore offsite, and the number of facilities available tends to avoid overuse of any one facility. Sizing of camp and village recreation facilities for Susitna would follow this concept. During detailed design, the facilities would be sized according to the average annual population for the each construction period (See Table E.7.5.2).

(d) Proposed Recreation Plan for Workers and Residents (**)

The proposed worker recreation plan would be designed for the average resident population during the Watana Stage I construction period and the Devil Canyon Stage II construction period. Stage III construction personnel would utilize recreation facilities constructed during Stage I, depending on condition of the facilities.

Current construction plans call for five separate communities. The recreation plan, therefore, proposes equivalent facilities at each community. The proposed facilities are listed in Table E.7.5.3.

Many of the proposed recreation activities can be accommodated in multipurpose spaces. For example, the gymnasium would be a multipurpose space suitable for activities such as jogging, basketball, volleyball, tennis, and badminton. Such spaces do not necessarily require a separate building, but may be developed by clustering residential modules with flooring and erecting roofing across intervening spaces. Many outdoor activities likewise do not require separate spaces but could utilize single fields for multipurpose sports. Further recreation planning for the camps, villages, and the townsite would be required as the Applicant progresses with policy decisions regarding details of the construction program and as actual facility design is undertaken.



6 - PLAN IMPLEMENTATION (**)

6.1 - Phasing (**)

Phased implementation of the recreation plan provides the opportunity to adjust to changes in recreation demand, project design, landownership, environmental impacts, or other factors that are difficult to predict 15 or 20 years into the future.

The four phases of the Susitna Project recreation plan are proposed to be constructed as follows:

- Phase One - Watana Stage I Construction: Phase one recreation facilities are generally planned to be developed simultaneously with the start of Stage I construction.

- Phase Two - Devil Canyon Construction/Watana Operation: Phase two recreation facilities are intended to be developed within three years of the operational date of Watana Stage I.

- Phase Three - Devil Canyon Operation/Watana - Stage III Construction: Phase three recreation facilities are generally planned to be developed within three years of the operational date of Devil Canyon Stage II.

- Phase Four - Watana - Stage III Operation: Phase four recreation facilities are intended to be developed within three years of the operational date of Watana Stage III.

6.2 - Detailed Recreation Design (***)

Detailed and site-specific recreation designs for the proposed recreation plan would begin after the Project License is issued. Facility locations would be identified in detail through field investigation. The field investigations would be coordinated with other program disciplines such as cultural resources, socioeconomic, and wildlife. After field investigation, construction drawings and specifications would be prepared. The master planning for each phase should begin at least one year before anticipated phase construction.

Recreation facility design standards of the APORD would be used where appropriate since the APORD is expected to be the major managing agency for the recreation facilities. Examples of APORD design standards are shown in Appendix E3.7.

6.3 - Operation and Maintenance (***)

6.3.1 Personnel (***)

The Applicant would operate and maintain recreation facilities within the project boundary. The APORD would operate and maintain, with the financial support of the Applicant, the recreation facilities proposed in this plan that are located on state lands and, through cooperative agreement, on BLM lands. (Should the parties deem it desirable, separate agreements could be drafted with the BLM.)

Recreation program personnel required for operating facilities within the project boundary would include a recreation manager, park ranger and park technicians. Maintenance is assumed to be handled by project operation and management staff or to be contracted out under the supervision of the recreation manager. A recreation manager is needed early in phase two of the recreation plan. The manager would be responsible for management and operation of the recreation plan, supervising visitor center programming, maintenance, and regulation enforcement.

A full time park ranger would be hired during phase four construction to staff the permanent Watana visitor center. The park ranger should be experienced in interpretive programming and also be knowledgable in the fields of safety, rescue operations, wildlife management, and park and recreation administration.

Through completion of phase four construction, three temporary park technicians would be on staff. Their duties would include aiding permanent staff, providing information to the public on recreation facilities and interpretive aspects, and conducting powerhouse tours. The total recreation staff after completion of phase four facilities would be two permanent and three temporary employees. This is considered the minimum staff necessary. The number could increase if demand rises noticeably or if tourism of the Project is promoted by the state.

6.3.2 - Interpretive Program (***)

A key component of the recreation program is the interpretation of the Project and its setting. The general goal of the program would be to inform and educate the public with regard to the purpose and concept of the Project and the cultural, natural, and scenic features of the area. The Project visitor centers would be the focus of the interpretive program.

The visitor centers would also function as the primary orientation sites for the public. Information on trails, campsites, and backcountry conditions would be available as well

as information regarding regulations and outdoor safety. Interpretive displays would include exhibits dealing with hydroelectric power, wildlife, water resources, and tundra ecology, as well as slide/tape programs emphasizing the project setting both before and after construction of the Project.

Project interpretive themes and media suggestions are identified in the matrix in Table E.7.6.1. The matrix is intended to serve as a guide for program development.

Design and construction of the visitor center interpretive displays would be accomplished through contract. Estimated costs for the interpretive program development are discussed in Section 7.1.

6.4 - Monitoring (**)

The recreation plan consists of four phases and all the components identified therein. In general, the Applicant's commitment beyond phase one is to acquire and develop the facilities listed in phases two, three, and four or their equivalent. Modifications to the plan may be made based on the ongoing monitoring and evaluations. The APORD, with financial support of the Applicant, would be responsible for maintaining facility use records and surveying use of phase one recreation facilities according to standards consistent with APORD practice. At the time Watana Stage I begins operation or six years after the completion of phase one recreation facilities (whichever is earlier), APORD and the Applicant would evaluate the plans for phase two of the recreation plan.

Plans for phase two would be verified or modified as required. Any modifications would be consistent with established management guidelines established in this plan and the recreation opportunity preference classification appropriate for each proposed facility (see Appendix E3.7). Need would be determined both by use levels of phase one facilities and demand generated by the completion of Watana Stage I. Construction of phase two recreation facilities would be completed within three years of determination of need by the Applicant and APORD.

The plans for phase three of the recreation plan would be similarly evaluated when operation of Devil Canyon begins. The facilities recommended in phase three would be verified or modified as required, based on experience for phase one and two and demand generated be completion of Devil Canyon Dam. Phase three would be constructed within three years of the joint determination of need by the parties.

When Watana Stage III begins operation, or six years after the completion of phase three construction (whichever is earlier), APORD

and the Applicant would meet to evaluate the phase four plan, and similarly verify or modify it as required. Phase four would be constructed within three years of the joint determination of need.

Monitoring would begin upon completion of phase four facilities. Monitoring would consist of the APORD maintaining facility use records as discussed above. In addition, monitoring would include two to three surveys of recreation use in the project area conducted approximately every five years after completion of phase four. The monitoring commitment would continue for 15 years after the phase four construction period.

7 - COSTS FOR CONSTRUCTION AND OPERATION OF THE PROPOSED RECREATION FACILITIES (**)

It is anticipated that the Applicant and APORD would enter into an agreement whereby APORD performs design, construction, monitoring, and operation and maintenance functions of the recreation facilities on public lands with the costs to be borne by the Applicant. If any recreation phase should be modified under the terms of the proposed monitoring plan, budgeted monies would be transferred from proposed element to element and from phase to phase. This would be done with the provision that total development costs for the 4 phases do not exceed the currently anticipated total cost, as measured in constant 1985 dollars.

7.1 - Construction (**)

Estimated capital costs for each phase of the recreation plan are as follows:

	Capital Costs ($ 1985)
Phase One	$ 120,650
Phase Two	563,650
Phase Three	1,481,650
Phase Four	621,550
Total Facilities	$2,787,500

Breakdowns for these costs by facility are shown in Table E.7.7.1. Construction costs have been prepared based on APORD and NPS data. Costs of recreation facilities for construction camps and villages and the permanent village are included under project development costs identified in Exhibit D.

7.2 - Operations and Maintenance (**)

Table E.7.7.2 summarizes estimated average annual costs for supplies, equipment, and personnel to operate and maintain the facilities. No additional staff or operation and maintenance costs are anticipated for phase one. Annual operation and maintenance costs for phase two are estimated at $56,350. Annual operation and maintenance costs for phase three, including the cost of maintaining the phase two facilities, are $71,100. Annual costs for phase four are estimated at $125,650, including maintenance of phases two and three facilities.

Table E.7.7.3 provides estimates of equipment necessary to operate the proposed facilities. Costs for such equipment are estimated at $63,150.

7.3 - Monitoring (***)

Monitoring costs assume that annual monitoring efforts would be part of the recreation staff responsibilities included in the operation and management costs (Table E.7.7.2). However it was assumed that demand evaluations requiring surveys and additional effort would be needed approximately every 5 years for 10 to 15 years after phase four construction. This cost is estimated to be approximately $100,000 over the life of the Project and is also included in Table E.7.7.2.

8 - AGENCY COORDINATION (**)

8.1 - Agencies and Persons Consulted (**)

The Susitna Project recreation report and plan were prepared in consultation with various representatives of state, federal and local agencies and private entities. Discussions were held in the form of meetings or phone conversations with representatives of the ADNR, ADFG, ADTPF, BLM, NPS, Chugach National Forest, Matanuska-Susitna Borough, and area Native corporations.

8.2 - Agency Comments(**)

In response to the Draft Exhibit E provided to the agencies on November 15, 1982, review comments were received from the following agencies: ADNR, ADF&G, NPS, and USFWS.

The NPS and ADNR expressed concern that the recreation plan presented in Section 6 did not include sufficient facilities south of the Susitna River in the Fog Lakes and Stephan Lake areas. Since these areas are primariliy private land or selected for Native ownership, limited recreational development has been proposed as part of the Susitna Project recreation plan. Development in these areas could be expanded by Native corporations as a private venture.

The ADNR expressed the desire to also provide recreational opportunities downstream from Devil Canyon. Presently, recreation sites have not been proposed in this area, since the project access road ends at Devil Canyon, and the area is private property. Recreation demand in this area would be monitored, and additional sites would be considered if demand is determined to be sufficient.

The USFWS and ADF&G have expressed concern with the increased access the Susitna Project would provide to fish and wildlife resources. The development of the recreation plan has, to the extent possible, taken this concern into consideration when siting the proposed recreational facilities. An effort has been made to avoid particularly sensitive fish and wildlife habitat areas while maintaining maximum plan flexibility to the advantage of project recreational opportunities.

Responses to the specific comments raised by these four agencies are contained in Chapter 11 of Exhibit E.

8.3 - Native Corporation Comments (***)

Tyonek Native Corporation submitted a position paper to FERC (Bedard 1984), which discussed some of their development possibilities if the Susitna Project is constructed. These included:

- Using and connecting other roads to the proposed access road;

- Developing a single lodge and some rental cabins at the Fog Lakes with hiking trails to the other lakes and canoe routes throughout the five lake area.

- Developing a single lodge with some rental cabins at Stephan Lake. Establishing a 2,500 acre brown/grizzly bear viewing site for tourist and scientific studies in the Prairie Creek area and a network of canoe and hiking trails to Talkeetna River and to the Susitna River on the north side of Stephan Lake.

- Establishing a primitive trail on the north side of the Susitna River from the Devil Canyon proposed bridge to Portage Creek.

- Developing a lodge at Otter Lake using the existing trails from Chulitna to Portage Creek.

The Susitna Project's proposed recreation plan would complement rather than compete with these development intentions. Further consideration would be given to the development intentions of the Native corporations as agreements are made regarding construction, operation and maintenance of the Project's recreation plan.

8.4 - Consultation Meetings (***)

Additional specific input on recreation has been received from agencies and private organizations through consultation meetings (see Chapter 11, Section 2.2.3, Exhibit E).

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10 - GLOSSARY

Accessibility - the kind of roads, four-wheel-drive trails, foot trails, etc., which are in or surround the study area.

Attractiveness - a measure of a landscape's unique or special settings and features. These can be both cultural and natural.

Carrying Capacity (recreation) - the inherent capability of a landscape to support recreation use. The primary purpose is to achieve fitness between the number of people using a site and the preferred recreation type (experience). The goal is not to reduce the experiential potential of a site through over-use or participation.

Encounter space - that cover (in acres) within which an encounter with another individual can be anticipated. It not only includes physical contact (passing on a trail) but visual proximity as well.

Inherent Durability - a general measure of the physical ability of a site to absorb the impact of recreation development. The evaluation is based upon known physical data and field observation of each recreation resource site.

Natural Rarity - a measure of the inventoried landscape features and settings based upon the frequency of occurrence and overall quality. Natural rarity also defines the physical characteristic's relationship to the regional and local scales.

Recreation Opportunity Quality Factor - based upon the natural rarity of a proposed recreation setting, this is used to determine the probability of capturing recreation users by simply saying the higher the rating for natural rarity, the greater the potential for attracting recreation users.

Recreation Preference Type - a principal objective of the recreation plan is to provide a variety of recreation activities within a spectrum of recreation "preference types". The preference types relate to the character and quality of the existing land base. The recreation activities also relate in terms of their appropriateness to a particular setting. The four recreation preference types are: pristine, primitive, semiprimitive, and developed.

Rehabilitation Site - in addition to those recreation opportunities which are intrinsic to the natural environment, there are other areas under consideration such as borrow areas, construction and maintenance roads, and transmission corridors. These elements which are created to serve temporary purposes or as a by-product of construction commonly attract recreationists who find them convenient for campsites; hiking trails, offroad tracks, and other activities. Additional recreation improvements and activities could be developed in such locations if unforeseen recreation demand occurs.

Visitor Day Conversion Factor - a factor in determining the visitation capacity of a recreation setting which defines average use days by recreation preference type activities.

Visitation Estimates - this method utilized two visitation estimates for each recreation site: (1) yearly visitation capacity; and (2) yearly visitation potential. Visitation capacity is an estimate of how many visitors can annually experience and use a particular recreation setting, based upon the designated recreation preference type.

Visual Quality - a measure of the scenic quality and importance of the site. The relative availability of significant landscape features and settings contained in each potential recreation site can be measured by; rarity, levels of quality, manageability (reinforcing the Alaska landscapes image, and visual quality.

TABLES

TABLE E.7.2.1: STATEWIDE RECREATION INVENTORY - BY LAND OWNERSHIP

	Federal		Military		State		Local		School Sites	
Acreage	153 million		N/A		4.7 million		7,883		2,000	
Facilities	#	PAOT*	#	PAOT	#	PAOT	#	PAOT	#	PAOT
Camping Units	1270	6299	229	824	1218	4384	477	1717	–	–
Remote Cabins	221	1135	30	180	2	8	3	6	–	–
Picnic Tables	270	1368	34	161	1747	8735	323	1583	–	–
Picnic Shelters	22	220	1	10	32	320	–	–	–	–
Clam Beaches	–	–	–	–	28 miles		–	–	–	–
Boat Launches	34	34	4	4	26	26	12	12	–	–
Boat Moorages	–	–	25	25	–	–	4378	4378	–	–
Canoe Trails(mi)	332	1932	–	–	47	280	26	160	–	–
Horse Trails(mi)	214	1070	49	240	8	40	–	–	–	–
Walk/Run Trails(mi)	973	9730	–	–	443	4430	23	230	–	–
Bicycle Trails(mi)	–	–	1	10	–	–	76	760	–	–
ATV/ORV Trails(mi)	535	2130	70	280	142	670	14	104	–	–
X-C Ski Trails(mi)	101	1010	132	1320	256	2510	80	800	–	–
Dog-mushing Trails(mi)	–	–	–	–	750	3000	–	–	–	–
Ski Lifts/Tows	6	–	15	–	–	–	4	–	–	–
Golf Courses	–	–	1	–	–	–	4Loc/ (Pvt)	–	–	–
Tennis Courts	–	–	23	–	–	–	59	–	40	–
Basketball Courts	–	–	14	–	–	–	20	–	223	–
Volleyball Courts	–	–	11	–	–	–	9	–	72	–
Swimming Pools	–	–	2	–	10	–	7	–	11	–
Softball/Baseball Fields	–	–	41	–	–	–	75	–	69	–
Soccer/Football Fields	–	–	14	–	–	–	12	–	20	–
Track & Field	–	–	4	–	–	–	5	–	13	–
Target Shooting Ranges	–	–	4	–	3	–	1	–	4	–
Ice Skating Rinks	–	–	12	–	–	–	20	–	81	–

Source: ADNR 1981
*PAOT = Persons At One Time

TABLE E.7.2.2: STATEWIDE INVENTORY OF EXISTING RECREATION FACILITIES BY REGION

Region:	Southcentral*	Southeast	Interior	Southwest Northwest	Total
Facilities:					
Camping Units	2328	351	484	31	3194
Remote Cabins	70	149	33	-	252
Picnic Tables	1185	332	767	20	2304
Picnic Shelters	16	30	9	-	55
Boat Launches	79	38	44	1	162
Boat Moorages	1723	2759	-	1	4483
Canoe Trails(mi)	339	34	22	-	395
Horse Trails(mi)	271	-	-	-	271
Walk/Run Trails(mi)	944	409	84	2	1439
Bicycle Trails(mi)	76	-	1	-	77
ATV/ORV Trails(mi)	702	-	59	-	761
X-C Ski Trails(mi)	523	2	44	-	569
Dog-mushing Trails(mi)	450	-	300	-	750
Ski Lifts/Tows	11	7	7	-	25
Golf Courses	5	-	-	-	5
Tennis Courts	89	20	13	-	122
Basketball Courts	183	35	38	-	256
Volleyball Courts	62	19	11	-	92
Swimming Pools	13	2	15	-	30
Softball/Baseball Fields	134	27	20	4	185
Soccer/Football Fields	32	8	6	-	46
Track & Field	14	4	2	2	22
Target Shooting Ranges	9	2	1	-	12
Ice Skating Rinks	106	2	5	-	113
Playgrounds	215	20	11	-	246

Source: ADNR 1981

* Location of proposed Susitna Project

TABLE E.7.2.3: PERCENTAGE OF ADULT POPULATION PARTICIPATION IN INLAND OUTDOOR RECREATION: SOUTHCENTRAL REGION

Activities	Percentage of Participation
Driving for Pleasure	59%
Walking/Running for Pleasure	53%
Fishing (freshwater)	42%
Attending Sports Events	37%
Tent Camping	31%
Motor Boating	30%
Cross Country Skiing	26%
RV Camping	24%
Hiking w/Pack	22%
Baseball/Softball	19%
Flying for Pleasure	19%
Kayaking/Canoeing	17%
Sledding/Tobogganing	17%
Winter ORV's	17%
Alpine Skiing	17%
Outdoor Tennis	17%
Swimming (freshwater)	17%
Summer ORV/Motorcycles	14%
Other	11%
Football/Soccer	7%
Outdoor Basketball	7%
Horseback Riding	7%
Sailing (freshwater)	5%
Water Skiing (freshwater)	5%
Golfing	4%
Outdoor Hockey	2%
Hang Gliding	0%

Source: ADNR 1981 and Clark et al. 1981

TABLE E.7.2.4: ALASKA STATE PARK SYSTEM VISITOR COUNT SUMMARY

Park District	1978*		1979*		1980*	
	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident
Mat-Su	343,532	69,513	372,212	61,958	580,829	94,523
Copper Basin	85,364	59,071	167,014	82,682	66,615	32,148
Chugach	490,823	76,869	1,456,556	234,671	516,976	108,507
Kenai	116,197	29,118	418,986	84,470	615,542	146,132
Interior	39,510	18,312	197,300		41,866	19,702
Southeast	367,256	630,883	126,841	59,729	119,026	89,747
Total	1,442,682	883,766	2,738,909	523,510	1,940,854	490,760
Combined Total	2,326,448		3,262,429		2,431,614	

Note: *1978 and 1979 field data are based upon non-standardized format.
*1980 field data are based upon a computer stratified sampling system with incidental counts.
1980 data do not include the months of October, November, and December.

Source: ADNR 1981

TABLE E.7.2.5: EXISTING TRAILS IN THE STUDY AREA

Trail Type	Beginning	Middle	End	Years Used
1 Cat, ORV	Gold Creek		Devil Canyon	1950s - present
2 Cat, ORV	Gold Creek	Ridge top west of VABM Clear	Confluence of John & Chunilna Creeks	1961 - present
3 Cat	Alaska Railroad mile 232		Chunilna Creek	1957 - present
4 Packhorse, Old Sled Road	Chunilna	Portage Creek	Mermaid Lake	1920s - present
5 ATV	Denali Highway	Butte Lake	Tsusena Lake	1950s - present

Trail Type	Beginning	Middle	End	Use
6 Snodgrass Lake Trail	Denali Highway		Snodgrass Lake	Foot, snowmobile skis
7 Portage Creek Trail	Chunilna		Portage Creek	Sled road, foot use
8 Susitna River Trail	Near Cantwell		to Maclaren River	Dry, snowmobiles and foot
9 Talkeetna Trails	Random throughout the southern portion of the study area			Unknown
10 Stephan Lake Trail	Susitna River		Stephan Lake	Best portaging
11 Big Lake Trail	Denali Highway Near Butte Lake		Big and Deadman Lakes	Biking & off road vehicles
12 Butte Creek Trail	Denali Highway near the Susitna Bridge		Butte Creek drainage	Off road vehicles & hiking
13 Byers Lake Trail	Byers Lake		Byers Lake	Hiking
14 Little Coal Creek	Parks Highway		Curry Ridge	Hiking
15 Curry Ridge Trail	Park Highway at Little Coal Creek		Parks Highway at Troublesome Creek Crossing	Hiking

Note: Existing trails are shown in Figure E.7.4

Sources: TES 1982; ADNR 1980, and undated; Alaska State Parks undated.

TABLE E.7.3.1: ESTIMATED RECREATION DEMAND

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing	Total
Assumed 1980 Use of Project Recreation Area User Days[1]	800	100	1,500	4,000	200	---	---	100	6,700
Estimated Year 2000 Use of Project Recreation Area Without Susitna Project, User Days[2]	1,300	170	2,500	8,000[3]	370	---	---	220	12,540
Estimated Year 2000 Use of Project Recreation Area With Susitna Project Recreation Plan, User Days[4]	2,200-2,400	170	4,800-5,200	12,000-14,000	100[5]	12,000-14,000[6]	12,000-14,000[6]	350	43,520

Notes:

1/ Project Recreation Area is the area enclosed by the Parks Highway, Nenana River, the Susitna River to the east, and about 20 miles south of the Susitna River.

2/ Derived by applying assumed percentage increases in annual-per-capital participation days and projected regional population increase to 1980 use.

3/ Assumed doubling of 1980 capacity only. Demand as calculated in Note 2 would be 9,700.

4/ EDAW estimate.

5/ Decreases due to impacts on resource.

6/ Same as developed camping.

TABLE E.7.5.1: RECOMMENDED PROJECT RECREATION AREA MANAGEMENT ZONE DESCRIPTIONS

Management Zone	Purpose and Characteristics	Development and Activity Guidelines
RECREATIONAL DEVELOPMENT ZONE	Recreational development zones are established within State Park System units to meet the more intensive recreational needs of the public with convenient and well-defined access via roads, railroads, boating anchorages, airstrips, and high standard trails; with more intensively-developed recreational facilities such as campgrounds or picnic areas; with guided activities; and with information centers to orient visitors to the unit's special features. The landscape within this zone can be modified to support educational and recreational activities and/or to enhance wildlife habitat and scenic qualities. These zones are established where soils, slope, drainages and vegetation can support more intensive recreational activities. Fire suppression and insect and disease control may be used, where appropriate, with this zone to maintain or enhance recreational use. A recreational development zone may already have been influenced by prior developments and is intended to provide a transition area to absorb heavy human impacts.	The highest level of developments and activities is meant to occur in this zone within park units. The developments allowed in this zone include (but are not limited to) roads and trails, private vehicle and public transportation routes or access, campgrounds, picnic areas, visitor and interpretive centers, high-standard trails for all ages and abilities, park management facilities and commercial lodges or resorts as provided for within the unit manngement or site development plan. High intensity activities related to the use of these developed facilities are generally encouraged. Summer and winter off-road vehicles (ORV's) and other motorized recreational vehicles may be allowed in the zone within specifically designated areas or through management techniques such as time and/or space allocations.
NATURAL ZONE	Natural zones are established to provide for moderate- to low-impact and dispersed forms of recreation and to act as buffers between recreational development and wilderness zones. These zones are relatively undeveloped and undisturbed, and are managed to maintain high scenic qualities and to provide visitors with opportunities for significant natural outdoor experiences. An area's natural landscape character is the dominant feature within this zone. Landscape modification may be within this zone. Landscape modification may be allowed to enhance, maintain, or protect the natural setting according to the unit management plan. Use of fire suppression, insect or disease control, or wildlife habitat enhancement as management techniques in natural zones would be defined in the unit management plan.	Developments in a natural zone are intended to provide for the safety of park visitors and to provide for a moderate level of convenience in a high-quality natural setting. Allowable developments include (but are not limited to) backcountry shelters, public-use cabins, high standard hiking and bicycle trails (paved or gravel), bridges and roads where necessary to access development zones and as provided for in an approved management plan. A medium level of activity is encouraged in this zone. Activities include (but are not limited to) hang-gliding, bicycling, backpacking, fishing, hunting, cross-country skiing, camping, sledding, tobogganning, berry picking and rock climbing. Snowmobiles may be allowed in this zone (within specifically designated areas) depending on resource sensitivities and potential conflicts with other park uses. Other private, motorized off-road vehicle use is generally prohibited with this zone.

Source: ADNR 1982c

TABLE E.7.5.1 (Page 2 of 2)

Management Zone	Purpose and Characteristics	Development and Activity Guidelines
BACK COUNTRY/ WILDERNESS ZONE	Wilderness zones are established to promote, to perpetuate and, where necessary, to restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration and primitive recreational opportunities. Wilderness zones are of such size as to maintain the area's wilderness character, are tailored to protect the associated values and, if possible, are defined by watershed boundaries. These zones are characterized by the natural landscape, its vegetation and its geologic forms. Resource modification can occur in this zone only to restore areas to a natural state. Natural processes would be allowed to operate freely to the extent that human safety and public and private property are protected. The use of fire suppression and insect and disease control as management techniques may occur only through the implementation of a plan approved by the director of the Division of Parks. Wildlife habitat enhancement activities, such as vegetation manipulation, may not occur in this zone.	A wilderness zone should have no man-made conveniences within its boundaries except for the most primitive of trails with minimum trail maintenance, bridges, and signing. Developments or other improvements will be undertaken only if it has been determined by the Director of the Division of Parks that significant threats to public safety exist or in order to reduce adverse impacts on the area's resources and values. Access to and within this zone, for other than rescue or management purposes, would be by foot or other non-motorized means except for 1) use of designated aircraft-landing access sites where alternative means of access do not exist, 2) authorized research projects, or 3) situations specifically allowed by law. Aircraft landing for recreational access or research purposes may be restricted by the director as to daily time or season of use. The dropping of people or objects from aircraft is prohibited except by special permit issued by the director. Activities which threaten the character of the wilderness zone would be restricted. If overuse or misuse occurs, the director may restrict entry and use of the area. Methods of restriction may include separation and control of use activities through time and space alloction, use/area rotation schemes, and/or a permit system.

TABLE E.7.5.2: CONSTRUCTION WORK FORCE ESTIMATES

Stage	Stage Years	Peak Work force Year	Workers in Camp Single Status (Peak)	Workers in Camp Single Status (Average Annual for Stage)	Married Workers and* Dependents in Village (Peak)	Married Workers and* Dependents in Village (Average Annual for Stage**)	Total Population On-Site (Peak)	Total Population On-Site (Average Annual for Stage)
Watana I	1991-1999	1997	2,315	880	1,023	396	3,338	1,276
Devil Canyon II	1996-2005	2003	1,412	414	528	152	1,940	566
Watana III	2006-2012	2009	1,383	596	624	294	2,007	890

OPERATION WORK FORCE ESTIMATES AT WATANA

Years	O&M Workers	Dependents *	Population in Permanent Town
1999-2004	87	200	287
2005-2017	92	212	304
2017-	60	138	198

* Each worker is assumed to be accompanied by 2.3 dependents.
** Averages assume 10 to 13 percent of the work force are married with dependents on site.

TABLE E.7.5.3: PROPOSED RECREATION PLAN FOR CONSTRUCTION CAMPS, VILLAGES, AND PERMANENT TOWNSITE (Page 1 of 2)

Proposed Facilities And Activities	Stage I			Stage II		Stage III	
	Watana Single-status Camp 2,315 Workers Peak 1997	Watana Family-status Village 310 Families 1,023 Population Peak 1997	Watana Permanent Townsite 92 Families 304 Population After 1998	Devil Canyon Single-status Camp 1,412 Workers Peak 2003	Devil Canyon Family-Status Village 160 Families 528 Population	Watana Single-status Camp 1383 Workers Peak 2009	Watana Family-status Village 189 Families 624 Population Peak 2009
Indoor Activities							
o Gymnasium							
Basketball/Volleyball	X	X	@ school	X	X		
Track	X	X	@ school	X	X	Same facilities as Stage I - Rehabilitated	
Weight/Exercise Room	X	X	@ school	X	X		
Tennis							
Swimming Pool	X	X	@ school	X	X		
Sauna/Steam Room/Jacuzzi	X	X	@ school	X	X		
Shower/Locker Rooms	X	X	@ school	X	X		
o Recreation Hall							
Movie/Multi-purpose Space	X	X	@ school	X	X		
Lounge/Video Tape Viewing	X	X		X	X		
Game Room-Darts/Video Games/Cards	X	X		X	X		
Hobby Room/Workshop	X	X		X	X		
Community Greenhouse		X			X		
Rest Rooms	X	X		X	X		
Darkroom	X	X		X	X		
o Clubhouse							
Library/Reading Room	X	X	@ school	X	X		
Snack Bar/Vending Machines	X	X		X	X		
Convenience/Sundry Store	X	X	X	X	X		
Post Office	X	X	X	X	X		
Bank	X	X	X	X	X		
Rest Rooms	X	X	X	X	X		

TABLE E.7.5.3 (Page 2 of 2)

Proposed Facilities And Activities	Stage I			Stage II		Stage III	
	Watana Single-status Camp 2,315 Workers Peak 1997	Watana Family-status Village 310 Families 1,023 Population Peak 1997	Watana Permanent Townsite 92 Families 304 Population After 1998	Devil Canyon Single-status Camp 1,412 Workers Peak 2003	Devil Canyon Family-status Village 160 Families 528 Population	Watana Single-status Camp 1,383 Workers Peak 2009	Watana Family-status Village 189 Families 624 Population Peak 2009
Outdoor Activities							
o Developed Facilities							
Softball	X	X	@ school	X	X		
Football/Soccer/Lacrosse	X	X	@ school	X	X		
Basketball/Volleyball	X	X	@ school	X	X	Same Facilities as Stage I - Rehabilitated.	
Tennis	X	X	@ school	X	X		
Picnic/Barbecue Area		X		X			
Playground/Totlot		X	@ school	X			
o Non-Structural Activities							
Ice Skating/Hockey	@ Lakes	@ Lakes	@ Lakes				
Boating	@ Lakes	@ Lakes	@ Lakes				
Hiking/Jogging Trails	X	X	X	X	X		
Regulated Fishing	X	X	X	X	X		
Cross Country Ski Trails	X	X	X	X	X		
Snowshoeing	X	X	X	X	X		
Sledding	X	X	X	X	X		

TABLE E.7.6.1: SUGGESTED INTERPRETIVE PROGRAM THEMES FOR VISITOR CENTERS AND SURROUNDINGS (Page 1 of 2)

INTERPRETIVE THEME AND MEDIA MATRIX P = Primary S = Secondary	Personal or Attended Services								Non-Personal or Unattended Services												
THEME	Entry control station	Information desk	Roving duty	Talks	Walks	Guided tours	Demonstrations	Slide programs	Bulletin board	Films	Slide shows	Indoor exhibits	Outdoor exhibits	Hiking trails	Self-guided trails	Publications	Signs and labels	Radio	T.V.	News releases	Concession staff
Project Purposes			S	S		P		S			S	P				P					
Project Benefits and Impacts			S	S		S		P			S	P				P					
Recreation Opportunities	P	P						P	P	S	S	P	S			P		S	S	S	S
Recreation Facilities, Services and Safety	P	P						P	P		S	P	S			P	P	S	S	S	
Points of Interest	P	P						S	P		S	P			P	S					S
Wildlife Habitat and Food				S	P			S		S					P	P					
Energy Cycles in Natural Communities				S				S		S	S				P						
The Aquatic Environment								S		S					P						
Tundra Ecology				S	P			S		S	S	P		S	P						

TABLE E.7.6.1 (Page 2 of 2)

INTERPRETIVE THEME AND MEDIA MATRIX P = Primary S = Secondary	Personal or Attended Services								Non-Personal or Unattended Services													
THEME	Entry control station	Information desk	Roving duty	Talks	Walks	Guided tours	Demonstrations	Slide programs	Bulletin board	Films	Slide shows	Indoor exhibits	Outdoor exhibits	Hiking trails	Self-guided trails	Publications	Signs and labels	Radio	T.V.	News releases	Concession staff
Historical and Cultural Resources				S	S		S	S			S	P	S			S					
Rules and Regulations	P	P	P					S	P							P	P			S	
Watersheds and Water Quality					S	S							S		S						
Resource Protection			S		S			S	S	S	S	P	P	S	S	P	S	S	S	S	
Wildlife and Fisheries Management				S			S				S	P	S		P			S	S	S	
Glaciers and Their Actions				S				S		P	S	S				P					
Early Man and the Environment				S	S		S	S			S	P	S		S	S					
Archaeology at the Project					S		S	S			S	P	S			S					
Development of Regional Native Cultures				S			S	S				P									

TABLE E.7.7.1: ESTIMATED CAPITAL COSTS OF PROJECT RECREATION PLAN

Recreation Setting	Facilities	1985[3] Unit Cost	1985 Total Cost	Site[2] Total	Phase Total
PHASE ONE					
A - Susitna River/Denali Highway Bridge Boatlaunch	1 Boatlaunch (upgraded)	$40,000	$40,000		
	10 Vehicle/trailer parking spaces	2,000	20,000		
	2 Signs	350	700		
	1 Trash receptable	250	250		
				$60,950	
B - Watana Construction Camp and Townsite Worker Recreation Plan	Recreation facilities for project workers		[1]		
	1.5-Mile primitive trail[2]	1,300/mi	1,950		
	1 Sign, 3 trail markers	950	950		
	2 Scenic pulloffs (4 parking spaces 1 interpretive sign)	8,500	17,000	19,900	
C - Middle Fork Chulitna River/ Caribou Pass Trail	17-Mile primitive trail[2]	1,300/mi	6,500[3]		
	2 Bridges	2,100	4,200		
	4 Trail markers	200	800		
	1 Trailhead[4]	1,300	1,300		
	6 Trailhead parking spaces	2,000	12,000		
				24,800	
D - Project Entry Sign	1 Interpretive sign	5,000	5,000		
	5 Parking spaces	2,000	10,000		
				15,000	
					$120,650

TABLE E.7.7.1 (Page 2 of 5)

Recreation Setting	Facilities	1985[3/] Unit Cost	1985 Total Cost	Site[2/] Total	Phase Total
PHASE TWO					
E - Watana Damsite Temporary Visitor Center and Boat Access	1 Temporary (800 sq ft) visitor exhibit building	$100/sq ft	$ 80,000		
	10 Parking spaces	2,000	20,000		
	Interpretive Exhibits	12,000	12,000		
	0.5-Mile Interpretive Developed Trail	6,500/mi	3,250		
	1 Single vault toilet	12,000	12,000		
	2 Picnic units [5/]	3,500	7,000		
	1 Watana reservoir boat access (10 vehicle/trailer parking spaces, 2 signs, trash can)	21,050	21,050		
	1 Downstream boat access (10 Vehicle/trailer parking spaces, 2 signs, trash can)	21,050	21,050		
				$176,350	
F - Tsusena Creek/Caribou Pass Trail	26-Mile primitive trail[2/]	1,300/mi	33,800		
	4 Trail markers	200	800		
	1 Trailhead[4/]	1,300	1,300		
	5 Trailhead parking spaces	2,000	10,000		
				45,900	
G - Susitna Entrance Campground	10 Developed campsites[6/]	8,000	80,000		
	1 Double vault toilet	16,000	16,000		
	1 Trash dumpster	500	500		
	1 Bulletin board	500	500		
	2 Signs	350	700		
	1 Water well	22,000	22,000		
	0.5-Mile road (14 ft Width)	380,000/mi	190,000		
				309,700	
H - Deadman/Big Lake Trail	4-Mile primitive trail[2/]	1,300/mi	5,200		
	1 Trailhead[4/]	1,300	1,300		
	6 Trailhead parking spaces	2,000	12,000		
				18,500	

TABLE E.7.7.1 (Page 3 of 5)

Recreation Setting	Facilities	1985[3] Unit Cost	1985 Total Cost	Site[2] Total	Phase Total
I - Stephan Lake Portage Campsite					
	8 Semi-primitive campsites	$ 500	$ 4,000		
	2 Signs	350	700		
				$ 4,700	
J - Devil Canyon Construction Camp and Village Worker Recreation Plan	Recreation facilities for Project workers	[1]	[1]		
	1 Scenic pull off (4 parking spaces, 1 interpretive sign)	8,500	8,500		
				8,500	
PHASE THREE					$563,650
K - Devil Canyon Damsite Visitor Center and Boat Access	1 Visitor center (5,000 sq ft)	150/sq.ft	750,000		
	Interpretive program development	75,000	75,000		
	0.75-Mile developed Interpretive trail	6,500/mi	4,875		
	1 Single vault toilet	12,000	12,000		
	3 Picnic units[5]	3,500	10,500		
	1 Picnic shelter	10,000	10,000		
	15 Parking spaces	2,000	30,000		
	5 Signs	350	1,750		
	4 Benches	200	800		
	1 Reservoir boat access (10 Vehicle/trailer parking, 2 Signs, trash can)[7]	21,050[7]	21,050		
	1 Downstream boat access (10 Parking spaces, 2 signs, 1 Trash can)	21,050	21,050		
				937,025	
L - Devil Creek Falls Trail	7-Mile developed trail	6,500/mi	45,500		
	2 Trail markers	200	400		
	1 Bridge	2,100	2,100		
	1 Trailhead[4]	1,300	1,300		
	6 Parking spaces	2,000	12,000		
				63,300	

TABLE E.7.7.1 (Page 4 of 5)

Recreation Setting	Facilities	1985[3/] Unit Cost	1985 Total Cost	Site[2/] Total	Phase Total
M - Tsusena Butte and Tsusena Creek Falls Trails	2.5-Mile developed trail	$ 6,500/mi	$ 16,250		
	9-Mile primitive trails	1,300/mi	5,200		
	5-Mile developed trail	1,300/mi	6,500		
	1 Trailhead	1,300	1,300		
	1 Interpretive sign	500	500		
	8 Parking spaces	2,000	16,000	$45,750	
N - Mermaid Lake Campground	12 Developed campsites	8,000	96,000		
	1 Double vault toilet	6,000	16,000		
	1 Trash dumpster	500	500		
	1 Bulletin board	500	500		
	2 Signs	350	700		
	1 Water well	22,000	22,000		
	0.75 Road (14 ft width)	380,000/mi	285,000		
				420,700	
O - Devil Canyon Dam Overlook	0.75-Mile developed trail	6,500/mi	4,875		
	1 Interpretive sign	500	500		
	1 Bench	200	200		
	1 Trailhead[4/]	1,300	1,300		
	5 Parking spaces	2,000	10,000		
				16,875	
PHASE FOUR					$1,481,650
P - Watana Permanent Visitor Center	1 Visitor center (3,000 sq.ft)	150/sq ft	450,000		
	Interpretive program development	100,000	100,000		
	1-Mile developed interpretive trail	6,500/mi	6,500		
	3 Picnic units[5/]	3,500	10,500		
	1 Picnic shelter	10,000	10,000		
	1 Single vault toilet	12,000	12,000		
	15 Parking spaces	2,000	30,000		
	5 Signs	350	1,750		
	4 Benches	200	800		
				621,550	
					$ 621,550

- Total Construction Cost (1985 $) Phases 1-4 $2,787,500[4/]

Notes:

1/ Costs for worker recreation facilities are included in camp village construction cost.
2/ Primitive trail development cost assumes minor brushing out in areas.
3/ Includes trail construction through public land only. Does not include construction within designated trail easements.
4/ Trailhead includes one sign, trail register, and trash receptacle.
5/ Picnic unit includes four tables, two grills, one trash receptacle.
6/ Developed campsite includes parking space, bumper log, bench, tent pad, table and grill.
7/ Cost for boat access and ramp are included under project cost for haul roads.

TABLE E.7.7.2: ADDITIONAL STAFF REQUIRED AND STAFF EXPENSES TO OPERATE AND MAINTAIN SUSITNA PROJECT RECREATION FACILITIES - 1985 DOLLARS

Phase	Job Class	Annual Cost	Phase Duration	Total Cost[1/]
ONE	No staff,[2/]	---	---	---
TWO	1 Recreation Mgr./ranger, 12 mos.	$33,000		
1998-2008	1 Park Technician, 6 mos.	11,500		
	Uniform Allowance	650		
		45,150		
	Plus 25% Administration Costs	11,200		
		56,350	6 years	$338,100
THREE	1 Park Technician, 6 mos.	11,500		
2008-2014	Uniform Allowance	325		
		11,825		
	Plus 25% Administration Costs	2,925		
		14,750		
		56,350		
	Annual Phase Three Staff	71,100	6 years	426,600
FOUR	1 Ranger, 12 mos.	31,500		
2015-	1 Park Technician, 6 mos.	11,500		
	Uniform Allowance	650		
		43,650		
	Plus 25% Administration Costs	10,900		
		$ 54,550		
		+71,100[4/]		
	Annual Phase Four Staff Cost	125,650	35 years[5/]	4,397,750
	TOTAL			5,162,450[6/]

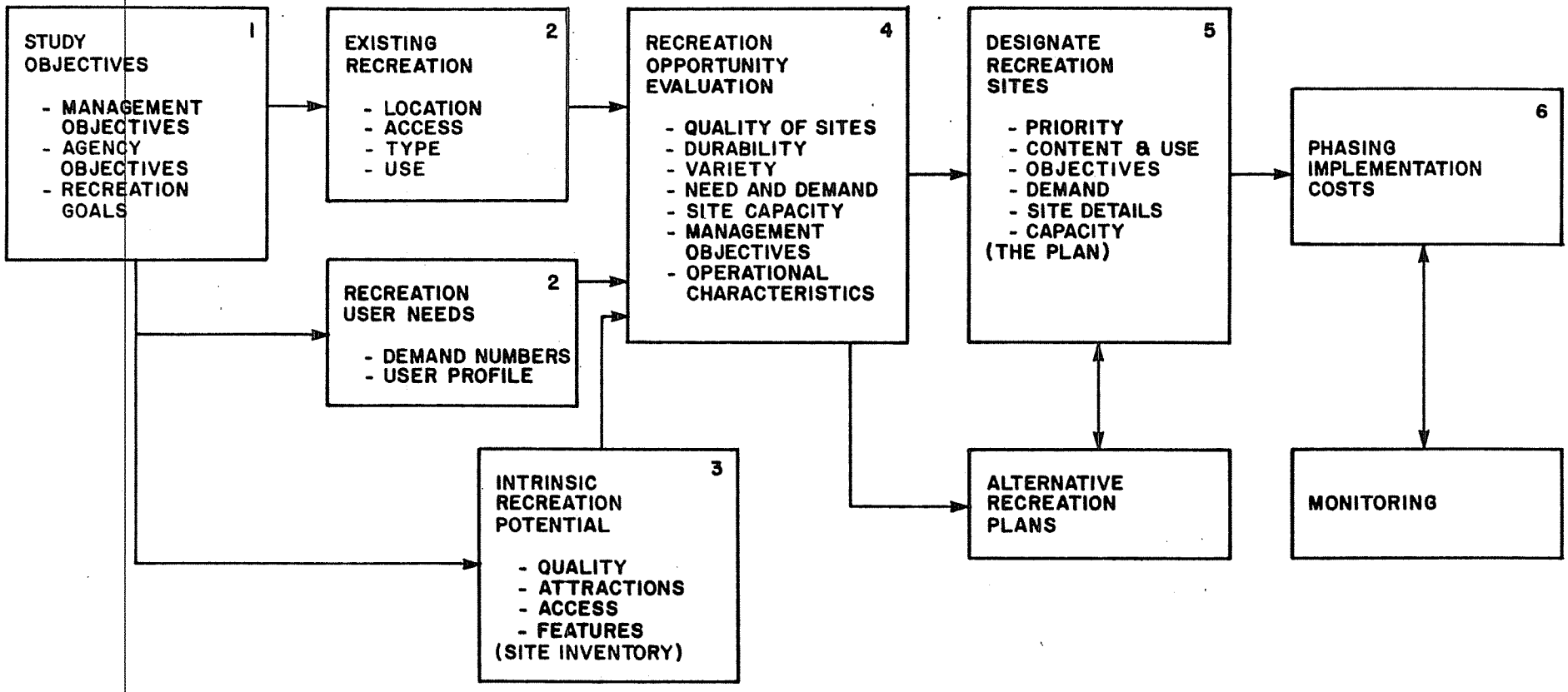
1/ Does not consider cost of inflation
2/ Assumes ADNR and/or BLM staff.
3/ Annual cost for Phase Two.
4/ Annual cost for Phase Three.
5/ Assumes a project life of 50 years starting in 1999.
6/ Does not include $100,000 for survey monitoring.

TABLE E.7.7.3: ADDITIONAL FACILITIES AND EQUIPMENT TO BE PURCHASED FOR OPERATION AND MAINTENANCE AS PART OF THE SUSITNA PROJECT'S RECREATION PLAN* - 1985 DOLLARS

Phase	Facilities and Equipment	Unit Cost	Total Cost
ONE	No additional needed	----	----
TWO	1 pickup	$12,000	$12,000
	Tools	550	550
	Supplies	4,500	4,500
			17,050
THREE	2 pickups	12,000	24,000
	Tools	1,100	1,100
	Supplies	4,500	4,500
			-
			-
			29,600
FOUR	1 pickup	12,000	12,000
	Supplies	4,500	4,500
			16,500
TOTAL			$63,150

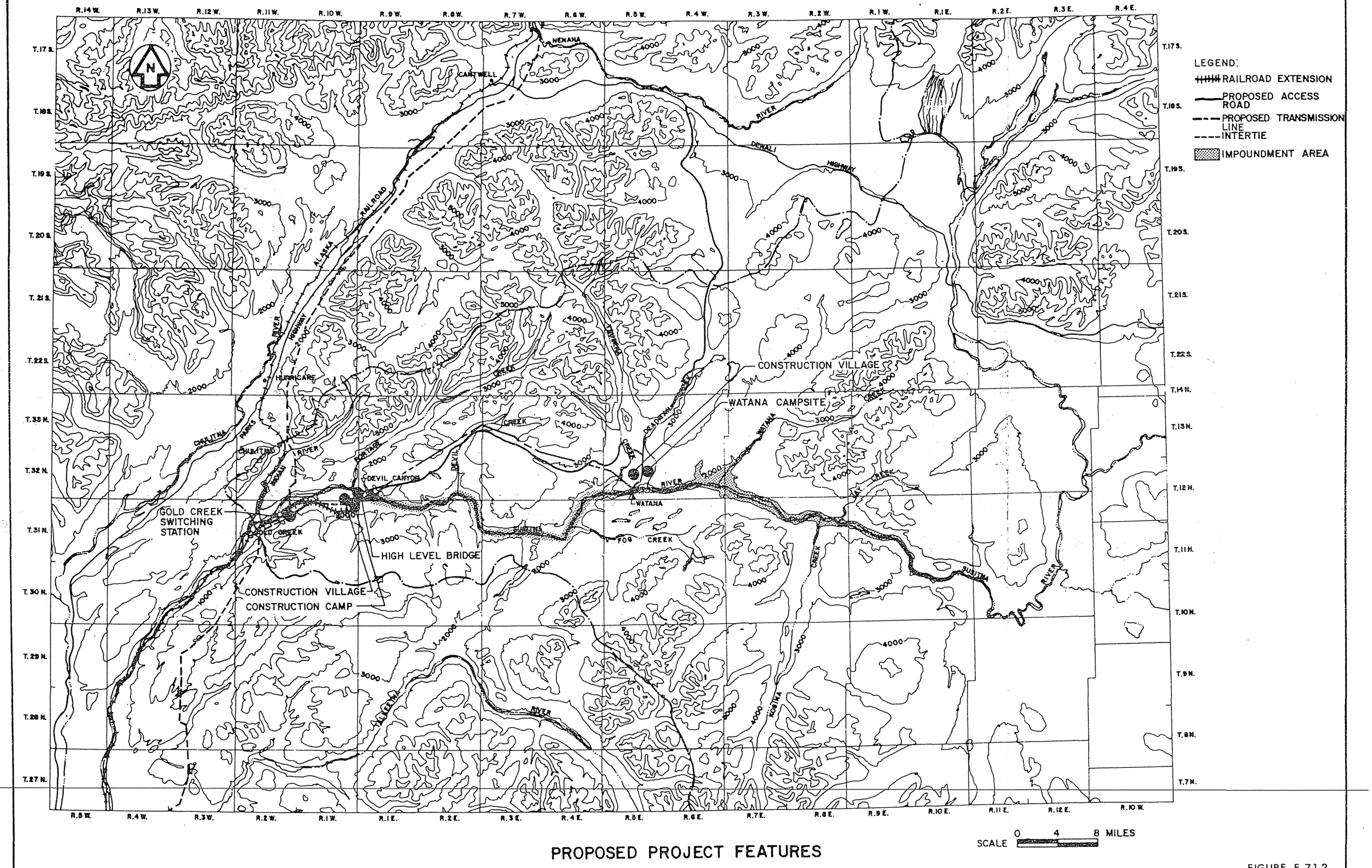
* Approximately 5,000 sq. ft. of management center, shop, and storage space would be provided by the Applicant in project buildings.

FIGURES



STUDY METHODOLOGY

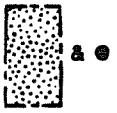
FIGURE E.7.1.1



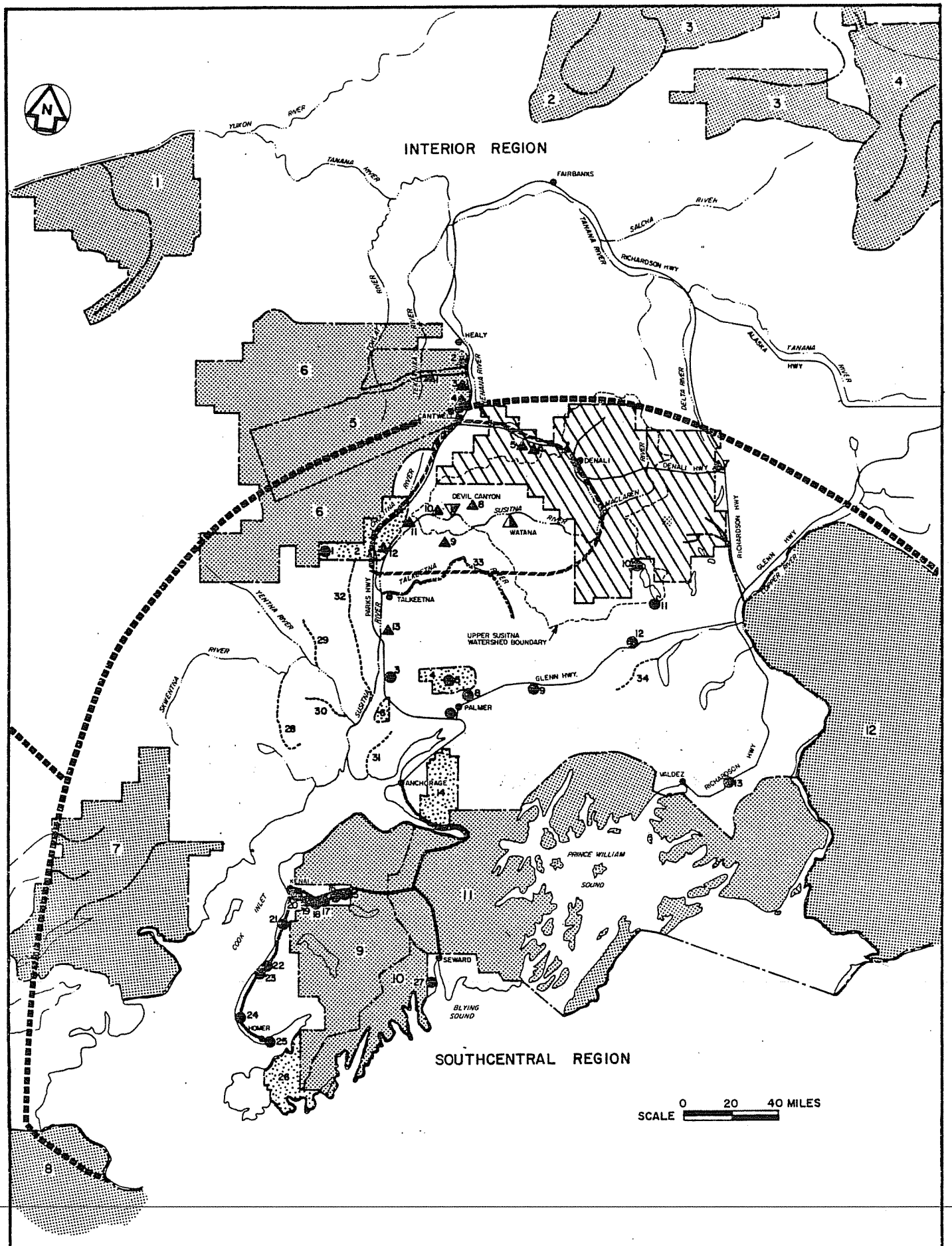
PROPOSED PROJECT FEATURES

FIGURE E.7.1.2

IDENTIFICATION OF EXISTING AND PROPOSED DEVELOPMENTS SHOWN ON REGIONAL RECREATION MAP (FIGURE E.7.2.1)

SYMBOL	SITE DEVELOPMENT
-----	SUSITNA RECREATION STUDY AREA
	NATIONAL PARKS, RECREATIONAL AREAS, FORESTS, WILDLIFE REFUGES, MONUMENTS, PRESERVES, AND CONSERVATION AREAS
1	Kodiak National Wildlife Refuge
2	White Mts. National Recreation Area
3	Steese National Conservation Areas
4	Yukon-Charley Rivers National Preserve
5	Denali National Park
6	Denali National Monument and Preserve
7	Lake Clark National Park and Preserve
8	Katmai National Park and Preserve
9	Kenai National Wildlife Refuge
10	Kenai Fjords National Park
11	Chugach National Forest
12	Wrangell - St. Elias National Park and Preserve
—··—	NATIONAL WILD AND SCENIC RIVERS
	BUREAU OF LAND MANAGEMENT RECREATION AREAS
	DENALI PLANNING BLOCK
*	BRUSHKANA RIVER CAMPGROUND
	STATE RECREATION AREAS, RECREATION SITES, HISTORIC PARKS
	PROPOSED & EXISTING
1	Tokositna Resort (Proposed)
2	Denali State Park (Existing)
3	Willow Creek SRA (Existing)
4	Natcher Pass SRA (Proposed)
5	Independence Mine SHP (Existing)
6	Nancy Lake SRA (Existing)
7	Kelper-Bradley SRA (Existing)
8	Moose Creek SRS (Existing)
9	Matanuslea Glacier SRS (Existing)
10	Susitna Lake - Tyone River SRA (Proposed)

SYMBOL	SITE DEVELOPMENT
11	Lake Louise SRA (Existing)
12	Little Nelchina SRS (Existing)
13	Worthington Glacier SRS (Existing)
14	Chugach State Park (Existing)
15	Izaak - Walton SRS (Existing)
16	Bings Landing SRS (Existing)
17	Ninunqa SHP (Existing)
18	Morgans Landing SRA/Funny River SRS (Existing)
19	Lower Kenai River SRS (Existing)
20	Slikuk SRS (Existing)
21	Cohoe Beach SRS (proposed)
22	Ninilchik SRA (Existing)
23	Deep Creek SRA (Existing)
24	Anchor River SRA (Existing)
25	Homer Spit (Proposed)
26	Kachemak Bay State Park (Existing)
27	Caines Head SRA (Existing)
------	STATE RECREATION RIVERS
28	Tulaculutna
29	Lake Creek
30	Alexander Creek
31	Little Susitna
32	Kroto Creek
33	Talkeetna
34	Nelchina - Tazlina
▲	PRIVATE RECREATIONAL DEVELOPMENT
1	North Face Lodge
2	McKinley Village Motel
3	Grizzly Bear Camper Park
4	Carlo Creek Lodge
5	Gracious House Cabins
6	Adventures Unlimited
7	Summit Lake Lodge
8	Tsusena Creek Lodge
9	Stephan Lake Lodge
10	High Lake Lodge
11	Chulitna River Lodge
12	Mt. McKinley View Lodge
13	Montana Creek Lodge



EXISTING AND PROPOSED REGIONAL RECREATION MAP

FIGURE E.7.2.1

RECREATION ACTIVITIES:

- HIKING
- CROSS COUNTRY SKIING
- DOG SLEDDING
- BOATING
- ROCK HUNTING
- BERRY PICKING
- CAMPING
- SNOW MACHINING
- TAKE-OUT POINT
- HUNTING
- SNOWSHOEING
- PUT-IN POINT
- FISHING
- MOUNTAINEERING
- PHOTOGRAPHY
- FLYING
- OFF-ROAD DRIVING
- SHELTER
- BIRD WATCHING
- HORSEBACK RIDING

WILDLIFE CONCENTRATIONS:

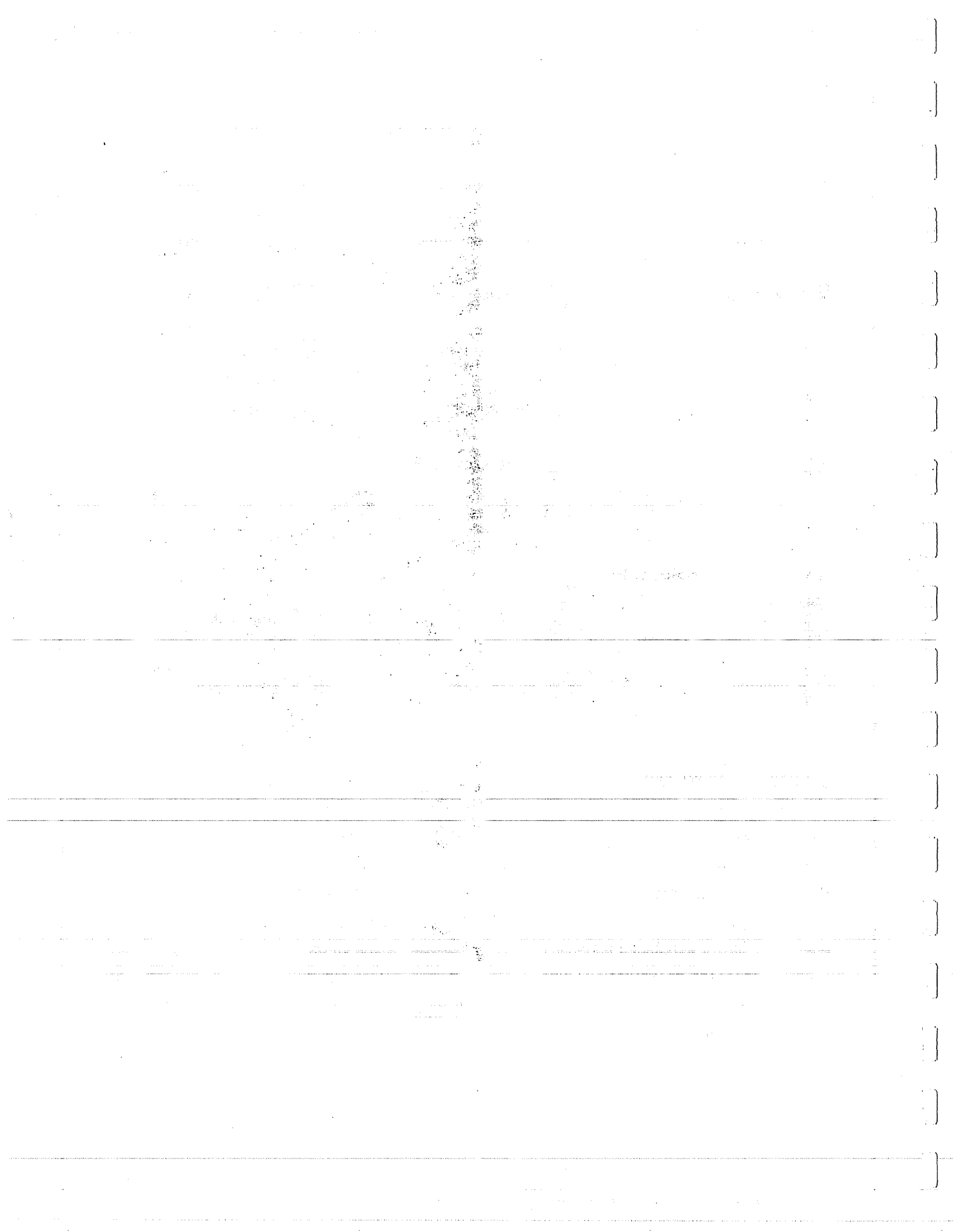
- MOOSE
- SHEEP
- BROWN BEAR
- CARIBOU
- WATER FOWL
- BLACK BEAR

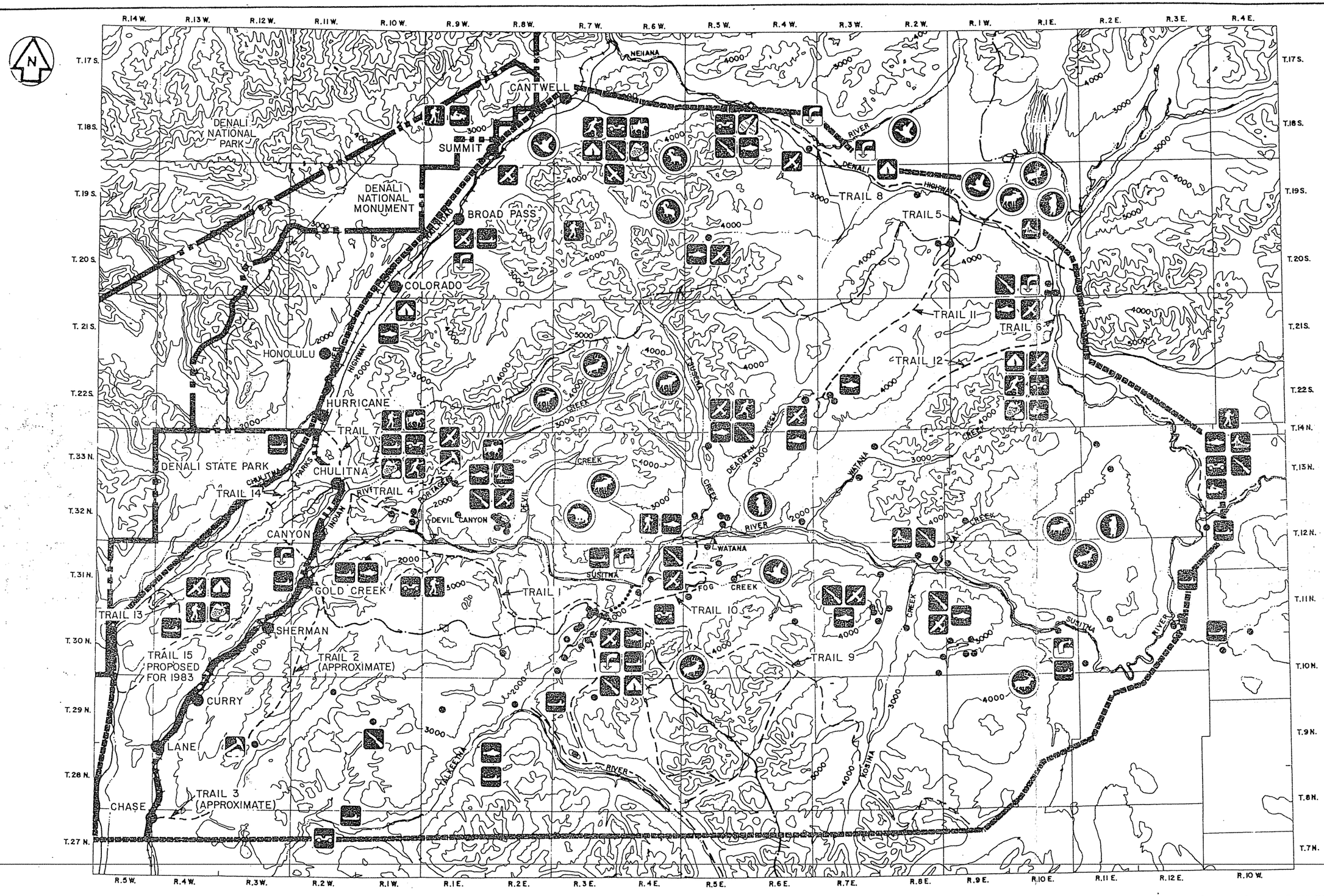
LANDSCAPE FEATURES:

- WATERWAYS
- RAILROADS
- EXISTING ROADS
- PROPOSED ROADS
- TRAILS
- SUSITNA WATERSHED BOUNDARY
- PROPOSED TRANSMISSION LINES
- LIMITS OF RECREATION STUDY
- PARK BOUNDARIES
- PORTAGE TRAIL
- TOWNS
- STRUCTURES
- BUILDING CLUSTERS
- HIGH POINTS
- MINOR VIEWS
- MAJOR VIEWS
- SIGNIFICANT LANDSCAPE SETTINGS

RECREATION LEGEND

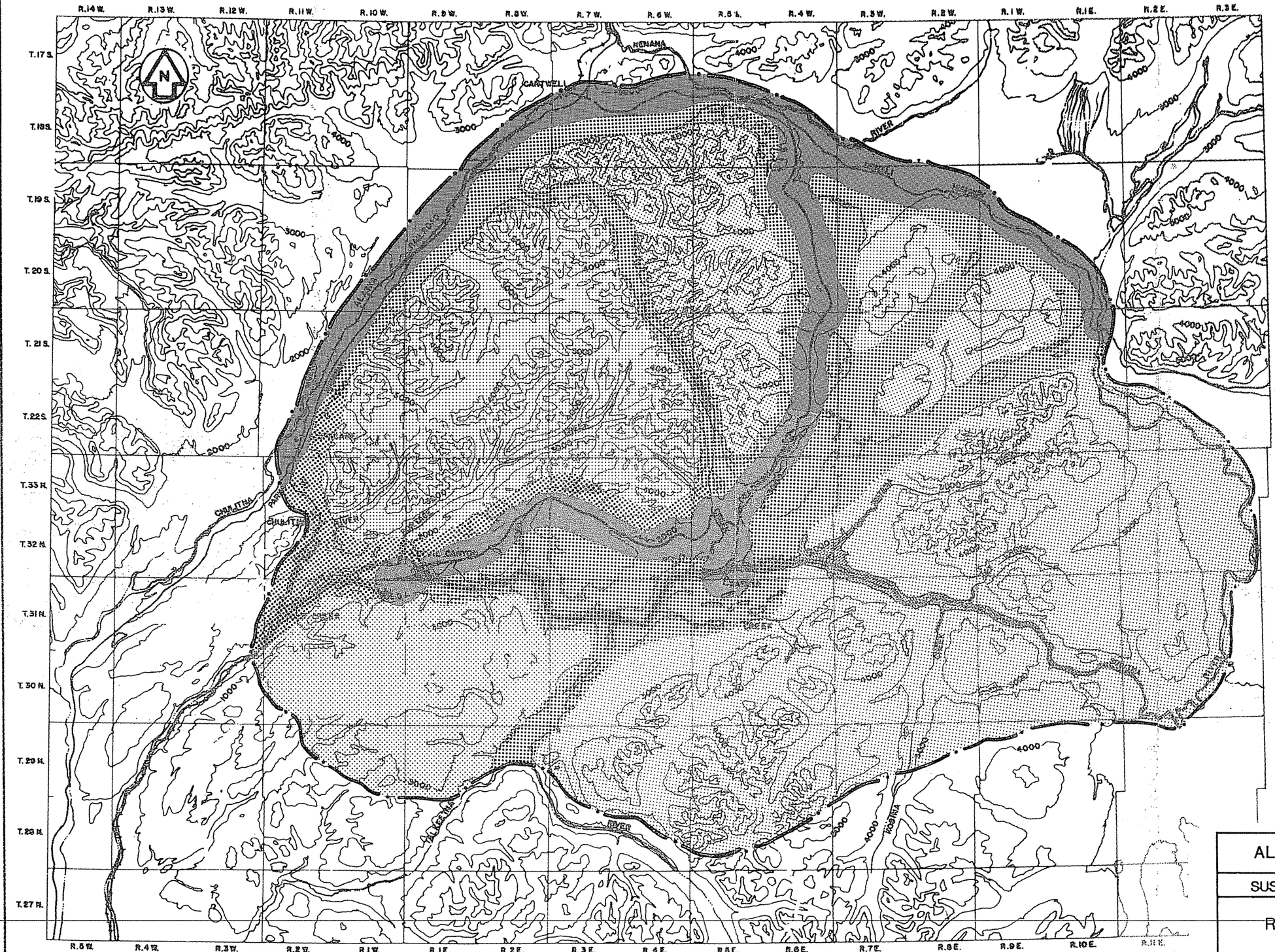
FIGURE E.7.2.2





EXISTING RECREATION

FIGURE E.7.2.2.



RECREATIONAL DEVELOPMENT ZONE

NATURAL ZONE

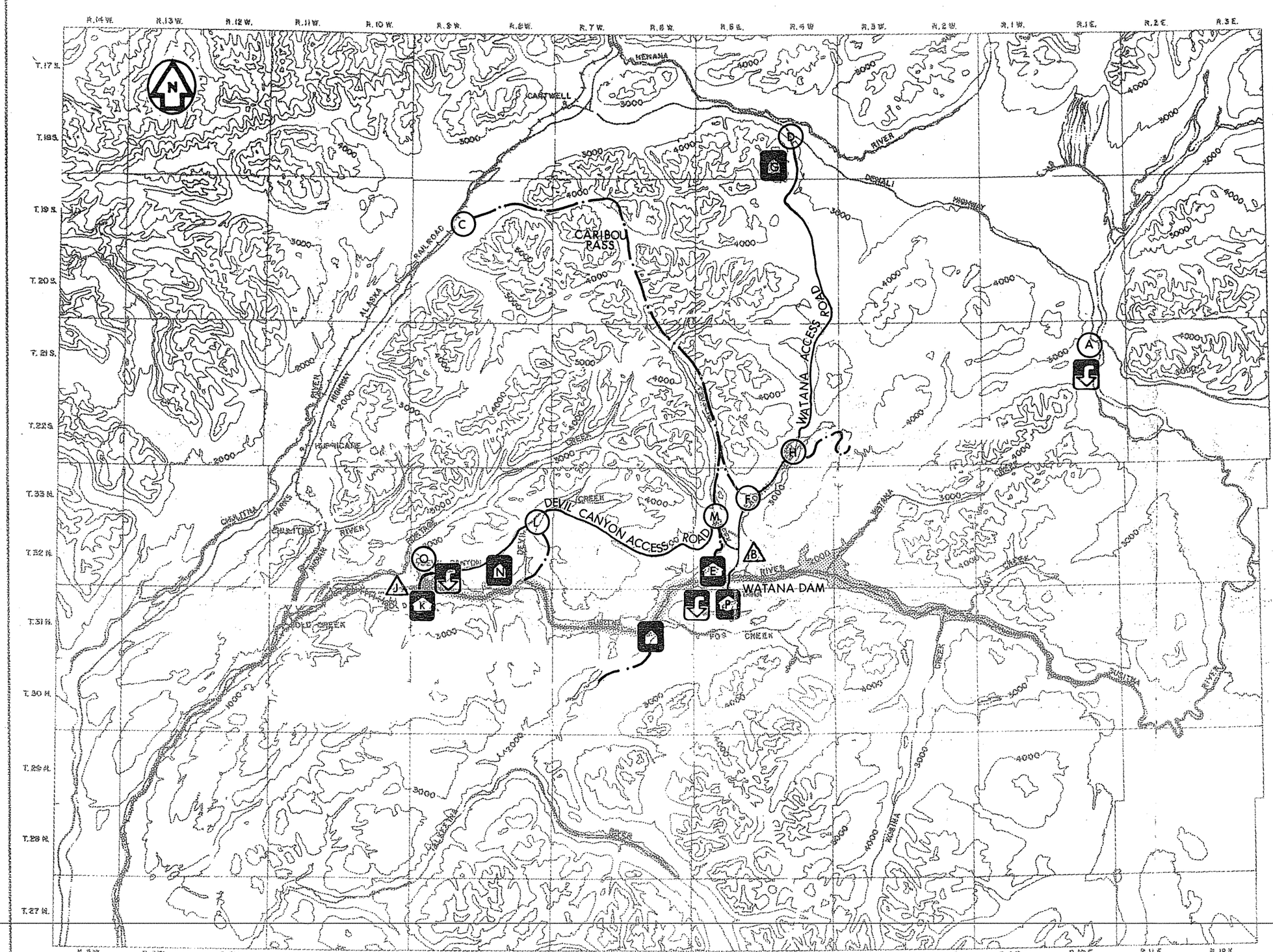
BACKCOUNTRY WILDERNESS ZONE

PROPOSED ACCESS ROAD

PROJECT RECREATION STUDY AREA BOUNDARY

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
RECREATION MANAGEMENT CONCEPT

FIGURE E.7.5.1



LEGEND

- PARKING/TRAILHEAD
- TRAIL
- BOAT LAUNCH / TAKE-OUT
- CAMPGROUND
- VISITORS CENTER
- WORKER RECREATION FACILITIES

RECREATION FACILITIES

PHASE 1

- A. SUSITNA RIVER/DENALI HIGHWAY BRIDGE BOAT LAUNCH
- B. WATANA CONSTRUCTION CAMP AND TOWNSITE WORKER RECREATION PLAN
- C. MIDDLE FORK CHULITNA RIVER/CARIBOU PASS TRAIL
- D. SUSITNA PROJECT ENTRY

PHASE 2

- E. WATANA TEMPORARY VISITOR CENTER AND BOAT ACCESS
- F. TSUSENA CREEK/CARIBOU PASS TRAIL
- G. SUSITNA ENTRANCE CAMPGROUND
- H. DEADMAN / BIG LAKE TRAIL
- I. STEPHAN LAKE PORTAGE CAMPSITE
- J. DEVIL CANYON CONSTRUCTION CAMP AND VILLAGE WORKER RECREATION PLAN

PHASE 3

- K. DEVIL CANYON DAMSITE VISITOR CENTER AND BOAT ACCESS
- L. DEVIL CREEK FALLS TRAIL
- M. TSUSENA BUTTE AND TSUSENA CREEK FALLS TRAIL
- N. MERMAID LAKE CAMPGROUND
- O. DEVIL CANYON DAM OVERLOOK

PHASE 4

- P. WATANA PERMANENT VISITOR CENTER

FIGURE E.7.5.2

O PHASE 2
DEVIL CANYON
DAM OVERLOOK

K PHASE 4
DEVIL CANYON
DOWNSTREAM
BOAT LAUNCH

J PHASE 3
DEVIL CANYON
CAMP/VILLAGE
WORKER RECREATION PLAN

K PHASE 4
DEVIL CANYON
RESERVOIR
BOAT LAUNCH

K PHASE 4
DEVIL CANYON
VISITOR CENTER

Dawn Lakes

Trailhead

Trailhead

Devil Canyon Dam

High Bridge

Village

Camp

Trailhead

Railhead

Switching Station

Railroad Spur

Transmission Line

Gaging Sta

Gold Creek

Mile 265

Canyon

RIVER

SUSITNA

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING / ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

LETTERS AND PHASE NUMBERS REFER TO LIST OF RECREATION FACILITIES ON TABLE E.7.7.1.

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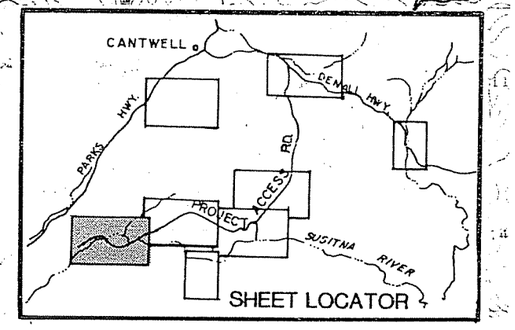

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

HARZA-EBASCO SUSITNA JOINT VENTURE	APPROVED	
ANCHORAGE, ALASKA	DATE 7/19/85	DRAWING NO E.7.5.3

Trailhead

Transmission Line

Swimming Bear Lake Viewpoint

PHASE 3
Devil Creek Falls Trail

PHASE 3
Mermaid Lake Campground

High Lake

Viewpoint

Viewpoint

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING / ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

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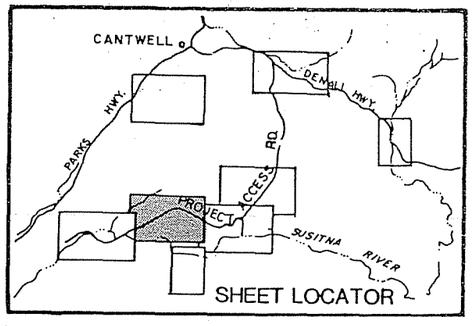


SHEET LOCATOR

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

HARZA-EBASCO SUSITNA JOINT VENTURE	APPROVED	
ANCHORAGE, ALASKA	DATE 7/19/85	DRAWING NO. E.7.5.4

M PHASE 3
Tsusena Creek Trail

M PHASE 3
Tsusena Butte Trail

F PHASE 2
Tsusena Creek/ Caribou Pass Trail

Trailhead

Trailhead/Viewpoint

AIRSTRIP

Deadman Creek

Viewpoint

M PHASE 3
Tsusena Creek Falls Trail

Transmission Line

C PHASE 1
Watana Camp/ Village Worker Recreation Plan

B PHASE 1
Deadman Creek Falls Trail

Tsusena Falls

E PHASE 2
Watana Temporary Visitor Center

E PHASE 2
Watana Dam Boat Launch

Switchyard

SUSITNA RIVER

Watana Dam

E PHASE 2
Downstream Boat Launch

Viewpoint

P PHASE 4
Watana Permanent Visitors Center

P PHASE 4
Visitor Center Interpretive Trail

FOG LAKES

N

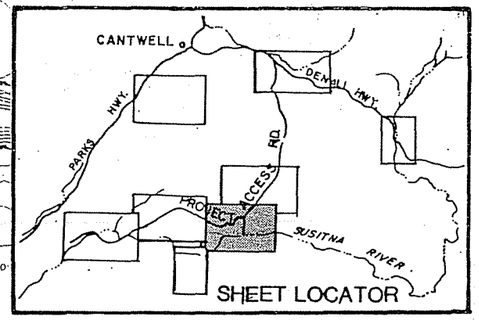
0 5 mi 1

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING / ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

LETTERS AND PHASE NUMBERS REFER TO LIST OF RECREATION FACILITIES ON TABLE E.7.7.1.

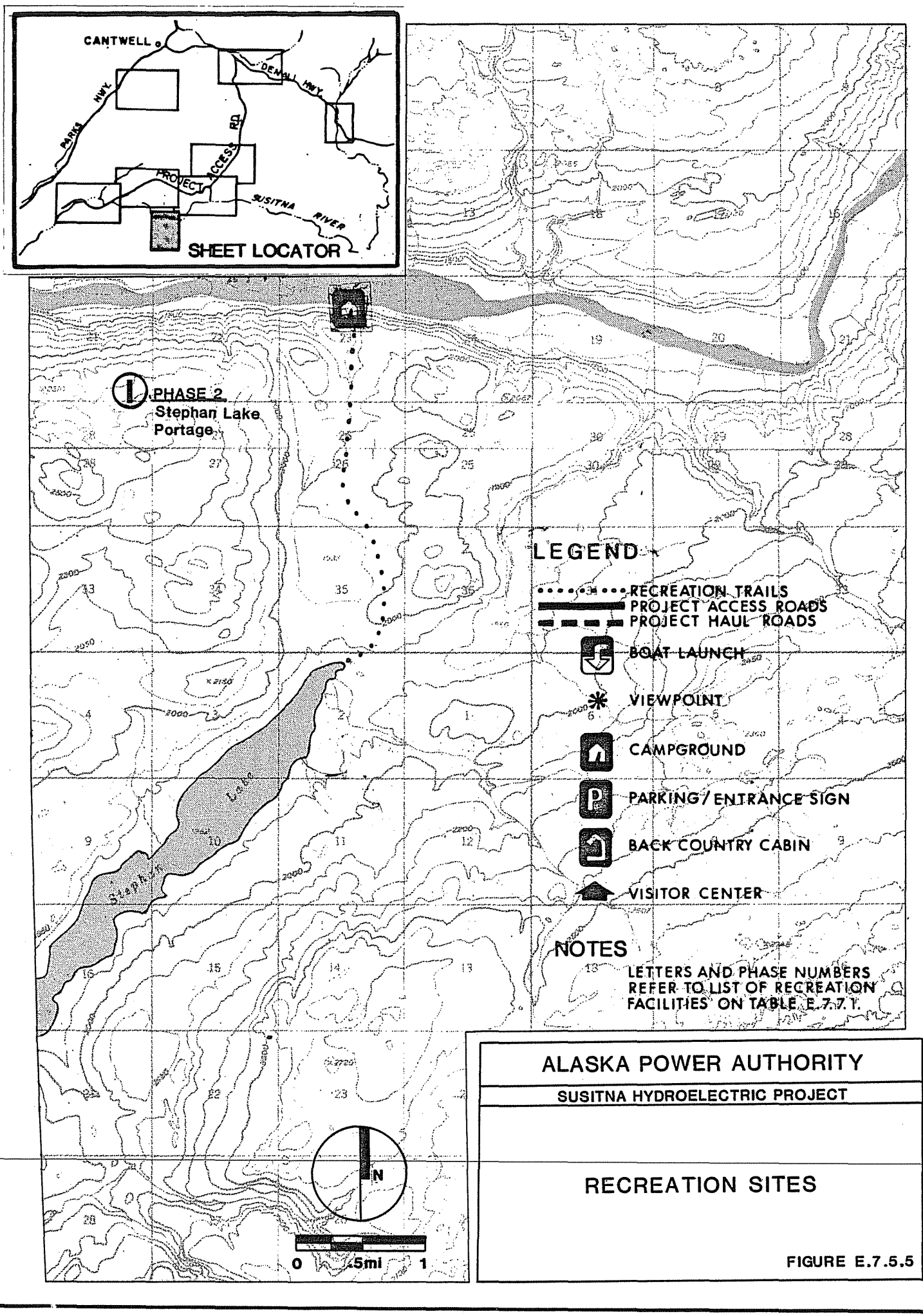


ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

HARZA-EBASCO SUSITNA JOINT VENTURE	APPROVED	
ANCHORAGE, ALASKA	DATE 7/19/85	DRAWING NO. E.7.5.6



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

FIGURE E.7.5.5

To Caribou Pass

CANTWELL

DENALI HWY.

PARKS HWY.

ACCESS RD.

PROJECT

SUSITNA RIVER

SHEET LOCATOR

F PHASE 2
Tsusena Creek / Caribou Pass Trail

H PHASE 1
Deadman/Big Lake Trail

Trailhead

Deadman Lake

Big Lake

Murphy Lake

Deadman Creek

Tsusena Creek

Tsusena Butte Viewpoint

Tsusena Butte

F PHASE 2
Tsusena Creek / Caribou Pass Trail

M PHASE 3
Tsusena Creek Trail

M PHASE 3
Tsusena Butte Trail

Trailhead

Trailhead

To Tsusena Creek Falls

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING / ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

LETTERS AND PHASE NUMBERS REFER TO LIST OF RECREATION FACILITIES ON TABLE E.7.7.1.

0 .5 mi 1

ALASKA POWER AUTHORITY		
SUSITNA HYDROELECTRIC PROJECT		
RECREATION SITES		
HARZA-EBASCO SUSITNA JOINT VENTURE	APPROVED	
ANCHORAGE, ALASKA	DATE 7/19/85	DRAWING NO. E.7.5.7

1 PHASE 1 SUSITNA PROJECT ENTRY

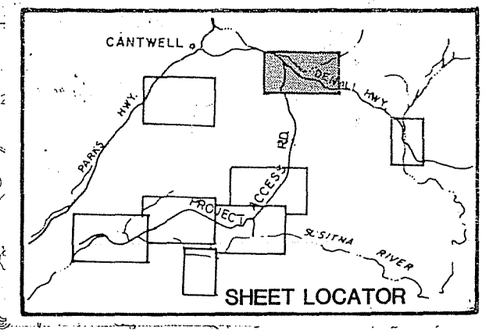
2 PHASE 2 SUSITNA ENTRANCE CAMPGROUND

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING / ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

LETTERS AND PHASE NUMBERS REFER TO LIST OF RECREATION FACILITIES ON TABLE E.7.7.1.



SHEET LOCATOR

0 .5 mi 1

ALASKA POWER AUTHORITY		
SUSITNA HYDROELECTRIC PROJECT		
RECREATION SITES		
HARZA-EBASCO SUSITNA JOINT VENTURE	APPROVED	
ANCHORAGE, ALASKA	DATE 7/19/85	DRAWING NO. E.7.5.8

PHASE 1
Middle Fork
Chulitna River/
Caribou Pass Trail

Trailhead

PHASE 2
Tsusena Creek
Caribou Pass
Trail

To Tsusena Creek
Trailhead (Figure
E.7.5.3.0-7)

Caribou Pass

Mile 309

VABM 2345 Pass

VABM 2296

VABM 2236 Trestle

VABM Broad Pass NB Base 2174

VABM 5603 Pass

VABM 5112 Lima

GLO Corner

Middle Fork Chulitna River

Coal Creek

Caribou Pass

ALASKA RAILROAD

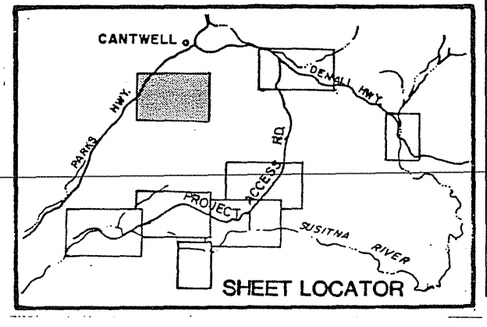
Summit

LEGEND

- RECREATION TRAILS
- PROJECT ACCESS ROADS
- PROJECT HAUL ROADS
- BOAT LAUNCH
- VIEWPOINT
- CAMPGROUND
- PARKING/ENTRANCE SIGN
- BACK COUNTRY CABIN
- VISITOR CENTER

NOTES

LETTERS AND PHASE NUMBERS REFER TO LIST OF RECREATION FACILITIES ON TABLE E.7.1.1.

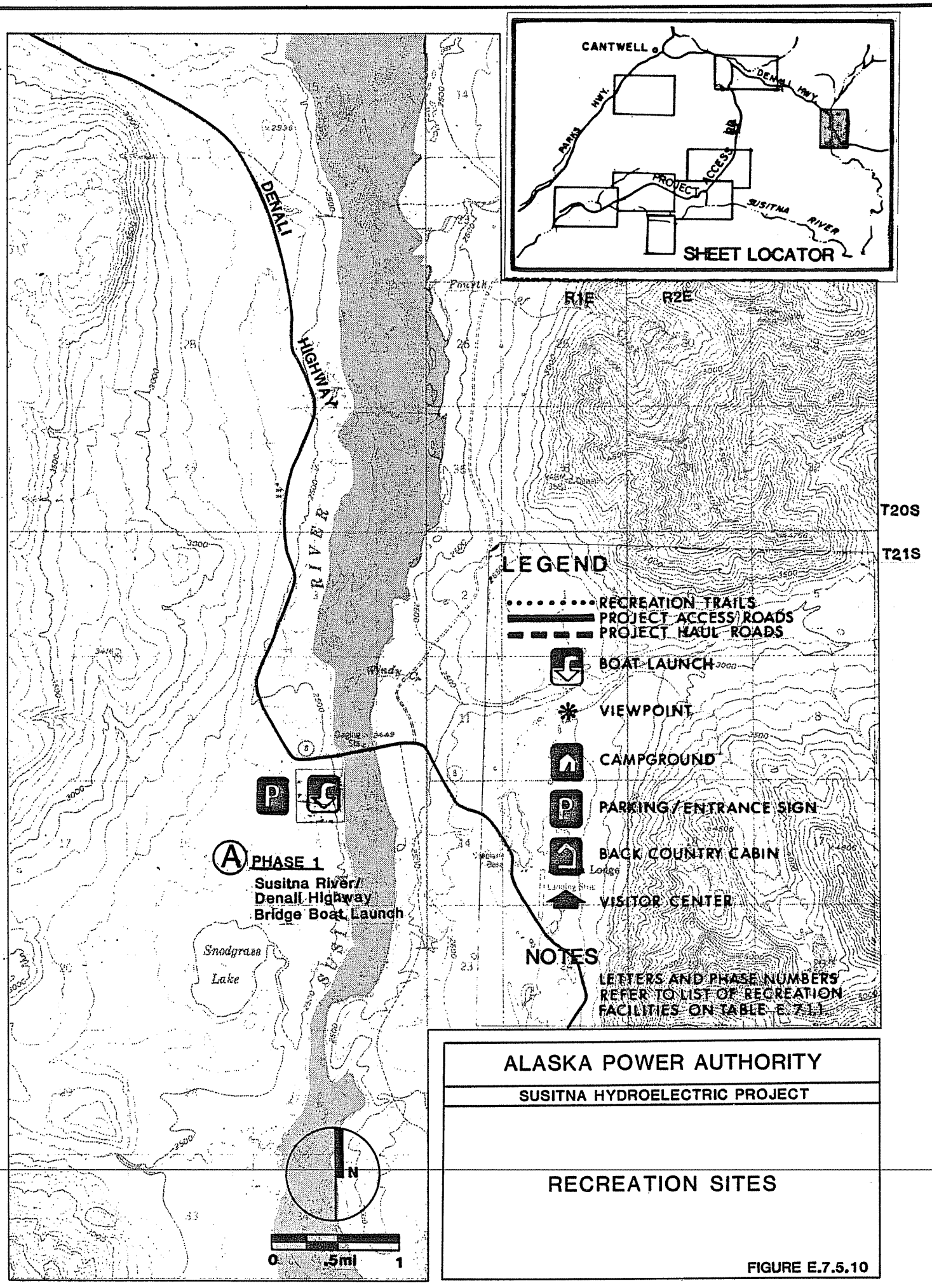


ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

FIGURE E.7.5.9



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

RECREATION SITES

FIGURE E.7.5.10

APPENDICES

APPENDIX E1.7
DATA ON REGIONAL RECREATION FACILITIES

EXHIBIT E - CHAPTER 7

APPENDIX E1.7

DATA ON REGIONAL RECREATIONAL FACILITIES

TABLE E1.7.1: DATA ON REGIONAL RECREATIONAL FACILITIES (Page 1 of 7)

Existing Site Development	Location (a)	Managing Agency	Area	Accommodations
Susitna Area Recreation Developments				
High Lake Lodge and Airstrip	5 kilometers (3 miles) N.E. of Devil Canyon damsite at High Lake	Private	111 acres	8 units or 15 people
Stephan Lake Lodge and Airstrip	16 km (10 miles) S.W. of Watana damsite at Stephan Lake	Private	42 acres	24 units or 45 people
Tsusena Lake Lodge and Airstrip	16 km (10 miles) N.W. of Watana damsite at Tsusena Lake	Private	49 acres	8 units or 15 people
Denali Highway Recreation Development				
Denali Planning Block		Bureau of Land Management	4,500,000 acres	
Brushkana River Campground	Denali Highway, Mile 105	Bureau of Land Management	47 acres	33 campsites
Clearwater Creek Camping Area	Denali Highway, Mile 55.9	Bureau of Land Management	25 acres	No development
Tangle Lakes Campgrounds and Boat Launch	Denali Highway, Mile 21.5	Bureau of Land Management	47 acres	13 campsites
Upper Tangle Lakes Campground and Boat Launch	Denali Highway, Mile 21.7	Bureau of Land Management	25 acres	7 campsites
Adventures Unlimited Lodge & Cafe	Denali Highway, Mile 100	Private (b)	Unknown	Unknown
Gracious House Cabins, Cafe, Guide Services	Denali Highway, Mile 82	Private	Unknown	Unknown
Parks Highway Recreation Areas				
Mt. McKinley View Lodge	Parks Highway, Mile 325.8	Private	Unknown	Unknown
McKinley KOA	Parks Highway, Mile 248	Private	Unknown	70 campsites
Denali National Park and Preserve	Parks Highway, Mile 237.7	National Park Service	5.7 m. acres	228 campsites

TABLE E1.7.1 (Page 2 of 7)

Existing Site Development	Location (a)	Managing Agency	Area	Accommodations
Parks Highway Recreation Areas (Cont'd)				
A Riley Creek Campground B Morino Campground C Savage River Campground D Sanctuary River Campground E Teklanika River F Igloo Creek Campground G Wonder Lake Campground				
McKinley Village Motel, Restaurant	Parks Highway, Mile 231.1	Private	Unknown	Unknown
North Face Lodge	Mt. McKinley Park Road	Private	Unknown	15 campsites
Grizzly Bear Camper Park Campground, Raft Trips	Parks Highway, Mile 231.1	Private	Unknown	Unknown
Carlo Creek Lodge	Parks Highway, Mile 223.9	Private	Unknown	Unknown
East Fork Rest Area	Parks Highway, Mile 185.7	Alaska Division of Parks	Unknown	Unknown
Denali State Park	Parks Highway, Mile 132 to 169	Alaska Division of Parks	421,120 acres	Unknown
Tokositna Resort	Parks Highway, West of Mile 135	Alaska Division of Parks	43,240 acres	Unknown
Byers Lake Rest Area	Parks Highway, Mile 147.2	Alaska Division of Parks	Unknown	Unknown
Byers Lake Wayside	Parks Highway, Mile 147	Alaska Division of Parks	Unknown	61 campsites 15 picnic sites
Chulitna River Lodge & Cafe Cabins, Fly-in Fishing, Glacier Trips, Raft Trips	Parks Highway, Mile 156.2	Private	Unknown	Unknown
Mt. McKinley View Lodge	Parks Highway, Mile 134.5	Private	Unknown	Unknown
Montana Creek Lodge Campground, Cabins	Parks Highway, Mile 96.5	Private	Unknown	Unknown
Willow Creek Recreation Area	Parks Highway, Mile 71.2	Alaska Division of Parks	97 hectares (240 acres)	Unknown
Willow Creek Wayside	Parks Highway, Mile 71.2	Alaska Division of Parks	90 acres	17 campsites

Existing Site Development	Location (a)	Managing Agency	Area	Accommodations
Parks Highway Recreation Areas (Cont'd)				
Nancy Lake Recreation Area	Parks Highway, Mile 67.2	Alaska Division of Parks	22,685 acres	136 campsites
Nancy Lake Wayside	Parks Highway, Mile 66.6	Alaska Division of Parks	35 acres	30 campsites 30 picnic sites
South Rolly Lake Campground	Parks Highway, Mile 67	Alaska Division of Parks	Unknown	106 campsites 20 picnic sites
Houston Campground	Parks Highway, Mile 57.3	Community of Houston	80 acres	42 campsites
Big Lake, South and East Waysides	Parks Highway, Mile 52.3	Alaska Division of Parks	35 acres	28 campsites 8 picnic sites
Finger Lake Wayside Restaurant	Parks Highway, North of Wasilla	Alaska Division of Parks	47 acres	14 campsites
Rocky Lake Wayside	Parks Highway, Mile 52.3	Alaska Division of Parks	48 acres	10 campsites
Recreation Areas Along the Glenn Highway				
Lake Louise Recreation Area	Glenn Highway, Mile 157	Alaska Division of Parks	90 acres	Unknown
Lake Louise Wayside	Glenn Highway, West of Glennallen	Alaska Division of Parks	50 acres	6 campsites
Tolsona Creek Wayside	Glenn Highway, Mile 172.5	Alaska Division of Parks	600 acres	5 campsites
Little Nelchina Wayside	Glenn Highway, Mile 137.4	Alaska Division of Parks	22 acres	6 campsites
Matanuska Glacier Wayside	Glenn Highway, Mile 101	Alaska Division of Parks	231 acres	6 campsites
Long Lake Recreation Area	Glenn Highway, Mile 85	Alaska Division of Parks	480 acres	Unknown
Long Lake Wayside	Glenn Highway, East of Palmer	Alaska Division of Parks	372 acres	8 campsites

TABLE E1.7.1 (Page 4 of 7)

Existing Site Development	Location (a)	Managing Agency	Area	Accommodations
Recreation Areas Along the Glenn Highway (Cont'd)				
Bonnie Lake Recreation Area	Glenn Highway, Mile 82.5	Alaska Division of Parks	129 acres	Unknown
Bonnie Lake Wayside	Glenn Highway, Northeast of Palmer	Alaska Division of Parks	31 acres	8 campsites
King Mountain Wayside	Glenn Highway, Mile 76.1	Alaska Division of Parks	20 acres	22 campsites 2 picnic sites
Moose Creek Wayside	Glenn Highway, Mile 54.7	Alaska Division of Parks	40 acres	8 campsites
Mirror Lake Wayside	Glenn Highway, Mile 23.5	Alaska Division of Parks	90 acres	30 campsites
Peters Creek Wayside	Glenn Highway, Mile 21.5	Alaska Division of Parks	52 acres	32 campsites
Richardson Highway Recreation Areas				
Black Rapids Picnic Area	Richardson Highway, Mile 225.4	Alaska Department of Transportation	Unknown	Unknown
Summit Lake Lodge - Motel, Restaurant, Airstrip, Guide Service	Richardson Highway, Mile 195	Private	Unknown	Unknown
Paxson Lake Wayside	Richardson Highway, Mile 179.4	Bureau of Land Management	4 acres	4 campsites
Paxson Lake Campground and Boat Cavern	Richardson Highway, Mile 175	Bureau of Land Management	40 acres	20 campsites
Dry Creek Recreation Area	Richardson Highway, Mile 117.5	Alaska Division of Parks	372 acres	Unknown
Dry Creek Wayside	Richardson Highway, Northeast of Glennallen	Alaska Division of Parks	128 acres	58 campsites 4 picnic sites
Sourdough Creek Campground	Richardson Highway, Mile 147.4	Alaska Division of Parks	160 acres	20 campsites

TABLE E1.7.1 (Page 5 of 7).

Existing Site Development	Location (a)	Managing Agency	Area	Accommodations
Other Existing Recreation in the Region				
Chugach State Park	East of Anchorage	Alaska Division of Parks	495,000 acres	Unknown
Knik Wayside	Approx. 64 km (40 miles) North of Anchorage	Unknown	40 acres	Unknown
Talkeetna Riverside Boat Launch	Talkeetna	U.S. Coast Guard	2 acres	Unknown
Independence Mine Historic Area	Hatcher Pass Road	Alaska Division of Parks	271 acres	Undeveloped

TABLE E1.7.1 (Page 6 of 7)

Site Location or Existing Site Development	Location (a)	Managing Agency	Proposed Action
Denali State Park	Parks Highway	Alaska Division of Parks	Implemented Site Plan Expand trail system further studies
Tokositna Resort	Off the Parks Highway	Alaska Division of Parks	Implemented Site Plan Expand trail system further studies
Lake Louise	Off the Glenn Highway	Alaska Division of Parks	Expand 350 acres, implement master plan
Susitna Lake and Tyone River	Off the Glenn Highway	Alaska Division of Parks	Designate river corridor and develop plan
Talkeetna River	Off the Parks Highway	Alaska Division of Parks	Designate river corridor and develop plan
Moose Creek State Recreation Site (existing)	Glenn Highway	Alaska Division of Parks	Implemented site plan
Matanuska Glacier State Recreation Site (existing)	Glenn Highway near Palmer	Alaska Division of Parks	Implemented site plan
Kepler-Bradley State Recreation Area (existing)	Glenn Highway	Alaska Division of Parks	Acquire 330 acres and develop
Independence Mine State Historic Park (existing)	Willow Creek Road	Alaska Division of Parks	Develop existing 271 acres, acquire and develop additional area
Hatcher Pass State Recreation Area (proposed)	Hatcher Pass Road	Alaska Division of Parks	Acquire land and develop
Nancy Lake State Recreation Area (existing)	Parks Highway	Alaska Division of Parks	Acquire additional 150 acres, and trail 12 O.W. expand development particularly winter recreation opportunities
Willow Creek State Recreation Area (existing and proposed)	Parks Highway	Alaska Division of Parks	Upgrade existing site
Iditarod Trail (existing)	Alaska Range west of Anchorage	Alaska Division of Parks	Acquire property and implement plans

TABLE E1.7.1 (Page 7 of 7)

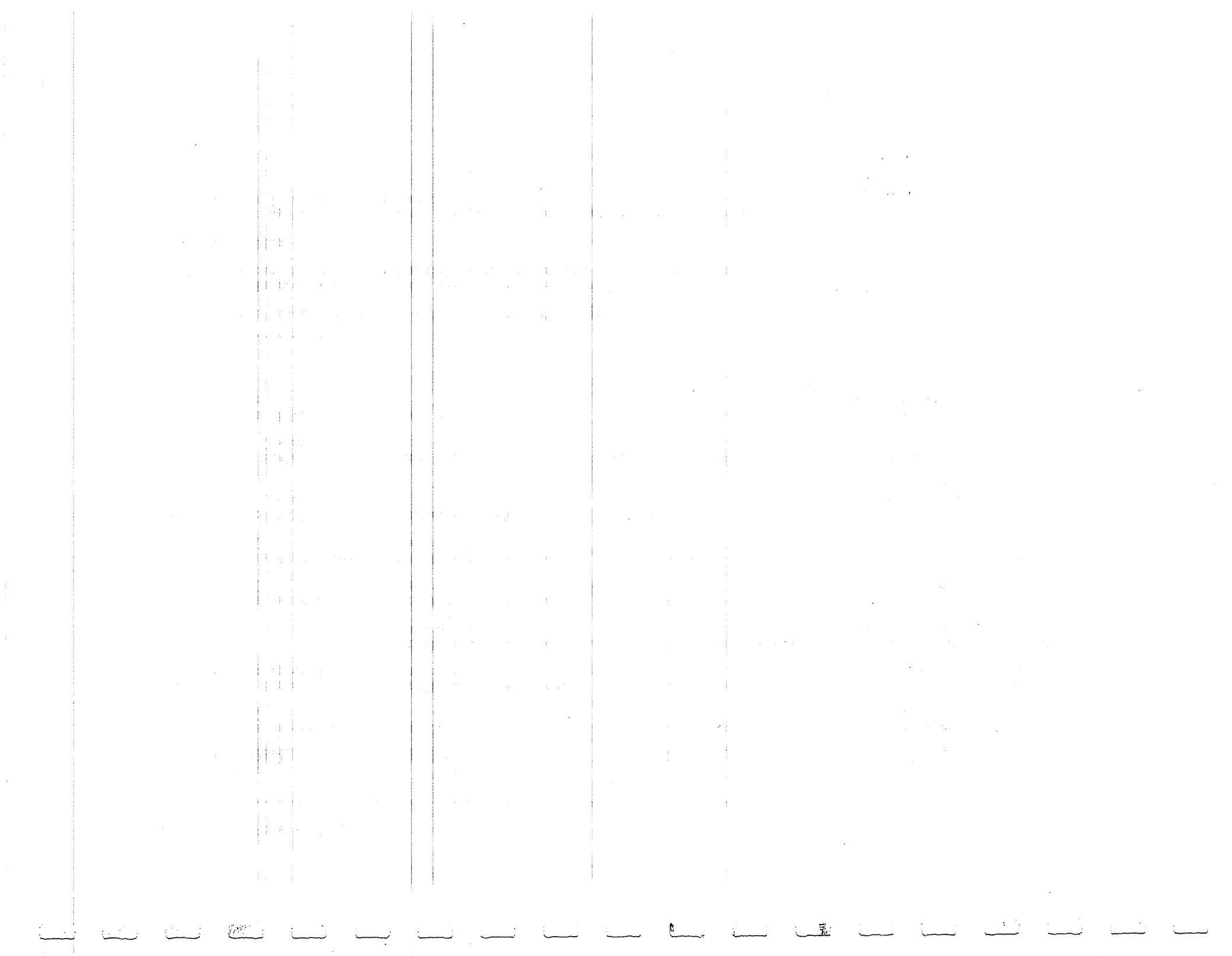
Site Location or Existing Site Development	Location (a)	Managing Agency	Proposed Action
Lake Creek State Recreation River (proposed)	Near Cook Inlet	Alaska Division of Parks	Designate river corridor and develop plan
Alexander Creek State Recreation River (proposed)	A tributary to the lower Susitna River	Alaska Division of Parks	Designate river corridor and prepare management plan.
Talachulutna	A tributary to the lower Susitna River	Alaska Division of Parks	Designate river corridor and prepare management plan
Lake Creek State Recreation River (proposed)	A tributary to the lower Susitna River	Alaska Division of Parks	Designate river corridor and prepare management plan
Kroto Creek State Recreation River (proposed)	A tributary to the lower Susitna River	Alaska Division of Parks	Designate river corridor and prepare management plan
Worthington Glacier State Recreation Site (existing)	Richardson Highway	Alaska Division of Parks	Acquire additional 480 acres adjoining glacier terminals develop funded projects
Little Nelchina State Recreation Site (existing)	Glenn Highway	Alaska Division of Parks	Acquire 620 acres plan and implement
Nelchina Tazlina State Recreation River	Glenn Highway	Alaska Division of Parks	Designate river corridor, prepare river plan

(a) Locations of site developments taken from the 1980 Milepost.

(b) This list is not an all inclusive list of privately-run facilities, but only a representation of most types of recreational opportunities offered by the private sector.

Sources: ADNR 1982a

Susitna Hydroelectric Project Feasibility Report, Volume 2 Environmental Report, Section 7 Recreational Resources.



APPENDIX E2.7
ATTRACTIVE FEATURES - INVENTORY DATA

EXHIBIT E - CHAPTER 7

APPENDIX E2.7

ATTRACTIVE FEATURES - INVENTORY DATA

TABLE E2.7.1: ATTRACTIVE FEATURES - INVENTORY DATA (Page 1 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Soule Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			
Glaciers				
Geological Interest Sites	X			Glacial features - valleys, etc.
Gorges/Cliffs/Bluffs	X			
Talus Slope/Rock Environment	X			
Cirques				
Rock/Mineral Collection Sites	X			
Big Game Hunting Habitats	X			Caribou, bear and Dall sheep
Fishing Habitats				Soule Cr. and its lake source
Wildlife Observation Areas		X		
Lakes				Long linear lake - source of Soule Cr.
Waterfalls/White Water	X			
Rivers/Streams	X			Soule Cr. - nearby Brushkana Cr. - Jack R.
Bogs				
Vegetation Patterns				Tundra with some mixed forest
Botanical Interest Sites				
Dams/Reservoirs				
Campgrounds				Proposed walk-in camp at Soule Cr. Lake
Boating Facilities				Canoeing on lake
Resorts/Lodges				
Trails/Trailhead				Trail from North Access Road along Soule Cr. to Jack R. and Caribou Pass to Cantwell or Tsusena Cr.
Access				Trailheads north and south along access road and from Cantwell
Float Plane Facilities				Potential at Soule Cr. Lake
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				Ice fishing and x-country skiing

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING: Jack River Drainage to Cantwell

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks				Spectacular mountains
Glaciers				
Geological Interest Sites	X			Glacial features - carved valleys
Gorges/Cliffs/Bluffs	X			
Talus Slope/Rock Environment	X			
Cirques				
Rock/Mineral Collection Sites	X			
Big Game Hunting Habitats	X			Moose, caribou, bear and Dall sheep
Fishing Habitats	X			Jack R. and tributaries and lakes
Wildlife Observation Areas		X		Potential
Lakes	X			Several large lakes
Waterfalls/White Water	X			
Rivers/Streams	X			
Bogs				
Vegetation Patterns				Tundra - mostly and some mixed forest
Botanical Interest Sites				Potential
Dams/Reservoirs				
Campgrounds				Recommend primitive camping only
Boating Facilities				May be possible to kayak down river from confluence with Soule Cr.
Resorts/Lodges				
Trails/Trailhead				Proposed trail along Soule Cr. and through Caribou Pass to Cantwell or to Tsusena Cr.
Access**				Trailhead from 2 points along the North/South Access Road at Cantwell
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				X-country skiing for experienced people

** Caribou Pass is an existing route for people traveling through this area.

TABLE E2.7.1 (Page 3 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Tsusena Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Elevations range from 2600' to 5800'
Glaciers		X		Glacier in mountains North of Tsusena Cr.
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs	X			Valley - floor is approximately 1 mile wide
Talus Slope/Rock Environment	X			
Cirques				
Rock/Mineral Collection Sites		X		
Big Game Hunting Habitats	X			Moose and bear - Dall sheep in mountains
Fishing Habitats	X			Grayling and trout
Wildlife Observation Areas	X			Potential
Lakes	X			East side of Tsusena Butte
Waterfalls/White Water		X		Some white water
Rivers/Streams	X			Tsusena Cr. and tributaries
Bogs			X	Along water course
Vegetation Patterns	X			Tundra - on mountain slopes and mixed forest on valley floor
Botanical Interest Sites	X			Diverse vegetation types
Dams/Reservoirs				Drains into Susitna below Watana Dam site
Campgrounds				Non-developed - primitive
Boating Facilities				Canoeing on lake
Resorts/Lodges		X		
Trails/Trailhead			**	Proposed trail through valley and countinuing along Jack R. and Caribou Pass
Access				North Access Road near Tsusena Butte
Float Plane Facilities		X		At lake side of Tsusena Butte and from Cantwell and the North-North Access Road near Brushkana Cr.
Visitor Information Service				
Historical/Archeological Sites				At an additional trailhead site*
Winter Sports				X-country skiing, ice fishing and snowmobiling

* Proposed trail follows Soule Cr. to Caribou Pass.
** There are existing non-defined routes through Tsusena Cr. drainage and into or from Caribou Pass and to or from Cantwell

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING: Mountain Area West of Proposed North/South Access Route Midway/West of Deadman Mountain

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Excellent mountain views
Glaciers		X		
Geological Interest Sites	X			
Gorges/Cliffs/Bluffs		X		
Talus Slope/Rock Environment	X			
Cirques				
Rock/Mineral Collection Sites		X		
Big Game Hunting Habitats		X		Caribou, Dall sheep and bear
Fishing Habitats		X		Lakes with outlets
Wildlife Observation Areas		X		
Lakes	X			Only one of any significant size - good number of small ones - scenic
Waterfalls/White Water		X		Nearby Brushkana Cr.
Rivers/Streams		X		Nearby Brushkana Cr. and tributaries
Bogs			X	Valley floors
Vegetation Patterns			X	Tundra
Botanical Interest Sites		X		
Dams/Reservoirs				
Campgrounds				Proposed walk-in camp at larger lake
Boating Facilities				
Resorts/Lodges				
Trails/Trailhead				From North Access Road to lake and overlooks*
Access				Trialhead at about midway North Access Road
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				X-country skiing

* Overlook areas/points should be attempted only by those with good hiking skills - knowledge of terrain in this area or similar. Potentially dangerous.

TABLE E2.7.1 (Page 5 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Mountain Area Immediately North of Tsusena Butte and West of the Proposed North Access Road

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Very high scenic quality
Glaciers	X			
Geological Interest Sites	X			
Gorges/Cliffs/Bluffs	X			
Talus Slope/Rock Environment	X			
Cirques	X			
Rock/Mineral Collection Sites	X			
Big Game Hunting Habitats	X			Caribou and Dall sheep
Fishing Habitats		X		Large lakes with outlets
Wildlife Observation Areas	X			Potential
Lakes	X			Northeast of Tsusena Lake toward Deadman Lake
Waterfalls/White Water		X		
Rivers/Streams	X			
Bogs			X	
Vegetation Patterns		X		Tundra and Willow
Botanical Interest Sites		X		
Dams/Reservoirs				
Campgrounds				Proposed walk-in camp at lake
Boating Facilities				Potential for lake boat launch
Resorts/Lodges				
Trails/Trailhead				Proposed trail west from North Access Road*
Access				North Access Road trailhead or by float plane
Float Plane Facilities				Potential if not existing
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				Ice fishing and x-country skiing

* Potentially dangerous hiking to overlook points. Good skills (hiking) and knowledge of similar terrain traversing are recommended.

TABLE E2.7.1 (Page 6 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING				Tsusena Butte Area
SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		View to mountains
Glaciers			X	
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs	X			Tsusena Butte - landmark
Talus Slope/Rock Environment		X		
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats	X			Bear and moose - Tsusena Cr.
Fishing Habitats	X			Grayling and lake trout
Wildlife Observation Areas		X		
Lakes	X			East side of Tsusena Butte
Waterfalls/White Water			X	
Rivers/Streams	X			Tsusena Cr.
Bogs			X	Near lakes
Vegetation Patterns		X		Mixed forest - Tsusena Cr.
Botanical Interest Sites			X	Potential
Dams/Reservoirs				
Campgrounds				Proposed campground at lake
Boating Facilities				Existing boat launch
Resorts/Lodges			X	Hunting/fishing cabin
Trails/TrailHead				Proposed trail to lake and along creek
Access				North Access Road - float plane
Float Plane Facilities			X	Fly-in float plane - existing
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				Ice fishing

TABLE E2.7.1 (Page 7 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Big Lake and Deadman Lake Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks			X	View to mountains
Glaciers			X	
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs			X	
Talus Slope/Rock Environment			X	
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats		X		Better known for fishing - caribou
Fishing Habitats	X			Grayling and lake trout
Wildlife Observation Areas		X		Potential - big game, waterfowl and raptors - eagles
Lakes	X			Big Lake - largest in study area
Waterfalls/White Water				
Rivers/Streams		X		Deadman Cr.
Bogs			X	Near lakes and streams
Vegetation Patterns		X		Tundra - marshland
Botanical Interest Sites		X		Potential
Dams/Reservoirs				
Campgrounds	X			Big Lake - proposed
Boating Facilities				Walk-in canoe
Resorts/Lodges				
Trails/Trailhead				Trail from North Access Road
Access				Good access - North Access Road
Float Plane Facilities				Possible to land on both lakes
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				Ice fishing and x-country skiing

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Butte Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Immediate area is not spectacular - views are fair to good
Glaciers				
Geological Interest Sites			X	
Gorges/Cliffs/Bluffs			X	Broad, flat valley primarily
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats		X		Moose, bear and caribou
Fishing Habitats		X		Grayling - lake trout at Butte Lake
Wildlife Observation Areas		X		
Lakes		X		Butte Lake - large number of small lakes - Snodgrass Lake
Waterfalls/White Water				Insignificant
Rivers/Streams			X	Tributaries/Butte Cr. - close to Watana Cr.
Bogs			X	Most of the drainage is in a flat, poorly drained area - large percentage of bogs
Vegetation Patterns		X		Mixed forest and tundra (upland slopes)
Botanical Interest Sites			X	
Dams/Reservoirs				
Campgrounds				Recommend primitive
Boating Facilities				Butte Lake
Resorts/Lodges			X	Existing sport lodges at Butte Lake
Trails/Trailhead			**	Potential for trail from Big Lake to Susitna River bridge on Denali Highway
Access				North Access Road or Susitna River bridge on Denali Highway
Float Plane Facilities				Big Lake - Deadman Lake or Visitor Information Service
Historical/Archeological Sites				
Winter Sports				X-country skiing, snowmobiling

** Comparatively, area is not very scenic - linear land-scape with few areas of significant interest. Might best be developed for hunting access.

TABLE E2.7.1 (Page 9 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Clarence Lake Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks				Distance views to mountains
Glaciers				
Geological Interest Sites				
Gorges/Cliffs/Bluffs				
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats			X	Caribou
Fishing Habitats	X			Lake trout and grayling at lake
Wildlife Observation Areas			X	
Lakes		X		Clarence Lake - long and linear
Waterfalls/White Water				
Rivers/Streams		X		Gilbert Cr. & nearby Kosina Cr.
Bogs				Most of the area is very wet
Vegetation Patterns		X		Primarily tundra and willow
Botanical Interest Sites				Tundra
Dams/Reservoirs				South of proposed Watana Reservoir
Campgrounds				
Boating Facilities				Existing launch at lake
Resorts/Lodges			X	Existing sport lodge
Trails/Trailhead				None recommended
Access				Float plane - one could walk in along Clarence Lake drainage outlet to Susitna-Watana Reservoir; however, it is very wet
Float Plane Facilities			X	Existing at lake
Historical/Archeological Sites				
Winter Sports				

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Watana Lake Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Mt. Watana 6255'
Glaciers				
Geological Interest Sites				
Gorges/Cliffs/Bluffs				
Talus Slope/Rock Environment		X		
Cirques				
Rock/Mineral Collection Sites			X	
Big Game Hunting Habitats			X	Moose, bear and caribou
Fishing Habitats	X			Watana Lake and its oulet - lake trout, etc.
Wildlife Observation Areas		X		Potential - spotted waterfowl and eagles
Lakes	X			Watana
Waterfalls/White Water				
Rivers/Streams		X		Nearby Susitna R., Kosina and Tsisi Creeks
Bogs				
Vegetation Patterns			X	Tundra and willow - small amount of mixed forest - marsh
Botanical Interest Sites				
Dams/Reservoirs				South of proposed Watana Reservoir
Campgrounds				
Boating Facilities				Existing boat launch at lake
Resorts/Lodges			X	Existing sport lodge
Trails/Trailhead				Potential for trail around south side of Mt. Watana to link with proposed trail through mountains to Fog Lakes
Access				Float plane or trail from Fog Lakes
Float Plane Facilities	X			Existing at lake
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

TABLE E2.7.1 (Page 11 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Talkeetna Mountains (Immediately south and east of Fog Lakes)

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Spectacular peaks - rugged mtns.
Glaciers		X		Permanent snow
Geological Interest Sites	X			Glacier-formed valleys, etc.
Gorges/Cliffs/Bluffs	X			
Talus Slope/Rock Environment	X			
Cirques	X			A number of crystal-clear cirque lakes
Rock/Mineral Collection Sites	X			
Big Game Hunting Habitats	X			Caribou, bear and Dall sheep
Fishing Habitats		X		
Wildlife Observation Areas		X		
Lakes	X			
Waterfalls/White Water		X		Small waterfalls
Rivers/Streams		X		
Bogs			X	Lower valley areas
Vegetation Patterns				Tundra
Botanical Interest Sites				Tundra
Dams/Reservoirs				Views to proposed reservoir sites
Campgrounds				Primitive - recommended
Boating Facilities				None
Resorts/Lodges				None
Trails/Trailhead				Proposed loop trail from Fog Lakes - also from Watana Lake
Access				Float plane to Fog Lakes or from proposed trailhead at Watana Dam
Float Plane Facilities				If not existing - recommended
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Fog Lakes Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks				Excellent views to mountains
Glaciers				
Geological Interest Sites				
Gorges/Cliffs/Bluffs				
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats	X			Moose, bear and caribou
Fishing Habitats	X			Fog Lakes - lake trout, etc.
Wildlife Observation Areas		X		
Lakes	X			
Waterfalls/White Water		X		
Rivers/Streams		X		Fog Creek
Bogs		X		Area is very wet
Vegetation Patterns		X		Moderately dense mixed forest - willows and tundra
Botanical Interest Sites	X			Diverse vegetation types
Dams/Reservoirs				South of proposed Watana Dam & Reservoir
Campgrounds				Primitive
Boating Facilities				
Resorts/Lodges			X	
Trails/Trailhead				Proposed trail head at Watana Dam
Access				Float plane - see above - also proposed trail from Stephan Lake and Devil Canyon Reservoir
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Stephan Lake Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Views
Glaciers				
Geological Interest Sites				
Gorges/Cliffs/Bluffs				
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats		X		Moose, bear and caribou
Fishing Habitats	X			Fog Lakes and Prairie Cr. - salmon, lake trout, etc.
Wildlife Observation Areas		X		
Lakes	X			Second largest in study area
Waterfalls/White Water		X		Prairie Cr.**
Rivers/Streams		X		Prairie Cr. and lake outlets
Bogs				Low areas
Vegetation Patterns			X	Mixed forest
Botanical Interest Sites		X		
Dams/Reservoirs				South of proposed Devil Canyon Reservoir
Campgrounds				Recommended primitive
Boating Facilities		X		Existing boat launch
Resorts/Lodges	X			Existing high use sport lodge
Trails/Trailhead				Proposed trail through area to or from Devil Canyon Dam and Fog Lakes
Access				Float plane - trail head at Devil Canyon Dam, trail access from Devil Canyon Reservoir northeast of lake and from trailhead at Watana Dam
Float Plane Facilities	X			Existing**
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

** According to Alaska Dept. of Natural Resources Susitna Basin Land use/Rec. Atlas, there is an existing float plane-use lake southwest of Stephan Lake. Prairie Cr. is also identified as a canoeing/rafting resource.

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Devil Canyon Damsite to Watana Dam Site along South Side of Susitna River

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Good views primarily to mountains to the north
Glaciers				
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs	X			Susitna River valley - Devil Canyon
Talus Slope/Rock Environment			X	
Cirques				
Rock/Mineral Collection Sites			X	
Big Game Hunting Habitats	X			Moose, bear and caribou
Fishing Habitats	X			Tributaries of Susitna, Stephan and Fog Lakes
Wildlife Observation Areas		X		
Lakes	X			Large number - Stephan Lake and Fog Lakes are the most significant
Waterfalls	X			Tributaries to Susitna River
White water	X			Tributaries to Susitna River
Rivers/Streams		X		Tributaries to Susitna River
Bogs				
Vegetation Patterns	X			Dense mixed forest - tundra on uplands
Botanical Interest Sites	X			Potential
Dams/Reservoirs				Views to both proposed dams and reservoirs
Campgrounds				Proposed walk-in camp directly south of Devil Creek at lakes
Boating Facilities				
Resorts/Lodges				Existing abandoned structure at campsite lake
Trails/Trailhead				Along the south side of reservoir staying up high above the reservoir a proposed trail from Devil Canyon Dam to Stephan Lake to Fog Lakes and to Watana Dam
Access				Trailhead at both damsites or float plane to a number of lakes in the area
Float Plane Facilities				Potential
Visitor Information Service				Both damsites
Historical/Archeological Sites				
Winter Sports				Ice fishing and x-country skiing

TABLE E2.7.1 (Page 15 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Lakes Area Northeast of Devil Canyon Dam

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Views to mountains
Glaciers				
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs				
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites		X		
Big Game Hunting Habitats	X			Moose, caribou and bear
Fishing Habitats		X		Lakes
Wildlife Observation Areas		X		Potential
Lakes	X			High scenic quality - large to small
Waterfalls/White water		X		
Rivers/Streams	X			Close to Devil Canyon and Portage Cr.
Bogs				
Vegetation Patterns			X	Primarily tundra and willow - some mixed forest
Botanical Interest Sites	X			Tundra and other alpine species
Dams/Reservoirs				Just north of Devil Canyon Dam and Reservoir
Campgrounds				Proposed campground near East-West Access Road
Boating Facilities				Walk-in canoe use at lakes
Resorts/Lodges			X	Close to High Lakes Lodge
Trails/Trailhead				Proposed loop trail through lakes
Access				East-West Access Road near Devil Canyon Dam
Float Plane Facilities			X	
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				Ice fishing and x-country skiing

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Devil Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks				
Glaciers				
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs	X			Vertical canyon in areas
Talus Slope/Rock Environment		X		
Cirques				
Rock/Mineral Collection Sites			X	
Big Game Hunting Habitats			X	
Fishing Habitats				Salmon, grayling below falls
Wildlife Observation Areas			X	
Lakes				
Waterfalls/White water	X			Most spectacular falls in area
Rivers/Streams				Devil Cr.
Bogs				
Vegetation Patterns			X	
Botanical Interest Sites			X	
Dams/Reservoirs				
Campgrounds				
Boating Facilities				
Resorts/Lodges				
Trails/Trailhead				Proposed overlook trail from High Lakes
Access				Devil Canyon Dam Road
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

TABLE E2.7.1 (Page 17 of 17)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Portage Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks				
Glaciers				
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs				Steep, narrow river canyon
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites		X		Potential
Big Game Hunting Habitats		X		
Fishing Habitats	X			Salmon, trout and grayling
Wildlife Observation Areas		X		
Lakes				
Waterfalls/White water	X	X		Fast - white water
Rivers/Streams	X			Very scenic
Bogs				
Vegetation Patterns		X		Mixed forest - spruce and aspen
Botanical Interest Sites		X		
Dams/Reservoirs				
Campgrounds				
Boating Facilities				Proposed put-in kayak
Resorts/Lodges				
Trails/Trailhead				Trail down to Portage Cr.
Access				Devil Canyon Dam Road East and West
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

APPENDIX E3.7
RECREATION SITE INVENTORY AND OPPORTUNITY EVALUATION

EXHIBIT E - CHAPTER 7
APPENDIX E3.7
RECREATION SITE INVENTORY AND OPPORTUNITY EVALUATION METHODOLOGY

1 - INTRODUCTION (***)

The procedure for the inventory of the land base and the analysis of the intrinsic recreation potential of the sites was as follows:

- Review all planimetric information, USGS quadrangles, previous inventories and aerial photographs.
- Locate the occurrence of all attractive features as understood from above and including local knowledge and previous work.
- Field check all sites located in the previous step plus new potential sites, using the inventory shown in Appendix E2.7 Define the quality and extent of the various landscape features.
- Map all features and settings depicting the distribution and location of the recreational resources and include indications of special or significant views and vistas. Recreational opportunities, hunting, fishing, and collecting sites are not specifically located or symbolized. Many opportunities exist to view wildlife through the project area.

2 - INVENTORY METHODOLOGY (**)

The purpose of the site inventory is to inventory the land recreational base of landscapes that support the most diverse range of possibilities. It includes three steps to define recreational resources inherent to the site:

- o Attractiveness (physical description);
- o Recreation preference type; and
- o Accessibility.

2.1 - Attractiveness (o)

Attractiveness is a measure of a landscape's unique or special settings and features. These can be both cultural and natural. However, they are almost exclusively natural within this study area. The landscape was inventoried for features (their frequency and significance) which bear on the potential for recreation. The natural features and their typical characteristics which were determined to be important in the study area are as follows:

- o Mountaintops: rocky, craggy, often snow-capped, usually above timberline, glaciated or glacier forms most unique and impressive;
- o Tundra landscapes: tundra landscapes, both wet and dry, with close-up beauty and photographic resources;
- o Lakes: naturally occurring, degree of enclosure, habitat, formation, glaciated lakes and beaver ponds most unique;
- o Rivers: glaciated, ruggedness and enclosure, quality expressive of Alaska, size, edges;
- o Streams: character, clarity, size, edge;
- o Water features: waterfalls, cascades, beaver ponds, snowfields, ice;
- o Hunting area: locations of big game animals and birds;
- o Fishing sites: location of fish species;
- o Botanical interest sites: unusual plants, or systems; and
- o Special aesthetic features: unique exploratory vistas, features and settings.

2.2 - Recreation Preference Type (**)

A principal objective of the recreation plan is to provide a variety of recreational activities within a spectrum of recreation "preference types" (USDA 1974). The preference types relate to the character and quality of the existing land base. The recreational activities also relate in terms of their appropriateness to a particular setting. Patterned after the USFS Recreation Opportunity Spectrum (ROS) approach, the four recreation preference types used in this report are:

- o Pristine: A natural, unmodified environment, a source of intellectual or physical challenge; seeking solitude; aesthetic stimulation. The landscape setting should be remote, devoid of people, with a stimulating natural environment and difficult to access.

- o Primitive: A natural environment, a source of enjoyment of settings which provide fish or game species, rocks, edible plants, etc. The landscape setting should be natural, removed from human influences.

- o Semiprimitive: Sparsely developed locations, natural surroundings, a source of relaxation. The appropriate physical settings are natural-semiprimitive sites with relatively easy access.

- o Developed: Developed sites with easy access. The appropriate settings are developments that can accommodate many people with site-specific interests.

Recreation opportunity activities have been identified in relationship to the above reference types as follows:

- o Pristine: Mountaineering, kayaking, canoeing, backpacking, hiking, snow-shoeing, ski touring, nature study, and photography;

- o Primitive: Backpacking, hiking, photography, nature study, big game hunting, fishing, rock hounding, berry picking, and plant gathering;

- o Semiprimitive: Car camping, pleasure driving, boating, lodges, snowmobiling, hiking/walking, and picnicking; and

- o Developed: Sports, snowmobiling, tours, picnicking, and pleasure driving.

Another major consideration is accessibility. The study area is remote and must be considered as such in evaluating demand. A related consideration is the competition for the recreational user within the same framework for "remoteness" from such places as Denali National Park, the Wrangell Mountains, the Chugach Mountains, the Alaska Range, and the Kenai Peninsula.

2.3 - Accessibility (*)

Accessibility refers to the kind of roads, including four-wheel-drive trails and foot trails that are in or surround the study area. Access to the landscape occurs in four modes: foot, auto-ORV, boat, and plane. After the Susitna Project is constructed, the damsite access roads would allow automobile access to new areas previously inaccessible except by less convenient modes. Appropriate access to the various settings is important in maintaining the setting preferences, e.g., pristine activity preferences must have difficult access. This relationship is determined during the onsite field review.

3 - RECREATION OPPORTUNITY EVALUATION (*)

(Moved from Section 5.3 in main text.)

The major considerations for the evaluation of the recreation resources are:

- o Natural value;
- o Inherent durability;
- o Visual quality;
- o Carrying capacity; and
- o Present land status.

3.1 - Natural Value (*)

Natural value is a measure of the inventoried landscape features settings based upon the frequency of occurrence and overall quality. Natural value establishes the physical characteristic's relationship to regional and local scales. The sites were evaluated on an onsite basis in a three-level rating:

- o High: valuable local or state resources, symbolic of Alaska landscapes or carrying unique recreation potential--0.8 recreation opportunity quality factor (a factor defining the potential for attracting recreation users to a particular site);

- o Medium: moderately uncommon, expressive of local characteristic landscapes, provides exposure to abundant recreational resources-- 0.5 recreation opportunity quality factor; and

- o Low: commonly occurring landscapes with few features with recreation potential--0.2 recreation opportunity quality factor.

3.2 - Inherent Durability (o)

Durability is a general measure of the physical ability of a site to absorb the impact of recreational development. The evaluation is based upon known physical data and field observation of each recreational resource site. There are four aspects to determining durability for each site as described in the following matrix:

	Abiotic	Vegetation	Wildlife	Encroachment
Durable	rock formations, well-drained soils, low-slope gradient	upland and lowland forest	waterfowl	rural
Moderately durable	poorly drained soil, moderate-slope gradient	moist tundra	caribou wintering	countryside
Fragile	poorly drained soil, steep-slope gradient	alpine tundra wetlands	waterfowl beaver endangered species	pristine

3.3 - Visual Quality (o)

Visual quality is a measure of the scenic quality and importance of the site. The relative availability of important landscape features and quality settings contained in each potential recreation site can be measured by:

- o Uniqueness based upon frequency and scale;
- o Levels of quality of the resource; and
- o Imageability (reinforcing the Alaska landscape image) and visual quality of each setting.

Unique settings and features are important to describe in terms of their quality and imageability, and are related as indicated in the following matrix:

	Unique Alaskan Landscapes	Rare or Unusual Landscapes	Common or Extensive Landscapes
Few extraordinary features with high apparency	High	High	Medium
Several special features and settings	High	Medium	Low
Encroachment and created landscapes	Medium	Medium	Low

3.4 - Carrying Capacity (*)

Carrying capacity is the inherent capability of a landscape to support recreation use. The primary purpose is to match the number of people using a site and the preferred recreation type (experience). The goal is not to reduce the experiential potential of the site through over-use or participation. The USFS approach (USDA 1974) has been used in a modified version to define the carrying capacity of each site.

3.4.1 - Visitation Estimates (o)

This method utilized two visitation estimates for each recreation site: yearly visitation capacity and yearly visitation potential. Visitation capacity is an estimate of how many visitors can annually experience and use a particular recreational setting, based upon the designated recreation preference type. This estimate is described by the following formula:

$$\frac{[\text{peak capacity estimate}][\text{days in year}][\text{\% of year utilized}][\text{visitor day conversion factor}]^{1/}}{\text{recreation site acres}} = \text{visitation capacity}$$

Visitation potential estimates the probable actual use of the same recreational setting. This estimate is described by the following formula:

visitation capacity * recreation opportunity quality factor [1/] = visitation potential

Recreation opportunity quality factor is based upon the natural value of the recreation site.

3.4.2 - Peak Capacity Estimates (*)

Integral to the two visitation estimate formulas is the peak capacity estimates (PCE) of visitor use. The major criteria for these estimates are: (1) acreage of recreation settings; (2) encounter space (that area in acres of physical and visual potential for encounter); and (3) miles of trails and roads. Groups at one time (GAOT) is the unit for describing visitor groups (4 persons). For each recreation preference type various formulas were used to generate the estimated PCE as follows:

1/ Constant (USDA 1974).

$$\text{Pristine:} \quad \frac{\left[\text{recreation setting acres}\right]\left[\text{\% acres encounter space}\right]^{1/}}{(250 \text{ acres/visitor group})} = \text{PCE}$$

$$\text{Primitive:} \quad \frac{\left[\text{recreation setting acres}\right]\left[\text{\% acres encounter space}\right]^{1/}}{(100 \text{ acres/visitor group})} = \text{PCE}$$

Semiprimitive: (GAOT/mi trail)(mi trail) + (GAOT/mi 4WD road)(mi 4WD road) + (GAOT/mi 2WD road)(mi 2WD road) = PCE

Developed: (GAOT/mi 2WD road)(mi 2WD road) + (GAOT/mi MTR) (mi MTR) + (GAOT of existing recreation facilities) = PCE

These estimated capacities can be compared to the estimated recreation demand to verify satisfaction of estimated recreation needs.

1/ Encounter space along trails is 0.5 miles wide.

4 - INVENTORY AND OPPORTUNITY EVALUATION RESULTS (**)

The above inventory and evaluation methodology were applied to the sites identified below. Most of these sites are included within the first four phases of the proposed recreation plan. Others, not included, may be added under phase five, future additions depending on recreation demand.

4.1 - Brushkana Camp (o)

4.1.1 - Physical Characteristics (o)

An existing developed campground with 33 campsites, including picnic, fire, and toilet facilities on the Denali Highway, Road Mile 105. Although surrounded by wonderful views of the Alaska Range and its glaciers, the campground is set in a nondescript brushy environment along Brushkana Creek.

4.1.2 - Recreation Preference Type (*)

Developed environment with easy access in a seminatural state.

4.1.3 - Recreation Opportunity Summary (o)

- Car camping
- Picnicking
- Fishing
- Big game hunting
- Photography
- Berry picking

4.1.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Low	
Inherent Durability:	abiotic:	Medium
	vegetation:	Medium
	wildlife:	Durable
	encroachment:	Durable
Visual Quality:	Low, a commonly occurring brushy gravelly environment. Brushkana Creek tumbles past the campground, and there are expansive views of the Alaska Range.	
Carrying Capacity:	Developed	
Visitation Capacity:	3,200	

Visitation Potential: 1,600

Present Land Status: Bureau of Land Management

4.1.5 - Accessibility (o)

The Denali Highway, approximately at Road Mile 100, is immediately adjacent and intersects the Parks Highway approximately 30 miles to the west.

4.2 - Tyone and Susitna Rivers Confluence (*)

4.2.1 - Physical Characteristics (*)

The site is located at the confluence of the Tyone and Susitna Rivers at River Mile 246 where the Susitna River becomes a fixed-channel river just beyond the eastern limits of the Watana Reservoir site within a rolling open landscape of the Gulkana uplands.

4.2.2 - Recreation Preference Type (*)

Primitive: a natural environment with enjoyable settings, which offer game species; difficult access.

4.2.3 - Recreation Opportunity Summary (*)

- o Boating
- o Kayaking canoeing
- o Camping
- o Big game hunting
- o Fishing

4.2.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Medium	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Moderate
	Encroachment:	Fragile
Visual Quality:	Moderate; this is an extensive river channel environment, dotted with lakes and rolling hills. Panoramic views are possible toward the Clearwater Mountains, but primarily restricted within the river basin foreground.	

Carrying Capacity: Primitive

Visitation Capacity: 160

Visitation Potential: 28

Present Land Status: Selected for Native ownership

4.2.5 - Accessibility (o)

Boat, put into Susitna River from Denali Highway and the Tyone River/Lake Susitna/Lake Louise route from the Glenn Highway.

4.3 - Butte Creek/Susitna River/Denali Highway Bridge (*)

4.3.1 - Physical Characteristics (*)

This is a broad valley in which Butte Creek meanders from the tundra uplands and the headwaters of Watana Creek to its confluence with the Susitna River. A wide and boggy valley with tiny ponds, lakes, and wetlands in contrast to the rocky Talkeetna Mountains immediately south. In the area of the confluence with the Susitna River, downstream from the Denali River crossing, the river is broad, braided and shallow (see Appendix E6.7, Photograph E6.7.2).

4.3.2 - Recreation Preference Type (*)

Butte Creek: Pristine; a natural unmodified environment with aesthetic stimulation.

Butte Lake: Primitive; a semiprimitive experience with a natural setting.

Susitna River: Semiprimitive; highly developed natural surroundings with relatively easy access.

4.3.3 - Recreation Opportunity Summary (o)

(a) Butte Creek (o)

- o Wildlife observation
- o Botanical interest sites
- o Fishing
- o Big game hunting
- o Photography

(b) Butte Lake (o)

- o Fishing
- o Big game hunting

(c) Susitna River

- o Fishing
- o Photography
- o Boating
- o Ski touring
- o Snowshoeing

4.3.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Medium	
Inherent Durability:	Abiotic:	Fragile
	Vegetation:	Fragile
	Wildlife:	Moderate
	Encroachment:	Fragile
Visual Quality:	Moderate, cohesive, a very wet valley bottom, typical of Alaska lowlands in this region; set among moderately sloped mountains, Butte Creek is a pristine environment.	
	Butte Lake receives ATV pressure and extensive fishing. There are several cabins on the lake. The Denali Highway crosses the Susitna River with many inhabitants living nearby.	
Carrying Capacity:	Semi-primitive	
Visitation Capacity:	720	
Visitation Potential:	360	
Present Land Status:	Bureau of Land Management	

4.3.5 - Proposed Recreation Facilities (see Figure E.7.5.10) (o)

Butte Creek:	No additional recreational developments.
Butte Lake:	No additional recreational developments; consider removing ATV access to this area.
Susitna River:	Boat ramp development at Denali Highway bridge across the Susitna, including storage for 6 to 10 vehicle-trailers.

4.3.6 - Accessibility (o)

Butte Creek:	None except via cross-country on foot from Deadman Lake or by boat on river
Butte Lake:	ATVs and airplanes currently access the lake.
Susitna River:	The Denali Highway and boats.

4.4 - Middle Fork Chulitna River (o)

4.4.1 - Physical Characteristics (o)

Extending from the town of Summit through the Summit Lake chain, this corridor runs 27 miles east into the Chulitna Mountains. It follows along the Middle Fork of the Chulitna River, the upper reach of the Jack River, and the headwaters of Tsusena Creek. The corridor includes the lakes of Caribou Pass and begins in a broad river valley, eventually leading into a narrower V-shaped valley where intersections of other drainages form a visually complex mountainous and glaciated landscape. At the southern boundary (el. 3,900), it crosses a pass and leads to Tsusena Creek. The background views of the Alaska Range are dramatic from the Middle Fork Chulitna drainage basin (see Appendix E6.7, Photograph E6.7.1).

4.4.2 - Recreation Preference Type (o)

Pristine: a natural unmodified environment which offers solitude, aesthetic stimulation, and a source of intellectual or physical challenge.

4.4.3 - Recreation Opportunity Summary (o)

- Hiking
- Backpacking
- Camping
- Collection sites
- Botanical interest sites
- Wildlife observation
- Ski touring (Broad Valley only)
- Snowshoeing
- Big game hunting
- Fishing
- Meets state priority for trail development

4.4.4 - Recreation Opportunity Evaluation Summary (*)

Natural Value: High

Inherent Durability:

Abiotic:	Moderate
Vegetation:	Moderate
Wildlife:	Moderate
Encroachment:	Fragile

Visual Quality: High; much of the corridor consists of lake environments. Opportunities for panoramic views of the Alaska Range exist throughout the corridor. Many areas of foreground interest and waterforms which offer a high level of visual interest and landscape unity.

Carrying Capacity: Pristine

Visitation Capacity: 4,645

Visitation Potential: 3,857

Present Land Status: Bureau of Land Management and Ahtna Village Corporation selection.

4.4.5 - Proposed Recreation Facilities (see Figure E.7.5.9) (o)

- o 17 miles of primitive trail
- o Trailhead and parking for 6 cars

4.4.6 - Accessibility (o)

- o Railroad stop at Summit
- o Parks Highway
- o Foot trails proposed in Tsusena Creek, Site H
- o Cross-country access to Jack Creek and Soule Creek drainages

4.5 - Watana Damsite (*)

4.5.1 - Physical Characteristics (*)

Located above the Watana damsite on the south side of the Susitna River (River Mile 184) within the Fog Lakes recreation setting, this site has views both up and down the Susitna River and toward the Chulitna Mountains.

4.5.2 - Recreation Preference Types (*)

Developed environment with easy access.

4.5.3 - Recreation Opportunity Summary (o)

- o Viewpoint
- o Visitor information
- o Photography
- o Picnicking
- o Walking

4.5.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Moderate	
Inherent Durability:	Abiotic:	Low
	Vegetation:	Low
	Wildlife:	Moderate
	Encroachment:	Low
Visual Quality:	Moderate; high potential exists here for exploratory viewing of the Watana damsite In addition, views northward as well as along the river provide excellent contextual settings for the dam.	
Carrying Capacity:	Developed	
Present Land Status:	Private (CIRI Village Section) within designated project boundary	

4.5.5 - Proposed Recreation Facilities (see Figure E.7.5.6)(o)

Access road, 0.15 mile
Parking, 15 cars
Exhibit building:

- o Souvenir shop
- o Museum
- o Restrooms
- o Food service

Indigenous plants on botanical trail
Three picnic sites
Boat ramp to reservoir

Note: Powerhouse tour headquarters to be located on north side of dam at operations headquarters.

4.5.6 - Accessibility (o)

Access road across Watana Dam

4.6 - Tsusena Creek (*)

4.6.1 - Physical Characteristics (*)

Adjoining the Middle Fork of the Chulitna River recreation setting and descending from the headwaters of Tsusena Creek, the valley runs southward toward the Tsusena Lakes which are almost 250 acres in size. Many unusual and interesting rock formations, waterfalls, and glacial deposits are evidence of its glacial history. The valley floor is covered with wetlands, ponds, and brush, with an overstory of mixed woods, and scattered stands of spruce (see Appendix E6.7, Photographs E6.7.5 and E6.7.6).

4.6.2 - Recreation Preference Type (o)

Pristine; a natural unmodified environment, a source of physical and intellectual challenge, solitude, and aesthetic stimulation.

4.6.3 - Recreation Opportunity Summary (*)

- o Hiking
- o Backpacking
- o Botanical interest sites
- o Rock hounding
- o Wildlife observation
- o Photography
- o Snowshoeing
- o Ski touring
- o Mountaineering
- o Fishing
- o Meets state priority of trail development

4.6.4 - Recreation Opportunity Evaluation Summary (*)

Natural Value:	High	
Inherent Durability:	Abiotic:	Fragile
	Vegetation:	Fragile
	Wildlife:	Fragile
	Encroachment:	Fragile
Visual Quality:	High, with a great natural diversity of mountainous ridgelines, waterfalls, rock formations, and streamside and wetland environments; area has unique fore- foreground and middleground views in	

every direction. The potential for wildlife observation occurs everywhere.

Carrying Capacity: Pristine

Visitation Capacity: 2,657

Potential Capacity: 2,206

Present Land Status: Bureau of Land Management

4.6.5 - Proposed Recreation Facilities (see Figure E.7.5.7) (o)

Three shelters
26 miles of primitive trail development

4.6.6 - Accessibility (*)

- o Foot trail from the proposed Middle Fork of the Chulitna River
- o Airplane at Tsusena Lakes
- o Foot trail from the Watana access road within the Tsusena Butte recreation setting

4.7 - Tsusena Butte (*)

4.7.1 - Physical Characteristics (*)

The southern extent of the Tsusena Valley divides around Tsusena Butte, which is a prominant solitary mountain. The Tsusena Lakes lie between the butte and the foothills of the Chulitna Mountains and are over one mile in length. The Tsusena Valley ends here and becomes part of the upland terrace above the Susitna River where Deadman Creek meanders through alpine tundra (see Appendix E6.7, Photograph E6.7.10).

4.7.2 - Recreation Preference Type (o)

Primitive area with lightly developed facilities and natural surroundings, which has easy access.

4.7.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Photography
- o Wildlife observation

- o Ski touring
- o Snowshoeing
- o Fishing

4.7.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Moderate
	Encroachment:	Moderate
Visual Quality:	High; this area has background views south to the Talkeetna Mountains and north into the Tsusena Creek Basin as well as foreground views of Tsusena Lakes. The sportsman's lodge at the lake adds a cultural feature in this otherwise pristine environment.	
Carrying Capacity:	Primitive	
Visitation Capacity:	1,274	
Visitation Potential:	1,019	
Present Land Status:	Bureau of Land Management	

4.7.5 - Proposed Recreation Facilities (see Figure E.7.5.7) (o)

Primitive trail development, 9 miles
Developed trail, 5 miles
Trailhead, with 10 parking spaces
Two to four undesignated campsites

4.7.6 - Accessibility (o)

Auto, via the Watana access road (Mile 36)

4.8 - Deadman Lake/Big Lake (o)

4.8.1 - Physical Characteristics (o)

Two lakes of approximately 1,800 acres lie at the southern base of Deadman Mountain among a complex set of rolling, rocky hills. Above the surrounding Watana and Butte Creek drainages, Deadman Creek meanders through the lake basin on its way to its confluence with the Susitna River (see Appendix E6.7, Photographs E6.7.11 and E6.7.12).

4.8.2 - Recreation Preference Type (o)

Pristine; a natural, stimulating, unmodified environment, offering solitude and possessing great aesthetic appeal.

4.8.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Photography
- o Wildlife observation
- o Fishing

4.8.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High	
Inherent Durability:	Abiotic:	Durable
	Vegetation:	Moderate
	Wildlife:	Fragile
	Encroachment:	Fragile
Visual Quality:	High; with panoramic views across the Susitna Basin to the Talkeetna Mountains, the foreground lakeside settings are subtly complex rock, tundras, and are brushy in character with spectacular fall color variety.	
Carrying Capacity:	Pristine	
Visitation Capacity:	1,292	
Visitation Potential:	1,034	
Present Land Status:	Bureau of Land Management, State Suspended/Native Selection	

4.8.5 - Proposed Recreation Facilities (see Figure E.7.5.7) (o)

- o Primitive trail development, 4 miles
- o Trailhead, with 6 parking spaces

4.8.6 - Accessibility (o)

- o Airplane at Big Lake
- o Foot trail to the Watana access road (Mile 28).

4.9 - Clarence Lake (*)

4.9.1 - Physical Characteristics (*)

This popular fly-in fishing lake is set in a rolling upland terrace above the Susitna River. The lake's outflow, Gilbert Creek, flows westward to its confluence with Kosina Creek, which flows northward to the Susitna River Valley. Alpine tundra covers the large undulating terrace, with mixed woodlands occurring only at Kosina Creek (see Appendix E6.7, Photograph E6.7.14).

4.9.2 - Recreation Preference Type (o)

Primitive; a natural or semiprimitive environment for the enjoyment of game species and removed from human influences that is difficult to reach.

4.9.3 - Recreation Opportunity Summary (*)

- Hiking
- Backpacking
- Photography
- Wildlife observation
- Fishing
- Big game hunting

4.9.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Low	
Inherent Durability:	Abiotic:	Low
	Vegetation:	Medium
	Wildlife:	Medium
	Encroachment:	Medium
Visual Quality:	Medium; the site has many opportunities for views of the surrounding mountains in all directions. The primary views and experiences relate to the streamside, where small canyons, woodlands, and streams create a pleasant and interesting micro-environment.	
Carrying Capacity:	Primitive	
Visitation Capacity:	3,243	

Visitation Potential: 648

Present Land Status: Bureau of Land Management, State suspended/ Native selected

4.9.5 - Accessibility (o)

- o Airplane on Clarence Lake
- o Primitive trail from Watana reservoir, 2 or 3 miles (3-5 miles) south of River Mile 207 (boat-only access).

4.10 - Watana Lake (o)

4.10.1 - Physical Characteristics (o)

Mt. Watana and Watana Lake are set at the northern extent of the Talkeetna Mountains, rising above the Susitna River Valley. Alpine tundra covers a gently undulating uplands which extends to the Talkeetna Mountains (see Appendix E6.7, Photograph E6.7.16).

4.10.2 - Recreation Preference Types (o)

Primitive; a natural or semiprimitive environment, enjoyment of game species; difficult to access.

4.10.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Photography
- o Wildlife observation
- o Fishing
- o Big game hunting

4.10.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value: Low

Inherent Durability:

Abiotic:	Low
Vegetation:	Medium
Wildlife:	Medium
Encroachment:	Medium

Visual Quality: Moderate; the extensive broadness of the upland terrace plus the lack of foreground variety reduces the potential for interest, even considering the pristine nature of the setting. Cultural interest exists because of the sportsman's cabins on the lake edge.

Carrying Capacity: Primitive

Visitation Capacity: 1,045

Visitation Potential: 209

Present Land Status: Bureau of Land Management, State suspended/Native selected

4.10.5 - Accessibility (o)

- o Airplane on Watana Lake
- o Hiking trail from Kosina Creek (boat-only access)

4.11 - Mid-Chulitna Mountains, Deadman Mountain (o)

4.11.1 - Physical Characteristics (o)

A complex environment of spectacular sawtooth ridges and high, wet tundra landscapes. The western half of the setting is a unique combination of multicolored mountaintops, snow, glaciers, and tundra. The headwaters of Deadman Creek originate here, twisting through a broad, flat tundra muskeg, then abruptly descending toward the east at Deadman Mountain (see Appendix E6.7 Photographs E6.7.7, E6.7.8 and E6.7.9).

4.11.2 - Recreation Preference Type (o)

Pristine; a natural unmodified environment. This area is a source of intellectual and physical challenge, solitude, and a highly aesthetic experience.

4.11.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Photography
- o Wildlife observation
- o Botanical interest sites
- o Meets state priority for trail development.

4.11.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value: High

Inherent Durability:

Abiotic:	Moderate
Vegetation:	Fragile
Wildlife:	Moderate
Encroachment:	Fragile

Visual Quality: High; this area has spectacular panoramic views north to the Alaska Range and views into the highly complex, colorful and interesting Chulitna Mountains only a few miles away. The high, wet tundra offers fall color and interesting foreground wetlands and waterforms. Unique possibilities exist to experience a wide variety and scale of interesting landscapes.

Carrying Capacity: Pristine

Visitation Capacity: 2,743

Visitation Potential: 2,195

Present Land Status: Bureau of Land Management

4.11.5 - Accessibility (*)

Auto, via the Watana access road. Mountaineer route to Tsusena Creek drainage.

4.12 - Devil Creek (*)

4.12.1 - Physical Characteristics (*)

Set in an upland tundra landscape of great complexity, Devil Creek cascades down into the Susitna River gorge at River Mile 161. Within a very narrow enclosed series of canyons and tight valleys, the creek twists through a brushy and partially wooded valley. Devil Falls passes through a narrow slot in the cliffs and joins another small tributary which also has a spectacular waterfall in the same small gorge. This setting is highly scenic and a major resource of the study area (see Appendix E6.7, Photographs E6.7.20, E6.7.21, and E6.7.22).

4.12.2 - Recreation Preference Types (o)

Pristine; a natural unmodified environment for seeking solitude with great aesthetic stimulation.

4.12.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Nature observation
- o Photography

4.12.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Moderate
	Encroachment:	Fragile
Visual Quality:	High; this is a dynamic enclosed small-scale environment with great experiential potential. Unusually spectacular series of falls and roaring streams provide an exciting and unique recreation resource.	
Carrying Capacity:	Pristine	
Visitation Capacity:	1,257	
Visitation Potential:	1,006	
Present Land Status:	Bureau of Land Mangement, State suspended/Native selected	

4.12.5 - Proposed Recreation Facilities (see Figure E.7.5.4) (*)

o Developed trail, 7 miles

4.12.6 - Accessibility (o)

o Gravel road, the Devil Canyon access road.

4.13 - Devil Canyon Damsite (*)

4.13.1 - Physical Characteristics (*)

Above the Devil Canyon Dam, perched high above the Susitna River at River Mile 152, are open forested uplands. Expansive views exist to the west and north, but of particular note is the very deep canyon below (see Appendix E6.7, Photograph E6.7.26).

4.13.2 - Recreation Preference Type (*)

Developed site with easy access within a natural setting.

4.13.3 - Recreation Opportunity Summary (o)

o Visitor information service
o Walking

- o Picnicking
- o Nature observation
- o Photography
- o Ski touring
- o Snowshoeing

4.13.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Moderate
	Encroachment:	Fragile
Visual Quality:	High; the site is located above the deep gorge of the Susitna River and reveals an awesome scale of the natural forces below. Panoramic views also exist toward the west and the lower Susitna valley.	
Carrying Capacity:	Developed	
Present Land Status:	Private (CIRI Village Selection) within designated project boundary.	

4.13.5 - Proposed Recreation Facilities (see Figure E.7.5.3) (o)

One visitor center:
- o Interpretive program
- o Exhibit building
- o Food service
- o Souvenirs shop
- o Restrooms

Three picnic sites
15 parking sites
Boat access and ramp at reservoir downstream of dam
Developed trail 75 miles, and overlook

Note: The auto-oriented campground at Mermaid Lake about 4 miles northeast, is the destination comapground associated with Devil Canyon Visitors' Center.

4.13.6 - Accessibility (o)

- o Devil Canyon access road

4.14 - Mermaid Lake (*)

4.14.1 - Physical Characteristics (o)

This is an undulating upland tundra landscape dotted with many medium-to-large lakes set in shallow wet basins. The physiography has great diversity in its topographic character. The Chulitna Mountains rise to the north of these uplands, and Devil Canyon forms the southern edge (see Photographs E6.7.24 and E6.7.25).

4.14.2 - Recreation Preference Type (o)

Semiprimitive; a semiprimitive location in a natural surrounding, with relatively easy access.

4.14.3 - Recreation Opportunity Summary (o)

- Car camping
- Snowshoeing
- Ski touring
- Nature observation
- Wildlife observation
- Fishing
- Big game hunting

4.14.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High
Inherent Durability:	Abiotic: Moderate Vegetation: Fragile Wildlife: Moderate Encroachment: Moderate
Visual Quality:	High, a scenic visual environment, this area has great foreground appeal, and vistas toward the colorful Chulitna Mountains. Tremendous fall color potential in this setting.
Carrying Capacity:	Semiprimitive
Visitation Capacity:	3,329
Visitation Potential:	2,663
Present Land Status:	Bureau of Land Mangement, State suspended/ Native selected

4.14.5 - Proposed Recreation Facilities (see Figure E.7.5.4) (*)

- o 12 campsites, tables, tent pads, parking
- o Access road, 0.25 mile
- o Two toilet facilities

4.14.6 - Accessibility (o)

- o Airplane; Mermaid Lake, and High Lake, auto;
- o Devil Canyon access road, Mile 29.

4.15 - Soule Creek (o)

4.15.1 - Physical Characteristics (o)

The site extends westward from the Watana access road within the Brushkana drainage. The proposed trail hugs the north side of the drainage, affording vistas of the Alaska Range to the east. To the west the narrow enclosed Soule Creek valley ends in a complex array of mountaintops and ridges. Often snow-covered and comprised of muliticolored rock with a large hidden lake basin of 5 miles containing a long (2-mile) linear lake, this valley is a strikingly complex, natural environment (see Appendix E6.7, Photographs E6.7.27 and E6.7.28).

4.15.2 - Recreation Preference Type (o)

Pristine; a natural stimulating environment offering solitude and possessing great aesthetic appeal.

4.15.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Wildlife viewing
- o Primitive camping
- o Photography
- o Fishing
- o Big game hunting
- o Meet state priority of trail development

4.15.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	High	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Fragile

Encroachment: Fragile

Visual Quality: High; this is a symbolic mountainous landscape, offering exploratory vistas of the Alaska Range. A high degree of natural diversity of landforms, rock and snow landscapes, and waterforms exists here.

Carry Capacity: Pristine

Visitation Capacity: 2,361

Visitation Potential: 1,888

Present Land Status: Bureau of Land Management

4.15.5 - Accessibility (o)

- o Proposed Watana access road; and
- o Existing airplane access upon lake.

4.16 - Southern Chulitna Mountains (*)

4.16.1 - Physical Characteristics (*)

Set within the southwestern foothills of the Chulitna Mountains this small valley is surrounded by a rugged skyline. The valley is covered by an alpine tundra with a rocky base which is very wet in places. A small lake created by an old moraine lies at the lower end of the valley, opening to views toward the Susitna basin below (see Appendix E6.7, Photographs E6.7.29 and E6.7.30).

4.16.2 - Recreation Preference Type (o)

Pristine; a natural unmodified environment, a source of intellectual or physical challenge, solitude, and aesthetic stimulation.

4.16.3 - Recreation Opportunity Summary (o)

- o Backpacking
- o Hiking
- o Nature observation
- o Snowshoeing
- o Ski touring

4.16.4 - Recreation Opportunity Evaluation Summary (*)

Natural Value:	High	
Inherent Durability:	Abiotic:	Fragile
	Vegetation:	Fragile
	Wildlife:	Moderate
	Encroachment:	Fragile
Visual Quality:	High; this small-scale mountain valley has jutting mountainous edges surrounding a tundra-covered valley floor. A pristine hidden lake is the foreground setting to distant panoramic views of the Susitna basin and beyond to the Talkeetna Range.	
Carrying Capacity:	Pristine	
Visitation Capacity:	456	
Visitation Potential:	365	
Present Land Status:	Bureau of Land Management	

4.16.5 - Acccessibility (o)

The Watana dam access road.

4.17 - Fog Lakes (o)

4.17.1 - Physical Characteristics (o)

This cluster of long, linear lakes paralleling each other, each over 15 miles long, are within a partially wooded upland above the Susitna River. The Talkeetna Mountains form a dissected, glaciated complex landscape to the south. Fog Creek originates here and cascades through its small canyons to the Susitna River at River Mile 177. (See Appendix E6.7, Photograph E6.7.17).

4.17.2 - Recreation Preference Type (o)

Primitive; the area is semiprimitive, lightly developed with natural surroundings and relatively easy access.

4.17.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Car camping

- o Nature observation
- o Wildlife observation
- o Photography
- o Fishing

4.17.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Moderate	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Fragile
	Wildlife:	Moderate
	Encroachment:	Moderate
Visual Quality:	Moderate; these are very visually interesting large lakes with background views toward the Chulitna and Talkeetna Mountains. Fog Creek possesses a wonderful small-scale series of cascades, cliffs, and small enclosures providing an interesting and pleasurable environment.	
Carrying Capacity:	Primitive	
Visitation Capacity:	7,144	
Visitation Potential:	3,572	
Present Land Status:	Private land	

4.17.5 - Accessibility (o)

- o Airplane to Fog Lakes
- o Road access across Watana Dam

4.18 - Stephan Lake (o)

4.18.1 - Physical Characteristics (o)

Stephan Lake is a 3.5-mile-long lake set in a wooded valley in the uplands south of the Susitna River. The area contains Prairie Creek which winds its way south to the Talkeetna River. The Talkeetna Mountains form the southern boundary to the valley setting and evidence the glaciated history of the area (see Appendix E6.7, Photograph E6.7.19).

4.18.2 - Recreation Preference Types (o)

Primitive; a semiprimitive environment of settings which provides a variety of game species, in a natural setting difficult to access.

4.18.3 - Recreation Opportunity Summary (o)

- o Hiking
- o Backpacking
- o Kayaking-canoeing
- o Wildlife observation
- o Photography
- o Fishing
- o Big game hunting

4.18.4 - Recreation Opportunity Evaluation Summary (o)

Natural Value:	Moderate	
Inherent Durability:	Abiotic:	Moderate
	Vegetation:	Moderate
	Wildlife:	Low
	Encroachment:	Moderate
Visual Quality:	Moderate; the area has a relatively common forested upland and lake character. Many opportunities exist for viewing the Talkeetna Mountains in the distance.	
Carrying Capacity:	Primitive	
Visitation Capacity:	1,956	
Visitation Potential:	978	
Present Land Status:	Private land.	

4.18.5 - Proposed Recreation Facilities (see Figure E.7.5.5) (o)

- o Primitive trail development, 5 miles
- o Five campsites
- o Canoe launch

4.18.6 - Accessibility (o)

- o Airplane, on Stephan Lake
- o By foot trail from the Susitna River

APPENDIX E4.7
PROJECT RECREATIONAL DEMAND ASSESSMENT

EXHIBIT E - CHAPTER 7
APPENDIX E4.7
PROJECT RECREATIONAL DEMAND ASSESSMENT

1 - BACKGROUND (*)

(Moved from Section 3.2 of main text of 1983 License Application)

Estimation of recreation demand related to the Susitna Project is a complex task due to project location, project characteristics, and long construction schedule. Added complexities result from a historically unpredictable regional growth pattern in Alaska and lack of consistent and verifiable data concerning regional recreational patterns. Some of the planning considerations unique to Alaska are listed below.

1.1 - Alaskan Recreational Environment (o)

As discussed in Section 2 of this chapter, recreation in Alaska has unique characteristics due to the size of the state, the sparse population, the lack of roads, and long distances between facilities. The untouched wilderness conditions and abundance of wildlife have attracted new state residents who enjoy the primitive recreational experience. Usual recreational standards used in the Lower 48 states are not, for the most part, applicable in Alaska.

1.2 - Lack of Recreational History (*)

Alaska became a state in 1959 and the Alaska Department of Natural Resources, Division of Parks was formed in 1971. There consequently is not the long history and background of user data, public preferences, and demand data which are usually available in most other states.

1.3 - Uncertainty of Population Growth

(This section deleted.)

1.4 - Population Changes (*)

As energy, mineral development, and construction projects begin and end, and as the large proportion of military and governmental personnel change assignments, the population composition changes. As a result, public opinion and preference surveys can become quickly outdated.

1.5 - Climate (o)

Winters in the project area are long and severe. The Denali Highway, the only road penetrating the area, is not maintained in winter. Smaller trails require special off-road vehicles for travel year round. Landing strips and lakes used for airplane access are also hazardous

during the winter season. In addition, the short winter daylight period decreases available time for outdoor work, recreation, and travel.

1.6 - Setting (o)

The Susitna project area, compared with many other places in the United States, appears to be an outstanding recreation resource. However, in comparison with other resources in Alaska (with exceptions such as Devil Canyon Rapids), it is not unique.

1.7 - Changing Land Ownership (*)

Major portions of Alaska have historically been owned by the federal and, more recently, the state governments. Large portions of land are currently in the process of being conveyed to Native corporations (see also Section 4). While the exact impact of this action is yet unknown, it appears that the historical pattern of open recreational access to most lands within the state will change to one of more restricted access.

1.8 - International Travel (*)

Recent years have seen wide fluctuations in international travel patterns as currencies change in value. As a remote and somewhat exotic tourist destination, tourist recreational levels in Alaska may fluctuate greatly according to a variety of influences such as currency values.

2 - ASSUMPTIONS REGARDING PROJECT RECREATION DEMAND PROJECTIONS (**)

(Moved from Section 3.2)

In projecting demand, a number of simplifying assumptions were made to account for the uncertainties in Alaska's recreational future. The phased recreation plan and monitoring program proposed as part of the plan would allow periodic adjustments to be made in the plan as assumptions and recreational conditions change. The following discussion specifies assumptions used in the demand projections.

The Denali Highway to Watana Dam access road would be open to the public following completion of the Stage I construction. The Watana Dam to Devil Canyon access road would be open to the public following completion of Stage II. During Stage III the access road would be open to the public from the Denali Highway to the intersection of the Devil Canyon access road and from the intersection to Devil Canyon Dam.

Both Watana and Devil Canyon dams would have an inherent curiosity value which would attract one-time visitors. Watana, in particular, would not be regarded as a major sustained attraction for repeat visitors. Devil Canyon Dam, the high-level canyon bridge, and the railroad spur would have more inherent attraction as potential recreation.

Both reservoirs would be characterized by slumping side walls, scales, and landscapes on steep banks. Watana, in particular, would have large mudflats in many locations when drawn down. Neither reservoir would be an attractive recreational resource for sport fishing or boating. Watana, in particular, and Devil Canyon, to a lesser extent, would not be attractive resources to kayakers, canoers, rafters, and other small boat recreationists due to wind, chop, and temperature conditions.

The Denali Highway would be upgraded as currently proposed by the Alaska Department of Transportation. The road would be kept open in the winter from the intersection with the Watana Dam access road west to the Parks Highway at Cantwell.

The Alaska Department of Parks, the BLM, the USFS, the Municipality of Anchorage, Fairbanks, and other appropriate governmental units would continue to pursue plans for increased recreational facilities elsewhere to serve increased demand. (Many of the facilities documented in Section 2 would be closer to population centers than the Susitna Project and would accommodate a portion of future demand by city dwellers.)

The Native corporations would pursue a course of paced development of their lands, including selected mineral development, recreation home development, and commercial recreational development. These uses are

assumed to be complementary to this recreation plan and are not anticipated to cause conflicts.

Existing private lodges would continue to operate in a manner and scale similar to 1985 operations. While some changes undoubtedly would occur, they would not be of sufficient scale to influence demand projections substantially.

The Alaska Railroad would continue to provide passenger service with scheduled whistle-stop service between Anchorage and Fairbanks.

The Project would primarily be an in-state recreational attraction and would not be a major national or international tourist attraction such as Denali National Park.

Because of climate, winter darkness, and distance from population centers, the Project would be primarily a summer (mid-June to mid-September) recreational resource.

3 - ESTIMATED RECREATIONAL DEMAND (**)

(Moved from Section 3.2)

Available studies were surveyed and evaluated for applicability to the Susitna Project. The methodolgy and assumptions used in the Susitna River Basin Cooperative Study - Talkeetna Subarea (USCS 1978) were used as a basis for the recreation plan methodology. The base data and methodology employed in the USCS study used in the project recreation plan are referred to as the "per capita participation method." The projections were modified by updated population data. Allocations of regional recreational demand derived from the projections were assigned to the Susitna Project's recreation area through a series of assumptions. The results of this estimation were then compared with four estimates, which were prepared by other methods. The other four estimates include:

- o Willingness to drive comparison;
- o Denali National Park comparison;
- o Denali Highway travel comparison; and
- o Opinion survey comparison.

3.1 - Per Capita Participation Method (**)

3.1.1 - Recreation Demand Without the Project (**)

This method was developed by the U.S. Soil Conservation Service (USCS 1978) and applied to the 13 million-acre Talkeetna Subarea in 1978 as part of a series of Susitna River Basin cooperative studies which were joint efforts with the ADNR, the ADF&G, and other cooperating agencies. The method utilized empirical participation rates for eight major outdoor recreational activities and applied them to existing population figures.

Demand projections presented in this report use the general methodology and recreational data developed by USCS. The actual calculations were developed specifically for this study. The year 2000 was chosen for convenience and comparability as the future demand project time. Assumed percentage increases in annual participation days were utilized, as well as the year 2000 population projections. The following formula was utilized to estimate 1980 recreational demand: Total 1980 Population multiplied by Average Annual Participation Days equals Total Demand in User Days.

To estimate recreational demand in the year 2000, the following formula was used: Total Year 2000 Population multiplied by Average Annual Participation Days times Assumed Percentage Increase in Participation equals Total Demand in User Days.

This procedure is followed for eight separate activities. Populations used are shown in Table E4.7.1. Recreational participation is shown in Table E4.7.2.

Both participation days and assumed increases in participation were from the 1970 Alaska Outdoor Recreation Plan. While more recent participation and preference data were published in the 1976 and 1981 Alaska Outdoor Recreation plans, average annual participation days per capita were not provided in those reports. It is assumed that the projected increases in participation published in the 1970 plan are sufficiently representative for the purpose at hand. Comparisons of the activity participation rates which appear in all three plans support this assumption.

The SCS (1978) utilized the travel cost method, which is based on the premise that other things being equal, per capita use of recreational sites would decrease as travel time and cost increases. This appears to be generally true in Alaska. The data base employed distributes the sum total of trips within given hourly driving times. For the Susitna Project, driving times, distances, and percentage of trips are shown in Table E4.7.3. The total demand previously calculated is multiplied by these percentages for each trip origin. Note that for this study (unlike the River Basin Study which uses actual mileage distances in the Willow subbasin), Mat-Su Borough figures are used to represent population between Anchorage and Fairbanks, and an assumed centroid of Mat-Su population was chosen for calculation purposes. While the potential market area for project recreational demand undoubtedly exceeds these areas, it is anticipated that population growth rates and demand percentages are sufficient to adequately represent maximum demand.

The centroid of the project's recreational area is assumed to be 10 miles north of the Watana damsite. Table E4.7.4 gives estimations of total recreational demand in user days for all recreational sites within 250 miles (or 5-6 hours) of Anchorage and 200 miles (or 4-5 hours) of Fairbanks for Anchorage, Fairbanks, and Matanuska-Susitna Borough residents. It is important to note that these demands are for all sites within the given time-distance, not specifically for the Susitna site. For example, other sites within a 5- to 6-hour drive from Anchorage could include those south on the Kenai Peninsula or east in the Wrangell Mountains. Time-distance factors are based on empirical evidence as developed by the SCS, whereby the number of trips in each hourly travel band is estimated as a proportion of the whole. These estimates were calculated separately for each type of recreational activity using the population given in Table E4.7.1, the factors in Table E4.7.4, and the distances in Table E4.7.3. Table E4.7.4 summarizes these demands.

To apply total demand to the project's study area, a number of additional assumptions were made. The recreation plan area was generally defined as the area extending from the Parks Highway on the west, the Denali Highway-Nenana River on the north, the Susitna River on the east, and about 20 miles south of the Susitna River on the south. This area was based on knowledge of areas directly affected by project development, known recreational resources, and recreational opportunity settings determined in the field. It also takes into consideration ADF&G management subunits.

ADF&G hunting statistics for moose, caribou and Dall sheep indicate that in 1981, fewer than 700 hunter days were spent within the study area. It was assumed that there were 800 hunter days in the study area in 1982. Table E4.7.5 and Table E4.7.6 show assumed use of the area in numbers of recreation days and in percentages of the total days given in Table E4.7.4.

Based on observation and personal conversations with informed local sources, it was assumed that there are currently 100 waterfowl hunting days in the area. This activity is generally limited to lakes along the east side of the Parks Highway, an area only peripherally connected with the project area.

Assumptions of current sport fishing were made based on the ADF&G Statewide Harvest Study (ADF&G 1981). This report lists angler days for 1977 through 1981 (Table E4.7.8 and Table E4.7.9). While these data do not directly correspond to the project area, in combination with personal conversations with knowledgeable local sources, 1,500 angler days/year were estimated to be in the area. Fishing activity was assumed to be quite low in the study area because it is inaccessible by auto and has no salmon runs except on the Susitna River below Portage Creek and on Prairie Creek.

Number of user days was assumed to be 4,000 at the only developed campsite in the area. The BLM camp at Brushkana Creek on the Denali Highway has 33 campsites and is reportedly at capacity during hunting seasons. The assumed current numbers represent a capacity use, with three persons per campsite, during a month-long hunting season. Two additional months of capacity use, with two persons per campsite, were calculated for the weekends of the other two summer recreation months. It is assumed that there is essentially no hiking or picnicking in the area that is not associated with other activities such as hunting, fishing or camping.

Cross-country skiing is known to occur in the Chulitna Mountains south of Cantwell. One hundred user days were assumed for the study area.

As indicated in Table E4.7.6 approximately 6,700 recreation days per year were estimated to occur in the area. To project future user days for the area without the Susitna Project, population growth rates from 1980 to the year 2000 (Table E4.7.1) and increased participation rates (Table E4.7.2) were applied to the 1980 usage. That is, usage in the year 2000 would increase as would population and the propensity to recreate, given no other actions such as construction of access roads into the area. This simplification does not take into consideration the changing attraction values of other recreational opportunities in the state. As other recreation areas are developed, projected demand would be redistributed. It is assumed that this would cause a decrease of demand at Susitna recreational facilities and therefore reinforce a conservative estimation.

In the case of the future camping estimate at developed campgrounds, a different procedure was followed. While demand as calculated above shows an increase to 9,700 user days, it is typical for campground supply to lag behind demand and for the unaccommodated increment to go to undeveloped sites. The BLM Denali Block Management Plan (BLM 1980) calls for three 3-unit pull-offs in the area, and it is understood that an expansion of the Brushkana Campground is under consideration. Therefore, a doubling of developed campground space has been assumed for the year 2000.

In summary, without the Project, about 12,500 recreation days are estimated to occur in the year 2000. This is almost a 90 percent increase over 1980 figures.

3.1.2 - Recreation Demand with the Project (**)

To estimate the year 2000 recreational demand with the Project, the baseline (without Project) recreational growth rates shown in Table E4.7.5 were examined and compared with project impacts as described in Section 2.

For big game hunting, increased road access would lead to increased activity. Because the game resource is limited and regulated, a maximum increase of 0.2 percent is assumed. Today's capture rate is 0.3 percent of total demand. The year 2000 is assumed to have a capture rate of 0.5 percent of total demand (see Tables E4.7.5 and E4.7.6).

No waterfowl hunting increase over baseline figures is anticipated as the proposed project features would not affect the attractiveness or accessibility of any waterfowl hunting lakes.

Presently, freshwater fishing is very limited due to lack of automobile access. Existing fishing sites are used principally

by fly-in fishermen. It is assumed that this demand, like hunting, would increase 0.2 percent, attracting approximately double the number of fishermen as in the base case and triple the current use.

Developed campground demand is a function of both the demand for other resources (e.g., hunting and fishing) and the opportunities available to meet theoretical demand. Because of the remote nature of the area and the stated objective of protecting the natural resources (see Section 4.5), demand is expected to be directed toward small, primitive campgrounds. Demand is anticipated to be an additional 4,000 to 6,000 visitor days per year.

Demand for hiking and picnicking is anticipated to be equal to that for camping.

Demand for cross-country skiing is assumed to increase about 50 percent over the base case due to increased accessibility and interest in the area.

A total of about 43,500 to 50,200 visitor days per year are projected for post-project conditions in the year 2000. Other recreational uses, such as driving and sightseeing, are included in this estimate.

3.2 - Willingness to Drive Comparison (*)

Clark and Johnson (1981) indicate that 20 percent of the population is willing to drive five hours to a weekend recreational area, and an additional 11 percent would drive six or more hours. Applying these data to the projected year 2000 population (0.31 x 450,570), it can be estimated that approximately 140,000 persons from the Railbelt, Anchorage, and Fairbanks could be attracted to a site the distance of the study area in one year. Assuming a capture rate of 33 percent, approximately 46,000 persons could be attracted to the project area each year.

3.3 - Denali National Park Comparison (*)

The entrance to Denali National Park and Preserve is about 80 highway miles from the Watana site. With Mt. McKinley, the park is a world-renowned recreational attraction. In 1981, the area attracted 256,500 recreational visitors and has shown generally a high rate of increase since the Parks Highway was opened in 1971 (see Table E4.7.7). While the NPS has not projected visitation to the year 2000, the Denali State Park Visitor Facility Market Analysis and Economic Feasibility Study (ERA 1980) projects total recreational visitors to Alaska to increase from about 550,000 in 1982 to 1,100,000 in the year 2000 (high range). If Denali National Park and Preserve visitation increases at

the same rate as the state as a whole, visitation in the year 2000 would be approximately 513,000.

The Susitna Project area has a very different character and appeal than Denali National Park and Preserve and offers only a small portion of the park's attractions. Currently, the study area appears to draw about 2.5 percent of the number of visitors drawn to the national park. If, after project development it were to draw 10 percent of the visitation of the park, that would be 51,000 in the year 2000.

3.4 - Denali Highway Travel Comparison

(This Section deleted.)

3.5 - Recreation Participation Survey Method

(This Section deleted.)

3.6 - Conclusion

(This Section deleted.)

TABLES

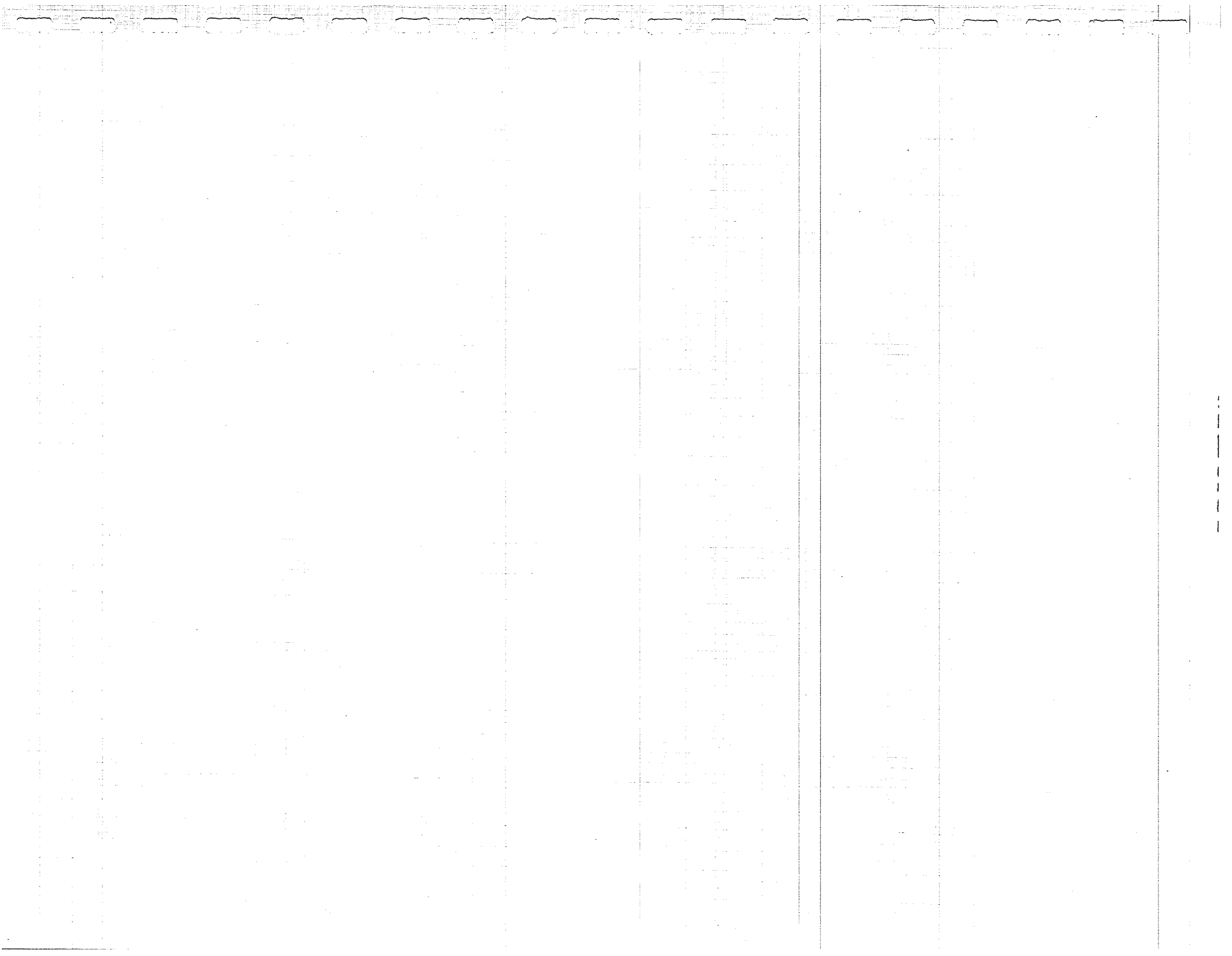


TABLE E4.7.1: POPULATION ESTIMATES OF SELECTED COMMUNITIES WITHIN THE REGION

	1980[1]	2000[2]	%
Anchorage	174,400	263,000	+ 51%
Fairbanks-North Star	57,300	83,000	+45%
Mat-Su Borough	17,800	58,500	+229%
Total	249,500	404,500	+ 62%

NOTE: Estimates are rounded to the nearest 100.

Sources: [1] Alaska Department of Labor, Administrative Service Division, 1985.

[2] Frank Orth and Associates, 1985

TABLE E4.7.2: AVERAGE REGIONAL RECREATION PARTICIPATION

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing
Average Annual Per Capita Participation Days, 1980	2.9	0.9	7.7	3.0	0.7	3.0	11.7	0.6
Assumed Percentage Increase in Annual-Per-Capita Participation Days 1980-2000	8%	8%	6%	57%	20%	27%	12%	40%

Source: ADNR 1970

TABLE E4.7.3: DISTANCES TO CENTROID OF RECREATION AREA

Trip Origin	Miles[1]	Hrs. @ 45 mph	Hourly Interval	% of Demand Type at Hourly Interval[3]
Anchorage	250	5.5	5-6	35%
Fairbanks	200	4.5	4-5	30%
Mat-Su	-	-	3-4[2]	30%

NOTE: Centroid of project recreation assumed to be 10 miles north of Watana Dam on access road (40 miles from Cantwell via Denali Highway and Access Road).

Sources: 1 Rand McNally Inc.

2 Centroid of Recreation Population in Borough assumed to be at this distance

3 U.S. Soil Conservation Service 1978.

TABLE E4.7.4: ESTIMATED TOTAL ANNUAL RECREATION DAYS FOR RESIDENTS OF SELECTED LOCATIONS, TO WATANA AND ALL OTHER LOCATIONS EQUIDISTANT FROM THEIR ORIGIN

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing
Anchorage Residents 1980	126,000	39,000	336,000	131,000	31,000	131,000	510,000	26,000
Anchorage Residents 2000	157,000	61,000	516,000	298,000	53,000	241,000	829,000	53,000
Fairbanks-North Star Residents 1980	47,000	15,000	125,000	49,000	11,000	49,000	189,000	10,000
Fairbanks-North Star Residents 2000	112,000	35,000	292,000	169,000	30,000	75,000	257,000	30,000
Matanuska-Susitna Residents 1980	41,000	5,000	41,000	16,000	4,000	16,000	63,000	3,000
Matanuska-Susitna Residents 2000	196,000	23,000	192,000	111,000	20,000	90,000	309,000	20,000
Estimated Total Recreation User Days - 1980	214,000	120,000	502,000	196,000	46,000	196,000	762,000	39,000
Estimated Total Recreation User Days - 2000	465,000	119,000	1,000,000	578,000	103,000	406,000	1,395,000	103,000

NOTES: Rounded to nearest 1,000.
EDAW calculations based on Susitna River Cooperative Study methodology/

Source: U.S. Soil Conservation Service 1978

TABLE E4.7.5: ASSUMED PROJECT RECREATION CAPTURE RATES

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing
Assumed Capture Rates of the Project Recreation Area, 1980[1]	0.3%	0.1%	0.3%	2%	0.4%	-	-	0.3%
Assumed Capture Rates of the Project Recreation Area, 2000, Without Susitna Hydroelectric Project[2]	0.3%	0.1%	0.3%	1.4%[3]	0.4%	-	-	0.2%
Estimated Capture Rate of the Project Recreation Area, 2000, with Susitna Hydroelectric Project Proposed Recreation Plan, User Days	±0.5%	±0.1%	±0.5%	±2.3%	±0.1%	±3%	±1%	±0.3%

NOTES:

1. For big game hunting, derived from Alaska Fish & Game Geowonderland Data for 1981. For fishing, assumed from Alaska Fish & Game Statewide Harvest Study, 1981 data. Others assumed based on personal interviews.
2. Derived by applying assumed percentage increase in annual-per-capita participation days and year 2000 projected regional population to 1980 use.
3. Assumed doubling of 1980 capacity only. Capture rates as calculated in Note 2 would be 1.7%.

TABLE E4.7.6: ESTIMATED RECREATION DEMAND

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing	Total
Assumed 1980 Use of the Project Recreation Area, User Days[1]	800	100	1,500	4,000	200	-	-	100	6,700
Estimated 2000 Use of the Project Recreation Area Without Susitna Hydroelectric Project, User Days[2]	1,300	170	2,500	8,000[3]	370	-	-	220	12,540
Estimated 2000 Use of the Project Recreation Area With Susitna Hydroelectric Project Proposed Recreation Plan, User Days[4]	2,200-2,400	170	4,800-5,200	12,000-14,000	100[5]	12,000-14,000[6]	12,000-14,000[6]	350	43,520

NOTES:
1. Project Recreation Area is the area enclosed by the Parks Highway, Nenana River, the Susitna River to the east, and about 20 miles south of the Susitna River.
2. Derived by applying assumed percentage increases in annual-per-capita participation days and projected regional population increase to 1980 use.
3. Assumed doubling of 1980 capacity only. Demand as calculated in Note 2 would be 9,700.
4. EDAW estimate.
5. Decreases due to impacts on resource.
6. Same as developed camping.

TABLE E4.7.7: ANNUAL RECREATION VISITOR DAYS - DENALI NATIONAL PARK

Year	Recreation Visits	% Annual Increase Since 1971
1971	44,528	-
1972	88,615	99% (Parks Hwy. Completed)
1973	137,418	55%
1974	161,427	17%
1975	160,600	-.5%
1976	157,612	-2%
1977	170,031	8%
1978	222,993	31%
1979	251,105	13%
1980	216,361	-14%
1981	256,493	18%
1982	321,868	25%
1983	346,082	7%
1984	394,426	14%

Source: U.S. Department of the Interior/National Park Service 1985

TABLE E4.7.8: NUMBER OF ANGLERS WHO SPORT FISHED IN ALASKA BY AREA OF RESIDENCE, 1977 - 1981

	Number of Anglers				
	1977	1978	1979	1980	1981
Alaska					
Southeast	20,387	21,799	20,740	24,534	26,923
Upper Copper-Susitna River	1,885	1,377	1,255	1,302	1,195
Prince William Sound	2,802	2,788	2,675	3,018	3,064
Kenai Peninsula	14,690	13,939	15,429	13,514	15,229
West Cook Inlet-Lower/ Susitna Drainage	85,062	85,844	86,210	89,370	94,707
Kodiak	2,955	3,182	3,418	3,160	4,265
Bristol Bay	933	1,113	1,260	1,666	1,667
Arctic-Yukon-Kuskow	22,261	25,866	29,624	30,163	32,822
Total	150,975	155,908	160,611	166,727	179,872
Other Than Alaska					
Other United States	38,717	41,604	46,622	51,473	62,923
Foreign	11,366	8,673	6,076	6,213	6,434
Total	50,083	50,277	53,698	57,686	69,357
TOTAL	201,058	206,185	213,309	224,413	249,229

Source: Mills, 1981

TABLE E4.7.9: NUMBER OF ANGLER DAYS FISHED IN ALASKA AND PERCENTAGE BY REGION AND AREA, 1977 - 1981

ANGLER-DAYS

AREA FISHED	1977 NUMBER	1977 PERCENT	1978 NUMBER	1978 PERCENT	1979 NUMBER	1979 PERCENT	1980 NUMBER	1980 PERCENT	1981 NUMBER	1981 PERCENT
South central										
Glennallen	51,485	4.3	44,566	3.5	57,266	4.2	50,518	3.4	53,499	3.8
Prince William Sound	48,369	4.0	35,046	2.7	46,594	3.4	46,468	3.1	42,734	3.0
Knik Arm Drainage	81,949	6.8	75,540	5.9	78,411	5.7	102,530	6.9	105,052	7.4
Anchorage	55,060	4.6	31,147	2.4	65,425	4.8	79,665	5.4	67,618	4.8
*East Susitna Drainage	56,651	4.7	86,010	6.7	78,222	5.7	91,304	6.1	59,854	4.2
*West Cook Inlet-West Susitna Drainage	32,842	2.7	38,771	3.0	52,747	3.9	49,924	3.4	40,658	2.9
Kenai Peninsula	422,954	35.3	521,498	40.6	525,327	39.2	530,493	35.6	519,662	36.6
Kodiak	41,563	3.5	44,502	3.5	59,045	4.3	64,907	4.4	66,439	4.7
Alaska Total	1,198,486	100.0	1,285,863	100.0	1,364,729	100.0	1,488,962	100.0	1,420,172	100.0
Susitna Drainage Total	89,493	7.4	124,781	9.7	130,969	9.6	141,228	9.5	100,512	7.1

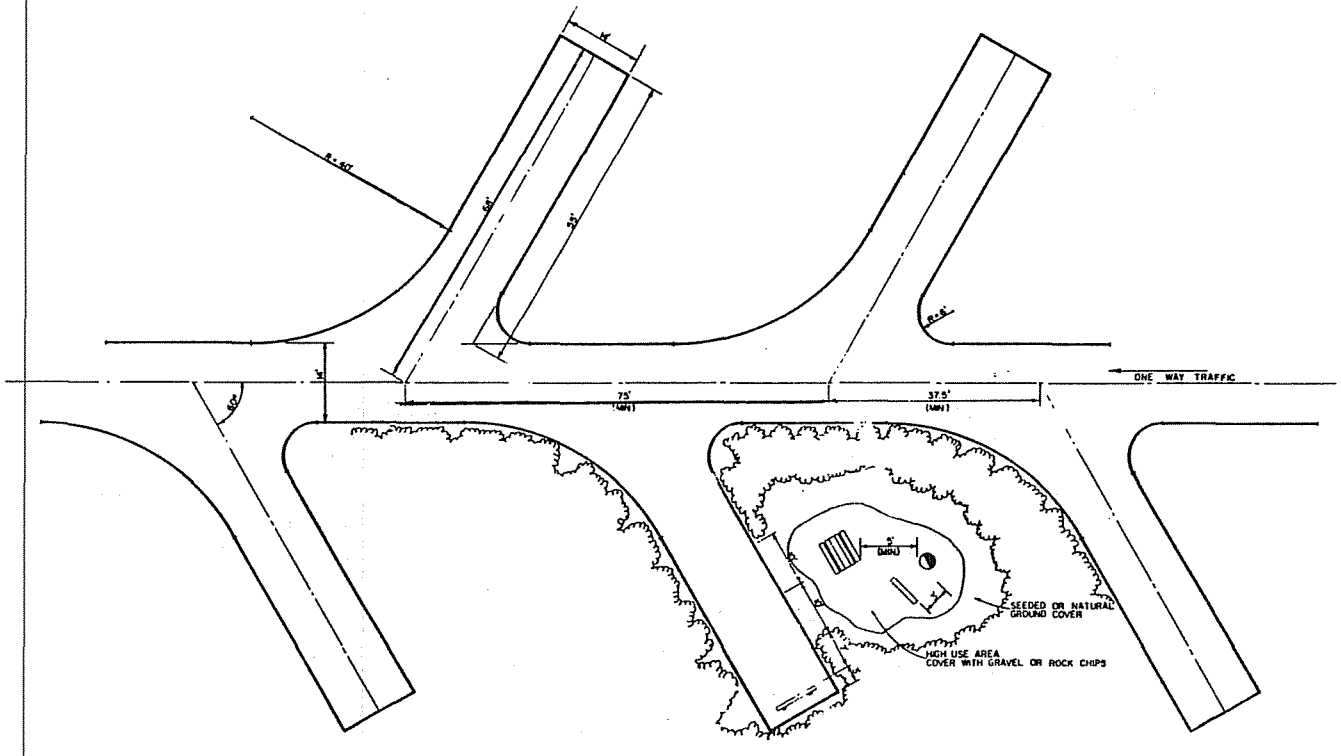
Source: Mills, 1981

APPENDIX E5.7
EXAMPLES OF TYPICAL RECREATION FACILITY DESIGN STANDARDS FOR THE SUSITNA PROJECT

EXHIBIT E - CHAPTER 7

APPENDIX E5.7

EXAMPLES OF TYPICAL RECREATION FACILITY DESIGN STANDARDS FOR THE SUSITNA PROJECT



NOTES

1. CLEAR SPACES AS DIRECTED BY THE ENGINEER.
2. SET FRONT OF FIREPLACE AWAY FROM PREVAILING WINDS.
3. PROVIDE TENT PAD IF OPEN SPACE IS AVAILABLE
4. GUARD POSTS DEPENDENT UPON VEGATATION MAXIMUM NUMBER INDICATED
5. GRADE TO DRAIN AWAY FROM DEVELOPMENT

LEGEND

- PICNIC TABLE
- BENCH
- BUMPER LOG
- ROUND FIREPIT

SUSITNA
DEVELOPED CAMPSITES

NO	REVISION	DATE	APPVD
2	REVISED TYPE OF FIREPIT	8-17-82	TD
1	REMOVED BUMPER LOGS, GUARD POSTS, ETC.	11-17-81	

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS — STATE OF ALASKA

DESIGN & CONSTRUCTION SECTION

SCALE 1" = 10'

BACK IN SPUR CAMPSITE

DRAWN M_J
CHECKED J.A. Lagen
APPROVED
DATE

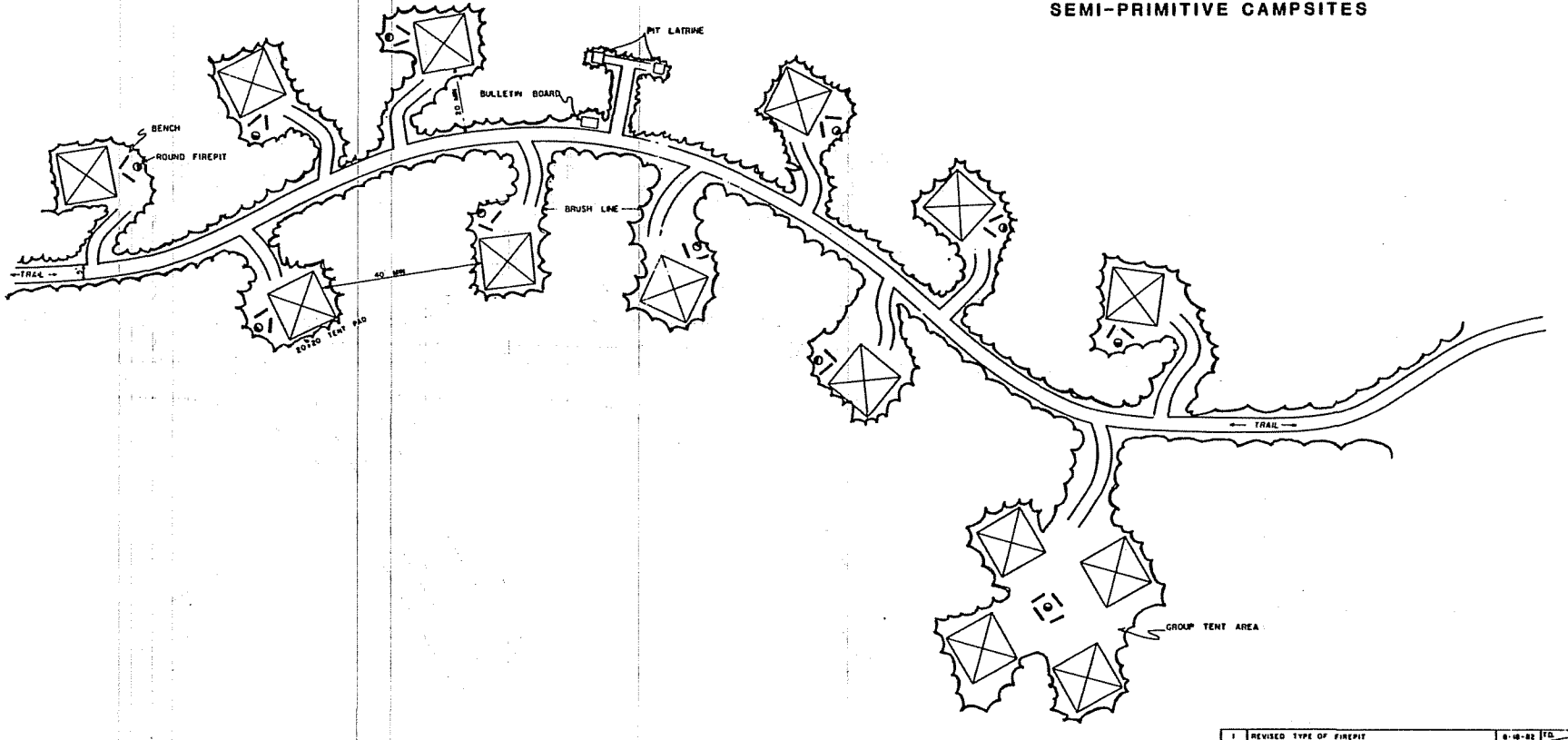
SHEET 1
C-7
OF 1 SHEETS

FIGURE E5.7.1 (PAGE 1 OF 7)

GENERAL NOTES

1. STANDARD PICNIC TABLES WILL BE INSTALLED IF SITE IS SUCH THAT MAINTENANCE COULD BE ACCOMPLISHED.
2. MAXIMUM CLEARING TO BE DONE TO ESTABLISH SITE DEVELOPMENT.
3. ALL DIMENSIONS ARE MAXIMUM – FACILITIES TO BE CONSTRUCTED TO CONFORM TO SITE.

SUSITNA
SEMI-PRIMITIVE CAMPSITES



NO	REVISION	DATE	APPROVED
1	REVISED TYPE OF FIREPIT	6-18-82	TD

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS
STATE OF ALAS

DESIGN & CONSTRUCTION SECTION

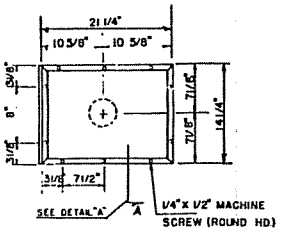
NOT TO SCALE

CONCEPT
REMOTE CAMPING AREA

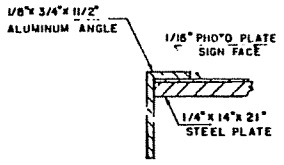
DRAWN JWR
CHECKED JFS
APPROVED
DATE

SHEET 1
C-11
OF 1 SHEETS

FIGURE E5.7.1 (PAGE 2 OF 7)



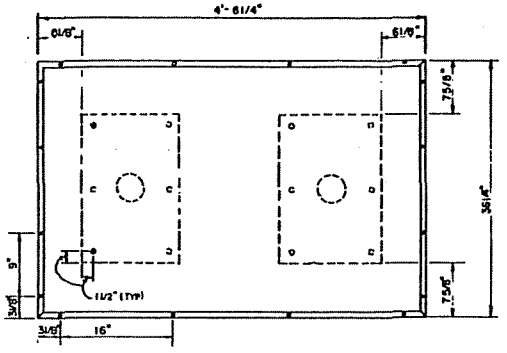
PLAN



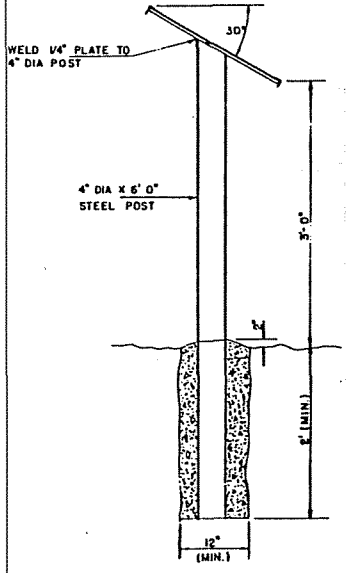
DETAIL A

GENERAL NOTES

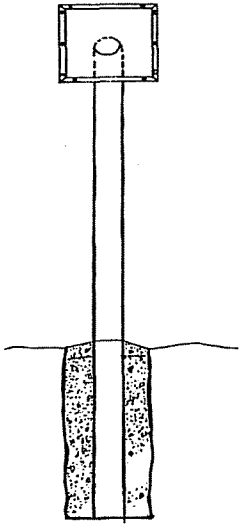
1. USE EPOXY GLUE TO SECURE PHOTO PLATE SIGN TO STEEL BACK PLATE
2. FASTEN ALUMINUM ANGLE FRAME TO BASE PLATE AFTER GLUING SIGN TO BASE
3. DRILL & TAP HOLES IN BACK PLATE TO RECEIVE FRAME SCREW
4. SIGN SHALL BE ADEQUATELY BRACED FOR 24 HRS. AFTER PLACING CONCRETE.
5. PAINT EXPOSED SECTION OF PIPE & PLATE WITH RUSTOLEUM BROWN PAINT.



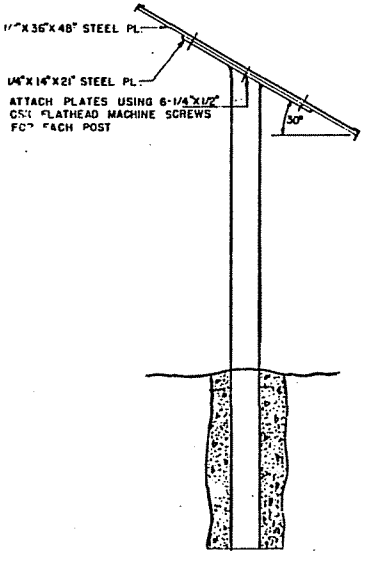
PLAN



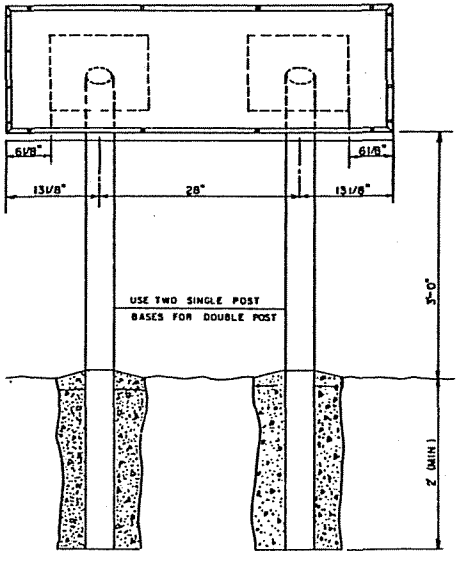
SIDE VIEW



ELEVATION



SIDE VIEW



ELEVATION

MATERIAL LIST

SINGLE POST INSTALLATION

1ea	4" DIA X 6' STEEL POST
2ea	1/4" X 14"X 21" STEEL PLATE
6ft	1/8"X 3/4"X 11/2" ALUMINUM ANGLE
10ea	1/4"X 1/2" MACHINE SCREW (ROUND HD,ST STL)
1/3cf	CONCRETE

DOUBLE POST INSTALLATION

2ea	4"DIA X 6' STEEL POST
2ea	1/4"X 14"X 21" STEEL PLATE
1ea	1/4"X 36"X 54" STEEL PLATE
15ft	1/8"X 3/4"X 11/2" ALUMINUM ANGLE
12ea	1/4"X 1/2" MACHINE SCREW (FLATHD,CSK.)
16ea	1/4"X 1/2" MACHINE SCREW (ROUNDHD)
3cf.	CONCRETE

DEPARTMENT OF NATURAL RESOURCES DIVISION OF PARKS	STATE OF ALASKA	PARK DEVELOPMENT	NO SCALE	STANDARD INTERPRETIVE SIGN INSTALLATION	DRAWN JH CHECKED JH APPROVED JH DATE 1/21/75 SHEET S-8 OF SHEETS

FIGURE E5.7.1 (PAGE 3 OF 7)

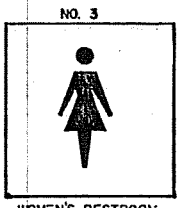
NO. 1

CROSS COUNTRY SKI TRAIL

NO. 2

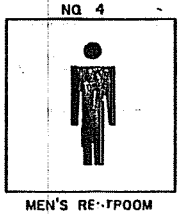
HIKING TRAIL

NO. 3



WOMEN'S RESTROOM

NO. 4



MEN'S RESTROOM

NO. 5

HANDICAPPED

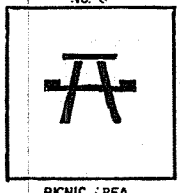
NO. 6

SNOWMOBILING

NO. 7

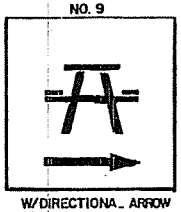
CAMPFIRE

NO. 8



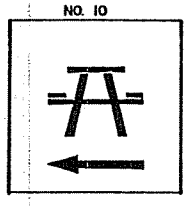
PICNIC AREA

NO. 9

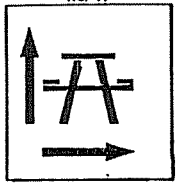


W/DIRECTIONAL ARROW

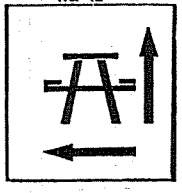
NO. 10



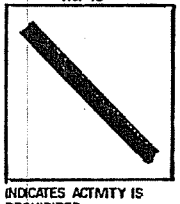
NO. 11



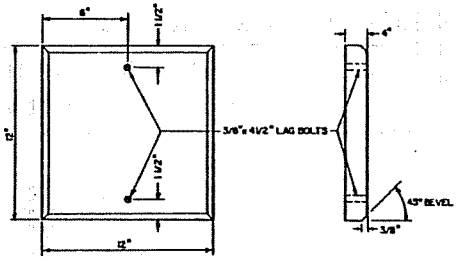
NO. 12



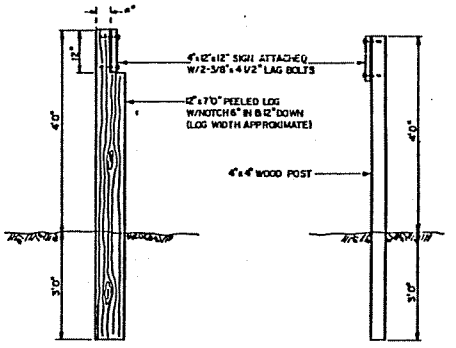
NO. 13



(INDICATES ACTIVITY IS PROHIBITED
TO BE USED WITH ANY SYMBOL)



SIGN PLATE



LOG POST

4"x4" WOOD POST

GENERAL NOTES

1. ALL LUMBER SHALL BE DOUGLAS FIR, S-DRY, S4S.
2. ALL BURIED PORTIONS OF SIGNPOST SHALL BE PRESERVATIVE TREATED WITH PENTACHLOROPHENOL IN ACCORDANCE WITH AWPB STANDARD LP-77 AND AWPA STANDARD P-8 WITH A MINIMUM NET RETENTION OF 50 LBS PER CU FT
3. ROUTED PORTION OF SIGN PLATE TO BE PAINTED WITH TWO COATS WHITE EXTERIOR ENAMEL.
4. THE "ACTIVITY PROHIBITED" ACCESSORY SYMBOL TO BE PAINTED WITH TWO COATS RED EXTERIOR ENAMEL
5. SIGN PLATE AND POSTS TO BE PAINTED WITH EITHER TWO COATS FLOOD CWF CLEAR WOOD FINISH FOR EXTERIOR WOOD OR TWO COATS PREPACO OIL BASE SOLID COLOR STAIN (RUSSETT 63-138)
   NOTE: RUSSETT STAIN SHOULD BE USED FOR SIGNS WHICH ARE TO BE VIEWED FROM A VEHICLE
6. ALL HARDWARE SHALL BE GALVANIZED

MATERIALS LIST

LUMBER ----1- 2"x 12"x 12"
1-12" (APPROX DIAM) x 7'0" PEELED LOG OR 4"x4"x 7'0"

HARDWARE ---2- 3/8"x 4 1/2" LAG BOLTS

MISCELLANEOUS -- WHITE EXTERIOR ENAMEL
RED EXTERIOR ENAMEL (WHEN PROHIBITIVE ACCESSORY PLATE IS USED)
1/2 PINT- FLOOD CWF CLEAR WOOD FINISH FOR EXTERIOR WOOD OR PREPACO OIL BASE SOLID COLOR STAIN (RUSSETT 63-138)

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS
STATE OF ALASKA

PARK DEVELOPMENT SECTION

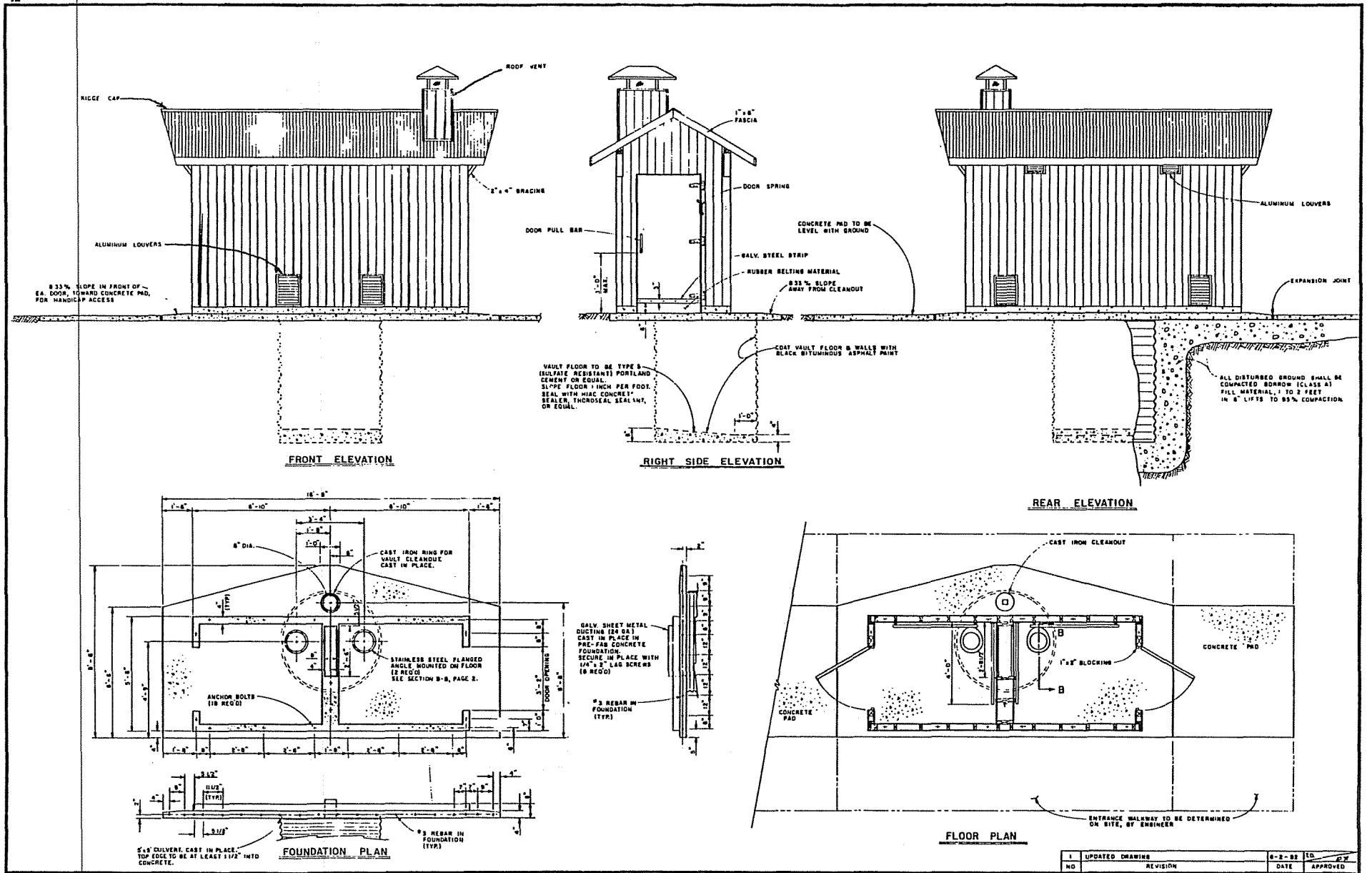
SCALE
AS NOTED

STANDARD WOOD SIGNS
SYMBOLS

DRAWN RFM
CHECKED
APPROVED
DATE 11-14-77

SHEET 1
S-7A
OF 1 SHEETS

FIGURE E5.7.1 (PAGE 4 OF 7)



NO	REVISION	DATE	APPROVED
1	UPDATED DRAWING	6-2-82	T.D.

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS — STATE OF ALASKA

DESIGN & CONSTRUCTION SECTION

SCALE: 1/2" = 1'-0"

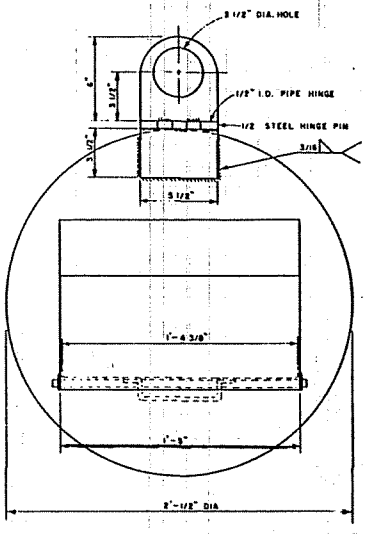
SINGLE VAULTED TOILET WITH ENCLOSED ATTIC

DRAWN T.D.
CHECKED
APPROVED
DATE 4-15-82

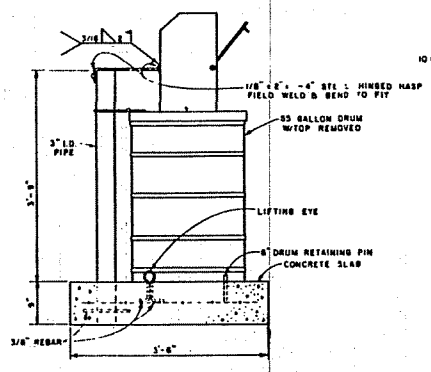
SHEET 1 OF 3 SHEETS

R-7

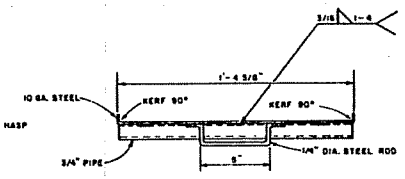
FIGURE E5.7.1 (PAGE 5 OF 7)



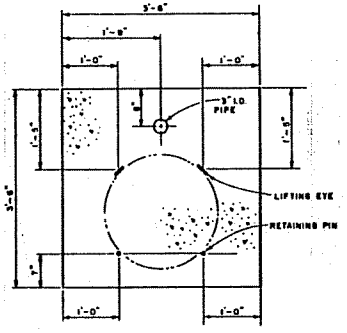
TOP VIEW



INSTALLATION
SCALE: 1" = 1'-0"



DOOR DETAIL
SCALE: 1" = 1'-0"



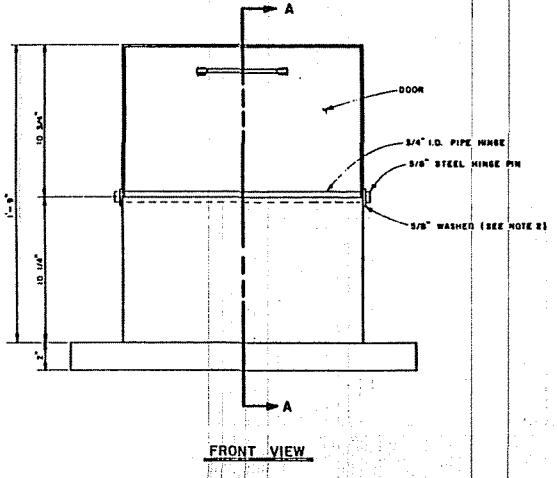
CONCRETE SLAB
SCALE: 1" = 1'-0"

GENERAL NOTES

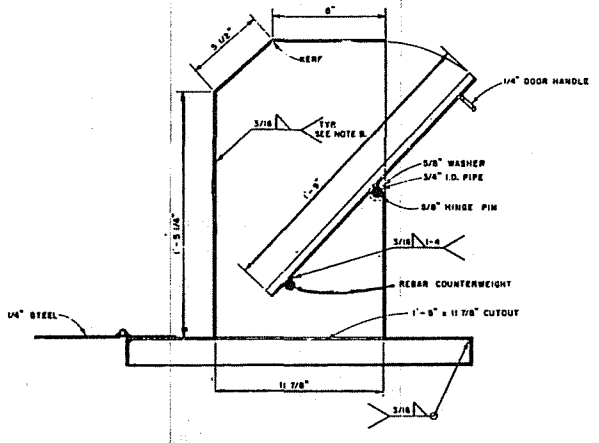
1. SHEET STEEL TO BE 10 GAUGE (1/8") SHEET.
2. WASHERS TO BE WELDED EACH SIDE TO DOOR PIN.
3. USE BOTTOM PLATE CUTOUT (1'-5" x 11 7/8") AS FRONT PLATE.
4. HEAT & WELD 2" STRIP TO OUTSIDE OF BOTTOM PLATE.
5. LIFTING EYES ARE 3/8" REBAR FOR LIFTING CONCRETE SLAB & HOLDING DRUM IN PLACE.
6. DRUM RETAINING PINS TO EXTEND 1 1/2" ABOVE SLAB.
7. PLACE TOP ON DRUM & WELD HINGED HASP LEVEL.
8. PRIME ALL EXPOSED METAL WITH RUSTOLEUM # 960 ZINC CHROMATE, & THEN PAINT WITH RUSTOLEUM # 856 ORANGE.
9. ALL WELDS TO BE 3/16 FILLET.

BILL OF MATERIALS

1 SHEET — 10 GA STEEL (3'-0" x 6'-0")
18 INCHES — 3/4" I.D. IRON PIPE
6 INCHES — 1/2" I.D. IRON PIPE
4 FT 6 INCHES — 3" I.D. IRON PIPE
1 — 1/4" x 5 1/2" x 10" STEEL
10 INCHES — 1/4" STEEL ROD
8 INCHES — 1/2" STEEL ROD
18 INCHES — 5/8" STEEL ROD
2 — 5/8" STEEL WASHERS
43 FT — 3/8" REBAR (# 3)
1/3 CU YD. — CONCRETE
1 QT — RUSTOLEUM # 960 ZINC CHROMATE PAINT
1 QT — RUSTOLEUM # 856 ORANGE PAINT



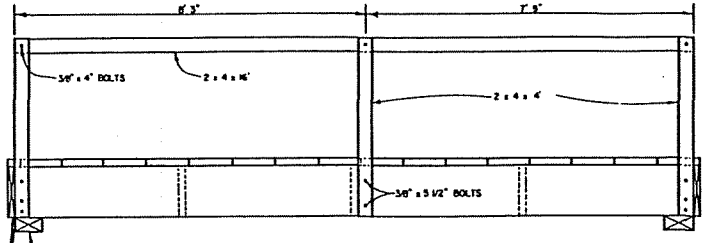
FRONT VIEW



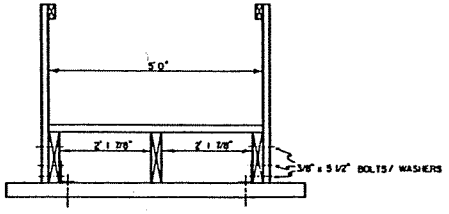
SECTION A-A

DEPARTMENT OF NATURAL RESOURCES DIVISION OF PARKS	DESIGN & CONSTRUCTION SECTION STATE OF ALASKA	SCALE: 1/4" = 1" & NOTED	BEARPROOF GARBAGE CAN	DRAWN T.D. CHECKED D.?. APPROVED DATE 8-3-82	SHEET 1 C-17 OF 1 SHEETS

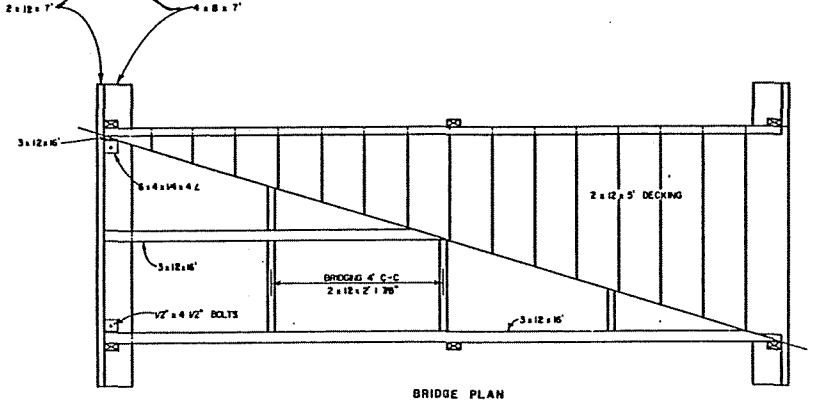
FIGURE E5.7.1 (PAGE 6 OF 7)



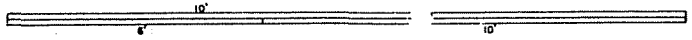
ELEVATION



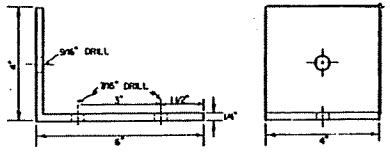
END



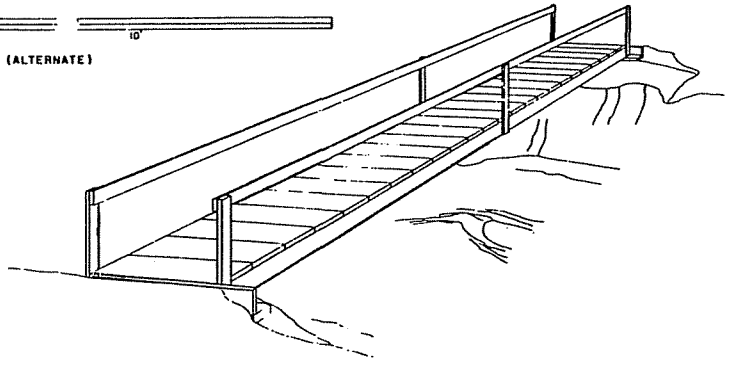
BRIDGE PLAN



DETAIL – LAMINATED BEAM (ALTERNATE)



FOUNDATION ANGLE
SCALE: 1" = 2"



GENERAL NOTES

1. THE BRIDGE SHOULD BE AT LEAST TWO FEET ABOVE HIGH WATER
2. ATTACH FOUNDATION ANGLES TO FOUNDATION PLATE PRIOR TO SETTING
3. FOUNDATION PLATES SHOULD SIT ON GRAVEL OR A PLACED ROCK FOUNDATION
4. IF THE FOUNDATION IS UNSTABLE, DRILL AND DRIVE TWO 3/4" x 4' STEEL BARS THROUGH THE FOUNDATION PLATE
5. EACH BRIDGING IS CONNECTED TO THE STRINGERS WITH FOUR TYPE C TRIP-L-GRIP ANCHORS
6. MAXIMUM SAFE LOAD:
   100 lb per sq ft or
   60 lb per sq ft and two moose
7. ALL WOOD SHALL BE DOUGLAS FIR, S-DRY
8. ALL WOOD SHALL BE PRESERVATIVE TREATED WITH PENTACHLOROPHENOL IN ACCORDANCE WITH AWPI STANDARD LP-77 AND AWPA STANDARD P-8 WITH A MINIMUM NET RETENTION OF 50 LBS. PER CU FT
9. ALL HARDWARE SHALL BE GALVANIZED OR CADMIUM PLATED STEEL.
10. ALL DECKING SHALL BE INSTALLED WITH A 1/4" CLEAR SPACING

MATERIALS LIST

LUMBER

S4S – "SELECT STRUCTURAL" – STRUCTURAL LIGHT FRAMING

6	2 x 4 x 4'
2	2 x 4 x 16'

ROUGH – "SELECT STRUCTURAL" – JOISTS AND PLANKS

17	2 x 12 x 5'
6	2 x 12 x 2' 1 7/8"
2	2 x 12 x 7'
3	3 x 12 x 16'
2	4 x 8 x 7'

HARDWARE

4	6 x 4 x 1/4 x 4 ∠
24	TYPE C, TRIP-L-GRIP WITH NAILS
12 LB	20d COMMON NAILS
6	3/8 x 4 MACHINE BOLT W/ NUT AND WASHERS
16	3/8 x 5 1/2 MACHINE BOLT W/ NUT AND WASHERS
4	1/2 x 4 1/2 MACHINE BOLT W/ NUT AND WASHERS

LAMINATED BEAM ALTERNATE

1. GLUE FULL CONTACT FACE OF ADJOINING BOARDS
2. NAIL ADJOINING BOARDS USING 10d NAILS
3. SPLICE BOARDS AS INDICATED IN DETAIL

MATERIAL LIST

S4S – SELECT STRUCTURAL – JOISTS

6	2 x 12 x 10'
3	2 x 12 x 18'

DEPARTMENT OF NATURAL RESOURCES DIVISION OF PARKS STATE OF ALASKA	DESIGN & CONSTRUCTION SECTION	SCALE NONE	16' TRAIL BRIDGE DRAWN M.J. CHECKED J.F.S. APPROVED DATE

FIGURE E5.7.1 (PAGE 7 OF 7)

APPENDIX E6.7
PHOTOGRAPHS OF SITES WITHIN THE PROJECT RECREATION STUDY AREA

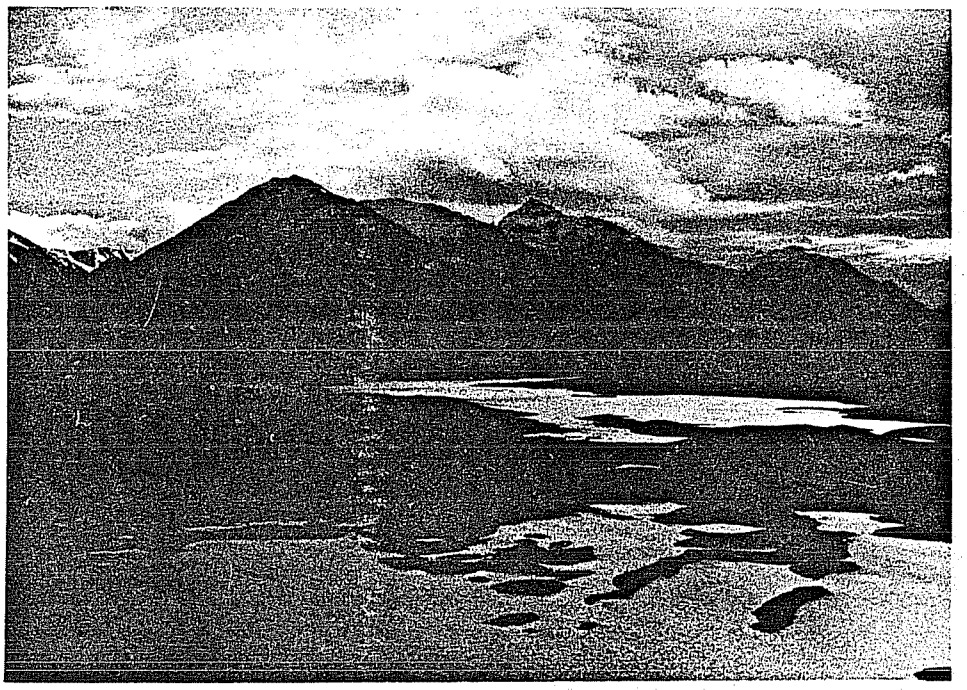


PHOTO E6.7.1: MIDDLE FORK OF CHULITNA RIVER; VIEW TO THE SOUTH THROUGH CARIBOU PASS ALONG PROPOSED TRAIL

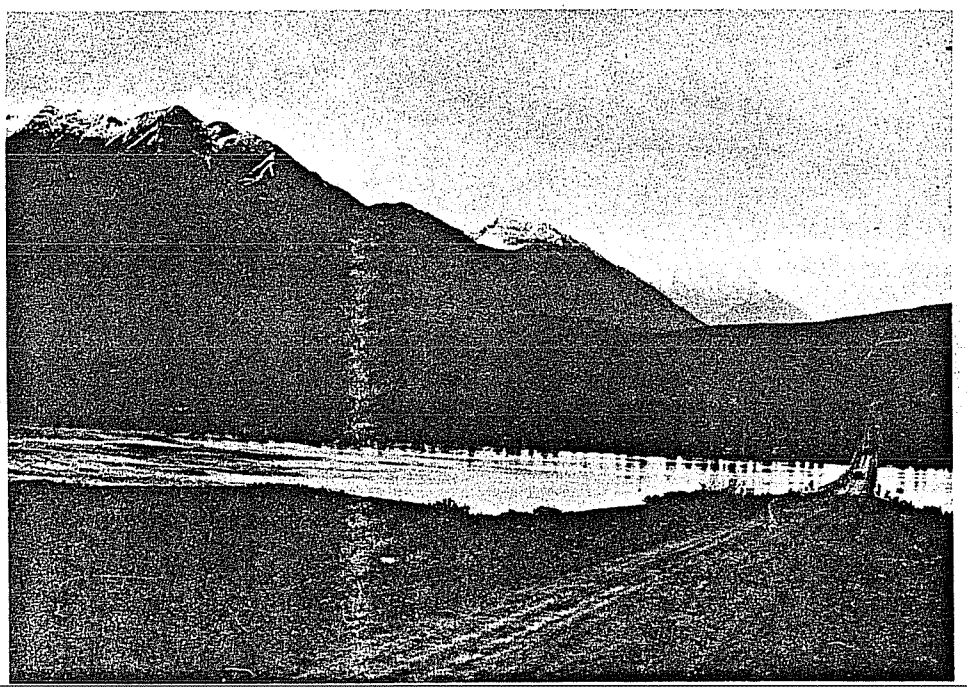


PHOTO E6.7.2: SUSITNA BRIDGE ON THE SUSITNA RIVER; IMMEDIATELY NORTH OF PROPOSED BOAT RAMP

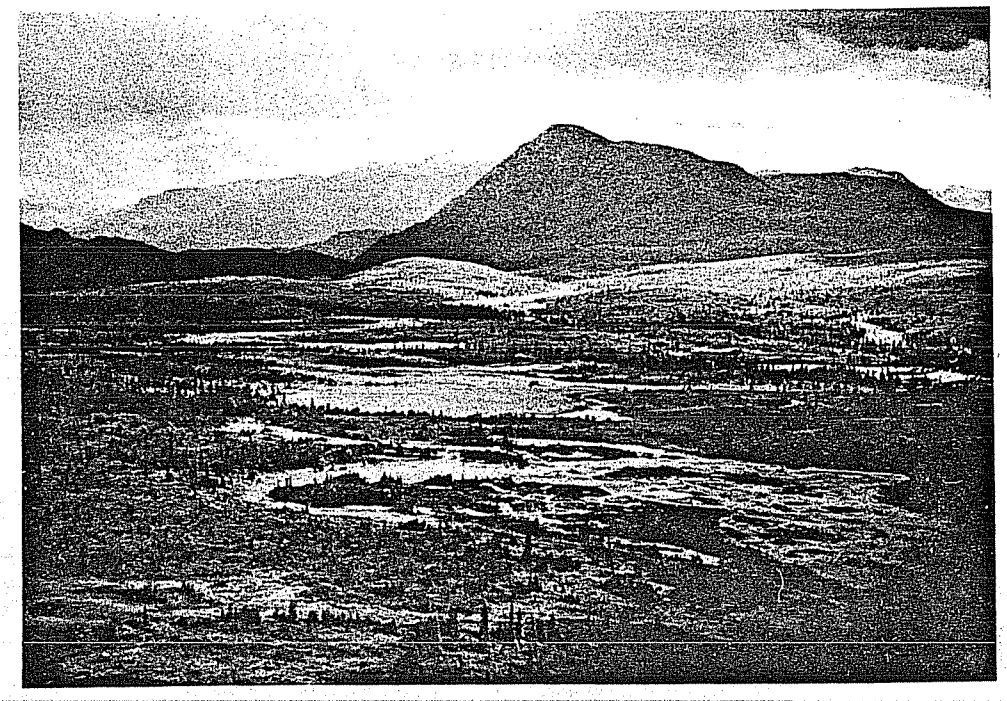


PHOTO E6.7.3: WATANA TOWNSITE

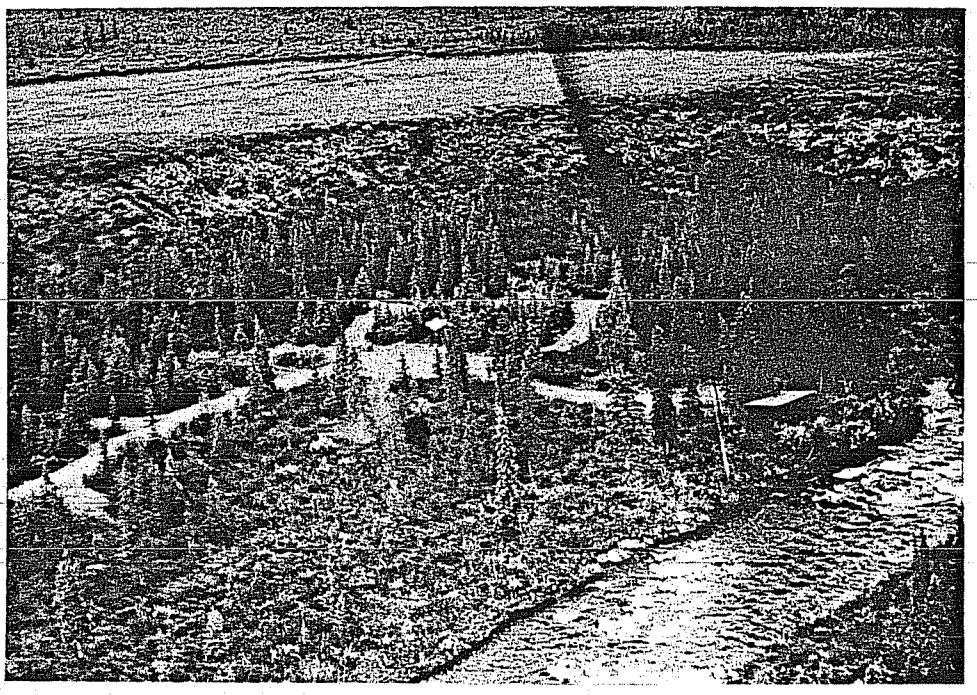


PHOTO E6.7.4: BRUSHKANA CAMP; EXISTING CAMPSITE ADJACENT TO PROPOSED CAMPSITE

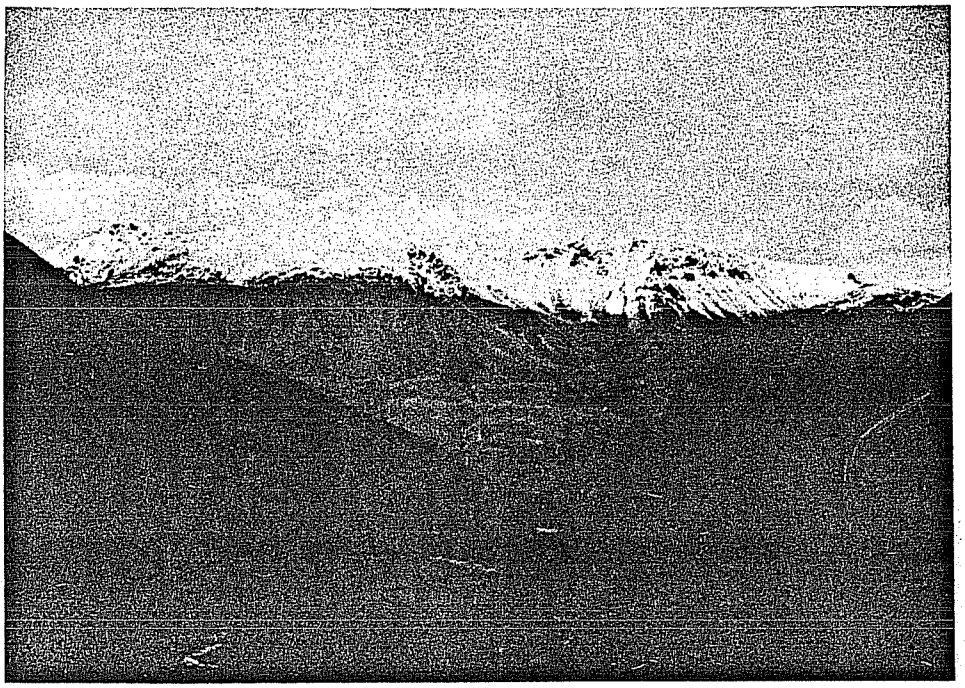


PHOTO E6.7.5: TSUSENA CREEK; VIEW WEST INTO THE TSUSENA CREEK DRAINAGE FROM THE CHULITNA MOUNTAINS, FROM THE PROPOSED MOUNTAINEERING TRAIL

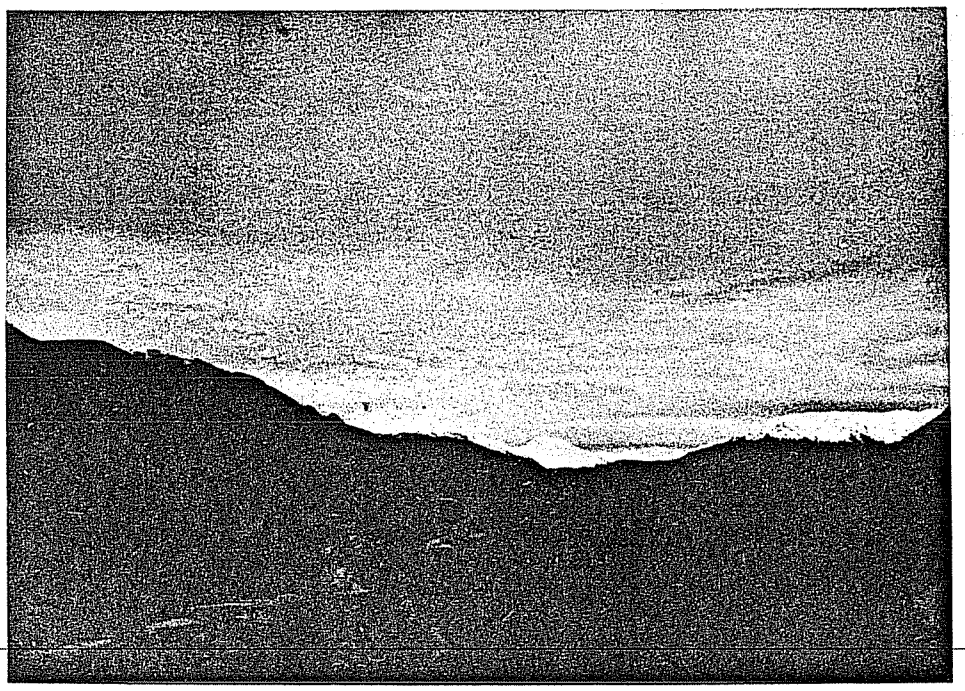


PHOTO E6.7.6: TSUSENA CREEK; VIEW NORTH INTO THE CHULITNA MOUNTAINS FROM ABOVE THE PROPOSED TRAIL

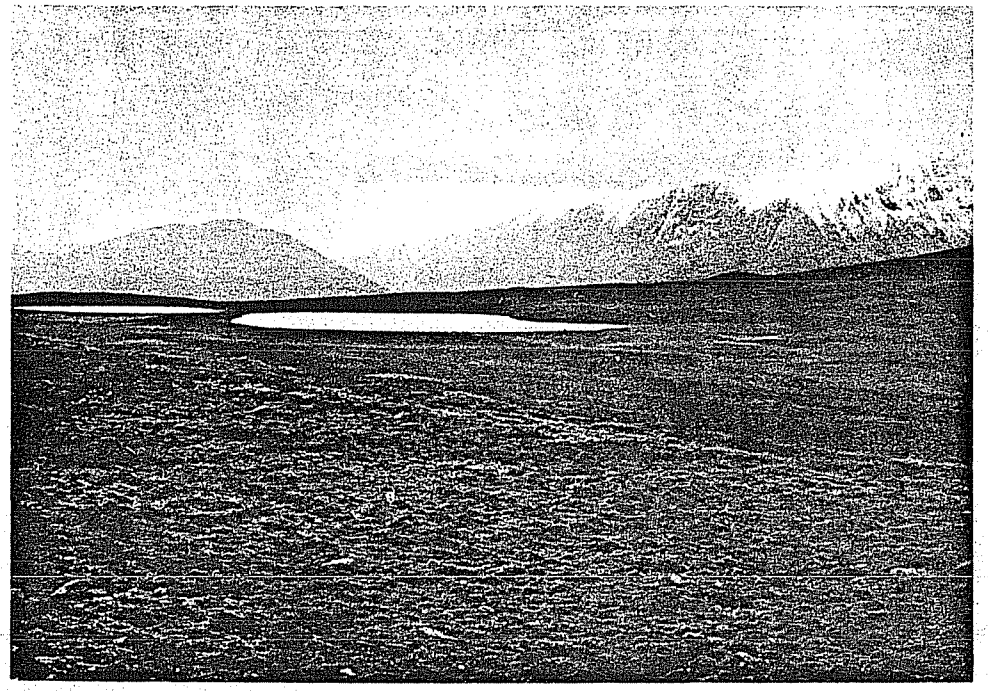


PHOTO E6.7.7: MID-CHULITNA MOUNTAINS; LOOKING SOUTH AT LAKE FROM PROPOSED TRAIL

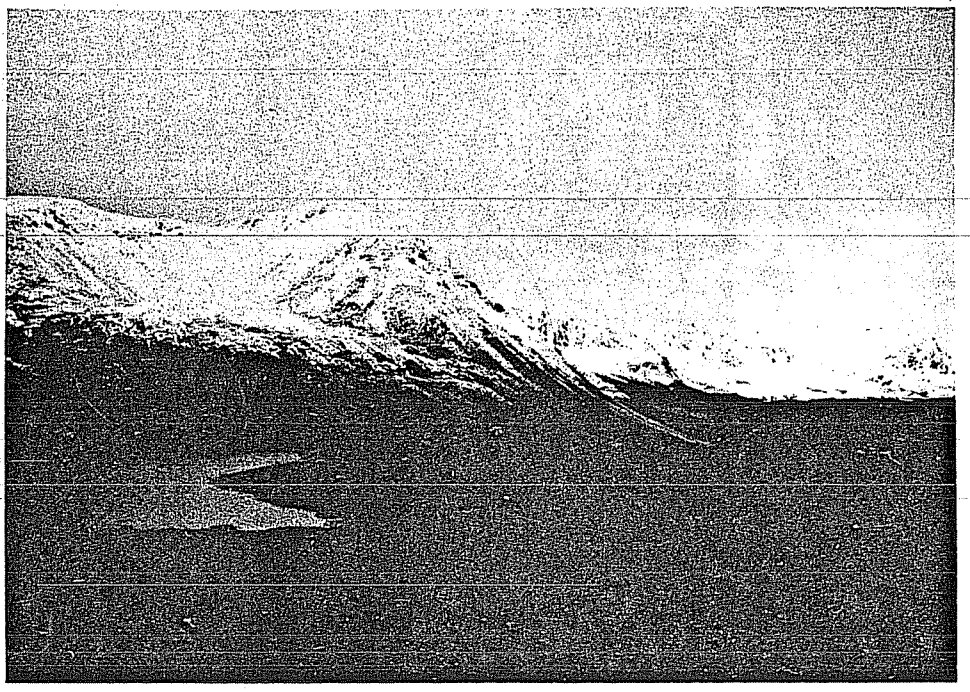


PHOTO E6.7.8: MID-CHULITNA MOUNTAINS; LOOKING NORTH FROM PROPOSED UNDESIGNATED CAMPSITES

PHOTO E6.7.9: MID-CHULITNA MOUNTAINS

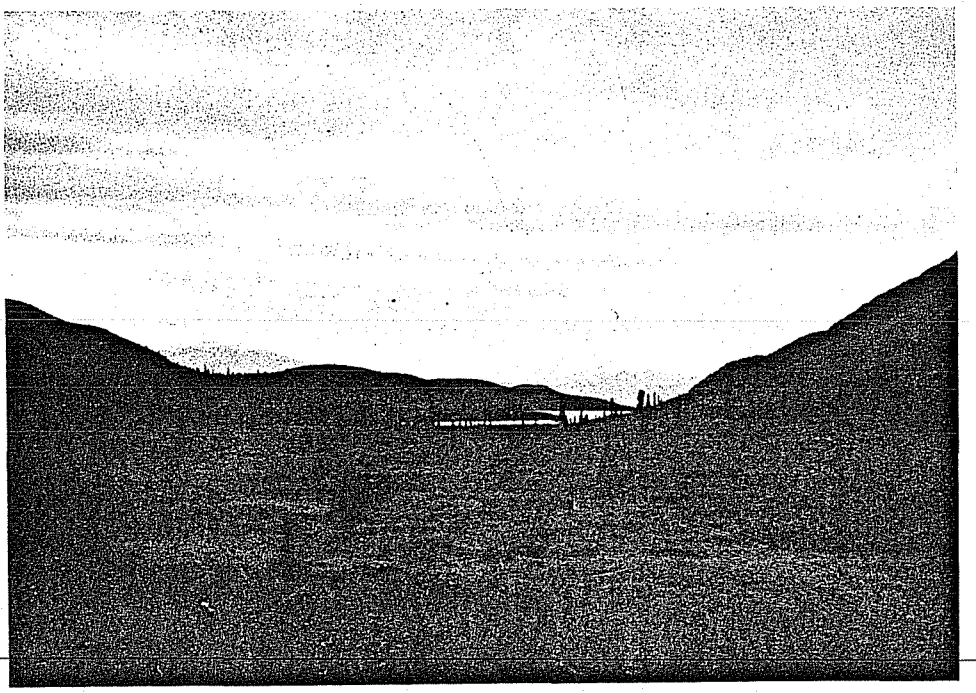
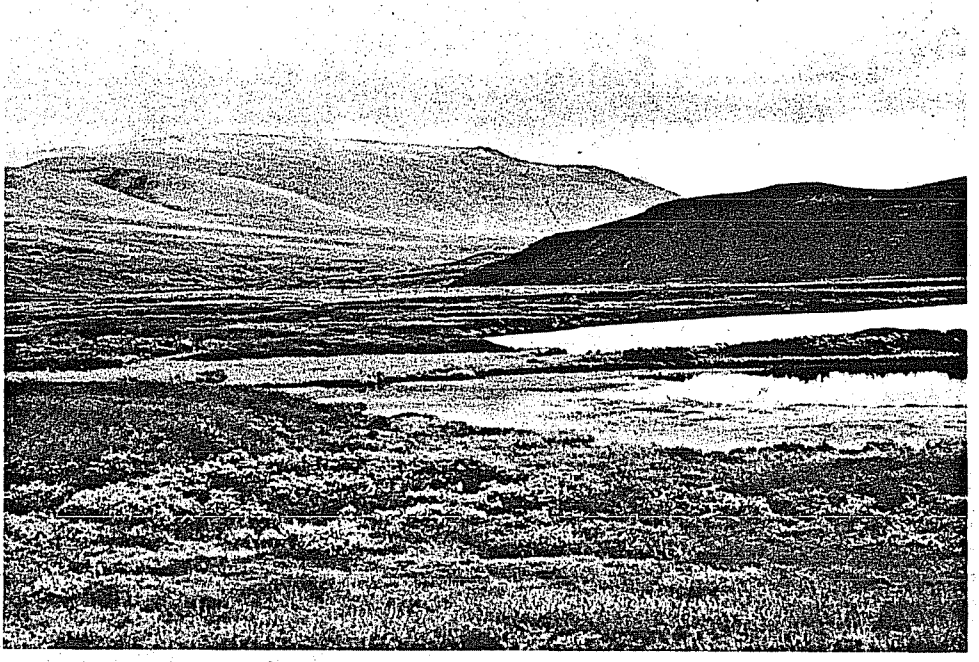


PHOTO E6.7.10: TSUSENA BUTTE; LOOKING SOUTH TOWARD TSUSENA LAKES FROM PROPOSED TSUSENA CREEK TRAIL



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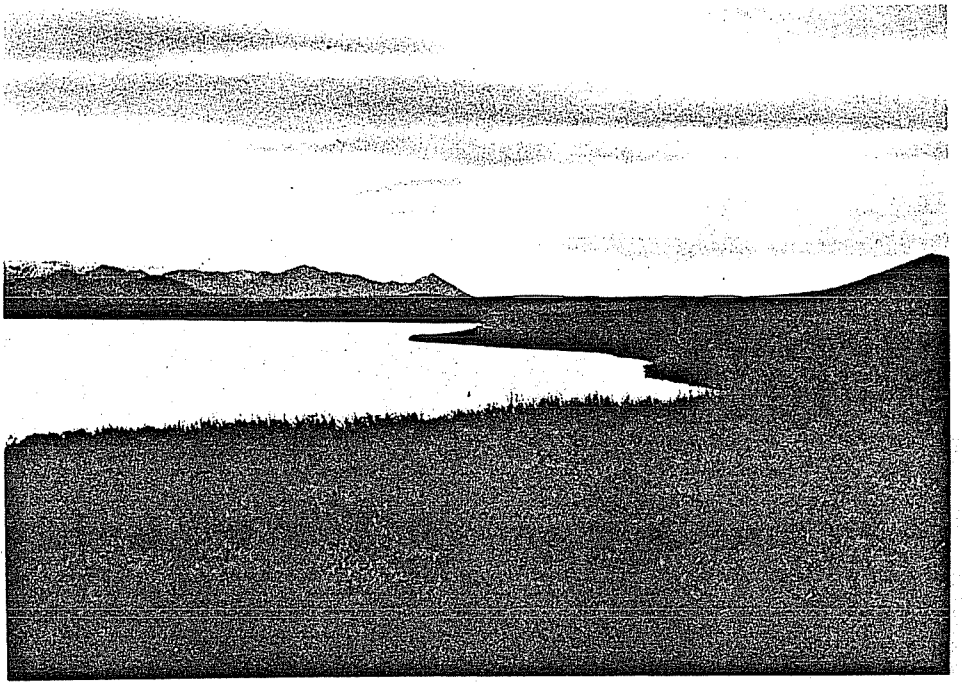

PHOTO E6.7.13: BIG LAKE; VIEW TOWARD THE SOUTH END OF THE LAKE FROM THE PROPOSED UNDESIGNATED CAMPSITES

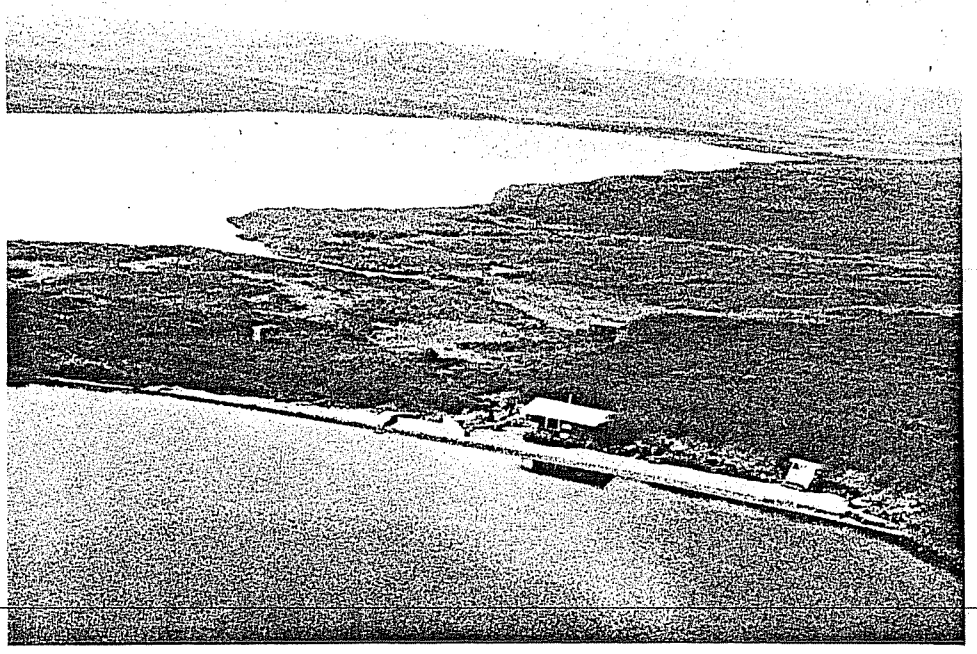

PHOTO E6.7.14: CLARENCE LAKE; GILBERT CREEK VIEW WEST TOWARD PROPOSED TRAIL AND UNDESIGNATED CAMPSITES

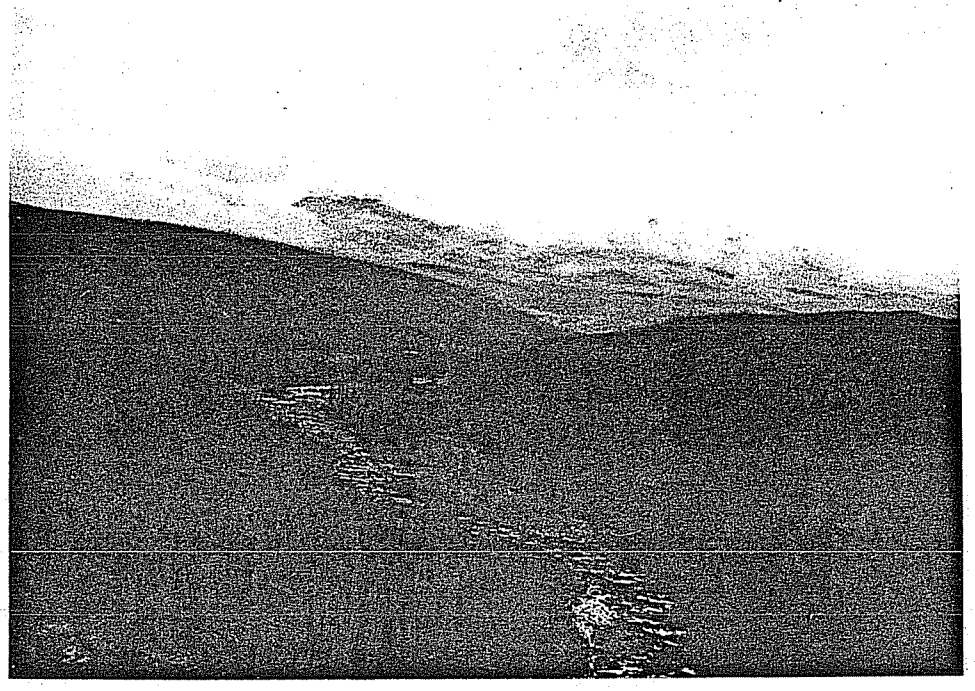

PHOTO E6.7.15: KOSINA CREEK; VIEW NORTH ALONG CREEK FROM ABOVE PROPOSED TRAIL

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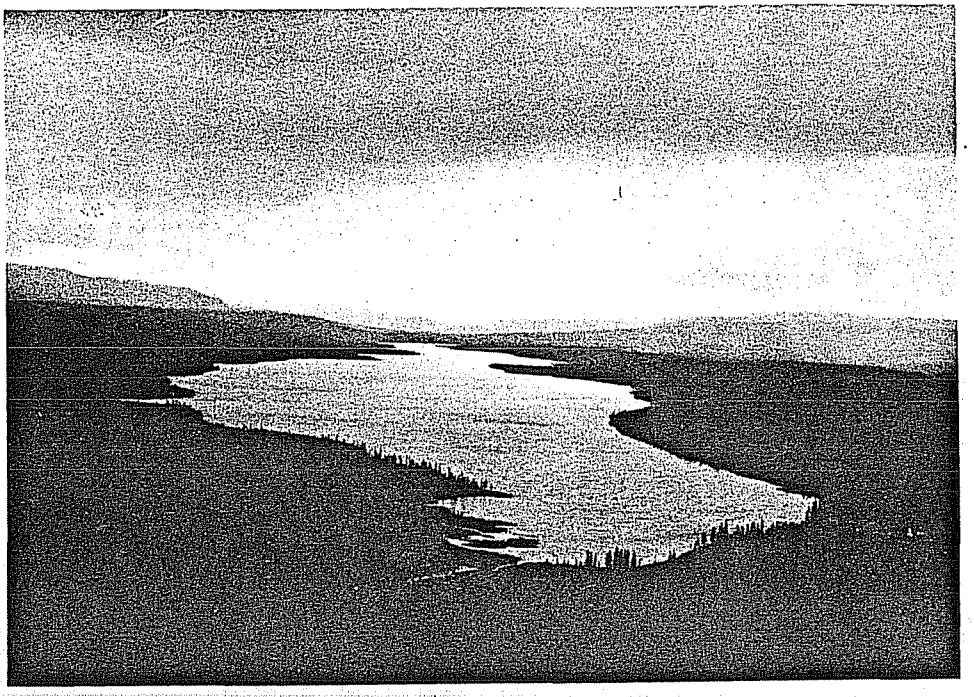

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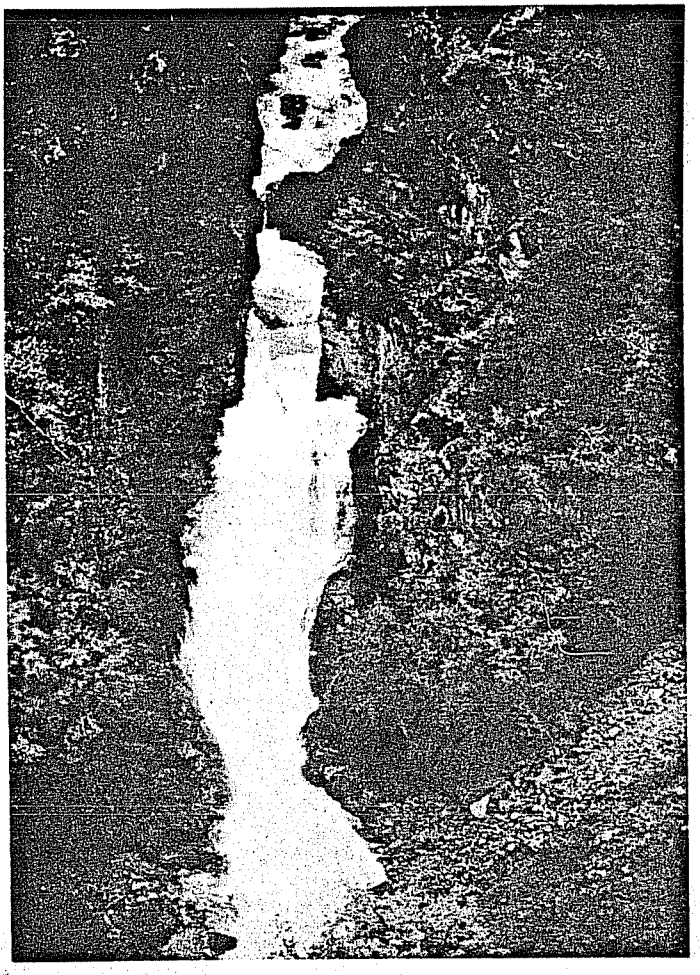

PHOTO E6.7.21: DEVIL CREEK; DEVIL CREEK FALLS EAST, AS VIEWED FROM NEAR PROPOSED VIEWPOINT

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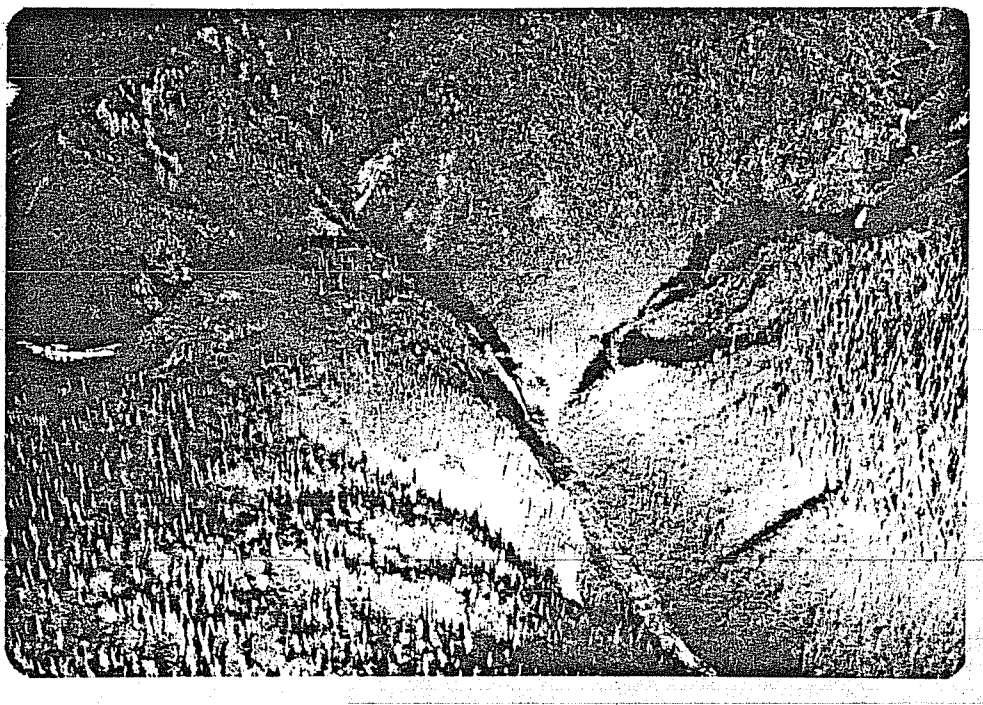

PHOTO E6.7.23: DEVIL CREEK; VICINITY OF PROPOSED SCENIC TRAIL AND VIEWPOINTS

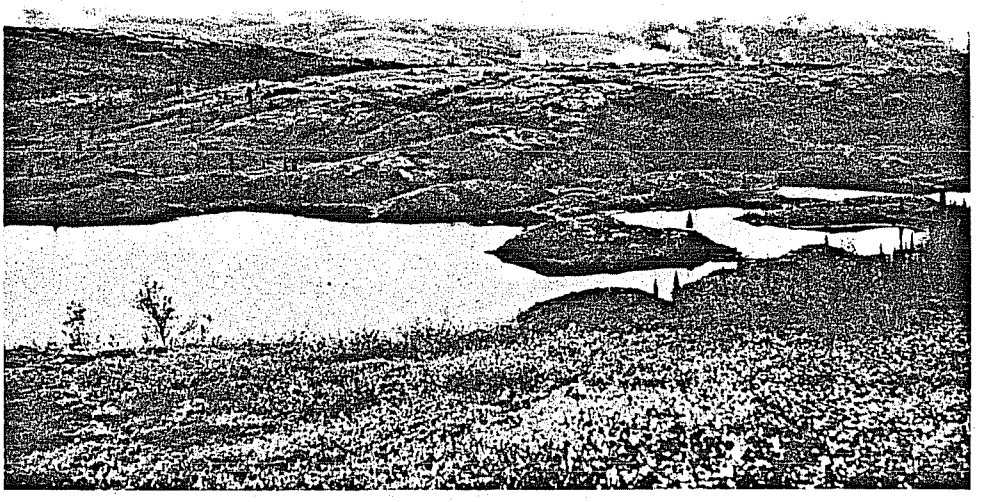

PHOTO E6.7.24: MERMAID LAKE; SOUTH END OF LAKE FROM ABOVE PROPOSED CAMPGROUND

PHOTO E6.7.25: MERMAID LAKE; NORTH END OF LAKE, FROM ABOVE PROPOSED CAMPGROUND

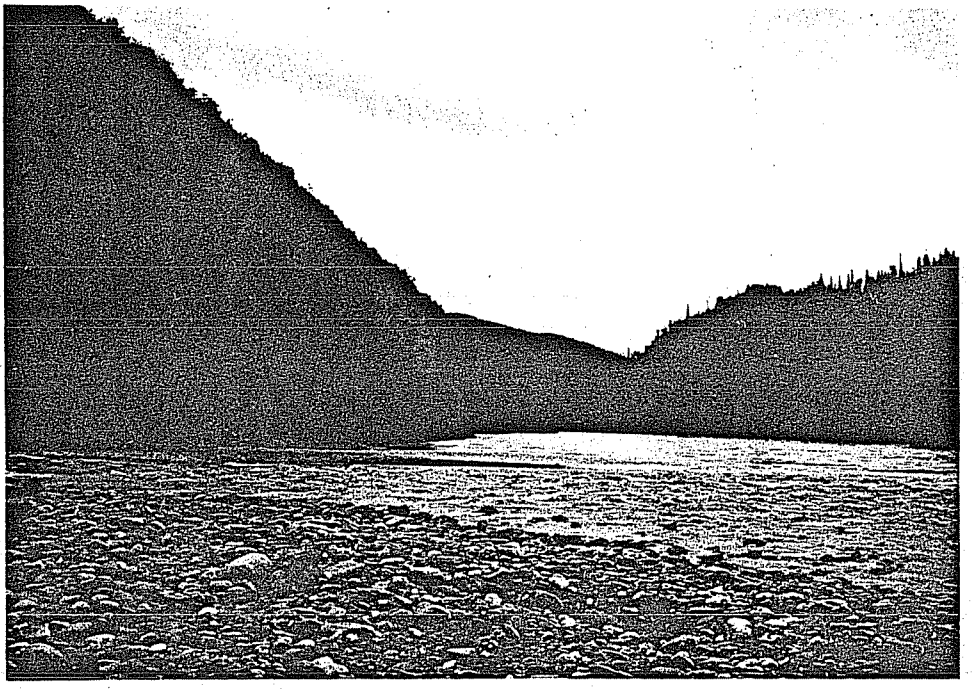

PHOTO E6.7.26: DEVIL CANYON DAMSITE; VIEW OF SUSITNA RIVER FROM THE PORTAGE CREEK CONFLUENCE

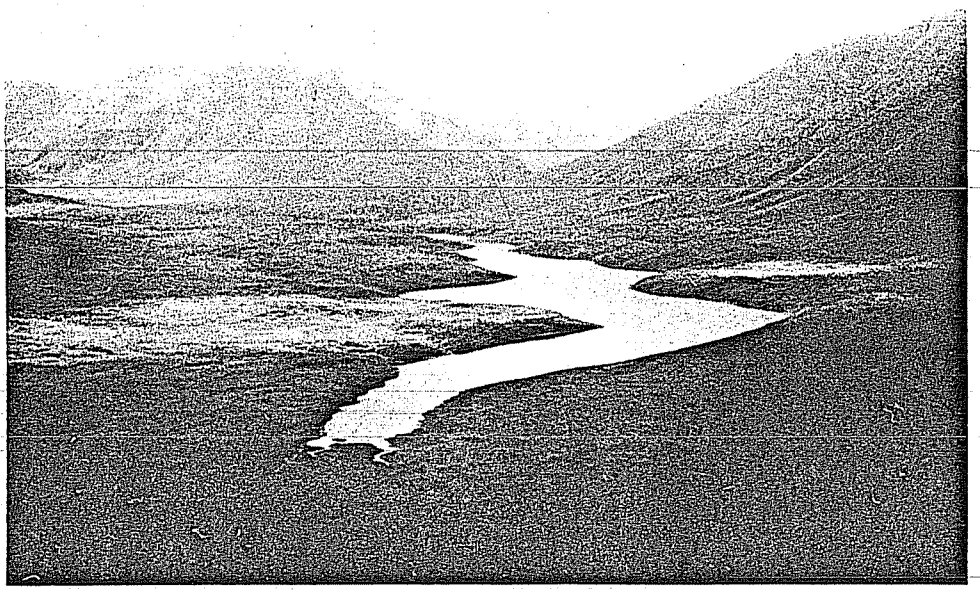

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PHOTO E6.7.28: SOULE CREEK, UPPER SOULE CREEK CANYON VIEWING TOWARD THE EAST ALONG THE PROPOSED MOUNTAINEERING TRAIL

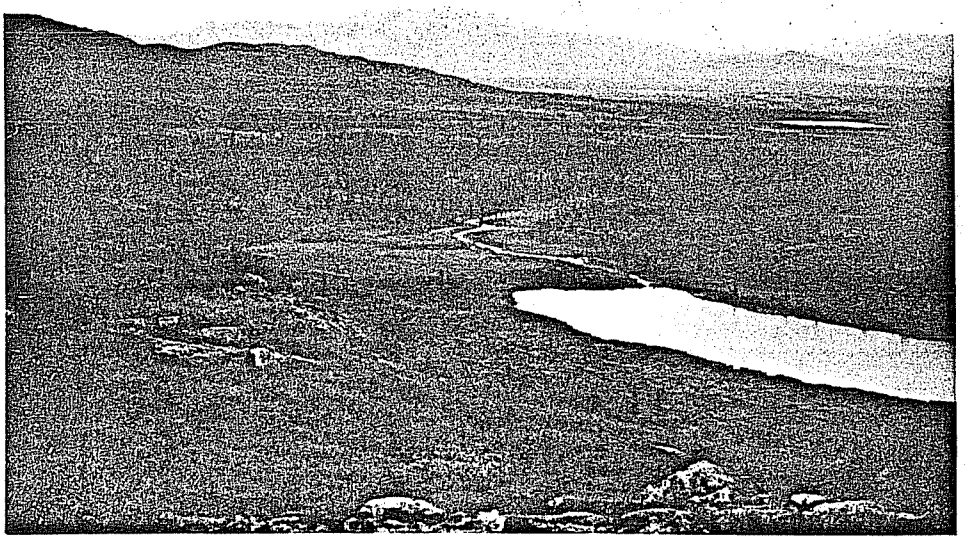

PHOTO E6.7.29: SOUTHERN CHULITNA MOUNTAINS, VIEWING SOUTHEAST OVER LAKE, FROM ABOVE THE PROPOSED TRAIL

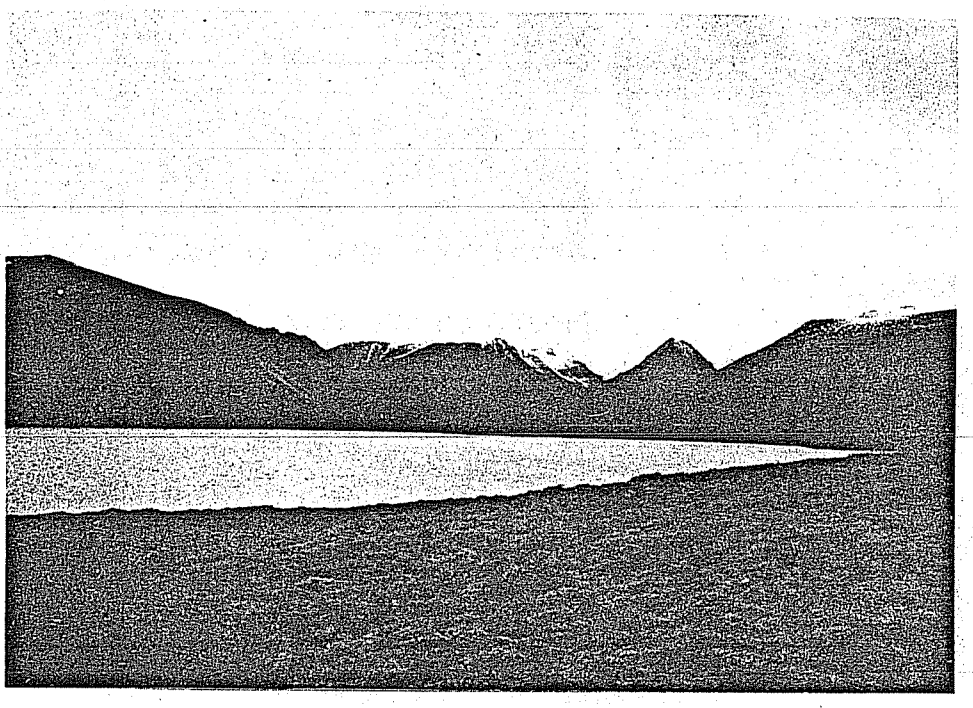

PHOTO E6.7.30: SOUTHERN CHULITNA MOUNTAINS; VIEWING EASTWARD INTO THE CHULITNA MOUNTAINS ALONG THE PROPOSED TRAIL FROM THE PROPOSED UNDESIGNATED CAMPSITES

CHAPTER 8
AESTHETIC RESOURCES

SUSITNA HYDROELECTRIC PROJECT
LICENSE APPLICATION

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AESTHETIC RESOURCES

1 - INTRODUCTION (**)

1.1 - Purpose (*)

The purpose of this chapter is to describe the aesthetic resources of the proposed project area, outline the anticipated impacts of project development on those resources, and describe proposed mitigation measures to prevent or minimize negative impacts to the visual environment. Mitigation measures which would enhance viewing opportunities of aesthetic resources in the project area are also identified.

1.2 - Relationship to Other Analyses (*)

This chapter is based, in part, on the project description presented in Exhibit A and project operations described in Chapter 2 of Exhibit E. Important inputs to the aesthetics mitigation plan can also be found in Exhibit E: Chapter 3, Fish, Wildlife, and Botanical Resources; Chapter 4, Historic and Archeological Resources; and Chapter 7, Recreation Resources.

1.3 - Environmental Setting (**)

1.3.1 - Regional Setting (**)

Susitna Hydroelectric Project facilities, including the transmission lines, would be located within two of Alaska's physiographic regions: the Southcentral Region and the Interior Region (see Figure E.8.1.1).

The Southcentral Region is bounded by the Alaska Range to the north and west, the Wrangell Mountains to the east, and the Chugach Mountains and Gulf of Alaska to the south. This region, which encompasses all of the Susitna Project features except for the northern stub of the transmission line, is characterized by rugged mountainous terrain, plateaus and broad river valleys. In addition, the region contains approximately 55 percent of the state's population. This includes Anchorage, located 100 air miles south of the project area.

Mount McKinley, the highest mountain in North America, is on the Southcentral Region's northwest border. Spruce-hemlock and spruce-hardwood forests, wetlands, moist and wet tundra, plateau uplands and a number of active glacially-bedded mountain valleys are other important natural environments present. These diverse

landscapes are complemented with a wide variety of wildlife and fishery resources.

The Interior Region is bordered by the Brooks Range to the north, the Bering Sea to the west, Canada to the east, and the Alaska Range to the south. It is generally characterized as a broad open landscape of large, braided and meandering rivers and streams. River valleys are primarily vegetated with spruce-hardwood forests giving way to treeless tundra and brush-covered highlands and large wetland areas. The Yukon River, which bisects the Interior Region, is its single most important natural feature. Again, as in the Southcentral Region, wildlife and fishery resources are as diverse as the landscapes.

Fairbanks, located 100 air miles north of the project area with approximately 65,000 residents, is Alaska's second largest urban center (Frank Orth & Associates 1985). Due to a harsh winter climate and general inaccessibility (other than by air), the Interior Region is still considered to be predominantly a wilderness area.

1.3.2 - Project Setting (**)

The 39,000-square-mile middle Susitna River basin is located entirely in the Southcentral Region. The basin is bordered by the Alaska Range to the north, the Chulitna and Talkeetna Mountains to the west and south, and the northern Talkeetna Plateau and Gulkana Uplands to the east. Although the basin is not considered to be unusually scenic in comparison to other natural resources in Alaska, it has distinct and diverse combinations of landforms, waterforms, vegetation and wildlife species. The deep V-shaped canyons of the Susitna River, the Talkeetna Mountains, and the upland plateau to the east are the dominant topographic forms. Elevations in the basin range from approximately 700 feet to over 6,000 feet. Distinctive landforms include panoramic tundra highlands, active and post-glacial valleys, and numerous lakes. The most well-known features in the basin are the vertical-walled Devil and Vee Canyons on the Susitna River.

The project area is located within the middle Susitna River basin. The project area boundary is defined as the Alaska Railroad to the southeast, the Parks Highway to the northeast, the Denali Highway to the north, the Susitna River to the east and a line twenty miles south of the Susitna River.

The major drainages in the middle Susitna River basin are the Susitna, Maclaren, Tyone and Oshetna Rivers. The principal creeks in the basin are Portage, Devil, Fog, Tsusena, Watana, Kosina, Jay, and Butte Creeks. Scenic waterfalls occur

on several creeks near their confluence with the Susitna River. The most notable falls occurs on Devil Creek.

Spruce and mixed spruce-deciduous forests are located in river and tributary valleys below an elevation of 2,500 feet west of the confluence of the Oshetna and Susitna Rivers. Tundra and muskeg replace the mixed forests to the east and on the highlands. Mountain slopes are bare or lightly covered with vegetation.

Wildlife species in the middle Susitna River basin include Dall sheep, moose, caribou, grizzly and black bears, bald and golden eagles, trumpeter swans, and numerous migratory waterfowl. All five Alaskan salmon species, grayling, burbot and rainbow and lake trout also occur in the basin.

Existing access into the middle Susitna River basin is generally limited to hiking, float planes, all-terrain vehicles (ATV's), and watercraft. The Denali Highway, a scenic gravel road, passes through the northern portion of the basin linking the George Parks Highway to the west with the Richardson Highway 136 miles to the east. Several short roads and trails traverse the tundra to mining claims and fishing and hunting lodges. Primary human use of the basin includes recreational hunting and fishing.

1.3.3 - Summary

(This section deleted)

2 - PROCEDURE (*)

The methodology followed in conducting the aesthetic impact and mitigation planning analyses is described below. These steps are summarized below and are described in more detail in the following sections.

Step 1 - Analysis Objectives

- o Establish objectives of the aesthetic impact assessment and mitigation planning analyses through consultation with key agencies and project designers;
- o Prepare a detailed work program and study outline;
- o Review previous Susitna Project reports and other related visual studies;
- o Perform air and ground reconnaissance of the project area and proposed facility sites; and
- o Identify concerns of agencies and special interest groups.

Step 2 - Project Facilities

- o Identify and analyze the siting and design of proposed project facilities.

Step 3 - Landscape Character Types

- o Identify and describe existing landscape character types within the study area based on their land and water forms, and vegetation.

Step 4 - Views

- o Identify major viewpoints within the study area.

Step 5 - Aesthetic Value Rating

- o Assign aesthetic value ratings to each landscape character type based on the criteria of distinctiveness, uniqueness and harmony/balance.

Step 6 - Absorption Capability

- o Rate the absorption capability of landscape character types according to their ability to absorb visual modification, without causing disharmony or degradation.

Step 7 - Composite Rating

- o Determine the composite ratings of each landscape character type based on a synthesis of Steps 5 and 6.

Step 8 - Facilities Rating

- o Analyze the relationship of proposed facilities to the existing landscape character types and determine potential impacts.

Step 9 - Mitigation Measures

- o Develop mitigation measures which would avoid or reduce adverse aesthetic impacts and provide or enhance the positive aesthetic impacts of the Project on the landscape.

3 - STUDY OBJECTIVES (*)

The major objectives for the aesthetic impact and mitigation planning analyses were to:

- Identify the inherent quality of the aesthetic resources of the existing landscapes that would be directly or indirectly affected by development of the Susitna Project;
- Protect the quality of existing landscapes by minimizing negative impacts caused by human activity and development;
- Maximize opportunities to appreciate existing and new areas of high aesthetic quality; and
- Maximize the positive relationships between proposed project facilities and existing landscapes.

4 - PROJECT FACILITIES (*)

The Susitna Project has a number of facilities which would potentially have aesthetic impacts on existing landscapes. The general location of these facilities is shown in Figure E.8.4.1. The facilities are described in the following sections.

4.1 - Watana - Stage I Project Area (*)

- Earthfill dam and two temporary cofferdams
- Reservoir
- Main spillway
- Borrow areas (material for dams)
- Construction haul roads
- Construction camp (single status)
- Construction village (married status)
- Two 345-kV transmission lines (Watana Dam to Intertie)
- Temporary transmission line (power for Watana construction)

4.2 - Devil Canyon Project Area (*)

- Concrete arch dam, saddle dam and two temporary cofferdams
- Reservoir
- Main spillway
- Borrow areas (material for saddle and cofferdams)
- Construction haul roads
- Construction camp (single status)
- Construction village (married status)
- Two 345-kV transmission lines (Devil Canyon to Intertie)
- Railroad (Gold Creek to Devil Canyon)

4.3 - Watana - Stage III Project Area (***)

- Raised earthfill dam and two temporary cofferdams
- Raised reservoir
- Raised spillway
- Borrow areas (material for cofferdams)
- Construction haul roads
- Construction camp (single status)
- Construction village (married status)
- Permanent town
- Two 345 kV transmission lines (Devil Canyon to Intertie)

4.4 - Denali Highway to Watana Dam Access Road (*)

- Gravel road from Denali Highway to Watana Dam
- Borrow areas for road construction

4.5 - Watana Dam to Devil Canyon Dam Access Road (*)

- o Gravel road from Watana Dam to Devil Canyon Dam
- o High level bridge (below Devil Canyon dam site)
- o Borrow areas for road construction

4.6 - Transmission Lines (*)

- o Two 345-kV transmission lines from Healy to Fairbanks (north stub) and one 345-kV transmission line parallel to the Intertie from Gold Creek to Healy

- o Three 345-kV transmission lines from Willow to Anchorage (south stub) and two 345-kV transmission lines parallel to the Intertie between Gold Creek and Willow

4.7 - Intertie

(This section deleted)

4.8 - Recreation Facilities and Features (*)

- o Visitor centers at Watana and Devil Canyon Dams
- o Road pulloffs and parking
- o Semi-developed campgrounds
- o Primitive camping
- o Trailheads
- o Developed and primitive trails
- o Warming shelters

Appendix E2.8 provides site photos with simulations of project facilities. Appendix E3.8 presents photos of proposed project facility sites.

5 - EXISTING LANDSCAPE (**)

5.1 - Landscape Character Types (*)

Landscape character types are a description and classification of coherent units of a landscape used as a frame of reference to classify physical features of an area. They are, for the most part, based on physiographic units and they represent land areas with common distinguishing visual characteristics. Using aerial photographs and USGS topographic quadrangles, physiographic units were identified. These were subsequently verified and inventoried in the field. The landscape character types for areas containing project features are shown in Figures E.8.5.1, E.8.5.2, and E.8.5.3. The inventory included evaluations of four major landscape characteristics:

- o Landforms: Physiographic units defined by their degree of enclosure, geologic history and composition, slope gradient and distinguishing landscape patterns, and notable natural features;

- o Waterforms: The location of water bodies, lakes, rivers, streams, and wetlands, and the pattern and character of their occurrence. Rarity is also noted.

- o Vegetation: A description of the vegetation patterns which exist within the basin. Special or unusual vegetation occurrences are noted.

- o Views: A description of special visual characteristics within a landscape character type, panoramic views to regional landscape settings, and potential viewers.

The charts shown in Appendix E8.8 identify and summarize the landscape character types and the notable natural features within each landscape character type. Numbered and asterisked items identify notable natural features which are described in Section 5.2.

The landscape character types were then evaluated for their aesthetic value and absorption capability. Aesthetic value is a relative measure of overall importance of the visual landscape, including components such as distinctiveness, uniqueness, harmony and balance. Absorption capability is a measure of a landscape's sensitivity to alteration.

The charts showing landscape character types and notable features have been moved to Appendix E8.8.

5.2 - Notable Natural Features (**)

Identification of notable natural features within the project area is important in evaluating aesthetic impacts, because they may serve as

destinations for visitors and residents seeking recreation opportunities. The Project would improve access to the project area; thus increasing the likelihood of these features being viewed. Even when these features are not connected to formal road or trail systems, they may still serve as destinations for hikers, boaters or fliers. Therefore, project facilities located within view of a notable natural feature are judged to have a greater potential aesthetic impact than those which are not visible. Ten notable natural features were identified within the project area. The location of these features is shown in Figure E.8.5.1. Appendix E1.8 provides photographs of the features. A brief description of each of these notable natural features is provided below:

5.2.1 - Devil Canyon (**)

Devil Canyon, which surrounds an 11-mile stretch of the Susitna River, begins just downstream of the mouth of Devil Creek and ends approximately 1.5 miles upstream of Portage Creek. The combination of high volumes of glacial water, steep inaccessible canyon walls and large boulders highlights this turbulent and dynamic landscape. There are four sets of rapids, known as Devil Canyon rapids, that encompass approximately five miles of the canyon. These rapids are rated as Class VI (the highest rating) on the International Whitewater Scale. Between the Class VI rapids, the fast-moving whitewater is rated as either Class II or Class III. Because of the extreme challenge that the rapids present, only 27 kayakers were known to have attempted the rapids between 1976 and 1982.

5.2.2 - Devil Creek Falls (*)

Two large waterfalls fall through narrow gorges on Devil Creek which joins the Susitna River above the proposed Devil Canyon dam site. The setting is a combination of vertical rock walls, icy clear streams and colorful vegetation.

5.2.3 - Stephan Lake (*)

Stephan Lake, a large lake located at the base of the Talkeetna Mountains, has one lodge and several cabins along its shore. Wetlands and gentle hills covered with mixed woods and tundra comprise the lake's natural shoreline. Stephan Lake is used as a starting place for kayaking and rafting on the Talkeetna River.

5.2.4 - Tsusena Creek Falls (*)

A spectacular rocky canyon covered with mixed woods and tundra and a series of rapids and cataracts provides the backdrop for Tsusena Creek Falls. The falls are located on Tsusena Creek approximately three miles above the confluence of Tsusena Creek and the Susitna River.

5.2.5 - Tsusena Butte Lake (*)

Located at the edge of the Chulitna Mountains, Tsusena Butte Lake was created by a glacial moraine. The Tsusena Creek valley shows evidence of its glacial history and includes a large variety of tundra landscapes and colorful rock formations.

5.2.6 - Deadman Creek Falls (*)

Similar to other tributary falls that flow into the Susitna River, Deadman Creek Falls occurs in a steep, small-scale rocky canyon. The falls are located approximately one mile above the proposed Watana dam site.

5.2.7 - Fog Lakes (*)

Fog Lakes consists of a series of large linear lakes on the south side of the Susitna River. They occur in a gently-rolling to flat landscape covered with wetlands, mixed forest and open tundra vegetation.

5.2.8 - Big and Deadman Lakes (*)

Big and Deadman Lakes are picturesquely set between three large tundra-covered buttes. There are many outstanding views from the lakes into the Susitna basin.

5.2.9 - Caribou Pass (*)

Two long lakes surrounded by glaciated mountains are located in a narrow valley referred to as Caribou Pass. Wetlands and tundra cover the valley floor where the middle fork of the Chulitna River has its headwaters.

5.2.10 - Vee Canyon (**)

Vee Canyon is a narrow, vertical, rock-worn canyon which encloses the Susitna River for over one mile. The canyon is located east of the Watana damsite. The canyon includes a double hairpin bend, a deeply cut channel, and a stretch of whitewater rapids. The canyon's steep ridges, and varied coloration and rock formations make it a visually interesting natural resource.

6 - VIEWS (**)

An evaluation of existing landscape character types and their inherent aethetic quality is independent of visibility since aesthetic quality does not depend on visibility. However, the evaluation of aesthetic impacts is directly related to the potential for viewing a particular resource.

Aesthetic sensitivity requires an understanding of who the viewers would be, when and where they would see resources, what they can see, and what preconceptions they bring with them about those views. These factors (viewers and visibility) are important because they form the basis for an evaluation of the importance of aesthetic impacts discussed in Section 8.

6.1 - Viewers (***)

Existing viewers in the project area include hunters, fishermen, guides, flyers, boaters, and hikers. Concentrated at places such as High Lake, Tsusena Butte Lake and Stephan Lake, many of these viewers are attracted to the area because of its remote setting and recreation opportunities. In addition, there are two other groups of project-area viewers: hikers (especially those who hike to the viewpoint at the top of Indian Mountain) and drivers and passengers in vehicles on portions of the Parks and Denali Highways adjacent to project facilities. Those viewers are typically in transit to some location outside the Susitna project area.

As the Susitna Project is developed, access roads, a rail spur and developed recreation sites would be constructed. There would be an influx of new viewers: first, construction workers, then hunters and fishermen, people travelling for non-consumptive recreation opportunities (hiking, camping) and tourists (especially when the visitor centers are completed).

6.2 - Visibility (***)

An aesthetic impact that is rarely seen is less critical than one which is occasionally seen, and much less critical than one which is seen frequently and from many different vantage points. Many of the Susitna Project facilities would not be visible from locations in the project area.

The visibility of each project facility was determined through an examination of the following three parameters: distance zones, viewsheds, and significant views. This information was then used in conjunction with viewer data to determine the aesthetic impact of each project facility. A discussion of visibility parameters follows.

6.2.1 - Distance Zones (***)

In the distance zone analysis, three distance zones (foreground, middleground, and background) were mapped from major travelways (access roads and the rail spur) and from points of viewer concentration (remote viewpoints, campgrounds, the visitor centers, dams, construction camps and villages, and the permanent village). Distance zones were not mapped from backcountry trails or remote campsites.

6.2.2 - Viewsheds (***)

In the viewshed analysis, individual viewsheds were composited and used in conjunction with distance zones to help determine aesthetic impacts of project facilities. The viewshed analysis demonstrated that viewers would potentially see the rail spur, Gold Creek switchyard, and the Devil Canyon construction camp from Indian Mountain. Travelers on the Parks Highway would see portions of the transmission lines, and travelers on the Denali Highway would see the first few miles of the Denali Highway to Watana Dam access road. Hunters, fishermen and flyers potentially would view all project facilities. While visitors to Stephan Lake Lodge would see little change, visitors to Tsusena Butte Lake Lodge may see a proposed campground and trail. In addition, persons visiting High Lake Lodge may see a portion of the Watana Dam to Devil Canyon Dam access road and transmission line.

6.2.3 - Significant Views (***)

Significant views focus on the most important portion of the total view possible in each viewshed. A viewer at a designated viewpoint would usually look longer at one particular segment of the view, just as a passenger, travelling north along the Denali Highway to Watana Dam access road would first be attracted to the view of a prominent butte (Significant View #2, Table E.8.6.1) and, a few minutes later, shift their view to distant vistas of the Alaska Range and Nenana River Valley (Significant Views #1a and #1b, Table E.8.6.1). The significant view analysis identifies viewers, their location, and the duration of their view. See Table E.8.6.1 and Figure E.8.6.1 for a summary of this information.

7 - AESTHETIC EVALUATION RATINGS (**)

7.1 - Aesthetic Value Rating (*)

Each landscape character type was evaluated for its aesthetic value; i.e., high, medium or low. Aesthetic value is defined as a relative measure of the visual landscape based on the following three characteristics.

7.1.1 - Distinctiveness (*)

The visual impression of an area; i.e., a landscape where land forms, water forms, rocks, vegetative or soil patterns are of outstanding and memorable aesthetic quality.

7.1.2 - Uniqueness (*)

The relative scarcity or commonality of the landscape and natural features. Due to Alaska's varied and numerous high-quality landscapes and natural features, uniqueness has two levels of meaning for the purpose of this report:

- Landscapes and natural features may or may not be rare on a statewide scale; and
- Landscapes and natural features may or may not be rare on a project-area scale.

7.1.3 - Harmony and Balance (*)

The degree to which all elements of the landscape form a unified composition. This includes how well man-made elements are integrated in a natural setting.

These characteristics (distinctiveness, uniqueness, and harmony and balance) were evaluated by an on-site examination of each landscape character type. This on-site examination also considered visibility and the potential for views in generating aesthetic value rating.

7.2 - Absorption Capability (*)

Each landscape character type was evaluated for its absorption capability, which is the relative ability of a landscape to absorb physical change. Each landscape character type was rated as high, medium or low based on aesthetic value, topographic enclosure, vegetation cover, ground plane color and visibility. Each landscape character type was also evaluated through an on-site examination with respect to potential project facilities.

The ratings for aesthetic value and absorption capability evaluations are presented in Appendix E9.8.

7.3 - Composite Ratings (**)

The aesthetic value rating and the absorption capability for each landscape character type were combined to create a composite rating. The range of relationships can be stated as follows: the most durable and easily altered landscape character types are those with a high absorption capability and a low aesthetic value rating; the most fragile and difficult to alter landscape character types are those with a low absorption capability and a high aesthetic value rating. This relationship is illustrated in the Table E.8.7.1. This table summarizes the inherent quality of the landscape that is used in assessing aesthetic impacts and in developing mitigation measures to reduce adverse aesthetic impacts.

8 - AESTHETIC IMPACTS (**)

Adverse impacts to project area aesthetic resources have been avoided as much as practicable through siting and design of project facilities. Locating the Watana and Devil Canyon switchyards and powerhouses underground and eliminating emergency spillways and the temporary airstrip are design refinements that resulted in an important reduction of aesthetic impacts. Nonetheless, with a project of this magnitude, it is not possible to avoid all impacts to aesthetic resources.

Construction of proposed project facilities would change the visual character of the area from an undeveloped, remote setting to an area characterized by development and increased human activity. The most important visual impacts resulting from the Project would include the loss of Devil Canyon rapids, Vee Canyon rapids and Deadman Creek Falls, which are notable scenic features of local or regional importance. While Devil Canyon would be mostly inundated, much of the Vee Canyon and its scenic rock formations would remain since its location in the upper reaches of Watana Reservoir prevents its complete inundation. The other seven notable natural features described in Section 5.2 would not be directly affected by the Project. These include the waterfalls at Devil Creek, the Tsusena Creek Falls, Caribou Pass, and four lakes (Stephan Lake, Fog Lakes, Tsusena Butte Lake, and the Big/Deadman Lakes).

Temporary visual impacts would also occur. These would include the presence of construction personnel, traffic, materials, and worker camps. Viewer response to visual change would vary depending on individual preference and values.

The Project would also have positive effects, since the access road and, to a lesser extent, the railroad spur and reservoirs would provide new recreational and viewing opportunities to the public. Viewing of notable natural features in the area would substantially increase as a result of project access and recreation facilities. Additionally, the dams are expected to be visually interesting to many.

Aesthetic impacts of the Project are summarized below. Discussions of aesthetic impacts for Stage I, Stage II, access routes and transmission lines are based on the Draft Environmental Impact Statement, Appendix M, modified to reflect staging (FERC 1984). Additional details of potential impacts are listed by project feature in Appendix E6.8.

8.1 - Mitigatation Planning of Incompatible Aesthetic Impacts

(Now addressed in E.8.9).

8.2 - Watana Stage I (***)

The construction of the Stage I Watana Dam and associated structures, the impoundment area, the construction camp and village, and the permanent village would substantially change the image and character of portions of the project area, especially in the Susitna River Valley landscape character type and in the southern portion of the Wet Upland Tundra landscape character type. The currently remote and largely undisturbed Susitna River valley would become an area of increased human activity and development, and visual resources would be altered accordingly.

The proposed earth-fill dam, which is 700 feet high and 4,100 feet long, would become the most prominent visual feature in the previously natural setting of the Susitna River valley. The geometric lines and forms of the dam and associated structures would be in visual contrast to the natural form, color, and texture of the valley. These structures would be viewed by project personnel, support staff, recreationists in the area, and individuals flying over the area.

The main spillway of the dam would consist of a long, straight, sloping concrete chute, 2,000 feet long, up to 100 feet wide, and more than 250 feet deep. This deep rock cut spillway would be visible to operation personnel and visitors. The rock cuts and grading would contrast with the natural landforms and vegetation in the area. The road cuts and clearing required for construction of the road to the powerhouse and tailrace tunnel areas would be visible from the dam area.

When filled, the Watana - Stage I impoundment would be about 40 miles long, 3 miles wide at its widest location, and would have a surface area of approximately 21,000 acres. The landforms, waterforms, and vegetation within the Susitna River valley would be inundated. The impoundment would also inundate downstream portions of major tributaries, including Deadman (1 mile), Watana (7 miles), Kosina (2.5), and Jay Creeks (2 miles) as well as the Deadman and Watana Creek Falls. The Vee Canyon rapids would be inundated from July through February during average water years. Most of Vee Canyon would remain visible throughout the year. Of the affected landforms, Deadman Creek Falls, is considered to be a notable natural feature (see Section 5.2).

During operation, the maximum reservoir drawdown of 150 feet would be in the spring (April and May) and would result in exposure of substantial mudflats. During much of this period, the mudflats would be covered by snow which would reduce the visual impact. It is expected that these mudflats would be more than one mile wide and be visible to people near the reservoir once the snow cover melted. While snow cover might obscure the mudflats in early spring, they would continue to be visible to people on or near the reservoir throughout the summer until the reservoir fills by September each year.

A number of proposed borrow areas would be located both up- and downstream from the proposed Watana Dam. The presence of borrow areas not inundated by the reservoir would create long-term visual impacts. Such areas include islands in the Susitna River below the dam, the low north river terrace below the dam (near the mouth of Tsusena Creek), and the borrow area located on the high north terrace adjacent to Deadman Creek. The borrow areas along the river below Watana Dam would be in full view from the dam area until inundated by the Devil Canyon Reservoir. Figure E.8.8.1 indicates the location and sizes of the borrow areas. Borrow area boundaries located above reservoir shores, if constructed as presently proposed, would create rigid angular forms visible to visitors in the area.

The temporary construction camp and village constructed for Watana - Stage I would create long-term visual effects. See Section 8.3 for a discussion of the long-term visual effects.

The permanent village would be visually inconsistent with the natural landscape character of the area. The village would consist of a town center with approximately 20 buildings, a hospital, 92 dwelling units, and a water and sewage treatment plant. Adequately designed facilities and boardwalks would avoid degradation of the visual character resulting from human activities in and surrounding the permanent village.

8.3 - Devil Canyon Stage II (***)

As was described for Watana - Stage I, the construction of the Devil Canyon Dam and associated structures, the impoundment area, and the construction camp and village would substantially change the image and character of the upper and middle Susitna River basin, especially in portions of the Devil Canyon, Mid-Susitna River Valley, Talkeetna Uplands, Chulitna Moist Tundra Uplands, and Portage Lowlands landscape character types. The visual character of the area would change from that of a remote and largely undisturbed canyon area to one of greater human activity, development, and disturbance.

The proposed project area would be viewed by project personnel, recreationists, and people flying over or near the area. The line, form, and color of the 645 foot high, 1,300 foot span concrete arch dam would visually contrast with the natural form, color, and texture of the Devil Canyon area.

When filled, the Devil Canyon Reservoir would be about 26 miles long and a maximum of 3,800 feet wide. The surface area of the reservoir would be about 7,800 acres, with the impoundment reaching upstream almost to Watana Dam. The reservoir would inundate Devil Canyon and its rapids, which are considered to be notable natural features (see Section 5.2). The impoundment would also inundate a small portion of Devil and Fog Creeks.

The main spillway of the dam would consist of a sloping concrete channel more than 1,000 feet long and approximately 25 feet deep, with a tapered width ranging from 75 to 150 feet. The spillway would require rock cuts on the northern slope of the river valley. The main spillway and rock cuts would dominate the landscape on the northern river valley slope and be in full view of the proposed visitor center, located on the southern side of the canyon.

The 1,000 foot long Devil Canyon saddle dam adjacent to the main arch dam would dominate the small-scale, plateau-type landscape. The texture and color of the saddle dam would be in sharp contrast to the surrounding vegetation and small pond area. Extensive clearing of vegetation, as well as rock cutting for 2.5 miles of road access during construction of the powerhouse tunnel, would leave large visual scars on the steep northern slopes that would be visible to persons using the access road and the visitor center.

The development of the temporary construction village and camp sites would cause long-term visual impacts that would extend into the operation phase of Devil Canyon Stage II. Both sites would be located on a flat, wetland terrace surrounded by mixed forests. Visual impacts would result from the scarification of the land in areas devoid of vegetation after the camp structures are removed. This lack of vegetation and the presence of mud and water ponding created by soil compaction would be visible to persons traveling through the area (FERC 1984).

8.4 - Watana Stage III (***)

Aesthetic impacts related to raising Watana Dam would be similar to those described for Watana Stage I. Short-term aesthetic impacts related to construction activities, workers and equipment would last for approximately six years.

The Stage III reservoir would be approximately 48 miles long and more than 5 miles wide at its widest location, and would have a surface area of approximately 38,000 acres. While the Stage III reservoir would have less drawdown than the Stage I reservoir (120 feet as compared with 150 feet), substantial areas of mudflats would still be exposed in the spring. In fact, the Stage III reservoir would increase the amount of exposed mudflats in the Watana Creek drainage because of the low topographic relief in that area. However, in Watana Stage I, the mudflats would be inundated by September each year.

The same construction camp and village would be used for Watana - Stages I and III. The camp and village would most likely be visible from the project access road depending on the final alignment of the road. After construction is completed, temporary facilities would be removed and the areas rehabilitated. Nonetheless, these areas would still visually contrast with the surrounding natural vegetation for many years.

Quarry Area A, which is located immediately south of Watana Dam and would be excavated as a source of material for raising the dam, would be in full view of the proposed Watana visitor center. Visual impacts as a result of viewing the quarry would be acceptable if design and reclamation of the site are prepared with post-construction viewing in mind.

8.5 - Access Routes (***)

Temporary visual impacts during construction of the proposed Denali Highway-to-Watana Dam access route, the Watana Dam-to-Devil Canyon Dam access route, and the Devil Canyon rail spur would result from the presence of workers, equipment, and materials along the routes. The nature of these impacts would be similar to those discussed for other project features; namely, remote and largely undisturbed areas would be converted to areas of greater human activity and development. Visual disturbances would be viewed by construction personnel, recreationists in the areas, and individuals flying over the access routes. Visual impacts that would extend into the long-term operation phase of the project are discussed below (FERC 1984).

8.5.1 - Denali Highway-to-Watana Dam Access Route (***)

The presence of the 40-mile long, 24-foot wide, high-speed design (40-55 mph), gravel access road to Watana Dam would result in substantial visual impacts to the landscape, as the road would extend south from the Denali Highway, cross Brushkana and Deadman Creeks, extend west of Deadman Mountain, cross a Deadman Creek tributary, and parallel Deadman Creek to the Watana Dam site. Visual impacts along this route would consist of views of large cut-and-fill areas, areas where vegetation has been removed, and areas subject to erosion. All these features would vary the aesthetic character of the area. In addition, borrow areas excavated adjacent to the road would result in long-term visual impacts from scarification caused by the removal of vegetation, erosion, and the presence of partially water-filled depressions.

At the same time, the proposed road would provide new access to scenic views for visitors, recreationists, and persons from the permanent Watana village. Such views would include panoramic views toward the Alaska Range, Clearwater Mountains, and the Talkeetna Range. However, some people may consider the road to be a visual intrusion that detracts from their enjoyment of the area's natural landscape (FERC 1984).

8.5.2 - Watana Dam-to-Devil Canyon Dam Access Route (***)

Development of the 34-mile long, 24-foot wide, gravel road between the Watana and Devil Canyon Dam sites would result in cut-and-fill areas and borrow areas visible to motorists and

recreationists during the operation phase of the Project. Creation of borrow areas near the road would result in scarred, unvegetated, and partially water-filled depressions that would remain long after construction is completed. As with the Denali Highway-to-Watana Dam access road, the visual character of the Watana Dam-to-Devil Canyon Dam access road would be in contrast to the existing natural environment, but, at the same time, the route would provide views of the surrounding area previously unavailable to the general public travelling by car (FERC 1984).

A 2,600-foot steel suspension bridge located 600 feet above the Susitna River west of Devil Canyon Dam would be visually prominent. Construction of this bridge would require extensive grading and disruption of land forms and vegetation for the bridge approaches.

8.5.3 - Devil Canyon Rail Spur (***)

The construction and operation of the proposed 14-mile long, 31-foot wide rail spur between Gold Creek and the Devil Canyon Dam would create visual impacts along the Susitna River. The rail alignment would result in cut-and-fill operations that would contrast with the color and texture of naturally forested and vegetated areas along the river valley. People using the Susitna River would see the scarification of the slopes adjacent to the rail spur. If, after project construction the rail spur is used for public transportation, the rail spur would provide the public with new opportunities to view remote areas in the Susitna River valley (FERC 1984).

8.6 - Transmission Facilities (***)

The project transmission facilities would be constructed in stages as shown in Figure E.8.8.2.

The temporary visual impacts that would occur during construction of the Susitna transmission line facilities would be similar for all segments of the proposed transmission line corridors. These impacts consist of the presence of workers, equipment, and materials during construction of the transmission lines and their associated facilities. These visual disturbances would be viewed by construction personnel, individuals flying over transmission lines, persons at various vantage points along project access roads and on highways and rail lines in the vicinity of transmission line segments, and residents of communities along various corridor segments. In addition to these temporary impacts, development of the transmission line facilities would create visual impacts that would continue during the entire operating life of the facilities (FERC 1984).

8.6.1 - Watana and Devil Canyon Dams-to-Gold Creek Segment (***)

The transmission line towers along the 45-mile long Watana and Devil Canyon Dams-to-Gold Creek 345-kV transmission line segment would consist of 100-foot high, guyed, Corten steel-pole, X-frame structures. Some single steel-pole structures would be used for angles and areas with steep slopes. The cleared right-of-way would be 300 feet wide between the Watana and Devil Canyon Dams, and 510 feet wide between the Devil Canyon Dam and the Gold Creek Substation. The transmission line towers and conductors would be silhouetted against the skyline from various viewpoints along the Watana Dam-to-Devil Canyon Dam access road and rail spur, and at the dam sites. Through wooded areas, the cleared right-of-way would be highly visible from the air (FERC 1984).

8.6.2 - Gold Creek-to-Fairbanks Segment (***)

The transmission line segment extending 185 miles from the Gold Creek Substation to its termination point at Fairbanks would consist mainly of 100-foot tall, guyed Corten steel-pole, X-frame towers. The cleared right-of-way would be 300 feet wide. The distance between tower structures along the proposed transmission line typically would be 1,300 feet. Adjacent tower structures along parallel lines would be about 115 feet apart. Between Gold Creek and the Healy Substation, the proposed transmission line would essentially parallel the Anchorage-Fairbanks Intertie transmission line; therefore, visual impacts caused by the Susitna Project tower and line placement along this stretch of the corridor would be only incremental in nature. From the Healy Substation to the terminus point near Fairbanks, a new right-of-way would be required for most of the segment (FERC 1984).

Visual resources would be particularly impacted within the Broad Pass landscape character type, where the transmission line would extend across the Denali Highway and be in full view of motorists. Also, the transmission line would be from about 200 feet to about 2 miles away from the George Parks Highway in this highly scenic region. The transmission line would be visible at two Alaska Railroad crossings as well as from portions of planned remote parcel land disposal areas between Gold Creek and Hurricane. Between Cantwell and the Yanert Fork, the transmission line would be close to the Parks Highway. The transmission line would be highly visible along the Nenana River in the Alaska Range landscape, and from various vantage points along the eastern boundary of Denali National Park and the Parks Highway. The Healy Substation near the Alaska Railroad would also be highly visible. From Healy to Fairbanks, the transmission line

would extend through the forested Tanana Ridge and the Nenana Uplands landscape character types, while paralleling the road near Healy (FERC 1984).

Additional detail on landscape characters types, views and impacts associated with the Intertie transmission line can be found in supplemental information on the Susitna License Application presented to FERC in July 1983 (APA 1983).

8.6.3 - Gold Creek-to-Anchorage Segment (***)

The transmission line segment extending 145 miles from the Gold Creek Substation to the terminus point in Anchorage would consist of the same type of tower structures as discussed above. The right-of-way clearing would be 400 feet wide. Between Gold Creek and the Willow Substation, the proposed transmission line would parallel the Anchorage-Fairbanks Intertie transmission line. Thus, visual impacts caused by the Susitna Project's tower and line placement would be only incremental in nature. A new right-of-way would be required from the Willow Substation to the the west shore of Knik Arm. The route east of Knik Arm into Anchorage would parallel an existing transmission line; visual impacts there would be only incremental also.

Major visual resource impacts between Gold Creek and Anchorage would include those in the Talkeetna Mountains landscape area, where the transmission line would be in full view from Curry Ridge in Denali State Park and where it would be highly visible as it extends across the Talkeetna River, which is considered to be an important state recreation resource. From Talkeetna to Willow, the transmission line is seldom visible to Parks Highway travelers due to distance from the highway, flat topographic relief and intervening vegetation. Between Willow and Anchorage, the transmission line corridor would be visible mainly from the air. Within the greater Anchorage area, from the Knik Arm to the terminus point, the transmission line would generally parallel an existing transmission line and would not substantially affect the visual resources in the area (FERC 1984).

9 - MITIGATION (**)

Aesthetic mitigation measures were designed to protect the quality of the existing landscape by preventing or minimizing negative impacts caused by human activity and development. The measures are also intended to enhance the existing environment in the following ways:

- o Improve opportunities to appreciate areas of high aesthetic quality;
- o Improve the aesthetic quality of proposed facilities; and
- o Maximize the positive relationships of proposed facilities with existing landscapes.

9.1 - Mitigation Feasibility (**)

The mitigation measures proposed in this section are all considered feasible for project facilities. Mitigation measures with low or mediocre success have not been proposed. For example, use of non-local small caliper (3/4" - 1 1/2") trees, even when they were native species, did not create adequate screening at Trans-Alaskan Pipeline road crossings as a result of high mortality rates due to transplant shock. On the other hand, the use of woody cuttings as discussed in the "Erosion and Sedimentation Control" Best Practices Manual (APA 1985) has proven to be highly successful in achieving adequate screening, although more time is needed for the trees to reach screening height. Although each mitigation measure listed below would be implemented to the extent practicable, it is expected that some measures may be modified as a result of detailed engineering and design refinements during the final design phase. Moreover, because specific locations of all project disturbance cannot be anticipated prior to detailed design work, some mitigation measures are general or non-site-specific.

The proposed mitigation measures have been grouped into three categories: best development practices, siting refinements, and design considerations. Each of these categories are described below:

- o Best Development Practices - Best development practices (BDP) are general measures typically used in construction projects to avoid or reduce construction-related impacts. BDP's commonly include measures for erosion control, educational programs for workers, rehabilitation techniques, and construction guidelines. Most BDP's can be implemented at no additional cost to a project. In addition to BDP measures identified in this chapter, measures identified in Best Management Practices Manuals, developed specifically for the Susitna Project, would help reduce or avoid aesthetic impacts.

- Siting Refinements - Siting refinements are adjustments in the location of facilities made in the detailed design stage of a project. They are used to improve negative aesthetic impacts due to visibility. In addition, siting refinements can avoid impacts that would require costly mitigation.

  For example, topographic maps used to site the access roads and transmission lines have 100-foot contour intervals. Field investigation shows that throughout proposed corridors, landforms under 100 feet in height can be used to screen or partially screen transmission line towers from access roads or at least from viewpoints and trailheads where people would congregate.

- Design Considerations - Design considerations are recommended modifications or design guidelines made to project facilities to reduce visual contrast with facility surroundings and/or to enhance the aesthetic quality of an area. They range widely in cost and overlap with siting refinements as part of the planning and design process.

  Because of design constraints already imposed by distance, weather conditions and construction cost, there are substantial limitations on making major design changes during the detailed design phase.

9.2 - Mitigation Plan (***)

The Aesthetic Mitigation Plan consists of the recommended aesthetic mitigation measures listed below. The measures are listed according to seven project feature groups: Watana Dam site, Devil Canyon Dam site, access roads, quarry/borrow areas, railroad, camps and villages, and transmission lines. Recreation facilities are not included (with the exception of visitor centers) because the proposed recreation facilities (including trailheads, trails, campgrounds and campsites) were all determined to be compatible with existing landscape. To ensure that these facilities do not create an aesthetic impact, they would be carefully sited in the field, taking into account the visibility impact from roads and other locations. Each recreation facility would be planned and designed using design standards of the Alaska Department of Natural Resources, Department of Parks current at that time.

9.2.1 - Watana Dam Site (***)

The Watana damsite includes the dam and associated structures such as the spillway, construction haul roads, proposed visitor center, and the reservoir. While the dam and reservoir are not considered mitigable with respect to aesthetic impacts, general best development practices related to reclamation of surrounding construction, and mitigation applied to associated structures as discussed below would help reduce the degree of aesthetic impact.

Best Development Practices

1. Consolidate structures to minimize the amount of disturbance and need for rehabilitation.

2. Site facilities to minimize vegetation clearing.

3. Identify areas of notable vegetation before construction that are not necessary to remove for construction, and mark for protection.

4. Develop an environmental briefing program for construction personnel that includes aesthetic resource concerns.

5. Use fracture and bench construction methods for cut slopes to avoid uniform cut slope appearances and to provide spaces for debris to collect and vegetation to grow.

Siting Refinements

1. Minimize haul road construction by increasing haul distances over existing haul roads, where practical.

2. Coordinate final siting of the Watana visitor center south of the dam with the boundaries of Quarry Area A.

3. Locate the visitor center at the edge of the quarry high wall to allow better views of Watana Dam and impoundment.

Design Considerations

1. Use stone in the design of the Watana visitor center to visually integrate the facility with Quarry Area A and Watana Dam.

9.2.2 - Devil Canyon Dam Site (***)

As with the Watana Dam, there are few aesthetic mitigation measures that can be implemented to reduce the visual contrast that Devil Canyon Dam and reservoir would create with the surrounding landscape. However, the concrete form and arch design of Devil Canyon Dam would create a positive contrast to the equally dramatic natural setting of Devil Canyon. Aesthetic mitigation for surrounding areas disturbed by construction activities and related facilities such as the high level bridge are described below.

Best Development Practices

1. Retain as much vegetation as possible between the Devil Canyon saddle dam and the Susitna River to provide visual screening from the Watana Dam to Devil Canyon Dam access road (Figure E.8.9.1).

2. Consolidate structures to minimize the amount of disturbance and need for rehabilitation.

3. Site facilities to minimize vegetation clearing.

4. Develop an environmental briefing program for construction personnel that includes aesthetic resource concerns.

5. Use fracture and bench construction methods for cut slopes to avoid uniform cut slope appearances and to provide spaces for debris to collect and vegetation to grow.

Siting Refinements

1. Site the Devil Canyon visitor center as close to the canyon rim as possible to create maximum views of the dam and high bridge.

Design Considerations

1. Use concrete construction and design forms for the Devil Canyon visitor center to complement the dam and canyon characters.

9.2.3 - Access Roads (***)

The first priority of the proposed access roads is to facilitate construction of the Project. Present design criteria for the roads reflects this. However, since the access roads would also provide a scenic driving experience for the general public, final siting and design of the roads should consider the scenic and recreational attributes of the area and be coordinated with the development of project recreation facilities such as scenic pulloffs and trailheads.

Similarly, post-construction management objectives and agreements would be established between entities responsible for access road operation and maintenance and adjacent landowners. These management objectives would focus on enhancing the recreational experience for road travelers, while protecting the visual character of the area. In addition to the following measures,

mitigation guidelines identified in the Forest Service's road manual (USFS 1977) should be considered.

Best Development Practices (BDP)

1. Adhere to standard erosion control practices for areas around stream crossings.

2. Feather clearings in forested areas rather than making straight-edged clearings.

3. Provide dust control if roads are not blacktopped.

4. Site facilities to minimize vegetation clearing.

5. Develop an environmental briefing program for construction personnel that includes aesthetic resource concerns.

6. Use fracture and bench construction methods for cut slopes to avoid uniform cut slope appearances and to provide spaces for debris to collect and vegetation to grow.

Siting Refinements

1. During detailed design, refine road locations to: minimize cut and fill; select appropriate stream crossings for bridge locations; establish horizontal and vertical curves to take best advantage of long side valley views; and avoid passing through forested areas, staying at the tundra edge, whenever possible.

2. Coordinate the final siting of the Watana Dam-to-Devil Canyon Dam access road with the final siting of the adjacent transmission line to minimize views of the transmission line from the access road.

3. Orient the Watana Dam-to-Devil Canyon Dam access road to maximize distant views of Mt. McKinley.

9.2.4 - Quarry/Borrow Sites (***)

Mitigation of proposed borrow and quarry sites is important because of the extent of their disturbance and their location in primary view corridors. Careful planning and design that considers post-construction land use would lessen adverse visual impacts.

Best Development Practices

1. Round cut-and-fill slopes for side borrow construction of the access roads to match the rolling character of the surrounding landscape.

2. Grade borrow sites for the access roads to minimize steep cuts and conform to surrounding topography.

3. Screen access road borrow sites from significant view corridors, wherever possible.

4. Prioritize access road borrow sites so that sites with the least visual impact would be used first.

5. Complete reclamation and revegetation as soon as quarry and borrow sites are no longer being used.

6. Develop an environmental briefing program for construction personnel that includes aesthetic concerns.

7. Retain as much vegetation as possible to provide visual screening.

8. Provide dust control.

Siting Refinements

1. Locate any borrow sites necessary for the Watana Dam-to-Devil Canyon Dam access road to minimize impacts to west-bound traffic and vistas of Mt. McKinley.

2. Avoid use of Borrow Site C and the upper portion of Borrow Site F, if possible, since they are highly visible to views from the Watana Dam-to-Devil Canyon Dam access road and from recreation sites.

3. Maintain a 1/4-mile buffer between the proposed access roads and Borrow Sites C, D, and F (Figure E.8.9.2). Borrow boundaries should be coordinated with access road views and recreation trail and trailhead placement.

4. Coordinate the delineations of final boundaries of Quarry Site A with the final siting of the proposed Watana visitor center to maximize views from the visitor center.

Design Considerations

1. Coordinate reclamation of Borrow Sites E and D with the location and views from the proposed Watana visitor center, access roads, and other recreation sites such as the boat launch downstream of Watana Dam. Excavate borrow edges above reservoir lands to follow contours (Figure E.8.9.2).

2. Reclaim access road borrow areas according to designated post-construction land uses (e.g., campsites, trailheads, ponds) as determined by an interdisciplinary review team and landowner.

3. Locate the proposed Watana - Stage III visitor center at the highest point within Quarry Site A (after mining) to allow better views and interpretive opportunities.

9.2.5 - Railroad (***)

The proposed railroad would follow construction methods similar to those used for the Alaska Railroad. For example, ballast would be used for the foundation to support heavy construction loads. Wood trestles would be used at stream crossings where the volume of flow is sufficient to warrant such construction. Disturbed areas due to construction, such as at the connection with the Alaska Railroad at Gold Creek and at the proposed railhead facility at Devil Canyon, would be reclaimed as soon as construction is completed in those areas.

Best Development Practices

1. Consolidate railhead facilities as much as possible to reduce the amount of disturbance and rehabilitation needed.

2. Keep vegetation clearing to a minimum.

3. Use fracture and bench construction methods for cut slopes to avoid uniform cut slope appearances and to provide spaces for debris to collect and vegetation to grow.

4. Evaluate the visual impact of railroad cuts on viewpoints from Denali State Park after construction to determine whether mulches or sprays should be applied to the cut slopes to reduce visual contrast.

5. Keep parking areas at railheads dark-toned, if paved, to reduce visual contrast.

6. Retain as much vegetation as possible to provide visual screening.

7. Adhere to standard erosion control practices for areas around stream crossings.

8. Feather clearings in forested areas rather than making straight-edged clearings.

Site Refinements

1. Refine the final railroad alignment to minimize extensive cuts as much as practicable.

9.2.6 - Camps and Villages (***)

Temporary construction camps and villages would be removed after construction and the sites rehabilitated with natural vegetation species. The need to mitigate Watana camp facilities would be greater than for Devil Canyon facilities because of the Watana camp facilities' higher visibility from both access roads.

Particular emphasis would be placed on the location and design of the permanent village since it would be a permanent living environment for project personnel and families, and since the structures would remain long after construction and visible to the general public.

Best Development Practices

1. Rehabilitate camps and surrounding disturbed areas after they are closed out.

2. Minimize the removal of trees surrounding the Devil Canyon construction camp and village sites to screen the facilities from major viewpoints such as Indian Mountain Lookout (Denali State Park), the high bridge, visitor center and trails.

Siting Refinements

1. Physically separate the construction village from the permanent village.

2. Consolidate structures within the construction areas to minimize the amount of disturbance and need for rehabilitation.

3. Develop an environmental briefing program for construction personnel that includes aesthetic resource concerns.

4. Provide dust control.

Design Considerations

1. Design the permanent and construction villages to create smaller clusters of structures, which would more readily fit into the landscape and would minimize vegetation loss.

2. Make maximum use of elevated paths and pads to reduce soil and vegetation degradation in the camps and villages to the extent practicable.

9.2.7 - Transmission Lines (***)

Mitigation measures for the proposed transmission lines focus on areas of high visibility and areas where new rights-of-way are created. Most of the recommended mitigation measures listed below are general in nature. In addition to these measures, mitigation guidelines identified in the Rural Electrification Administration's Bulletin (USDOI and USDA 1970) and the Forest Service's Utilities Manual (USFS 1975) should be considered.

Best Development Practices

1. Construct towers of Corten steel.

2. Use nonspecular conductors unless the hazard to aircraft is too great.

3. Use short spurs off the Watana Dam-to-Devil Canyon Dam access road for access to adjacent transmission line construction rather than clearing new access in the transmission line right-of-way.

4. Feather right-of-way edges to prevent rights-of-way from appearing as tunnels cut through timber.

5. Minimize clearing and construction activities in the vicinity of streams to minimize damage to the natural condition of the area and adhere to standard erosion control practices near stream crossings.

6. Limit clearing of natural vegetation to material which poses a hazard to the transmission line.

7. Vary the right-of-way and create openings in the forest edge where transmission lines must parallel a roadway.

8. Replant trees and shrubs native to the area if natural vegetation cannot be saved to provide adequate screening.

9. Develop an environmental briefing program for construction personnel that includes aesthetic resource concerns.

10. Avoid the use of trucks by using aircraft where possible to inspect and maintain transmission facilities.

11. Adhere to standard erosion control practices for areas around stream crossings.

Siting Refinements

1. Use land forms, vegetation, and minor alignment adjustments during detailed design to screen transmission line towers from significant views. For example, route the line north of promontory proposed for Devil Canyon Dam overlook if possible (Figure E.8.9.1). Route the line away from Tsusena Falls if possible (Figure E.8.9.2).

2. Avoid siting rights-of-way in places of high visibility such as prominent ridges, or near lakes and streams.

3. Avoid alignments which result in long views of transmission lines parallel to transportation routes.

4. Locate transmission lines at sufficient distance from transportation routes so that intervening vertical elements would interrupt views down the rights-of-way.

5. Site transmission lines along natural linear features such as the bottom of a ridge, valley, or cliff, or along edges of muskeg openings or forests, instead of centering down the middle. For example, route the transmission line along ridge bottom and along forest edge south of the Gold Creek railspur (Figure E.8.9.1).

6. Cross major roadways as near to perpendicular as possible to allow for maximum setback of facility structures and minimum visibility from the roadway into the right-of-way on each side.

7. Where ridges run parallel to roads place transmission lines beyond the ridge or downslope, to the extent practical, so that facilities are not silhouetted against the sky.

8. Site facilities to minimize vegetation clearing.

Design Considerations

1. Use longer spans and taller towers where transmission lines must cross valleys to retain as much existing vegetation as possible and to reduce construction impacts to slopes.

9.3 - Mitigation Costs (**)

The aesthetic mitigation plan is designed to reduce or eliminate adverse visual impacts due to project development, and to enhance the aesthetic resource of the project area. The emphasis of the mitigation measures in this plan is on:

- o Avoiding important natural and visual environments through site refinements;
- o using best development practices; and
- o rehabilitating areas as soon as they are no longer needed.

Many measures of this kind have been addressed in Exhibit E throughout the evolution of the Project. As part of ongoing, supplemental, and future planning throughout the design engineering phase, additional study for aesthetic mitigation would include siting studies, avoidance of difficult site specific physical conditions, and visual compatibility with the existing landscape setting.

9.3.1 - Mitigation Measures (***)

Costs for many of the aesthetic mitigation measures listed in the previous section under best development practices and siting refinements would be included as part of the detailed design process and project reclamation costs. Similarly, costs for most of the design consideration measures identified above would be included under other program mitigation costs or general project development costs. For example, the costs of the aesthetic mitigation measures identified for the visitor centers would be included in the visitor center construction cost noted in the recreation plan.

The aesthetic mitigation plan costs include measures identified solely for reducing aesthetic resource impacts. These measures include feathering rights-of-way, spraying cut slopes with mulch to reduce visual contrast, planting vegetation to provide screening, adding additional transmission lines to avoid important views or sensitive areas, development of an environmental briefing program, and focusing on aesthetic

resource concerns. While costs for these measures cannot be detailed at this time since the measures are highly dependent on final design and construction methods employed, it is anticipated that costs would not exceed $500,000.

9.3.2 - Monitoring Costs (***)

Costs for monitoring aesthetic resource concerns during construction would be included as part of the cost for the Project Environmental Field officer (EFO). Costs for the EFO and project monitoring are discussed in Exhibit D.

9.4 Mitigation Monitoring (***)

Monitoring of aesthetic resource concerns during construction would be the responsibility of the Project Environmental Field Officers (EFO). EFOs would supervise environmental briefing programs for construction workers, ensure according to the project design specifications that scenic and natural resource areas of distinction are protected, and ensure that identified aesthetic resource mitigation measures are implemented and properly developed. These duties would be shared with monitoring duties for other resource programs which are described in Chapters 3 and 5 of Exhibit E.

After completion of Watana Stage I, a review of implemented aesthetic mitigation measures would be made. Those mitigation measures that have succeeded in reducing aesthetic impacts would be continued at Devil Canyon Dam, while those that have not achieved a substantial reduction in aesthetic impact, or have proven to be more costly than the level of reduction warrants, would be modified or eliminated. Measures implemented for the other stages, likewise, would be reviewed after construction is completed.

10 - AESTHETIC IMPACT EVALUATION OF THE INTERTIE

(This section deleted)

11 - AGENCY COORDINATION (**)

11.1 - Agencies and Persons Consulted (**)

This section was prepared following discussions with the following agencies and Native corporations:

- o U.S. Bureau of Land Management
- o U.S. National Park Service
- o U.S. Fish and Wildlife
- o Alaska Department of Natural Resources
- o Alaska Department of Transportation and Public Facilities
- o Matanuska-Susitna Borough
- o Cook Inlet Region Inc.
- o Tyonek Native Corporation
- o Ahtna, Inc.
- o Knikatnu, Inc.

11.2 - Agency Comments (**)

In response to the Draft Exhibit E provided to the agencies by the Applicant on November 15, 1982, review comments were received only from the Alaska Department of Natural Resources and the U.S. Fish and Wildlife Service.

The concerns raised by these two agencies included:

- o Incorporation of mitigation measures in project design;
- o Use of avoidance as a mitigation measure; and
- o Access road location and design criteria.

In response to these concerns, the mitigation section has been expanded to include site refinement and design modification mitigation measures. These measures would be considered during the detailed design stage of the project. In particular, the transmission and access road alignments would be reassessed before construction begins.

Responses to the specific comments raised by these two agencies are included in Exhibit E, Chapter 11 of the original License Application filed before FERC in February 1983.

12 - REFERENCES

Alaska Power Authority. 1983. Before the Federal Energy Regulatory Commission, Susitna Hydroelectric Project, FERC License Application. Project No. 7114. Anchorage, Alaska.

_____. 1985. Susitna Hydroelectric Project, Staged Construction Pre-Filing Consultation Package. Filed with FERC May, 1985. Project No. 7114.

EDAW. 1985. Aesthetic Resource Mitigation Plan. Draft Report. Prepared for Harza/Ebasco Susitna Joint Venture, Anchorage, Alaska.

Federal Energy Regulatory Commission. 1984. Susitna Hydroelectric Project Draft Environment Impact Statement. FERC No. 7114. Volume 6: Appendices L and M.

Frank Orth & Associates. 1985. Documentation Report for the Susitna Hydroelectric Project, Socioeconomic Impact Model. Preliminary Draft Report. June 1985. Prepared for Alaska Power Authority.

U.S. Department of Interior and U.S. Department of Agriculture. 1970. Environmental Criteria for Electric Transmission Systems.

U.S. Forest Service. 1975. National Landscape Management, Utilities. Vol. 2, Chapter 2. July 1975. 147 pp.

_____. 1977. National Forest Landscape Management, Roads. Vol. 2, Chapter 4. March 1977. 62 pp.

13 - GLOSSARY

Absorption Capability - A measure of the natural sensitivity of a landscape to alteration. Factors such as the potential for human experience, compatible site relationships, and aesthetic values are commonly considered.

Aesthetic Value - A measure of the relative overall importance of the visual landscape, including such components as distinctiveness, uniqueness, harmony and balance.

Compatible - A relationship between the existing landscape and man-made features in which the proposed elements are designed in fitness with the character of the existing landscape.

Distinctiveness - A measure of the visual impression of an area; a landscape where landforms, waterforms, rocks, vegetative or soil patterns are of outstanding and memorable visual quality.

Harmony and Balance - A measure of the degree to which all elements of the landscape form a unified composition. This includes the level of integration of man-made elements in a natural setting.

Landscape Character Type (LCT) - a description and classification of coherent units of the landscape which are used as a frame of reference to classify the physical features of an area. They are, for the most part, based on physiographic units, and represent land areas with common distinguishing visual characteristics such as landform, geologic formation, waterform and vegetation pattern.

Observer Position - The location or point from where an individual views the landscape.

Rarity - A measure of the relative scarcity or commonality of the landscape.

View Duration - The length of time an individual views the landscape from a particular position.

TABLES

TABLE E.8.6.1 : SUSITNA HYDROELECTRIC PROJECT
SIGNIFICANT VIEWS

Significant View	View Description	
1a. Nenana River Valley and Alaska Mountain Range	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for ±3 miles
	Potential Viewers:	All vehicular traffic traveling north
	Distance:	Panoramic
	Facilities Seen:	Access road (foreground)
1b. Nenana River Valley and Alaska Mountain Range	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for 1+ miles
	Potential Viewers:	All vehicular traffic traveling north
	Distance:	Panoramic, but narrower than 1a.
	Facilities Seen:	None
2. Views of Butte Landmark	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for ±6 miles
	Potential Viewers:	All vehicular traffic traveling north
	Distance:	Middle ground
	Facilities Seen:	Access road fore-middle-ground
3. Panoramic View of Clearwater Mountains	Observer Position:	Access road
	View Duration:	Seen at 50 mile per hour for 4 miles
	Potential Viewers:	Vehicular Traffic: northbound
	Distance:	Panoramic
	Facilities Seen:	None
4a. Views Up Small Drainage Ways Into The Chulitna Mountains	Observer Position:	Access road
	View Duration:	Seen at 50 mile per hour for ±3 miles or during stops at road pull-offs with trail heads
	Potential Viewers:	Vehicular Traffic: northbound - southbound

SOURCE : EDAW 1985

TABLE E.8.6.1 (PAGE 2 of 8)

Significant View		View Description	
		Distance:	Drainage way, fore-middle-ground, Chulitna Mountains background
		Facilities Seen:	Trailheads, trails
4b.	Views Up Small Drainage Ways Into The Chulitna Mountains	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for 1+ mile
		Potential Viewers:	Vehicular Traffic: southbound
		Distance:	Drainage way to Chulitna Mountains
		Facilities Seen:	Trailhead and trail
4c.	Views Up Small Drainage Ways Into The Chulitna Mountains	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for 3+ miles
		Potential Viewers:	Vehicular Traffic: north-and southbound
		Distance:	Drainage Way to Chulitna Mountain
		Facilities Seen:	Trailhead, Viewpoint and Trail
4d.	Views Up Small Drainage Ways Into The Chulitna Mountains	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for 4+ miles
		Potential Viewers:	Vehicular Traffic: northbound
		Distance:	Drainage Way To Chulitna Mountains
		Facilities Seen:	Trail
5.	Panoramic View of Talkeetna Mountains	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for $\pm$4 miles
		Potential Viewers:	Vehicular traffic
		Distance:	Foreground, Big/ Deadman Lakes, Middle ground, Watana Reservoir, Background, Talkeetna Mountains

Significant View		View Description	
		Facilities Seen:	Access road and reservoir
6.	Deadman Creek	Observer Position:	Access road or road pull-off
		View Duration:	Seen at 50 miles per hour for ±6 miles or at stationary pull-offs
		Potential Viewers:	Vehicular traffic
		Distance:	Foreground
		Facilities Seen:	None
7a.	Deadman Lake	Observer Position:	Access road
		View Duration:	Less than 1/2 mile
		Potential Viewers:	Vehicular Traffic: northbound
		Distance:	Middleground
		Facilities Seen:	Access road, Trail
7b.	Tsusena Butte	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for ±10 miles
		Potential Viewers:	Access road users
		Distance:	Middleground
		Facilities Seen:	None
8.	Tsusena Drainage	Observer Position:	Access road
		View Duration:	Seen at 50 miles per hour for 2.5 miles
		Potential Viewers:	Access road users: northbound
		Distance:	Mid- to background
		Facilities Seen:	Access road, foreground
9.	Townsite Views	Observer Position:	Watana townsite
		View Duration:	Stationary/ destination
		Potential Viewers:	Town residents
		Distance:	Fore- to middleground
		Facilities Seen:	Dam, damsite facilities, reservoir

TABLE E.8.6.1 (PAGE 4 of 8)

Significant View	View Description	
10. Watana Reservoir	Observer Position:	Damsite
	View Duration:	Stationary/ destination
	Potential Viewers:	Damsite workers, visitors
	Distance:	Foreground through background
	Facilities Seen:	Power plant facilities, dam, and reservoir
11. Downstream Watana Views	Observer Position:	Damsite
	View Duration:	Stationary/ destination
	Potential Viewers:	Damsite workers, visitors
	Distance:	Fore- to middleground views of facilities Background views of river valley
	Facilities Seen:	River borrow areas and powerhouse road, middleground Power facilities and transmission lines, foreground
12. Fog Lakes Area	Observer Position:	Damsite
	View Duration:	Stationary/ destination
	Potential Viewers:	Damsite workers and visitors
	Distance:	Middle to background
	Facilities Seen:	Visitors facilities
13. Transmission Lines	Observer Position:	Damsite
	View Duration:	Stationary short-term and destination
	Potential Viewers:	Damsite workers and visitors
	Distance:	Fore- to middleground
	Facilities Seen:	Transmission lines and switchyard (silhouetted)

TABLE E.8.6.1 (PAGE 5 of 8)

Significant View	View Description	
14. Watana Site	Observer Position:	Access road above facilities
	View Duration:	Seen at 50 miles per hour for ±2 miles
	Potential Viewers:	Damsite workers and visitors
	Distance:	Middle to background
	Facilities Seen:	Damsite facilities, the dam, and reservoir
15. Transmission Corridor Crossing	Observer Position:	Access road immediately under the line
	View Duration:	Seen at 50 miles per hour for 2 miles
	Potential Viewers:	East/west road users
	Distance:	Foreground
	Facilities Seen:	Transmission towers and corridor
	Note: This view occurs at a sharp angle and minimizes the length of view duration.	
16. Transmission Corridor	Observer Position:	Access road immediately below facility
	View Duration:	Seen at 50 miles per hour for ±200 feet (crossing)
	Potential Viewers:	East/west road users
	Distance:	Fore- to middleground
	Facilities Seen:	Transmission corridor and towers
	Note: This view is very oblique, causing a much greater length of corridor to be prominent at the crossing as well as along the uphill side of the east/ west road.	
17a Talkeetna Mountains and Susitna River Valley	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for ±5 miles
	Potential Viewers:	East/west road users

TABLE E.8.6.1 (PAGE 6 of 8)

Significant View	View Description	
	Distance:	Panoramic
	Facilities Seen:	None
17b. Denali Vista	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for 10+ miles (in good weather)
	Potential Viewers:	Vehicular Traffic: westbound
	Distance:	Background, panoramic
	Facilities Seen:	Access road, Transmission Lines, Borrow Pits
18. Devil Creek Drainage	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for 1 mile
	Potential Viewers:	East/west road users
	Distance:	Middle to background
	Facilities Seen:	Transmission line (uphill side)
19. High Lake	Observer Position:	Access road
	View Duration:	Seen at 50 miles per hour for ±2 miles
	Potential Viewers:	High Lake visitors, road users
	Distance:	Middleground to background
	Facilities Seen:	None
20. Devil Canyon Reservoir	Observer Position:	Damsite
	View Duration:	Stationary/ destination
	Potential Viewers:	Damsite workers, visitors
	Distance:	Fore- to middle-ground; reservoir extends to background
	Facilities Seen:	Dam, damsite facilities, and reservoir
21. Devil Canyon Saddle Dam	Observer Position:	Damsite
	View Duration:	Stationary
	Potential Viewers:	Damsite workers, visitors

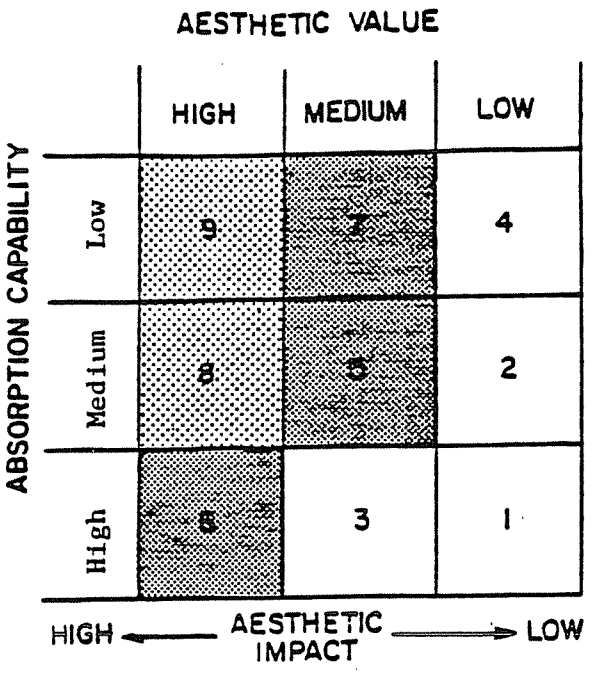
TABLE E.8.6.1 (PAGE 7 of 8)

Significant View		View Description	
		Distance:	Middleground
		Facilities Seen:	Saddle dam and associated facilities
22.	Devil Canyon Bridge	Observer Position:	Bridge surface
		View Duration:	Seen at 50 miles per hour for ±1 mile
		Potential Viewers:	Visitor center visitors and damsite workers
		Distance:	Fore to middlegound
		Facilities Seen:	Power plant outfall, transmission line corridor
23.	Devil Canyon (Downstream View)	Observer Position:	Dam top (800 feet and higher)
		View Duration:	Stationary
		Potential Viewers:	Damsite visitors and workers
		Distance:	Fore- to middleground
		Facilities Seen:	Power facilities, power access roads, and dry river bed
24.	Alaska Range and Chulitna River Valley	Observer Position:	Back country trails
		View Duration:	Walking for indeterminate distance
		Potential Viewers:	Hikers
		Distance:	Panoramic
		Facilities Seen:	None
25. 26. 27. 28. 29.	Soul Creek, Deadman Creek, Tsusena Creek, Caribou Pass	Observer Position:	Back country trails
		View Duration:	Walking pace at many positions
		Potential Viewers:	Hikers and recreational users
		Distance:	Panoramic, enclosed
		Facilities Seen:	None

TABLE E.8.6.1 (PAGE 8 of 8)

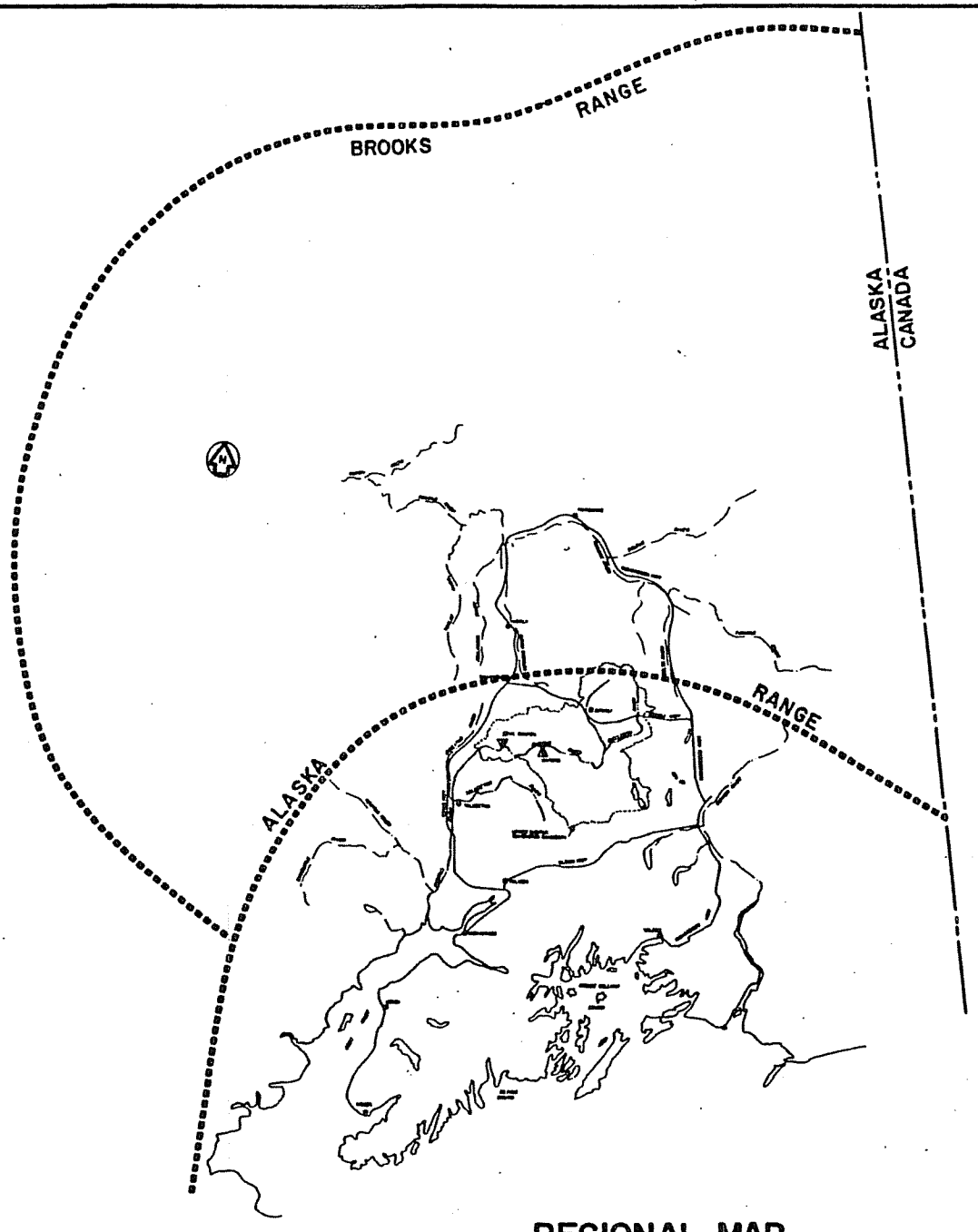
Significant View	View Description	
30. Susitna River Views	Observer Position:	River surface or shore
	View Duration:	Seen at floating speed for ±6 miles
	Potential Viewers:	River recreationists
	Distance:	Fore- to middleground
	Facilities Seen:	Railroad
31. Indian Mountain	Observer Position:	Lookout at end of Little Coal Creek Trail
	View Duration:	Stationary
	Potential Viewers:	Hikers on existing trail, along Parks Highway corridor
	Distance:	Background
	Facilities Seen:	Railspur, transmission lines, Devil Canyon construction camp (depending on siting/clearing)

TABLE E.8.7.1: AESTHETIC IMPACT POTENTIAL
COMPOSITE RATINGS

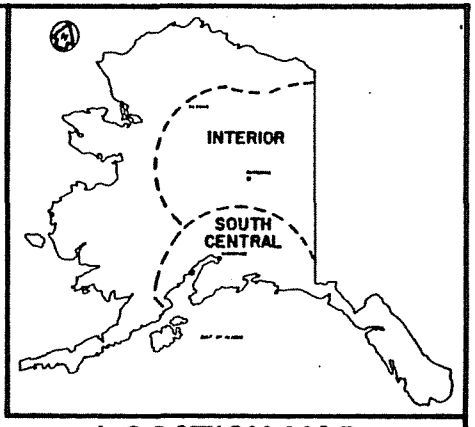


Composite Rating	Description	Design Criteria
9-8	Landscape has high aesthetic value with moderate to little ability to absorb man-made features.	Facility designs should be similar in character and equal in boldness with the landscape, or remain visually subordinate to the natural surroundings
7-6-5	Landscape has moderate to high ability to absorb man-made features.	Facility designs may visually dominate the landscape but should relate to the surrounding form, line, color and texture to be compatible with the surroundings.
4-3-2-1	Landscape has low to moderate aesthetic value with high ability to absorb man-made features.	New elements may add to the aesthetic quality beyond existing conditions by introducing visual interest and/or complementing the landscape.

FIGURES



REGIONAL MAP

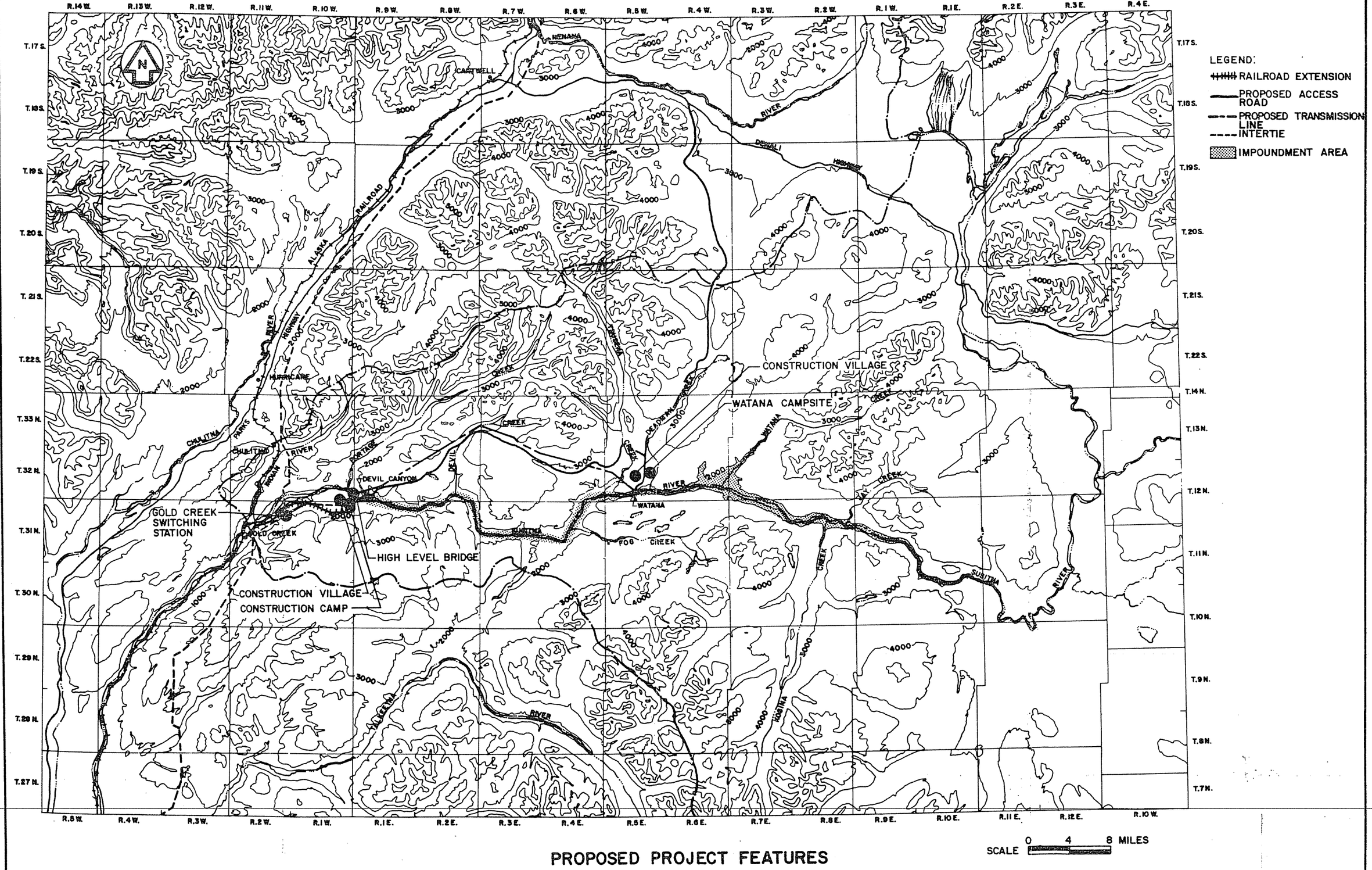


LOCATION MAP

LEGEND:

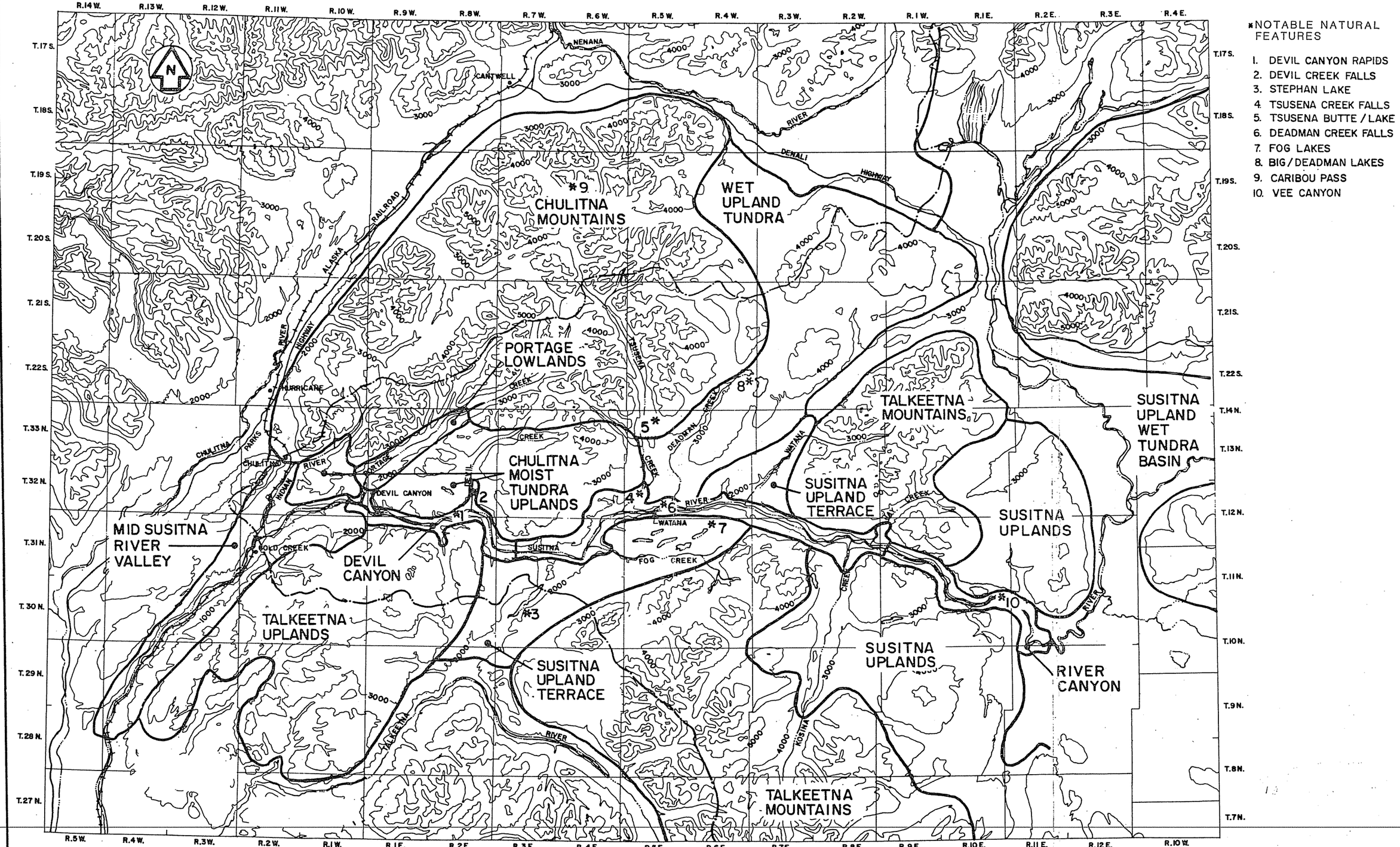
- PRIMARY PAVED UNDIVIDED HIGHWAY
- RIVERS
- RANGES
- DAMSITES

FIGURE E.8.1.1



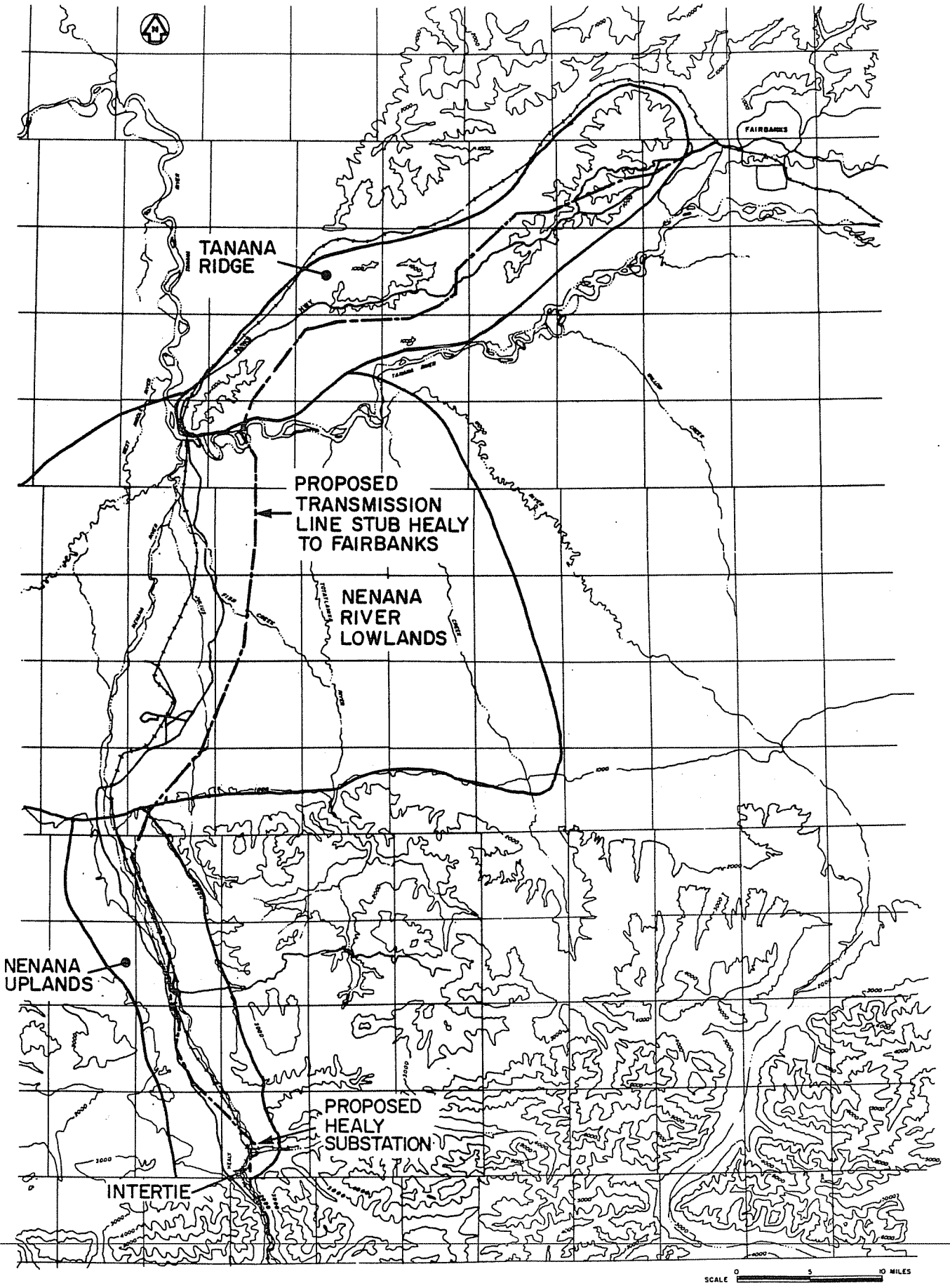
PROPOSED PROJECT FEATURES

FIGURE E.8.4.1



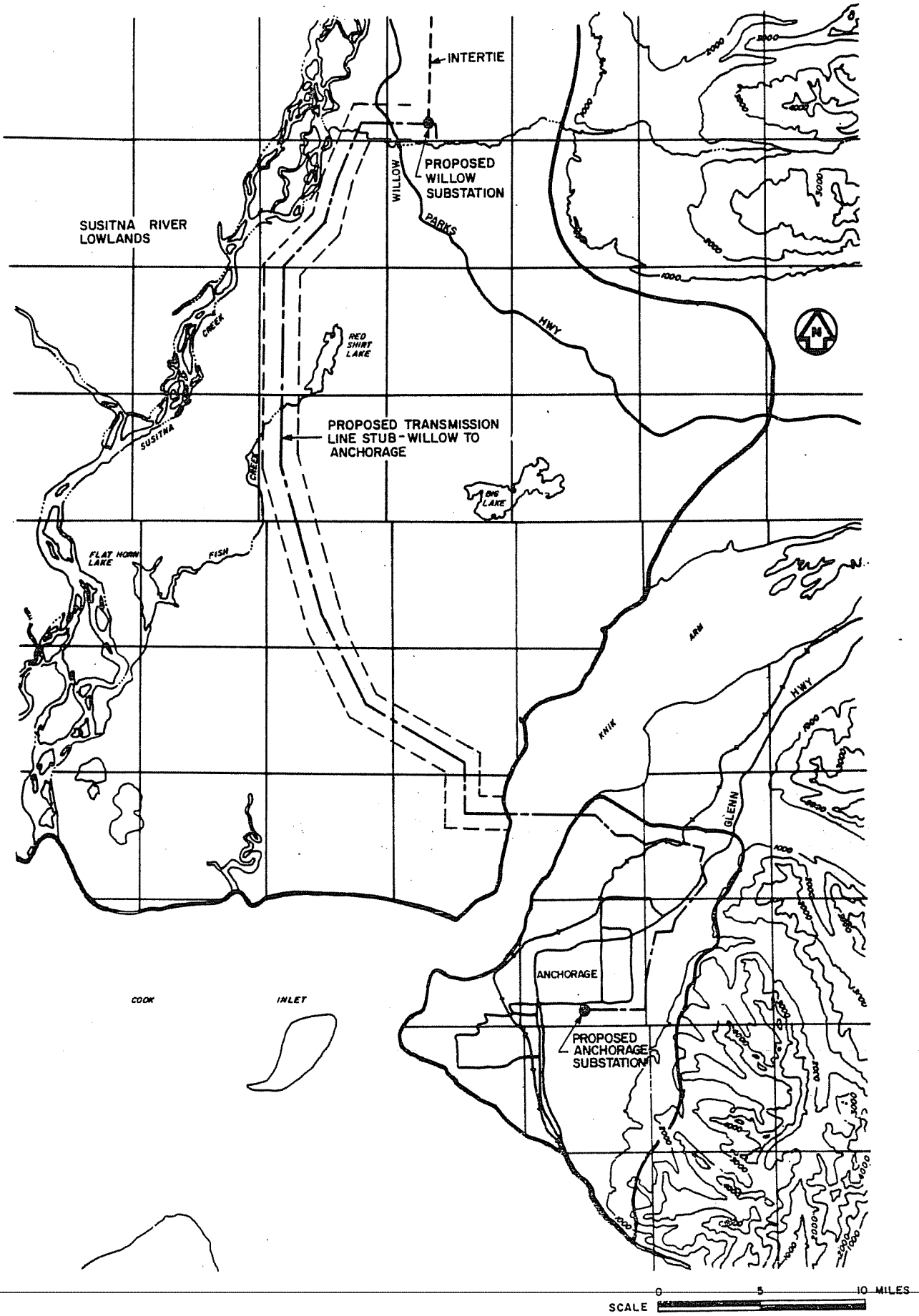
LANDSCAPE CHARACTER TYPES

FIGURE E.8.5.1



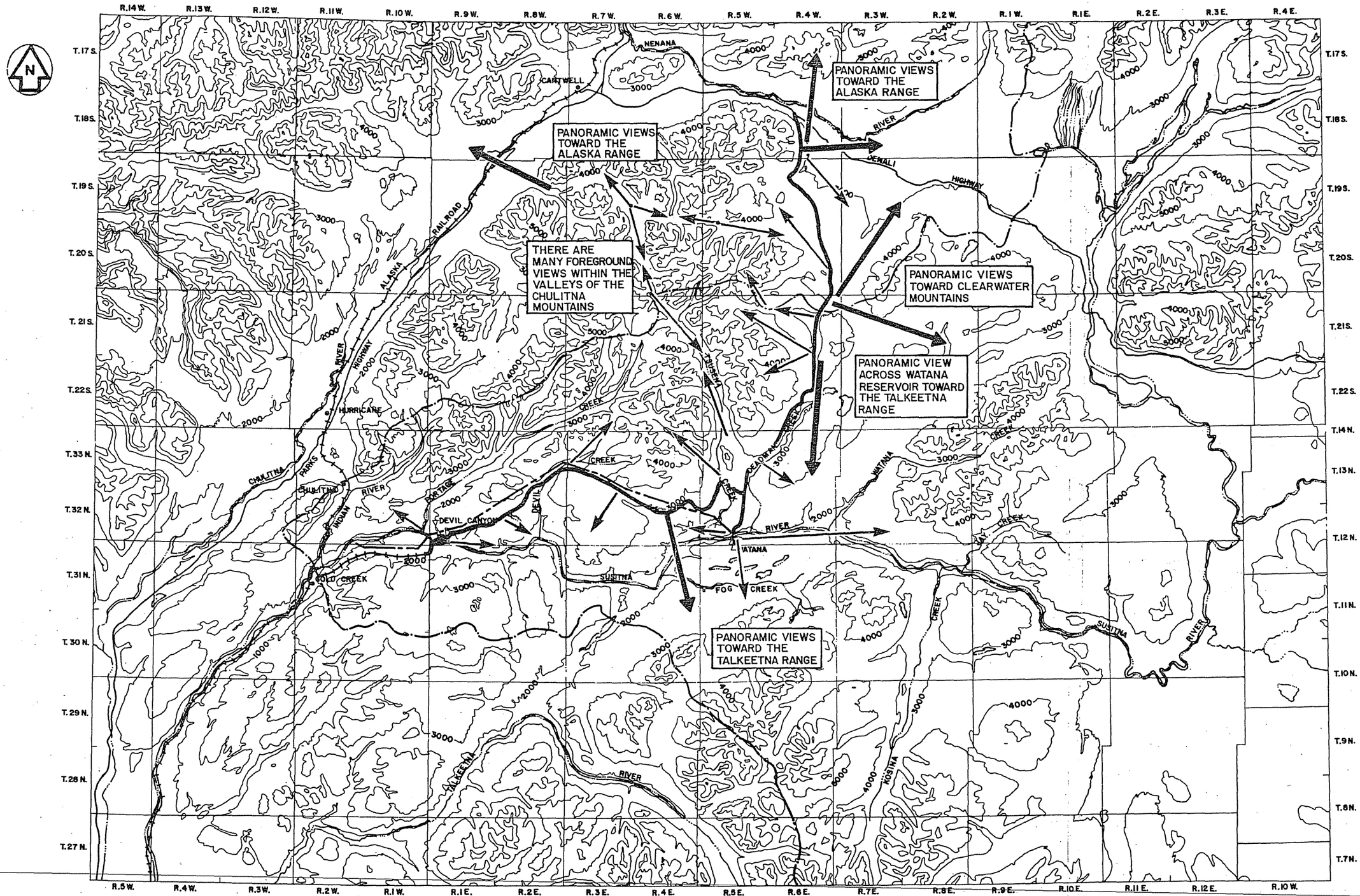
LANDSCAPE CHARACTER TYPES NORTHERN STUB

FIGURE E.8.5.2



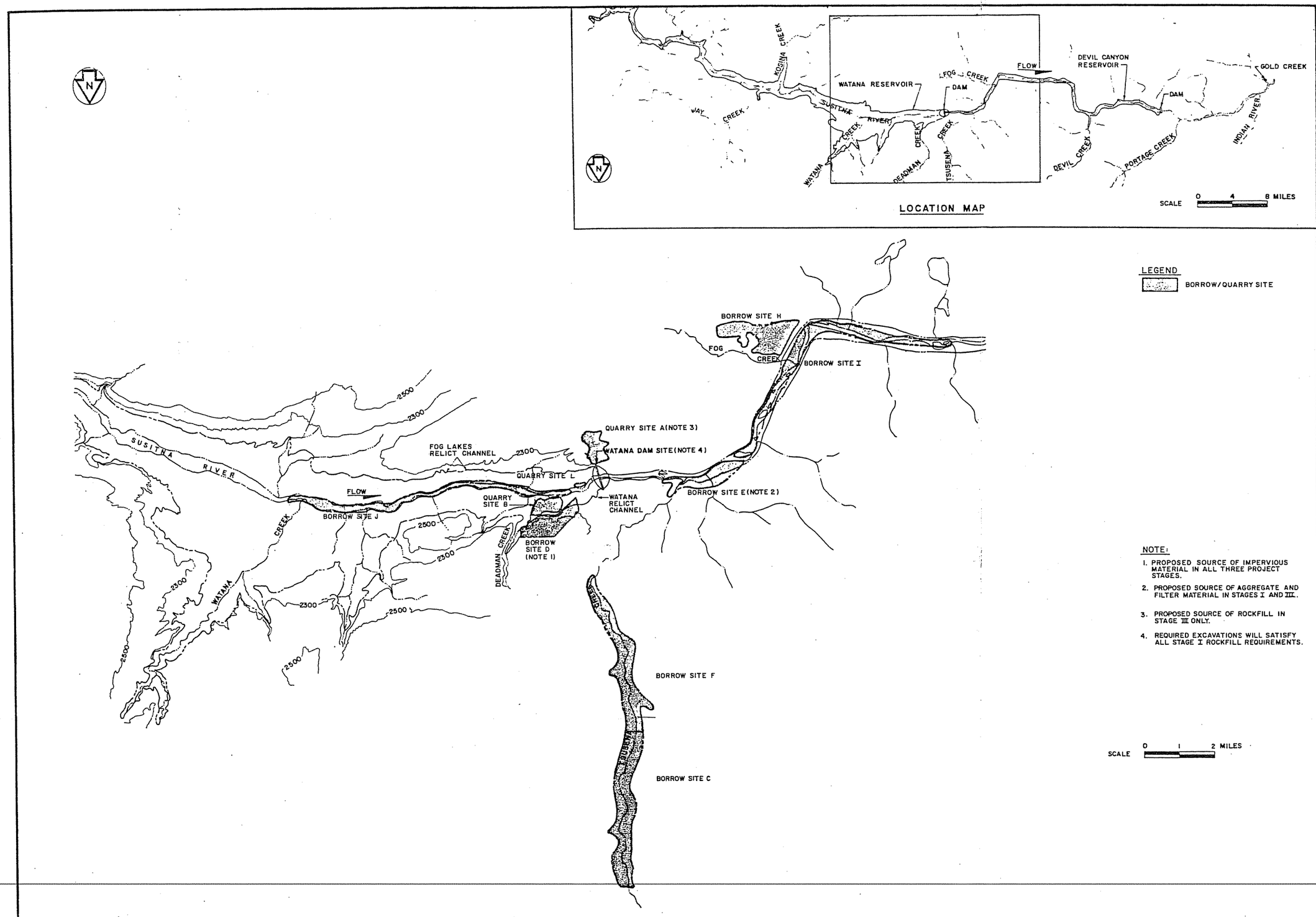
LANDSCAPE CHARACTER TYPES SOUTHERN STUB

FIGURE E.8.5.3



SIGNIFICANT VIEWS

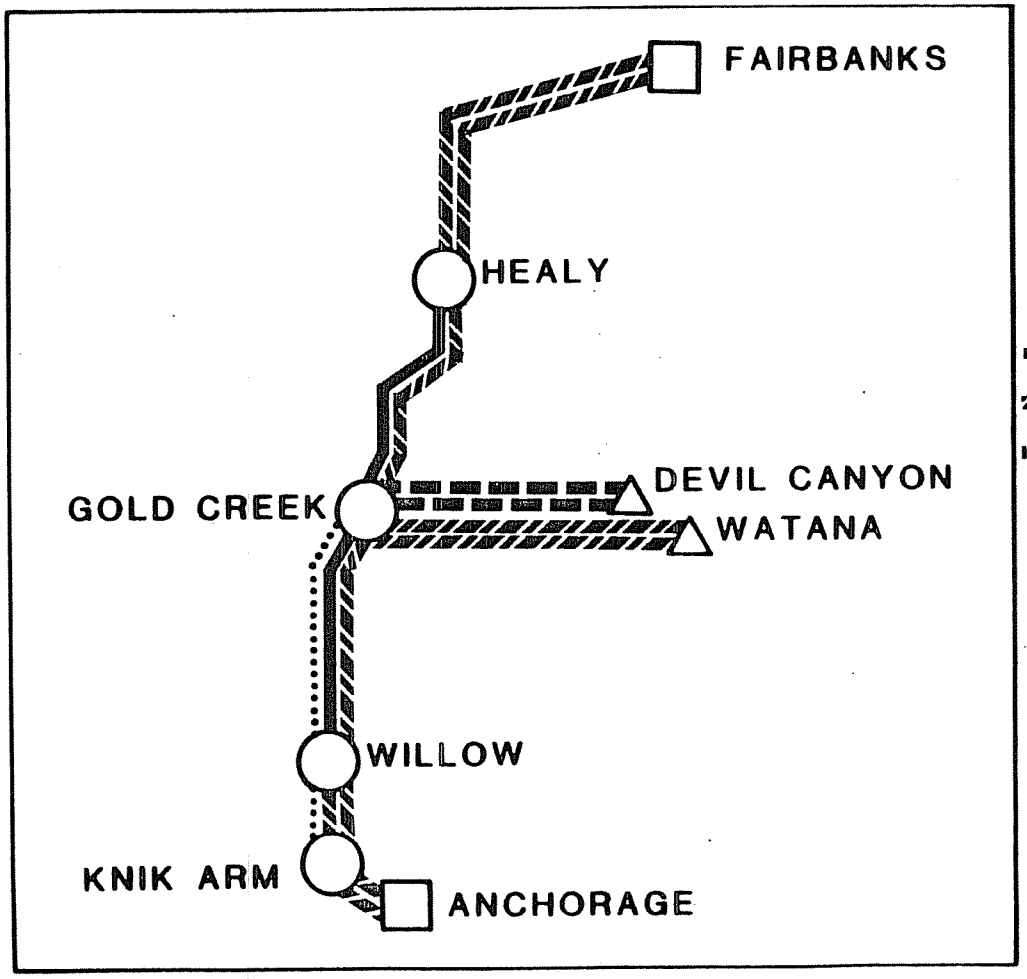
FIGURE E.8.6.1



WATANA BORROW SITE MAP

FIGURE E.8.8.1

SUSITNA HYDROELECTRIC PROJECT
TRANSMISSION LINES

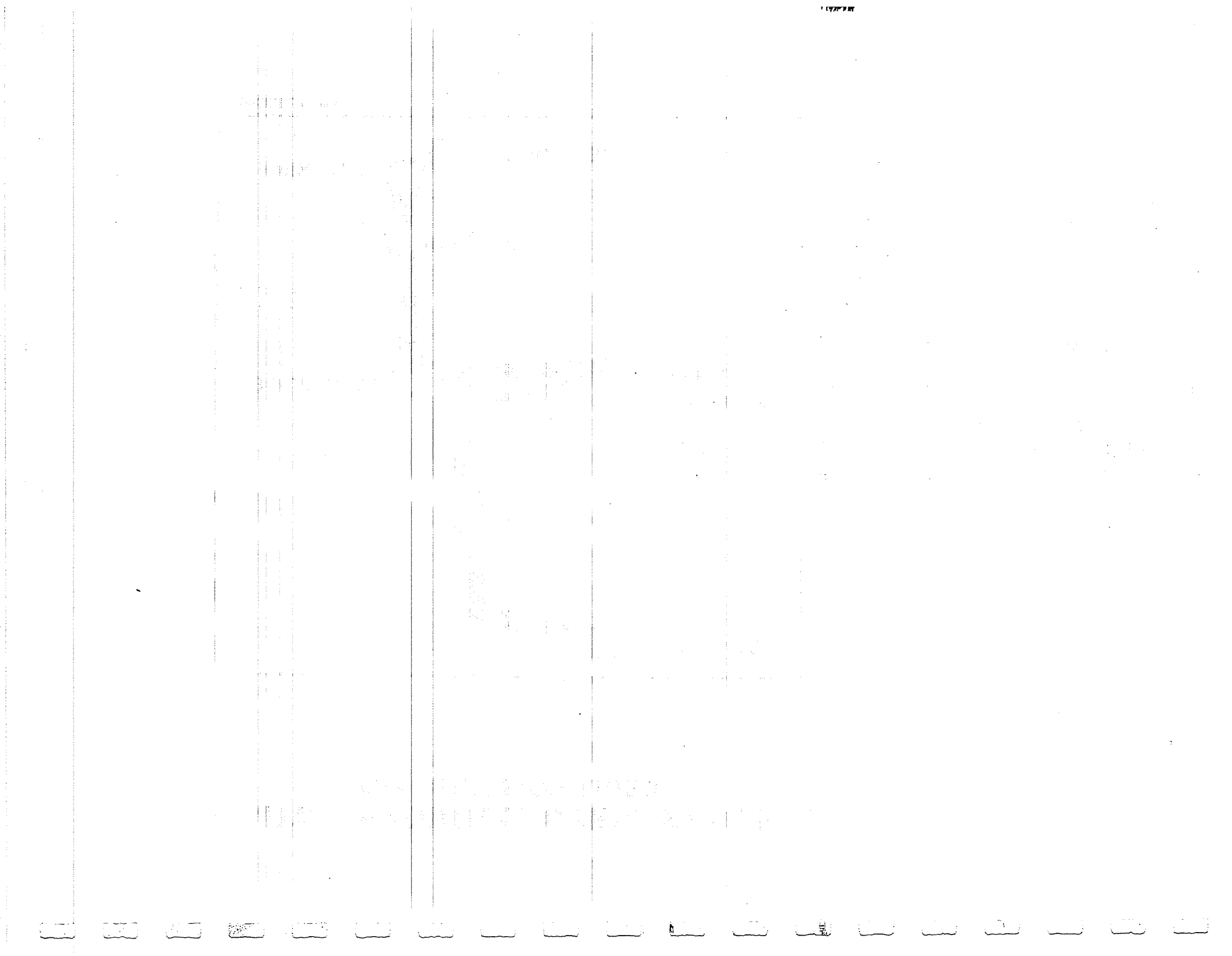


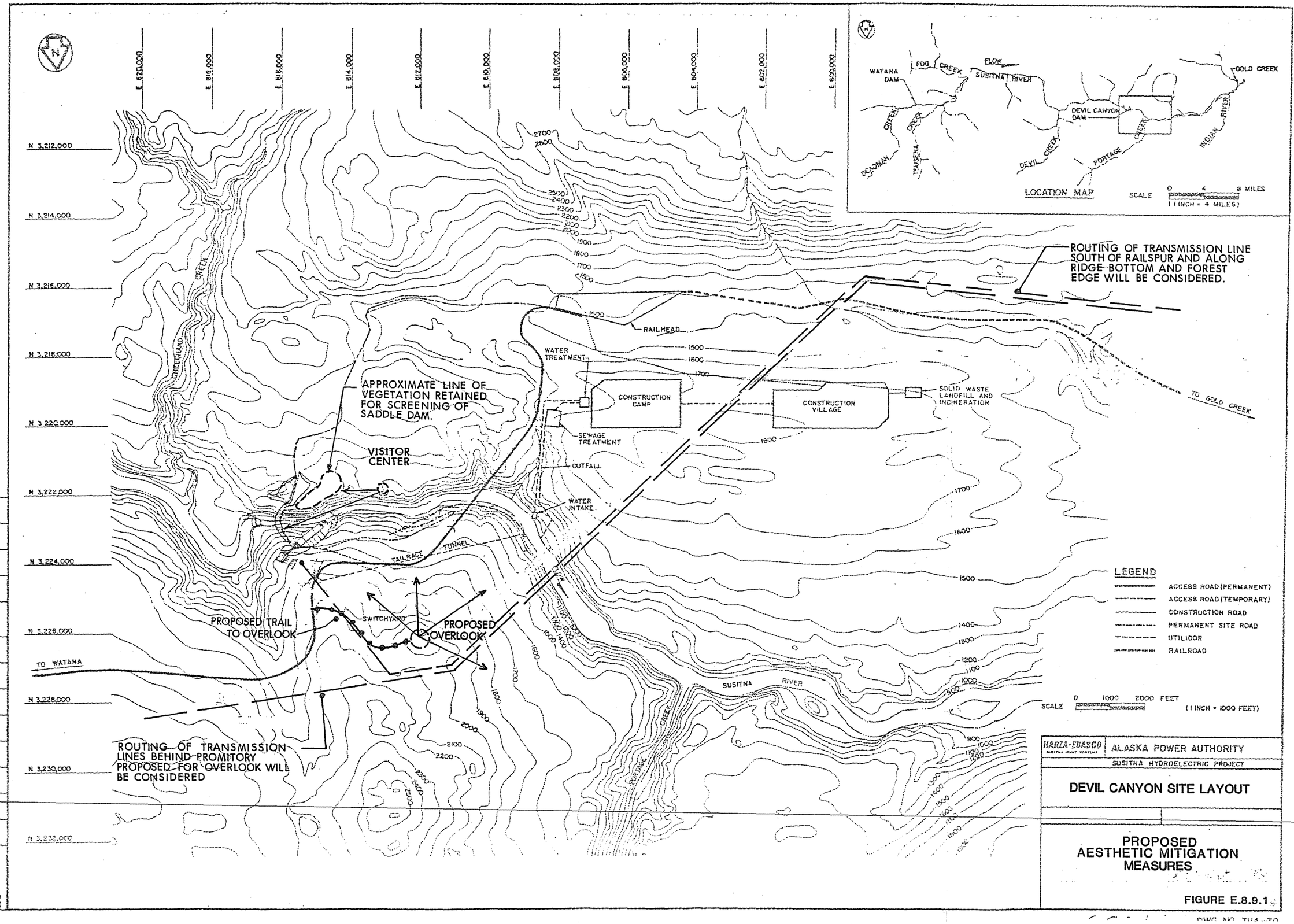
EXISTING INTERTIE
WATANA INITIAL DAM-STAGE I
DEVIL CANYON-STAGE II
WATANA HIGH DAM-STAGE III

(Note all Lines=345 kv)

SOURCE: PLP 1985

FIGURE E.8.8.2





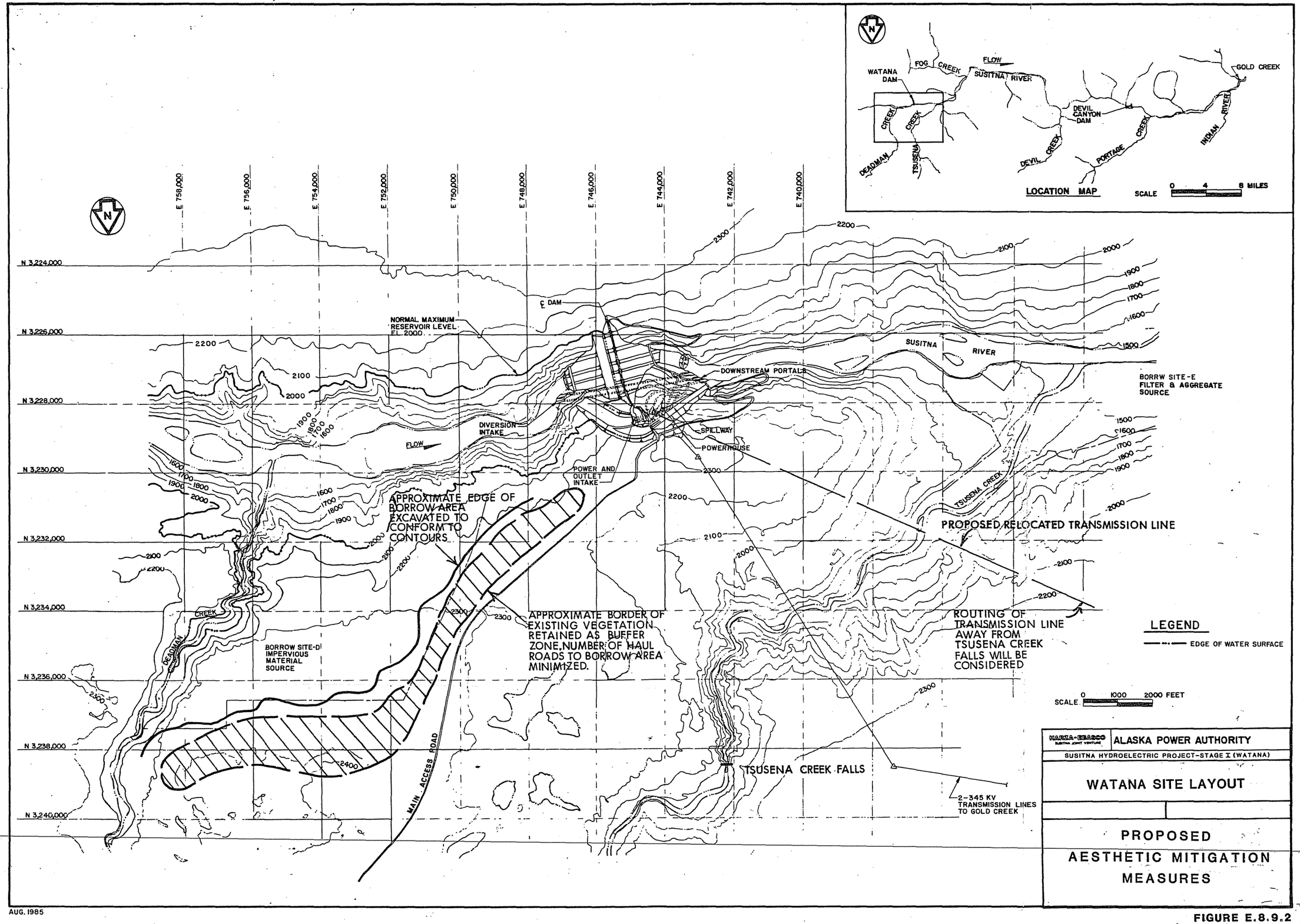
HARZA-EBASCO SUSITNA JOINT VENTURE | ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON SITE LAYOUT

PROPOSED AESTHETIC MITIGATION MEASURES

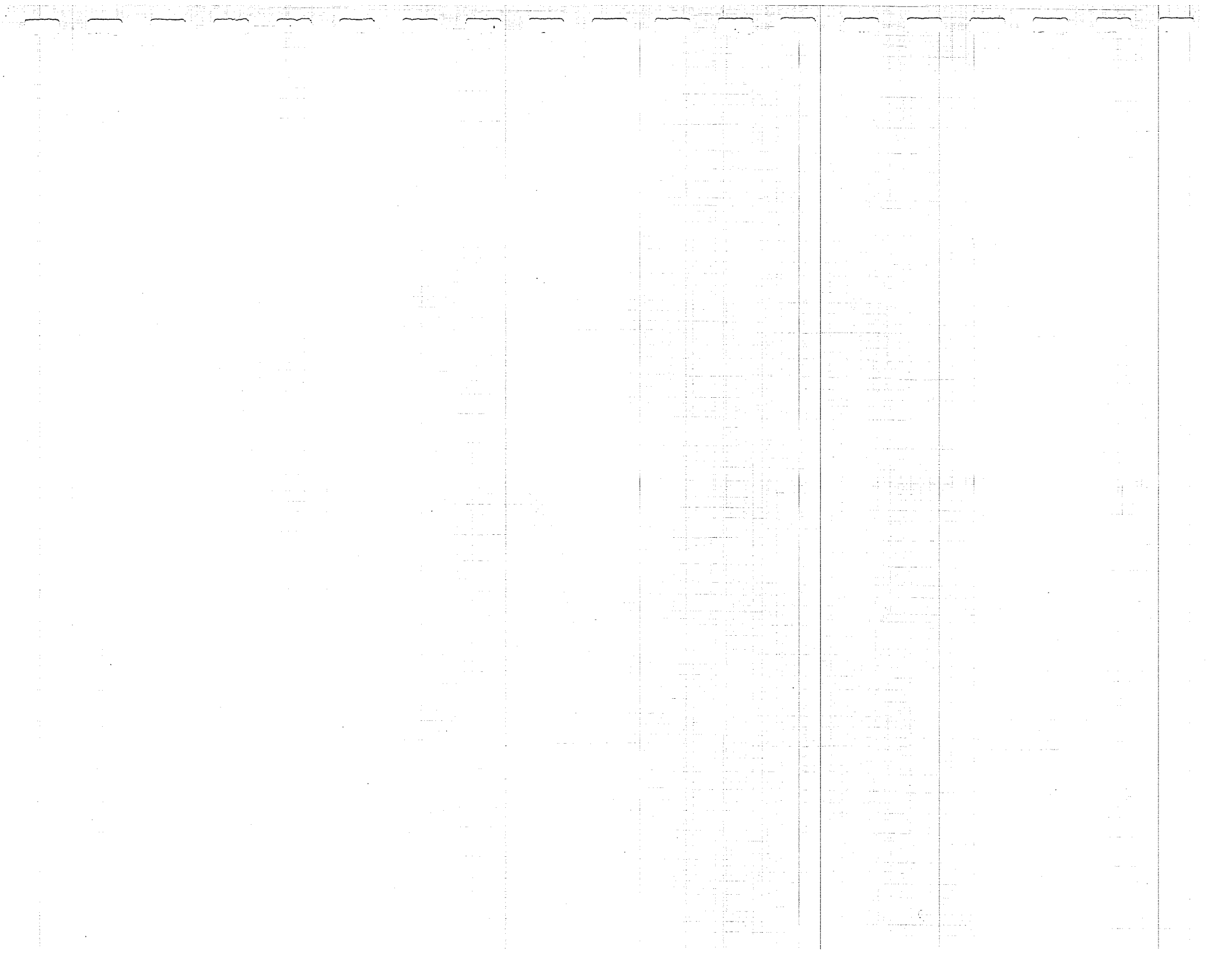
FIGURE E.8.9.1



AUG. 1985

FIGURE E.8.9.2

APPENDICES



APPENDIX E1.8
NOTABLE NATURAL FEATURES

NATURAL FEATURES #1
DEVIL CANYON RAPIDS

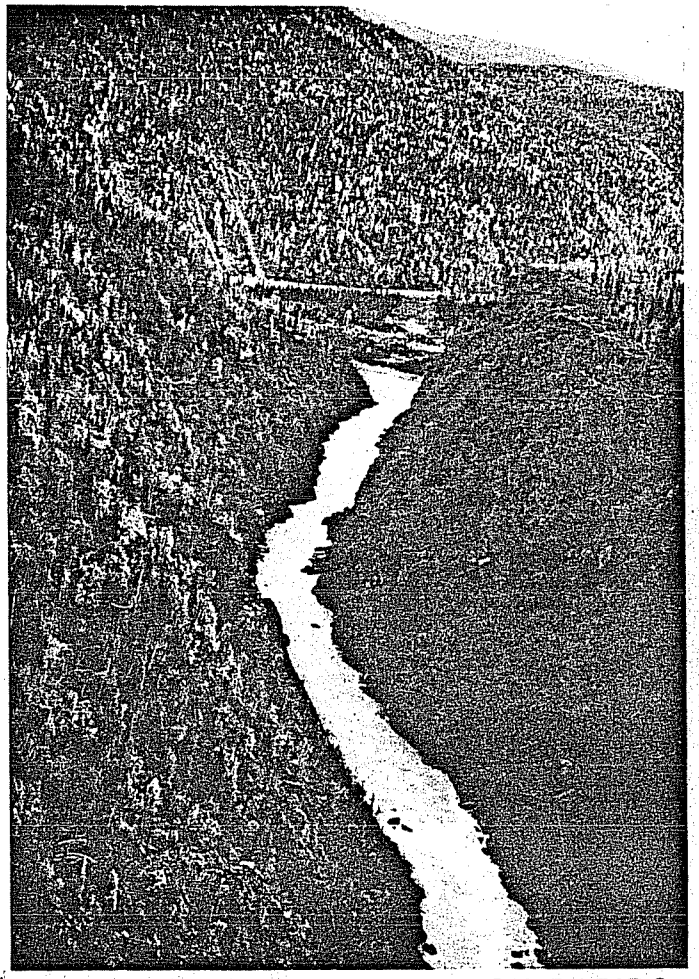


PHOTO E1.8.1: DEVIL CANYON RAPIDS
LOOKING UPSTREAM TO
DEVIL CANYON DAMSITE

NATURAL FEATURES # I
DEVIL CANYON RAPIDS

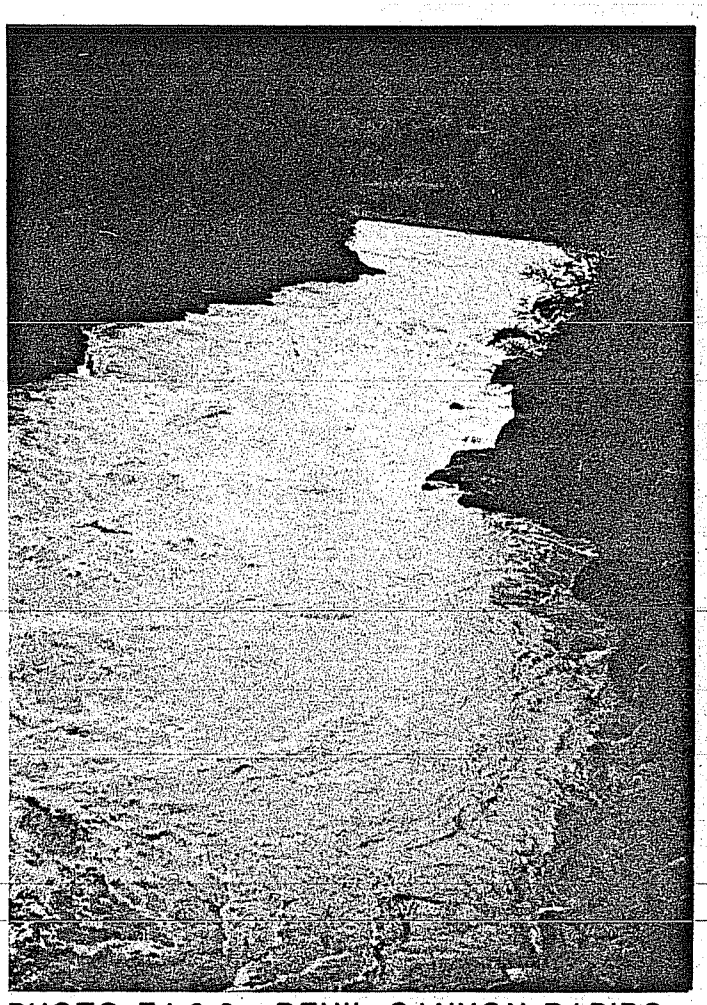


PHOTO E1.8.2: DEVIL CANYON RAPIDS

NATURAL FEATURES # 2
DEVIL CREEK FALLS

PHOTO E1.8.3: DEVIL CREEK FALLS #1

PHOTO E1.8.4: DEVIL CREEK FALLS #2

NATURAL FEATURES #3
STEPHAN LAKE

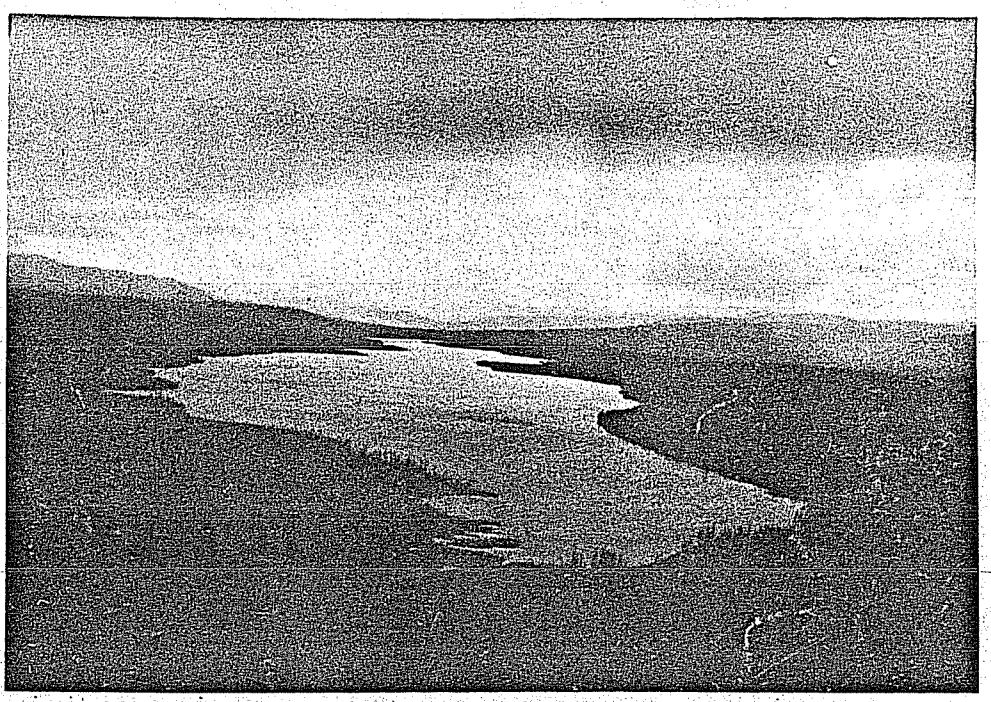


PHOTO E1.8.5: STEPHAN LAKE LOOKING SOUTH

NATURAL FEATURES #4
TSUSENA CREEK FALLS

PHOTO E1.8.6: TSUSENA CREEK FALLS

NATURAL FEATURES # 5
TSUSENA BUTTE LAKE

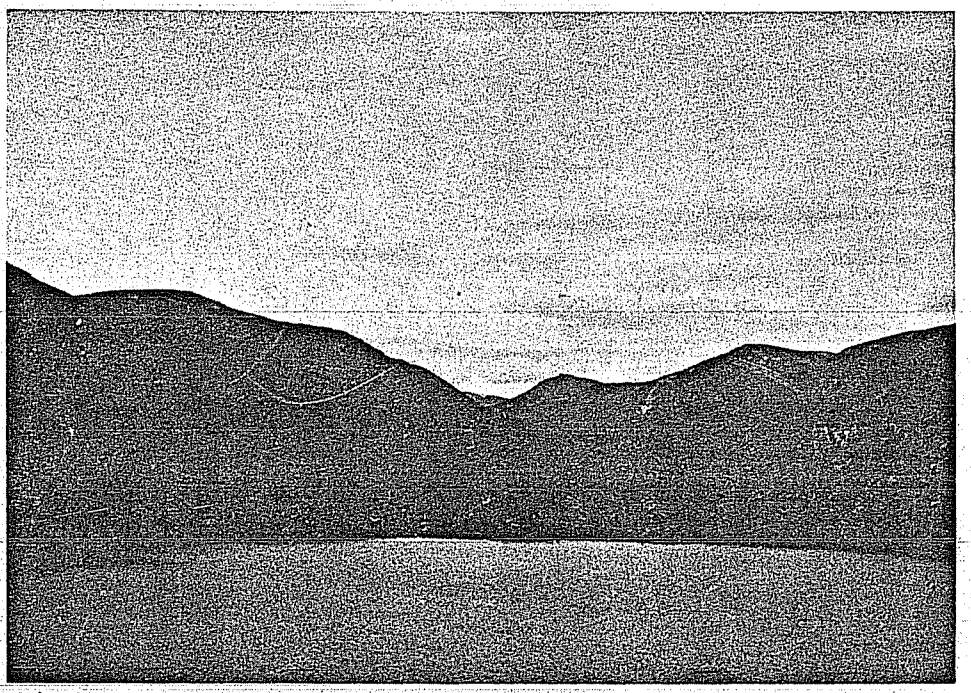


PHOTO E1.8.7: TSUSENA BUTTE LAKE LOOKING NORTH NORTHWEST

NATURAL FEATURES #6
DEADMAN CREEK FALLS

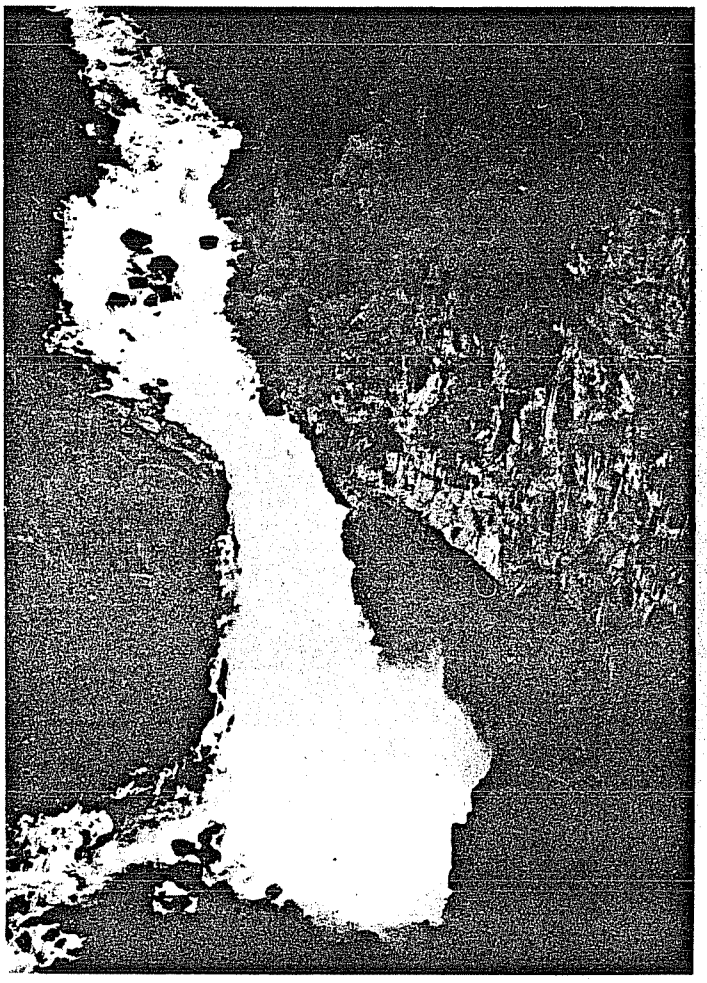


PHOTO E1.8.8: DEADMAN CREEK FALLS

NATURAL FEATURES # 7
FOG LAKES

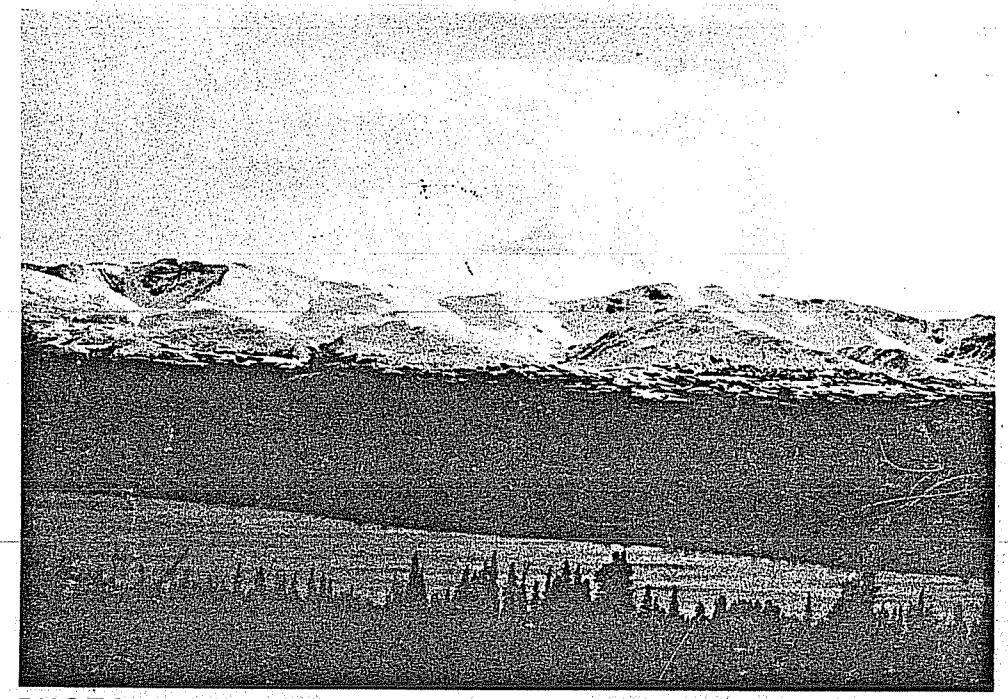


PHOTO E1.8.9: FOG LAKES

NATURAL FEATURES #8
BIG/DEADMAN LAKES

PHOTO E1.8.10: BIG/DEADMAN LAKE
(THE CONNECTING LAND BETWEEN THE 2 LAKES)

PHOTO E1.8.11: BIG/DEADMAN LAKE
(DEADMAN LAKE IS IN THE FOREGROUND AND BIG LAKE IN THE MIDDLEGROUND)

NATURAL FEATURES # 9
CARIBOU PASS

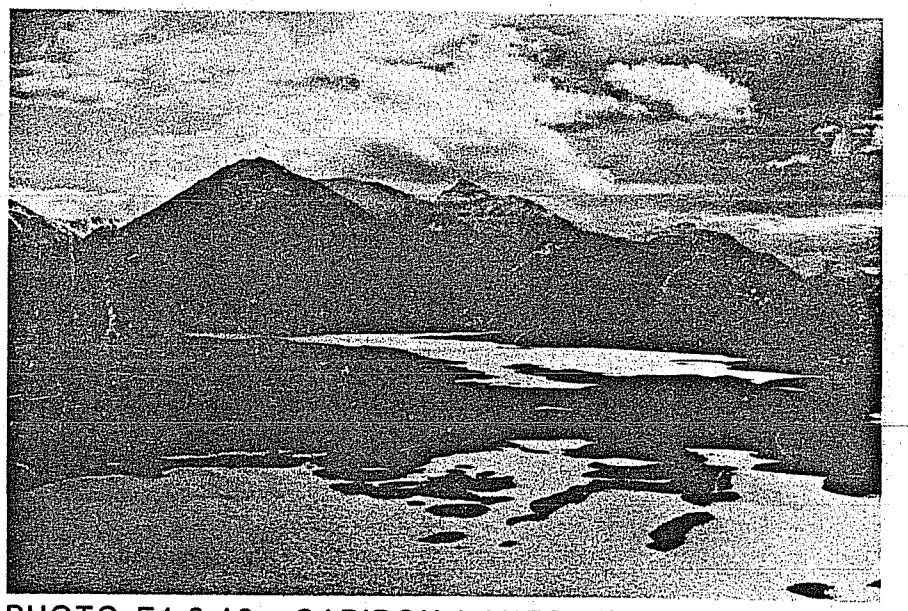


PHOTO E1.8.12: CARIBOU LAKES LOOKING SOUTH TOWARDS THE CONFLUENCE OF SOULE CREEK AND JACK RIVER

NATURAL FEATURES #10
VEE CANYON

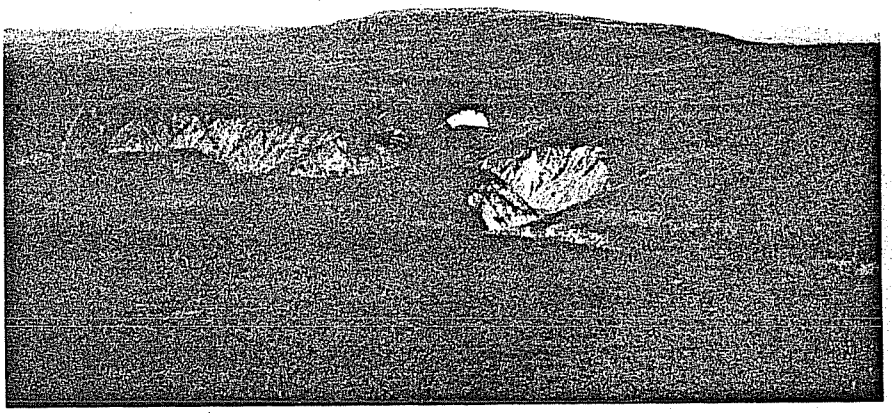


PHOTO E1.8.13: VEE CANYON AND VICINITY

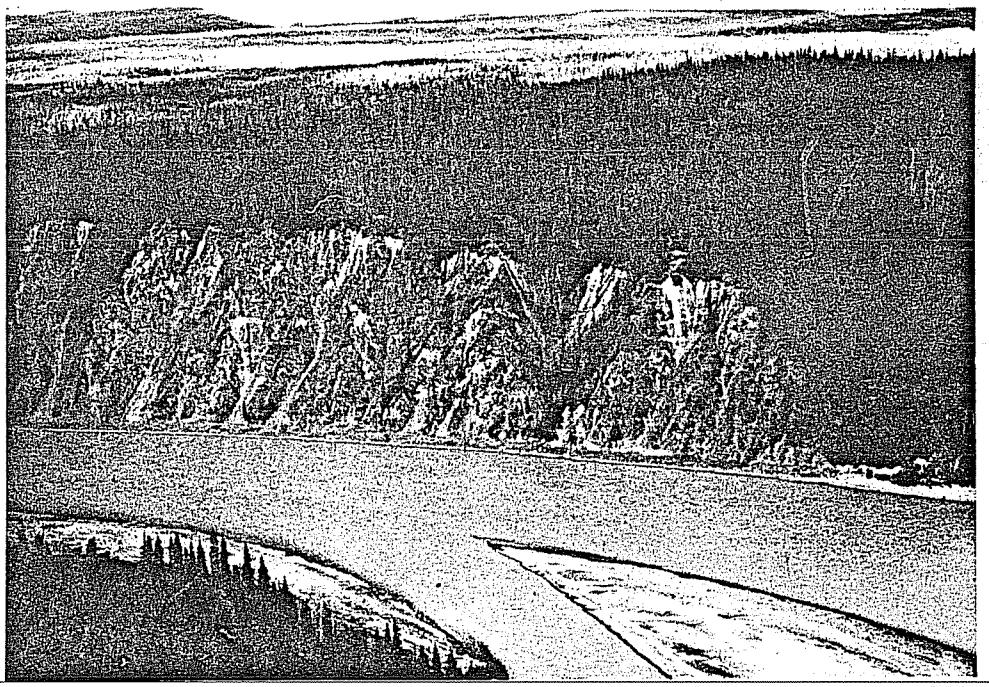
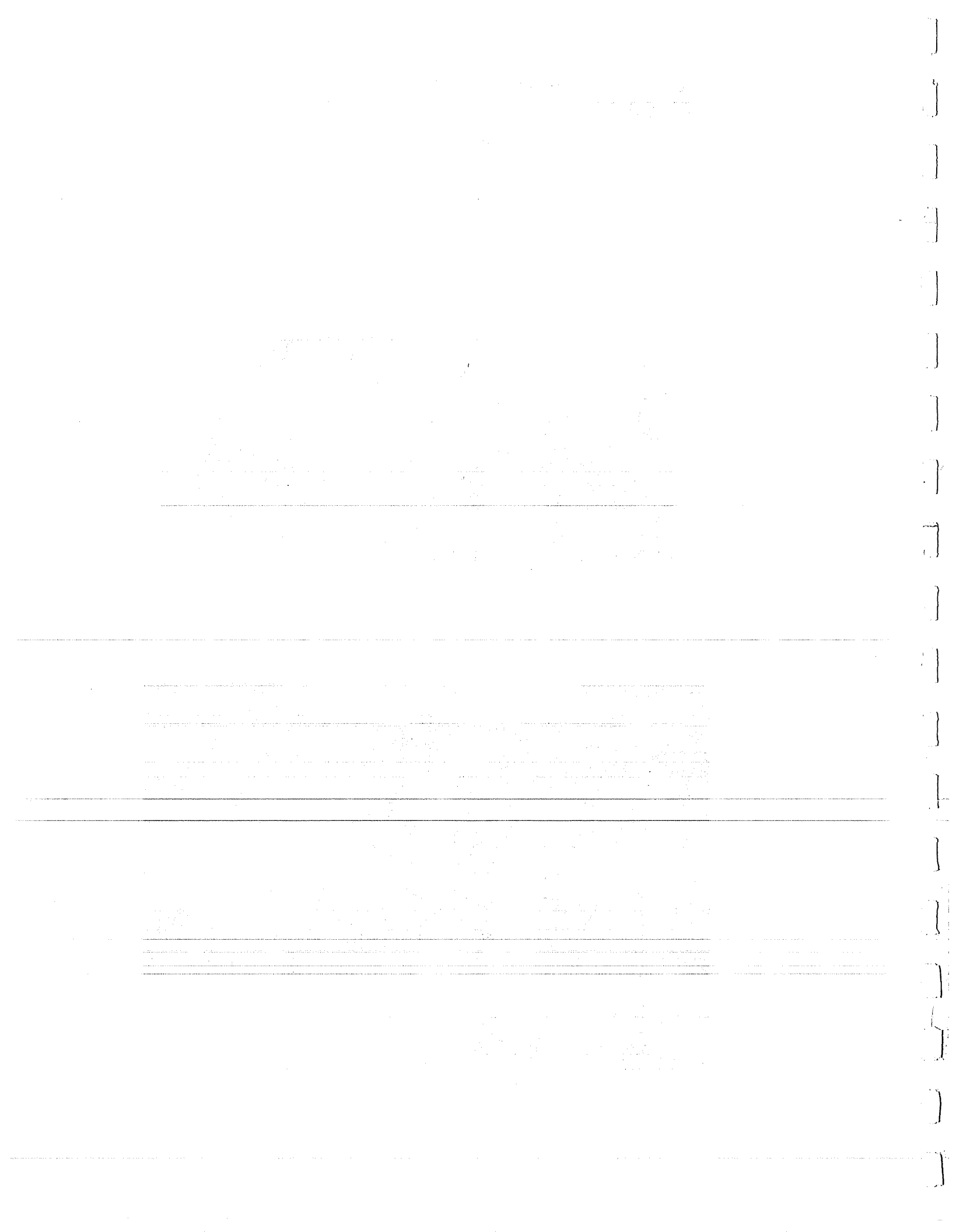


PHOTO E1.8.14: THE SOUTHERN WALLS OF VEE CANYON



APPENDIX E2.8
SITE PHOTOS WITH SIMULATIONS OF PROJECT FACILITIES

WATANA RESERVOIR

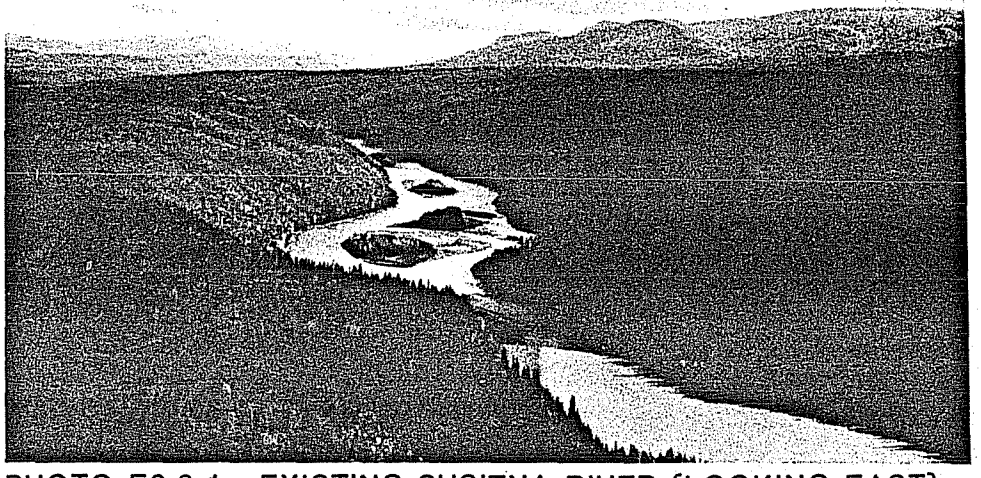
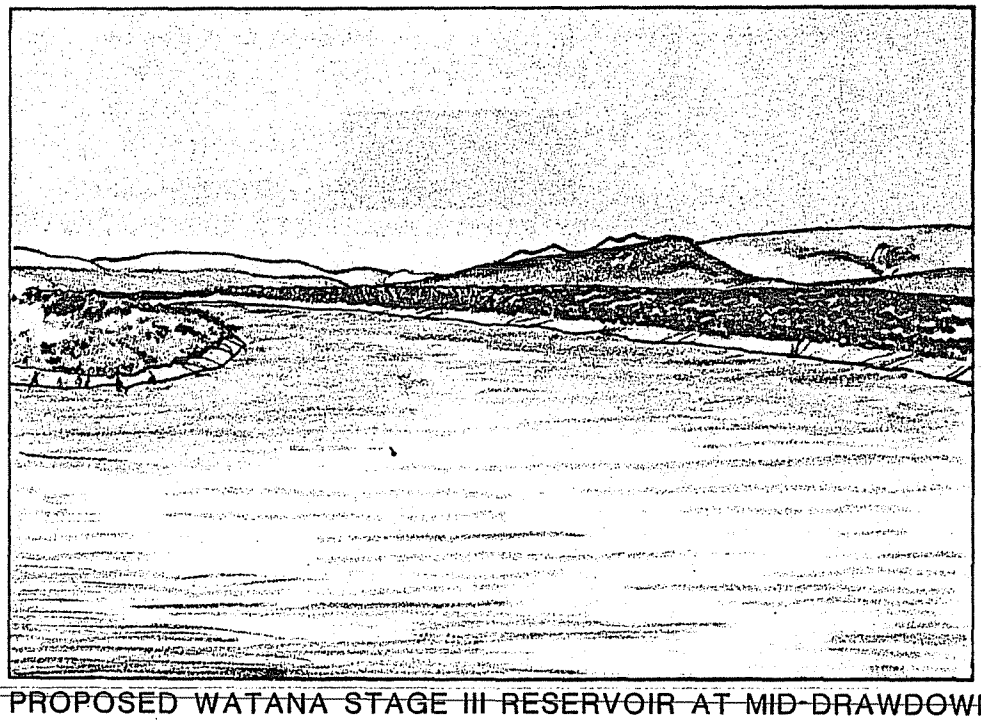


PHOTO E2.8.1: EXISTING SUSITNA RIVER (LOOKING EAST)



PROPOSED WATANA STAGE III RESERVOIR AT MID-DRAWDOWN

WATANA PERMANENT TOWNSITE

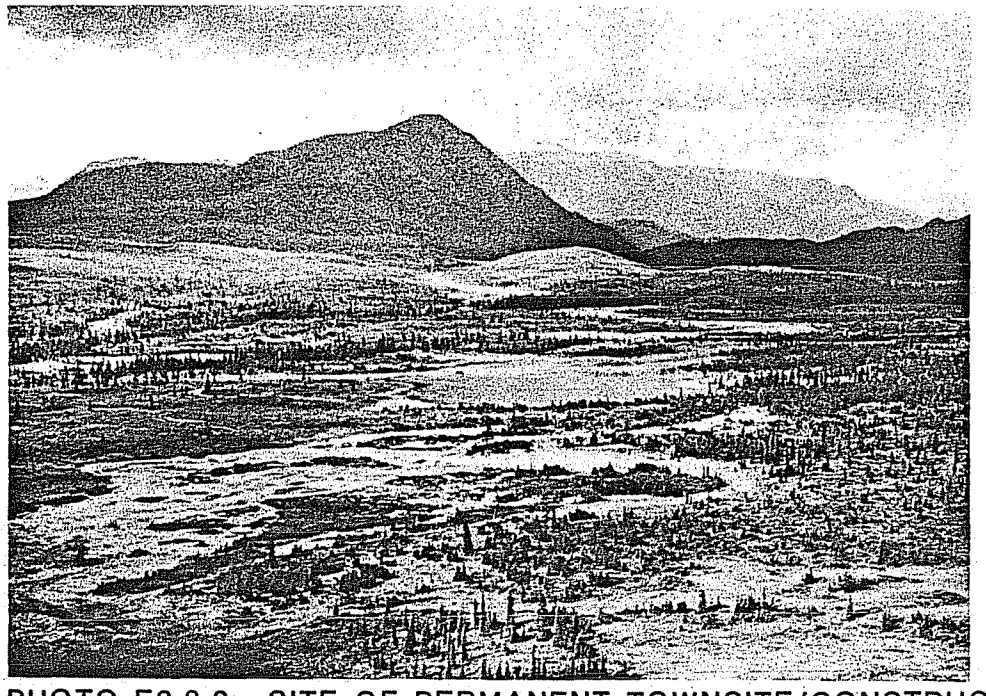
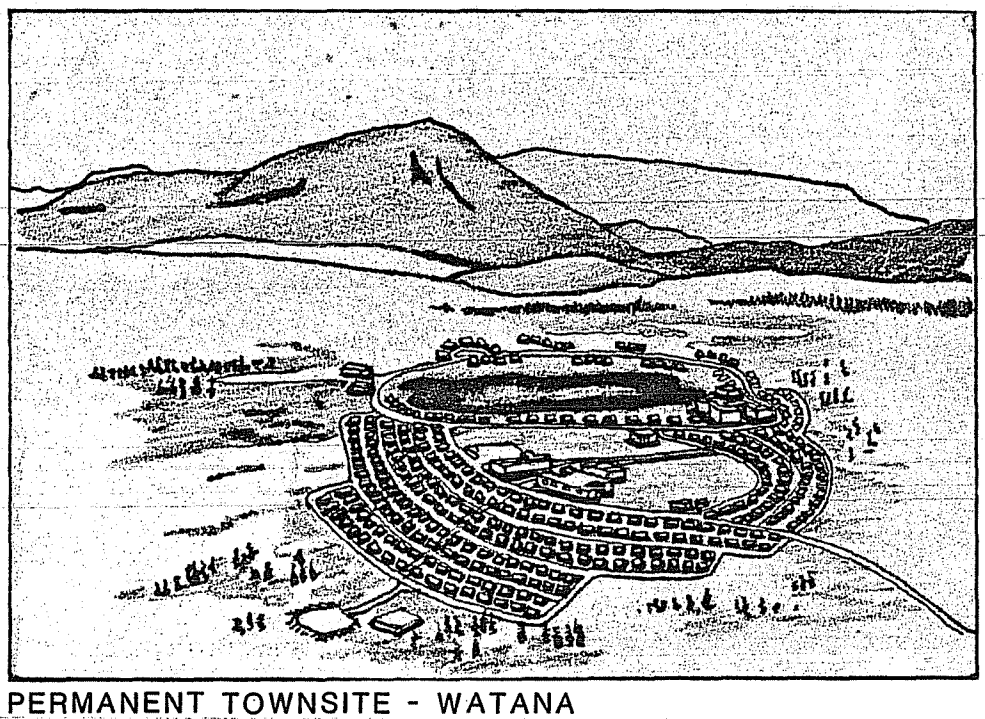


PHOTO E2.8.2: SITE OF PERMANENT TOWNSITE/CONSTRUCTION VILLAGE (LOOKING NORTH)



PERMANENT TOWNSITE - WATANA

DEVIL CANYON ACCESS ROAD

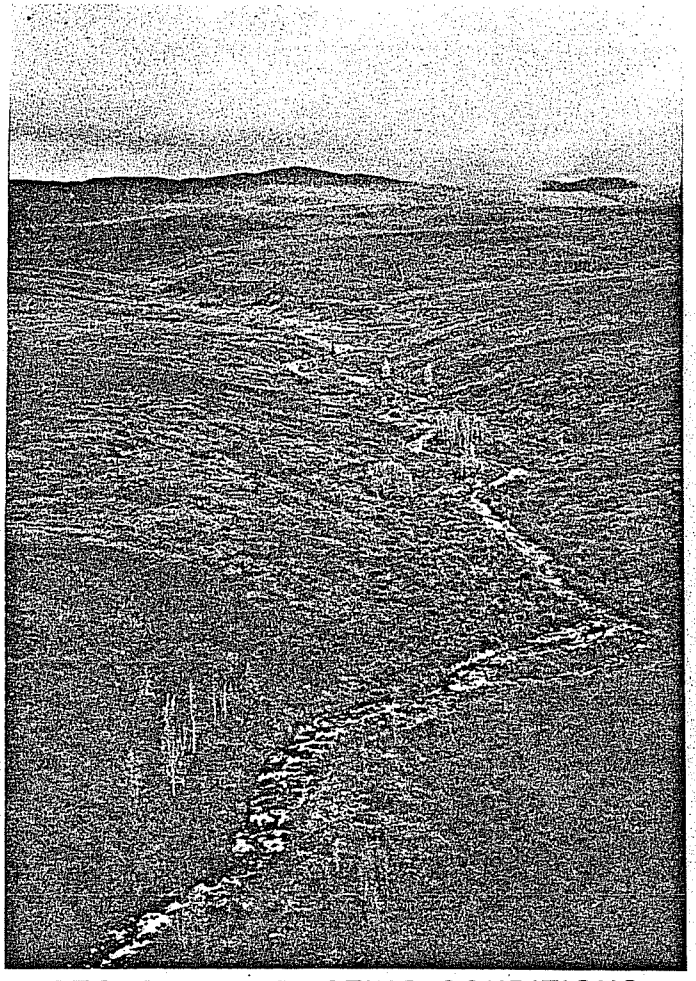
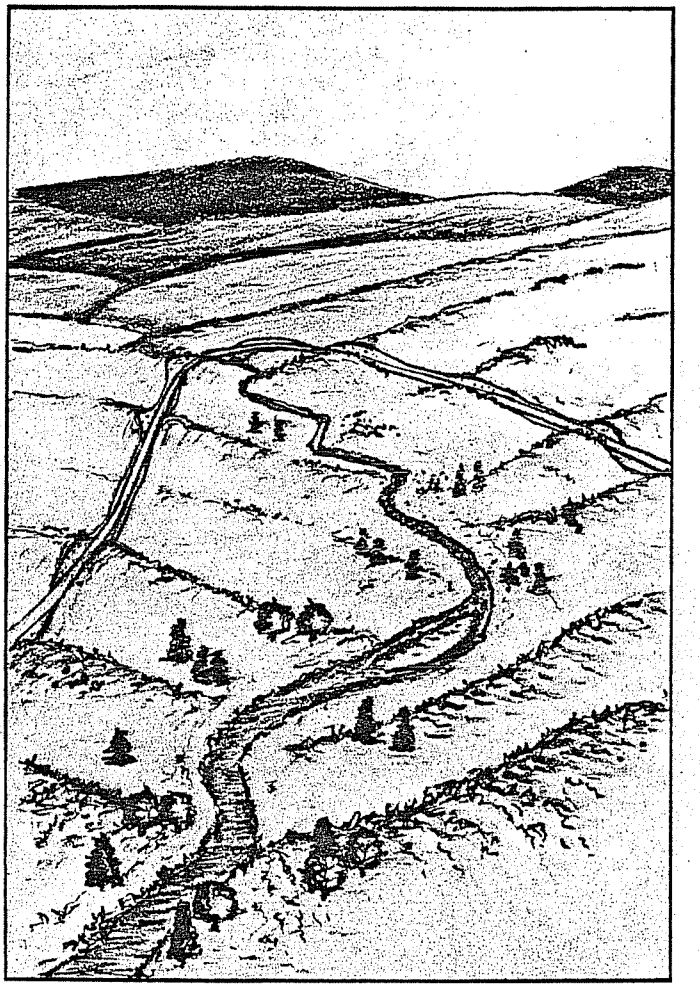


PHOTO E2.8.3: EXISTING CONDITIONS NEAR TSUSENA CREEK



PROPOSED ROAD CROSSING

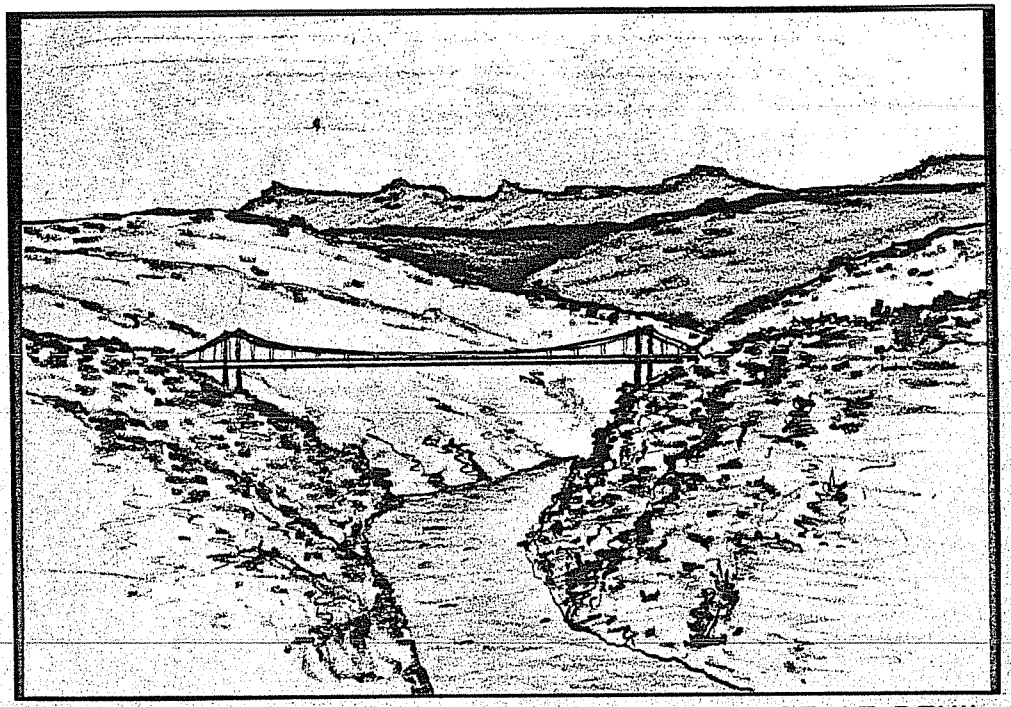


PHOTO E2.8.4: PROPOSED HIGH LEVEL BRIDGE AT DEVIL CANYON

APPENDIX E3.8
PHOTOS OF PROPOSED PROJECT FACILITIES SITES

PHOTO E3.8.1: PROPOSED DEVIL CANYON CONSTRUCTION VILLAGE/CAMPSITE (LOOKING EAST)

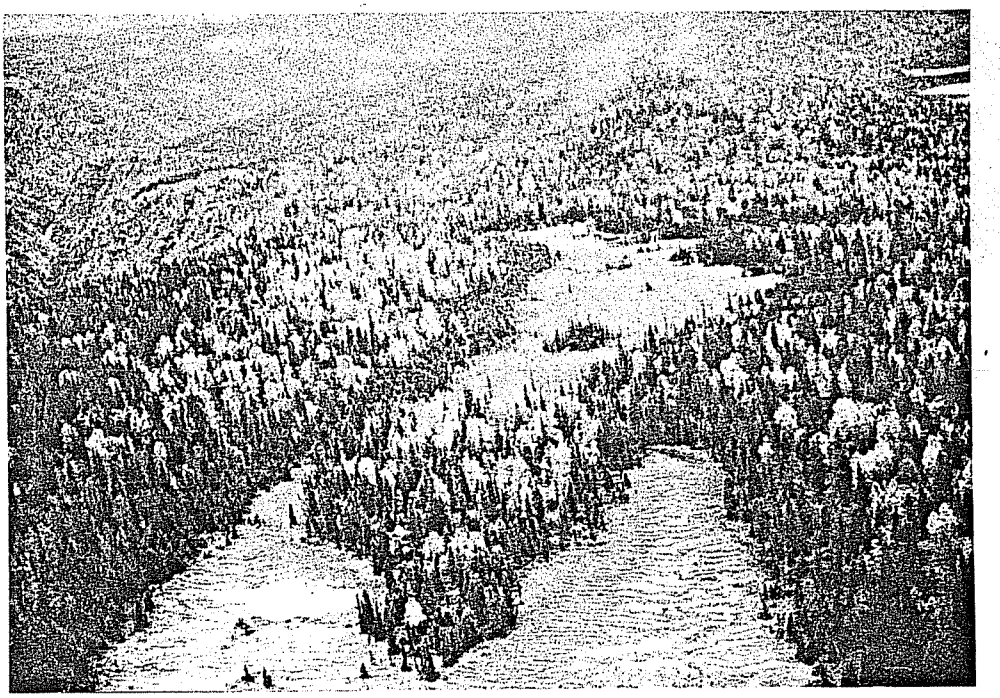


PHOTO E3.8.2: PROPOSED DEVIL CANYON CONSTRUCTION VILLAGE/CAMPSITE (LOOKING EAST)

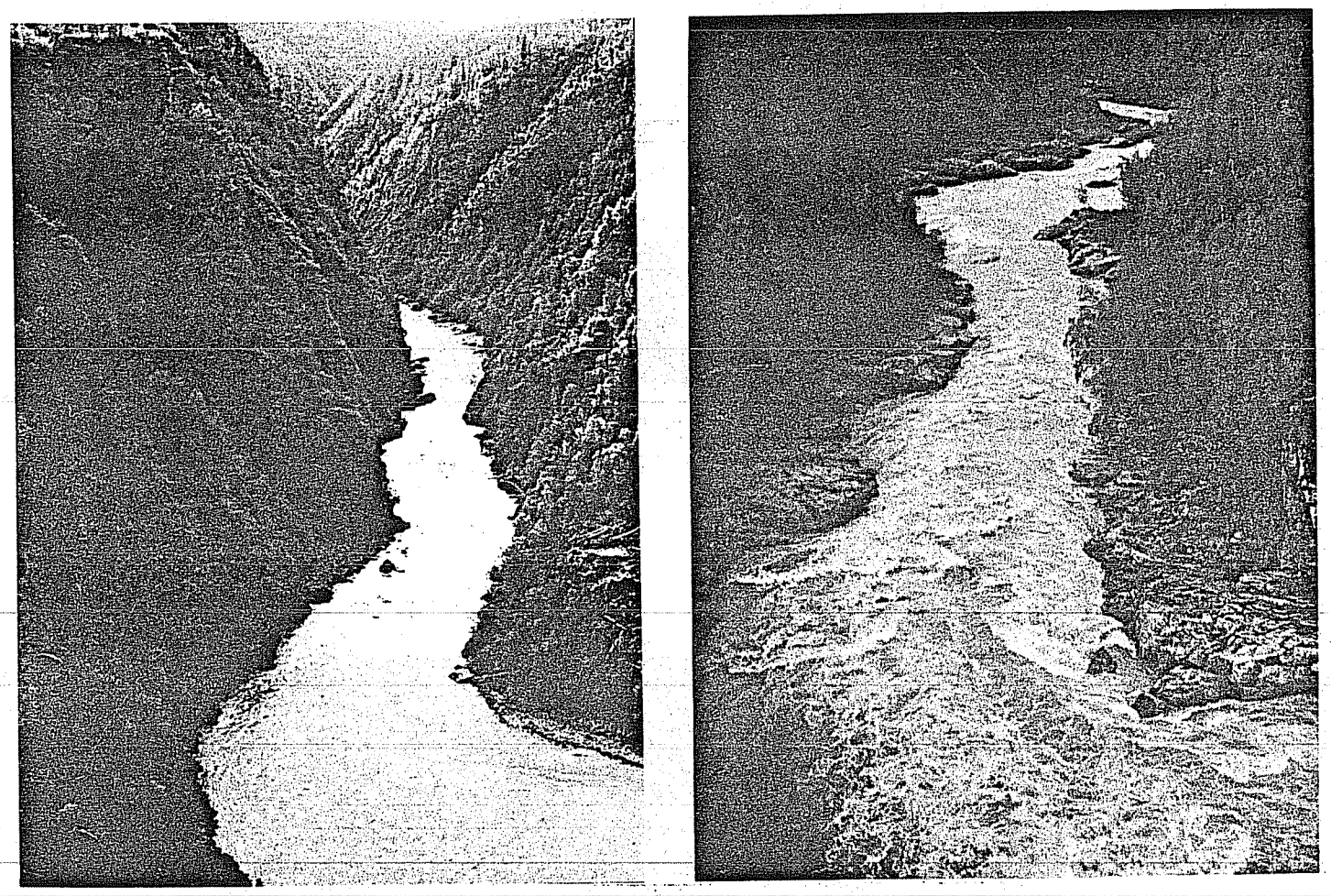


PHOTO E3.8.3: LEFT PHOTO - DEVIL CANYON DAMSITE LOOKING DOWNSTREAM. RIGHT PHOTO - RAPIDS AT DEVIL CREEK TO BE INUNDATED BY DEVIL CANYON RESERVOIR.

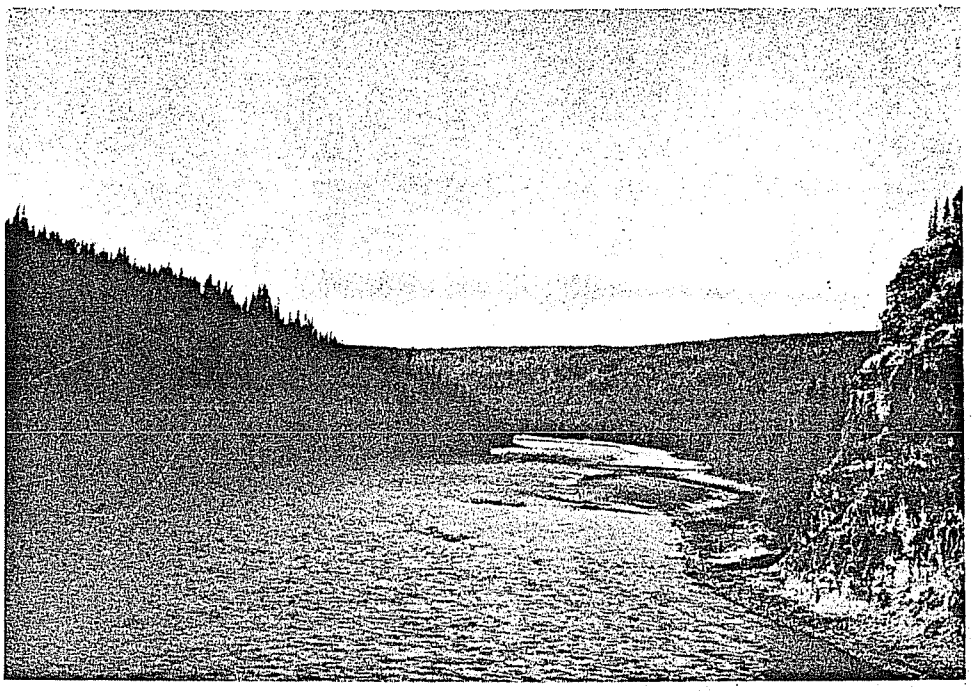


PHOTO E3.8.4: PROPOSED MAJOR BORROW AREA FOR WATANA DAM ON NORTH (RIGHT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)

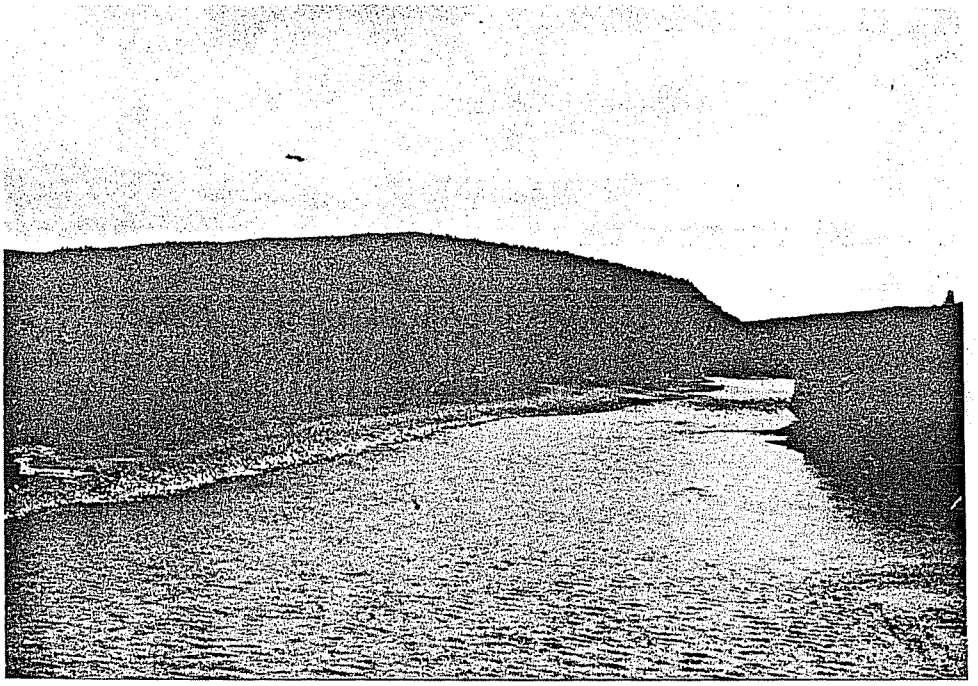


PHOTO E3.8.5: PROPOSED MAJOR BORROW AREA (SAME AS ABOVE) FOR WATANA DAM ON NORTH (LEFT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)

APPENDIX E4.8
EXAMPLES OF EXISTING AESTHETIC IMPACTS

HIGHWAY CONDITIONS

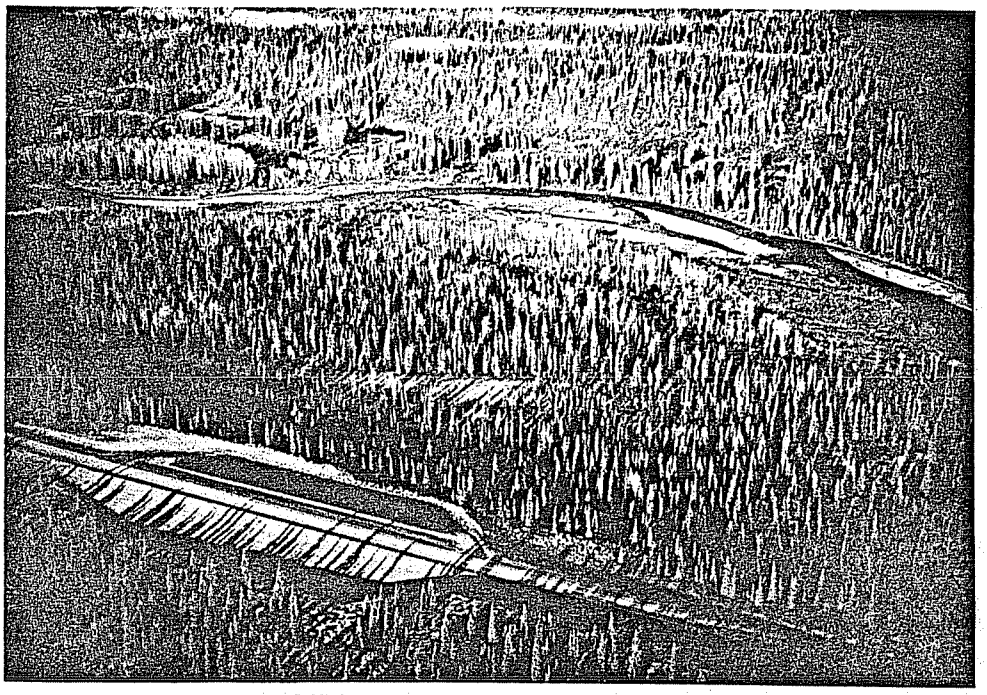


PHOTO E4.8.1: TYPICAL ROAD PULLOUT ON THE PARKS HIGHWAY (A PAVED ROAD WAY)

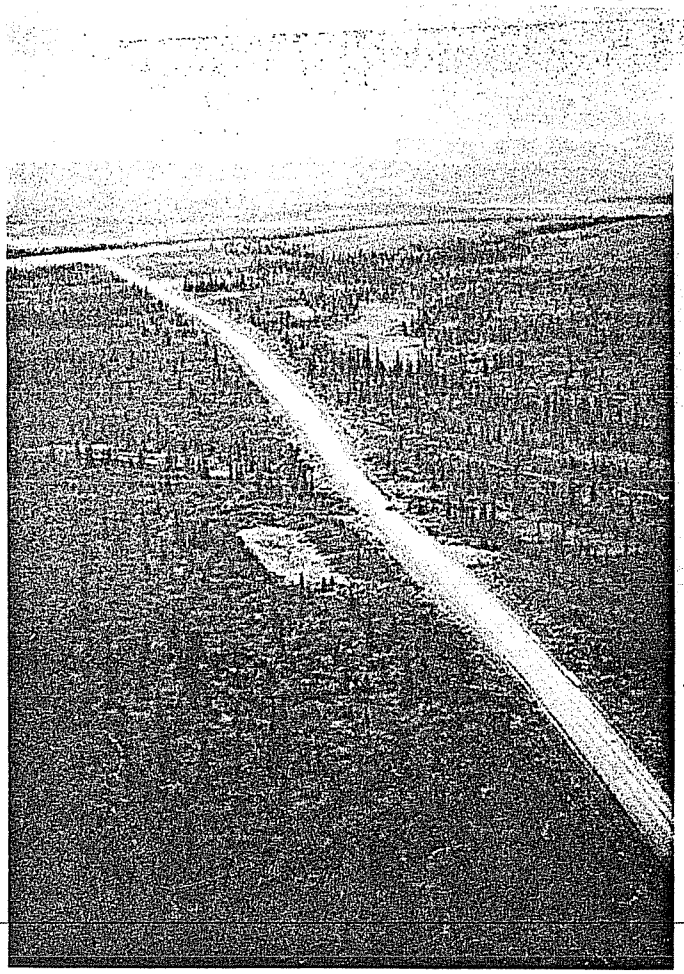


PHOTO E4.8.2: BORROW AREAS NEAR THE DENALI HIGHWAY SHOW LACK OF NATURAL VEGETATION

HIGHWAY CONDITIONS

PHOTO E4.8.3: DENALI HIGHWAY (LOOKING SOUTHEAST) NEAR PROPOSED ACCESS ROAD. JUNCTION. THIS IS A TYPICAL COMPACTED GRAVEL ROAD AND IS SIMILAR TO THE PROPOSED ACCESS ROAD

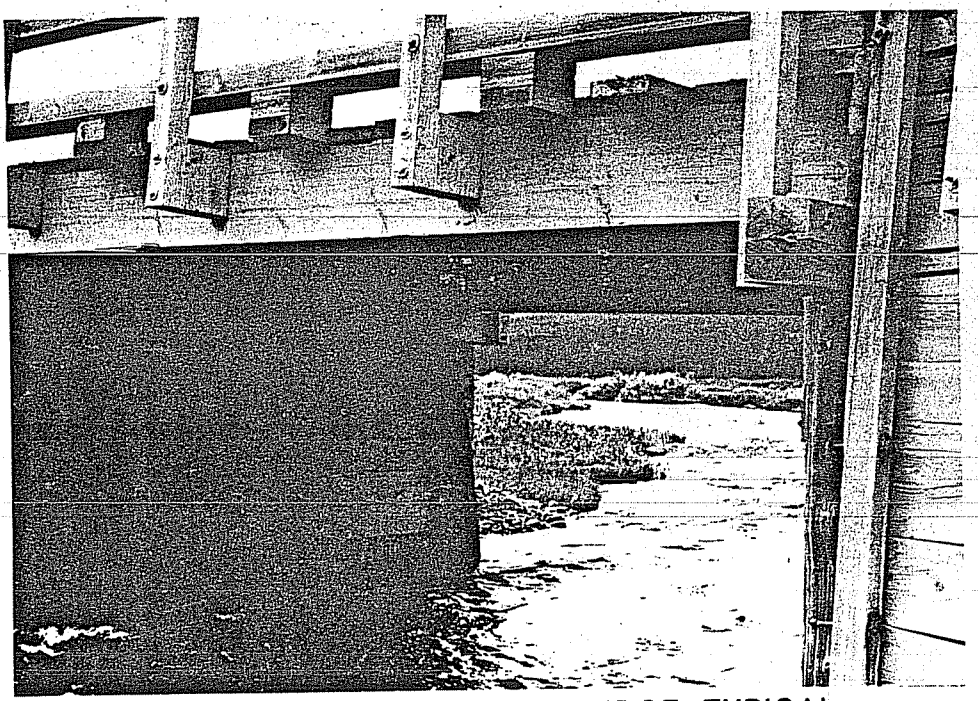


PHOTO E4.8.4: DENALI HIGHWAY BRIDGE. TYPICAL WOOD-FRAME STREAM CROSSING

OFF ROAD TRAIL IMPACTS

PHOTO E4.8.5: JEEP ROAD/TRAIL OFF DENALI HIGHWAY. TRACKS MADE BY VEHICLES IN THE TUNDRA ARE VIRTUALLY PERMANENT

PHOTO E4.8.6: ALL-TERRAIN-VEHICLE (ATV) TRAIL TO BUTTE LAKE. THIS TRAIL IS SEVERAL YEARS OLD AND IS CAUSING RAPID PERMAFROST THAW. EACH YEAR THE OLD MARKS BECOME LINEAR PONDS.

PHOTO E4.8.7: GOLD CREEK ORV TRAIL

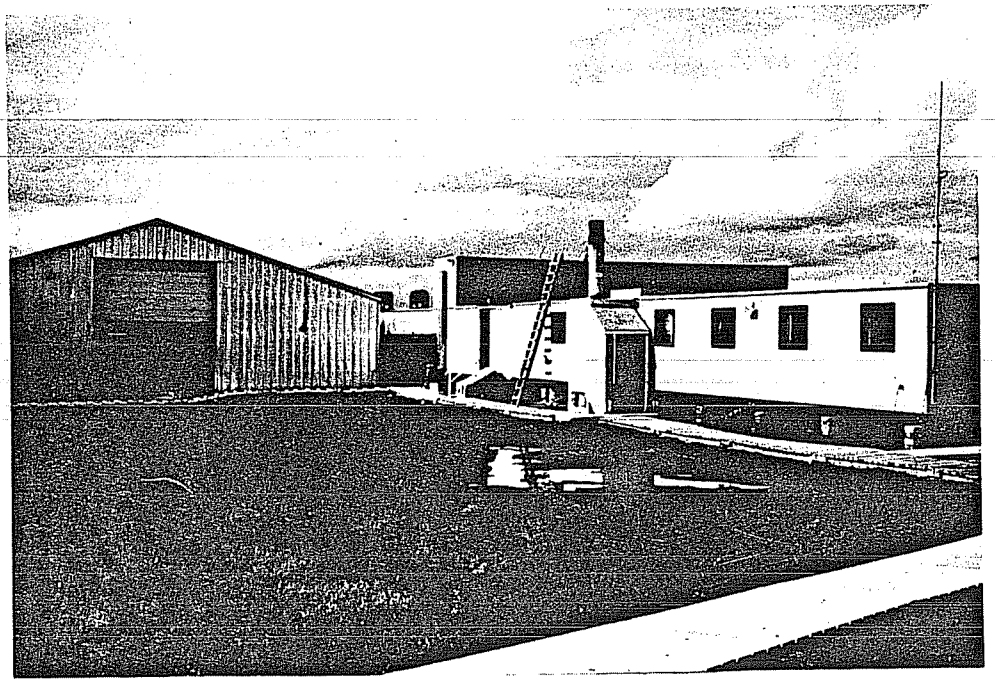


PHOTO E4.8.8: EXISTING WATANA CAMP

CAMPSITE CONDITIONS

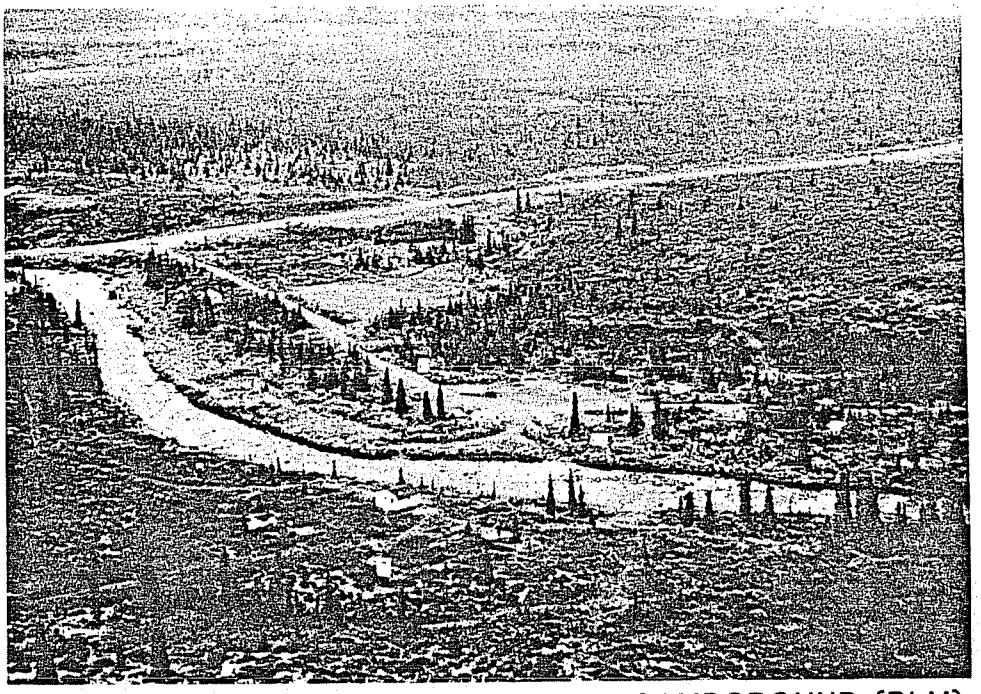


PHOTO E4.8.9: EXISTING BRUSHKANA CAMPGROUND (BLM) OFF DENALI HIGHWAY - PROPOSED EXPANSION. THIS IS TYPICAL OF DEVELOPED CAMPGROUND DESIGN IN THE REGION NOTE THE UNCONTROLED ORV TRACKS

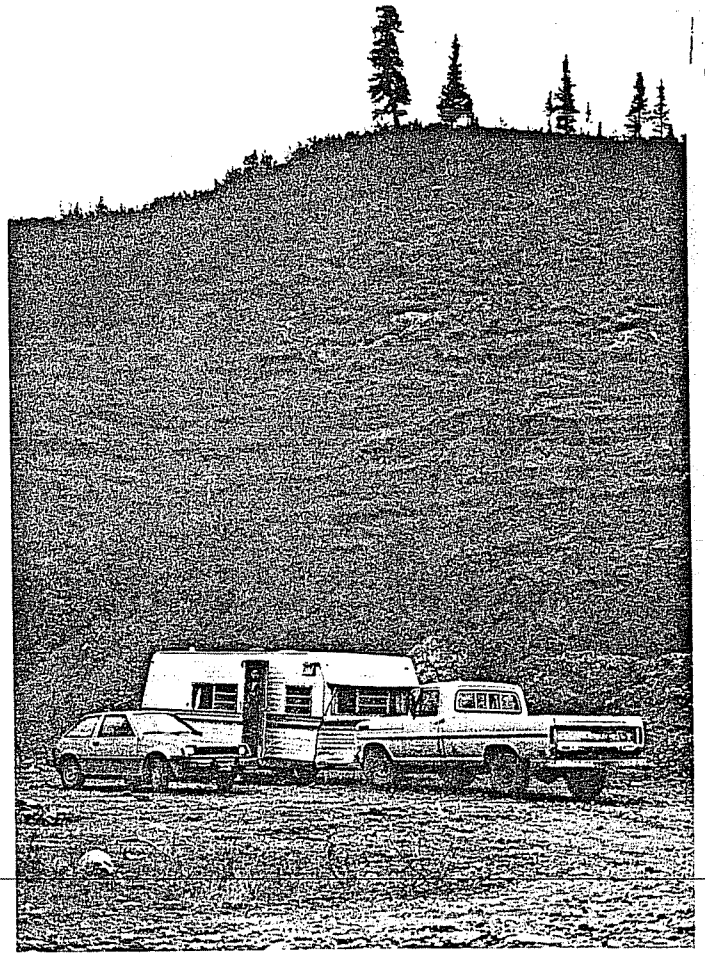


PHOTO E4.8.10: EXISTING BORROW PIT ALONG DENALI HIGHWAY. BORROW PITS ADJACENT TO PUBLIC ROADS ARE POPULAR CAMPSITES FOR HUNTERS, FISHERMEN, AND OTHER RECREATIONISTS BECAUSE THEY ARE RELATIVELY DRY AND BUG FREE

TRANSMISSION LINE CONDITIONS

PHOTO E4.8.11: EXISTING TRANSMISSION LINES NORTH SIDE OF COOK INLET-SUSITNA RIVER LOWLANDS. NOTE THE HIGH VISIBILITY OF THE ALUMINUM TONE TOWERS

PHOTO E43.8.12: EXISTING TRANSMISSION LINES NORTH SIDE OF COOK INLET - SUSITNA RIVER LOWLANDS. THIS CORRIDOR IS SIMILAR IN SIZE AND TOWER DESIGN TO THE DEVIL CANYON TO GOLD CREEK CORRIDOR. NOTE THE STRAIGHT ALIGNMENT AND RIGID VEGETATION EDGES

APPENDIX E5.8
EXAMPLES OF RESERVOIR EDGE CONDITIONS SIMILAR TO THOSE ANTICIPATED AT WATANA AND DEVIL CANYON DAMS

PHOTO E5.8.1: POTENTIAL RESERVOIR SLOPE/EDGE CONDITION (WILLISTON RESERVOIR-BRITISH COLUMBIA)

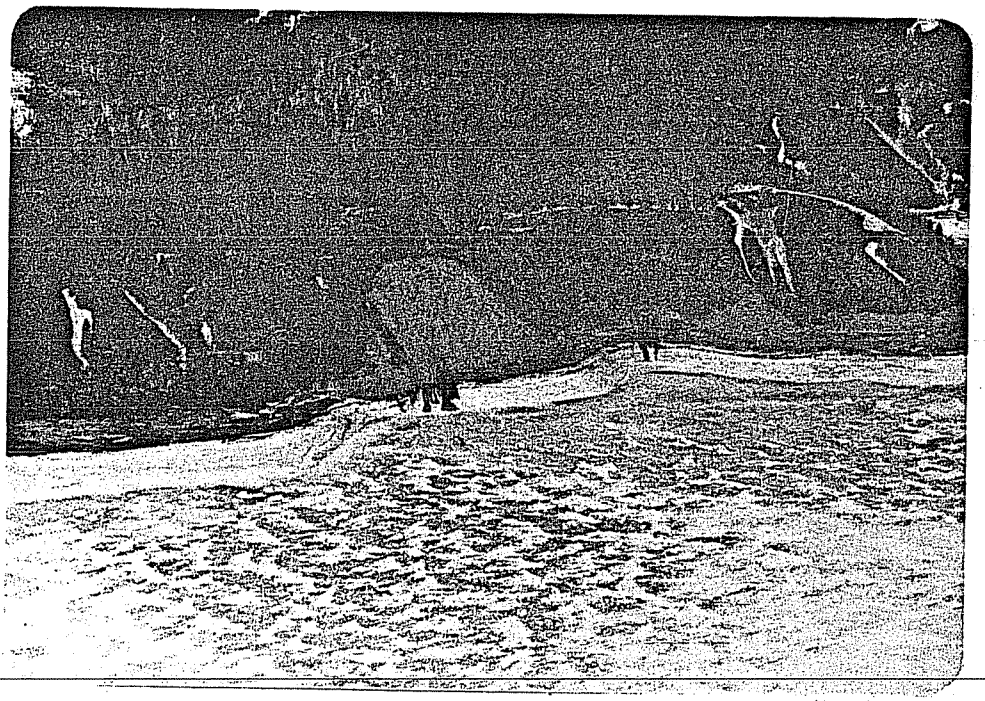
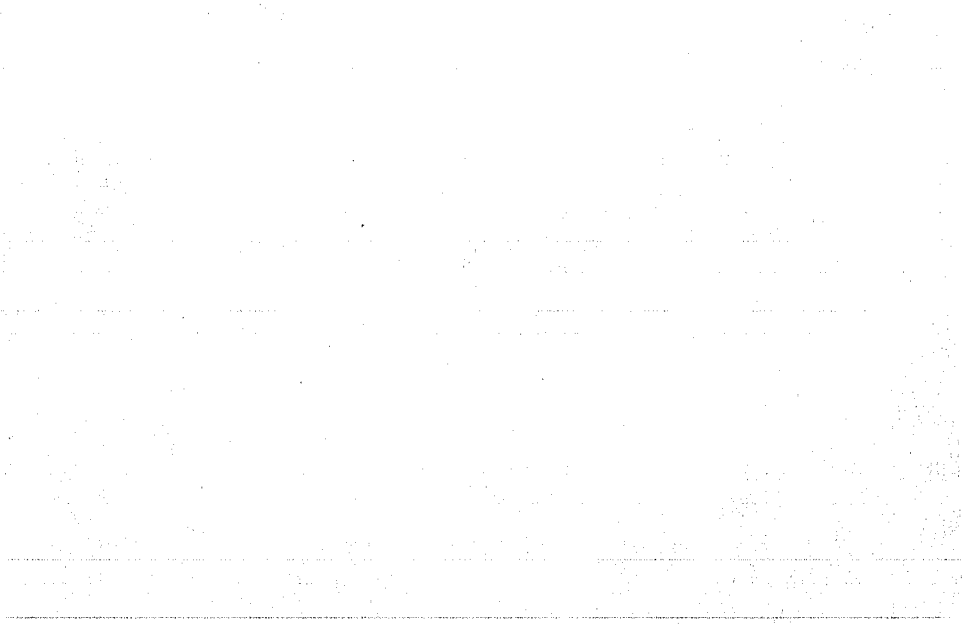
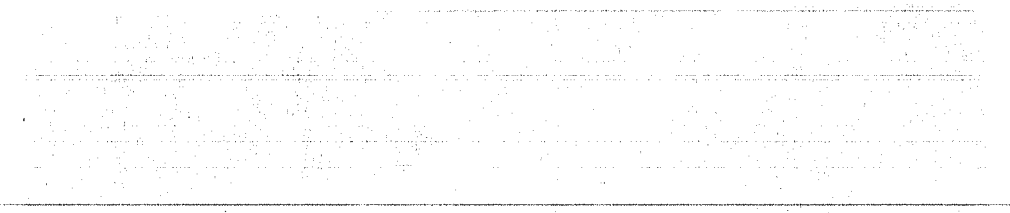
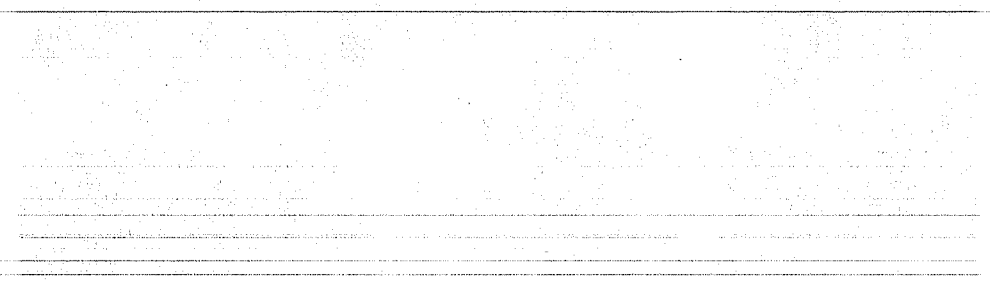


PHOTO E5.8.2: POTENTIAL RESERVOIR SLOPE/EDGE CONDITION (WILLISTON RESERVOIR-BRITISH COLUMBIA)







APPENDIX E6.8
PROJECT FEATURES
IMPACTS AND CHARTS

PROJECT FEATURES IMPACTS

PROJECT FEATURE

WATANA PROJECT AREA 1 - 9
1 WATANA DAM STAGE III

FEATURE DESCRIPTION

- Earth-fill dam.
- 885 ft (270 m) high.
- 4100-ft (1250 m) crest length.
- Rough textured rock surface similiar color tones as surrounding exposed rock.
- Will be one of the highest dams in the world.

FEATURE IMPACTS

- Massive scale and sloping dam face in harmony with existing land forms in the river valley.
- Rock color is consistant with exposed rock but not with soft texture and color of existing vegetation patterns.
- Horizontal form is consistent with the dominant horizontal character of reservoir.
- Construction activity will denude much of the surrounding land and disturb the soil.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

2 WATANA RESERVOIR

FEATURE DESCRIPTION

- Approximately 54 miles (90 km) in length and over 5 miles (8 km) wide at the confluence of Watana Creek.
- Surface area of 38,000 acres (15,200 ha).
- Maximum depth at normal operating level of 680 ft (205 m).
- Normal maximum operating elevation is 2185 ft (660 m) and a low of 2065 ft (625 m) in April or May -- drawdown of 120 ft (35 m).
- All timber will be cleared in the reservoir area and will probably be burned.
- Drawdown will create extensive mud flat areas up to over 1 mi (1.6 km) in width at maximum drawdown.
- Extensive slumping, scaling and landsliding is expected along steep side slopes, possibly extending hundreds of feet up sidewalls, when reservoir is filled. Will continue until angle of repose is reached.
- In winter, ice shelves will form along the shoreline.
- The impoundment will inundate small to significant portions of 7 major tributaries, 2 waterfalls, and a large amount of Vee Canyon.

FEATURE IMPACTS

- The reservoir will replace the highly rated existing landscape character by covering much of the valley landform.
- As a result of extensive erosion and regular exposure of large mud flats during annual drawdown, the visual quality of this new reservoir landscape will be low.
- Additional impacts include the loss of 4 outstanding natural features: Vee Canyon, Tsusena Creek Falls, Deadman Creek Falls and Watana Creek Falls.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)
River Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

3 WATANA MAIN SPILLWAY

FEATURE DESCRIPTION

- Concrete sloping channel 2000 ft (600 m) long and 100 ft (30 m) wide varies.
- 30 ft (9 m) deep.
- As engineered will require rock cuts up to and over 100 ft (30 m) deep on river valley slope. Cut side slopes are 4 ft (1.2 m) vertical to 1 ft (0.3 m) horizontal.

FEATURE IMPACTS

- Long straight concrete chute will be visible by Watana workers and visitors as they cross the access road bridge.
- Extensive rock cuts and grading is inconsistent with the natural landforms and vegetated slopes.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

5 WATANA POWERHOUSE ACCESS ROAD AND TAILRACE TUNNEL ACCESS ROAD

FEATURE DESCRIPTION

Powerhouse Road

- Gravel road of ±24 ft (7.3 m) wide and over 1.5 miles (2.5 km) long. Several hairpin turns as it traverses down 400 ft (120 m) in elevation on the river's south slope before it continues down and across the dam face.
- Significant cuts will be required to place the road on these steep slopes.

Tailrace Tunnel Road

- Gravel road of ±24 ft (7.3 m) in width and over 1 mile (1.6 km) in length.
- Traverses down the south river slope some 500 ft (150 m) in elevation. Several hairpin turns.
- Significant cuts will be required to build the road on these steep slopes.

FEATURE IMPACTS

- The primary impact of these roads will be the extensive vegetation clearing and rock cutting required for construction on such a steep bank. This will leave large scars which are highly visible from the dam site.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

7 WATANA DAM BORROW SITES

FEATURE DESCRIPTION

- Material for Watana Dam.
- Extracted by draglines in the river; blasted in other areas.
- Existing islands and several miles of the low north river terrace below the damsite are designated as borrow sites.
- A borrow site of approximately 640 acres (256 ha) is located on the high north terrace adjacent to Deadman Creek.

FEATURE IMPACTS

- Riverine borrow sites will be located at the mouth of Tsusena Creek and will be in full view of the dam area. Exposed rock and rigid angular forms will be out of character with the soft flowing forms of the river valley.
- Borrow sites designated upstream of the dam may affect the shoreline by creating rigid angular shores.
- Borrow limits shown, leave no buffer between excavation activities and the construction camp.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)
Wet Upland Tundra	7 (B/L)
Susitna Upland Terrace	7 (B/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

8 WATANA PERMANENT TOWN

FEATURE DESCRIPTION

- Town Center - approximately 20 buildings.
- Road - perimeter.
- Supports 304 people of which 92 will operate both dams and facilities.
- Dwelling Units (125).
- Hospital.
- Water and Sewage Treatment Plants.

FEATURE IMPACTS

- Town siting is inconsistant with existing physical environment.
- Permanent dwellers will have to access village through the old construction townsite which will continue to be a blighted area even after removal of structures and site facilities.
- Town will most likely be visible from the access road depending on the final layout of the road.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

9 WATANA TEMPORARY CONSTRUCTION CAMP & VILLAGE

FEATURE DESCRIPTION

Camp

- Covers an area of approximately 150 acres (60 ha).
- Over 100 structures
  - + dormatories
  - + recreation facilities
  - + hospital
  - + service buildings
  - + administration buildings, etc.
- Ball fields (3).
- Sewage treatment plant and landfill.
- Will support 3480 people for approximately 8 yr.
- Roads
- Fenced

Village

- Covers an area of approximately 150 acres (60 ha).
- Multi-family and single family status.
- Supports 1120 people for approximately 8 yr
- Variety of structures including
  - + dwelling units
  - + school
  - + service
  - + recreation center
  - + gymnasium
  - + managing offices
  - + general store, etc.
- Roads
- Fenced

FEATURE IMPACTS

- These facilities will be removed after construction is complete, therefore the physical design is not a long term issue, but rehabilitation must occur.
- Impacts will result from facility removal, the visual scar created by invegetated mud and ponds created by soil compaction.
- This scarring is most significant on the village site because permanent town residents will travel through the site and will live adjacent to it.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

DEVIL CANYON PROJECT AREA (1-9)
1 DEVIL CANYON CONCRETE ARCH DAM

FEATURE DESCRIPTION

- Arch dam will be double curved with a maximum height of 645 ft (195 m), spans approximately 1300 ft (394 m) across lower Devil Canyon.

FEATURE IMPACTS

- Dramatic concrete form and massive scale will create a positive contrast to the equally dramatic natural setting of Devil Canyon.
- Arch down design embraces rock outcrops and canyon enclosure.
- The river channel will be dry for approximately 0.66 miles (1.1 km) below the damsite which includes the present Devil Canyon rapids.
- Surrounding construction areas will create large areas of disturbed land.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	
Devil Canyon	9 (A/L)	

PROJECT FEATURES IMPACTS

PROJECT FEATURE

2 DEVIL CANYON SADDLE DAM
(Adjacent to Arch Dam)

FEATURE DESCRIPTION

- Earth-fill.
- Saddle dam is an extension of the arch dam. Same crest elevation and approximately 1000 ft (300 m) long. Rough (consistent) textured rock surface.

FEATURE IMPACTS

- Massive scale and form of saddle dam will dominate the small scale plateau landscape.
- Its rough texture and earth tones will be a stark contrast to the surrounding vegetated land and small ponds.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

3 DEVIL CANYON RESERVOIR

FEATURE DESCRIPTION

- Approximately 32 miles (53 km) long (backs up almost to Watana Dam) and its broadest point is near the dam.
- The reservoir will inundate most of the World Class whitewater through the canyon.
- Surface area of 7800 acres (3120 ha).
- Maximum depth at normal operating level of 550 ft (167 m).
- Normal maximum operating elevation of 1455 ft (440 m) for most of the year. Low of 1405 ft (425 m) in August or September [drawdown of 50 ft (15 m)].
- All timber in the reservoir impoundment area will be cleared and probably burned.
- Exposed areas due to drawdown will coincide with heaviest visitor season.
- The impoundment will inundate a few major tributary canyons. Devil Creek Falls will not be covered.

FEATURE IMPACTS

- Aesthetic impacts are similiar to Watana reservoir.
- The new lake will replace a highly dramatic river canyon.
- Regular drawdown will occur exposing mud slopes and sheer rock walls.
- The outstanding natural features of Devil Canyon and Devil Canyon Rapids will be lost.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Devil Canyon	9 (A/L)
Susitna River	8 (A/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

4 DEVIL CANYON MAIN SPILLWAY

FEATURE DESCRIPTION

- Steeply sloping concrete channel over 1000 ft (300 m) long with a tapered width no less than 75 ft (22.7 m). Channel depth of approximately 25 ft (7.5 m).
- As engineered, will require cuts up to and over 100 ft (30 m) deep on the north river slope. Cut side slopes are 4 ft (1.2 m) vertical to 1 ft (0.3 m) horizontal.

FEATURE IMPACTS

The spillway and associated rock cuts will dominate the north bank of the damsite. Exceedingly steep terrain is visually exposed to the proposed visitor center on the south side of the canyon.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

6 DEVIL CANYON POWERHOUSE TUNNEL
ACCESS ROAD

FEATURE DESCRIPTION

- Gravel road ±24 ft (7.3 m) in width and over 2.5 miles (4 km) long from the switchyard to tunnel entrance.
- Makes 3 hairpin turns as it traverses down the north slope some 800 ft (242 m) in elevation.
- Significant cuts will be required to build the road on these steep slopes.

FEATURE IMPACTS

- Extensive cutting will leave large scar on the canyon wall in full view of access road users.
- This landscape character type has very little ability to absorb this feature without substantial design alteration.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

8 DEVIL CANYON TWO 345-kV TRANSMISSION LINES -
Adjacent to and parallel to the two 345-kV lines from the Watana phase

FEATURE DESCRIPTION

- See Watana Project Area description of transmission lines.
- Increases right-of-way width to 500 ft (150 m).

FEATURE IMPACTS

- Transmission lines in the dam area will be quite apparent from primary use areas.
- Both lines and towers will be silhouetted against the skyline.
- Cleared corridors through densely wooded areas will be highly visible from the air.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Chulitna Moist Tundra Uplands	8 (A/M)
Talkeetna Uplands	7 (B/L)
Mid Susitna River Valley	5 (B/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

9 DEVIL CANYON TEMPORARY CONSTRUCTION VILLAGE & CAMP

FEATURE DESCRIPTION

Village

- Covers an area of approximately 100 acres (40 ha).
- Multi-family and single family status.
- Supports 550 people for approximately 10 years.
- Structures include
  - + 320 housing units
  - + school
  - + gymnasium
  - + recreation center
  - + store, etc.
- Roads
- Fenced
- Landfill

Camp

- Covers an area of approximately 100 acres (40 ha).
- Approximately 75 structures including
  - + dormitories
  - + hospital
  - + warehouse
  - + recreation hall and facilities
  - + water treatment plant and reservoir.
- Roads and covered walkways.
- Supports 1,780 workers for approximately 10 yr.
- Sewage treatment plant.
- Fenced

FEATURE IMPACTS

- Both temporary sites are located on a flat wetlands terrace which are surrounded by mixed forests.
- Intense human activity and vehicle movement will cause these wetlands to deteriorate.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Mid Susitna River Valley	5 (B/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

10 SWITCHYARD AT GOLD CREEK INTERTIE

FEATURE DESCRIPTION

- Termination point for the Watana phase transmission lines and also the 2 additional lines from Devil Canyon at a later date.
- Miscellaneous electrical equipment.
- Located approximately 75 ft (22.7 m) above the Susitna River on the south bank terrace north of Gold Creek.

FEATURE IMPACTS

- Facility site is well situated in LCT to minimize intrusion.
- No major views of this facility are anticipated.
- Surrounding heavy forest blends well with form and texture of equipment and will screen the facility.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Mid Susitna River Valley	5 (B/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

11 RAILROAD SPUR FROM GOLD CREEK TO DEVIL CANYON

FEATURE DESCRIPTION

- Approximately 14 miles (23 km) in length.
- Minimum disturbed section width of 31 ft (9.3 m).
- Primary purpose of operation is hauling materials and equipment for the construction of Devil Canyon Dam.
- Railhead facility at Gold Creek and Devil Canyon construction camp. Requires a space of approximately 600 ft (180 m) by 3000 ft (900 m). Includes:
  - engine turnaround
  - fuel storage
  - loading docks
  - workshop, stores and management office.
- Will require extensive cut and fill to construct railroad bed at 2 percent maximum slope.

FEATURE IMPACTS

- Railroad alignment impacts views from the Susitna River.
- Large cut and fills will contrast natural forest color and texture as the rolling landforms on river terraces.
- Railroad bed will create disruption of wildlife habitats.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Mid Susitna River Valley	5 (B/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

WATANA ACCESS ROAD - DENALI HIGHWAY TO WATANA DAM

FEATURE DESCRIPTION

- Gravel road of approximately 40 miles (67 km) in length.
- 24 ft (7.3 m) wide, 44 ft (13.3 m) minimum disturbed section.
- Significant cut and fill will be required to construct road on the variety of landscape and terrain conditions
  - + wet bog areas
  - + permafrost
  - + steep slopes
  - + creek and ravine crossings
- Will serve as an access road for construction of Watana Dam and will not be open to the public until dam completion (1993).
- Long-term use of road will be for recreationists and project operators.
- Several recreational developments will have small parking areas for 3-5 cars.

FEATURE IMPACTS

- Road section and alignment criteria for assigned design speed generates large cut and fill sections.
- Revegetation will be difficult on steep proposed slope gradients for drainage ditches. These steep slopes also will have erosion problems which reduce the aesthetic site value. The design speed is too fast for a scenic designation for a road.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)
Chulitna Mountains	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

BORROW SITES - Material for Construction of Watana Access Road

FEATURE DESCRIPTION

- Rock/gravel extraction areas for road material.
- Large pits in selected locations adjacent to the proposed road.
- Upland sources of rock material may also be chosen. May require temporary roads for extraction.

FEATURE IMPACTS

- Large pits near roads will be visually disruptive and are often located in primary view corridors. Access roads to upland or distant sites will also impact views. Borrow sites alongside roads will parallel the road alignment and be more compatible to existing landforms once natural revegetation occurs.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)
Chulitna Mountains	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

WATANA TO DEVIL CANYON ACCESS ROAD

FEATURE DESCRIPTION

- Constructed after the completion of Watana Dam (1993).
- Gravel road of approximately 34 miles (56 km) in length.
- 24 ft (7.3 m) wide - 44 ft (13.3 m) minimum disturbed section.
- Significant cut and fill will be required to construct road on the variety of landscape and terrain conditions.
  - + wet bag areas
  - + permafrost
  - + steep slopes
  - + significant river and ravine crossings.
- Will have several small recreational small parking areas for 3-5 cars.

FEATURE IMPACTS

- Major impacts result from cut and fill work required for road construction in steep areas.
- Height of road profile has been minimized to reduce visual instrusion.
- Roadside borrow trenches are designed to be revegetated and will be graded to fit character of existing landforms. Alignment and road section design criteria for assigned design speed creates awkward relationship to the existing landscape.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)
Chulitna Moist Tundra Uplands	8 (A/M)
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

BORROW SITES - Material for Construction of Watana to Devil Canyon Access Road

FEATURE DESCRIPTION

- Rock/gravel extraction areas for road material.
- Large pits in selected locations adjacent to the proposed road.
- Upland sources of rock material may also be chosen. May require temporary roads for extraction.

FEATURE IMPACTS

- Potential impacts include views from road to the borrow sites, which in some cases will be filled with water and in others will appear as a unvegetated scar.
- Borrow pit sites are located in landscapes which have little ability to absorb these intrusions as presently planned.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Wet Upland Tundra	7 (B/L)
Chulitna Moist Tundra Uplands	8 (A/M)
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

HIGH LEVEL BRIDGE OVER DEVIL CANYON BELOW DAM

FEATURE DESCRIPTION

- Steel suspension bridge approximately 2600 ft (785 m) in length and 600 ft (180 m) above the river bottom.
- The bridge, as engineered, is not horizontal. The south end is nearly 100 ft (30 m) higher in elevation than the north end.
- Primary purpose is to aid in construction of Devil Canyon dam.
- Shallow curved suspension.

FEATURE IMPACTS

- Bridge does not offer significant views of Devil Canyon Dam.
- Form of structure does not take advantage of the dramatic Devil Canyon environment.
- Bridge approaches may require extensive grading and disruption.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Devil Canyon	9 (A/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

ANCHORAGE TO WILLOW TRANSMISSION STUB LINE

FEATURE DESCRIPTION

- Two 345-kV transmission lines after completion of Watana Dam. An additional 345-kV line will be constructed with the completion of Devil Canyon Dam.
- 63 miles (105 km) in length.
- See feature description of transmission lines for Watana Project Area for detail.

FEATURE IMPACTS

- Seldom in view of any roadways, these lines are quite distant from major ground activity.
- Major impacts will be from the air as travellers view the long cleared corridors.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Anchorage, Alaska	1 (C/H)
Susitna River Lowlands	1 (C/H)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

TWO 345-kV TRANSMISSION LINES

FEATURE DESCRIPTION

- Towers are guyed steel pole "x" structures (CORTEN)
  + 100 ft (30 m) high to structure top, 85 ft (25.7 m) to cross beam and 45 ft (13.6 m) at the base
  + 3 single circuit conductors per transmission line for a total of 6 nonspecular conductors.
- Right-of-way width of 300 ft (90 m) vegetation will be cut to 6 in (15 cm) in height areas between will be trimmed to 10 in (25 cm) high.
- Additional towers include:
  + single steel pole angle structure, also 100 ft (30 m) high. Generally one pole per conductor.
  + single steel pole structure for slopes 30 percent or more. Three conductors per pole.
- 30 percent slope structures are typically 116.5 ft (35.3 m) high.
- Typical distance between towers is 1300 ft (394 m) with 115 ft (34.8 m) between adjacent towers.
- Foundations for all structures, except hill side single poles, will consist of steel piling or rock anchored concrete pedestals, base width is 45 ft (13.6 m).
- Single pole structure will have a foundation pedestal anchored to rock or a concrete cylinder approximately 6 ft (1.8 m) in diameter and 25 ft (7.5 m) deep in other soils.
- Rough construction and maintenance trails will run along the R.O.W. at various points.
- Right-of-way clearing.
- Towers and conductors have been signed to minimize glare impacts.

FEATURE IMPACTS

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Mid Susitna River Valley	5 (B/M)
Devil Canyon	9 (A/L)
Susitna River	8 (A/M)
Chulitna Moist Tundra Uplands	8 (A/M)
Talkeetna Uplands	7 (B/L)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

HEALY TO FAIRBANKS TRANSMISSION STUB LINE

FEATURE DESCRIPTION

- Two 345-kV transmission lines after completion of Watana Dam.
- 98 miles (163 m) in length.
- See feature description of transmission lines for Watana Project Area for detail.

FEATURE IMPACTS

- Transmission lines will be quite apparent through the Nenana Uplands.
- Transmission lines will not be seen from the major travel route in Nenana Lowlands, except at crossings and when paralleling the road near Healy.
- Transmission lines will be apparent through the forested Tenana Ridge landscape.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Nenana Uplands	5 (B/M)
Nenana River Lowlands	1 (C/H)
Tanana Ridge	7 (B/L)

(B,D,D)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

1 RECREATION FACILITIES AND FEATURES
WATANA DAM VISITOR CENTER

FEATURE DESCRIPTION

- Exhibit building with food service, souvenir shop, museum, restrooms and tour facility.
- Indigenous botanical garden.
- Parking for 20 cars.
- Located above the dam on the south side of the river.

FEATURE IMPACTS

All proposed facilities are to be part of the design character of the damsite.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING
Susitna River	8 (A/M)

PROJECT FEATURES IMPACTS

PROJECT FEATURE

2 DEVIL CANYON DAM VISITOR CENTER

FEATURE DESCRIPTION

. Located above the dam on the south side of the river.
. See Watana visitor center description above. No botanical garden.

FEATURE IMPACTS

All proposed facilities are to be designed as part of the design character of the damsite and the existing landscape character.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	
Chulitna Moist Tundra Uplands	8 (A/M)	

APPENDIX E7.8
GENERAL AESTHETIC MITIGATION MEASURES APPLICABLE TO THE PROPOSED PROJECT

EXHIBIT E - CHAPTER 8
APPENDIX E7.8
AESTHETIC MITIGATION MEASURES

1 - TRANSMISSION LINE ROUTING

- Rights-of-Way (ROW's) should avoid sites of high visibility such as prominent ridges lakes and stream. They should avoid heavily timbered areas, steep slopes and proximity to main roads where possible.

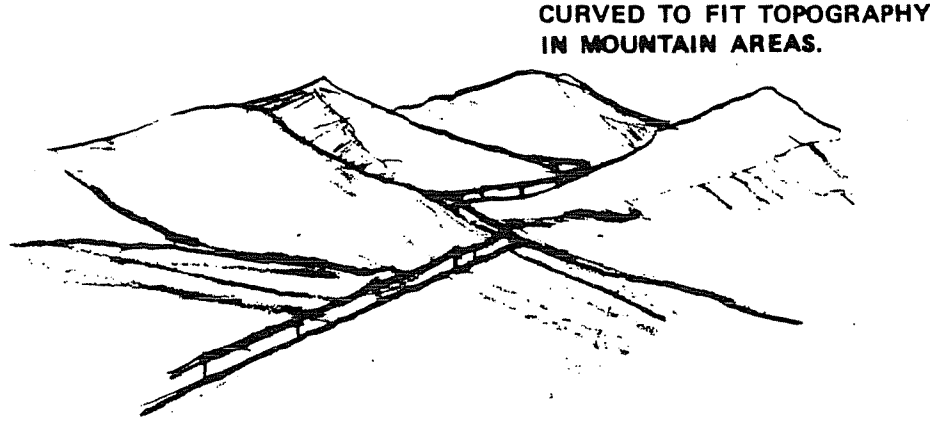
- Transmission ROW's should avoid paralleling rivers and streams since these are heavily used wildlife corridors.

- Select a route that will maximize the use of natural screens to remove transmission facilities from view.

- Unobtrusive sites should be selected where possible for the location of substations and like facilities.

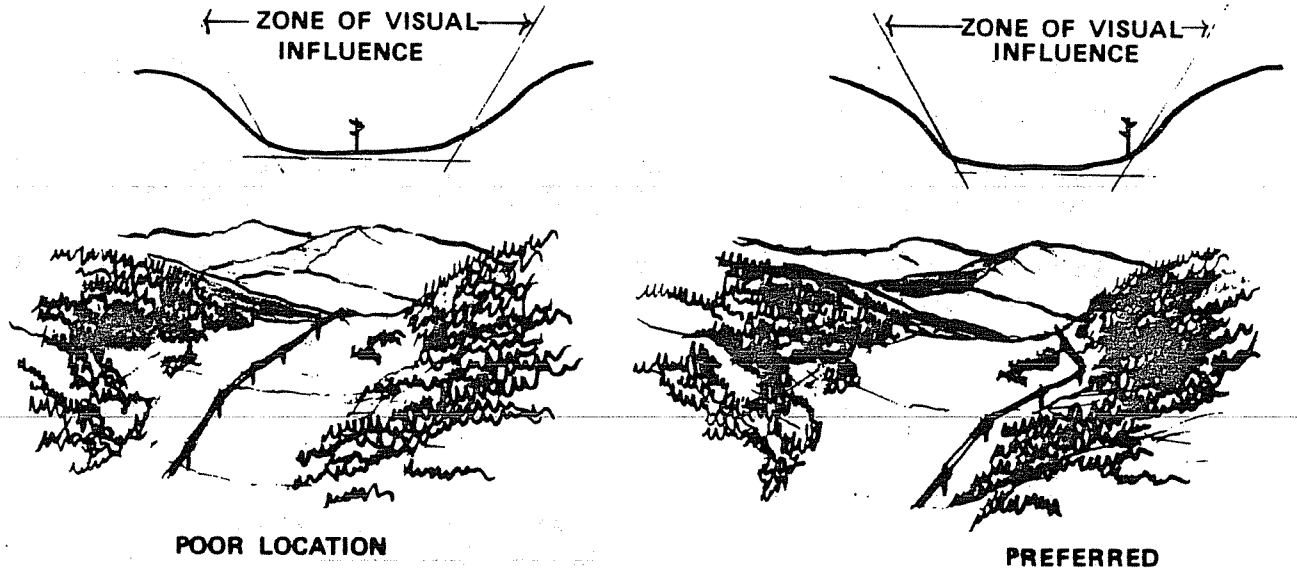
- The joint use of ROW's with other types of utilities should be coordinated in a common corridor wherever uses are compatible.

- In rough or very hilly country, change the alignment continuously in keeping with the scale of topographic change.

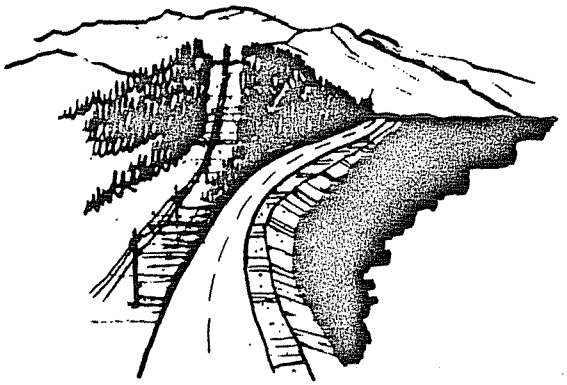


- Avoid alignments which result in long views of transmission lines parallel to highways. Locate transmission alignments at sufficient distance from the highway that intervening vertical elements will interrupt the view down the transmission lines.

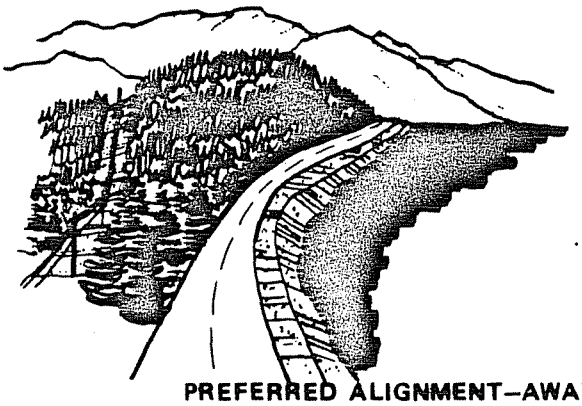
- Locate transmission alignments along natural linear features such as the bottom of a ridge, valley or cliff, or along the edges of muskeg openings, instead of centering down the middle. A center alignment focuses attention on the utility, while there is minimum visual disturbance if the alignment follows the edge of landform change. The background vegetation and topography of the slope serve as an effective visual screen, since lines and poles blend against their texture.



- ROW's should not across hills and other high points at the crests or perpendicular to the contours. Where ridges are adjacent to highways, the ROW should be places beyond the ridge or downslope so that facilities are not silhouetted against the sky and tunnel effects are avoided.

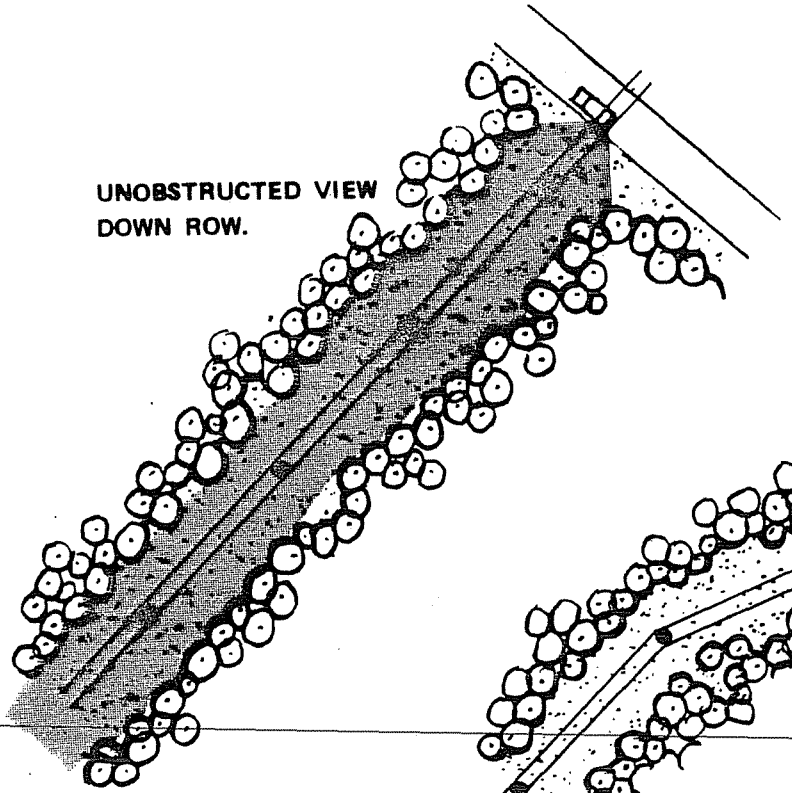


ALIGNMENT ON CREST
CREATES A STRONG VISUAL IMPACT.

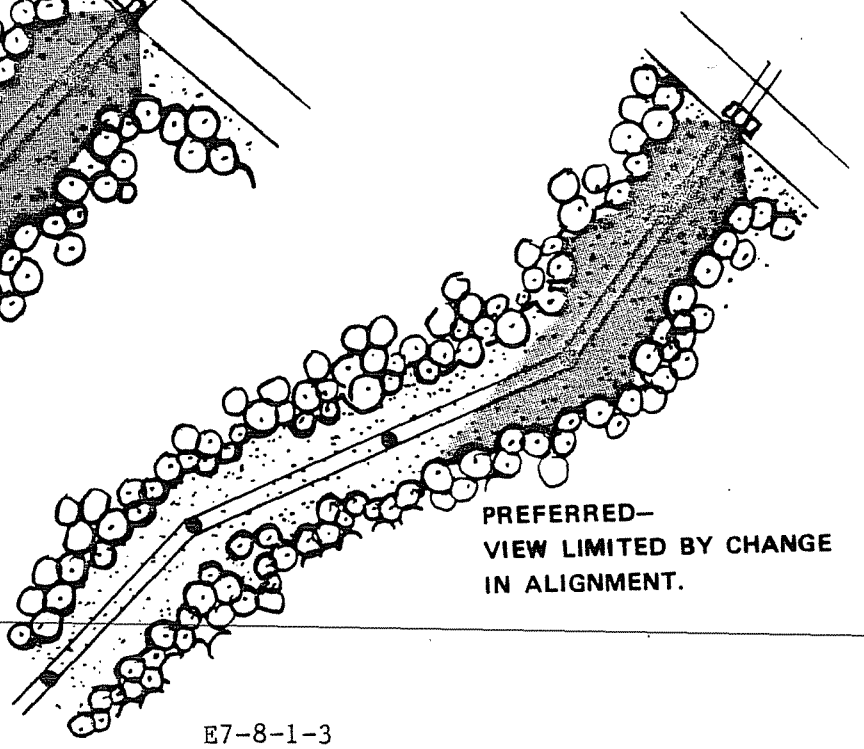


PREFERRED ALIGNMENT–AWAY
FROM THE CREST AND LAKE.

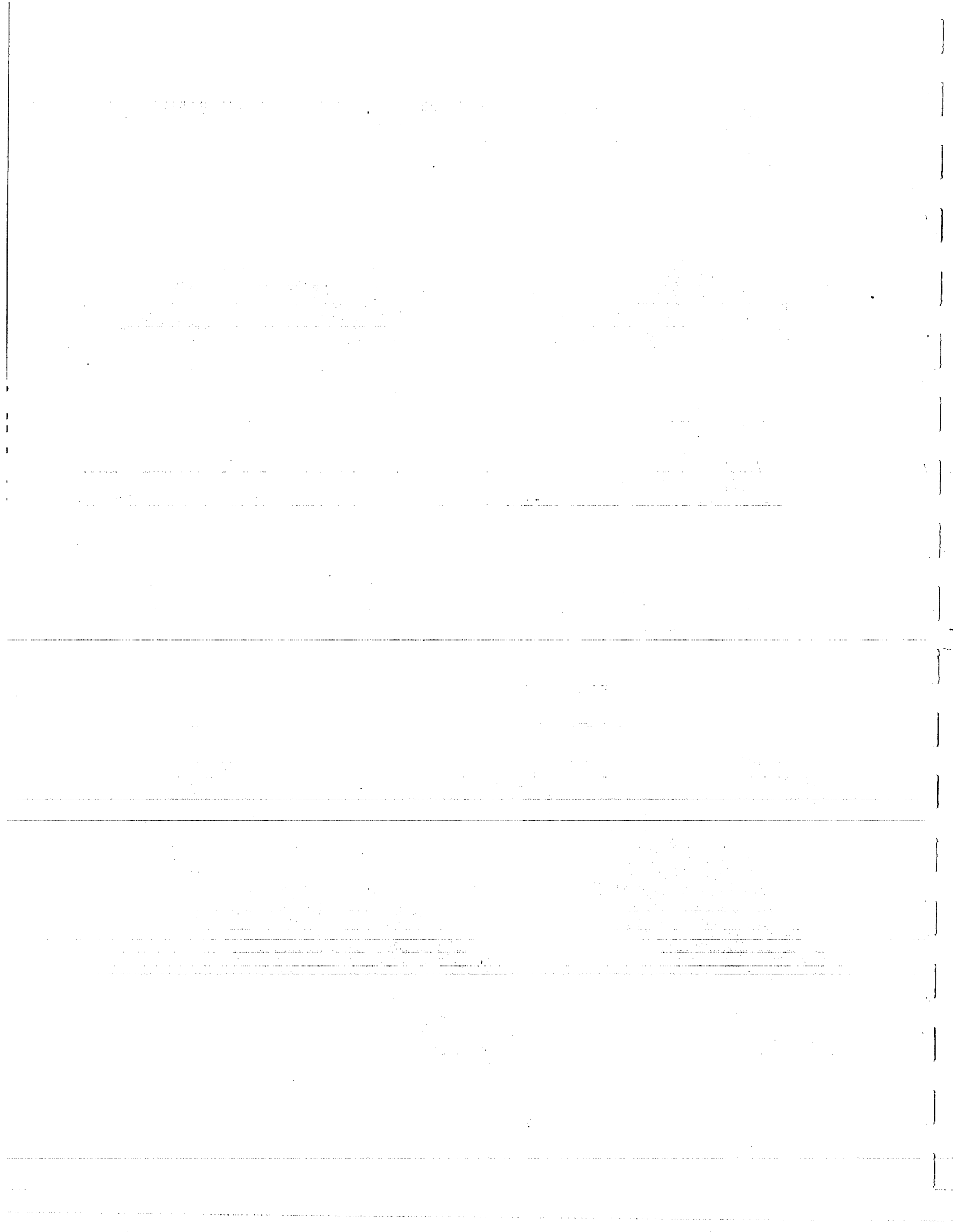
- ROW's through forest areas should be deflected and follow irregular patterns. This will prevent the rights-of-way from appearing as tunnels cut through the timber.



UNOBSTRUCTED VIEW
DOWN ROW.



PREFERRED–
VIEW LIMITED BY CHANGE
IN ALIGNMENT.



2 - TRANSMISSION LINE CONSTRUCTION

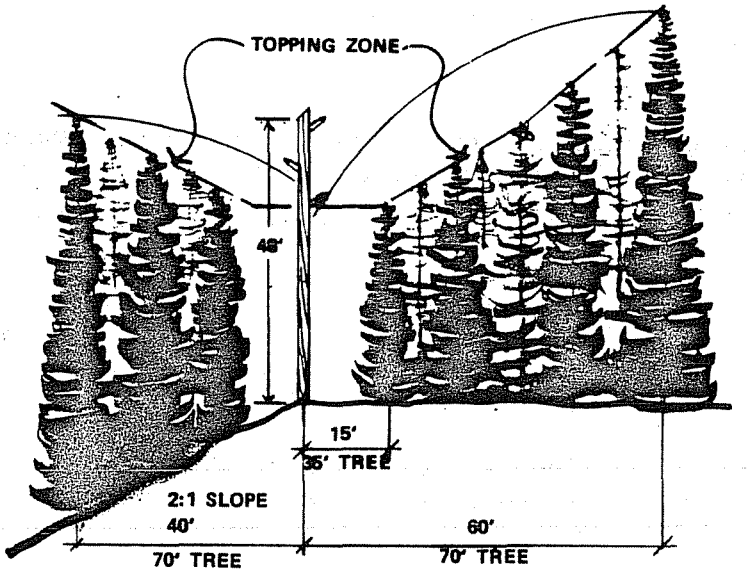
- Trees and other vegetation cleared from ROW's in areas of public view should be disposed of without undue delay. If trees and other vegetation are burned, local fire and air pollution regulations should be observed. Unsightly tree stumps which are adjacent to roads and other areas of public view should be cut close to the ground or removed.

- Clearing shall be performed in a manner which will maximize preservation of natural beauty, conservation of natural resources, and minimize marring and scarring of the landscape or silting of streams.

- Clearing and construction activities in the vicinity of streams should be performed in a manner to minimize as much as possible, damage to the natural condition of the area. Machine clearing should not be permitted within 100 feet of any stream bed.

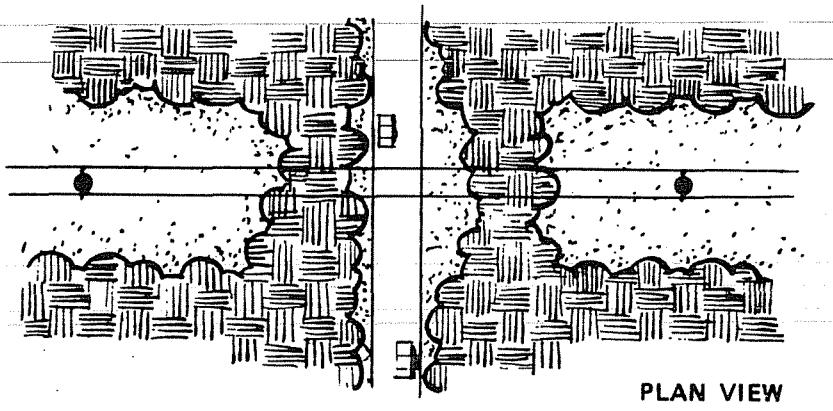
- The use of helicopter for the construction of ROW's should be considered on the steep slopes, where all-terrain vehicles cannot be used.

- Clearing of natural vegetation should be limited to that material which poses a hazard to the transmission line. On slopes, clearing should be limited on the downslope side in order to screen the upslope edge created by clearing. Selective thinning and topping should be done to remove danger trees.



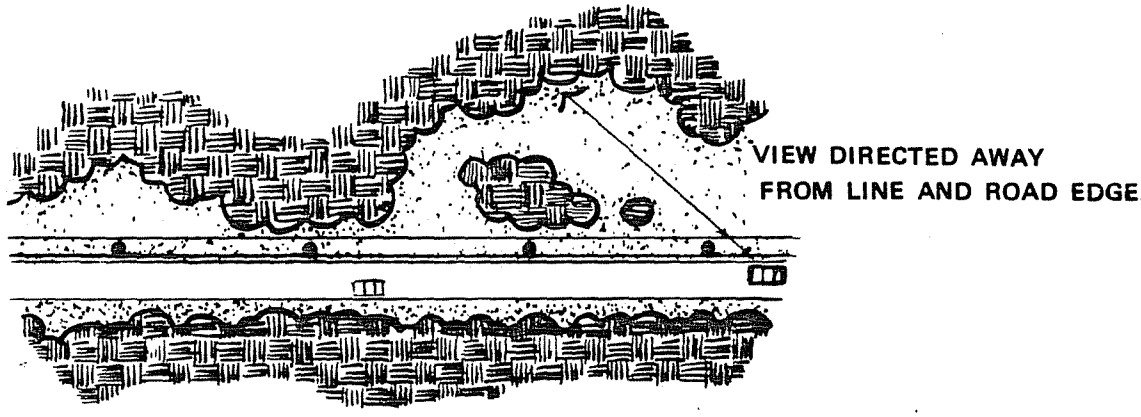
(Trees in old-growth areas may reach 150 feet, requiring the topping zone to be extended out)

- The angle at which transmission lines cross major roadways should be as near to perpendicular as possible to allow for maximum setback of line structures and minimum visibility from the roadway into the ROW on each side. Long spans should be used in order to preserve existing vegetation along the roadside. The same should be done where the ROW enters a wooded area from open land. Retention of existing material is preferable to replanting.



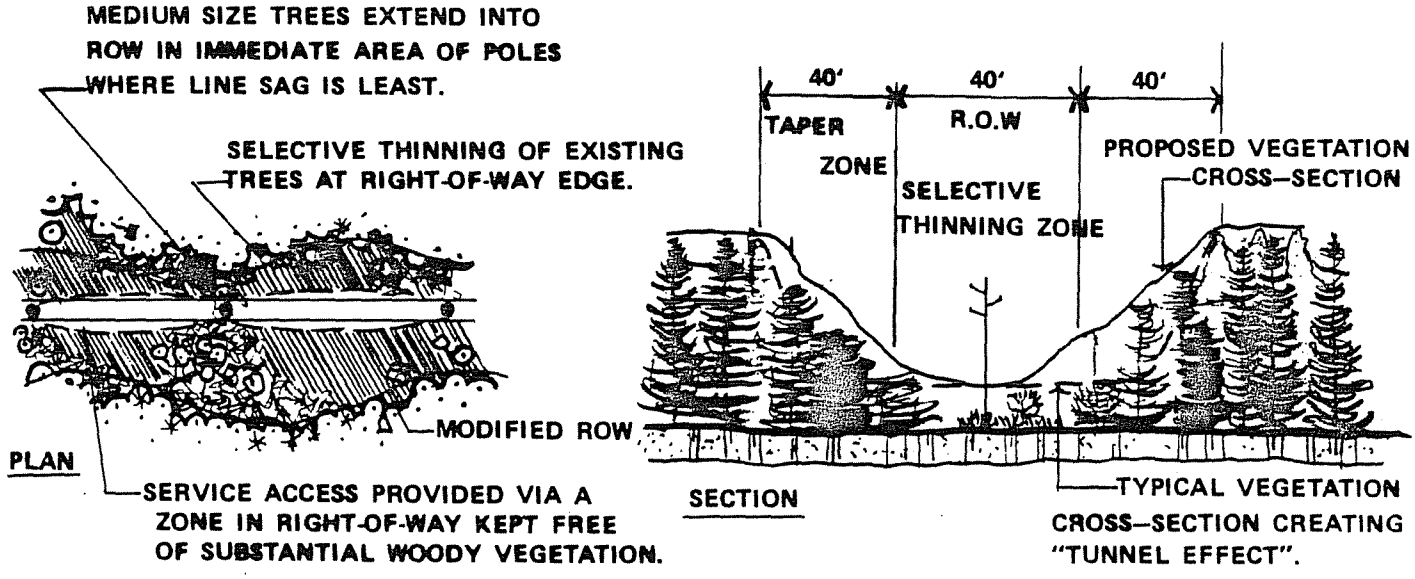
PLAN VIEW

o Where the transmission line must parallel the roadway, vary the ROW and create openings in the forest edge. This reduces the visual impact from the linear from of the transmission line, and ROW edge.

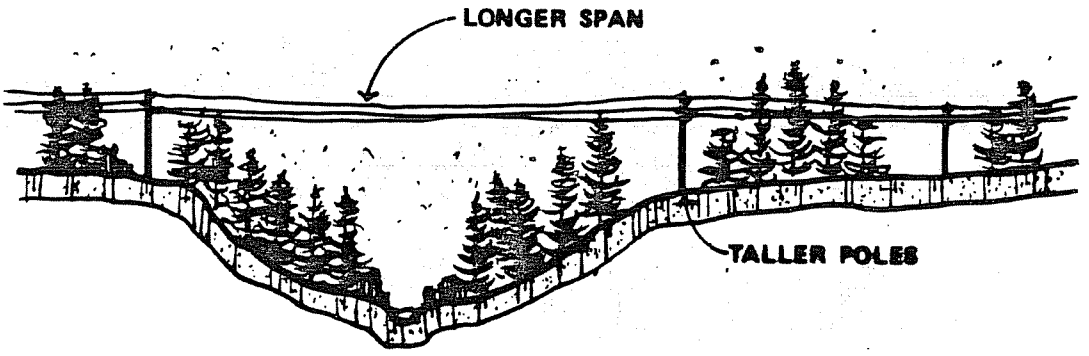


PLAN VIEW

o In locating transmission lines through wooded zones, preserve within the ROW as much vegetation as possible in order to reduce tunnel effect. Achieve a natural and random tapering down of forest edge through careful installation and selective thinning and topping to reduce the sheared-edge effect. The notched affect of a ROW cross section should be avoided.



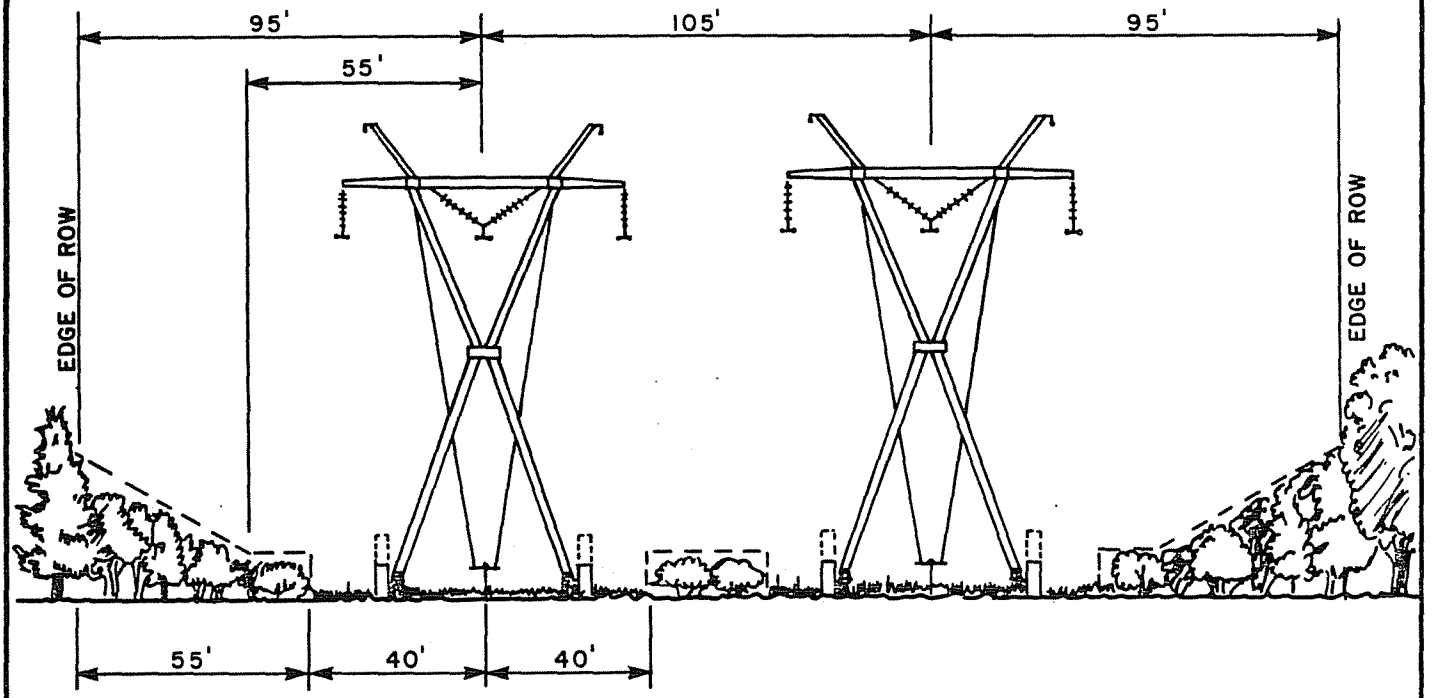
- If the transmission line must cross valleys, particularly stream corridors, the use of longer spans and taller poles should be considered in order to retain as much existing vegetation as possible and to reduce construction impacts to the slopes.



- Certain conductors can be highly reflective and produce a highly visible line across the landscape under the right light conditions. The visibility of the conductor from a distance can almost be eliminated by using a non-reflective or non-specular cable.

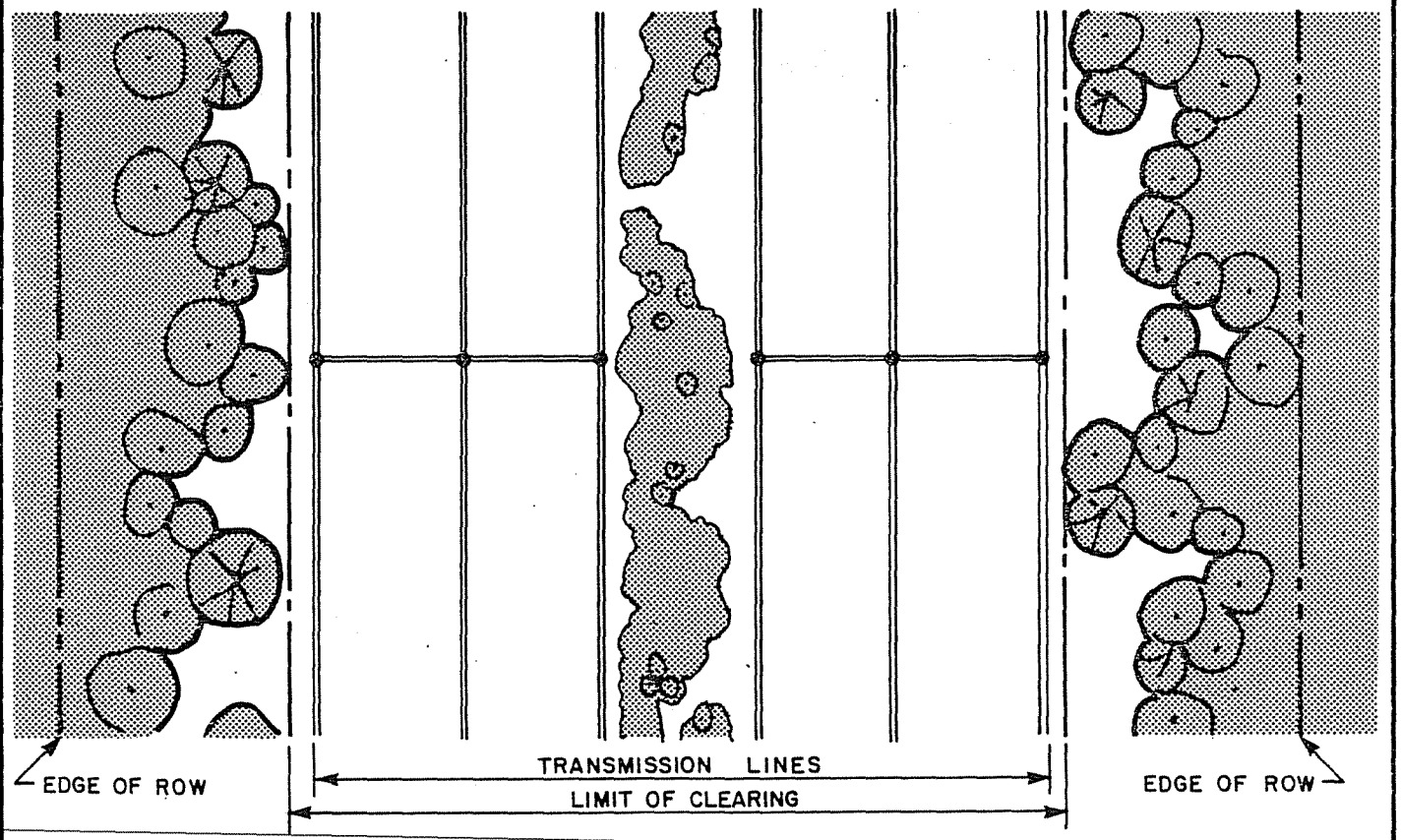
FIGURES

MINIMIZE SITE DISRUPTION FOR ROAD AND TOWER CONSTRUCTION



VEGETATION TO TEN FEET HIGH TO REMAIN EXCEPT AT MAINTENANCE ACCESS

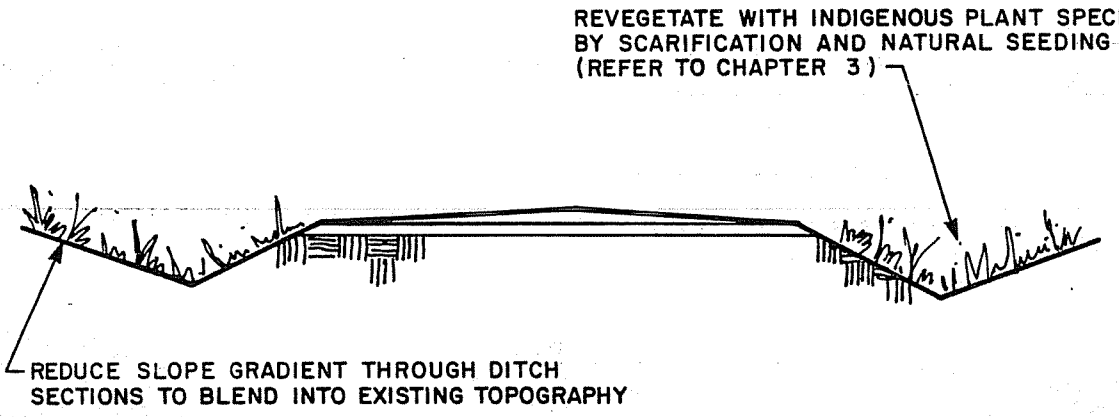
CREATE IRREGULAR NATURALISTIC EDGE TO MAJOR VEGETATION TYPES



CREATE IRREGULAR NATURALISTIC EDGE TO MAJOR VEGETATION TYPES

TYPICAL TRANSMISSION LINE CORRIDOR PLAN AND SECTION

FIGURE E7.8.1



TYPICAL ROAD SECTION

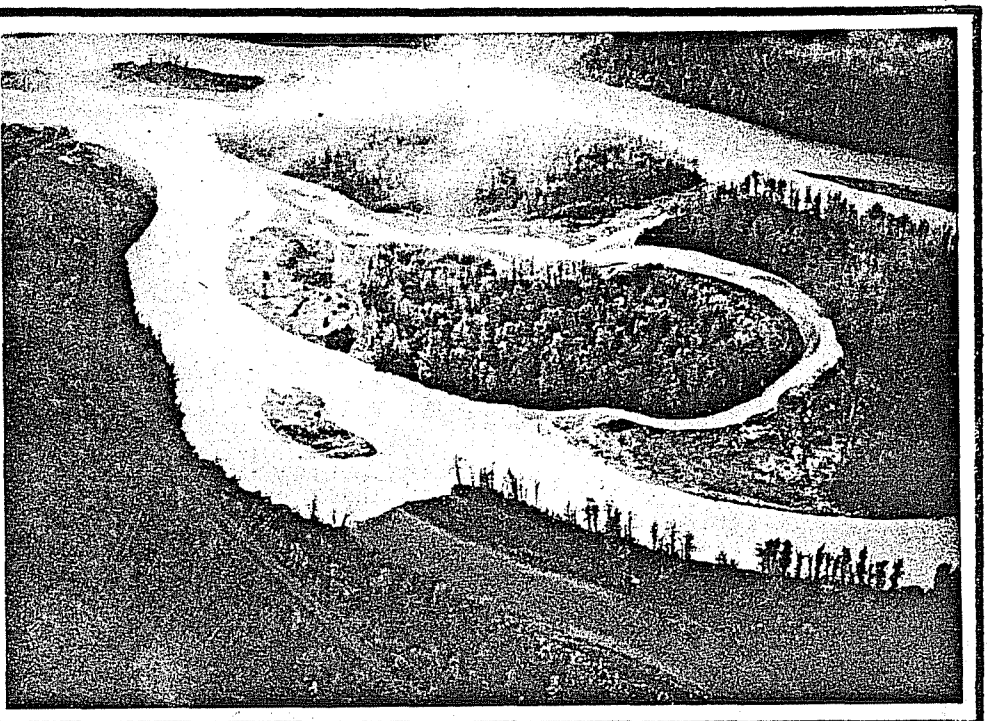
FIGURE E7.8.2

APPENDIX E8.8
LANDSCAPE CHARACTER TYPES OF THE PROJECT AREA

LANDSCAPE CHARACTER TYPE

MID SUSITNA RIVER VALLEY

PHOTO E8.8.1



LANDFORMS

- Valley is 2 to 6 miles (3 to 10 km) wide with steep slopes.
- Flat terraced land adjacent to Indian River near confluence with Susitna.

WATERFORMS

- Moderately braided and silt laiden river up to 1/2 mile (0.8 km) wide.
- Wetland areas are common adjacent to the flat terraced areas, as are islands, sandbars and cobbles.
- Gold Creek tributary to Susitna here has high aesthetic value - flows through narrow forested canyon.

VEGETATION

- Dense mixed forest of spruce and deciduous trees.
- Tundra and brush species only on steeper valley slopes.
- Spruce/green is most prominent color - small amount of yellow/gold fall color by deciduous trees and willows.
- Tundra cover provides good red/orange tones in the fall.

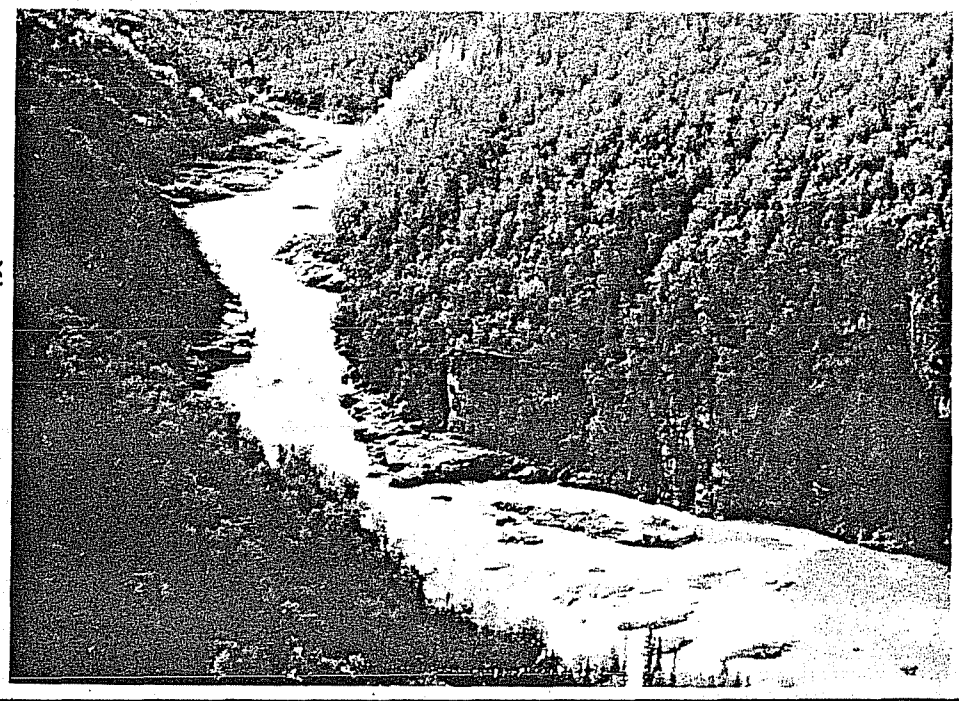
VIEWS

- Views are directed within the river channel, valley slopes and the commonly snow-capped Chulitna Mountains to the North.

LANDSCAPE CHARACTER TYPE

SUSITNA RIVER NEAR DEVIL CREEK

PHOTO E8.8.2



LANDFORMS

- Steep to vertical rock canyon walls - medium to dark brown colors for several miles - nearly 1000 feet (300 m) deep. Unstable environment.
- Deeply incised valley overall for over 20 miles (33 km).
- Giant rock shelves and angular boulders in river channel.
- The canyon is a significant Alaska natural feature.

WATERFORMS

- High volume and fixed channel river through a deep canyon.
- Contains an 11-mile (18-km) stretch of world class kayaking whitewater (Class VI).
- Portage, Cheechako and Devil creeks are all notable - steep to vertical canyoned tributaries.
- Devil Creek Falls are the most scenic falls in the basin.

1.*Devil Canyon Rapids
2.*Devil Creek Falls

VEGETATION

- Slopes are densely covered with a good mixture of spruce and deciduous trees - good fall color.
- Small pure stands of poplar species provide interesting tree patterns in the fall and winter.
- High color contrast with foamy gray water.

VIEWS

- Views are primarily restricted within the immediate canyon/valley.
- Views are dramatic in the vertical and near vertical rock canyon portions of the river.

LANDSCAPE CHARACTER TYPE

SUSITNA RIVER

PHOTO E8.8.3

LANDFORMS

- Broader valley - up to 4 miles (7 km) wide - in comparison with Devil Canyon area.
- Occasional dark colored rock outcrops or bluffs are found along the valley. Up river from Tsusena Creek on the northside is shear cliff of light colored rock, soil and cobble.
- The river bottom also has a low terrace before it steeply rises to the uplands.

WATERFORMS

- Mildly braided river with large islands of cobble and sand.
- Fog, Tsusena, Deadman, Watana, Kosina and Jay creeks are all significant and scenic tributaries to this portion of the Susitna. All have steep and narrow canyons near their confluences with the river.
- Tsusena, Deadman and Watana creeks all have notable falls.
- The tributaries' clear-water confluence with the silt-water river is of visual interest.

4.*Tsusena Creek Falls
6.*Deadman Creek Falls

VEGETATION

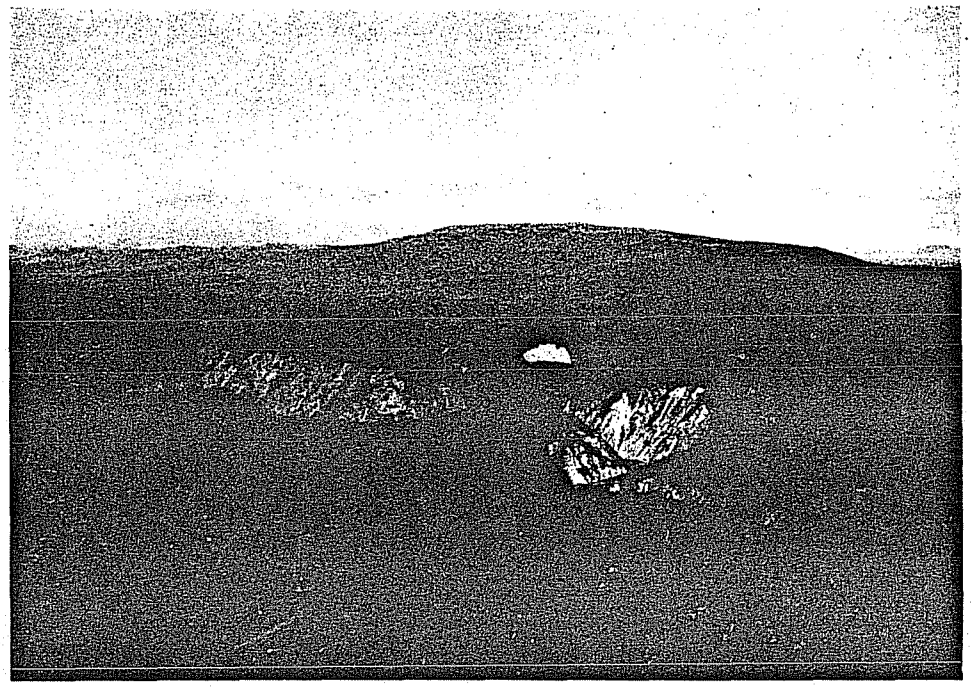
- Moderately dense to dense spruce-deciduous forest covers much of the river and tributary valleys. Good fall color.
- Willow and other shrub species are found along the river banks and terraces.

VIEWS

- The broader valley allows for more expanded views and although mostly river and valley oriented, views out of the valley are possible on the longer-straight portions of the river. High mountain tops can be seen.

LANDSCAPE CHARACTER TYPE

VEE CANYON
PHOTO E8.8.4



LANDFORMS

- Steep and meandering river valley.
- The 1/4 mile to 1 mile (0.4 to 1.6 km) wide valley rises up over 500 feet (150 m) from the river bottom.
- Vee Canyon displays a unique, very tight v-shaped rock feature in a double hairpin bend of the Susitna River. Colorful.
- Goose Creek, Oshetna River and other smaller tributary creeks have deep valleys themselves near their confluences with the river.

WATERFORMS

- The Susitna flows very fast here through a fixed channel.
- A well known stretch of rough whitewater occurs through Vee Canyon.
- Begins to meander several miles up river from Vee Canyon.
- Numerous islands and sandbars with gravel cobble edge.

13.*Vee Canyon

VEGETATION

- Tundra, brush and rock slopes dominate on the south side while moderately dense to sparse spruce forests cover the northside slopes and river bottom.

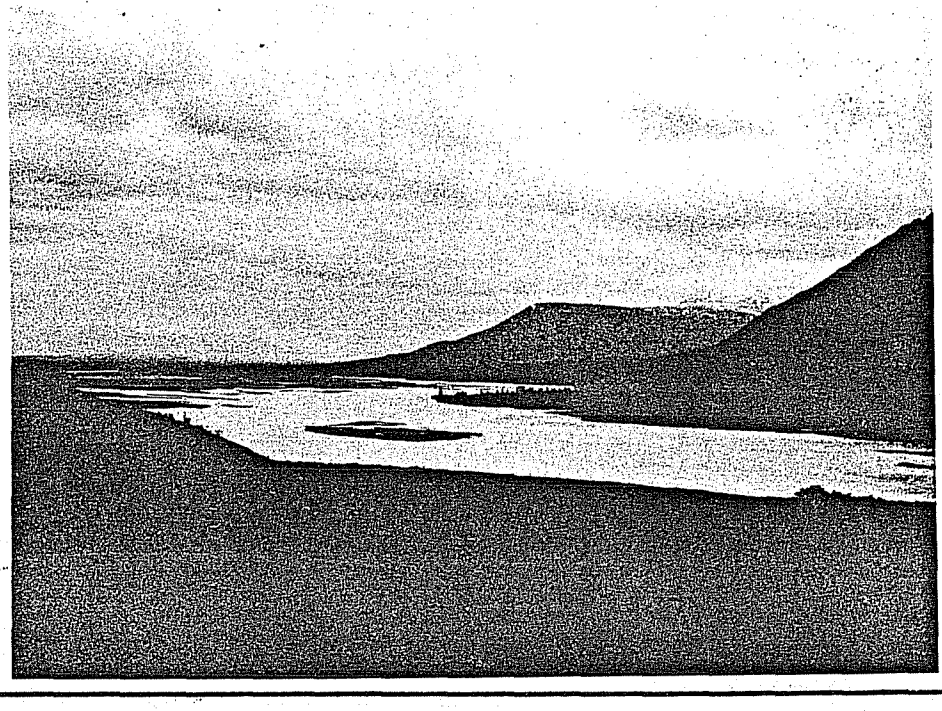
VIEWS

- The deep and narrow nature of the canyon/valley restricts views to the foreground area.
- Some of the higher points adjacent uplands can be seen from the more open areas of the river.
- Adjoining tributary canyons offer additional foreground views of interest.

LANDSCAPE CHARACTER TYPE

SUSITNA UPLAND WET TUNDRA BASIN

PHOTO E8.8.5



LANDFORMS

- Low, flat and rolling terrace above the banks of the Susitna River.

WATERFORMS

- The Susitna River here is mildly to heavily braided. Becomes more braided as it nears its glacial headwaters.
- River varies from 1/8 mile to over 1 mile (0.2 km to over 1.6 km) wide.
- Several hundred lakes ranging from very small to over 500 acres (200 ha) in size. Dense patterns.
- Oshetna, Tyone and Maclaren rivers and Clearwater, Butte, Windy and Valdez creeks are all significant tributaries.

VEGETATION

- Tundra (wet) is the dominant vegetation type.
- Sparse stands of spruce are scattered throughout the area.
- Dense willow and other shrub types are found along the river and many lake banks.
- The tundra foliage in the fall creates an extensive variety of colorful patterns over the landscape.

VIEWS

- The wide open character of the river basin allows scenic views of the Alaska Range and the Talkeetna Mountains.
- Susitna and West Fork glaciers - the source of the Susitna River - can be from 30 to 50 miles (50 to 80 km) distant.
- Views in the foreground landscape are not particularly scenic - except the fall tundra color.

LANDSCAPE CHARACTER TYPE

PORTAGE LOWLANDS

PHOTO E8.8.6

LANDFORMS

- The lower portion of Portage Creek forms a distinct winding fixed channel and steep-sloped valley.
- Large eroded sidewalls are common on the many hairpin turns in the river.
- Flat terraced areas along the upper creek are also common.

WATERFORMS

- Portage Creek is a very scenic, fast-flowing and clearwater tributary to the Susitna below Devil Canyon.
- A number of small streams cascade down into Portage Creek.

VEGETATION

- Moderately dense spruce-deciduous forest covers most of the valley up to an average elevation of 2500 feet (757 m).
- The well mixed forest provides scenic fall color.
- Bright green spring foliage of the deciduous trees also provide color.

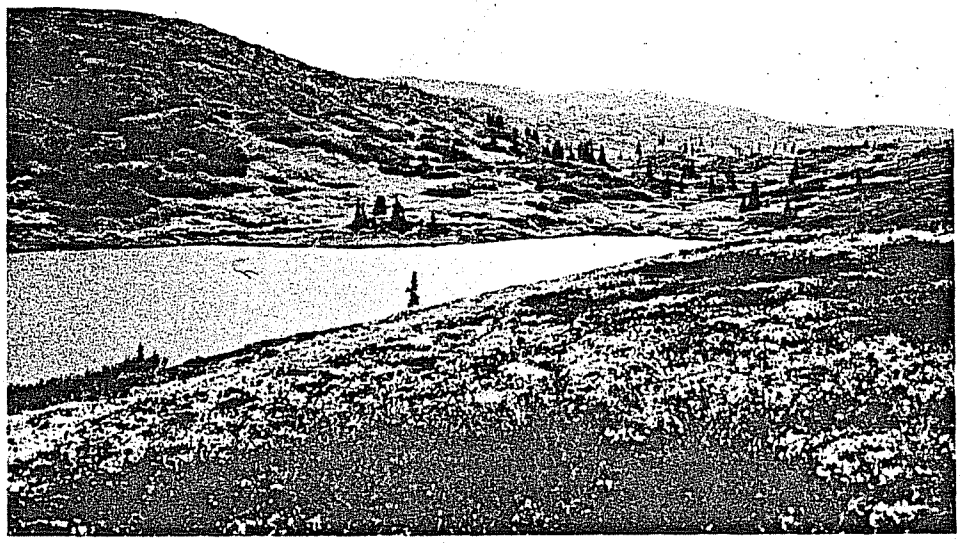
VIEWS

- Views are generally restricted to the deep and forested valley.
- Overall, the combination of natural features provides a very aesthetically pleasing environment.
- Forest views are in marked contrast to many locations in the region.

LANDSCAPE CHARACTER TYPE

CHULITNA MOIST TUNDRA UPLANDS

PHOTO E8.8.7



LANDFORMS

- Wide variety of small and large scale topographic relief.
- Large, well defined and enclosed lake beds.
- Long, flat as well as rolling terraces above the Susitna River, with a variety of canyon sizes.
- Dark brown colored rock outcrops are common along upper terrace, canyon and lake edges.
- Several long shallow valleys.

WATERFORMS

- Dozens of irregular shaped lakes up to several hundred acres in size.
- Bog and wetland areas are common throughout the area.
- Many small streams flow through the canyons down to the Susitna.
- Indian River, Portage and Devil creeks are part of this area.

VEGETATION

- The upland area east Portage Creek is predominantely tundra.
- The upland area west of Portage Creek is covered with a moderately dense spruce forest.
- Willow and other shrub species are commonly found in dense cover near lake banks and wetland areas.
- Scattered and sparse stands of spruce are found east of Portage Creek and mixed woods in the creek valley.
- Tundra colors are gold and light brown during winter months - when not covered by snow. Medium to dark green in spring and summer. Bright red, burgundy and yellow tones in the fall.

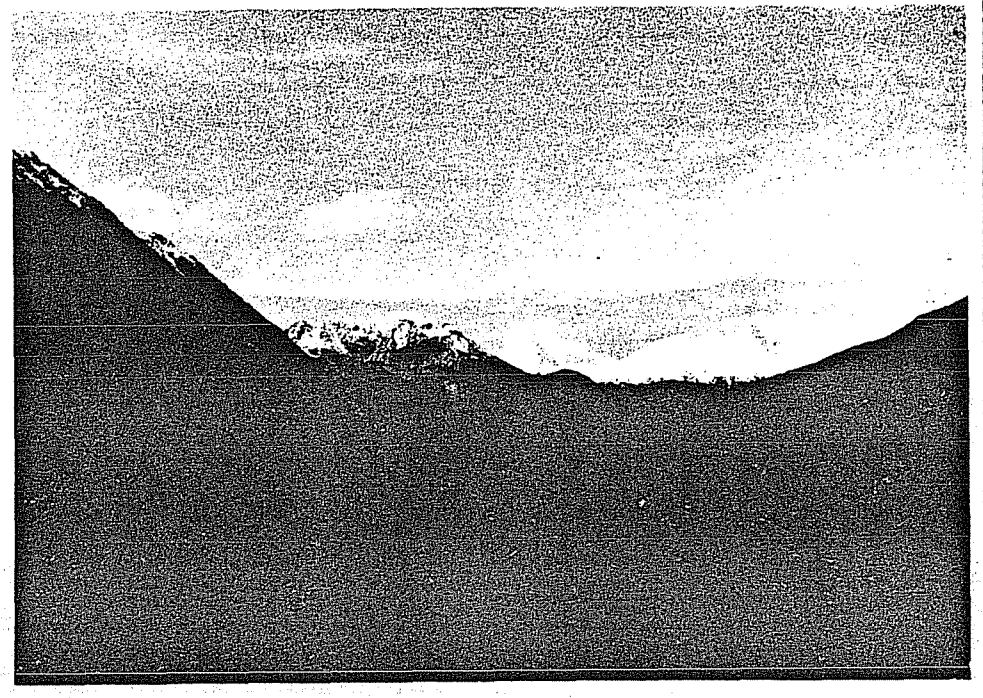
VIEWS

- Foreground and middleground views are scenic and common except in the denser forested areas.
- Vantage points are limitless.
- Views of the Chulitna and Talkeetna mountains occur often and views of the Alaska Range are possible.
- In late fall, the brilliant blue color of the lakes are in contrast to the snow covered landscape.
- Scenic views to adjacent drainages.

LANDSCAPE CHARACTER TYPE

CHULITNA MOUNTAINS

PHOTO E8.8.8



LANDFORMS

- Over 900 square miles (2340 square km) of rugged glacially carved mountains.
- Narrow and broad v-shaped valleys.
- Glaciers and permanent ice fields. Rock glaciers.
- Steeply rises up to over 6000 feet (1818 m) in elevation.
- Many extensive talus slopes.

11.*Caribou Pass
6.*Tsusena Butte Lake

WATERFORMS

- Cirque lakes of aqua-blue color.
- Five or six lakes of several hundred acres in size. Largest one is in Caribou Pass.
- Tsusena, Brushkana, Soule, Deadman and Honolulu creeks and the Jack, Middle and East Fork Chulitna rivers are all significant drainages.

VEGETATION

- Tundra and shrub species cover the valley floors and slopes creating an interesting edge as they meet the barren steeper rock slopes.
- Scattered stands of spruce and deciduous trees along Jack, Middle and East Fork Chulitna rivers.
- Tsusena Creek forms a unique green spruce-deciduous forest over 20 miles (33 km) through the Chulitnas.

VIEWS

- Views are scenic most everywhere.
- Impressive and awesome natural features.
- Mountain rock colors of light to dark gray (primarily talus slopes) and medium to dark brown (higher mountain tops) provide a variety of textures and patterns with the seasonal color changes of the tundra.

LANDSCAPE CHARACTER TYPE

WET UPLAND TUNDRA

PHOTO E8.8.9

LANDFORMS

- Flat to rolling upland area with several large surficial creeks.
- Gentle to moderately steep gradient slopes from Chulitna highlands to the creeks.
- Mild to moderately depressed lake beds with adjacent glaciated bluffs and hills.

WATERFORMS

- Big Lake and Deadman Lake are the largest examples of lakes in the upper basin. Big Lake is approximately 1080 acres (732 ha).
- Deadman Creek is a unique meandering watercourse.
- Brushkana and Butte creeks are other significant drainages of the area.
- Bogs and wetland areas are common and extensively occur in this upland.

10.*Big/Deadman Lakes

VEGETATION

- Wet tundra cover is prevalent with occasional stands of spruce.
- Willow and other shrub species are common near creek banks and lake shores and in wetland areas.

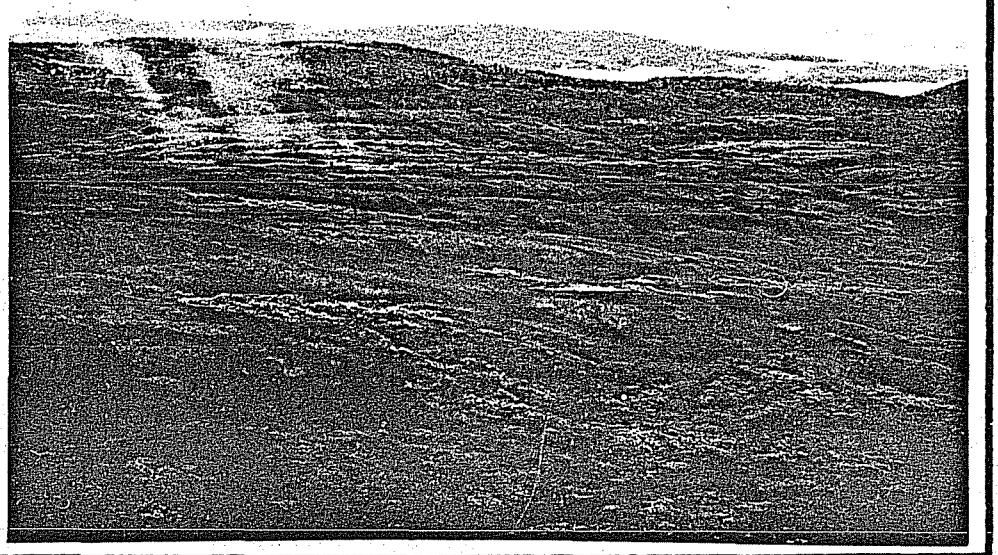
VIEWS

- Panoramic views of the Chulitna, Talkeetna and Clearwater mountains and the Alaska Range are possible.
- In the fall and early winter, ice forming on Deadman Creek creates very interesting patterns and textures.
- Fall color of the tundra, combined with all other natural features, is highly scenic.

LANDSCAPE CHARACTER TYPE

TALKEETNA UPLANDS

PHOTO E8.8.10



LANDFORMS

- Flat to rolling upland plateau.
- Slopes are primarily moderately steep to steep.
- Several knobs rise above 4000 ft (1212 m) with the average elevation of 3000 ft (900 m).
- Drainages in the area form deep and steep, sloped valleys and canyons.
- Rugged rocky hilltops and outcropping are common.

WATERFORMS

- Tens of lakes which are 20-50 acres (8-20 ha) in size. Simple and complex forms.
- Massive areas of muskeg bogs.
- Chunilna Creek is a very significant drainage in the area with many tributaries.
- Many of the lakes are topographically enclosed.

VEGETATION

- Moist and west tundra is dominant.
- Moderately dense spruce-deciduous tree cover is primarily restricted to drainages.
- Chunilna Creek valley is densely forested.

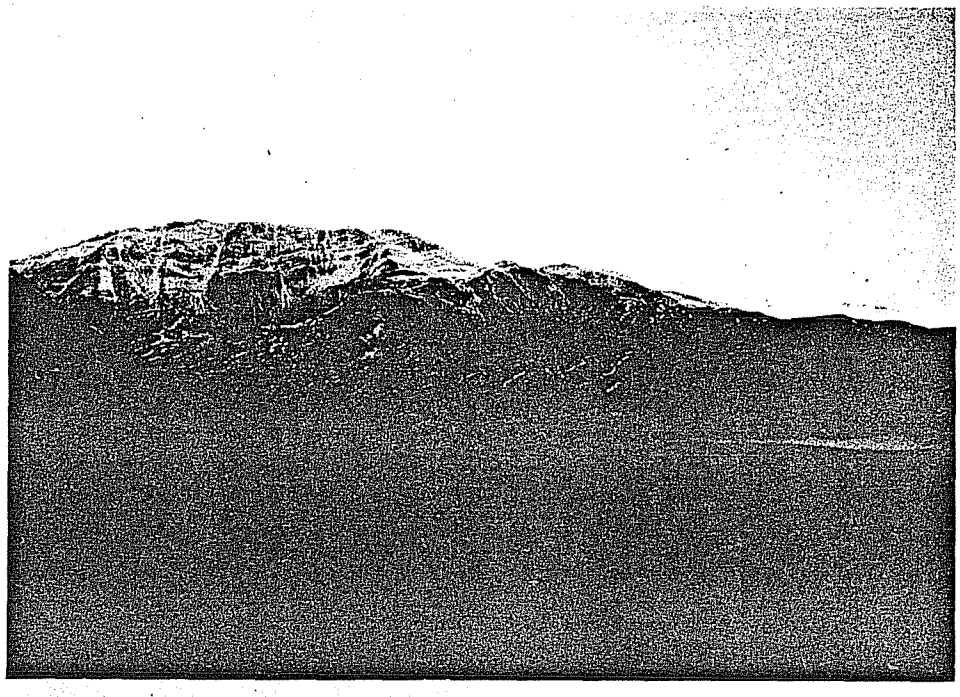
VIEWS

- Foreground and background views are scenic throughout most of the landscape.
- Panoramic views are possible from higher points.
- The Chulitna and Talkeetna mountains and the Alaska Range can be seen.
- Good views of the Susitna and Talkeetna river valleys are possible.

LANDSCAPE CHARACTER TYPE

TALKEETNA MOUNTAINS

PHOTO E8.8.11



LANDFORMS

- Rugged and steep sloped mountain range covering several thousand square miles.
- Elevations over 8000 ft (2420 m).
- Large glaciers, permanent ice fields and glacial features.
- Large moderately sloped terraces.
- Long, narrow and broad v-shaped valleys.
- Large talus slopes.

4.*Clear Valley

WATERFORMS

- Cirque lakes.
- Numerous lakes up to several hundred acres in size. Scattered to dense concentrations.
- Over ten rivers and creeks.

VEGETATION

- Primarily tundra and shrub species throughout the mountains below the steeper rocky slopes and peaks.
- Except for the drainages on the northeast area of the range, dense spruce-deciduous forests cover the river valleys.

VIEWS

- Views are scenic and limitless.
- Views are panoramic to semi-enclosed depending on viewer position.

LANDSCAPE CHARACTER TYPE

SUSITNA UPLAND TERRACE

PHOTO E8.8.12

LANDFORMS

- Terraced, flat and rolling terrain.
- Slopes have gentle gradients.
- Depressed lake basins.

WATERFORMS

- Large linear glaciated and irregular formed lakes. Stephan Lake is the second largest in the upper Susitna basin.
- Fog Lakes (5 adjacent lakes of several hundred acres in size each) create a pattern unique to the area.
- Fog Creek forms a narrow and deeply incised canyon leaving the Fog Lakes area and flowing into the Susitna.

3.*Stephan Lakes
8.*Fog Lakes

VEGETATION

- Densely forested with spruce and some deciduous trees, except for an area of approximately 10 square miles (26 square km) northeast of Fog Lakes, which is predominately tundra.
- Spruce-green is the dominant color for most of the year, white (snow) in the winter.

VIEWS

- Views are often restricted due to the forest cover and depressed lake beds. However, the higher mountains (Talkeetna and Chulitnas) still rise above the horizon.
- Open vantage points for panoramic views are present.

LANDSCAPE CHARACTER TYPE

SUSITNA UPLANDS

PHOTO E8.8.13

LANDFORMS

- Terraced, flat and rolling terrain.
- Elevation range is approximately 3000 - 5600 ft (900 - 1700 m).
- Slopes are primarily flat to moderately steep.
- Larger lake beds are depressed.
- Stream valleys are broad and fixed channel.
- Rock outcrops, cliffs and rocky hilltops are common in the area. Rock colors are light tan to dark brown.

WATERFORMS

- A number of small lakes are scattered throughout the area in dense patterns.
- The two largest lakes, Watana and Clarence, are narrow and linear in form. Both are several hundred acres in size.
- Large number of small creeks.
- Tributaries of the Susitna, Kosina, Tsisi, Gilbert and Goose creeks and the silt laiden Oshetna River are all scenic and significant to this area.

12.*Watana Lakes

VEGETATION

- Upland moist tundra and shrub species cover most all of the land except for the rock environments.
- Fall colors of this massive tundra area create a variety of patterns.
- Spruce are found within some of the drainages in sparse to moderately dense stands.

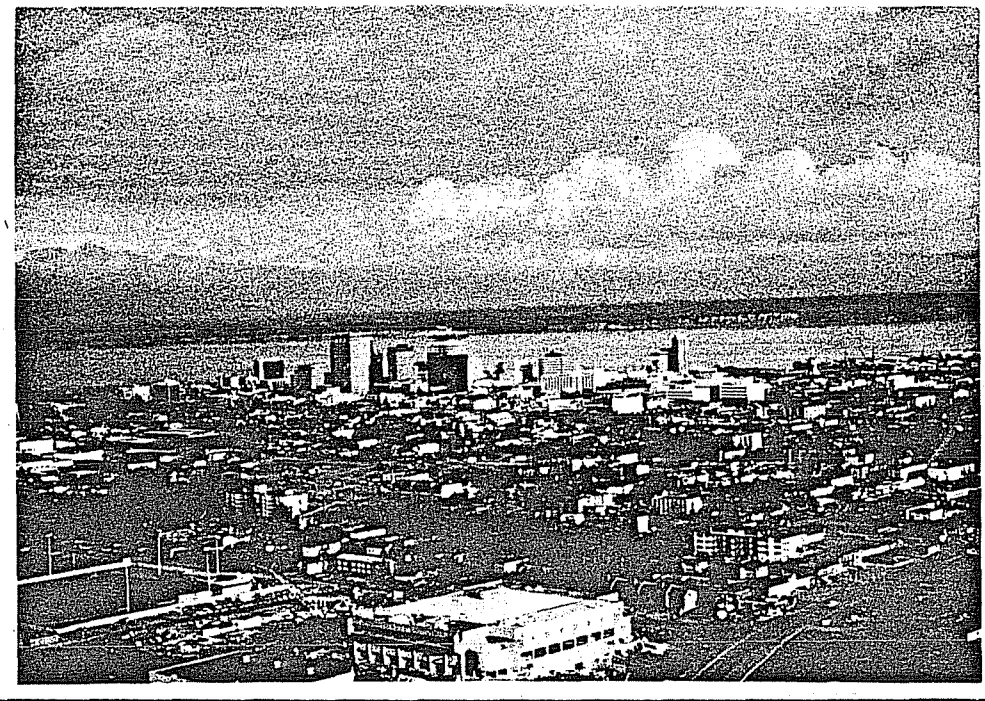
VIEWS

- Views are expansive.
- Many areas at the same elevation and higher in the upper basin can be viewed from this high upland.
- Views of the Talkeetnas are particularly scenic.

LANDSCAPE CHARACTER TYPE

ANCHORAGE, ALASKA

PHOTO E8.8.14



LANDFORMS

- Rolling and flat terraced lowlands of Knik and Turnagain arms (upper Cook Inlet).
- Rolling and moderately steep slopes of Chugach foothills.
- Large sunken areas caused by 1964 earthquake.
- Urbanized town landscape.

WATERFORMS

- Several small creeks traverse through the area and into Cook Inlet.
- Several large man-made lakes.
- Scattered natural lakes - low density.
- Dominated by the adjacent Cook Inlet and connecting arms.

VEGETATION

- Denser urban areas have sparse ornamental tree cover with some natural spruce and deciduous trees.
- Undeveloped areas, lakes and foothills are generally covered with moderately dense to dense forests of spruce-deciduous trees and willow.
- Natural drainages are usually forested and/or have dense shrub cover.

VIEWS

- Due to the flat to undulating terrain, views are open.
- The adjacent Chugach Mountains create a high quality aesthetic setting. Covered with snow in the winter, green in the summer and colorful in the fall.
- The Alaska Range, nearby Mount Susitna, Kenai Mountains and the Cook Inlet, with its unique mud flats, can be seen.

LANDSCAPE CHARACTER TYPE

SUSITNA RIVER LOWLANDS

PHOTO E8.8.15

LANDFORMS

- Very flat to gently rolling lowlands.
- Larger lake areas are enclosed by small hills.
- Mount Susitna, a flat topped remnant volcano, rises over 3000 ft (900 m) above the lowlands. Adjacent Little Mount Susitna and nearby Beluga Mountain also steeply rise above the landscape.

WATERFORMS

- Wet bog and wetlands cover a large percentage of the land.
- Hundreds of small lakes make dense patterns.
- Numerous topographically enclosed lakes several hundred acres in size.
- Heavily braided Susitna River varies from 1/2 mile to several miles (0.8 km to over 2 km) wide; many islands.
- Numerous meandering tributaries to Susitna.

VEGETATION

- Thin stands of black spruce cover many bog areas.
- Marsh grasses.
- Moderately dense to dense cover of spruce-deciduous trees around higher reliefed and larger lake areas - good fall color - also along Susitna River and tributaries.
- The dark green color of the spruce is most dominant.

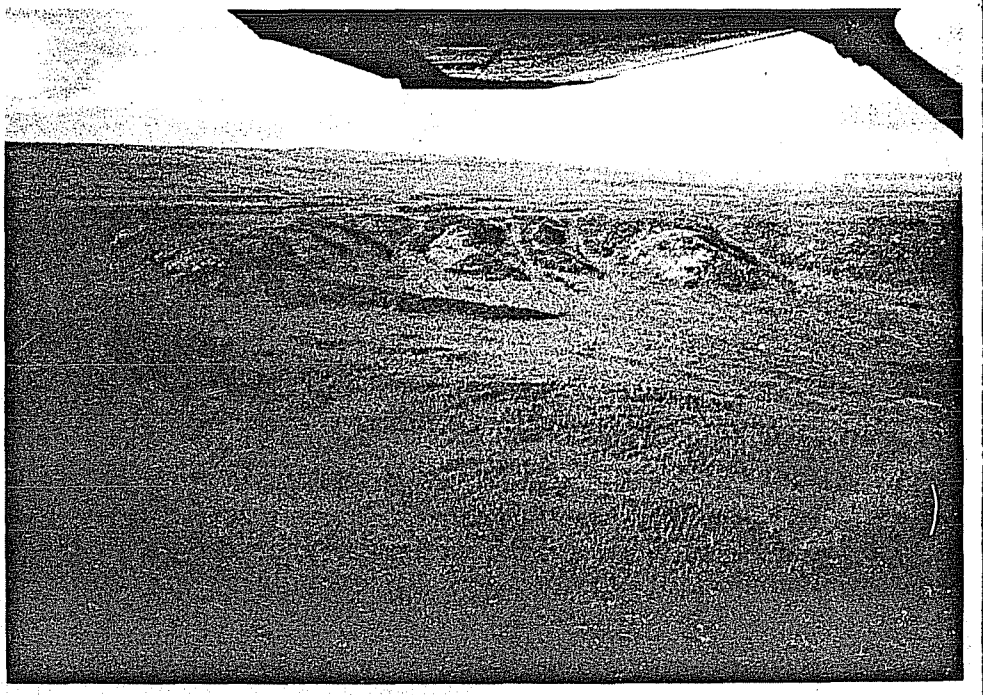
VIEWS

- Views of the immediate area are generally monotonous because of the expansive commonality and flat topography of the landscape.
- Views of the Alaska Range, Chugach and Talkeetna mountains and the Mount Susitna landmark are possible from open areas.
- Weather permitting, Mount McKinley dominates the scene.

LANDSCAPE CHARACTER TYPE

NENANA UPLANDS

PHOTO E8.8.16



LANDFORMS

- Relatively flat meandering river valley terraces several miles (over 2 km) in width with steep slopes rising up to the Alaska Range foothills.
- Exposed rock and soil cliffs and highly eroded banks are commonly found along the Nenana River.
- Rock outcrops are also common along rising terrace edges; light tan to dark brown in color.

WATERFORMS

- The moderately braided and large Nenana River is the most significant water form; silty glacial water.
- Several relatively small tributaries.
- Scattered small lakes.
- Bog areas and wetlands.
- Many islands, broad floodplain.

VEGETATION

- Variable patterns of sparse to dense spruce and mixed forest over most of the area.
- Scattered open spaces of tundra and bare ground. Soil colors are light.

VIEWS

- Views are oriented to the Alaska Range in the south and the higher reliefed foothills in the east.
- Views of the river are not particularly scenic in comparison to mountain views.
- Rock cliffs and outcrops do provide visual interest.
- Transmission lines (existing) are very visible.

LANDSCAPE CHARACTER TYPE

NENANA RIVER LOWLANDS

PHOTO E8.8.17

LANDFORMS

- Extremely flat terrain.
- Numerous small drainages and the Nenana and Teklanika rivers.
- Sand, gravel and cobbles.

WATERFORMS

- Braided channels and heavily meandering Nenana and Teklanika rivers create a distinct pattern on the land.
- Numerous smaller and also meandering tributaries.
- Adjacent to and tributaries of the larger and heavily braided Tanana River.
- Many scattered small lakes and expansive wetland areas.
- Many islands.

VEGETATION

- Expansive cover of thin to moderately dense spruce forests west of Nenana River.
- Linear bands of spruce along drainages east of Nenana River.
- Tundra and wetland-bog species cover most the the area.

VIEWS

- Views of the immediate area are monotonous because of the lack of relief and lack of distinctive features to view on ground.
- Views are across river and directed to the high and forested Tanana hills to the north and the Alaska Range to the south.
- Transmission lines (existing) are very visible.

LANDSCAPE CHARACTER TYPE

TANANA RIDGE

PHOTO E8.8.18

LANDFORMS

- Distinct rounded hills interrupted by small valleys.
- Slopes are moderately steep to steep.
- Rise several thousand feet above the lowlands.

WATERFORMS

- Bounded to the south and west by the heavily braided Tanana River (sixth longest in Alaska).
- Numerous creeks throughout the area.
- A few small scattered lakes.
- Goldstream Creek is a very distinctive meandering watercourse dividing Tanana Ridge from the higher hills to the north.

VEGETATION

- Distinct stands of pure deciduous trees occur here as well as pure stands of spruce and mixed forests.
- Forest cover is generally dense.
- Foliage color patterns have high aesthetic value in the spring and fall.
- The white trunks of the birch also provide interesting winter textures.

VIEWS

- The views are moderate in scenic quality. However, fall color is an exception.
- Views are limited due to the dense forest cover.
- Clear-cut right-of-ways of existing transmission lines and roads are distinctly visible from many areas.

APPENDIX E9.8
AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
MID SUSITNA RIVER VALLEY	Moderate	Medium	. Common Alaskan landscape--nothing which makes it particularly distinctive. . Existing man-made elements (i.e., railroad parallel to river, railroad bridge, cabins and railroad related structures) have not had significant negative aesthetic impacts.
DEVIL CANYON	High	Low	. Distinctive Alaskan natural resource feature. . Dramatic but unstable environment because of steep slopes. . Man-made elements must be sensitive to the existing landscapes. A highly aesthetic and recreational resource.
SUSITNA RIVER	High	Medium	. Distinctive and impressive deep valley--large-scale. . Good variety of landform, vegetation and water edges. . Variety of scenic large- to small-scale features. . Able to absorb some man-made impacts on semiforested, less steep areas. Small-scale impacts.
RIVER CANYON	High	Low	. Distinctive river canyon. . Steep slopes make the area sensitive to development. . Due to the lack of substantial forest cover, the overall open character of the canyon requires highly compatible design solutions.
SUSITNA UPLAND WET TUNDRA BASIN	Moderate	Medium	. Impressive scale but landscape character is common in Alaska. . Distant scenic views to mountains along with a variety of land, water and vegetative edges in foreground gives the area moderate to high aesthetic value. . Flat and open character of land will not easily absorb man-made elements/ impacts. However, existing roads and small structures are not distractive.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
PORTAGE LOWLANDS	High	Low	. Distinctive deep and winding tributary river canyon to the Susitna River. Variety of vegetation types and river bottom terrain. . Steep erodible slopes would be sensitive to any development.
CHULITNA MOIST TUNDRA UPLANDS	High	Moderate	. High aesthetic quality due to diversity of landforms, water and vegetation patterns. . The landform diversity and variety of forest edges and densities will allow for some visual integration and absorption of man-made elements.
CHULITNA MOUNTAINS	High	Low	. Highly distinctive area, rich in significant natural attractive features. . Complex glaciated landforms of all scales. . Man-made elements and impacts will be very visible on this predominantly treeless and steep sloped landscape. . Basically a wilderness area.
WET UPLAND TUNDRA	Moderate	Low	. There is a variety of water forms and their distinct edges with land and vegetation, along with highly scenic views. . Although the area is basically open, the rolling terrain would not be significantly impacted by man-made elements if they were properly sited and sensitively designed. Elements must be subordinate to the landscape.
TALKEETNA UPLANDS	Moderate	Low	. The overall aesthetic value of this area is good due primarily to variety of landforms, but is not as scenic (middle and foreground views) in comparison to many of the other character types. . The bisecting forested river valleys create a distinct and interesting pattern.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
TALKEETNA UPLANDS (contd)	Moderate	Low	. Man-made features would be visible in most areas due to the flat to rolling open terrain. . Sensitive siting is mandatory with the landscape dominating the character of development if any.
TALKEETNA MOUNTAINS	High	Low	. Highly distinctive mountain range with a complex variety of land and water forms, and patterns. . As with the Chulitna Mountains, this area can be considered a wilderness area. . Medium- to large-scale man-made features will be highly visible in this treeless steep sloped mountain environment. . Recreation trails here and in the Chulitna Mountains should not be aesthetically disruptive.
SUSITNA UPLAND TERRACE	Moderate	Low	. This setting of large lakes, dense forest and scenic views to the mountains is basically of moderate aesthetic value. . Distinctive to the basin but not to Alaska. . Clearing of trees for most any type of development would be highly visible in this densely forested area. . Any major man-made impact (medium- to large-scale) must be carefully considered to emphasize site fitness.
SUSITNA UPLANDS	Moderate	Low	. This landscape character is common in Alaska with the exception of its large number of distinctive streams and rivers. The open landscape is significantly enhanced by the scenic views of adjacent and distant character types. . Other than recreational trails--if properly sited--most all other man-made features would be highly visible.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
ANCHORAGE, ALASKA	Low	High	• Although the city is in a high quality aesthetic setting, the visual image of the city itself is not high in aesthetic value. • With the exception of the Chugach foothills, the large-scale urban environment should be able to absorb new man-made features. However, proper design, siting and alignment of features will be essential to lessen any potential aesthetic impact.
SUSITNA RIVER	Low	High	• The landscape is continuous and broad in scale with few significant landscape features. • Flat terrain and diverse vegetation patterns should be able to effectively absorb most man-made features. Aesthetic impacts will not be significant.
NENANA UPLANDS	Moderate	Medium	• Landscape has good variety of landforms and vegetation patterns and a large distinctive river. • Aesthetic value is not high in comparison to many other Alaskan character types. • This rich diversity and patterns of natural elements and generally open landscape will be able to absorb limited man-made features with sensitive planning and design.
NENANA RIVER LOWLANDS	Low	High	• This landscape has complex patterns of vegetation and water features but no topographic relief or significantly unique and attractive features to give it a higher aesthetic value. • Man-made features should be visually absorbed by this flat expansive landscape with a variety of vegetative patterns.
TANANA RIDGE	Moderate	Low	• Distinctive landscape relative to the general geographic area. The forested hills are at the edge of a large flatlands and visually significant.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
TANANA RIDGE (contd)	Moderate	Moderate	. Again, this character has local high aesthetic value but not significant in comparison to other Alaskan landscapes. . The dense forest cover and steep slopes do not provide a condition allowing for visual absorption of medium- to large-scale man-made development. Sensitive siting will be essential to lessen aesthetic impacts.

SUSITNA HYDROELECTRIC PROJECT
LICENSE APPLICATION

EXHIBIT E - CHAPTER 9
LAND USE

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EXHIBIT E - CHAPTER 9
LAND USE

1 - INTRODUCTION (***)

This chapter has been substantially modified and restructured to account for material changes in state land management policies that significantly affect the land use requirements applicable to the Susitna River Basin. Specific information respecting land ownership is found in Chapter 16 of Exhibit A and in Exhibit G. Subsequent sections in this chapter include the following information pertinent to an assessment of project-related impacts on land use:

- Descriptions of historical and present land use in the project vicinity,
- Highlights from federal, state, local and private land management plans which establish policies governing lands in the Susitna River Basin and elsewhere in the State of Alaska,
- Discussions of direct and indirect effects of project development on land use, and
- An account of pertinent mitigation measures.

The following assessment of land use in the Susitna project area was based on a review of aerial photographs and topographic and management planning maps, and field reconnaissance to ascertain land classifications and locate features such as trails and structures. A literature review was conducted to determine historical land uses and identify current resource management planning documents for the area. Interviews with lodge and air taxi operators, guides and individual resource users provided past and present resource use information. In addition, interviews with agency resource management personnel provided verification of land management policies and strategies.

2 - HISTORICAL AND PRESENT LAND USE (***)

2.1 - Historical Land Use (***)

The location and isolation of the Susitna project area in a subarctic environment has resulted in extremely low-density land use activity. Literature reviews prepared for the Applicant by Terrestrial Environmental Specialists, Inc. (TES 1982) and Historical Research Associates, Inc. (Greiser et al. 1985) suggest that this has been the case throughout the historic period. Information on the physical evidence associated with historic land uses is contained in Dixon et al. (1985) and TES (1982). The evidence includes remains associated with activities such as hunting, fishing, trapping, food and/or equipment storage, research, recreation, and mining.

For over a decade beginning in 1741, Russian fur companies were active in Alaska. Trading was the primary activity, although some exploration, trapping, and missionary work was undertaken by the Russian American Company. While a Russian expedition ascended the Susitna River in 1834, most exploration of the interior involved the Yukon Basin north of the project area and the Copper River to the east (Greiser at al. 1985).

After U.S. acquisition of Alaska in 1867, development centered around minerals and transportation. A trading post to supply explorers and prospectors was established on the lower Susitna River at Susitna Center as early as the mid-1870s. In the late 1800s, two expeditions ascended the Susitna River: the first (in 1876) ascended the Susitna River to Portage Creek, where it was stopped by Devil Canyon; the second (in 1898) followed the Susitna River to the Jack and Nenana Rivers. Due to the barrier presented by Devil Canyon, the middle Susitna River region was for the most part unexplored. Ore strikes in the 1890s and early 1900s to the south and southwest brought individual prospectors to the Susitna area in greater numbers (Greiser et al. 1985).

Miners followed aboriginal routes, frozen rivers, and/or a trail systems developed by the Alaska Road Commission to further their explorations. The bulk of activity was by individuals who eked out a marginal living by supplementing their prospecting with trapping. During the 1920s, fur prices escalated rapidly and fur farms became popular in the lower Susitna area. This industry crashed along with prices during the 1930s. Limited farming was developed in the lower Susitna to supply miners beginning in the late 1890s. Settlement was largely incidental, with extensions to the interior restricted to line cabins and caches (Greiser et al. 1985).

The coming of Alaska Railroad (which was completed in 1923) changed land use patterns significantly. Talkeetna replaced Susitna Center as the regional supply post, shifting the center of population and

activity north from the Susitna delta. Construction camps along the route of the railroad became maintenance camps, and, with access to the outside world, small, permanent settlements.

With the availability of the railroad, the trail networks fell into disrepair, and new transportation networks came into being. The use of the airplane became widespread. Later automobile roads, such as the Denali and Parks Highways, further opened up the area for recreation. Still, settlement and land use remained light, and left little in the way of remains to mark the primary mining and transportation uses of the historic past.

Since the 1940s, the Susitna River has been considered for hydropower development and several preliminary plans for such development have been prepared. Proposals prior to 1980, which included one to four reservoirs, did not proceed beyond the pre-feasibility analysis stage. The present project is located in the middle Susitna Basin (see Figure E.9.2.1) and focuses on a two-dam development in three stages: one near Tsusena Creek, Watana damsite-Stages I and III, and one at Devil Canyon-Stage II.

2.2 - Present Land Use (***)

Existing land use activity and development in the project area has evolved from the utilization of this remote resource base as a source of income, food, shelter, and recreation. As in the past, access continues to play the single most important role in determining the types and levels of land use in the middle Susitna River basin. To date, access has been limited by the lack of roads, ruggedness of terrain, and navigational difficulties presented by Susitna River rapids. In addition the area offers no unique amenities that would result in its being utilized for trade or industry. Furthermore, the relatively low population of the state continues to expand around already established growth centers. Those who use the area have gained access by various kinds of aircraft and boats, off-road vehicles (ORV's) and all-terrain vehicles (ATVs), dog teams and horses, and/or on foot. Consequently, the project area is used predominantly on a seasonal basis for a variety of recreation activities such as hunting and trapping. To support these activities there are 120 structures in the area of which only half are currently maintained (see Figure E.9.2.2 and Table E.9.2.1).

The 120 structures (which include lodges, cabins, sheds, trailers, tent frames, and foundations), a few airstrips, primitive roads, trails, and mining claims comprise the existing development that is found sparsely distributed throughout the project area. As shown in Figure E.9.2.3 much of the development is aggregated around lakes that are accessible by floatplane. The activities that these isolated areas of development support are summarized below to indicate the overall minimal nature of

resource use in the project area. More detailed descriptions of resource use activities can be found in Chapters 3, 5 and 7 of Exhibit E.

Hunting, fishing, trapping, mining, and other nonconsumptive recreational activities are pursued throughout the project area, although there are concentrations of such activities just as there are concentrations of the associated development.

Both guided and non-guided hunting occur within the project area, particularly near Stephan, Fog, Clarence, Watana, Deadman, Tsusena, and Big Lakes, as well as many of the smaller lakes. Both lodges and cabins provide field bases for hunters. Approximately 10 big game hunting guides operate 9 guide businesses which use the area. Generally, the businesses provide hunting as well as other activities including fishing and boating. In 1984, the 9 businesses guided approximately 300 clients (Harza-Ebasco 1985).

Fishing in the project area occurs either as a separate pursuit or in close association with other activities, such as hunting and trapping. Considerable fishing for lake trout, grayling, and salmon occurs in the Stephan Lake-Prairie Creek drainage. Salmon fishing occurs in lower Portage and Chunilna Creeks and Indian River. Fishing in Fog, Clarence, Watana, Tsusena, Deadman, Big, and High Lakes appears to be associated with other activities, such as hunting, summer cabin use, and mining. There is little stream fishing elsewhere in the project area.

Trapping in the project area occurs mostly on the south side of the Susitna River near Stephan and Fog Lakes. Some trapping also occurs near Tsusena Creek and Clarence and High Lakes. Traps are also set by trappers using airplanes in the easternmost portions of the Susitna River valley.

Mineral exploration and mining have been limited in the immediate project area. Mining in the upper and middle Susitna River basin has been low in claims density and characterized by intermittent activity since the 1930s. Active mining has been more concentrated in Gold, Chunilna, and Portage Creeks than in areas of the upper Susitna basin. Other active claims are located around Stephan and Fog Lakes, Jay Creek, and the Watana Hills east of Jay Creek.

Activities directly related to the Susitna River include river boating and floating. Boating within the project area has been linked with research, fishing, and recreation. Raft float trips are taken from the Denali Highway on the Susitna or Tyone Rivers down to above either Vee or Devil Canyons, while a few highly skilled kayakers have negotiated Devil Canyon rapids. In addition, riverboat operations out of Talkeetna travel up the Susitna River offering services that include

day trips to Devil Canyon, drops at camps for hunting, fishing, and photography, and canoe hauls to tributaries. Some canoeing and rafting takes place from just below Devil Canyon to Talkeetna. Some canoe enthusiasts portage between the lakes near Stephan Lake and canoe to Talkeetna via Prairie Creek and the Talkeetna River. Other nonconsumptive activities such as photography generally occur in conjunction with the activities already mentioned.

The vast majority of residential, commercial, agricultural, transportation and utility land use development occurs in and around Parks Highway communities and along rural sections of the Parks Highway west of the project area. That is, small towns such as Willow, Talkeetna, Cantwell, and Healy have a mix of residential and commercial land, and transportation lands for the highway, other roads, railroad, and airstrips. Other scattered residential lands occur in agricultural, homestead or other settlements along the highway, near the railroad or area rivers.

From Anchorage, the Anchorage-Willow transmission line route would cross or parallel numerous trails, including the Iditarod Trail, seismic survey lines, tractor and ORV trails, and several recreational trails near Willow (ADNR 1980) as illustrated in Figure E.9.2.4. The route would also traverse 5.3 miles of the Point MacKenzie Agricultural sale located north by northwest of Point MacKenzie. It would then cross approximately 11 miles of the Fish Creek Management Unit located between Point MacKenzie and Red Shirt Lake. The route would also cross the northeast corner of the Susitna Flats State Game Refugee, and 11 miles of the Fort Richardson Military Reserve - parallel to the existing Chugach Electric Association Inc. Point MacKenzie-University Substation transmission line.

Between Willow and Healy, the proposed transmission line route would parallel the existing Intertie transmission line corridor crossing lands (including the Indian River Land Disposal and Remote Parcel) described in detail in the Intertie environmental assessment (Commonwealth Associates, Inc. 1982). From Healy to Fairbanks the proposed route would intermittently parallel the existing Golden Valley Electric Association (GVEA) line, the Parks Highway, and the Alaska Railroad (see Figures E.9.2.5 and E.9.2.6). Ten miles of the U.S. Air Force Clear Missile Early Warning Site Military Preserve near Anderson and the Healy, Windy, Brown's Court and Goldstream Agricultural Disposals north of Healy would also be traversed. Numerous trails, light-duty roads, and a number of airstrips or small town airports would also be near the Healy-Fairbanks transmission route.

2.2.1 - Special Land Use Considerations (***)

The Susitna project area is characterized by an isolated subarctic environment comprised primarily of coniferous and

mixed forests and low shrubs. Numerous creeks flow into the Susitna River and occasional lakes dot this remote region. The locations of wetlands, floodplains, and prime agricultural lands are important considerations in the development of the proposed project.

Detailed wetland mapping of much of the state has been completed as part of the National Wetlands Inventory, conducted by the U.S. Fish and Wildlife Service (USFWS). Federal regulations define wetlands as areas that, under normal circumstances, would support vegetation typically adapted to saturated soils. By this definition approximately one-third of Alaska is wetlands. In the project area as a whole, wetland areas of particular importance include Brushkana and Upper Deadman Creeks, the area between Deadman and Tsusena Creeks, the Fog Lakes area, the Stephan Lake area, Swimming Bear Lake, and Jack Long Creek.

Wetlands specifically within the proposed impact area were mapped by the USFWS and classified according to Cowardin et al. (1979) into appropriate wetland classes (TES et al. 1981). The Cowardin system of wetland mapping has been adapted by the USFWS, and is acceptable to the U.S. Corps of Engineers for permit applications (Cowardin et al. 1979).

Within the approximate boundaries of the dams and impoundments, there are wetlands of various types, including riverine. The Watana - Stage I and III Dam, spillway, borrow sites and impoundment would cover approximately 12,732 acres of wetlands. The Watana camp, village, and airstrip would occupy an additional 98 acres of wetlands. The Devil Canyon Dam, spillway, borrow sites and impoundment facilities would cover 2,868 acres of wetlands while the Devil Canyon construction camp and village would occupy 76 acres of wetlands.

The proposed access road corridor from the Denali Highway south to Watana and then east to Devil Creek would cover about 202 acres of wetlands. Ninety-nine percent of wetland (105 acres) in the Denali Highway to Watana portion of the corridor is palustrine (marsh-like) habitat broken only by occasional creek crossings; 97 percent of the wetlands (97 acres) in the Watana to Devil Canyon portion are also palustrine type. The remaining three percent of wetlands are riverine type.

The railroad corridor would cover about 74 acres of vegetation; 26 percent of which are wetlands. Sixty-three percent of the wetlands covered would consist of forest with emergent vegetation intermixed.

The Stage I and III transmission line corridor within the middle Susitna Basin impact area would cover 256 acres of wetlands; 249

acres (97 percent) are palustrine and 8 acres (3 percent) are riverine. Stage II transmission lines would cover an additional 26 acres of wetlands, 20 percent of which are palustrine. The Anchorage-Willow transmission line corridor would pass through relatively flat terrain which is approximately 24 percent palustrine or lacustrine (lake-like) emergent meadows. The southern portion of the Healy-Fairbanks transmission line corridor would have palustrine forested wetlands along ridges, with palustrine scrub-shrub and palustrine or lacustrine emergent wetlands occupying the flatter areas. The central portion of the corridor would cover a complex mosaic of wet palustrine forested and palustrine scrub-shrub wetlands. The gradation and patches of wetland types made it necessary to map this area as "complex." Forested types of wetlands accounted for 78 percent of this corridor.

Details about the specific types of wetlands that would be disturbed or crossed by project facilities are found in Chapter 3 of Exhibit E.

The U.S. Corps of Engineers, Floodplain Management conducts hydraulic analyses of floodlands to determine floodplains for the Federal Insurance Program of the Federal Emergency Management Agency (FEMA). Floodplains of interest to the Federal Insurance Program are defined as "the lowland and relatively flat areas adjoining inland and coastal waters, including at a minimum, that area subject to a one percent or greater chance of flooding in a given year" (Office of the President 1977). In Alaska, due to the remote isolated nature of the majority of the state, floodplain studies and mapping have occurred only in communities and populated regions. No floodplain studies have been prepared by the U.S. Corps of Engineer in the middle Susitna basin. However, studies conducted in conjunction with the project include estimates of the 100-year floodplains along the river.

In other parts of the Susitna River basin, a preliminary final report entitled Flood Insurance Study, Mat-Su Borough (U.S. Corps of Engineers no date) has been completed by the U.S. Army Corps of Engineers for the FEMA. No consideration has been given to the Susitna River. Detailed study included the Little Susitna River, and Disception and Willow Creeks.

In addition, the U.S. Corps of Engineers has mapped the 100-year flood elevation on the Nenana River at the community of Nenana and at Chulitna on Pass Creek, a tributary of the Chulitna River. The 100-year floodplain of the Talkeetna, Susitna and Chulitna Rivers has been mapped within the townsite of Talkeetna where flooding has occurred in the past. The floodplain of the Talkeetna River at Talkeetna is wide and developed only on the

south side at the mouth of the river (see Figure E.9.2.7). Open spaces in the floodplain are extensive and may come under pressure for future development.

The Floodplain Information Report for Talkeetna, Alaska, (U.S. Corps of Engineers 1972) is a basis for the adoption of land use controls to guide floodplain development and prevent loss and damage. Peak discharge for the Intermediate Regional Flood, or the 100-year flood, at Talkeetna is estimated to be 268,000 cfs. Peak discharge for the Standard Project Flood[1/] was estimated to be 315,000 cfs. These estimates are for the Susitna River downstream of the confluences with the Chulitna and Talkeetna Rivers.

Exhibit E Chapter 2 of this report provides flood peak information for assessing natural and with-project flood conditions in the Susitna River reaches located downstream and upstream from the damsites. In addition, it discusses the existing flow, sediment and river regimes from Devil Canyon to the mouth of the Susitna River.

The U.S. Soil Conservation Service has determined that there are no prime or unique farmlands, rangelands, or forests within the middle Susitna basin.

1/ Standard Project Flood as defined for the lower river in the Floodplain Information Report is not related in any way to the Susitna Hydroelectric Project.

3 - LAND MANAGEMENT PLANNING IN THE PROJECT AREA (***)

The majority of land in the project area is managed by the Alaska Department of Natural Resources (ADNR) and the U.S. Bureau of Land Management (BLM). In April 1985, ADNR published the Susitna Area Plan which puts forth management guidelines and policies for all public lands (except such lands as existing parks and wildlife refuges) in the Susitna Area (see Figure E.9.2.8). Although numerous management plans covering portions of the Susitna project area have been completed by various federal, state and local agencies, the Susitna Area Plan is the most relevant to the entire project area and is most responsive to the interests of the numerous land management agencies that participated in its development. The plan was prepared by ADNR, the Alaska Department of Fish and Game (ADF&G), and the Matanuska-Susitna Borough (Mat-Su Borough) in cooperation with the Alaska Department of Transportation and Public Facilities (ADOTPF), the Kenai Peninsula Borough, the U.S. Department of Agriculture (USDA), and the BLM. This plan establishes policies that allow state and Mat-Su Borough lands to produce the greatest possible public benefits by designating uses (agriculture, fish and wildlife habitat, forestry, recreation, settlement, subsurface resources, transportation) that are to occur on the lands in the Susitna Area. The designated uses outlined by the plan encourage development of resources and stress protection of environmental quality and community character.

As stated in the Susitna Area Plan (ADNR 1985) the four major goals of the plan with respect to the economics, natural environment, social environment and land sale, and transportation and access of the Susitna area are:

- To use public lands for the development of basic industries that can contribute to the local and regional economy when state oil revenues decline.

- To allow forestry, agriculture, mining and other types of development to occur, but manage these uses to minimize environmental impacts.

- To sustain the characteristics of the region that attract people to the area: proximity to recreation opportunities, availability of local supplies of wood and fish and wildlife resources, visual quality, and plenty of open space.

- To open more land in the region to a variety of public and private uses.

According to the plan, the Talkeetna Mountain Subregion where the Susitna Hydroelectric Project would be located, will be managed for multiple uses with emphasis on those uses most important to the area - recreation, protection of fish and wildlife, and mining. Grazing,

private recreation settlements, and personal use timber harvest are also noted as secondary uses applicable to dispersed portions of the subregion.

Given the scope and intent of the Susitna Area Plan, the Susitna Hydroelectric Project would be compatible with the uses, goals, and policies outlined and endorsed by the management agencies that participated in its formulation.

In addition to coordinating with other agencies on the Susitna Area Plan, the BLM had already produced a land use plan for the Denali Planning Block which encompassed federal lands in the project area (see Figure E.9.2.9). This land use plan (BLM 1980) emphasized multiple use management. In 1982, as an amendment to the earlier plan for the Denali Block, the BLM prepared environmental assessments of mineral leasing, mineral location and land disposal and concluded that any decisions should be deferred until the Susitna Area Plan was completed by the state. The Susitna Area Plan recommends that federal lands in the Susitna Area remain in public ownership and be managed for recreation and wildlife resources. In response to this recommendation, the BLM in a recent decision (BLM 1985) proposed to limit land disposal and use actions to those meeting criteria established by the Federal Land Policy and Management Act and decided that the State of Alaska and the Mat-Su Borough would review proposed actions. In summary, the Susitna Hydroelectric Project would be compatible with current management plans for public lands managed by the BLM.

Native corporations are also responsible for land management on their lands in the project area. Currently, no active land management activities are being carried out, although preliminary development plans have been outlined by CIRI Village Corporations (Brown 1984). The outline includes extensive recreational development with lodges, trails and concessions as well as mineral and other resource development.

Numerous other management plans for specific regions of the project area and transmission line corridor have also been produced. These include the Denali National Scenic Highway Feasibility Study (Alaska Land Use Council 1983), Denali to Wangell-St. Elias Study (Kuklok et. al. 1982), Land Use Plan for Public Lands in Willow Sub-Basin Area (ADNR 1982), Mat-Su Borough Land Use Comprehensive Plan (Mat-Su Borough 1970), Mat-Su Borough Coastal Management Program (Mat-Su Borough 1983), Tanana Basin Area Plan (ADNR 1984), Anchorage Comprehensive Plan (Municipality of Anchorage 1982), and the Fairbanks-North Star Borough Comprehensive Plan (Wilsey and Ham 1983). The Susitna Hydroelectric Project is generally compatible with each of these plans.

4 - IMPACTS ON LAND USE WITH AND WITHOUT THE PROJECT (***)

Land use impacts due to the Project would result from the construction of the following project facilities: dams and impoundments, construction camps and villages, recreation plan facilities, access road, railspur and railhead, and transmission lines (see Figure E.9.2.10). Some impacts would be temporary such as with borrow sites which can be reclaimed. Other impacts such as the inundation of lands covered by the reservoirs would be permanent. All impacts can be classified as direct or indirect and of these, indirect impacts are of the most concern.

Direct land use impacts would be limited to the conversion of a specific number of acres from one use to another. Construction of the Watana and Devil Canyon Dams and impoundments would result in the inundation of approximately 43,952 acres (including 9 structures) changing the land from forest land used for dispersed recreation to reservoirs used for hydropower generation. A total of 2,208 acres of forest and low shrub land would be temporarily or permanently disturbed for borrow and quarry sites. Placement of the 2 construction camps and villages would convert 385 acres of low shrub and mixed forest land to developed community use. In addition, minimal acreages would be permanently disturbed by road and rail access, transmission line corridors and recreation plan facilities.

Direct impacts to wetlands, floodplains, and prime agricultural lands are again of special concern. Project impacts on wetlands are discussed in Chapter 3, Section 3.3.6 of Exhibit E. The discussion quantifies the extent of wetland areas that would be occupied or disturbed by project facilities or inundated by the impoundments. In addition, it describes indirect effects on the wetlands resulting from project development. Project impacts on U.S. Corps of Engineer-designated floodplains cannot be ascertained because of the lack of data for the middle Susitna basin. However, extensive project-related data show that floods up to the 50-year event would be diminished in magnitude on the middle reach of the Susitna River from Devil Canyon Dam to Talkeetna. Furthermore, the project is designed to accommodate the magnitude of the 50-year flood and such floods would generally be contained within the banks of the river. Details with project findings with regard to floods can be found in Chapter 2, Sections 4.1.3(a), 4.2.3(a), and 4.3.3(a) of Exhibit E. No impacts occur to prime agricultural lands because none exist in the area.

Provision of access into the Susitna River basin, an otherwise remote, roadless area, is the major indirect land use impact of the Project. The Project itself would establish new temporary and permanent population centers at the construction camps and villages, at the townsite, and at the railhead facility in Cantwell. The public would be introduced into the area via the access road connecting the Denali Highway to the Watana and Devil Canyon damsites, more easily navigable

river routes leading into the reservoir, and by floatplanes landing on the reservoir itself. New opportunities to use the reservoir for access to surrounding lands would be opened. An increase in numbers of people would in turn increase recreational and other activity levels and put new harvest, extraction, and development pressures on fish, wildlife, and other natural resources. Current activity patterns would change and displacement of a small number of resource users such as guides and trappers would follow. As more people are attracted to this area, peripheral commercial and other development would occur thus stimulating the regional economy. The opportunities for additional roads extending off the access road could encourage mineral and other resource extraction. Land values may be affected (see APA 1983 for further discussion). Also, an impetus for more active land management and cooperative agreements between landowners would be created to address such issues as trespass on private land.

Increased access would also be a primary land use impact with the establishment of the transmission line corridors, since much of it is routed over undeveloped recreation land. However, most additional impacts would be incurred in the southern corridor from Anchorage to Willow since north of Willow the project lines would parallel the existing Intertie and GVEA lines. Other transmission route-related indirect impacts would be possible effects on airplanes where the lines pass near floatplane bases or airstrips, negative visual effects, and the possible disruption of normal patterns of cultivation where the lines cross agricultural land.

The project area has been relatively undeveloped in the past, because of limited access and unfavorable economic feasibility. Discussions with landowners/managers and consideration of present market conditions indicate that, without the project, little change is likely to occur in existing land use or activity patterns. However, the CIRI Village Corporations have expressed intentions to develop the timber, mineral, and recreational potential of their lands south of the project area with or without the Project (Brown 1984).

5 - MITIGATION (***)

There are no mitigation measures for the project's direct land use impacts except where temporary facilities such as construction camps are removed and excavation sites are reclaimed and/or stabilized. Associated mitigation measures for compensation of fish and wildlife resources lost due to inundation are discussed in Chapter 3 while Chapters 3 and 6 describe reclamation and/or stabilization of disturbances at borrow and quarry sites.

Mitigation measures for indirect land use impacts are discussed in in other chapters of this document. For example, mitigation for the influx of people into the project area and impacts on special population/occupation groups (i.e., guides, lodge and air taxi operators) are discussed under Socioeconomic Impacts, Chapter 5. Increases in recreation opportunities and mitigation measures for increased activity levels are discussed in Recreational Resources, Chapter 7. Mitigation measures for fish, wildlife, and botanical resources are identified in Chapter 3. Aesthetic resource mitigation measures are presented in Chapter 8.

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TABLES

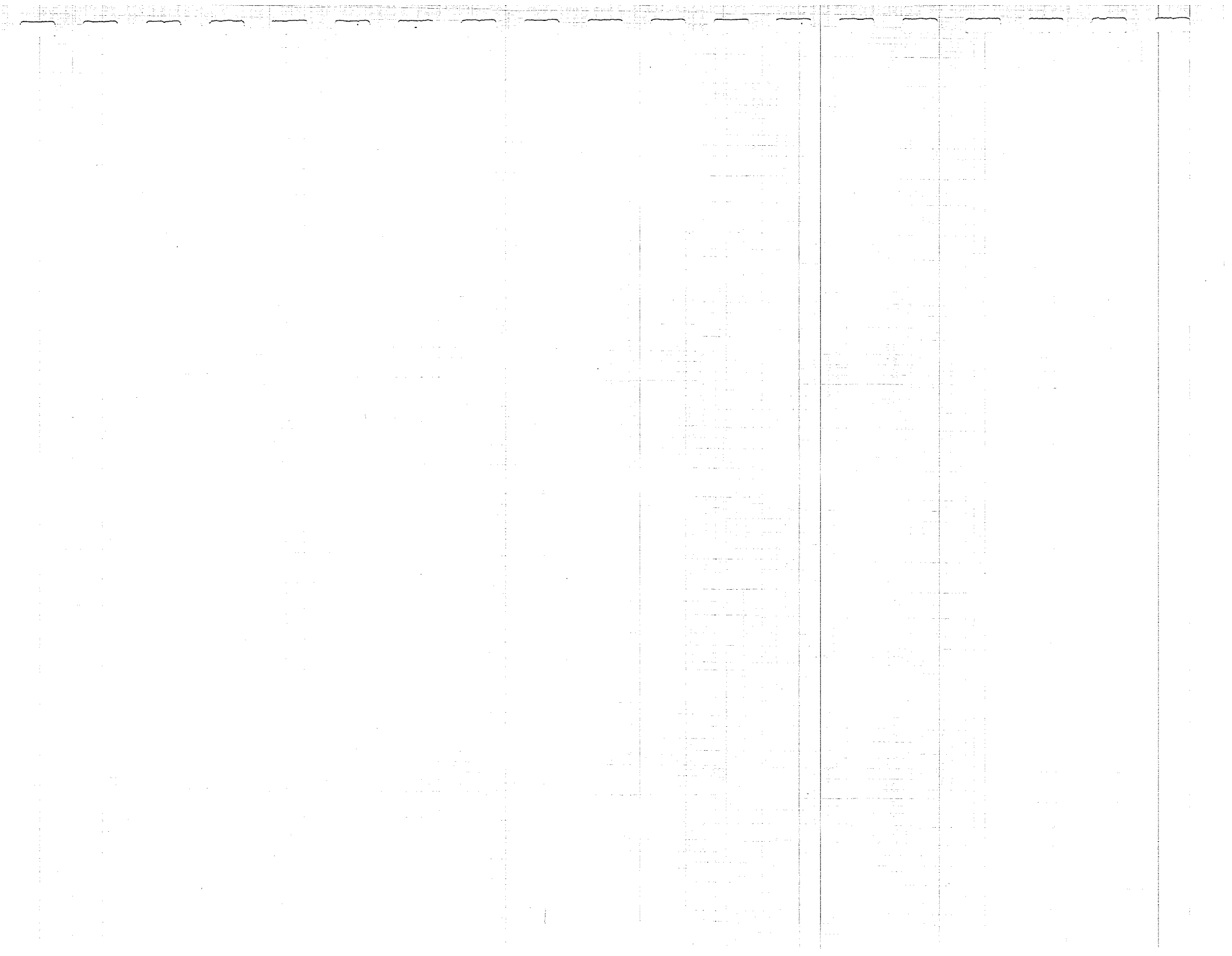


TABLE E.9.2.1: EXISTING STRUCTURES IN THE SUSITNA HYDROELECTRIC IMPOUNDMENT VICINITY

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
1	Cabin; meat house	2	Lake E. of Stephan Lake, 1850 feet elevation	floatplane, skis	Yes	Built in 1960s and in current use for seasonal hunting, fishing, and boating.
2	Boat cabin	1	S. bank Susitna: on tributary 3 miles S.W. of Fog Creek/Susitna Confluence	boat, foot	Yes	Built in 1960s for Stephan Lake Lodge; currently used seasonally by Stephan boating/hunting guests.
3 4	Cabin; shed Cabin	2	N.W. shore of Stephan Lake	airplane	Yes	Built 1960s and in current use for seasonal hunting, fishing, and boating.
5	Cabin	2	Tsusena Creek: 3.5 miles from Tsusena/Susitna Confluence	foot, dog team	No	Built in 1940s as a trapline cabin and used until late 1950s; no longer in use.
6	Cabin foundations	1	N. shore of Susitna: W. bank of 1st tributary W. of Tsusena/ Susitna Confluence	foot, dog team	No	Built in 1939 by Oscar Vogel as a trapping line cabin; used until late 1950s, now collapsed; no longer used.
7	Cabin; shed	2	S. shore of Fog Lake #2	floatplane	Yes	Built in 1960s and currently being usd as a seasonal fishing and hunting cabin.
8	Cabin	2	On knob of Fog Lake #1	airplane	Yes	Built in 1960s and currently being used as a seasonal hunting and fishing cabin.
9	Stephen Lodge (10 structures)	2	W. central shore of Stephan Lake	airplane, foot	Yes	Built in 1960s and in current use as hunting, fishing, and recreation lodge; can accommodate up to 35 guests; operates year-round.

TABLE E.92.1: (Page 2)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
10	Cabin; shed	2	0.5 mile S.W. of Stephan Lodge on Stephan Lake Shore	airplane, foot	Yes	Built in 1960s and in current use seasonally as a hunting and fishing cabin.
11	Cabin; shed	2	E. shore of Stephan Lake	airplane, foot	Yes	Hunting, fishing, boating, seasonal use; built in 1960s.
12 13 14 15	Cabin; shed Cabin; shed Cabin; shed Cabin; shed	2	E. shore of Stephan Lake	airplane, foot	Yes	Built in 1960s and in current seasonal use as hunting, fishing, and boating cabins.
16	Cabin; shed	2	Mouth of Prairie Creek at Stephan Lake	airplane, foot, horse	No	Built in 1940s and used until late 1950s as a hunting, fishing, and trapping base and residence; no longer used.
17 18	Cabin Cabin	2	W. shore of Prairie Creek	airplane, foot	Yes	Built in 1960 and 1979, respectively, and currently used as a year-round residence from which hunting, fishing, and trapping occur.
19	Cabin; meat house	2	E. shore of Murder Lake (S. of Stephan Lake)	airplane, foot	Yes	Built in 1960s and used as a year-round residence; hunting and fishing.
20 21	Cabin; shed Cabin; shed	3	S.E. shore of Daneka Lake	airplane, foot	Yes	Built in 1960s and currently used on a seasonal basis for hunting, fishing, and recreation by guests of Stephan Lodge.
22	Cabin; shed	3	Prairie/Talkeetna confluence	foot, dog team, boat	Yes	Built in 1960s and currently used seasonally by Stephan Lodge for purposes of fishing and hunting.

TABLE E.9.21: (Page 3)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
23	Cabin; shed	2	Game Lake	airplane, foot	Yes	Built in 1940s and used since then for trophy game hunting; now a part of Stephan Lodge's series of outreach cabins used on a seasonal basis.
25	Mining buildings (5)	2	Portage Creek: 2.5 miles N. of Portage/Susitna Confluence	airplane, ATV foot, dog team, horse	No	Mining records exist as far back as 1890s; mined 1920 and sporadically 1930s, then 1950-70s; currently inactive mining operations; buildings not in use.
26	Cabins (2)	2	1 mile N. of Portage Creek mining	airplane, ATV, foot, dog team	Yes	Mining; built in 1950s; used Creek seasonally.
27	Cabins (2)		N.W. shore of Dawn Lake	airplane, ATV, horse, dog team	Yes	Built in 1960s by owners of High Lake; used currently as a hunting cabin on a seasonal basis.
28	Lodge, High Lake (9 buildings)	2	S. shore of High Lake	airplane, ATV, horse, dog team	Yes	Built in 1960s for use as an international hunting/fishing lodge; currently in use by Acres American Susitna project on a seasonal basis.
30	Cabin foundations	2	S. shore of High Lake	airplane, ATV, horse, dog team	Yes	Built 1980.
34	Chunilna Creek Placer (7 buildings)	3	Chunilna Creek	airplane, ATV, 4WD, snowmachine	Yes	Large placer mixing operation in existence since 1950 and currently mined on a seasonal basis.
36	Mining buildings	3	Chunilna Creek: 8 miles S.W. of VABM Clear	airplane, ATV, 4WD, snowmachine, dog team, foot	Yes	Four buildings built in the 1920s, 1940s and 1960s and used seasonally for mining.

TABLE E.9.2.1: (Page 4)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
37	Cabin	3	3 miles N.E. of VABM Curry	foot, dog team	No	Built in 1940s and used seasonally for trapping until early 1960s; no longer used.
38	Cabin	3	Grizzly Camp: 5 miles E. of Daneka Lake	foot, dog team, airplane	Yes	Built by Vogel in the 1940s as a hunting cabin; currently used on a seasonal basis as a Stephan outrach cabin for hunting.
39	Cabin	2	9 miles of Stephan Lake: 7 miles S. of Fog Lake	foot, airplane	Yes	Built in 1970s; current use not known at this time.
40	Cabin; shed	2	E. shore of Stephan Lake	airplane, foot	Yes	Built in 1960s and in current seasonal use as hunting, fishing, and boating cabins.
42	Cabin	2	Portage Creek: 2 miles N.W. of Dawn Lake	foot, sled, road, airplane, ATV	Yes	Built in 1960s and currently used on a seasonal basis for hunting and fishing.
45	Cabin	2	1 mile W. of Portage Creek mining	foot, airplane, ATV, 4WD	Yes	Currently used on a seasonal basis for recreational purposes.
46	Cabin	2	1 mile W. of Portage Creek mining, on sled road	foot, airplane ATV, 4WD	Yes	Currently used on a seasonal basis for recreational purposes.
47 Cabin 48 Cabin 49 Cabin		2	Unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	Yes	Currently used on a seasonal basis for recreational purposes.
50	Trailer	2	W. end of S. shore of unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	No	Currently not in use, abandoned.

TABLE E.9.2.1: (Page 5)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
51	Cabin	2	W. end of S. shore of unnamed lake N. of Otter Lake	foot, airplaine ATV, 4WD	No	Built in late 1960s and currently used for hunting and fishing on a seasonal basis.
52 53	Cabin Cabin	2	S. shore of unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	Yes	Built in late 1960s and is seasonally used for hunting and fishing.
55	Cabins (3)	2	W. end of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970s and currently used on a seasonal basis for hunting and fishing.
56	Cabin	2	N. shore of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970s and currently used on a seasonal basis for hunting and fishing.
57	Lodge	2	N. shore of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970s; lodge and cabin used for fishing, hunting, and skiing on a year-round basis; seasonal boating.
58	Cabin foundations	2	E. end of Bear Lake	foot, airplane,	No	Built in 1950s for trapping purposes; no longer in use.
59 60 61 62 63	Cabin Cabin Cabin Cabin Cabin	3	Chulitna Pass: near railroad	foot, airplane, rail, car	Yes	Exact construction dates not known; currently used as year-round residences.
64 65	Cabin Cabin	2	Miami Lake	rail, foot, car, airplane	Yes	Perhaps being used as recreational cabins.
69	Cabin	2	S. shore of Bear Lake	airplane, foot, 4WD	Yes	Built in 1960s and currently used for hunting, fishing, and swimming.

TABLE E.92.1: (Page 6)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
70	Lodge	3	N. shore of Tsusena Lake	airplane, ATV	Yes	Built in 1958; used for commercially guided hunts until 1976; presently used on a seasonal basis for private hunting, fishing, and skiing trips.
72	Cabin	3	Deadman Lake: W. of Big Lake	airplane, ATV	Yes	Built in 1960s for fishing and hunting purposes and currently used on a seasonal basis.
73 74	Cabin Cabin	3	Big Lake	ATV	Yes	Built in 1960s; currently used on a seasonal basis for hunting and fishing.
75	Cabin	2	4 miles from Watana/ Susitna confluence	airplane, ATV	Yes	Built in 1960s; currently used on a seasonal basis for hunting.
76	Cabin	2	7 miles E. of Big Lake	airplane, ATV	Yes	Constructed in 1970s and currently used on a seasonal basis for hunting and fishing.
77 78	Cabin Cabin	2	W. end of Watana Lake	airplane, dog team, snowmachine	Yes	Built in 1950s and 1960s, respectively, and currently used seasonally for hunting and fishing.
79 80	Cabin Cabin	2	E. end of Watana Lake	airplane, dog team, snowmachine	Yes	Built in 1950s and 1960s, respectively, and currently used seasonally for hunting and fishing.
81	Cabin	2	E. end of Gilbert/ Kosina confluence	foot, dog team	No	Built on 1936 as a trapping line cabin; used until 1955; currently abandoned with everything intact.

TABLE E.92.1: (Page 7)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
82	Tent frame	2	S.W. foot, Clarence Lake	foot, dog team	No	Built in 1950s and used until 1960s for seasonal hunting.
84	Cabins (2)	2	S.E. end of Clarence Lake	airplane	Yes	Built in 1950s and currently used seasonally as a hunting and fishing cabin.
85	Cabin	2	E. end of Clarence Lake	airplane	Yes	Built in 1970s and currently used on a seasonal basis for hunting, fishing, and trapping.
86	Cabin	2	N. end of Clarence Lake	airplane	Yes	Built in 1960s and currently used on a seasonal basis for hunting, fishing, and trapping.
87	Cabin	2	On tributary 1 mile E. of Clarence Lake	foot, dog team	No	Built in 1930 and used until 1950 for trapping, hunting, and fishing (Simco's line Cabin #4); currently used seasonally as a hunting shelter.
88	Cabins (2)	2	Gaging station: S. bank of Susitna	airplane	No	Built in 1950s for research purposes; currently not used or maintained.
89	Cabin	3	Unnamed lake 3 miles S.W. of Clarence Lake (island in middle)	floatplane, boat	Yes	Exact construction date not known; currently used on a seasonal basis for fishing.
90	Hunting lean-to	1	S.E. bank of Kosina/ Susitna confluence	boat, foot, floatplane	Yes	Built in late 1970s for hunting/ fishing purposes; fresh supplies indicate current use.

TABLE E.92.1: (Page 8)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
91	Cabin	1	2 miles N.E. of Watana/ Susitna confluence	floatplane	No	Built in 1950s; used as a seasonal hunting and fishing cabin; supplies indicate current use.
92	Cabin/cache	1	N.W. bank of Watana/ Susitna confluence	dog team, foot	No	Built in 1960s for hunting purposes; cabin collapsed; no longer in use.
93	Cabin	2	W. of Jay/Susitna confluence	airplane	Yes	Built in 1960s and used currently on a seasonal basis for hunting and fishing.
94	Cabin	2	Laha Lake: 1.5 miles W. of Jay Creek	floatplane, airplane	Yes	Built in 1960s and used currently on a seasonal basis for fishing.
95	Cabin	2	Unnamed lake: 2.5 miles S.E. of Vee Canyon gaging station	airplane	Yes	Built in 1950s and used currently on a seasonal basis for fishing.
96	Cabin					
98	Cabin	3	Oshetna River: 10 miles S. of Oshetna/Susitna confluence	dog team, foot, boat	No	Built by Simco in 1930 as a trap line cabin and used on a seasonal basis for hunting and fishing.
99	Cabin	2	Tyone River/Susitna confluence	boat	Yes	Built in 1960s by Stephan Lodge owner as a river cabin for Stephan Lodge boating guests.
100	Tent platform	2	Susitna sandbar: S. of Tyone River/ Susitna confluence	boat, helicopter	No	Built in 1970s and used currently for transient boaters.
101	Cabin	3	0.2 mile S. of Maclaren/Susitna confuence	boat	Yes	Built in 1960s and currently used for boating on a seasonal basis.

TABLE E.9.2.1: (Page 9)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
103	Cabin	2	Jay Creek: 3 miles N. of VABM Brown	ATV	Yes	Built in 1970s for hunting and currently used on a seasonal basis.
105	Cabin	3	Coal Creek	ATV, airplane	Yes	Built in 1970s for hunting and currently used on a seasonal basis.
106	Cabin	3	S. end of Coal Lake	ATV, airplane	Yes	Built in 1960s and currently used on a seasonal basis for mining and fishing.
107	Cabin	1	S. bank of Susitna at Devil Canyon	4WD	No	Built and used in 1950s for Bureau of Rec. study; currently not in use.
110	Cabin	2	N. end of Madman Lake	airplane	Yes	Built in 1960s and currently used on a seasonal basis for hunting and fishing.
111	Cabin	1	S. bank of Susitna; 1 mile upstram of Watana/Susitna confluence	dog team, foot	No	Built in 1945 as a trapping line/ hunting cabin; used for trapping until mid 1950s, presently covered with brush; no longer used.
112	Line cabin	1	N.E. corner of Jay/ Susitna confluence	foot, dog team, boat, floatplane	No	E. Simco's line (trapping) and hunting cabin built in 1939; dates and game records indicate annual use.
112	Cabin foundations	2	W. bank of Portage Creek: 4 miles from Portage/Susitna confluence	dog team, foot	No	Built in 1940s as a mining/prospecting cabin; no longer in use.

TABLE E.9.2.1: (Page 10)

Map	Structure	Zone[a]	Location	Access[b]	Currently Maintained	Use Status
113	Cabin	3	Unnamed lake: 6 miles W. of Murder Lake	airplane	No	Built in 1960s for hunting purposes; no longer in use.
114	Cabin	3	7 miles N.E. of VABM Disappointment	airplane	Yes	Built in 1970s for hunting use and currently used for seasonal hunting.
115	Cabin	3	2 miles of N. of Tsusena Lake	airplane	Yes	Built in 1970s and currently used as a year-round residence by a guiding outfit.
116	Cabin	2	1 mile W. of VABM Oshetna	airplane	Yes	Built in 1970s for hunting purposes and is currently used on a seasonal basis.
117	Cabin	2	Tyone River/Tyone Creek confluence	boat, dog team	Yes	Built in 1960s for hunting and fishing purposes and currently used on a seasonal basis.
118	Cabin	2	7 miles due E. of Tyone River/Susitna confluence	boat, dog team	No	Built in 1960s for hunting and fishing purposes, no longer in use.
119	Trailer; work shack	1	N. bank of Susitna: 1 mile of Deadman/ Susitna confluence	helicopter	Yes	Built in 1970s by Army Corps for Susitna study.
120	Shack	1	S. bank of Susitna: 1 mile of Deadman/ Susitna confluence	helicopter	No	Used and built in 1970s as a research site; since Army Corps study, has collapsed; no longer used.

Notes: (put on bottom of first page)

(a) Zone 1 is the impoundment zone plus a 200 foot perimeter.
Zone 2 is the 6 mile perimeter around Zone 1.
Zone 3 is that zone between 6 and 12 miles from the impoundment.

(b) Almost all sites are accessible by helicopter.

FIGURES

LEGEND:


LANDING STRIP OR AREA


AIRPORT

HIGHWAYS, TRAILS, GRAVEL & PAVED ROADS


RAILROAD RESERVE


CAMPGROUNDS

TRANSMISSION LINE


GENERAL RECREATION AREA


GENERAL RECREATION AREA
INTENSIVELY USED


GENERAL RECREATION AREA
MODERATELY USED

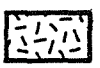

STATE RECREATION & STATE
GAME REFUGE AREAS


GENERAL MINING AREA

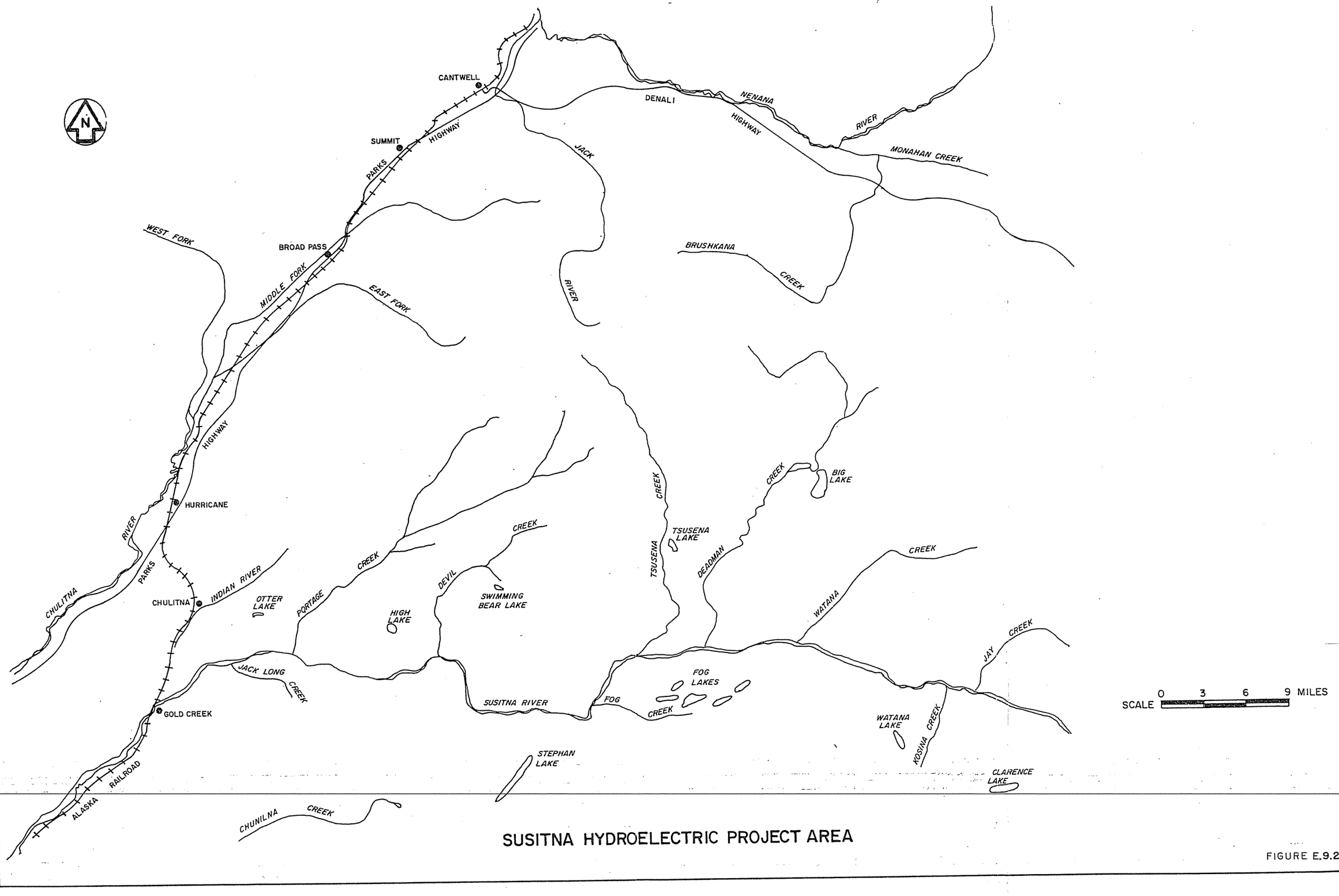

AGRICULTURAL AREA


POINT McKENZIE
AGRICULTURAL AREA


MILITARY INSTALLATION

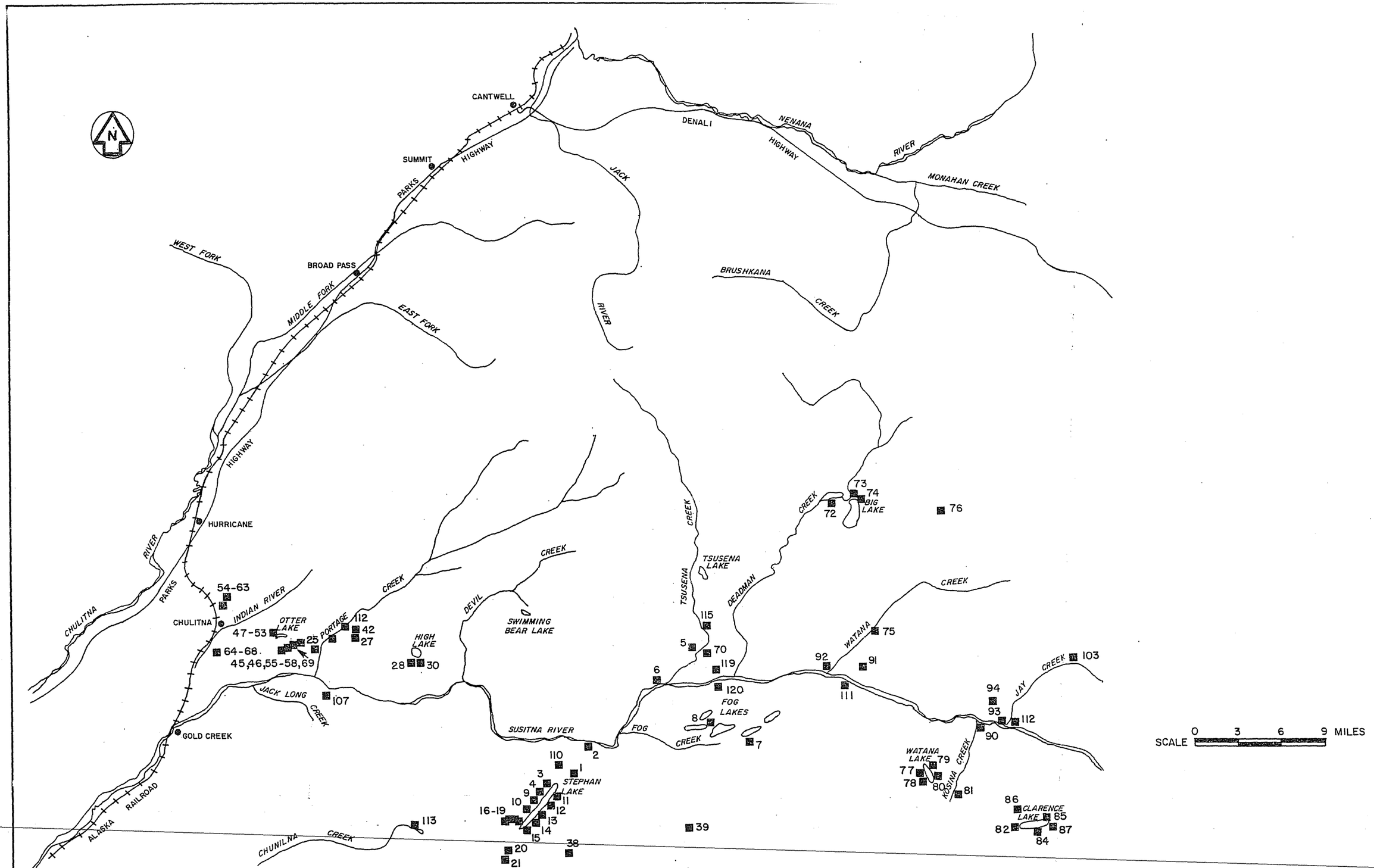

RESIDENTIAL / COMMERCIAL
DEVELOPMENT

LEGEND FOR FIGURES E.9.2.4, E.9.2.5, AND E.9.2.6



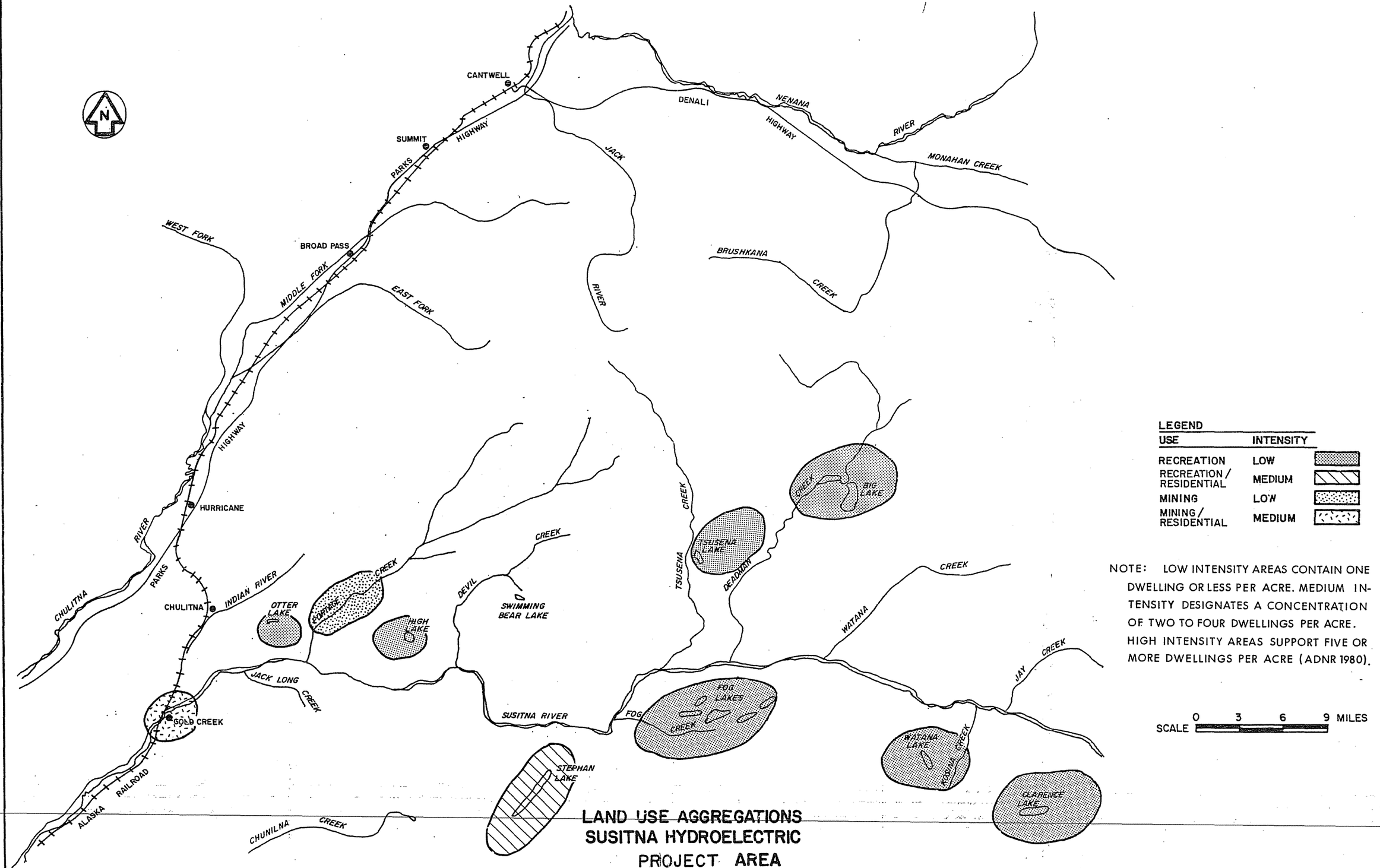
SUSITNA HYDROELECTRIC PROJECT AREA

FIGURE E.9.2.1



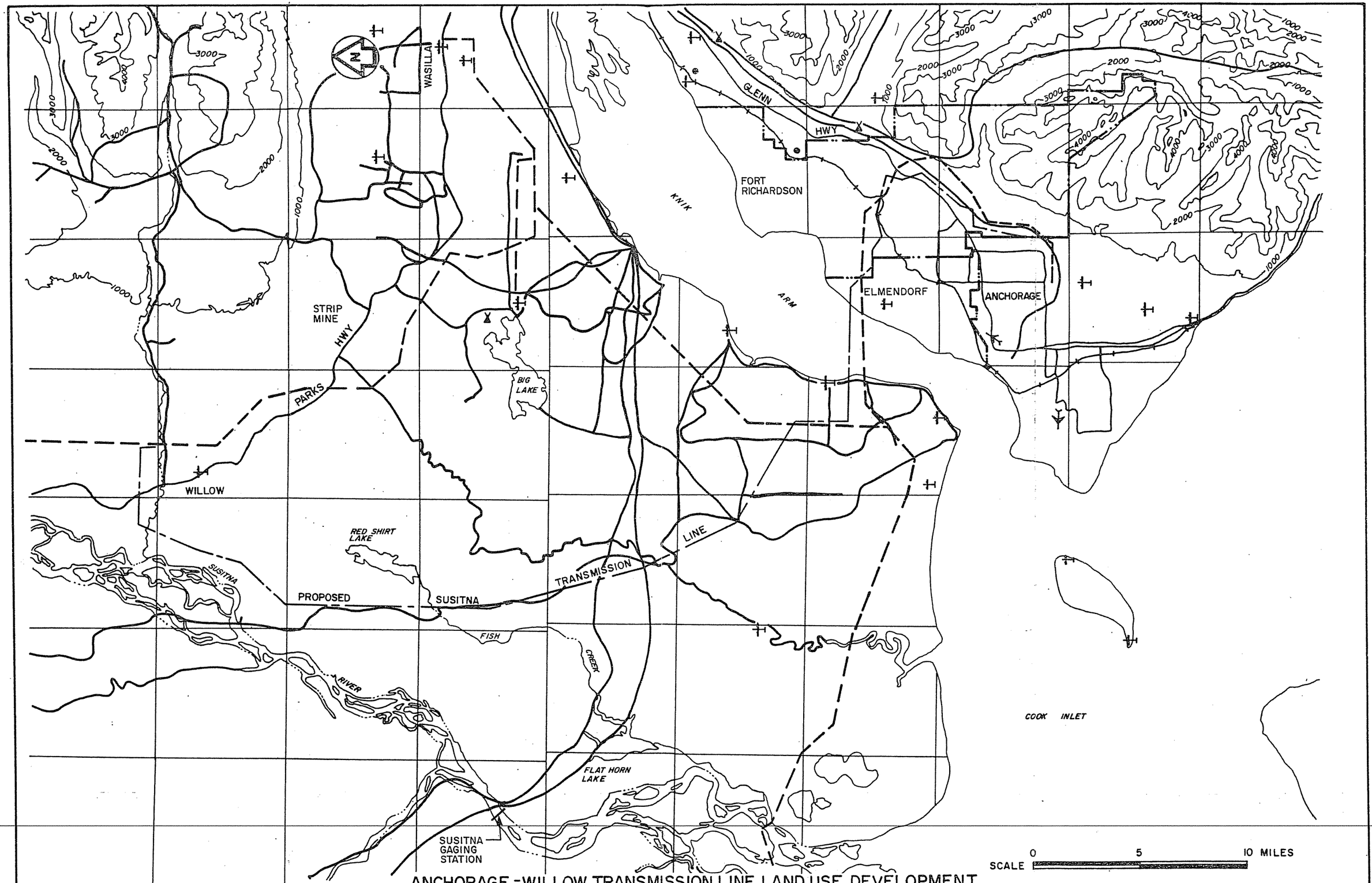
EXISTING STRUCTURES SUSITNA HYDROELECTRIC PROJECT AREA

FIGURE E.9.2.2



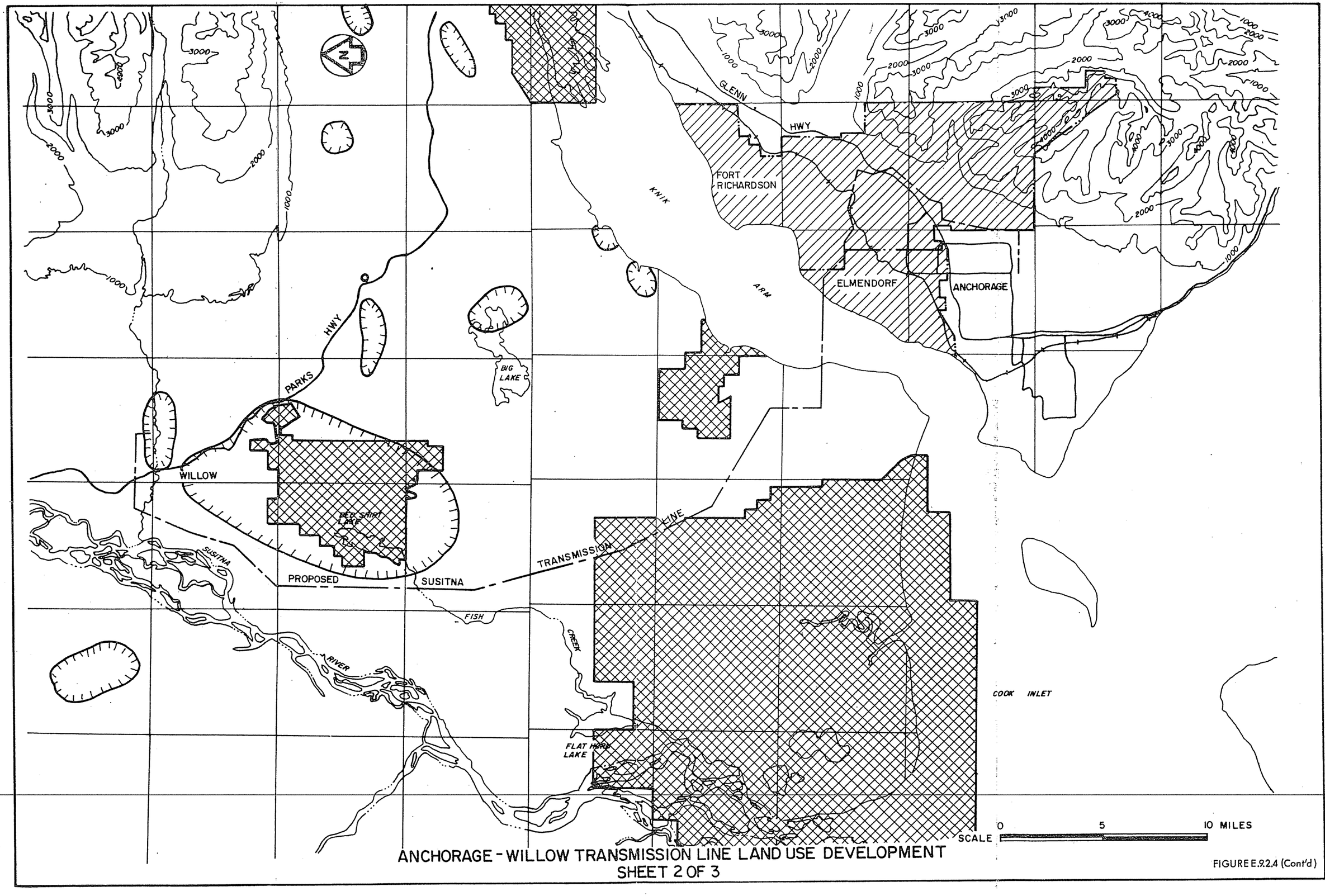
LAND USE AGGREGATIONS SUSITNA HYDROELECTRIC PROJECT AREA

FIGURE E.9.2.3



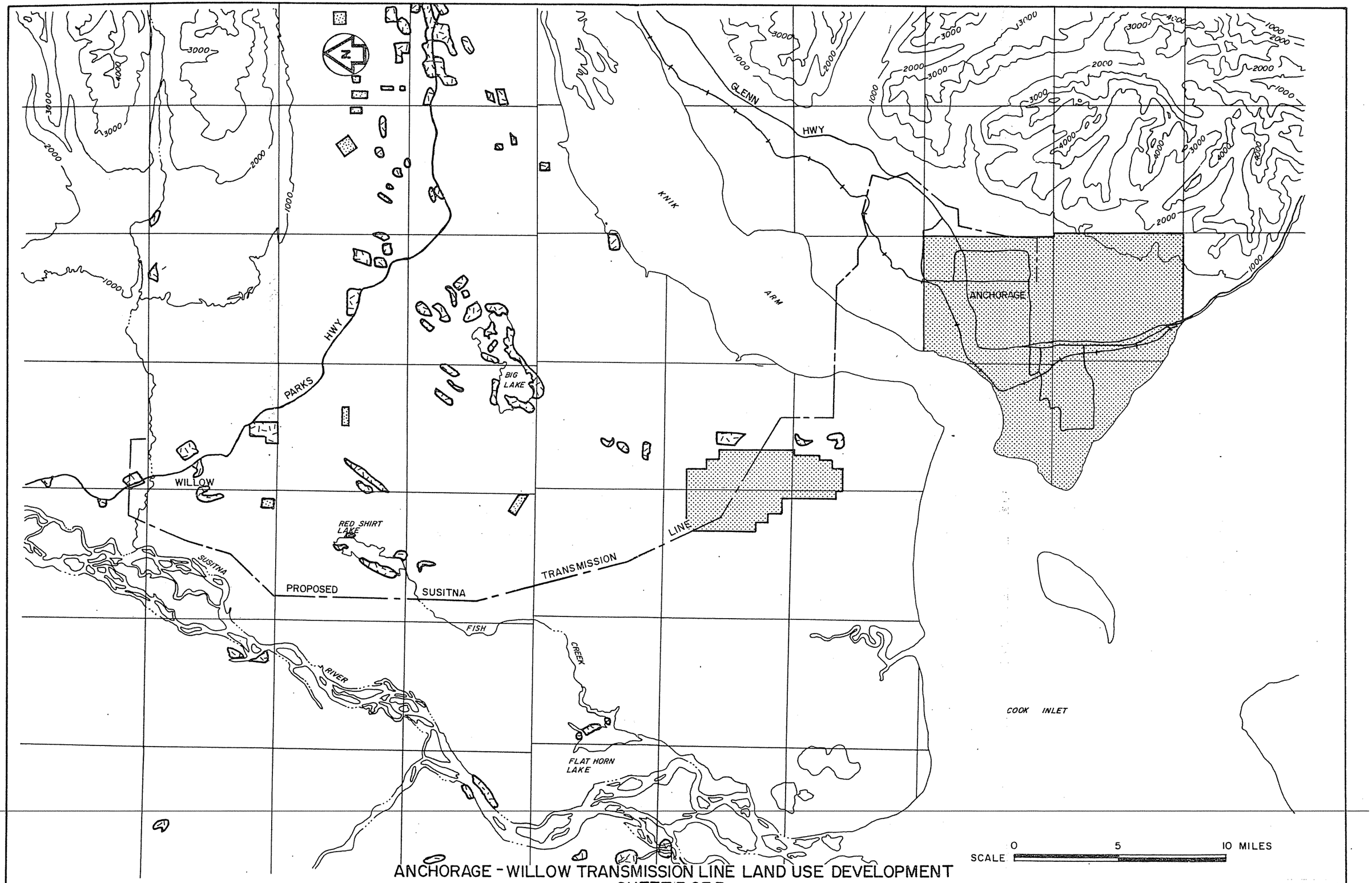
ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 1 OF 3

FIGURE E.9.2.4



ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 2 OF 3

FIGURE E.9.2.4 (Cont'd)



ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 3 OF 3

FIGURE E.9.2.4 (Cont'd)

N

TATLANIKA CREEK

TOTATLANIKA CREEK

TOTATLANIKA RIVER

TANANA RIVER

PROPOSED SUSITNA TRANSMISSION LINE

FISH CREEK

PARKS HWY

TRAIL

JULIUS CREEK

NENANA GRAVEL PIT

GRAVEL PIT

GRAVEL PIT

GRAVEL PIT

HWY

RIVER

TEKLANIKA RIVER

PLACER MINE

LIBERTY BELL MINE

PLACER MINE

GAGING STATION

HEALY

GAGING STATION

1000

2000

3000

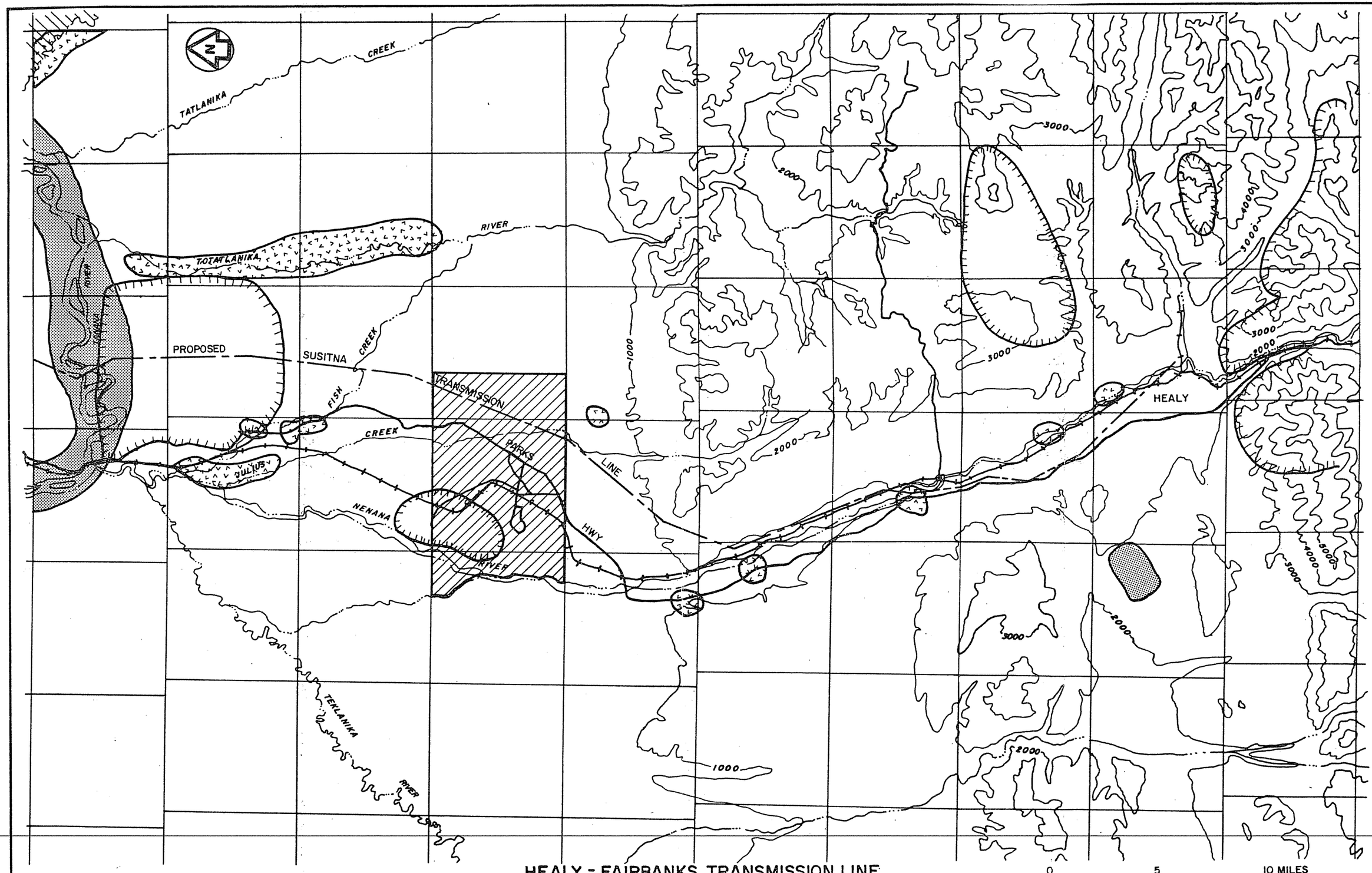
4000

5000

SCALE 0 5 10 MILES

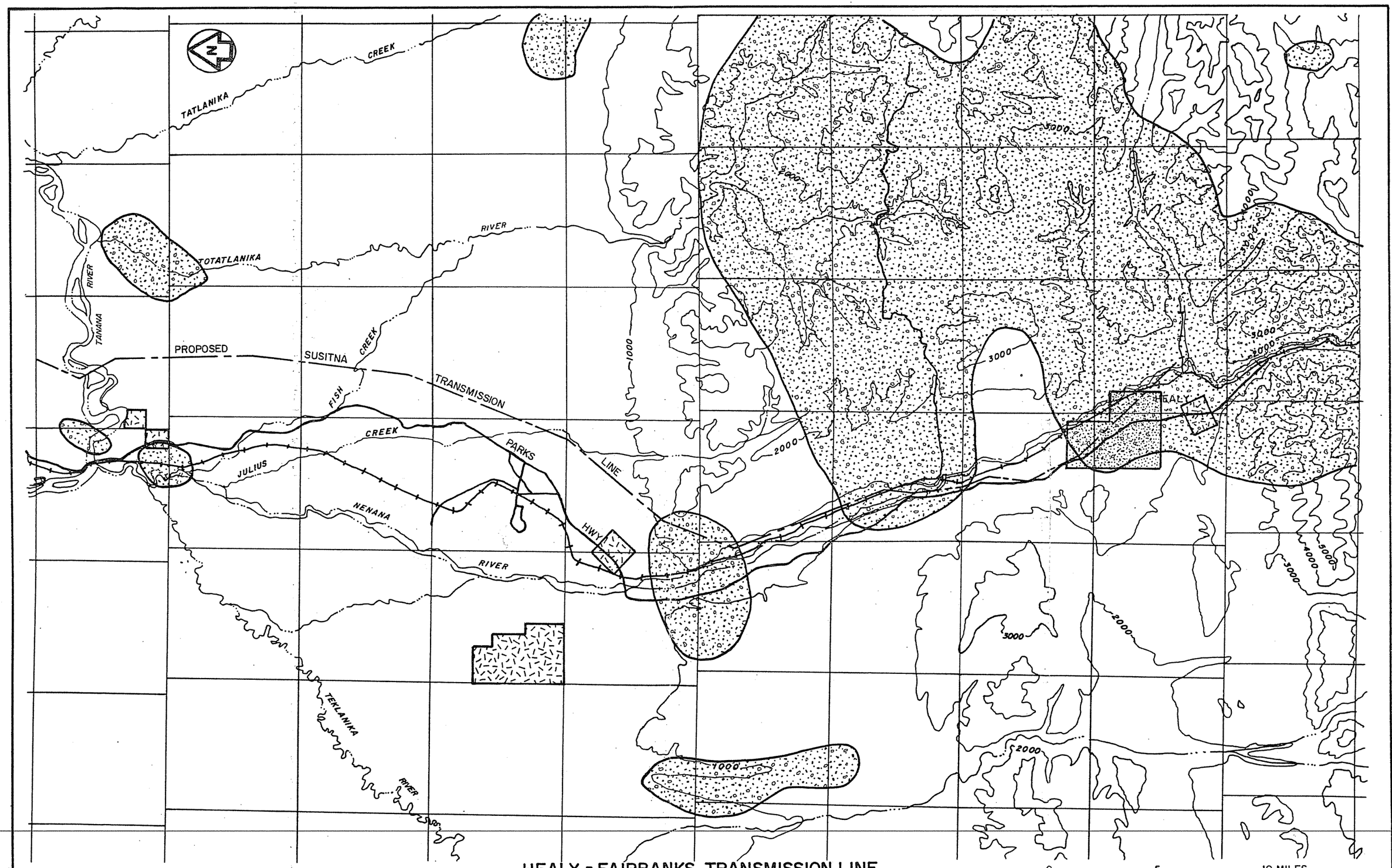
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 1 OF 3

FIGURE E.9.2.5



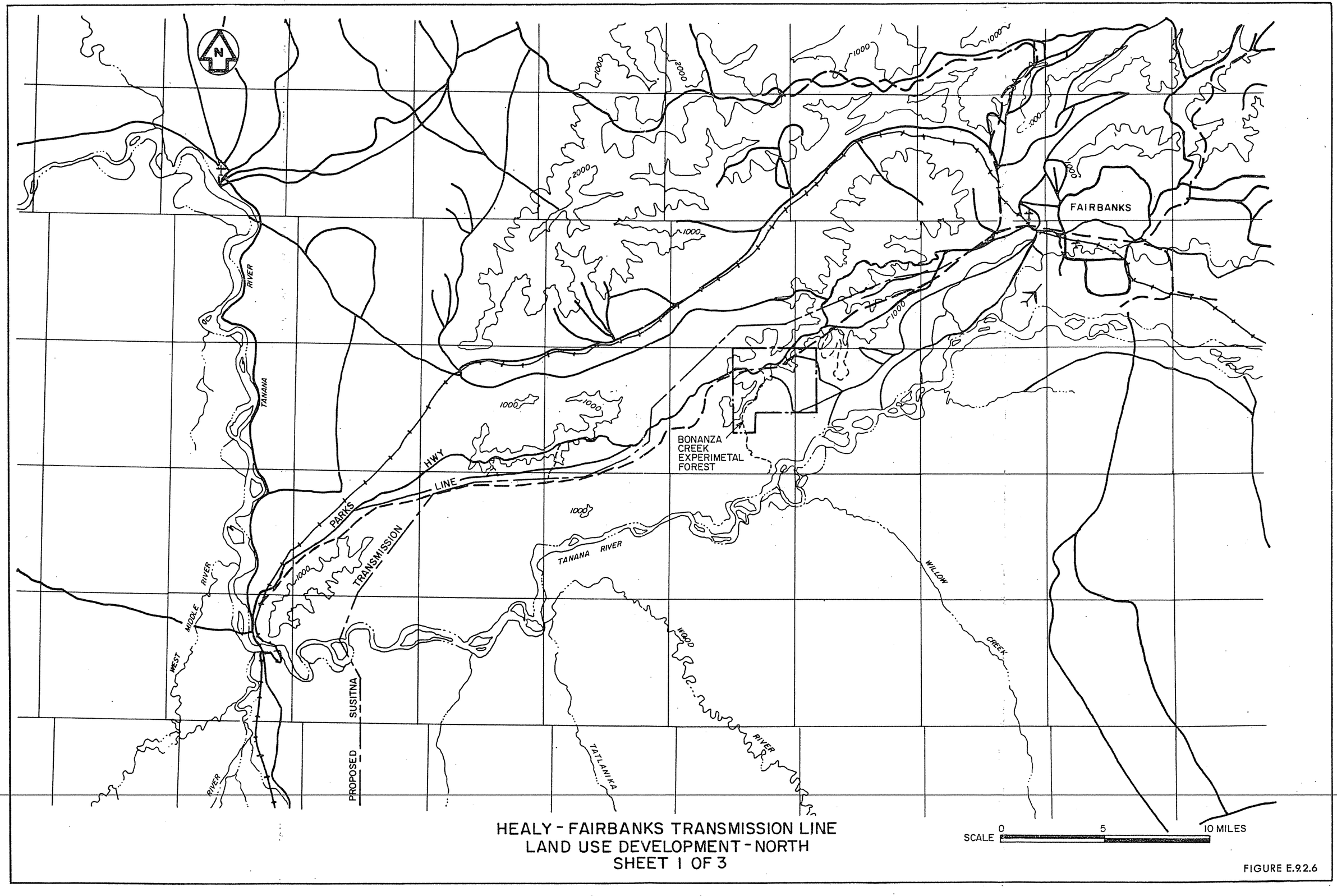
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 2 OF 3

FIGURE E.9.2.5 (Cont'd)



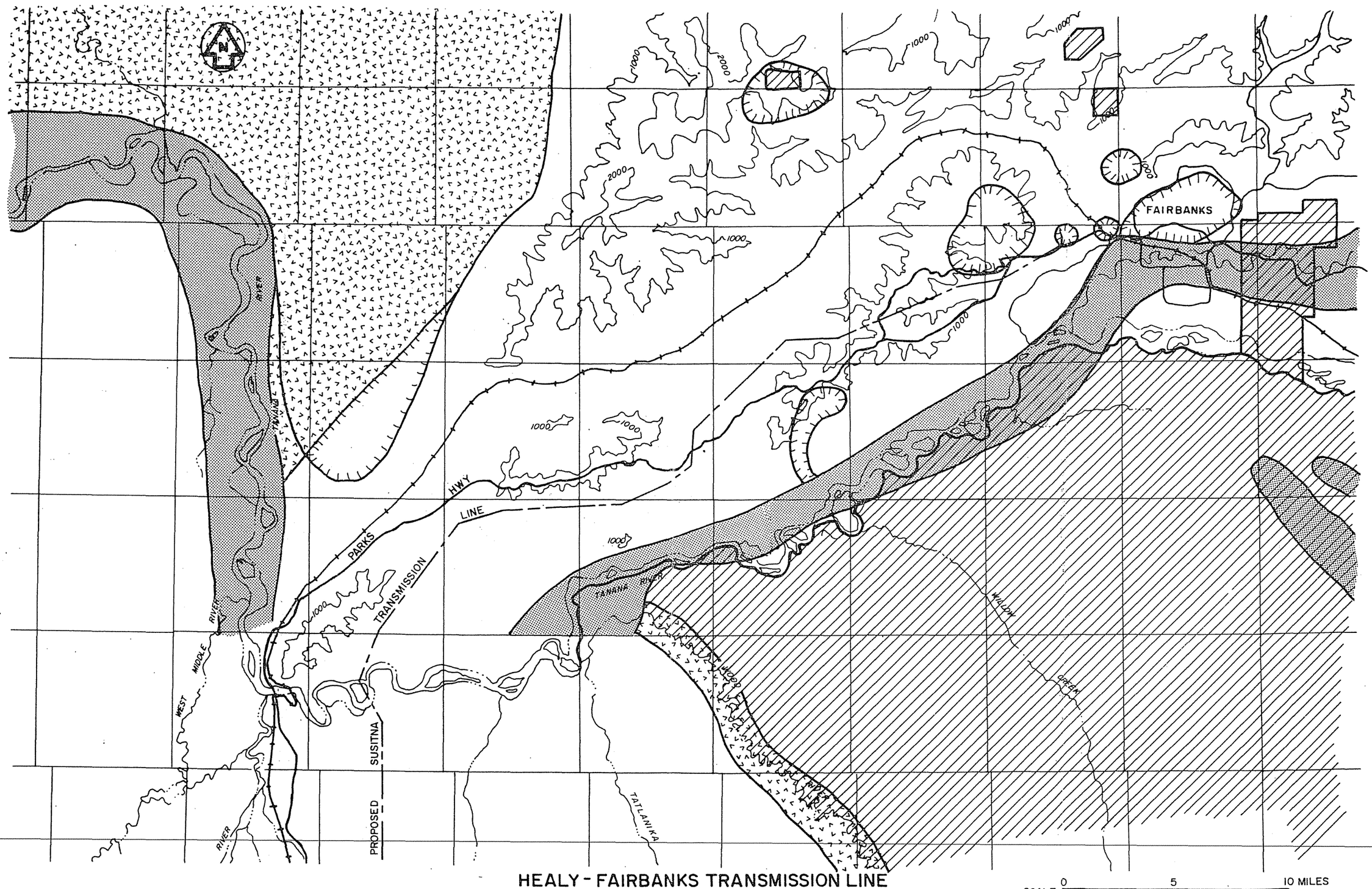
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 3 OF 3

FIGURE E.9.2.5 (Cont'd)



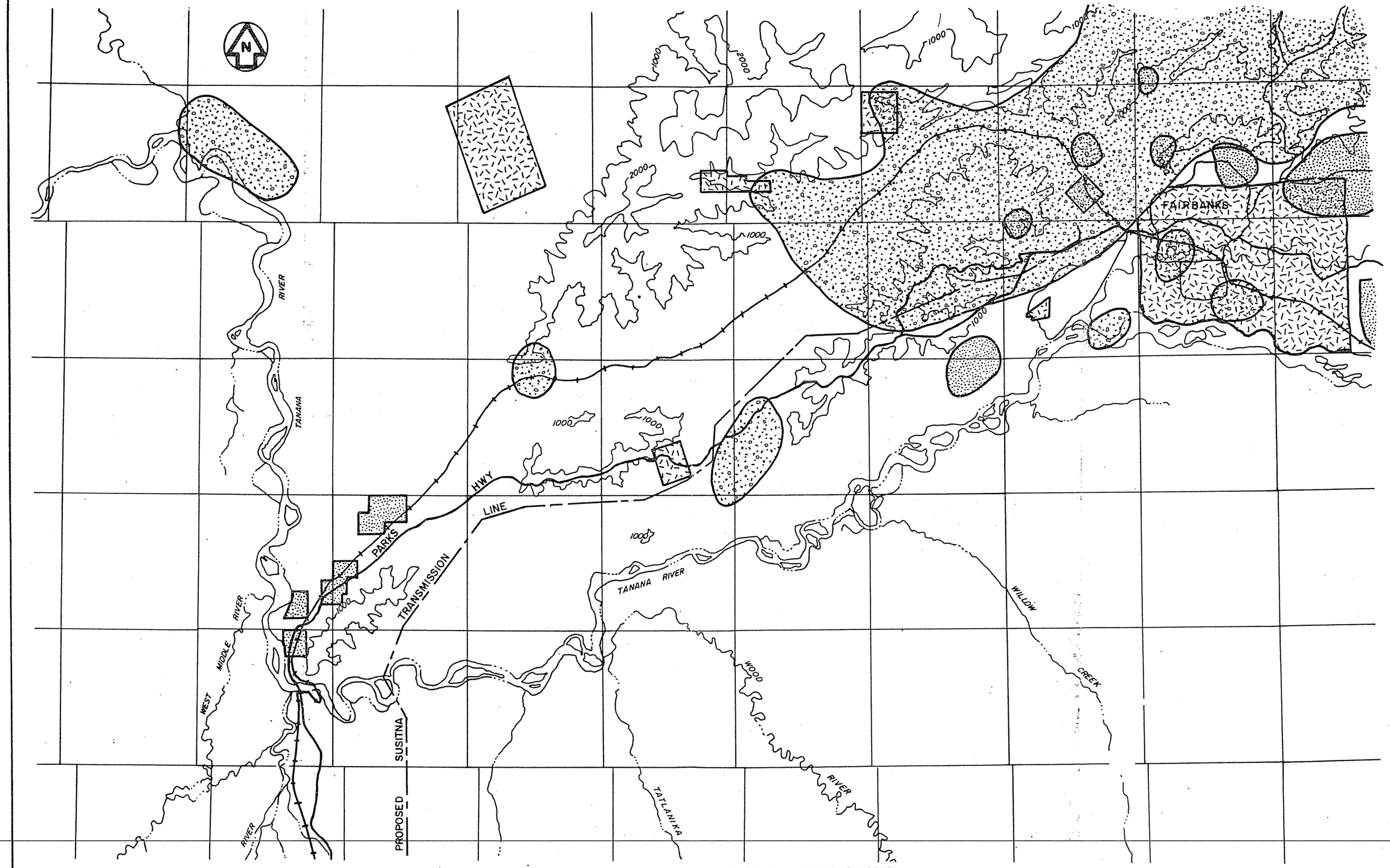
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 1 OF 3

FIGURE E.9.2.6



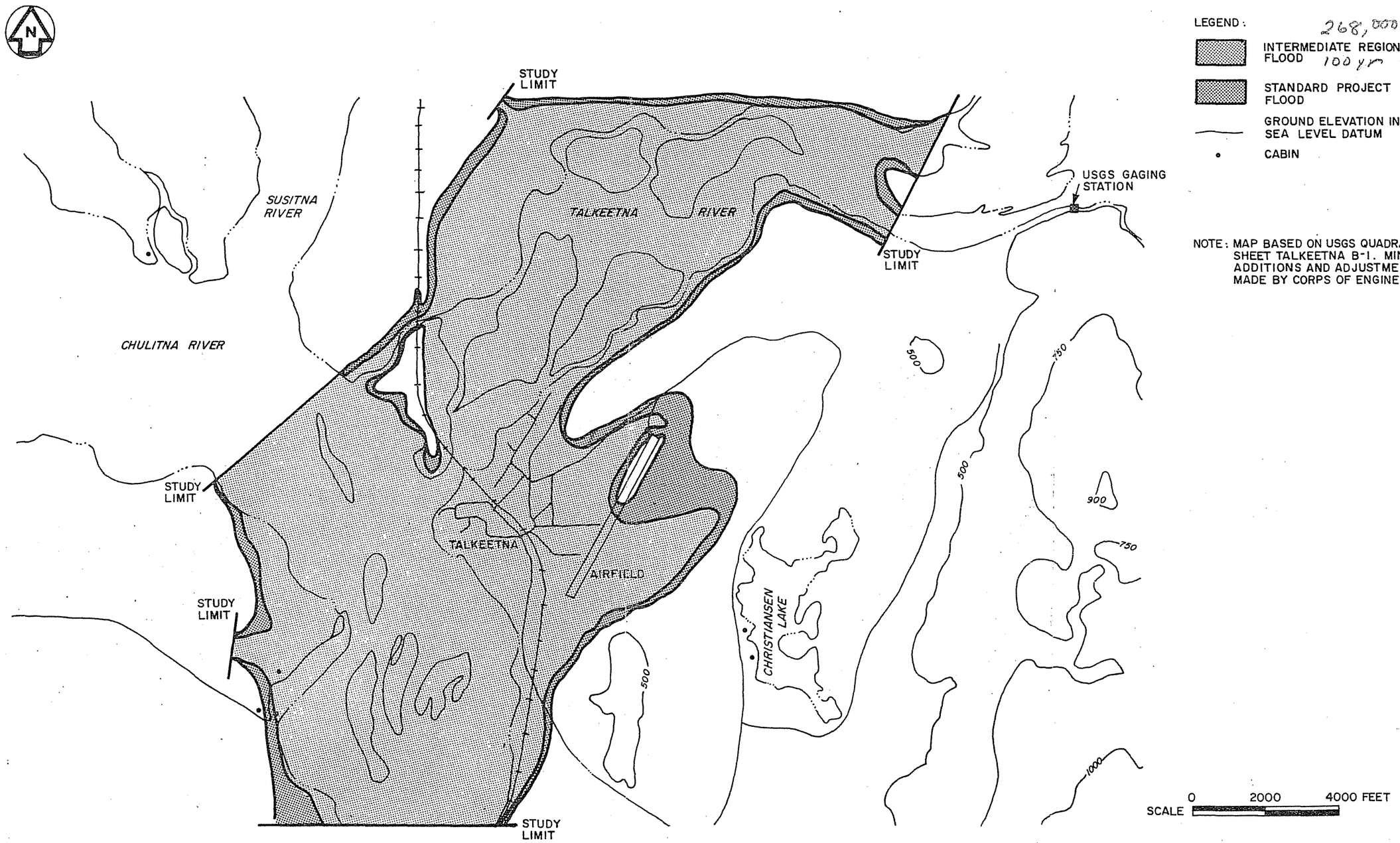
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 2 OF 3

FIGURE E.9.2.6 (Cont'd)



HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 3 OF 3

FIGURE E.9.2.6 (Cont'd)



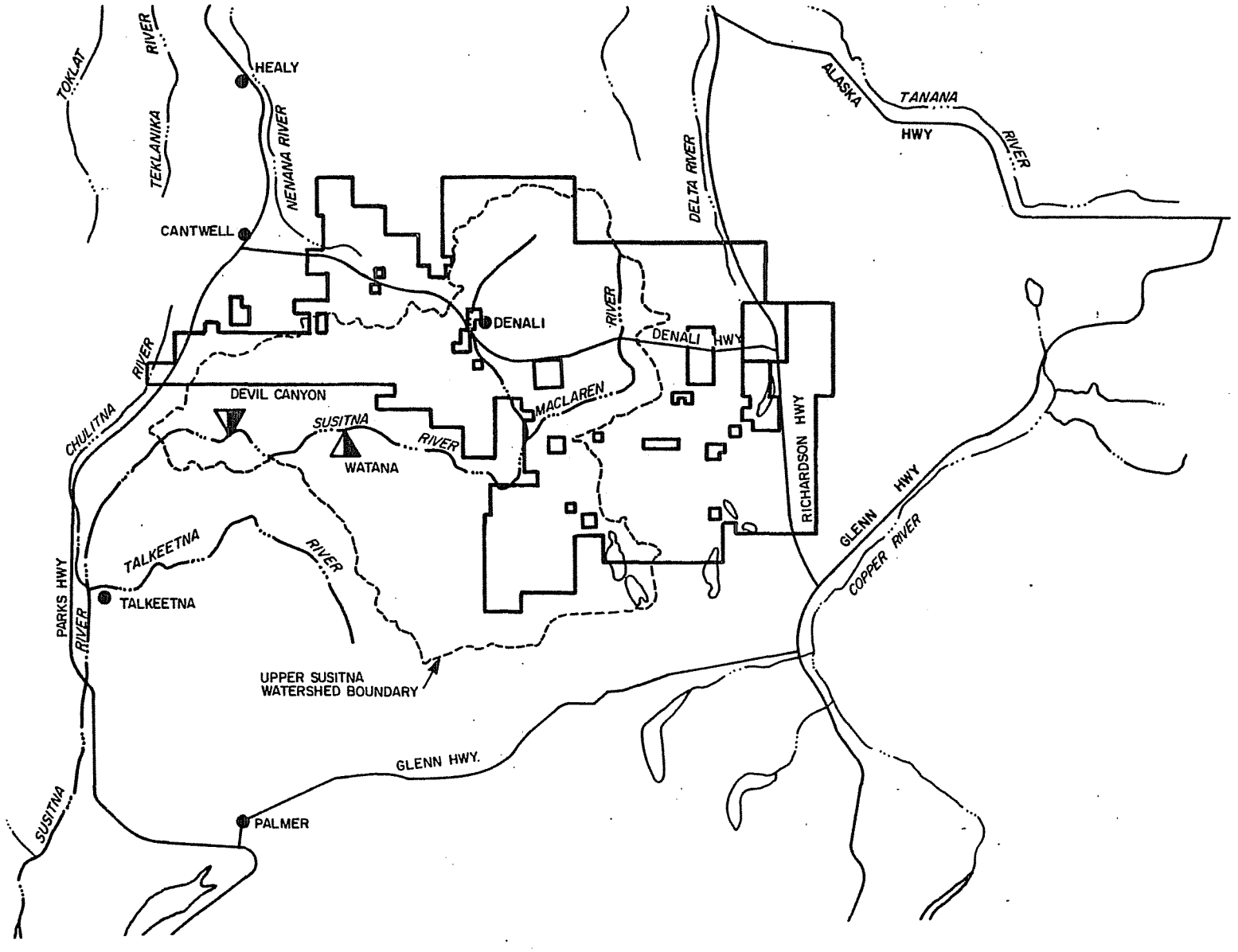
FLOODPLAIN INFORMATION - TALKEETNA, ALASKA

FIGURE E.9.2.7

LOCATION OF THE SUSITNA AREA PLAN STUDY AREA

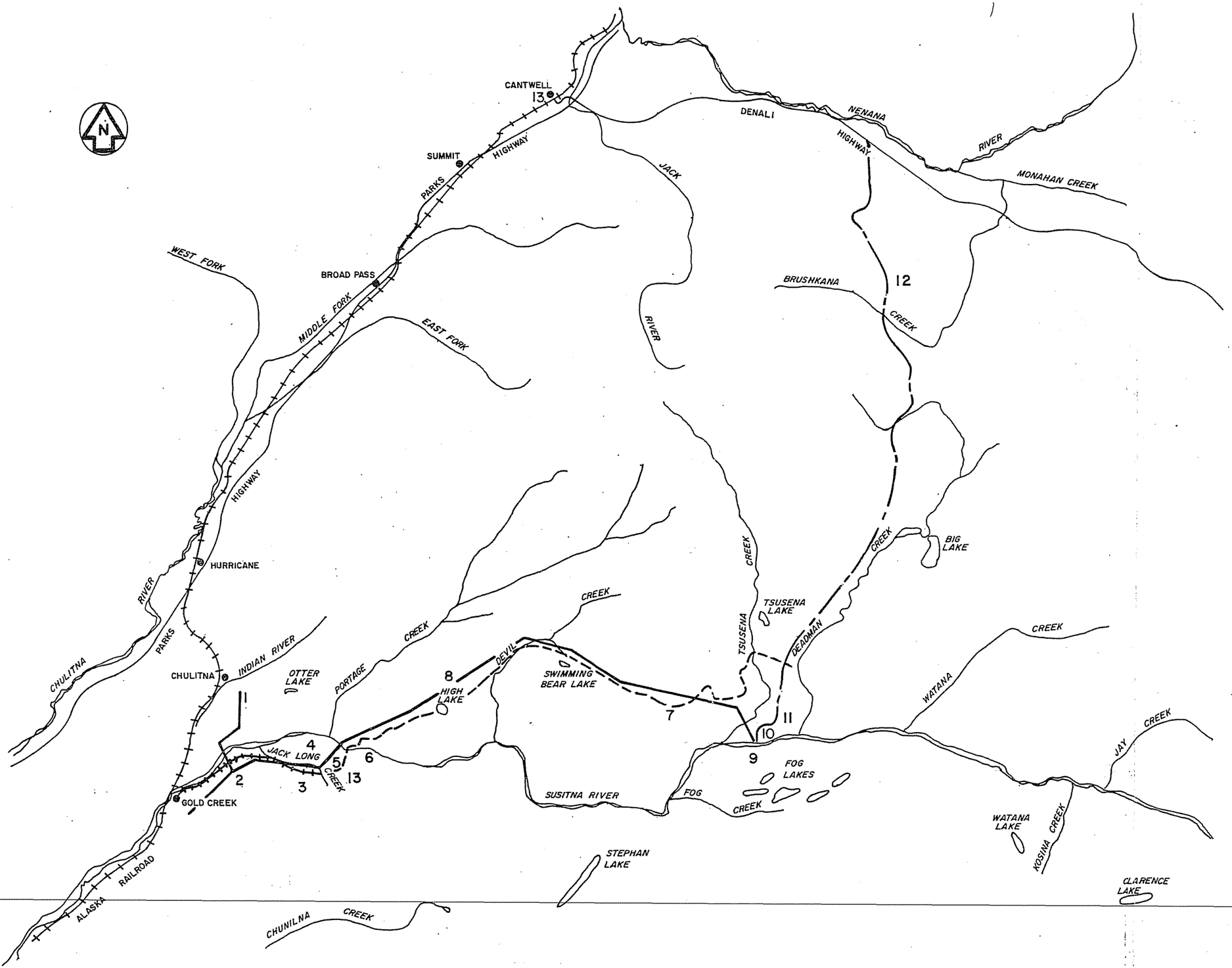
SOURCE: ADNR 1985

FIGURE E.9.2.8



BUREAU OF LAND MANAGEMENT
DENALI PLANNING BLOCK

FIGURE E.9.2.9



SUSITNA HYDROELECTRIC PROJECT FACILITIES

FIGURE E.9.2.10