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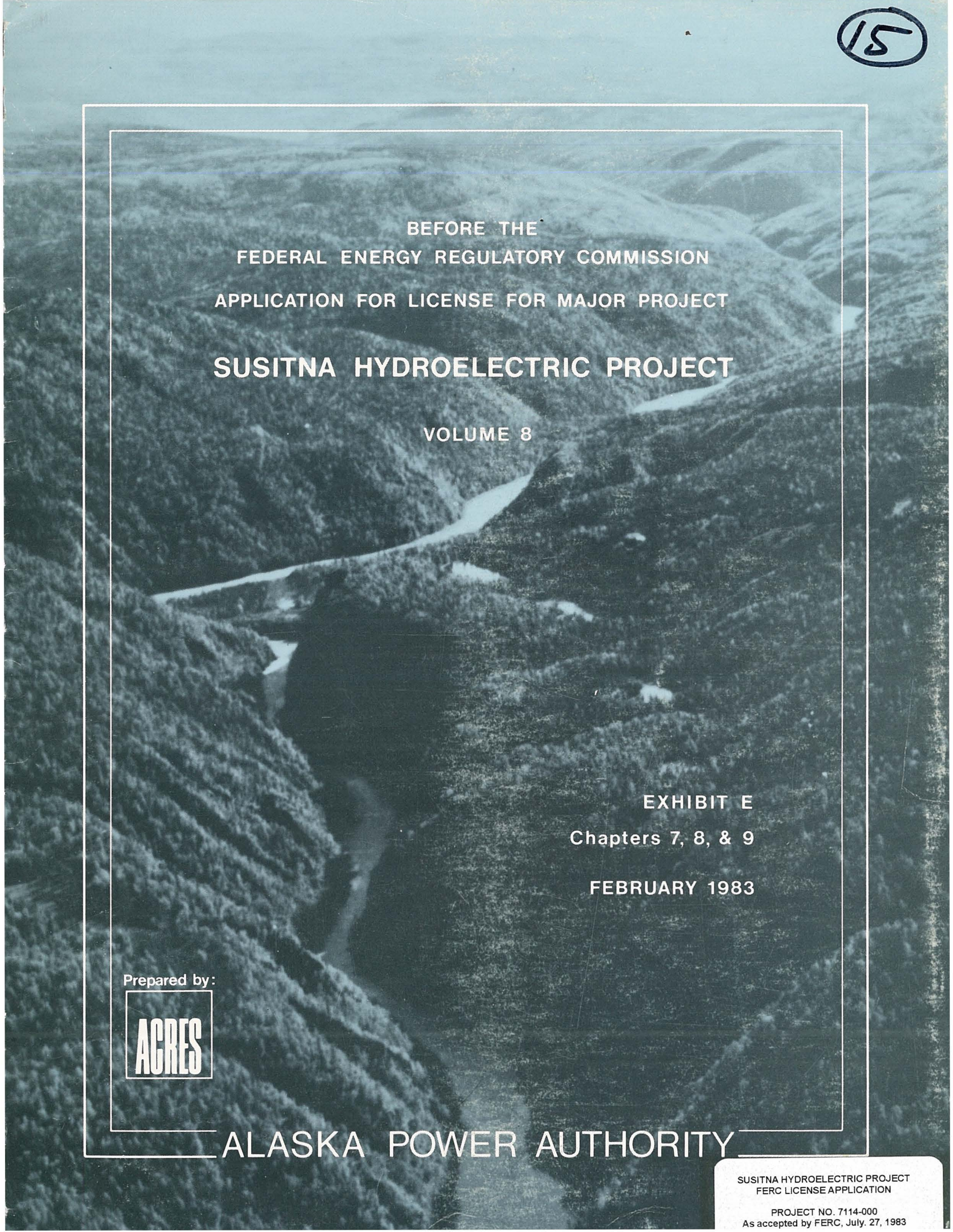

BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

APPLICATION FOR LICENSE FOR MAJOR PROJECT

SUSITNA HYDROELECTRIC PROJECT

VOLUME 8

EXHIBIT E

Chapters 7, 8, & 9

FEBRUARY 1983

Prepared by:

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ALASKA POWER AUTHORITY

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RECREATIONAL RESOURCES

SUSITNA HYDROELECTRIC PROJECT

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RECREATIONAL RESOURCES

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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 and to control public access within the project area. This plan is intended to be compatible with the existing environment and consistent with the planned construction and operation of the hydroelectric project. The plan has been designed to meet four primary objectives:

- To focus the public access on project lands and waters while protecting the scenic, public recreational, cultural, and other environmental values of the project area;

- To estimate and provide for the recreation user potential for the project area;

- To accommodate project-induced recreation demand; and

- To offset recreational resources lost by construction of the proposed project.

1.2 - Relationships to Other Reports

This recreation plan is based, in part, upon the project description presented in Exhibit A, project operations described in Exhibit B, and the proposed construction schedule described in Exhibit C. While the recreation plan constitutes a mitigation, it also becomes part of the project features, and as such has impacts in itself. This plan has therefore been coordinated with 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 they may assess the impacts.

1.3 - Study Approach and Methodology

1.3.1 - Approach

The planning approach is guided by the following factors;

- Phasing of facility and access;

- Operational characteristics of the project;

- Management objectives of the interested agencies and Native corporations;

- Recreation use patterns and demand;

- Intrinsic landscape resource opportunities and constraints;

- Facilities' design standards;

- Financial obligations and responsibilities of the Alaska Power Authority; and

- Federal Energy Regulatory Commission regulations.

The approach is divided into six steps, as follows:

- Analyze and describe operational characteristics, construction phasing, management objectives, and facilities' design standards related to the Susitna Hydroelectric Project;

- Determine locations and levels of existing recreation and forecast impacts of the project on existing recreation;

- Estimate existing and future recreation use patterns and demand;

- Evaluate the intrinsic physical recreation opportunities and constraints of the land;

- Develop the recreation use plan, develop conceptual designs of proposed sites, determine development levels and estimated user levels; and

- Describe mechanisms for plan implementation, construction and maintenance (see Figure E.7.1).

Section 1.4 describes the proposed Sustina Hydroelectric Project. Section 2 describes the existing recreation within the project's statewide and regional settings. Included are descriptions of facilities, activities, and the relationship of the project to existing recreation use patterns. Section 3 describes the impacts of the Watana and Devil Canyon project features, access routes, and the transmission lines on recreation and the project's future demand for area recreation with and without the Susitna project.

Section 4 describes the factors influencing the recreation use plan. These factors include Power Authority, agency, and Native corporation management objectives, design standards, and Alaska Power Authority's financial obligations and responsibilities.

Section 5 is the recreation use plan and includes an evaluation of the study area's intrinsic recreation potential, a recreation opportunity evaluation, proposed development levels, and recreation sites. This plan constitutes mitigations for impacts identified in Section 3. Section 6 describes the Recreation Use Plan implementation, phasing, monitoring, and future additions. Section 7 describes the costs associated with construction operations and maintenance of proposed facilities.

Every effort has been made to utilize the results of past studies and agency plans both of the Susitna Project itself and those of a more general nature. Particular emphasis has been given to the Susitna Hydroelectric Project Subtask 7.08 Report, (TES 1982b). Use was made both of that published report and the field data and background files utilized in its preparation. Additional results of a survey conducted as part of that effort have also been utilized in the formulation of this Recreation Plan.

1.3.2 - Methodology

Figure E.7.1 illustrates the study methodology employed in development of the recreation plan for the Susitna Hydroelectric Project.

Step 1 determined study objectives and developed a detailed work plan. This activity included review of all relevant agency documents and interviews with key agency personnel identified by the Power Authority. Objectives of each agency were determined as they relate to this recreation plan and included in Section 4 of this document. When combined with FERC Order 184, they constitute the objectives of this study as found in Section 1.1 of this report.

Step 2 included the parallel activities of an inventory of existing recreation facilities and plans and an estimate of future recreation demand with and without the project. An existing methodology for estimating future recreation demand was used as a basis for a project-related recreation demand methodology. In addition, four other approaches were utilized as a general check of results.

Step 3 consisted of an onsite inventory of existing recreation potential. This activity involved study of existing relevant project documents and previous studies, and extensive onsite investigations. Step 4 evaluated recreation opportunity based on information from Step 2 and defined the qualitative and quantitative aspects of site recreation potentials.

Step 5 is a further refinement of the opportunity evaluation and constitutes recommended recreation plans and alternatives for the project.

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

A detailed discussion of specific methodology employed is found in the introduction to individual report sections.

1.4 - Project Description and Interpretation

In order to develop a recreation plan related to hydroelectric development, it is first necessary to understand the project and its operation as it relates to recreation. The Susitna Hydroelectric Project is comprised of two major dams with storage reservoirs, penstocks and underground powerhouse, transmission lines, a railroad, and roads for construction and operation; two temporary single-status construction camps; two temporary married-status construction camps; a permanent village; and a landing strip. The project transmission lines connect to the Anchorage-Fairbanks Intertie, a separate project planned for construction beginning late 1982 and scheduled for operation in September 1984. The Intertie is not considered in this recreation plan.

1.4.1 - Construction

(a) Watana Dam and Reservoir

The Watana schedule anticipates issue of the FERC license by December 31, 1984 (see Exhibit C), and is predicated on having four units on line by the end of 1993 and an additional two units by July 1994 in order to meet forecasted load demand. Construction of an approximately 41.6-mile (61.7-km) access road commencing at Mile 110 of the Denali Highway and an airstrip near the site are planned to begin in January 1985 (see Figure E.7.2). Labor, equipment, and materials will be mobilized beginning in 1985. A temporary construction camp (single-status) ultimately housing 3480 workers and a construction village ultimately housing 350 families (1120 population) will be developed. Construction labor for the 885-foot (2170-m) high, 4100-foot (1250-m) crest length embankment dam and the 1020-MW powerhouse will peak in 1990 with about 3500 workers.

Construction of the two 33.6-mile (56-km) long 345-kV transmission lines will begin in 1989 and extend through 1992. They will be constructed primarily in the winter months. Impoundment of the reservoir, being 38,000 (14,200 ha) acres and 54 river miles (90 river km) long and with a gross storage capacity of 9,470,000 acre-feet, will begin in June 1991 and be completed in late 1993. As development nears completion, a permanent town near the construction camps intended to house a permanent work force of 125 plus dependents will be constructed, and the original camps will be relocated to the Devil Canyon site.

(b) Devil Canyon Dam and Reservoir

Devil Canyon construction is planned to begin as Watana approaches completion. Between early 1992 and mid-1994, a 37-mile (62-km) access road will be developed between Watana and Devil Canyon, including construction of a high-level bridge across Devil Canyon (see Figure E.7.2). A railroad will be constructed from Gold Creek to Devil Canyon. The Alaska Power Authority will defer decision on the public use of the access route from the Denali Highway until that time. However, for the purpose of this recreation plan it has been assumed that this road, no longer being heavily used for construction, will be opened to public access. Most construction materials will be brought to Devil Canyon on a new 12.2-mile (20-km) railroad from Gold Creek. A single-status camp for 1780 workers and a married-status village for 170 workers (550 people) will be constructed, utilizing structures brought from Watana to the extent possible. One of the 345-kV Watana transmission lines will be tapped for construction power. Construction work force for the 645-foot (197-m) high, 1650-foot (500-m) crest length thin arch concrete dam and the 600-MW powerhouse will peak at about 1800 workers in 1999 and extend to 2002. Two additional 8.8-mile (14.7-km) long, 345-kV transmission lines will be built to connect with the Intertie. An additional parallel 345-kV will be added to the Intertie itself. Impoundment of the reservoir will be 7800 acres (3080 ha) and 32 river miles (53 km) long and with a gross storage capacity of 1,090,000 acre-feet, will occur over a two-month period in 2001. The project will then be on line in 2002. The construction camp and village will be removed, and both Watana and Devil Canyon will be operated by the same personnel resident at the Watana townsite. It is assumed that the road connecting Watana and Devil Canyon will be opened to the public and the railroad, no longer needed for continuous project use, will potentially be available for public use.

1.4.2 - Operational Characteristics of the Project

(a) Watana Dam and Reservoir

The Watana dam and power plant are intended to provide base-load power supply supplementing existing and planned thermal and hydroelectric sources for the Railbelt beginning in 1993. Present plans also call for operation of Watana as essentially a baseloaded plant from 1993 to 2002, at which time it will be used as a daily peaking plant for load-following during the high-demand winter months. Watana reservoir will have a typical width of 1 mile (1.6 km), widening at Watana Creek to a maximum of 5 miles (8 km). Crest elevation of the dam will be 2210 feet (670 m), and water surface elevation during maximum probable flood conditions will be 2202 feet (658 m). Normal maximum operating elevations will be 2185 feet in September with a low of 2080 feet (630 m) in April or May. During breakup and through the most imporant recreation months of June, July, and August water levels will be increasing, reaching a peak in early September. Live storage area will be 3,740,000 acre-feet, and drawdown flats may range from a few hundred feet in canyon areas to several square miles in flatter areas such as Watana Creek (see Figure E.7.4).

As indicated in Table E.7.1, the Susitna River exhibits typical flow characteristics of arctic rivers. The table shows existing (pre-project) flows at three locations: Gold Creek, about 16 miles (27 km) below Devil Canyon; Sunshine, approximately 49 miles (82 km) farther downstream, and Susitna, another 53 miles (89 km) downstream. At Gold Creek, flows approach 6000 cubic feet per second (cfs) in October, the start of the water year. This rapidly decreases in November, December, January, February and March as the river freezes for the winter. At breakup, flows are over 13,000 cfs in May and peak in June. Average monthly flows gradually decrease in July (24,000 cfs), August (22,000 cfs), and September (13,000 cfs). The effect of the Watana project as currently planned will be both to moderate these wide fluctuations and also to redistribute flows, raising them in the winter, to provide energy in these high energy demand months. Flows will fluctuate from about 7700 cfs in April to 37,000 cfs in August, contrasted with 1100 cfs in March to a 90,000 cfs peak flood flow in June under natural conditions. Flows will increase over natural conditions in seven months (October through April), and will decrease in the remaining months. In the important recreation months of June through August, flows will be decreased from current flows. At Sunshine and Susitna, the same general patterns pertain, although the effects are proportionately much less as additional water sources join the river. The entire upper basin of the Susitna contributes less than 20 percent of the total Susitna discharge into the Cook Inlet.

(b) Devil Canyon Dam and Reservoir

The Devil Canyon dam and power plant is intended to provide baseload power supply. It will also operate as a re-regulating dam for peaking flows from Watana, modulating downstream flows.

Devil Canyon Reservoir will have a surface area of 7800 acres (3080 ha), with a length of 32 miles (53 km), contained in a narrow canyon generally 0.25 to 0.5-mile (0.4 to 0.8-km) wide. It will extend nearly to the toe of Watana Dam at maximum elevation. Crest elevation of the dam will be 1472 feet (445 m), and water surface elevation during maximum probable flood conditions will be 1466 feet (443 m). Normal maximum operating elevation will be 1455 feet (439 m) most of the year with a low of 1405 feet (424 m) in September during dry years (see Figure E.7.5). Unlike Watana, which will be operated with a September-October high and an April-May low, Devil Canyon will remain at its normal elevation from October through July. It will be drawdown in August and early September, be at a minimum elevation of about 1405 feet (424 m) in September, and refill in October. Table E.7.1 also compares pre- and post-project flows showing combined Watana and Devil Canyon operations at the three downstream locations. Flows tend to decrease slightly in October, May, June, July, and August compared with the Watana-only operation, and increase slightly in the remaining months.

1.5 - Implications of Project Design and Operation on Recreation Planning

The physical character of the reservoirs themselves and the operational characteristics of the projects have important implications for establishment of the recreation plan concept:

- The fast-flowing river and the tumultuous river canyon experience which attracts a very small number of kayakers and other river runners will be changed to a lake experience between Vee Canyon and Devil Canyon;

- Both lakes will be cold and silty. Watana in particular will be large enough that wind and chop conditions could constitute potential hazards for small boat recreationists;

- The large drawdowns, particularly at Watana, will create mudflats which will be unattractive, difficult to cross, and sources of blowing dust and dirt. However, water levels will be relatively high during the summer recreation months;

- Where canyon sides are steep, unstable banks will be a greater problem than drawdown. Large bank slumps, landslides, and scales will be unattractive and potentially dangerous. In either instance, development of boating or shoreline facilities will be extremely difficult, hazardous, and unattractive;

- Other lakes and streams in the project area already constitute recreation resources which are far superior to the proposed reservoirs. Road access will greatly increase their use potential, particularly to sports fishermen;

- The image of the area will continue to be one of a distant location remote from population centers since the road position causes the dams to be over 5 hours away from both Fairbanks and Anchorage, and hunters and fishermen will continue to reach the site by airplane;

- While there is some opportunity for cross-country ski development, climate, distance and sunlight-shortened days will limit the area to predominantly summer recreation; and

- The "dead-end" nature of the access road will discourage casual drive-through tourism and sightseeing. Tourists will, however, be attracted to both dams and powerhouse facilities. Therefore, planning should include considerations for public observation of operations and interpretive information.

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

2.1 - Statewide Setting

2.1.1 - Background

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

The open spaces of Alaska contain some of the most pristine and spectacular scenery and the most sensitive wild lands in the nation. Having the smallest and youngest population living in the largest land area of any state, Alaska once seemed an endless frontier. Less than a decade ago Alaskans enjoyed virtually unlimited potential for outdoor recreational opportunities. However, as rapid land status changes take place, a reduction of the available public recreation land and opportunities is imminent.

The 1971 Alaska Native Claims Settlement Act will transfer 44 million acres of public resource lands to private ownership within 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 removes over 20,000 acres (8000 ha) a year from public ownership.

The federal government has set aside another 100 million acres (40 million ha) through the Alaska National Interest Lands Conservation Act (ANILCA), adding 43.6 million acres (17.5 million ha) to the National Parks System and 53.7 million acres (21.5 million ha) to the National Wildlife Refuge System. Two million acres (800,000 ha) were placed in Bureau of Land Management (BLM) conservation and recreation areas. Fifty-six million acres (22.4 million ha) 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.

Alaska State Parks, a division of the ADNR formed in 1971, currently controls 3 million acres (1.2 million ha) 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 the best areas for wildlife habitat, agriculture, recreation, forestry, and settlement and locates the best sites for future state parks and recreation areas. A statewide inventory of public recreation facilities done in 1977 shows that approximately 157 million acres (62.8 million ha) of Alaska's 367.7 million acres (147 million ha) are now classified as public recreation. This inventory is presented in Table E.7.2.

2.1.2 - Regional Setting

The Susitna hydroelectric study area lies within the south-central region of Alaska. Recreational planning for this development must fit within the framework of existing and future regional recreation. Therefore, it is important to understand the regional recreational patterns and trends as well as the state Division of Parks plans.

This 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 river systems, massive mountains, large quantities of wildlife, and glaciers the size of states.

The diversity of landscapes and resources here offer a wide variety of outdoor recreational opportunities, making it an attractive recreational environment. Figure E.7.3 shows the existing and proposed regional recreational facilities.

More than half of Alaska's population lives in south-central Alaska. Anchorage, the largest city, had a 1980 civilian population of 174,400. The region's economy is based on support services, commercial fishing, mining, forestry, petroleum, tourism, and other private business. Economic trends are primarily toward natural, resource-related development. Tourism, although rated second in importance for the state's economy, is the foremost industry supporting the Mat-Su Borough economy.

South-central Alaska contains the most highly developed transportation system in the state. It is interconnected by paved highways and gravel secondary roads providing good access to much of the area. An extensive airport system ranging from the international level to gravel strips and water bodies permit plane access into much of the remaining land. The Alaska Railroad and ferry systems also service large portions of the region. All of these transportation systems combine with the population concentrations to make the south-central region's recreational opportunities the most easily accessible and heavily used in Alaska. See Table E.7.4 for an inventory of statewide recreational facility distribution by regions.

2.1.3 - Existing Facilities

The Alaska State Parks System includes 82 park units, 53 of these are in the south-central region of the state. Table E.7.3 describes the distribution of facilities throughout the state by region and illustrates this development concentration. Outdoor recreational developments in the south-central region are primarily located to serve the two major population centers of Fairbanks and Anchorage and the Railbelt area connecting them.

The region's largest and most popular attraction, for both out-of-state tourists and state residents, is the Denali National Park and Preserve. It is located about 220 miles (367 km) north of Anchorage and 125 miles (208 km) south of Fairbanks on the Parks Highway. It offers visitors views of Mt. McKinley and other major peaks as well as abundant wildlife. The park attracted over 250,000 recreational visitors in 1981. Facilities and services include several lodges, visitor centers, campgrounds as well as trails, gas and bus service. The adjacent Denali State Park, also entered by the Parks Highway, abuts the Susitna study area. It contains over 324,000 acres 129,600 ha) and offers 37 miles (62 km) of scenic driving, a major roadside campground, trails, picnic grounds, and canoeing and fishing areas. A total of 519,000 visitors used or passed through the park along the Parks Highway in 1981.

Seventy miles (117 km) from Anchorage, Nancy Lake State Park has 23,000 acres (9200 ha) and 130 lakes and ponds. It is heavily used by Anchorage residents for water-related recreation as well as hiking and camping (100 units). Chugach State Park, 10 miles (16 km) to the east of Anchorage, provides extensive hiking and cross-country skiing opportunities. The park covers 494,000 acres (197,600 ha) and offers major campgrounds (91 units), hiking, hunting, boating, and fishing. Lake Lousie, northeast of Anchorage and reached from the Glenn Highway, is a popular fishing, boating, and hunting area. 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 up the Tyone River into Lake Louise.

North of the Susitna project, the BLM maintains the 4.4 million acre (1.76 million ha) Denali Planning Block. This area encompasses much of the Denali Highway and includes several archeological sites of national significance. BLM maintains several small campgrounds and picnic areas along the highway, boat launches, a canoe trail on the Susitna River, and two campgrounds at Tangle Lakes. The major campgrounds are located at Brushkana Creek and Clearwater Creek.

The Susitna Flats State Game Refuge to the north of Anchorage and the Chugach National Forest to the east also absorbs a large portion of recreation demand for the southern portions of the south-central region. A great many recreationists from Anchorage use the world-famous Kenai Peninsula parks, over 100 miles (160 km) south of the city. These areas offer the widest range of Alaskan recreation. Features include superior fishing, big game hunting, scenic driving, and skiing as well as 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, white-water rafting, and other boat trips.

The town of Talkeetna, located on the confluence of the Susitna and Talkeetna rivers, serves as the operations center for Mt. McKinley mountaineering expeditions. People from all over the world come to this old mining town to fly out to the mountain base and other recreational points. In addition to mountain climbing, other recreational activities which serve as Talkeetna's economic base include hunting, fishing, guiding, tours, and sightseeing.

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

2.1.4 - Existing Regional Recreation Use

Outdoor recreation is a way of life in Alaska. According to a recent survey (Clark and Johnson 1981) which is used by recreation planners in Alaska to assess demand, the wide variety of recreation opportunities available is a major reason that people move to and stay in Alaska. Only self-reliance is considered more important, and proximity to the wilderness was the third most important reason Alaskans gave. The percentage of Alaska's population that participates in outdoor recreational activities is among the highest in the nation. According to that recent statewide recreation survey, 59 percent of the respondents in the south-central region reported that they enjoy driving for pleasure. Over half of the respondents walk or run for pleasure and a full 42 percent go freshwater fishing. Table E.7.4 ranks the percentage of participation in various inland activities within the region. South-central residents rank their favorite recreation as fishing, tent camping, hunting, trail-related activities, baseball and bicycling in that order (ADNR 1981a). In contrast, tourists in the area have indicated driving for pleasure as their favorite activity followed by camping, hiking, and sport fishing (Alaska Division of Tourism 1981).

Table E.7.5 outlines the total visitor count summary for Alaska State Parks from 1978 to 1980. The Mat-Su and Copper Basin Park districts constitute the Susitna River Basin as it was analyzed for those data.

Over 389,000 visitors 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 the year 1985 up to 1,000,000 tourists will visit Alaska. The reasons tourists give for being interested in Alaska were studied in a poll by GMA Research Corporation in 1980 (Alaska Division of Tourism 1981).

Main Reasons for Interest in Alaska	Percent
- Scenery, mountains, forest, outdoors	40
- Unique, different from other places	25
- People, Native cultures, Eskimos	10
- Unspoiled wilderness	10
- Other responses including: curiosity, adventure, vastness, wildlife, fishing, and hunting	15

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 which is within 80 miles (133 km) of the future Susitna damsites.

2.1.5 - Recreation Trends

South-central Alaska is reportedly experiencing overcrowding in some existing recreational areas near Anchorage due to recent population growth. Assuming that the present recreational participation rate remains constant, the region will continue to experience a significant 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. Alaskans have increasing amounts of leisure time and flexible working schedules which enable them to devote longer periods of time to recreation. This may result in longer trips at greater distances from the urban centers. In recreational areas which receive up to 50 percent of their users from the cities of Anchorage and Fairbanks, intensity of use increased three-fold in the late 1970s and the recreational season has lengthened by several weeks (ADNR 1982a).

According to the South-central Regional Plan, sports fishing license sales increased 40 percent from 1975 to 1980. Increased use of accessible streams has caused overcrowding in popular fishing areas throughout the region and in particular those streams nearest the urban centers. Interest in boating is also rising. Sales of motorized boating equipment has increased significantly in the late 1970s. The Knik Kanoers and Kayakers Club of Anchorage has reported rapid growth in recent years. There is evidence, as well, of a rapid increase in winter recreation, as surveys of winter recreation equipment sales over the last seven years show (Clark and Johnson 1981).

A statewide 1981 public survey (Clark and Johnson 1981) polled south-central 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 more tent camping, 7 percent said hunting, and 8 percent said motorboating. They said bad weather, lack of free time, closed seasons, overcrowding, and high transportation costs are the most common reasons that prevented them from increasing their activities. When asked what priorities the State Parks Department should have for future development, residents advised the department to acquire more campgrounds and hiking trails, and to develop recreation trails, backpacking campsites and boat trails. However, they would prefer only to maintain existing wilderness areas, not expand these further.

Also in the 1981 survey, 61 percent of the south-central residents are reported to 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, 17 percent said over 4 hours, 11 percent said over 5 hours, and a full 20 percent were willing to go over 6 hours from home for a weekend trip. This is generally believed to be supported by existing travel patterns and is an important concern for recreation planning at Susitna, since the site is over 5 hours from both Anchorage and Fairbanks.

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The identified needs and desires of south-central residents will be included in programming recreation for the Susitna project.

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

Feature	% of Population in Favor of Features
- Fishing areas	95
- Water access	91
- Developed camping and picnic sites	91
- Undisturbed natural areas	88
- Hunting areas	87
- ORV trails	7

2.1.6 - Future Facilities

In 1982 the State Parks Division published an aggressive plan to expand recreational opportunities within the south-central region. This plan reflects the role the State Parks Department has in providing outdoor regional recreation, and attempts to respond to all of the existing unsatisfied demands and projected needs of the region (see Figure E.7.3 and Appendix 7.A for future regional facilities.)

State Parks development priorities include several recreation sites that will affect the Susitna Hydroelectric Project Recreation Plan. They are included in Appendix 7.A and comprise the following:

Denali State Park, to the west of the Susitna project, 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 as well as the traditional 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 day visitors by 1985. This year-round resort would have become the premier recreation destination in Alaska. Should this potential project be developed, it would accommodate significant portions of projected recreational demand within the state for both residents and tourists.

In other areas of the 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 westernmost portion of the Susitna study area.

The Lake Louise Recreational Area southeast of the Susitna study area is a popular boating and fishing area. Current expansion plans will add 300 acres (120 ha) to the existing 50 (20 ha) 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. The adjoining Susitna Lake and Tyone rivers have been identified as boating recreation areas for possible campground development at a later time. This area is linked to the Susitna River via the Tyone River, and boaters currently travel between the areas.

The State Parks Division has identified the Talkeetna River as a possible State Recreation River. These lands have been selected by the Cook Inlet Region, Inc. (CIRI) Village Corporations for conveyance. The proposed recreation area would extend from the river mouth at Talkeetna up to the confluence of Talkeetna and Prairie Creek. It is possible that new legislative designation will not need to take place, but that means to protect the river will be sought under existing legislation.

Several other proposed new parks and park expansions given a high priority by ADNR are listed in Appendix 7.B, Future Regional Recreation Opportunities.

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:

- National Park - Preserve System;
- National or Historic Landmark Status;
- Wilderness Preservation System;
- National Trail System;
- National Forest System; and
- 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. Since no federal withdrawals were made, both the state and Native corporations have selected lands in anticipation of development and use.

2.2.2 - Existing Facilities and Activities

The middle Susitna River basin encompasses over 39,000 square miles (101,400 sq km). For the purposes of the recreation plan, the area to be studied is generally defined by Parks Highway on the west, Denali Highway to the north, Susitna River to the east and a line approximately 20 miles (33 km) from the Susitna River on the south.

2.2 - Susitna River Basin

This portion of the middle Susitna River basin has yet to be developed as a significant recreational resource. Presently, the level of use is restricted by several major limitations. The area is immense and isolated, access is difficult, and potential users live great distances away. Small planes are the most common form of recreational access and use the few gravel airstrips which exist in the area. Floatplanes also land on the larger lakes and rivers. Auto access consists of a few all-terrain vehicular (ATV) trails and rough roads into the settled areas. Boat access is possible to a limited extent, since various types of water craft float and motor along the Susitna above Vee Canyon and below Devil Canyon. Boats also use the Tyone River for access into the area.

As a result of these limitations, people who do not live nearby utilize the area only on weekends or on other overnight visits. Past development within the area has been closely tied to the needs of the small local population for food, income, subsistence, and recreation. Existing facilities are very dispersed, and activity occurs at a low level of intensity (see Figure E.7.4 for existing recreation patterns.)

(a) Facilities

No public recreational facilities presently exist within the study area except for the roadside facilities on the Denali and Parks highways.

Along the Denali Highway, BLM maintains several small roadside campgrounds and picnic areas. A boat launch, canoe trails, and two campgrounds were also built at Tangle Lakes. The most important of these facilities relevant to the Susitna Hydroelectric Project recreation plan is the 33-site campground at Brushkana Creek and the boat launch located at the highway bridge over the Susitna River.

Existing private recreational developments within the study area include clusters of small seasonal cabins and commercial lodges. There are approximately 110 structures within the study area. Chapter 9, Land Use, includes a comprehensive table of all structures within the area and lists their use, mode of access, location, and condition. The major concentrations of 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, fishing, and other recreation activities. Some of these locations are accessible by ATV trails, but most are located near dirt airstrips and large water bodies for access by plane. Those structures being utilized for recreational activities are located in Figures E.7.6, E.7.7, and E.7.8.

Portage Creek is a mining area with some summer cabins; it contains 19 cabins and several other structures. Other developments at Chunilna and Gold creeks are primarily mining establishments. There are 10 small cabins along the Susitna River banks which are currently used by transient recreationists. The three commercial lodges in the area are located at High, Tsusena, and Stephan Lakes.

Stephan Lake Lodge, located south of the Susitna River, is the largest of the three commerical lodges. It includes 10 main structures and seven additional outlying cabins, and receives the greatest number of visitors annually. Serving a predominantly European clientele, it offers a variety of outdoor recreation activities in a wilderness setting including hunting, fishing, and float trips down the Talkeetna and upper Susitna rivers and Prairie Creek.

High Lake Lodge is the second largest lodge complex with 11 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. The lodge is currently being utilized by Susitna project personnel doing field research. Several small outlying cabins located along Portage Creek and the Susitna River are utilized by visitors to High Lake Lodge while on hunting and fishing trips.

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.

The existing trail systems were built for access by prospectors, hunters, trappers, and fishermen (see Table E.7.6 and Figure E.7.4 for a listing of major trail locations, condition, and use.) At present, these trails and rough roads accommodate horses, tracked vehicles, rolligons, dogsleds, and hikers. They connect a few scattered recreational developments and mining settlements and the camps used for researching the area's hydroelectric potential. Trails radiate from these scattered structures out to airstrips, lakes, and adjacent fishing streams.

2.2 - Susitna River Basin

BLM is currently developing regulations for the management of the public trails located on lands which the Native corporations have selected. A total of six easements have been identified within the study area (see Exhibit E, Chapter 9). These include an access trail 50 feet (15 m) wide from the Chulitna wayside on the Alaska Railroad to public lands immediately east of Portage Creek; a state site easement and trail easements on Stephan Lake; and an access trail running east from Gold Creek.

(i) Trail Information

The following trail information was reported in the unpublished Area Notes (ADNR Division of Research and Development 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 months. 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 CAT trail, also identified by Terrestrial Environmental Specialists (TES) 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. There is some fishing effort for grayling and lake trout on Butte Lake. The Butte Lake area is a duck, geese, and swan birding area. The Brushkana Campground at Mile 105, Denali Highway, is reportedly one of the few known habitat areas for the Smith's Longspur.

A trail runs from the town of Denali downstream along the east bank of the Susitna River. At the confluence of the Susitna and Maclaren rivers, the trail 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. Bird watching is also popular along the Denali Highway between the Susitna Lodge and Swampbuggy Lake.

(b) Activities

Aside from the isolated lodges, cabins and trails which constitute a commitment to a particular site, the predominant recreational pattern is dispersed and non-site-specific. Activities include the consumptive recreations such as hunting, fishing, food gathering, and rock hounding. River-related activities include various types of power and non-powered boating and rafting. Other dispersed activities currently practiced in the area are camping, hiking, cross-country skiing, and photography.

(i) Sports and Trophy Hunting

This is a traditional activity in the middle Susitna Basin. The three commercial lodges in the area serve as bases for hunting groups that fly in for guided trophy hunts. The lodges typically handle 15-20 guests at a time and jointly total 120 guests per season (TES 1982a). In addition, many hunters fly into the larger lakes and utilize the small lakeside cabins for hunting trips. Hunters also use ATV vehicles and horses to gain access to more remote areas. The most popular big game include Dall sheep, moose, caribou, black bears, and brown bears. Alaska Department of Fish and Game data indicate that the recreation study area had about 600 hunter-days for moose, caribou and sheep in 1981.

(ii) Fishing

This is an activity which frequently occurs here in association with other activities such as hunting, boating, and camping. Local residents have long enjoyed high quality fishing in area lakes, streams and rivers. They 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; while stream fishing occurs mostly along the creeks accessible by land such as Portage Creek.

Salmon migrate the Susitna up to Portage Creek just below Devil Canyon. Both guided and individual fishing trips are popular here. Considerable salmon fishing also occurs in Stephan Lake and Prairie Creek as boaters travel downstream on the Talkeetna River from Prairie Creek. Other popular salmon fishing spots include lower Portage and Chunilna creeks 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.

(iii) Food Gathering

Very little site-specific data are currently available on food-gathering patterns within the study area. Some berry-picking areas are known near Chulitna to the east of the study area and several more are along the Denali Highway.

(iv) Boating

Summer boating occurs on many of the larger lakes as recreationists fly in. Riverboat and guide services are offered from Talkeetna and from the various lodges downstream from Devil Canyon. The Susitna River is considered navigable up to the mouth of Portage Creek by a variety of craft including rafts, canoes, airboats and riverboats.

The Susitna River is used for fishing and access to hunting. Boating activity takes place south of the study area near boat launches at Willow Creek, Kashwitna Landing, Sunshine Bridge, and Talkeetna. The upper Susitna above the proposed reservoirs is calm and provides good boating and canoeing. Boaters reportedly float the river from the boat launch on the Denali Highway down to the Tyone River, some then motor up to Lake Louise at the Tyone's source. Other boaters continue down the Susitna to the gaging station above Vee Canyon where they pull out and portage to Clarence Lake for fishing. The upper Talkeetna

River in the southern portion of the study area, rated Class IV, offers some of the finest rafting and white-water kayaking in Alaska. Talkeetna River is not easily accessible by land; airplanes usually land at Stephan Lake. 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 2 to 3 days (Knik Kanoe and Kayak Club. Personal communication, Mary Kay Kession).

VI

Two to three parties of a few individuals venture down through the rapids of Devil Canyon each year. This wild stretch of river, which roars through 11 miles (18 km) of a narrow vertical canyon, is described by veteran kayakers as the Mt. Everest of kayaking. It is generally considered by kayakers to be a Class VI rapids on the international white-water scale. Class VI has been defined as "life-threatening to skilled boatsmen with good equipment." The first successful running of the rapids occurred in 1978. Fewer than 40 kayakers from various parts of the world have attempted it since that time, and at least five people have died trying.

(v) Cross-country Skiing

Cross-country skiing takes places in the area, particularly near Denali Highway. Occasional tour packages have been offered by the local private lodges. Snowshoeing has also become a purely recreational sport here. 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. They most commonly use the frozen river as trail. Their activities are reportedly centered around Trapper Creek and Talkeetna to the south.

2.2.3 - Future Activities and Facilities

Should the Susitna Hydroelectric Project not be developed, the major obstacles which have limited past recreational activities will continue to do so in the future, although Native corporations may seek to develop their lands for recreational uses. Unless vehicular access is developed in the study area, no major shift in the existing low-level recreational patterns is anticipated.

The parties which will control future recreational activities and development in the study area include the Alaska state government, U.S. BLM, several Native corporations, and various private landholders.

The policies of these groups concerning the land parcels they control, along with overall increased pressures for recreational opportunities from Alaska residents, will largely determine future land use patterns. The exact nature of specific activities and developments is difficult to predict since land ownership decisions are in abeyance and are not likely to be resolved for several years.

(a) <u>The Native Corporations</u>

The Native corporations have selected much of the land adjacent to the Susitna River and along Portage Creek and Talkeetna River. The corporations have not identified any specific plans for development if the hydroelectric development does not occur; however, development possibilities which have been discussed include mineral extraction and recreation-home land development. 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 river.

The Matanuska-Susitna-Beluga Cooperative Planning Studies have analyzed the demand for recreation-home lots within their planning area, which includes the Susitna study area. They have projected a demand for 29,000 acres (11,600 ha) of new lots by the year 1990 assuming a population growth of 65,000 people. 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 May 1982). 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. Native corporations have also expressed a preference for land leasing rather than sale.

too high

2.2 - Susitna River Basin

(b) BLM Policies

BLM policies for the Denali Planning Block, shown in Figure E.7.5, reflect their goal of increasing recreational use. Their plans include road improvements to the Denali Highway and additional roadside improvements such as new campgrounds, picnic areas, and pull-outs. BLM is projecting an increase of the average annual daily traffic (ADT) along the highway to 130 in the year 2000; the existing ADT is 50 cars. Formal designation of BLM land for additional ATV use appears to be no longer under consideration, however.

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

The private lodge owners in the area have not indicated any plans for expansion. The existing levels of use are small and are not expected to change substantially.

3 - PROJECT IMPACTS ON EXISTING RECREATION

Impacts that the Susitna Hydroelectric Project will have on the existing recreational patterns are of two types: indirect or direct effects. Indirect impacts are those related to changes in recreation user demand levels. These include the impacts of construction worker recreation and the influx of recreationists as a result of the new road openings. Direct effects are defined as those which relate to physical changes in the natural resources which constitute recreation settings. Impacts to these settings might either increase or decrease the desirability and probability of existing recreational types and activity levels. They may also make possible new types of activity. Section 3.1 deals with direct impacts and discusses each major project development separately. Construction and operational impacts are also distinguished in each case.

3.1 - Direct Impacts of Project Features

Within the areas to be disrupted, existing recreation consists primarily of dispersed and low-level activities such as hunting, fishing, and hiking. These patterns will be somewhat impacted by increased activity, environmental disruption, and restricted or increased access. However, because of their inherent mobility and nonsite specificity, these activities, for the most part, can be absorbed in surrounding landscapes.

In most cases, the important issues are the potential impacts upon recreational resources rather than on specific existing activities. The major components of recreational settings consist of fish, wildlife, and botanical habitats and the aesthetic character of the landscape. Detailed discussions of the impacts on these resources can be found in Chapter 3, Fish, Wildlife and Botanical Resources, and Chapter 8, Aesthetic Resources of Exhibit E. References will be made to these chapters as needed.

3.1.1 - Watana Development

(a) Construction

Construction of the Watana dam and related features involves construction of two cofferdams and diversion of the river. It includes clearing of forest land, dredging of the river, excavation of borrow sites for damfill material, blasting for the underground powerhouse and other features, as well as other heavy construction activities at the damsite. An access road and temporary transmission line will be constructed from the Denali Highway and construction camps built near the damsite. (The access road is discussed in Section 3.3.) The 38,000-acre (15,200-ha) reservoir area will be cleared of trees prior to inundation. It is anticipated to require three years to fill the entire impoundment area.

3.1 - Direct Impacts of Project Features

The primary impacts of initial construction activities extend beyond these relatively small areas being physically disturbed. A significant change in image will affect a large area as the prevailing wilderness character changes to intense activity and heavy construction. This is an unavoidable impact of development and can only be partially mitigated by careful management of the remaining lands.

(i) Land-Based Recreation

Land-based recreational activities and resources within areas that Watana construction will affect have already been somewhat modified by the presence of project researchers who currently live and work in the vicinity. Although their low-level recreational activities have not caused any known adverse impacts, that area is no longer perceived as a wilderness setting.

It is anticipated that during construction all work areas associated with Watana Dam will be closed to the recreational public. Thus, any existing activities will be eliminated for the duration of construction. These recreational activities consist of hunting and fishing in the area and can be absorbed by other public lands for the duration of work. However, if construction practices cause permanent degradation to the recreational environment or fish and wildlife habitats, these activities could be lost permanently. This is already anticipated in the areas north of the damsite where a small concentration of black bears has been identified.

The 38,000-acre (15,200-ha) reservoir will eliminate 10 small riverfront cabins which are used seasonally by hunters, fishermen, and other recreationists who arrive by boat or plane. The impoundment will also inundate a large area of prime habitat for such wildlife as wolverines, moose, and black bear, and possibly disrupt migration of the Nelchina caribou herd. While no direct correlations can be drawn between these losses and a reduction of hunter days, it can be expected that, in general, fewer hunters, particularly trophy hunters of black bear, will be attracted to the area or they will be less successful. Specific impacts and mitigations for this loss are discussed in Exhibit E, Chapter 3, Fish, Wildlife, and Botanical Resources.

(ii) Water-Based Recreation

Fishing impacts will occur as a result of the effects of riverine construction (see Chapter 3). The Tsusena Creek mouth and Susitna River channels will be affected by gravel removal during construction. Downstream recreational fishing may also be negatively affected during the three-year filling period in which summer flows will be reduced. Twelve sloughs utilized for spawning and/or rearing will potentially be impacted, and the fishing experience may be diminished by the lower water levels. Existing fishing activity upstream from the Watana Dam will also be altered. The inundation of the lower reaches of clear-water tributaries will eliminate existing fishing spots for this area of the river.

The existing level of boating activity both downriver from Devil Canyon to Talkeetna and upriver from Watana will be largely unaffected by Watana construction until vegetation clearing, gravel removal, and burning begins. When filling of the Watana reservoir begins water levels downstream will decrease during summer recreation months. Depending on the precipitation and natural water level during filling, the reach of the Susitna 1 to 3 miles (1.6 to 5 km) below Sherman [about 6 to 9 miles (10 to 0.15 km) below Gold Creek] may be difficult to navigate. Boaters who currently venture up the river to Devil Canyon and Portage Creek may find this difficult to do.

(b) Operations

(i) Land-Based Recreation

After construction, the land areas associated with the Watana dam will either be rehabilitated or utilized for operations facilities and a permanent townsite. Rehabilitated areas may return to use as recreational areas. The operations areas may be permanently unavailable for public recreation as it currently exists. A visitor center is proposed for the damsite. The presence of workers and their families will also continue to impact the recreational resources. There are recreational facilities proposed in the village for these people.

Once operation of the Watana Dam facilities begin and the recreational public gains access to the area via the Watana access road, sightseers will be attracted to the damsite. The higher user levels will affect the existing recreational patterns of hunting and fishing by increasing the hunting and fishing pressure on the wildlife, fisheries, and botanical environment (see Chapter 3).

(ii) Water-Based Recreation

Potential fishing impacts after construction will also be dependent on water quality and quantity. As flows stabilize and as silt is trapped in the reservoir, it is anticipated that the Susitna downstream from the dam will clear and become more fishable than existing levels, particularly for coho and chinook salmon.

Downstream from Watana Dam, boating may continue to be affected by reduced water flows after construction. Water levels will be lower at Gold Creek during June, July, and August. Sunshine and Susitna farther down the river will be much less affected.

However, kayaking on the Devil Canyon Rapids may continue and will be less hazardous. Operational impacts of the dam and reservoir on existing boating recreation are related to the quantity, schedule, quality, and temperature of water retained in and released from the reservoir.

The reservoir drawdown will reach its low point in May, and the lake will fill from June through August, peaking in early September.

The lake shorelines exposed during low water will have large mudflats and steep banks of tree stumps and slumping soils. This situation will severely limit 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. Safety will also be a concern for future boaters. The lake's great length and breadth may lead to treacherous conditions during periods of high wind.

The recreationists that currently float this stretch of river will find in future a 54-mile (90-km) long lake in place of a rapidly flowing river. With a loss of current, boaters will need manual or mechanical propulsion to navigate the new lake. New activities such as floatplanes and large motorized boats will increase as recreationists take advantage of the recreational setting created by the lake. Access through Vee Canyon from upriver will be easier when the rapids are flooded. The lake experience will be quite different in character from existing conditions (see Chapter 8, Aesthetic Resources) and can be expected to attract a different type of recreational user.

3.1.2 - Devil Canyon Development

(a) Construction

Construction of the thin, concrete arch Devil Canyon Dam and related features includes a high-level bridge across the canyon, cofferdams, diversion of the river, land clearing, blasting, and a major concrete mix plant at the damsite. In addition, a railroad spur will be constructed from Gold Creek; a 37-mile (3120-ha) road built between Watana and Devil Canyon; and construction camps built near the damsite.

The 7800-acre (3120-ha) reservoir, unlike Watana, will be relatively narrow, and largely confined within the canyon walls, particularly in the downstream reaches, and will require less clearing of vegetation. The major impacts resulting from its creation will be the loss of 11 miles (18 km) of Class VI river rapids. This is an irreplaceable loss of a scarce worldwide recreation resource. Expert kayakers have come from around the world to attempt this trip. Although the actual number of kayakers are few (2-3 parties per year), it does not diminish the significance of the loss. An additional 32 miles (53 km) of river canyon upstream from Devil Canyon will also be lost.

With the exception of temporary impacts on water quality during the cofferdam construction, no water quality-related recreational impacts are foreseen. Filling will take about two months and, depending on season and rainfall, will not appreciably affect flow rates. No further impacts are anticipated on downstream fishing and boating activity.

The primary impacts of Devil Canyon construction on adjacent land-based recreation will be the conversion of a virtual wilderness to a construction area and residence for 3600 people. The land, which will become the primary areas of construction-related activity and storage, currently supports numerous game animals. The noise and dust of construction and the disruption caused by heavy equipment operations, along with the presence of large numbers of construction workers, will disturb wildlife habitats and recreation environment.

It is anticipated that all hunting from project facilities will be prohibited (see Chapter 3). Fishing activity will be managed by the state Department of Fish and Game. For purposes of enforcement, it is likely that all recreational access by project personnel will have to be managed during construction.

(b) Operations

Operation of Devil Canyon will 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 will have the same limitations that affect the recreational opportunities of Watana reservoir, although smaller drawdowns and steeper sides will result in less severe mudflats. The proposed operating schedule will lower the reservoir up to 50 feet mid August to September each year. This shoreline will also be visually unattractive.

After construction, the temporary village and camp will be closed and resident operators will be located at Watana Village, thus eliminating the ingoing impacts of a large resident group of people.

3.1.3 - Watana Access Road

(a) Construction

Access improvements to be made for the Watana dam phase include 21.3 miles (35.5 km) of upgrading to the existing Denali Highway and 41.6 miles (69 km) of new road from the Denali Highway to the damsite. Other related developments include a small temporary construction camp near Brushkana Creek and several borrow sites along the new road.

During construction, approximately 90 large construction vehicle trips per day are anticipated on the new road and an additional 600 to 800 trips are anticipated from commuting construction workers (see Chapter 5).

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

These road improvements and access into new areas will impact the existing recreational patterns and recreational resources in several ways. First, winter snowplowing along the Denali Highway will cause an increase in winter recreationists using the area for cross-country skiing, snowmobiling, dogsledding, and other winter sports. The Denali road improvements may also make that area more attractive to recreationists during the summer months, and the increased traffic (700 to 800 ADTs during peak years) of commuters, truck drivers, and new local residents will 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 trips.

The new Watana access road passes through an area which presently has a very low level of recreational activity. Construction activities will not, therefore, directly affect any major recreation, since the hunting, fishing or hiking which 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 should 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 alignment should 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 will be negatively impacted by the access road.

(b) Operations

The Watana access road will not be open to the public during construction. When work is completed at Watana in 1993, a decision will then be made regarding public access. It is assumed that the road will be officially opened for public use in 1993.

Once the Watana road has been constructed and workers and truck drivers begin traveling back and forth, the road will attract recreationists and off-duty construction workers and families. Unless a control point and physical barrier are placed at the Denali/Watana road junction to limit access or other controls provided to deal with this attraction, recreational activities such as roadside camping, hunting, and fishing along Denali Highway will spring up prior to the official 1993 opening.

These activities are not inconsistent with existing recreational patterns. The most significant potential impact would occur if overuse of popular areas resulted in degradation of the recreational resources such as fishing streams, wildlife and their habitats.

3.1.4 - Devil Canyon Access Road

(a) Construction

This 37-mile (60-km) road connecting the Devil Canyon damsite to the Watana damsite will be built in 1992. Its use during dam construction will be primarily to transport equipment and personnel from the Watana town to the Devil Canyon construction site. The road traverses more difficult terrain than the Watana access road and, as a result, requires careful design guidelines to control potentially significant impacts caused by large cut and fill sections. The selected road corridor will affect the private recreation lodge at High Lake. Passing within a mile of the development, the new access may change the character of the facility from a remote fly-in retreat to an auto-oriented facility. Construction will also have a significant impact on local game which is a prime visitor attraction for the lodge. No other recreational activities presently occur in this area.

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

(b) Operations

After dam construction is complete in 2002, the Devil Canyon road will be opened to the public. Operations personnel will 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 striking design and impressive setting, and the road will 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 previously remote hunting, fishing, and wilderness areas.

3.1.5 - Gold Creek - Devil Canyon Railroad

(a) Construction

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

Along the chosen alignment, particular attention must be paid to the segment which traverses the steep banks of the Susitna River in order not to degrade the river experience. Other segments which traverse difficult natural landscapes require site-specific considerations to achieve or maximize fitness.

The major sources of impact include cut-and-fill operations, vegetation clearing, borrow excavations, and stream crossings.

(b) Operations

After construction at the Devil damsite is completed, the rail spur will no longer serve project functions. At this time, it may become available for public use and will more significantly impact existing recreation.

The existing rail line to the west is currently used by recreationists to gain access to Denali State Park and surrounding lands in order to camp, hike, fish, hunt, etc.

If access similar to the existing whistle stops were to be provided, a significant number of recreationists could be expected to utilize it. An added attraction of rail access is that it reaches the Devil Canyon damsite in 2 hours less time than would be required by car. The types of activities anticipated are similar to existing recreational patterns, with the possible exception of railside camping.

3.1 - Direct Impacts to Project Features

3.1.6 - Project Area - Transmission Line

The east-west connection from the two powerhouses to the intertie will be constructed alongside the Devil Canyon access road. Construction and future maintenance access will not be continuous along the line. Short trails will connect to Devil Canyon road.

The presence of 100-foot (30-m) tall towers and cleared corridors will also reduce the area's appeal to recreationists as a wilderness area. The impacts of the transmission corridors on existing recreation patterns are primarily visual.

3.1.7 - Intertie and Stubs - Transmission Line

Intertie construction is scheduled to begin in 1983. These lines and the future stubs from Healy to Fairbanks and from Willow to Anchorage are not anticipated to affect existing recreational patterns during construction or operation. Cleared transmission corridors are commonly used by hunters and hikers, and to the extent that these activities take place, recreation will be positively impacted. Future studies are planned by the Power Authority to refine a recreation plan for these corridors.

(a) Recreational Plan Studies

The content of these studies will include:

- Description of existing and future recreation;
- Project impacts on existing recreation;
- Recreation plan, including recreation opportunity inventory and recreation opportunity evaluation; and
- Plan implementation.

(b) Specific Recreational Resources

Specific recreational resources have been identified adjacent to and within these corridors and include:

- Healy to Fairbanks Stub Corridor
  . Denali National Park
  . Proposed Parks Highway Scenic Highway Area

- Healy to Willow Intertie Corridor
  . Denali State Park
  . Alaska Railroad
  . Small recreational trails

3.2 - Indirect Impacts

- Willow to Anchorage Stub Corridor
  - Nancy Lake State Recreation Area
  - Susitna Flats State Game Refuge
  - Iditarod Dogsled Trail
  - Several other recreation trails.

3.2 - Indirect Impacts--Project-Induced Recreational Demand

3.2.1 - Background

Estimation of demand for recreation related to the Susitna Hydroelectric Project involves a number of complex and unusual circumstances due to project location, characteristics of the project, and construction schedule. Added complexities result from a historically unpredictable regional growth pattern and lack of consistent and verifiable data concerning regional recreational projections. Some of these circumstances include the following.

(a) Alaskan Recreational Environment

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. Recreational patterns and uses do not follow those common at many hydroelectric projects in the lower 48 states. Usual recreational standards are not, for the most part, applicable in Alaska.

(b) Lack of Recreational History

Alaska became a state in 1959. The State Department of Parks was formed in 1971. There consequently is not the long history and background of user data, public preferences, demand data and so on which is usually availale to recreational planners. While important useful data are being generated by state agencies, the backlog of experience helpful to confidently make long-range predictions does not yet exist.

(c) Uncertainty of Population Growth

Population growth has two components--natural growth (surplus of births over deaths) and immigration. In Alaska, a major component of growth is immigration. Growth has been dependent in the past on external causes, such as the discovery and price of oil and the world economy, and is largely unpredictable by standard demographic methods.

(d) Population Mobility

Alaska's population is among the youngest in the nation and unusually mobile. 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. Public opinion and preference surveys can become quickly outdated as new immigrants replace former residents. These changes may not, however, appear in total population counts, because the numbers may not reflect change in composition. Likewise, whole cycles can occur and be "missed" by the decennial census.

(e) Climate

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.

(f) Setting

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 some important exceptions such as Devil Canyon Rapids), it is not unique.

(g) Changing Land Ownership

Major portions of Alaska have historically been owned by the federal and, more recently, the state government. Large portions of land are currently in the process of being distributed to private Native corporations (see also Section 4.1). While many of the exact impacts of these actions are as yet unknown, it appears that the historical patterns of open recreational access to most lands within the state are changing in some instances.

(h) International Travel

Recent years have seen wide fluctuations in international travel patterns as the dollar, mark, yen and other currencies have changed in value. As a remote and somewhat exotic tourist destination, tourist recreational levels in

Alaska may vary greatly according to unpredictable outside influences.

3.2.2 - Assumptions

The proposed recreation plan is designed as mitigation for recreational opportunities lost or negatively impacted due to project developments. The plan utilizes the recreational opportunities gained due to project development and provides for demand induced by the development.

In projecting demand, a number of simplifying assumptions have been made which obviate the effects of the uncertainties in Alaska's recreational future. In addition to these assumptions, the recreation plan is phased and a monitoring program is proposed which will allow periodic adjustments to be made in the plan as assumptions and recreational conditions change.

The following paragraphs include assumptions of these demand projections.

- The population projections presented in Exhibit E, Chapter 5, are valid for Anchorage, Fairbanks-North Star Borough, and the Railbelt. Population projections for the Matanuska-Susitna Borough, as developed by the Borough in October 1982 and included by inference in the Railbelt projections, will continue to be valid.

- The project will be developed according to the general designs, operating characteristics, and schedule presented in Exhibit E, Chapters 1 and 2. Specifically, the current drawdown schedules for Watana and Devil Canyon will pertain. The access roads from the Denali Highway to Watana and from Watana to Devil Canyon will be developed as currently planned. A railroad spur will be built from Gold Creek to Devil Canyon and will be opened to the public upon construction completion. An access road will not be connected from Devil Canyon to Hurricane.

- The Power Authority will evaluate the decision to open the access road from Watana to the Denali Highway at the time Watana construction is completed. For the purposes of this recreational demand projection and plan, it is assumed that the road will be opened to full public access in 1993. If it is determined in the future that the road should not be opened then, demand for recreation will be less than projected. Specific elements of the recreation plan will then be deferred as appropriate through the monitoring/implementation program.

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

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

- The Denali Highway will be upgraded and new facilities will be installed as currently proposed by the Alaska Department of Transportation. The road will be kept open in the winter from the intersection with the Watana access road (approximately at Milepost 110) to the Parks Highway at Cantwell.

- The Alaska Department of Parks, the U.S. Bureau of Land Management, the U.S. Forest Service, the Municipality of Anchorage, Fairbanks, and other appropriate governmental units will continue to pursue their plans for increased recreational facilities elsewhere to serve increased demand. Many of the facilities documented in Section 2 will be closer to population centers than the Susitna project and will accommodate a portion of future demand by city dwellers.

- The Native corporations will 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.

- The Alaska Department of Fish and Game will adopt regulations appropriate to protect those resources within the project area and appropriate to the general levels of projected demand.

- Existing private lodges will continue to operate in a manner and scale similar to 1980 operations. While some changes undoubtedly will take place, they will not be of a scale to influence demand projections significantly.

- The Alaska Railroad will continue to operate as a passenger recreational facility, with daily whistle-stop service in the summer season and weekend whistle-stop service off-season.

- While there will continue to be an international clientele for select facilities, the project will primarily be an in-state recreational attraction and will 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 will be primarily a summer (mid-June to mid-September) recreational resource.

3.2.3 - Estimated Recreational Demand

Available recreational studies were surveyed and evaluated for applicability to the Susitna Hydroelectric Project. A wide variety of noncomparable and to some extent disparate data were found. A series of per capita participation projections developed in the Susitna River Basin Cooperative Study - Talkeetna Subarea (U.S. Soil Conservation Service 1978) were chosen as the most appropriate methodology and assumptions for this recreation plan. That methodology and major portions of the base data employed in that projection are used and referred to as the "per capita participation method." The projections have been modified for purposes of this recreation plan by updated population data and projections. Allocations of regional recreational demand derived from these projections are assigned to the Susitna Hydroelectric Project recreation area through a series of assumptions and judgmental evaluations. The results of this estimation are then compared with four estimates, prepared by other methods, and identified for the purposes of this report as:

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

(a) Per Capita Participation Method

This method was developed by the U.S. Soil Conservation Service (SCS) and applied to the 13 million-acre (5.2 million-ha) Talkeetna Subarea in 1978 as part of a series of Susitna River Basin cooperative studies which were joint efforts with the Alaska Department of Natural Resources, the Alaska Department of Fish and Game, and other cooperating agencies. The method utilizes empirical participation rates for eight major outdoor recreational activities and applies them to existing population figures.

The demand projection presented in this report uses the general methodology and recreational data developed by SCS. The actual calculations presented herein, however, were performed by the Susitna Recreation Plan Study Team specifically for this study. The planning year 2000 was chosen for convenience and comparability as the future demand project time. Assumed percentage increases in annual participation days are utilized, as well as year 2000 population projections. The following formula was utilized to estimate 1980 recreational demand:

TOTAL 1980 POPULATION X AVERAGE ANNUAL PARTICIPATION DAYS = TOTAL DEMAND IN USER DAYS

To estimate 2000 recreational demand:

TOTAL 2000 POPULATION X AVERAGE ANNUAL PARTICIPATION DAYS X ASSUMED PERCENTAGE INCREASE IN PARTICIPATION = TOTAL DAMAND IN USER DAYS

This procedure is followed for each of eight separate activities. Populations used are shown in Table E.7.7. Recreational participation is shown in Table E.7.8.

Both participation days and assumed increases are taken directly 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. While newer data, if available, would have been preferable, 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) utilizes the travel cost method, which is based on the premise that other things being equal, per capita use of recreational sites will decrease as travel time and cost increases. This appears to be generally true according to empirical data in Alaska. The data base employed distributes the sum total of trips within given hourly driving times. For the Susitna Hydroelectric Project, driving times, distances, and percentage of trips are shown in Table E.7.9. 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.

3.2 - Indirect Impacts

The centroid of the project recreational area is assumed to be 10 miles (16 km) north of the Watana damsite, determined by observation. Table E.7.10 gives estimations of total recreational demand (in user days) for all recreational sites within 250 miles (415 km) (or 5-6 hours) of Anchorage and 200 miles (330 km) (or 4-5 hours) of Fairbanks for the population of Anchorage, Fairbanks, and Matanuska-Susitna Borough. It is important to note that these demands are for all sites within the given time-distance, not specifically for the Susitna hydro site. For instance, 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 E.7.7, the factors in Table E.7.10, and the distances in Table E.7.9.

Table E.7.11 summarizes these demands. In order to apply total demands to the Susitna Hydroelectric Project recreation plan area, a number of additional assumptions were made.

The project 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 (33 km) south of the Susitna River on the south. This area was determined by the areas directly affected by development, known recreational resources of the area, and the recreational opportunity settings determined by the study team in the field. It also takes into consideration Alaska Department of Fish and Game management subunits. Since these units relate to big game management areas and not human recreation areas, the area studied does not correspond exactly to those boundaries. Correlations will be made for management purposes during Phase II design.

Alaska Department of Fish and Game (1981) hunting statistics for moose, caribou and Dall sheep were reviewed. These data indicated that in 1981, fewer than 700 hunter days were spent in the management within the study area. Only data for the hunting year 1981 were available for review. Therefore, in order to be conservative, it was assumed that the existing condition is 800 hunter days. Table E.7.12 and Table E.7.13 show assumed existing (1980, for simplicity) use of the area in numbers of recreation days and in percentages of the total days given in Table E.7.11. #5

3.2 - Indirect Impacts

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

Assumptions of current sport fishing were made from interpretations of the Alaska Department of Fish and Game Statewide Harvest Study (1981 data). This report lists angler days for 1977 through 1981. Data include the number of anglers resident in the upper Copper/Susitna River area who fish in all locations. This number is decreasing from 1885 in 1977 to 1195 in 1981. Charts of the number of angler days fished in the West Cook Inlet/West Susitna drainage and the East Susitna drainage show that these figures have generally decreased over the last four years. The level of fishing in this area as a percentage of statewide fishing has also decreased by 2.5 percent in the last three years (see Appendix 7.C).

While these data do not directly correspond to the project area, in combination with personal conversations with knowledgeable local sources the project team estimated 1500 angler days/year to be in the area. Fishing activity is assumed to be quite low in the areas 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 4000 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 occurring in the area that is not associated with other activities such as hunting, fishing or camping. Hiking trails are not rigorously designed for specific capacities at the primitive level of design anticipated, and picnicking in this remote area is most frequently associated with camping; therefore, this simplifying assumption is appropriate.

3.2 - Indirect Impacts

Cross-country skiing is known to exist in the Chulitna Mountains south of Cantwell, and 100 user days have been assumed for the study area.

As indicated in Table E.7.13, it is calculated that approximately 6700 recreation days per year occur in the area today. In order to project the future user days for the area if the Susitna Hydroelectric Project is not built, 1980 to 2000 population growth rates (Table E.7.7) and increased participation rates (Table E.7.8) are applied to the 1980 usage. That is, usage in the year 2000 will increase as will population and 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 will be redistributed. It is assumed that this will cause a decrease of demand at Susitna 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 9700 user days, it is typical for campground supply to lag behind demand 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 hydroelectric project, about 12,500 recreation days could occur in 2000. This is almost a 90 percent increase over 1980 figures.

In order to estimate the year 2000 recreational demand, assuming the Susitna Hydroelectric Project is built, the baseline (without project) recreational growth rates shown in Table E.7.12 were examined and compared with project impacts as described in Section 2. In addition, the team's knowledge of the project area derived from a careful recreational opportunities' assessment and study of regional alternative opportunities.

For big game hunting, increased road access will lead to increased activity. The 1981 Geowonderland data base indicates that most hunters currently fly into the area. 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 E.7.12 and E.7.13.).

No waterfowl hunting increase over baseline figures is anticipated as no proposed project features will affect the attractiveness or accessibility of the waterfowl hunting lakes.

Presently, freshwater fishing is very limited due to lack of automobile access. Most existing fishing sites are used principally by fly-in fishermen. It is assumed that this demand, like hunting, will increase 0.2 percent, attacting 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 wilderness nature of the area and the stated objective of protecting the natural resources, demand is expected to be directed toward small, primitive campgrounds. Demand is anticipated to be limited to an additional 4000 to 6000 visitor days per year.

After the Susitna project is completed, part of the river resource for canoeing and kayaking, and in particular the important Devil Canyon Rapids, will be eliminated. User days are estimated to decrease to half their 1980 levels.

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. The recreation plan has been developed to accommodate this growth, phased to the Watana and Devil Canyon portions of the project. Other recreational uses, such as driving and sightseeing, are assumed to be included in this estimate. This appears to be a reasonable assumption because recreational demand often takes 10 or more years to build up after facilities are developed and the curiosity value of the project is assumed to wane over time.

(b) 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 will 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 a single year. Assuming a capture rate of 33 percent, approximately 46,000 persons could be attracted to the Susitna. This estimate is in reasonable accord with that developed by the participation method.

(c) Denali National Park Comparison

The entrance to Denali National Park is about 80 highway miles (130 km) from the Watana site. With Mt. McKinley, North America's largest mountain, 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 E.7.14). While the National Park Service has not projected visitation to the year 2000, the Denali State Park Visitor Facility Market Analysis and Economic Feasibility Study (Economics Research Associates, 1980) projects total recreational visitors to Alaska to increase from about 550,000 in 1982 to 1,100,000 in 2000 (high range). If Denali National Park increases at the same rate as the state as a whole, visitation in the year 2000 would be approximately 513,000.

The recreational attraction of the Susitna project has a very different character and appeal than Denali National Park and offers only a small portion of the attractions. Today, the 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, for example, 10 percent of the visitation of the national park, that would be 51,000 in the year 2000. This calculation is also similar to ~~that~~ estimated in the per capita participation method.

(d) Denali Highway Travel Comparison

Because the primary access to the Susitna recreation area will be via the Denali Highway, comparisons can be made up to existing and future recreational traffic volumes along the highway. Results from a recreational study for the Denali Highway area (Johnson 1976) indicate that 90 percent of the highway travelers were recreationists and that average vehicle occupancy was 3.2 persons. The Environmental Assessment for the Denali Highway (Alaska Department of Transportation 1981) reports existing average daily traffic (ADT) on the midsections of the highway as 50 vehicle trips per day. The study projects this to rise to 130 by the year 2000. 130 trips/day x 3.2 persons/vehicle x 365 days/year x 0.90 recreation = 135,656 recreation trips per year.

Assuming the Susitna area captures 33 percent of these trips (as in Comparison [b]), a total recreational demand of 45,100 trips could be anticipated. This method also has results similar to the other projections.

(e) <u>Recreation Participation Survey Method</u>

The University of Alaska and TES, Inc., conducted recreation participation surveys as a part of their early studies. The surveys were intended to determine the existing level of use within the study area (TES 1982a). The survey was mailed to a random sample of 3116 Railbelt residents. Six-hundred and three of these were returned resulting in a response rate of 23 percent. Of those who responded, 148 individuals or 25 percent stated that they currently use the study area for recreational purposes. By simple extrapolation, 25 percent of the 1980 Railbelt population which is 284,166 places the number at 65,973 persons who could presently recreate in the area. If, however, nonresponse to the questionnaire was assumed to be a no-use response, as few as 14,339 persons were considered to recreate there by the authors of that study.

Based on detailed knowledge of activities in the study area, it seems highly unlikely that this many people recreate in the study area (see Table E.7.13). It appears that the responses were skewed by "yes" replies from persons who do recreate there and who responded in higher overall proportion than their proportion in the population. Additional error may have been introduced through the survey illustrations which include portions of the Parks and Denali highways in the study area. However, even taking the average value of these two figures (40,156), and projecting it at the growth rate of 55 percent (the rate of population growth), 62,200 would recreate in the area by the year 2000.

The estimates of future use generated in that study are based on questions regarding anticipated future use of the project. They are not considered reliable due to changes in the project features since the survey was conducted. The generally unreliable nature of asking people how they would like to recreate rather than how they actually recreate also contributed to this unreliability.

(f) Conclusion

Using the method (the per capita participation) project demand for recreation is estimated to be 43,520 - 50,220 user days/year. In comparison, other estimates are:

Comparison (b): 46,000
Comparison (c): 51,000
Comparison (d): 45,100
Comparison (e): 62,200

Based on the assumptions set forth in this section and the variable predictability of recreational estimates for the Susitna Hydroelectric Project, project demand will be considered to be:

43,000 - 50,000 recreation user days/year at the completion of the project in 2002.

These are proportioned as shown in Table E.7.13 and summarized as follows:

Activity	Annual Visitor Days
Big Game Hunting	2,200 - 2,400
Waterfowl Hunting	170
Freshwater Fishing	4,800 - 5,200
Developed Camping	12,000 - 14,000
Canoeing/Kayaking	100
Hiking	12,000 - 14,000
Picnicking	12,000 - 14,000
Cross-country Skiing	350

4 - FACTORS INFLUENCING THE RECREATION PLAN

The approach utilized in this study recognizes six major factors that influence the ultimate design of the recreation plan. They are:

- Construction access and phasing;

- Operational characteristics of the project;

- Recreational use patterns and demand;

- Management objectives of the interested agencies and Native corporations;

- Facilities' design standards; and

- Financial obligation and responsibility of the Power Authority.

These factors were analyzed then utilized to set parameters for the plan determination process. The first two factors above were described in Section 1.4. The third factor was discussed in Section 3.2. The remaining three factors are discussed below.

4.1 - Management Objectives

In addition to the Alaska Power Authority, various federal and state agencies and several Native corporations established under provisions of the Alaska Native Claims Settlement Act (ANCSA) have interests in this plan.

4.1.1 - Alaska Power Authority

At this time no specific official statement of recreation policy has been developed by the Authority. The following policy statement regarding fish and wildlife aspects of the project was issued by the Power Authority in January 1982.

> "A mandate of the Alaska Power Authority charter is to develop supplies of electrical energy to meet the present and future needs of the State of Alaska. Alaska Power Authority also recognizes the value of our natural resources and accepts the responsibility of ensuring that the development of any new projects is as compatible as possible with the fish and wildlife resources of the state and that the overall effects of any such projects will be beneficial to the state as a whole.

4.1 - Management Objectives

- If development of the hydroelectric potential of the Susitna River proceeds, it is the Power Authority's goal, and its intent to achieve no net loss in fish and wildlife productivity;

- In achieving no net loss, mitigation measures that avoid or minimize impacts on existing habitat, all else being equal, are preferred over other types of measures;

- The base line for assessing post-project impacts and the effectiveness of mitigation measures or enhancement opportunities, is the existing condition;

- The Power Authority will work cooperatively with any responsible entity to explore ways the Susitna Project can complement the fish or wildlife enhancement plans of these entities;

- The feasibility report will present previously identified enhancement plans for the Upper Susitna River Basin and assess the Susitna Project's impact on the ability to realize those plans; and

- The feasibility report will present, as the proposed plan of development, a project configuration that maximizes power benefits. Concurrently, all reasonable mitigation measures, including the maintenance of sufficient river flows to avoid appreciable impact, will be identified, and their effectiveness and costs will be estimated."

To the extent that fish and wildlife resources constitute a part of the recreational experience, the general intent of this policy can apply to recreation also.

In addition, the following recreation-specific objectives have been identified by the study team:

- The plan should attempt to meet the demands of project-induced recreation with facilities appropriate to the Alaska wilderness setting;

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

4.1 - Management Objectives

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

- The plan shall 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 operation, resources for the project, or other public services;

- Various combinations of ownership and management by the state or by Native corporations may be appropriate for particular elements of the plan;

- Irreversible losses will be identified and reasonable mitigation and/or compensation will be provided whenever possible;

- 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.

4.1.2 - Alaska Division of Parks

The following statewide goals are stated in the Division'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;

4.1 - Management Objectives

- Recognize and provide for the needs of special populations;

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

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

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

- 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.

In addition, discussions with the Division of Parks staff have suggested preferences for the following recreation characteristics specific to the Susitna project:

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

- The Susitna project recreation plan should become an integral, logical extension of an overall state recreational network;

- Construction and operations costs will require contributions by the Power Authority; and

- The Division welcomes participation in the provision of recreational opportunities in the state by private entities such as the Native corporations.

The Alaska State Parks System South-central Region Plan (ADNR, Division of Parks 1982a) identifies one proposed acquisition which could influence the Susitna project recreation plan: The Talkeetna State Recreation River. This proposal would entail legislative designation of the river corridor, preparation of a river management plan, and subsequent development in conformance with that plan. The Talkeetna River is presently reached via portage from the Susitna River to Stephan Lake and Prairie Creek by river recreationists originating on the Susitna, Tyone or Lake Louise areas or by flights directly to Lake Stephan. Current division thought is that the objectives of this plan may be met without actual legislative designation. Portions of this area have also been selected for conveyance to the CIRI Village Corporations, including Stephan Lake, Prairie Creek, and the upper reaches of the Talkeetna River.

4.1.3 - Alaska Department of Fish and Game

As a part of the Fish and Wildlife Mitigation Review Group, the Alaska Department of Fish and Game participated in the development of the "Susitna Hydroelectric Project Fish and Wildlife Mitigation Policy" published by the Alaska Power Authority. This policy states that it is the basic intent of the Power Authority "to mitigate the negative impacts of the Susitna project on the fish and wildlife resources."

While the Department of Fish and Game has not issued a specific formal statement of objectives regarding project-related recreation, discussions involving the recreation team and Department staff have suggested the following objectives:

- Protect from over-fishing the trophy-class grayling population in Deadman Creek;

- Protect from highway traffic dangers the Nelchina caribou herd;

- Maintain important fishing resources downstream from Devil Canyon;

- Protect back country from unregulated access along construction of other project-related roads; and

- Regulate hunting and fishing activities of the construction force.

4.1.4 - U.S. Bureau of Land Management

The Bureau of Land Management (BLM) is manager of substantial federal land holdings generally north of the Susitna River and along the Denali Highway. 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 which can relate to development of the recreation plan for the Susitna Hydroelectric Project include:

- Develop a water trail on the Maclaren River downstream from the Denali Highway crossing to the Susitna River and up the Tyone River to Lake Louise;

4.1 - Management Objectives

- Rehabilitate the Brushkana Campground on the Denali Highway;
- Develop a series of "three-unit wayside camping areas" along the Denali Highway. Seven are indicated, including three between Cantwell and the Susitna River;
- Develop interpretive signs, etc. along the Denali Highway to explain natural history and archeology;
- Protect the shelter cabins built along the Cantwell-Valdez Creek Trail by the Alaska Road Commission during the 1920s. (Three are identified near the juncture 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 from fire the portions of the caribou range that have a strong lichen component;
- 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, in order to benefit local guides.

Two off-road vehicle (ORV) study areas are designated in the project vicinity comprising most of the BLM lands 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 clear-water drainage has been closed by the State Fish and Game Commission to mechanized hunting. In addition, recent federal action has opened major portions of the Denali Block to mineral exploration and mining entry, which could be in conflict with recreation and wildlife objectives. The Denali Highway is currently under study for possible designation as a scenic highway. Mining access has been withdrawn within one mile of the highway for this reason. If the highway receives scenic designation, it is likely that the temporary project electric transmission line as well as any borrow pits would have to be located out of sight of highway traffic.

4.1.5 - Cook Inlet Region Inc. and Village Corporations

Land ownership patterns in Alaska are unique and will have significant impacts on the recreation plan. Prior to statehood in 1959, most lands in the project area were owned by the federal government and managed by BLM. With statehood, Alaska was allowed to select lands from federal holdings for patenting to the state. When ANCSA was passed in 1971, this process of land transfer to the State was incomplete. Within the Susitna project vicinity, some lands had been selected by the state and patented to the state; other lands, while selected by the state, were not yet patented to the state. Under terms of ANCSA, further action on these lands has been suspended in favor of Native lands selection. These lands are identified as state selection suspended on project land status maps.

ANCSA provides land and money as compensation for the aboriginal land rights of Alaska Natives and established corporations responsible for managing these assets for the benefit of Native shareholders. CIRI is one of the 13 regional corporations established by the Act and has received portions of both its monetary and land entitlements under conditions of the Act. Portions of these entitlements are in turn to be reconveyed to village corporations that are currently in the process of selecting lands from the region's master selection. Villages also have their own entitlements not related to CIRI selections. Major portions of the Susitna project area have been selected by CIRI. 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 private ownership, not public. Twenty years from the date of conveyance, they will be subject to property tax assessments.

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

- CIRI will defer to the village corporations regarding the development of recreational facilities;

- Project land ownership of the reservoirs should be confirmed to the high-water line, giving the Native corporations maximum flexibility for later private development;

- Native corporations must find and develop economic uses of their lands, including recreational uses, to meet future tax liabilities;

4.1 - Management Objectives

- Native corporations want to actively participate in the recreational planning, decision-making, and management process;

- They do not necessarily want to lose land ownership in order to provide public recreation;

- Public use must be carefully managed to avoid over-use and environmental degradation;

- Trespass must be regulated;

- The state must assume liability responsiblity for any project-related recreational use of Native lands; and

- The Native corporations would benefit from provision of technical recreational planning assistance subsidized by the Power Authority.

The Native corporations have expressed willingness to participate in a cooperative recreational planning process to assure provision of recreational opportunities while meeting Native objectives. Possibilities under discussion include but are not limited to:

- Ownership of recreation areas by the Native corporations and lease to the state;

- Ownership and management of recreation areas by the Native corporations;

- Ownership by the Natives and joint management by them and the state under Sec. 907, Alaska Land Bank, of PL 96-487, the Alaska National Interest Lands Conservation Act;

- Purchase of lands by the state, but facility management by the Natives under a preferred concessionaire or similar agreement; and

- Lease by the state of lands for project construction camp facilities and reuse by the Natives for recreational use.

4.1.6 - Matanuska-Susitna Borough

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

The Matanuska-Susitna Borough Coastal Management Program (WCC 1982) includes the Susitna River up to Devil Canyon where the

River south of the study area. The Devil Canyon damsite is designated as a "potential" Area Meriting Special Attention (AMSA) in that document. Under Alaska statute, should the area be designated an AMSA, a proposed management scheme would have to be developed by the borough and appropriate state agencies.

In 1982, the borough also published a draft Trails System report designed to identify trails that ought to 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 participated in joint planning with the State Department of Natural Resources. In some instances, they have provided lands and monies to the state for park development.

4.1.7 - Alaska Department of Transportation

The Alaska Department of Transportation (DOT) utilizes the American Association of State Highway Officials (AASHO) Geometric Design Guide for Local Roads and Streets (1970) as design standards for rural roads such as the project roads. Average Daily Traffic (ADT) design year is 20 years from the present.

The Alaska Department of Transportation and Public Facilities is currently proposing the 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 will correct roadway structure deterioration and substandard elements and will 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).

4.2 - Facilities' Design Standards

State of Alaska, Division of State Parks design standards will be used for the proposed recreational facilities. This is intended to minimize operational, managerial, and maintenance costs of the facilities for state park management.

4.3 - Financial Obligations and Responsibility of the Alaska Power Authority

Alaska Power Authority, as a state agency, has stated that it will provide for the public interest and implement an appropriate recreation

4.3 - Financial Obligations and Responsibility

plan. The ultimate responsibility and obligation for development, operation and maintenance of the recreational facilities relative to the project rests with the Power Authority. Financial commitment is related to numerous tradeoffs to be made by the Authority in terms of satisfying, with limited resources, the needs of many concerned user groups. The Alaska Department of Natural Resources expects the Power Authority to be responsible for meeting initial and future project-related recreational needs for the duration of the project license. The extent and nature of the responsibility will necessarily be dependent upon the conditions of the FERC license. In the event that the recreational needs within the project area should change or other specific needs not outlined in this Exhibit are identified, periodic reviews, as outlined in Section 6.2, will provide an opportunity to make adjustments to the plan. The responsibility for project financing, development, and operation will be negotiated betwen the parties concerned at the time the adjustments are needed and are subject to FERC approval.

5 - RECREATION PLAN

5.1 - Recreation Concept

5.1.1 - The Concept

The intent of this recreation plan is to satisfy the recreational demands created by hydroelectric development and to accommodate public use of the project areas. The plan offers compensation for recreational opportunities lost as a result of development. It does not attempt to duplicate exactly or replace these opportunities. The plan is also intended to fit within the framework of regional recreational opportunities and to provide additional options. It accommodates these diverse recreational concerns in a manner which fits the inherent opportunities and constraints of the study area landscape and protects its scenic, cultural, and environmental qualities.

The Susitna study area is rich in special large- and small-scale landscape settings and features, and has great potential for a wide variety of recreational uses. The area includes wooded stream valleys and gorges, tundra and muskeg landscapes, and mountainous glaciated terrain filled with lakes, bogs, waterfalls, glacial, and many other special features. These landscapes are comprised of a wide variety of plant communities and wildlife inhabitants.

The recreation concept was developed after a careful evaluation of the recreational opportunities and constraints within the study area, regional recreational concerns, and estimated demands. It utilizes information gained from earlier public participation programs.

The concept provides for a challenging variety of activities and experiences within a developmental range of natural wilderness to semiprimitive recreational facilities. Road access has been limited. Other options such as airplane, boat, train, and foot access are available to a variety of recreation areas. Off-road vehicular use will continue in existing BLM areas.

(a) Major Considerations of the Recreation Concept

(i) Regional Approach

The Susitna project is exceptional in its large scale and suggests a regional approach to the recreation plan. The study area is extended beyond the immediate perimeter of the reservoir sites in order to thoroughly examine all adjacent landscapes and satisfy demonstrated recreational need.

(ii) Fluctuating Reservoir Water Levels

The greatly fluctuating water level of the reservoirs precludes the use of the reservoir edge and any buffer zone from recreational use.

(iii) Hiking Trails

In response to the projected recreational needs of the state, since the number one recreational priority is hiking trails, a principal objective of this recreation plan will be to help meet this priority in appropriate portions of the project area.

(iv) Educational Values

To take advantage of the great recreational value of understanding the Alaskan environment, a variety of opportunities will be created to participate in and view the landscape in a range of scales. This variety will also represent and accommodate a variety of users.

(v) Public Interest in Hydroelectric Facilities

To accommodate the great interest of the public to observe and understand the hydroelectric facilities themselves, that development focuses activity on a core of recreational facilities and diverts the greatest number of users away from sensitive operations or environmental areas. Hydroelectric facilities which have appeal as a recreational resource have been incorporated into this concept.

(vi) Recreational Needs of Temporary Construction Workers and Permanent Village Residents

The concept also considers the complex recreational needs of the temporary construction camp workers and ultimately the residents' permanent village. At these locations the concept is intended to provide a variety of highly developed recreational facilities, both indoor and outdoor, which will satisfy demands without overtaxing the area's limited primitive recreational capacity.

The recreation concept was formulated to take advantage of these opportunities and the best natural features of the Susitna Basin rather than restricting the evaluation to specific project facilities. In fact, after analysis, the highest quality recreational opportunities were found to be in the diverse landscapes adjacent to the reservoir sites and not at the reservoirs themselves. Because of this fact, there are not many recreational facilities within the buffer zone which could potentially be impacted by changes in the dynamic edges of the reservoirs.

5.1.2 - Public Input

During earlier studies of recreational needs for the Susitna project, the University of Alaska distributed a Concept Plan Survey to the public in order to solicit ~~public input~~ into the recreational planning process. The 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 1982). 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 recreation opportunity spectrum preferences continue to be valid. These identified preferences serve as the framework of the proposed recreation plan.

A total of 2145 surveys were distributed. Recipients were given a choice of five alternative approaches to development and asked to rank the five in order of value. The choices were:

Approach A - Minimally developed and managed wilderness with no access;

Approach B - Managed wilderness with limited access;

Approach C - Watana Dam development;

Approach D - Devil Canyon reservoir development; and

Approach E - Highly developed and managed throughout.

Results of the 549 responses were separately analyzed by region (Anchorage, Fairbanks, and other areas of the railbelt) and by residence classification (urban, rural, remote rural, and other) but no significant statistical differences were found. Approach B was found to have the highest overall value to the respondents. Therefore, the recreation concept is based on minimal and primitive development having only limited access within a managed wilderness area. Further analysis of the attached comments indicated that facilities should be developed and managed on an as-needed basis, starting with minimal services and expanding only as demand warrants. This preference has been reflected in the proposed phased implementation program.

5.2 - Recreation Opportunity-Inventory

5.2.1 - Methodology

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

- Reviewed all planimetric information, USGS quadrangles, previous inventories and aerial photographs.

- Located the occurrence of all attractive features as understood from above, and including local knowledge and previous work, e.g., the recreation plan published (TES 1982d).

- Field checked all sited located in the previous step plus new potential sites, using the inventory shown in Appendix 7.B. Defined the quality and extent of the various landscape features.

- Mapped all features and settings depicting the distribution and location of the recreational resources. Included are indications of special or significant views and vistas (see Figure E.7.5. Recreational opportunities, hunting, fishing, and collecting sites are not specifically located or symbolized. The opportunity exists to experience the wildlife in many ways as they naturally inhabit the entire landscape.

5.2.2 - Inventory

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

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

(a) Attractiveness

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:

- Mountaintops: rocky, craggy, often snow-capped, usually above timperline, glaciated or glacier forms most unique and impressive;

- Tundra landscapes: tundra landscapes, both wet and dry, with close-up beauty and photographic resources;

- Lakes: naturally occurring, degree of enclosure, habitat, formation, glaciated lakes and beaver ponds most unique;

- Rivers: glaciated, ruggedness and enclosure, quality expressive of Alaska, size, edges;

- Streams: character, clarity, size, edge;

- Water features: waterfalls, cascades, beaver ponds, snowfields, ice;

- Hunting habitats: locations of big game animals and birds;

- Fishing habitats: location of fish species;

- Botanical interest sites: unusual plants, or systems; and

- Special aesthetic features: unique exploratory vistas, features and settings.

(b) 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 Recreation Opportunity Inventory and Evaluation 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:

5.2 - Recreation Opportunity - Inventory

(i) 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.

(ii) 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.

(iii) Semiprimitive

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

(iv) Developed

Man-made developed sites, with easy access. The appropriate settings are developments which embody many people and site-specific interests.

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

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

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

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

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

Another major consideration is accessibility. The study area is very 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.

(c) Accessibility

Accessibility refers to the kind of roads, four-wheel-drive trails, foot trails, etc., which 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 will allow access to new areas by the auto-related recreationist which were before inaccessible except by less convenient modes. Appropriate access to the various settings is important in maintaining the setting preferences, e.g., pristine activity preferences need to be difficult to access. This relationship is determined during the onsite field review.

5.3 - Recreation Opportunity Evaluation

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

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

5.3.1 - Natural Value

Natural value is a measure of the inventoried landscape features and settings based upon the frequency of occurrence and overall quality.

Natural value also defines the physical characteristic's relationship to the regional and local scales. The sites were evaluated on an onsite basis in a three-level rating:

- High: value 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);

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

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

5.3 - Recreation Opportunity - Evaluation

5.3.2 - Inherent Durability

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

5.3.3 - Visual Quality

Visual quality is 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:

- Uniqueness based upon frequency and scale;
- Levels of quality of the resource; and
- 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

5.3 - Recreation Opportunity - Evaluation

	Unique Alaskan Landscapes	Rare or Unusual Landscapes	Common or Extensive Landscapes
Several special features and settings	High	Medium	Low
Encroachment and created landscapes	Medium	Medium	Low

5.3.4 - Carrying Capacity

Carrying capacity is 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 site through over-use or participation. The United States Forest Service approach (U.S. Department of Agriculture 1974) has been used in a modified version to define the carrying capacity of each.

(a) 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 recreational setting, based upon the designated recreation preference type. This estimate is described by the following formula:

$$\frac{\begin{bmatrix}\text{peak capacity}\\\text{estimate}\end{bmatrix}\begin{bmatrix}\text{days in}\\\text{year}\end{bmatrix}\begin{bmatrix}\text{\% of year}\\\text{utilized}\end{bmatrix}\begin{bmatrix}\text{visitor day}\\\text{conversion}\\\text{factor}\end{bmatrix}^{*}}{\text{recreation site acres}} = \text{visitation capacity}$$

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

$$\begin{matrix}\text{visitation}\\\text{capacity}\end{matrix}\;\;\begin{matrix}\text{recreation opportunity}\\\text{quality factor}\end{matrix}^{*} = \text{visitation potential}$$

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

*Constant (U.S. Department of Agriculture 1974).

(b) Peak Capacity Estimates

Integral to these two 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:

$$\text{Pristine: } \frac{\left[\begin{array}{c}\text{recreation}\\ \text{setting acres}\end{array}\right]\left[\begin{array}{c}\text{\% acres}\\ \text{encounter space}\end{array}\right]^{**}}{(250 \text{ acres/visitor group})} = \text{PCE}$$

$$\text{Primitive: } \frac{\left[\begin{array}{c}\text{recreation}\\ \text{setting acres}\end{array}\right]\left[\begin{array}{c}\text{\% acres}\\ \text{encounter space}\end{array}\right]^{**}}{(100 \text{ acres/visitor group})} = \text{PCE}$$

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.

5.4 - The Recreation Plan

The Susitna Hydroelectric Project recreation plan includes the following sites and proposed facilities. Figure E.7.6 indicates extensive facilities such as long trails, and locates site-specific recreational facilities. All sites are shown with a key letter and phase number relating to text and maps. There are eleven additional maps which depict important features of the individual recreation sites (Figures E.7.7 - E.7.17).

** Encounter space along trails is 0.5 miles wide.

5.4 - The Recreation Plan

Phase One - Watana Construction Phase

Key Letter	Name
E	Brushkana Campground
D	Tyone Confluence with Susitna
B	Butte Creek/Susitna River
A	Middle Fork-Chulitna River
C	Watana Townsite
F	Portal Entry

Phase Two - Watana Implementation Phase

O	Watana Damsite
U	Watana Townsite
H	Tsusena Creek
I	Tsusena Butte
L	Deadman/Big Lake
J	Clarence Lake
K	Watana Lake

Phase Three - Devil Canyon Construction

G	Mid-Chulitna/Deadman Mountain

Phase Four - Devil Canyon Operation

Q	Devil Creek
S	Devil Canyon Damsite
R	Mermaid Lake

Phase Five - To Be Developed Only If Demand Requires

T	Soule Creek
M	Southern Chulitna Mountains
N	Fog Lakes
P	Stephan Lakes
W	Rehabilitation Sites

5.4.1 - Phase One: Watana Construction Phase

(a) Brushkana Camp (E)

(i) Physical Characteristics

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 (see Photograph E.7.4).

(ii) Recreation Preference Type

Developed; man-made environment with easy access, in a seminatural state.

(iii) Recreation Opportunity Summary

- Car camping;
- Picnicking;
- Fishing;
- Big game hunting;
- Photography; and
- Berry picking.

(iv) Recreation Opportunity Evaluation Summary

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:	3200	
Visitation Potential:	1600	
Present Land Status:	Bureau of Land Management	

(v) Proposed Recreation Facilities (see Figure E.7.7)

Twenty-five new campsites, similar to the existing development, with tables, fire, and toilet facilites, and 1/4-mile (0.4 km) circulation road for proposed site.

(vi) Accessibility

The Denali Highway, approximately at Road Mile 100, is immediately adjacent and intersects the Parks Highway approximately 30 miles (50 km) to the west.

(b) Tyone River (D)

(i) 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.

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

Boating;
Kayaking-canoeing;
Camping;
Big game hunting; and
Fishing.

(iv) Recreation Opportunity Evaluation Summary

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: 128

Present Land Status: State of Alaska, Department of Natural Resources

(v) Proposed Recreation Facilities (see Figure E.7.6)

One shelter

(vi) Accessibility

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

(c) Butte Creek/Susitna River (B)

(i) 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 fitted with tiny ponds, lakes, and wetlands is in contrast to the rocky Talkeetna Mountains immediately to the 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 Photograph E.7.2).

(ii) 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.

(iii) Recreation Opportunity Summary

- Butte Creek:
  Wildlife observation;

. Botanical interest sites;
. Fishing;
. Big game hunting; and
. Photography.

- Butte Lake:
  . Fishing; and
  . Big game hunting.

- Susitna River:
  . Fishing;
  . Photography;
  . Boating;
  . Ski touring; and
  . Snowshoeing.

(iv) <u>Recreation Opportunity Evaluation Summary</u>

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	

(v) Proposed Recreation Facilities (see Figure E.7.6)

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 vehicle-trailers.

(vi) Accessibility

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.

(d) Middle Fork Chulitna River (A)

(i) Physical Characteristics

Extending from the town of Summit through the Summit Lake chain, this corridor runs 27 miles (45 km) 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 3900), it crosses a pass and leads to Tsusena Creek (Site F). The background views of the Alaska Range are dramatic from the Middle Fork Chulitna drainage basin (see Photograph E.7.1).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

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

(iv) 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. There are many areas of foreground interest and waterforms which offer a high level of visual interest and landscape unity.	
Carrying Capacity:	Pristine	
Visitation Capacity:	4645	
Visitation Potential:	3857	
Present Land Status:	Bureau of Land Management and Ahtna Village Corporation selection.	

(v) Proposed Recreation Facilities (see Figure E.7.6)

Two overnight shelters along trail;
Primitive trail development 25 miles (41 km); and
Trailhead and parking for 6 cars.

(vi) Accessibility

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

(e) Watana Townsite (C)

See Section 5.4.6.

(f) Portal Sign (F)

At the entry of the Watana access road on the Denali Highway is the site for an explanatory project sign and visitor information service. Parking pull-off for 2-3 cars is necessary.

5.4.2 - Phase Two - Watana Implementation

(a) Watana Damsite (O)

(i) Physical Characteristics

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

(ii) Recreation Preference Types

Developed; a man-made environment with easy access.

(iii) Recreation Opportunity Summary

Viewpoint;
Visitor information;
Photography;
Picnicking; and
Walking.

(iv) Recreation Opportunity Evaluation Summary

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 Pryell Boundary

(v) Proposed Recreation Facilities (see Figure E.7.8)

Access road, 0.15 mile (0.25 km);
Parking, 20 cars;
Exhibit building;
- Souvenir shop;
- Museum;
- Restrooms; and
- Food service.

Indigenous plants on botanical trail;
Four picnic sites; and
Boat ramp to reservoir, possibly at emergency spillway.

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

(vi) Accessibility

Access road across Watana Dam.

(b) Watana Townsite Phase II (U)

See Section 5.4.6

(c) Tsusena Creek (H)

(i) 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 (100 ha) 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 Photographs E.7.5 and E.7.6).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

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

(iv) 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; the area has unique foreground and middleground views in every direction. The potential for wildlife observation occurs everywhere in this diverse natural environment.	
Carrying Capacity:	Pristine	
Visitation Capacity:	2657	

Potential Capacity: 2206

Present Land Status: Bureau of Land Management

(v) Proposed Recreation Facilities (see Figure E.7.9)

Two shelters; and
20 miles (33 km) of primitive trail development.

(vi) Accessibility

- Foot trail from the proposed Middle Fork of the Chulitna River (Recreation Site A);
- Airplane at Tsusena Lakes; and
- Foot trail from the Watana access road within the Tsusena Butte recreation setting, (Recreation Site I).

(d) Tsusena Butte (I)

(i) 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 a 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 Photograph E.7.10).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

- Hiking;
- Backpacking;
- Photography;
- Wildlife observation;
- Ski touring;
- Snowshoeing; and
- Fishing.

(iv) Recreation Opportunity Evaluation Summary

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 (Recreation Area H), as well as foreground views of well-defined Tsusena Lakes. The sportsman's lodge at the lake adds a cultural feature in this otherwise pristine environment.	
Carrying Capacity:	Primitive	
Visitation Capacity:	1274	
Visitation Potential:	1019	
Present Land Status:	Bureau of Land Management	

(v) Proposed Recreation Facilities (see Figure E.7.9)

Primitive trail development, 4 miles (7 km);
Trailhead, with 10 parking spaces; and
Two to four undesignated campsites.

(vi) Accessibility

Auto, via the Watana access road (Mile 36).

(e) Deadman Lake/Big Lake (L)

(i) Physical Characteristics

Two lakes of approximately 1800 acres (720 ha) 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 Photographs E.7.11 and E.7.12).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

- Hiking;
- Backpacking;
- Photography;
- Wildlife observation; and
- Fishing.

(iv) Recreation Opportunity Evaluation Summary

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:	1292	
Visitation Potential:	1034	
Present Land Status:	Bureau of Land Management, State Selection Suspended Lands.	

(v) Proposed Recreation Facilities (see Figure E.7.10)

Primitive trail development, 4 miles (7 km);
Four undesignated campsites; and
Trailhead, with 6-space automobile parallel parking.

(vi) Accessibility

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

(f) Clarence Lake (J)

(i) 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 tumbles northward to the Susitna River Valley. Alpine tundra covers the large undulating terrace, with mixed woodlands occurring only at Kosina Creek (see Photograph E.7.14).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

- Hiking;
- Backpacking;
- Photography;
- Wildlife observation;
- Fishing; and
- Big game hunting.

(iv) Recreation Opportunity Evaluation Summary

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: 3243

Visitation Potential: 648

Present Land Status: State-suspended lands.

(v) Proposed Recreation Facilities (see Figure E.7.11)

Primitive trail development, 9 miles (15 km);
One footbridge; and
Four to six undesignated campsites.

(vi) Accessibility

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

(g) Watana Lake (K)

(i) Physical Characteristics

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 Photograph E.7.16).

(ii) Recreation Preference Types

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

(iii) Recreation Opportunity Summary

- Hiking;
- Backpacking;
- Photography;
- Wildlife observation;
- Fishing; and
- Big game hunting.

(iv) Recreation Opportunity Evaluation Summary

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: 1045

Visitation Potential: 209

Present Land Status: State-suspended lands.

(v) Proposed Recreation Facilities (see Figure E.7.11)

Primitive trail development, 3 miles (5 km); and
Three undesignated campsites.

(vi) Accessibility

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

5.4.3 - Phase Three - Devil Canyon Construction

(a) Mid-Chulitna Mountains, Deadman Mountain (G)

(i) Physical Characteristics

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 Photographs E.7.7, E.7.8 and E.7.9).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

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:	Prisitine	
Visitation Capacity:	2743	
Visitation Potential:	2195	
Present Land Status:	Bureau of Land Management	

(v) Proposed Recreation Facilities (see Figure E.7.12)

Two vista auto pull-off areas, seven autos;
One trailhead with three-car parallel parking;

Primitive trail development, 7 miles (12 km); and
Two to four undesignated campsites.

(vi) Accessibility

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

5.4.4 - Phase Four - Devil Canyon Operation

(a) Devil Creek (Q)

(i) 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 roars 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 Photographs E.7.20, E.7.21, and E.7.22).

(ii) Recreation Preference Types

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

(iii) Recreation Opportunity Summary

- Hiking;
- Nature observation; and
- Photography.

(iv) Recreation Opportunity Evaluation Summary

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:	1257
Visitation Potential:	1006
Present Land Status:	State suspended lands, CIRI Village Selection Lands

(v) Proposed Recreation Facilities (see Figure E.7.15)

Primitive trail development, 9 miles (15 km).

(vi) Accessibility

Gravel road, the Devil Canyon access road.

(b) Devil Canyon Damsite (S)

(i) 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 Photograph E.7.26).

(ii) Recreation Preference Type

Developed, a man-made site with easy access, within a natural setting.

(iii) Recreation Opportunity Summary

- Visitor information service;
- Walking;
- Picnicking;
- Nature observation;
- Photography;
- Ski touring; and
- Snowshoeing.

(iv) Recreation Opportunity Evaluation Summary

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.

(v) Proposed Recreation Facilities (see Figure E.7.13)

One shelter;
- Exhibit building;
- Food service;
- Souvenirs shop; and
- Restrooms.

Eight picnic sites;
15 parking sites; and
Boat access and ramp downriver from dam via project construction road

Note: The auto-oriented campground at Mermaid Lake (Site R), about 4 road miles (7 km) northeast, is the destination campground associated with Devil Canyon Visitors' Center.

(vi) Accessibility

Devil Canyon access road.

(c) Mermaid Lake (R)

(i) Physical Characteristics

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 of the Susitna River forms the souther edge (see Photographs E.7.24 and E.7.25).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

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:	3329	
Visitation Potential:	2663	
Present Land Status:	Bureau of Land Management, state selection suspended lands	

(v) Proposed Recreation Facilities (see Figure E.7.14)

Eight campsites, tables, tent pads, parking;
Small-scale road, 0.25 mile (0.4 km);
Two toilet facilities; and
One shelter.

(vi) Accessibility

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

5.4.5 - Phase Five - To Be Delivered Only If Demand Requires

(a) Soule Creek (T)

(i) Physical Characteristics

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 multicolored rock with a large hidden lake basin of 5 miles (8 km) containing a long (2-mile [3-km]) linear lake, this valley is a strikingly complex, natural environment (see Photographs E.7.27 and E.7.28).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

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.

Carrying Capacity: Pristine

Visitation Capacity: 2361

Visitation Potential: 1888

Present Land Status: Bureau of Land Management

(v) Proposed Recreation Facilities (see Figure E.7.17)

Primitive trail development, 8 miles (13 km);
Five to six capacity undesignated campsites at the northern edge of the lake; and
Five-car parallel park trailhead.

(vi) Accessibility

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

(b) Southern Chulitna Mountains (M)

(i) 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 photographs E.7.29 and E.7.30).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

- Backpacking;
- Hiking;

- Nature observation;
- Snowshoeing; and
- Ski touring.

(iv) 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	

(v) Proposed Recreation Facilities (see Figure E.7.10)

Primitive trail development, 3 miles (5 km);
Three undesignated campsites; and
Trailhead with three parallel auto parking spaces.

(vi) Acccessibility

The Watana dam access road.

(c) Fog Lakes (N)

(i) Physical Characteristics

This cluster of long, linear lakes paralleling each other, each over one and one-half 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 Photograph E.7.17).

(ii) Recreation Preference Type

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

(iii) Recreation Opportunity Summary

- Hiking;
- Car camping;
- Nature observation;
- Wildlife observation;
- Photography; and
- Fishing.

(iv) Recreation Opportunity Evaluation Summary

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:	7144	
Visitation Potential:	3572	
Present Land Status:	Private land	

(v) Proposed Recreation Facilities (see Figure E.7.8)

Fifteen campground units, picnic tables, fire pits, and tent pads;
Three toilet facilities; and
Primitive trail development, 15 miles (25 km).

(vi) Accessibility

Airplane to Fog Lakes; and
Road access across Watana Dam.

(d) Stephan Lake (P)

(i) Physical Characteristics

Stephan Lake is a 3.5-mile-long (6-km) 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 Photograph E.7.19).

(ii) Recreation Preference Types

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

(iii) Recreation Opportunity Summary

- Hiking;
- Backpacking;
- Kayaking-canoeing;
- Wildlife observation;
- Photography;
- Fishing; and
- Big game hunting.

(iv) Recreation Opportunity Evaluation Summary

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: 1956

Visitation Potential: 978

Present Land Status: Private land.

(v) Proposed Recreation Facilities (see Figure E.7.16)

Primitive trail development, 5 miles (8 km); and
Five campsites.

(vi) Accessibility

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

(e) Rehabilitation Sites and Project Construction, Created Opportunities (W)

In addition to those recreational opportunities which are intrinsic to the natural environment, there are other areas under consideration such as borrow sites, 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, off-road tracks, and other activities. Additional recreational improvements and activities could be developed in such locations if unforeseen recreational demand occurs.

All such elements planned for Susitna should be designed in Phase II so that the option is available either to incorporate them into the recreation plan or to restrict public access after construction to protect sensitive areas.

These areas should be considered for development upon the completion of the 4-phased, site-specific facility program. These recreation opportunities would be part of Phase Five in the recreation plan, to be developed only as need requires.

It is of utmost importance in these cases to rehabilitate the disturbed environment (see Chapter 8, Aesthetics) and to allow a recovery period prior to future recreation development. It is necessary to recreate the physiographic character and indigenous plant communities as closely as possible and create new recreation opportunities, e.g., fisheries of native species, plant materials for gathering, etc.

5.4.6 - Recreation Plan for Construction Camps and Permanent Townsite

(a) Background

Because of its remote location, sequential development of construction camps at both the Watana and Devil Canyon sites has been planned. Each will be occupied for approximately 8 years by at least a part of the work force. The peak number of workers will be there for less than the entire construction period, and average work force will approximate half of the peaks. Therefore, facilities can generally be programmed to provide fewer opportunities both in range and extent than those in permanent communities. Prospective workers will understand that the project entails hardship circumstances and will not expect all the amenities of urban life. Experience has shown that there will be a turnover of work force through attrition. This means that, while a particular job may last the life of the project, it will not necessarily be filled by the same person for the entire period.

Operation of the camps and the length of work days and work weeks will influence both the proportion of the work force who chose to live in camp compared to those who chose to live elsewhere (if that option is given) and the amounts and types of recreation required. In addition, climatic consideration will require seasonal adjustments. The largest work force will be active from April through October, and a minimum work force of 30 percent of that year's peak will continue through December and January. The work pattern is planned to be four weeks on and one week off. There will be two 10-hour shifts per day, seven days per week.

While some Watana workers may choose to live in Cantwell or elsewhere, it is assumed that the majority will live at the camp and commute to their families' places of residence only periodically.

5.4 - The Recreation Plan

This recreation plan is intended to meet the needs of construction workers in residence at the construction camps; it is not intended to address the recreational needs of workers while not at the site.

(b) Planned Project Facilities

Table E.7.16 indicates recreation facilities proposed in the Susitna Hydroelectric Project Feasibility Report (Acres 1982d).

A single-status worker camp with a peak capacity of 3600 workers and a family-status village designed for a peak capacity of 350 families (1120 people) are planned. The village is currently planned to be located about 1.5 miles (2.5 km) north of the damsite, and the construction camp another 1.5 miles (2.5 km) northeast. An airfield will also be developed. After construction, the villages will be removed and relocated at Devil Canyon and a permanent townsite for 125 operators and their families will be developed adjoining the construction village. Current plans call for no preconstruction of the permanent town facilities, necessitating a duplication of facilities in the temporary village and townsite. The Devil Canyon project is planned to be constructed from a temporary single-status construction camp, and temporary family-status construction village located about 3 and 4 miles (5 and 7 km), respectively, from Devil Canyon. The camp is planned for a peak of 1780 workers and the village for 170 workers and their families, totaling 550 persons. No permanent residential facilities are planned for Devil Canyon.

The temporary camps and villages are designed to be largely self-contained and in fenced areas, with highly regulated environments. It is anticipated that hunting by project personnel will be prohibited and that fishing will be regulated. Recreation programs sponsored by the camp management will occur largely within these compounds.

The Feasibility Report programs major recreation facilities for each of the four temporary camps. Table E.7.15 shows the major facilities as anticipated in March 1982. Actual recreation facilities at the permanent town will be planned in detail during subsequent project design phases.

(c) Recreation Programming for Workers and Residents

Quality of life objectives are very difficult to achieve at construction camps. The type, number, and quality of recreation facilities and nonstructural opportunities available will be important factors in determining that quality of life, and could impact productivity, turnover, and ability of the project to attract quality construction workers. It will also affect the number of workers who choose to live and recreate out of the camp. Other things being equal, total environmental impacts can be reduced by concentrating the work force in camps rather than living elsewhere. Other important nonrecreation components which will affect quality of life are design considerations such as ability to achieve privacy, which experience has shown to be as important as recreational opportunities. Color and the use of interior plantscapes are also important. Other considerations which are managerial in nature includes food quality, management styles, special event planning and holiday celebrations (see also Chapter 5, Socioeconomic Impacts).

Ancillary construction camp facilities are typically programmed for less than peak work force because of the peak's relatively short duration. In terms of Susitna recreation, this concept is reinforced by the fact that annual peaks will occur in the summer months when outdoor nonstructural recreation will increase the range of recreational opportunities. While the peak work force at Watana will reach 3480 in June and July 1990, the average annual work force will more closely approximate 1600 total workers. Only in the five years between 1987 and 1992 will the work force exceed this average, and then only during half of the year. Facilities will be completed by the 1990 peak; therefore, 1987-1989 will incur the heaviest use. Devil Canyon construction activity will peak in 1998-2000, and facilities will have maximum use in 1997. The permanent Watana townsite wll be planned for 125 families, or 400 total population.

Assuming that the proportion of family and single-status workers remains constant, recreation in the Watana camps will be programmed as follows:

Single-Status Camp:	1600 workers
Family Village:	160 workers (500 total population)

For Devil Canyon, comparable working forecasts are:

Single-Status Camp:	1100 workers
Family Village:	110 workers (350 total population)

5.4 - The Recreation Plan

Private recreational standards vary widely and are affected by location, climate, user profiles, and other factors. Representative standards intended, however, to be applied to larger, permanent communities are:

Facility	Population Standard
Softball	1 per 1000
Tennis	1 per 2000
Basketball	1 per 500
Pool	1 per 20,000
Center	1 per 25,000
Golf Course	1 per 25,000

Source: National Recreation & Park Open Space Standards (1971)

Other standards use 1 per 3000 population for softball fields. Most planners would not use as high as 1 per 500 persons for basketball courts. Outdoor courts will be limited by climate. Similarly, other standards use 1 per 50,000 persons for a golf course. Other standards determine athletic field needs in terms of acres per 1000 population, typically 1.5 acres per 1000 for field sports (adults and older children) and 1.0 per 5000 population for tennis, outdoor basketball and other sports (DeChiara & Koppelman 1978).

These types of standard planning criteria are not directly applicable to programming for these facilities. Some of the other factors which have influenced the recreation plan are the:

- Extreme remoteness of the site;
- Long duration of construction period;
- Extreme harshness of climate from October through April;
- Short daylight hours in winter months and long daylight hours in summer months;
- Long (10-hour) work days;
- Pattern of four weeks on, one week off;
- Necessity to protect fish and wildlife from overuse; and
- Homogenous user profile.

Current construction plans call for five essentially separate communities which will require duplication of facilities and increase infrastructure and recreation costs. This recreation plan is designed to provide essentially equivalent facilities for single- and family-status workers. If family-status workers are not allowed, as is more typical with civilian projects in Alaska, significant savings can be achieved. In addition, if permanent townsite facilities are pre-built for the Watana village, some duplication can be eliminated.

(d) Proposed Recreation Plan for Workers and Residents

The recreation plan as presented is designed for the peak year for Watana, 1990-1991, and Devil Canyon, 1998-2000, and will be developed incrementally in the prior years, as needed. The plan is detailed in Table E.7.16.

Recommended facilities take into consideration those presented in the March 1982 Feasibility Report, recent comparable experience in construction camp programming, and reference to recognized sources (DeChiara and Koppelman 1975 and 1978, DeChiara and Callender 1973, Mountain West Research Inc. 1976, Myhra 1980).

Many of these proposed recreation uses can be accommodated in multipurpose space. For instance, the gymnasium can be a multipurpose space suitable for jogging, basketball, volleyball, tennis, badminton, etc. Such areas are not necessarily a separate building but are developed by clustering residential modules with flooring and roofing spanning the intervening space. The swimming pool can serve as the campfire protection reservoir and as an important image-generating and social gathering place. The "clubhouse" may be a separate structure or may be divided into smaller social groupings throughout the camp.

Exterior uses likewise do not require separate space dedicated to a particular activity but can utilize single fields for multipurpose sports. Utilization of recreational directors is an important component both in maximizing the multiuse potential of the facilities and in contributing to the quality of life for the residents.

It is also recognized that some of the nonstructural activities recommended in this plan carry liability risks for the Power Authority. Careful consideration will have to be given to the tradeoffs involved between quality of life and potential risks. Potential activities such as fishing will have to be carefully coordinated with the Alaska Department of Fish and Game to protect the resource. Other issues, such as storage of fish caught by camp residents, have important Health Department implications. It is anticipated that no storage of fish will be permitted, nor will angler fish be cooked in camp kitchens.

Further recreation planning for the camps, villages, and townsite will be required as the Power Authority progresses with policy decisions regarding details of the construction program and as actual facility design is undertaken.

5.4.7 - Site-Specific Design

The exceptionally large scale of the Susitna Recreation Area and regional approach to planning make detailed design of recreational elements inappropriate in Exhibit E.

Site-specific designs will occur during Phase Two engineering designs at which time site-specific data and site locations will be accurately described and designed.

These investigations of recreation sites will be closely coordinated with concurrent archeological site investigations. If potential conflicts are discovered between significant archeological sites and proposed recreational improvements, they will be resolved through careful siting and modifications as required.

5.4.8 - Design Standards

The intent of this plan is to use the Alaska Division of Parks design standard, since this division will be the major managing agency for the proposed recreation sites. Because of the intended primitive nature of most of the recreation sites, an onsite design construction process is most appropriate and is commonly used by the Parks Department. For example, the proposed trails will meet the Division of Parks "Priorities Trails" standard which is an 18-inch to 24-inch (45-60 cm) tread surfaced in the parent material, with half logs in wetlands. They will be brushed out to 48 inches (1.2 meters) where necessary. They will be hand constructed and follow existing topography. Trails are intended to be as primitive as possible to enhance the natural experience (see Appendix 7.C for typical or similar facility design standards for the Susitna project).

5.4.9 - Recreation Plan Mitigation Measures

There were several considerations that were made during the recreation planning process to ameliorate the impacts of the proposed recreations sites. These concerns guided final selection of those sites.

Avoidance of sensitive critical natural habitats and cultural or archeologic sites was a major consideration in the determination of the recreation plan. Each potential site was examined by an interdisciplinary group to define the suitability of potential recreation sites. Where critical habitats, environments, or cultural resources were in existence, those sites were eliminated or avoided.

Some critical sites were impossible to ignore because of their inherent attractiveness and accessibility as a result of the project design. The approach in these cases was to direct recreation use to the most durable locations within the recreation zone being impacted. Critical fisheries or spawning grounds were not made accessible by the recreation plan. Critical minimal habitats (eagle nests, animal dens, etc.) were avoided, as well as all major, identified archeologic sites.

Environmental situations including wetlands, steep slopes, and poor soils as observed in the field inventory, were also avoided.

The intent of the recreation plan concept is to enhance and be an integral part of the existing landscaped character. Proposed recreational facilities will be primitive in their design character and level of development in order to reflect this concern for fitness.

Fish and game monitoring management will be necessary to ensure appropriate fishing and hunting use of these resources. These systems already exist within the study area and will have to be expanded.

5.5 - Alternative Recreation Plans

In developing the Susitna Hydroelectric Project recreation Plan, a full range of alternatives was considered, including alternative levels of development, locations, and numbers of facilities. Also, the "no recreation facility" alternative was considered.

Because recreational demand is low (Section 5), there is great fitness between the carrying capacity of the recreation sites and recreational demand. Therefore the "additional development" alternative was rejected because of not satisfying project objectives of accommodating user demand, and appropriate levels of recreational development.

5.5.1 - Additional Facilities and Development

In addition to the proposed recreation plan, the alternative of additional recreational development was considered. This occurred in two ways: (1) additional new sites, and (2) more intense development on the proposed sites.

From the inventory, several sites were considered which had limited potential for recreation but were not chosen because of inherent limiting factors. These factors included physical characteristics, accessibility, and recreation potential.

Each proposed recreation site was evaluated for additional facilities. This was considered on an onsite basis for each site.

5.5.2 - No Recreation Facility

Based on the physical character and operational characteristics of the project, it was determined that the reservoirs themselves do not constitute resources for recreation. The silty water, wide mudflats, slumping sidebanks, and potential choppiness are expected to discourage their use by the recreating public. Furthermore, potential safety hazards for small boaters suggest that public policy not encourage use of project waters for recreation.

However, if this "no development" alternative were chosen, project objectives of mitigating recreation losses would not be met, nor would induced recreational demand caused by improved access be accommodated. Not only will project roads increase access, but the reservoirs will become transportation routes for hunters. This alternative was therefore rejected and other recreational resources, not reservoir based, were considered for development of the plan.

5.5.3 - Other Access Route Alternative

Many access route alternatives have been considered by project designers for access to the Watana and Devil Canyon damsites. The proposed recreation plan and subsequent phasing have been determined considering accessibility as a major determinant. The difference between the proposed recreation plan and another access plan would be in the phasing order of the various recreation sites for development and in the substation of some sites along that access for some of those along the current access. For instance, if the access to the Denali Highway were not built, the sites along it would not be recommended for development. If the north (east-west) access route were developed, sites along it (e.g., Mermaid Lake) would be moved from Phase Four to Phase Two for fly-in or hike-in use. If the southern access route were chosen, all sites along or near the reservoirs would be developed only for fly-in or hike-in access until Phase Four, when the railroad would convert to recreational use.

As part of the Phase Five monitoring, new sites might be located if demand warrants.

5.5.4 - Future Additions

Because of uncertainties in both recreational demand and other factors such as ultimate land ownership, flexibility has been built into the recreation plan; this is more completely discussed in Section 6, Plan Implementation. Future additions may be selected from the Phase Five projects which were not selected for inclusion in the recreation plan but which may be considered in reserve for future additions, should demand be generated or should sites in Phases One through Four not be available due to land ownership or other reasons.

6 - PLAN IMPLEMENTATION

6.1 - Phasing

Phasing of the proposed recreation plan is dependent upon a number of factors, including:

- The schedule on which Watana and Devil Canyon projects are actually implemented, including dates on which reservoirs are filled and dates on which project access roads are opened to the public;

- Agreement among the Power Authority and the various parties (Native corporations, BLM, state Division of Parks) on the schedule of provision of those recreation areas which are not dependent on access roads utilized in project construction;

- Agreement among the various parties on a recreation schedule. This schedule is expected to meet and possibly exceed FERC requirements for provision within three years, due to the extent of the project area, the extensive nature of recreational activity in Alaska, and the extremely long and phased construction period;

- Satisfactory and timely agreement among the agencies and private landowners regarding possible recreational features on private lands;

- Demand for recreation, which is difficult to predict with confidence over the long project implementation period and in a state where population growth, and hence the demand for recreation, is subject to major unpredictable variations in immigration rates. Availability of other regional recreational resources will affect demand in unpredictable ways as massive land status changes occur;

- Schedule of selection and transfer of land title to the state of Alaska and the Native corporations, which will determine actual ownership at the time of implementation of project recreation features, and whether a sufficient period (20 years) has passed to enable the Native corporations to sell the land; and

- Potential information developed in the recreation-use monitoring program described in Section 6.2 below.

Implementation of the Susitna Hydroelectric Project recreation plan is divided into five phases:

6.1.1 - Phase One: Watana Construction Phase

This phase 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-on recreational benefits derived from the public investment in Watana. Phase One projects are generally planned to be developed simultaneously with the start of project construction.

6.1.2 - Phase Two: Watana Implementation Phase

Phase Two consists of recreational features intended to mitigate the impacts of recreation lost due to the operation of Watana, to provide for the recreational use potential of the project; to accommodate project-induced recreational demand; to allow public access to project lands and waters, and to protect the environmental values of the project area. Phase Two projects are intended to be developed within three years of the operational date of the Watana project or when necessary agreements are reached with private landowners for those projects on private land.

6.1.3 - Phase Three: Devil Canyon Construction Phase

Phase Three consists of projects intended to mitigate the impacts of recreational opportunities lost due to Devil Canyon construction activities and to provide recreational opportunities for construction workers. Phase Three projects are generally planned to be developed simultaneously with the start of access construction to Devil Canyon or when necessary agreements are reached with private landowners for those projects on private land. In addition, they will be designed to adjust to postproject recreational demand at Watana.

6.1.4 - Phase Four: Devil Canyon Implementation Phase

Phase Four consists of recreational features intended to mitigate the impacts of recreation lost because of the operation of Devil Canyon; to provide for the recreational use potential of the project, to accommodate project-induced recreation demands; to allow public access to protect lands and waters, and to protect the environmental values of the project area. Phase Four projects are intended to be developed within three years of the operational date of the Devil Canyon project or when necessary agreements are reached with private landowners for those projects on private land.

6.1.5 - Phase Five: Post-Construction Monitoring Phase

Phase Five consists of monitoring recreational use. Monitoring will begin when the first project recreational facilities are available in order to determine actual recreational use of the project features and to trigger adjustments in the recreation plan as required. The triggering mechanicsm is designed to initiate any necessary adjustments in the Phase Two, Three, and Four plans and at 10-year intervals thereafter throughout the life of the project license.

6.1.6 - Elements of the Recreation Plan According to Their Phases of Development

(a) Phase One (Sites E, D, B, C, A, F)

E	Brushkana Camp	25 campsites west of existing camp water supply; and 3 vault toilets.
D	Tyone River Confluence with Susitna	1 shelter
B	Butte Creek/Susitna River	1 boat launch at Susitna Bridge.
C	Watana Townsite	Temporary camp and town facilities.
A	Middle Fork Chulitna River	2 overnight shelters; 25 (41 km) miles primitive trail; and Trailhead and parking
F	Portal sign	Explanatory entry sign; and 2-3 car pullout

(b) Phase Two (Sites O, U, H, I, L, J, K)

O	Watana Damsite Visitor Center	Parking, 20 spaces; Visitor exhibit building; Food service; Souvenir shop; Museum; Restrooms; Powerhouse tour facility; Indigenous botanical trail; and Boat launch.
U	Watana Townsite (Phase Two)	2 miles (3 km) of primitive trail; to Tsusena Falls; and Trailhead an parking.
H	Tsusena Creek	2 shelters; 40 miles (70 km) of primitive trail; and Trailhead and parking.
I	Tsusena Butte	4 miles (7 km) of primitive trail; 1 trailhead; and 3-4 capacity primitive camp

L	Big Lake/Deadman Lake	1 trailhead; 5-6 capacity primitive campsite; and 4 miles (7 km) of primitive trail.
J	Clarence Lake	9 miles (15 km) of primitive trail; 4-6 capacity primitive campsite; and 1 footbridge
K	Watana Lake	3 miles (5 km) of primitive trail; and 2-3 capacity primitive campsite.

(c) Phase Three (Site G)

G	Mid-Chulitna Mountains Deadman Mountain	2 vista pull-offs; 1 trailhead; 7 miles (12 km) of primitive trail; and 2-4 primitive designation camps.

(d) Phase Four (Sites Q, S, R)

Q	Devil Creek Drainage	7 miles (12 km) of trail
S	Devil Canyon Damsite Visitor Center	Shelter; Visitor center; Dam exhibit; Food service; Souvenir shop; Restrooms; and Boat launch.
R	Devil Canyon/ Mermaid Lake	8-10 campsites, tent pads; Shelter; and Restrooms.

(e) Phase Five - To be developed only if demand requires. (Sites T, M, N, P, W)

T	Soule Creek	8 miles (13 km) of primitive trail; and 5-6 capacity primitive campsite.
M	Southern Chulitna Mountains	3 miles (5 km) of primitive trail; 5-6 capacity primitive campsite; and Trailhead and parking.
N	Fog Lakes	15 miles (25 km) of primitive trail; and 15 units campground.

P	Stephan Lake	5 miles (8 km) of primitive trail; 5-7 campsites, semi-primitive (fire pits, tent pads); and Dock.
W	Rehabilitation Sites	As appropriate.

6.2 - Monitoring and Future Additions

The recreation plan consists of five phases and all the components identified therein. However, discussions with FERC and other relevant agencies recognize the peculiar difficulties associated with this project, including:

- Limited confidence levels in long-range recreation projections;
- Long period of project construction;
- Changing land ownership; and
- Geographic extent of project area, and the extensive nature of Alaska recreation.

Therefore, Phase One of the recreation plan would be initiated at the time of starting construction. Phases Two, Three, and Four may be modified based on Phase Five monitoring. In general, the Alaska Power Authority's commitment beyond Phase One is to acquire and develop the facilities listed in Phases Two, Three, and Four or their equivalent as agreed to by the relevant agencies and landowners as spelled out in the FERC license. Modifications to the plan may be according to the provisions of Phase Five - Postconstruction Monitoring Phase, as detailed below. This proposed monitoring phase is written with the assumption that the Alaska Division of Parks will operate and maintain, with the financial support of the Alaska Power Authority, recreation elements located on state lands and, through cooperative agreement, on BLM lands. However, should the parties deem it desirable, separate agreements could be drafted with the BLM and "BLM" be substituted for "Division" accordingly. For project elements located on lands belonging to the Native corporations, a variety of ownership and management options may be available, and it is anticipated that similar agreements will be drafted. Construction of proposed facilities on these private lands is tied to acquisition of necessary agreements with the Native corporations. If, after a reasonable amount of time, the Power Authority and the Native corporations are not able to reach agreement on a particular element of the recreation plan, the Power Authority, in cooperation with the Divison of Parks, will endeavor to find a site or sites suitable for the proposed recreation development on public land within the study area which are appropriate to the particular recreation opportunity matrix classification.

6.2 - Monitoring and Future Additions

6.2.1 - Proposed Monitoring Phase

The Division of Parks, with support of the Power Authority, will be responsible for maintaining facility use records and surveying use of Phase One recreation projects according to standards consistent with Division practice and sufficient to determine their level of use. At the time Watana reaches operation (or 10 years after the completion of construction of Phase 1 recreation facilities, whichever is earlier), the Division and the Power Authority will jointly meet to evaluate recreation use patterns and to plan schedules and levels of subsequent development, accordingly. The Phase Two (Watana Implementation) plan will be evaluated at this time and will be verified or modified as required consistent with the recreation opportunity preference OS classification appropriate for each proposed element. Construction of the Phase Two recreation developments will be completed within three years of the joint determination of need by the parties. Need will be determined both by use levels of existing facilities and anticipated demand generated by the completion of the Watana project.

The Phase Three (Devil Canyon Construction) recreation plan will be similarly evaluated when construction of the Devil Canyon project begins. The elements recommended in this plan will then be verified or modified as required, based on experience at Watana and anticipated demand, consistent with the appropriate recreation opportunity preference classification of each project element. Phase Three will be constructed within three years of the joint determination of need by the parties.

When Devil Canyon begins operation (or 10 years after the completion of construction of Phase Three, whichever is earlier), the Division and the Power Authority will jointly meet to evaluate the Phase Four plan (Devil Canyon Operation), and similarly verify or modify it as required.

At the 10-year anniversary of completion of construction of each phase throughout the license period of the project, the Division and the Power Authority will jointly agree upon a plan for a major rehabilitation and/or construction relevant to the phase's initial projects. It is anticipated that the Division of Parks and the Power Authority will enter into an agreement whereby the Division agrees to perform the survey, evaluation, design, construction, operation, and maintenance of said recreation facilities on public lands with the costs to be borne by the Power Authority. It is also anticipated that agreements of similar intent will be entered into with the BLM and the Native corporations as appropriate.

It is intended that the Power Authority will commit to the costs of the facilities specified in this recreation plan. Should any

6.2 - Monitoring and Future Additions

phase be modified by joint agreement of the Power Authority and Division under the terms of this proposed monitoring plan, budgeted monies may be transferred from proposed element to element and from phase to phase. This is done with the provision that total development costs in any one phase do not increase over those in the original plan for that phase and that the total development cost for Phases One, Two, Three, and Four does not exceed the currently anticipated total cost, as measured in constant 1982 dollars.

7 - COSTS FOR CONSTRUCTION AND OPERATION OF THE PROPOSED FACILITIES

7.1 - General

The cost estimates associated with the proposed recreation facilites and use are based upon 1982 prices for labor and materials and the assumption that the Alaska Divison of Parks will administer the construction, operations, and maintenance of the project areas. No land costs are included in this exhibit. Additionally, all financial responsibilities will be borne by the Alaska Power Authority. Costs of recreation facilities recommended for inclusion in the construction camps, construction villages, and permanent town are not included in this exhibit. No costs are included for Phase Five projects, as they will become a part of the recreation plan only if monitoring determines that will be necessary.

7.2 - Construction

A summary of estimated capital costs for each phase of the recreation plan is presented in Table E.7.17. Breakdowns for these costs by project features are shown in Table E.7.18. The costs have been prepared based on State Division of Parks data and discussions with Alaska contractors.

7.3 - Operations and Maintenance

It is intended that project recreation facilities will be operated and maintained by the State Division of Parks and/or the U.S. Bureau of Land Management, as appropriate. Table E.7.19 estimates additional equipment necessary to operate the proposed facilities. Table E.7.20 summarizes estimated average annual costs for supplies, equipment, and personnel to operate the facilities. The State Division of Parks recommends that no user fees be assessed.

8 - AGENCY COORDINATION

8.1 - Agencies and Persons Consulted

The attached list documents public agency, Native corporation, and University of Alaska consultations in the course of preparing this Recreation Plan. Written records of these conversations are available at offices of the Alaska Power Authority.

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:

- Alaska Department of Natural Resources (ADNR)
- Alaska Department of Fish and Game
- United States Department of Interior, National Park Service
- United States Department of Interior, Fish and Wildlife Service

The National Park Service and ADNR have expressed the concern that the recreation plan presented in Section 6 does not include sufficient facilities south of the Susitna River in the Fog Lakes and Stephan Lake areas. Although only limited recreational development has been proposed in the areas as part of the Susitna Hydroelectric Project Recreation Plan, recreational development in these areas could be expanded either by the Power Authority reaching suitable agreements with the Native Corporations or by the Native Corporation as a private venture.

The ADNR expressed the desire to also provide recreational opportunities downstream from Devil Canyon. Sites in this downstream area will be assessed in the continuing project refinement studies.

The USFWS and ADF&G have expressed concern with the increased access the Susitna Project will provide to important 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, wildlife habitat areas while maintaining maximum plan flexibility so that future recreational development can be directed away from these areas as they are identified through continued study. However, it should be noted that the resource management agencies will have an important role in reducing project impacts through regulation of hunting and fishing pressures placed on the resources.

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

AGENCIES AND PERSONS CONSULTED

Federal Agencies	Person	Date	Communication	Subject
FERC	Mark Robison	9/29/82	Phone	Land Status Phasing Implementation Demand
FERC	Frank Karwoski	9/30/82 & 10/30/82	Phone	Land Status Phasing Implementation Fish & Wildlife Demand Access Routes Alternatives
FERC	John Haimes	9/29/82	Phone	Impacts
USBLM	John Rego	10/15/82	Meeting	Review Proposed Recreation Plan
USBLM	Dave Dapkus	9/17/82	Meeting	Recreation Data
USBLM	Mike Wrabetz Bob Ward	9/17/82	Meeting	Visual Study Denali Highway
USF&WS	Date Patterson	9/21/82	Meeting	Rec. Demand
USFS Chugach Natl. Forest	Jim Tellerico	9/22/82	Phone	Rec. Data
USNPS	Larry Wright	9/15/82	Meeting	Rec. Data Demand
USNPS Denali Natl. Park	Bob Gerhardt	10/20/82	Phone	User Data

State Agencies				
F&G	Tom Trent	10/16/82	Meeting	Fisheries Data Rec. Impacts Borrow Areas
F&G	Nancy Tankersley	9/21/82 10/22/82	Meeting	Big Game Data
F&G	Mike Mills Carolyn Crouch	9/21/82	Meeting	Fisheries Data
F&G	Karl Schneider Stephen Burgess	10/22/82	Meeting	Big Game Data Mitigation
DNR Div. Parks	Sandy Rabinowitch	9/14/82 9/15/82	Phone Meeting	State Rec. Planning State Policy Maintenance Demand
		10/28/82	Meeting	Plan Review Cost Estimate
DNR Div. Parks	Kyle Cherry	10/28/82	Meeting	Cost Estimate Maintenance
DNR Div. Parks	Jack Wiles Peste Martin	9/15/82 10/20/82	Meeting Meeting	Rec. Data Demand Transportation Uses State Planning & Policy Public Participation Land Ownership Plan Review
DNR R&D	Chris Beck Randy Cowal	10/19/82	Meeting	Demand Existing Facilities & Use
DNR	Dave Stephans	9/22/82	Phone	Exist. Fac. & Use
DNR	Bill Beatty	10/4/82	Meeting	Scenic Resources
DOT	Mike Tooley	9/14/82	Meeting	Standards Construction Techniques
DOT	Bill Humphrey	9/24/82	Phone	Traffic Demand
DOT	Roger Maggard	9/24/82	Phone	Traffic Demand Construction Techniques
DOT	Andy Zahare	9/24/82	Phone	Design Standards

AGENCIES AND PERSONS CONSULTED (Cont'd)

Local Agencies	Person	Date	Communication	Subject
Mat-Su Borough Planning Dept.	Claudio Arenas	9/21/82 10/18/82	Meeting Phone	Population Projections Borough Concerns Rec. Demand Borough Parks Planning Trails Coastal Plan
Native Corporations				
CIRI	Roland Shanks	9/15/82 10/14/82	Meeting Meeting	Native Concerns Recreation Preferences Legislation Land Acquisition Rec. Plan Review
Tyonek Village Corp.	Carl Ehelebe	9/22/82 9/28/82 10/14/82	Phone Meeting Meeting	Rec. Planning Native Preferences Land Acquisition Plan Review Aesthetic Concerns
Tyonek Village Corp.	Agnes Brown	9/28/82 10/14/82	Meeting Meeting	Native Input Project Boundaries Land Ownership Rec. Mgmt. Issues Aesthetic Concerns Plan Review
AHTNA Development Corp. & Knik Village Corp.	N. Roy Goodman	9/22/82 9/28/82 10/14/82	Phone Meeting Meeting	Native Input Project Boundaries Land Ownership Aesthetic Concerns Plan Review
University of Alaska				
Museum	E.J. Dixon	9/20/82	Meeting	Historic & Archeological Resources Rec. Plan
Ag. Expt. Station	Alan Jubesville Jo Feyl	9/9/82 9/24/82	Phone Phone	Rec. Plan Data Sources

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TABLE E.7.1: AVERAGE MONTHLY FLOWS - PRE & POST PROJECT (cfs)

Gold Creek	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
-Pre Project	5,771	2,577	1,807	1,474	1,249	1,124	1,362	13,240	27,815	24,445	22,228	13,321
-Post Project Watana	8,014	9,186	10,693	9,708	8,951	8,324	7,740	10,405	11,420	9,185	13,378	9,840
-Post Project Watana & Devil Canyon	7,765	9,631	11,271	10,597	10,191	9,286	8,100	8,706	9,883	8,387	12,634	10,510
Sunshine												
-Pre Project	13,966	6,028	4,267	3,565	2,999	2,681	3,226	27,949	64,089	64,641	57,215	32,499
-Post Project Watana	16,209	12,637	13,153	11,798	10,701	9,881	9,604	25,114	47,694	49,381	48,365	29,018
-Post Project Watana & Devil Canyon	15,960	13,082	13,731	12,687	11,941	10,843	9,964	23,415	46,157	48,584	47,620	29,689
Susitna												
-Pre Project	31,426	13,501	8,518	8,030	7,149	6,408	7,231	61,646	124,614	134,550	113,935	67,530
-Post Project Watana	33,670	20,109	17,404	16,264	14,851	13,608	13,610	58,811	108,219	119,289	105,086	64,049
-Post Project Watana & Devil Canyon	33,420	20,555	17,981	17,153	16,090	14,570	13,970	57,112	106,682	118,492	104,341	64,719

Source: Exhibit E, Chapter 2 of Susitna FERC license application.

TABLE E.7.2: 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: Alaska Outdoor Recreation Plan, 1981

TABLE E.7.3: 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: Alaska Outdoor Recreation Plan 1981

TABLE E.7.4: PERCENTAGE OF ADULT POPULATION PARTICIPATION IN INLAND OUTDOOR RECREATION

South-central 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 Skining	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%
Swimming, Freshwater	16%
Outdoor Basketball	7%
Horseback Riding	7%
Sailing (freshwater)	5%
Water Skiing (freshwater)	5%
Golfing	4%
Outdoor Hockey	2%
Hang Gliding	0%

Source: Alaska Outdoor Recreation Plan 1981 and Selected Findings from the Alaska Public Survey, 1981

TABLE E.7.5: ALASKA STATE PARK SYSTEM VISITOR COUNT SUMMARY

Park District	1978* Resident	1978* Non-Resident	1979* Resident	1979* Non-Resident	1980* Resident	1980* 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 is based upon non-standardized format.
*1980 field data is based upon a computer stratified sampling system with incidental counts.
1980 data does not include the months of October through December.

Source: Alaska Outdoor Recreation Plan 1981

TABLE E.7.6: 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 area 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 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		same (100p)	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 *to be built in 1983

Note: Existing trails are shown in Figure E.7.4

Sources: T.E.S. Susitna Hydroelectric Project and Subtask 7.07 Land Use Analysis July 1980

DNR Division of Research and Development area notes - Upper Susitna Basin Recreation Atlas

ADNR Division of Research and Development Susitna River Basin Land Use/ Recreation Atlas, 1980.

Alaska State Parks Danali State Park Brochure

TABLE E.7.7: REGIONAL POPULATION - EXISTING AND FUTURE

	1980	2000	%
Anchorage	174,431	252,940	+ 45%
Fairbanks/Northstar[1]	53,983	119,130	+121%
Mat-Su Borough[2]	17,938	78,500	+338%
Total	246,352	450,570	+ 55%

NOTE: Population projections include Susitna Hydroelectric Project but do not include new capital move to Willow or Knik Arm Crossing.

Sources: [1] 1980: 1980 Census
2000: Frank Orth & Assoc., 4/82

[2] 1980: 1980 Census
2000: Borough Planning Department, 10/21/82

TABLE E.7.8: 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 Capital Participation Days 1980-2000	8%	8%	6%	57%	20%	27%	12%	40%

Source: 1970 Alaska Outdoor Recreation, Alaska Department of Natural Resources, 1970

TABLE E.7.9: 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 & Co. Alaska map, undated

2 Centroid of Recreation Population in Borough assumed to be at this distance

3 Susitna River Basin Cooperative Study, Talkeetna Subarea U.S. Soil Conservation Service, John O'Neill, 1978

TABLE E.7.10: 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

NOTE: Rounded to nearest 1,000.

Source: EDAW calculations based on Susitna River Cooperative Study methodology. Susitna River Basin Cooperative Study - Talkeetna Subarea
U.S. Soil Conservation Service, John O'Neill, Nov. 1978

TABLE E.7.11: TOTAL ESTIMATED REGIONAL RECREATION USER DAYS, BY ACTIVITY 1980 AND 2000

	Big Game Hunting	Waterfowl Hunting	Freshwater Fishing	Developed Camping	Canoeing/ Kayaking	Hiking	Picnicking	X-Country Skiing
Estimated Total Regional Recreation User Days - 1980	214,000	120,000	502,000	196,000	46,000	196,000	762,000	39,000
Estimated Total Regional Recreation User Days - 2000	465,000	119,000	1,000,000	578,000	103,000	406,000	1,395,000	103,000

NOTE: Rounded to nearest 1,000

Source: EDAW calculations based on Susitna River Cooperative Study Methodology. John O'Neill, Nov. 1978.

TABLE E.7.12: 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 E.7.13: 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[6]	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 E.7.14: ANNUAL RECREATION VISITOR DAYS - DENALI NATIONAL PARK

Year	Recreation Days	% Increase Since 1971
1971	44,528	-
1972	88,615	99%
1973	137,418	209%
1974	161,427	263%
1975	160,600	261%
1976	157,612	254%
1977	170,031	282%
1978	222,993	401%
1979	251,105	464%
1980	216,361	386%
1981	256,493	476%

Source: U.S. National Park Service, Robert Gerhardt, personal communication, 10/20/82

TABLE E.7.15: MAJOR RECREATION FACILITIES FOR CONSTRUCTION CAMPS, VILLAGES, AND PERMANENT TOWNSITE

	INTERIOR FACILITIES				EXTERIOR FACILITIES			
	Rec Hall	Clubhouse	Gym	Swim Pool	Baseball	Softball	Football	Hockey
Watana								
. Single Status Camp	25,000 20,500 45,500	4,000 400 4,400	40,000	11,500				
3,600 Workers								
. Village & Townsite								
1,120 Temp. Pop.	8,000	0	10,000	10,000	Not Specified			
350 Temp. Families								
. 125 Perm. Families	Not Specified							
Devil Canyon								
. Single Status Camp	20,500	3,200	40,000	12,5000				
1,780 Workers								
. Village	8,000	0	10,000	10,000	Not Specified			
550 Temp. Pop.								
170 Workers (families)								

Source: Susitna Hydroelectric Project Feasibility Report, Vol. 3, March 1982.

TABLE E.7.16: PROPOSED RECREATION PLAN FOR CONSTRUCTION CAMPS, VILLAGES, AND PERMANENT TOWNSITE

Recommended Recreation Plan for Construction Camps, Villages, and Permanent Townsite	Watana Single Status Camp 3,480 Workers Peak 1990-91	Watana Family Status Village 350 Families 1,120 Population Peak 1990-91	Watana Permanent Townsite 125 Families 400 Population Post 1992	Devil Canyon Single Status Camp 1,780 Workers Peak 1997	Devil Canyon Family Status Village 170 Families 550 Population
Interior Uses					
• Gymnasium					
Basketball/Volleyball	X	X	@ school	X	X
Track	X	X	@ school	X	X
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
• 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
Auto Workshop (if private cars allowed)	X	X			
• Clubhouse					
Library/Reading Room	X	X	@ school	X	X
Snack Bar/Vending Machines	X	X		X	X
Bowling Alley	X	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.7.16 (Cont'd)

Recommended Recreation Plan for Construction Camps, Villages, and Permanent Townsite	Watana Single Status Camp 3,480 Workers Peak 1990-91	Watana Family Status Village 350 Families 1,120 Population Peak 1990-91	Watana Permanent Townsite 125 Families 400 Population Post 1992	Devil Canyon Single Status Camp 1,780 Workers Peak 1997	Devil Canyon Family Status Village 170 Families 550 Population
Exterior Uses					
• Baseball	X	X	@ school	X	X
Softball	X	X	@ school	X	X
Football/Soccer/Lacrosse	X	X	@ school	X	X
Basketball/Volleyball	X	X	@ school	X	X
Tennis	X	X	@ school	X	X
Picnic/Barbecue Area		X		X	
Playground/Totlot		X	@ school	X	
Allotment Garden	X	X		X	X
Community Park			X		
Ice Hockey Rink				On football field	On football field
Handball/Squash	X	X	X	X	X
Non-Structural Activities					
Ice Skating/Hockey	@ Lakes	@ Lakes	@ Lakes		
Ice Boating	@ Lakes	@ Lakes	@ Lakes		
Hiking/Jogging Trails	X	X	X	X	X
Regulated Fishing	X	X	X	X	X
Cross Crountry Ski Trails	X	X	X	X	X
Canoe/Kayak/Sailboat Areas	X	X	X	X	X
Rock Hounding	X	X	X	X	X
Gold Panning	X	X	X	X	X
Snowshoeing	X	X	X	X	X
Sledding	X	X	X	X	X

Source: EDAW, Inc.

TABLE E.7.17: ESTIMATED CAPITAL COSTS FOR THE SUSITNA HYDROELECTRIC PROJECT RECREATION PHASES

	Capital Costs 1982 Dollars
Phase One	565,836
Phase Two	1,136,354
Phase Three	188,759
Phase Four	891,251
Total Facilities	$2,651,547*

*These estimates are based upon January 1, 1982 cost figures.

TABLE E.7.18: ESTIMATED COSTS OF RECREATION PLAN PROJECT FEATURES

Recreation Setting	Facilites	1982 Unit Cost	1982 Total Cost	Facility Total	Phase Total
PHASE ONE					
E Bruskana Camp	25 camp sites	$ 9,047	$ 226,175	$	$
	3 single vault latrines	9,157	27,471		
	1 bulletin board	762	762		
	8 trash cans	157	1,256		
	1 water well	19,040	19,040		
				274,704	274,704
D Tyone/Susitna	1 shelter	17,920	17,920		
				17,920	292,624
B Butte Creek	1 boat launch	44,800	44,800		
				44,800	337,424
A Middle Fork Chulitna River	2 shelters	17,920	35,840		
	25 miles trail	7,238	180,950		
	6 auto parking	1,810	10,860		
	trailhead (trash, bulletin board, signs)	762	762		
				228,412	565,836
H Tsusena Creek	2 shelters	17,920	35,840		
	20 miles trail	7,238	144,760		
				180,600	746,436
F Portal Entry	entry sign	6,000	6,000	6,000	752,436
PHASE TWO					
O Watana Visitor Center	20 units parking	1,810	36,200		
	.15 road, 24 ft	386,400/mi	57,960		
	3000 sq ft building	$120/sq ft	360,000		
	2 single vault latrines	9,157	18,314		
	interpretive trail	$5/sq ft	50,000		
	4 picnic sites	2,027	8,108		
	1 bulletin board	439	439		
	1 boat launch	NA		531,021	531,021
H Tsusena Creek Phase 2	20 miles trail	7,238	144,760	144,760	675,781
I Tsusena Butte	4 miles trail	7,238	28,952		
	trailhead	762	762		
	8 parking	1,810	14,480	44,194	719,915
L Deadman/ Big Lake	1 trailhead	762	762		
	4 miles trail	7,238	28,952		
	6 parking	1,810	10,860	40,574	760,549

TABLE E.7.18 (Cont'd)

Recreation Setting	Facilites	1982 Unit Cost	1982 Total Cost	Facility Total	Phase Total
PHASE TWO (Cont'd)					
J Clarence Lake	9 miles trail	$ 7,238	$ 65,142	$	
	signage	300	300	65,442	
					$825,991
K Watana Lake	3 miles trail	7,238	21,714		
	footbridge	15,052	15,052	36,766	
					862,757
PHASE THREE					
G Mid-Chulitna Mountains	10 parking	1,810	18,100		
	7 miles trail	7,238	7,238		
	trailhead	762	762	69,528	
					69,528
PHASE FOUR					
Q Devil Creek	5 auto parking	1,810	9,050		
	bench	320	320		
	signage	300	300	75,574	
					75,574
S Devil Canyon Center	1 shelter	17,920	17,920		
	5000 sq ft building	120 sq ft	600,000		
	8 picnic sites	2,027	16,216		
	1 single vault latrine	9,157	9,157		
	15 parking	1,810	27,150		
	.5 mile trail	7,238	3,619		
	signage	1,000	1,000		
	3 benches	320	960		
	1 boat launch	NA		676,022	
					751,596
R Mermaid Lake	.25m/14 ft	344,960/mi	86,240		
	8 campsites	9,047	72,376		
	1 shelter	17,920	19,920		
	2 single vault latrines	9,157	18,314		
	waterwell	19,040	19,040		
	bulletin board	439	439		
	5 garbage cans	140	700		
	signage	200	200	215,229	
					966,826
TOTAL Construction Cost Phase 1-4, 1982$					$2,651,547

Notes: Assumes no land acquisition costs for unappropriated state or federal lands.

Land acquisition costs for private land not included.

TABLE E.7.19: ADDITIONAL FACILITIES AND EQUIPMENT TO BE PURCHASED FOR OPERATION AND MAINTENANCE AS PART OF THE SUSITNA HYDRO-ELECTRIC PROJECT RECREATION PLAN - 1982 $

Phase	Facilities & Equipment	Unit Cost	Total Cost 1982 $
ONE	1 pickup	$ 11,000	$ 11,000
	tools	500	500
	supplies	4,000	4,000
			$ 15,500
TWO	2 pickups	11,000	22,000
	tools	1,000	1,000
	supplies	4,000	4,000
	management center* (1500 sq ft)		--
	shop and storage* (3500 sq ft)		--
			$ 27,000
THREE	no additional		0
FOUR	1 pickup	11,000	11,000
	supplies	15,000	4,000
			$ 15,000
TOTAL (PHASES 1-4)			$ 57,500

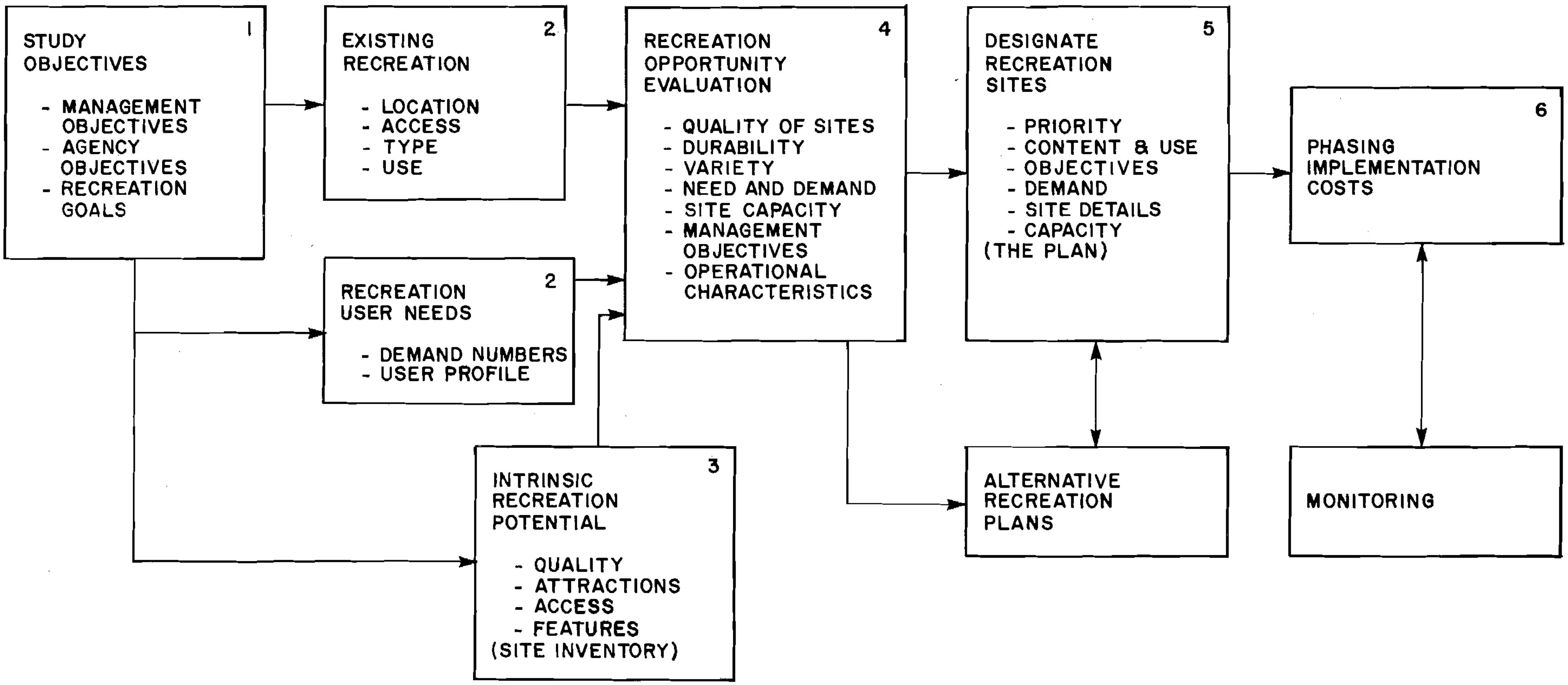
* to be provided by APA in project buildings

TABLE E.7.20: ADDITIONAL STAFF REQUIRED AND ANNUAL STAFF EXPENSES TO OPERATE AND MAINTAIN SUSITNA HYDROELECTRIC PROJECT RECREATION FACILITIES

Phase	Job Class	Annual Cost 1982 $
ONE	1 park technician, 6 mos.	10,500
	uniform allowance	300
	+ 25% administration costs	2,700
		$ 13,500
TWO	2 park technicians, 6 mos.	21,000
	1 ranger, 12 mos.	28,800
	uniform allowance	900
		$ 58,800
	+ 25% administration costs	14,700
		$ 73,500/year
THREE	no additional staff	
FOUR	1 ranger, 12 mos.	$ 28,800
	1 park technician, 6 mos.	10,500
		39,300
	+ 25% administration costs	9,800
		$ 49,100

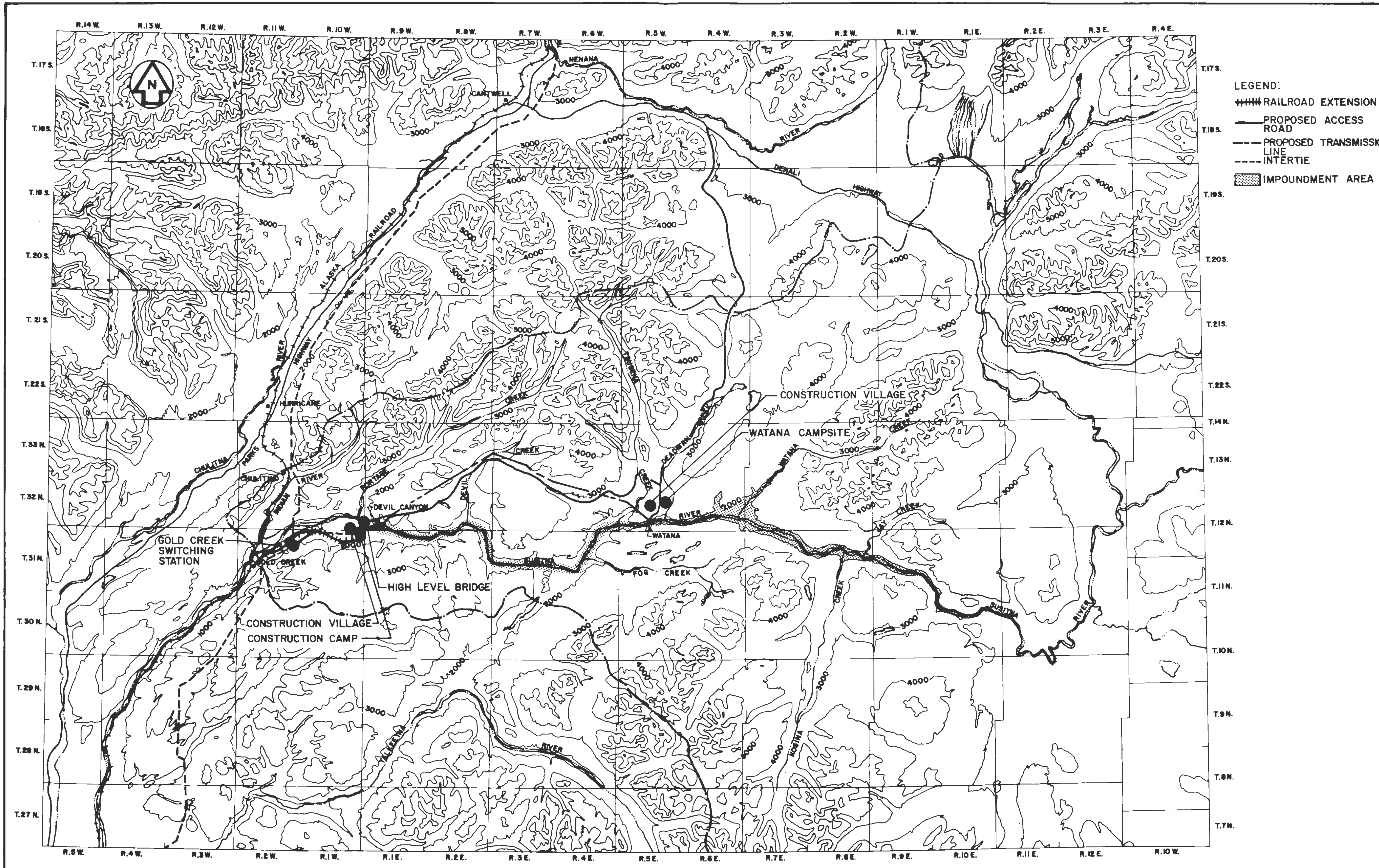
TOTAL ANNUAL STAFF COST DURING EACH PHASE:

Phase	1982 $
One	$ 13,500
Two	87,000
Three	87,000
Four	136,100



STUDY METHODOLOGY

FIGURE E.7.1



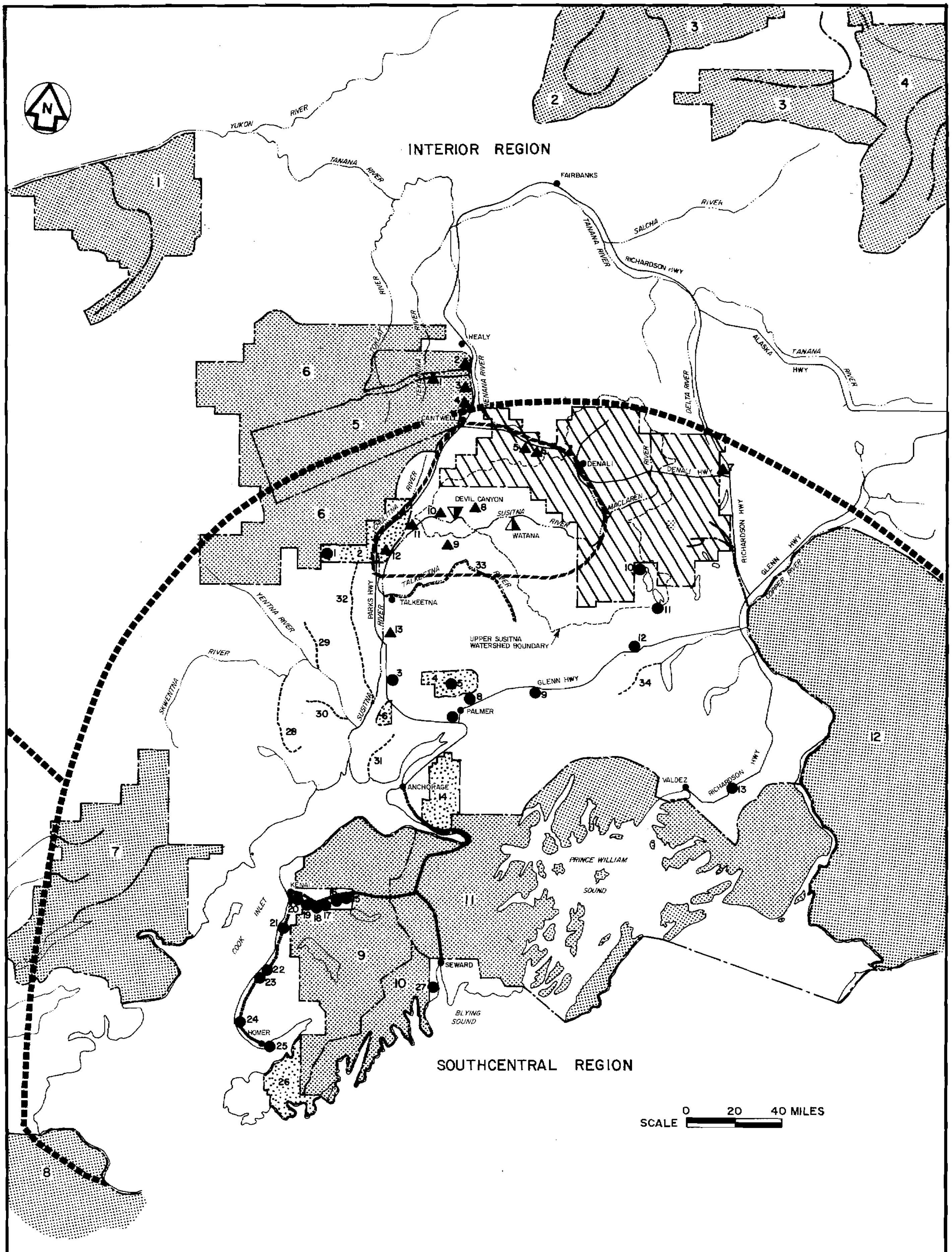
PROPOSED PROJECT FEATURES

FIGURE E.7.2

IDENTIFICATION OF EXISTING AND PROPOSED DEVELOPMENTS
SHOWN ON REGIONAL RECREATION MAP (FIGURE E.7.3)

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.7.3

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:

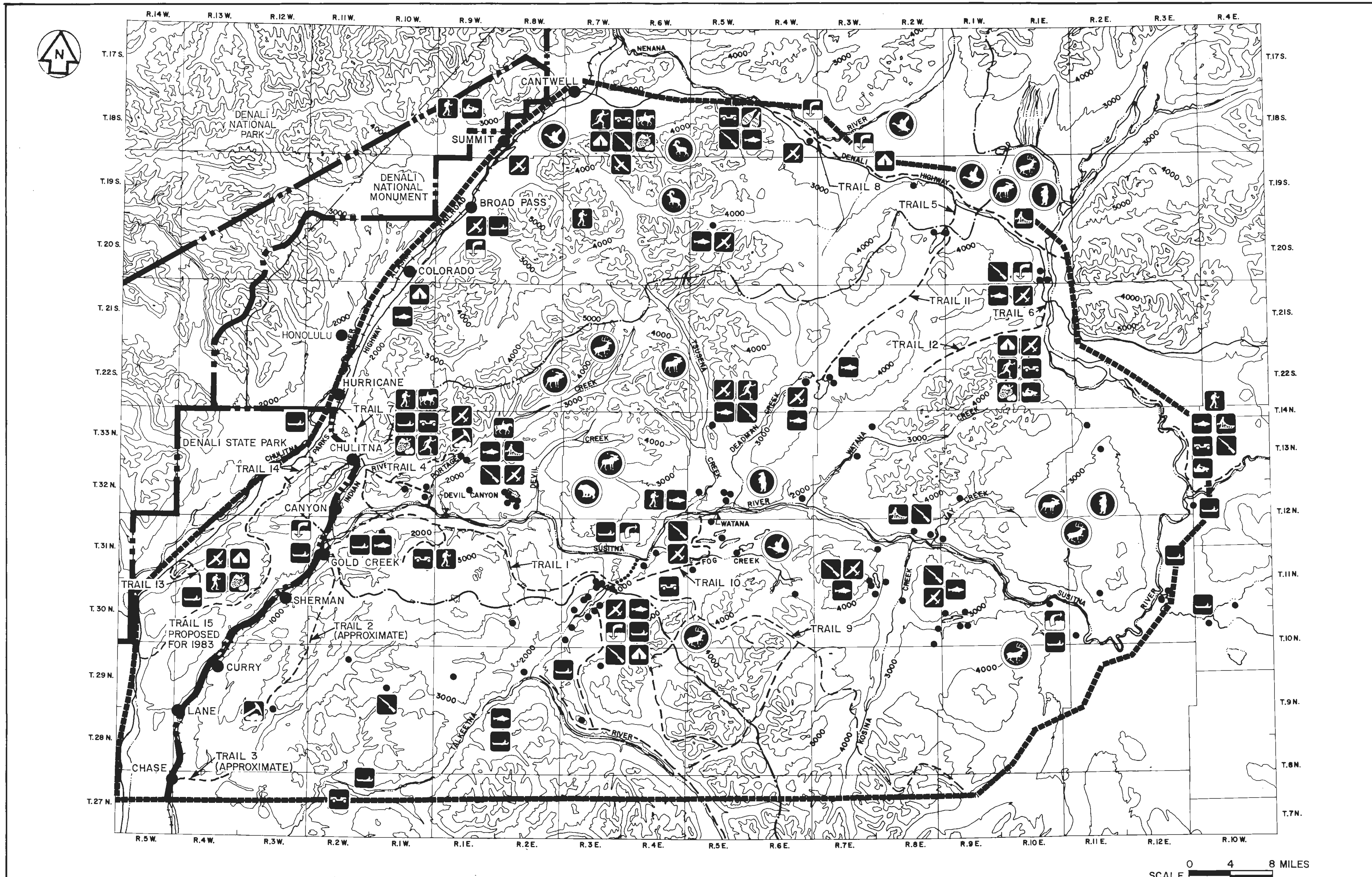
MOOSE	SHEEP	BROWN BEAR
CARIBOU	WATER FOWL	BLACK BEAR

LANDSCAPE FEATURES:

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

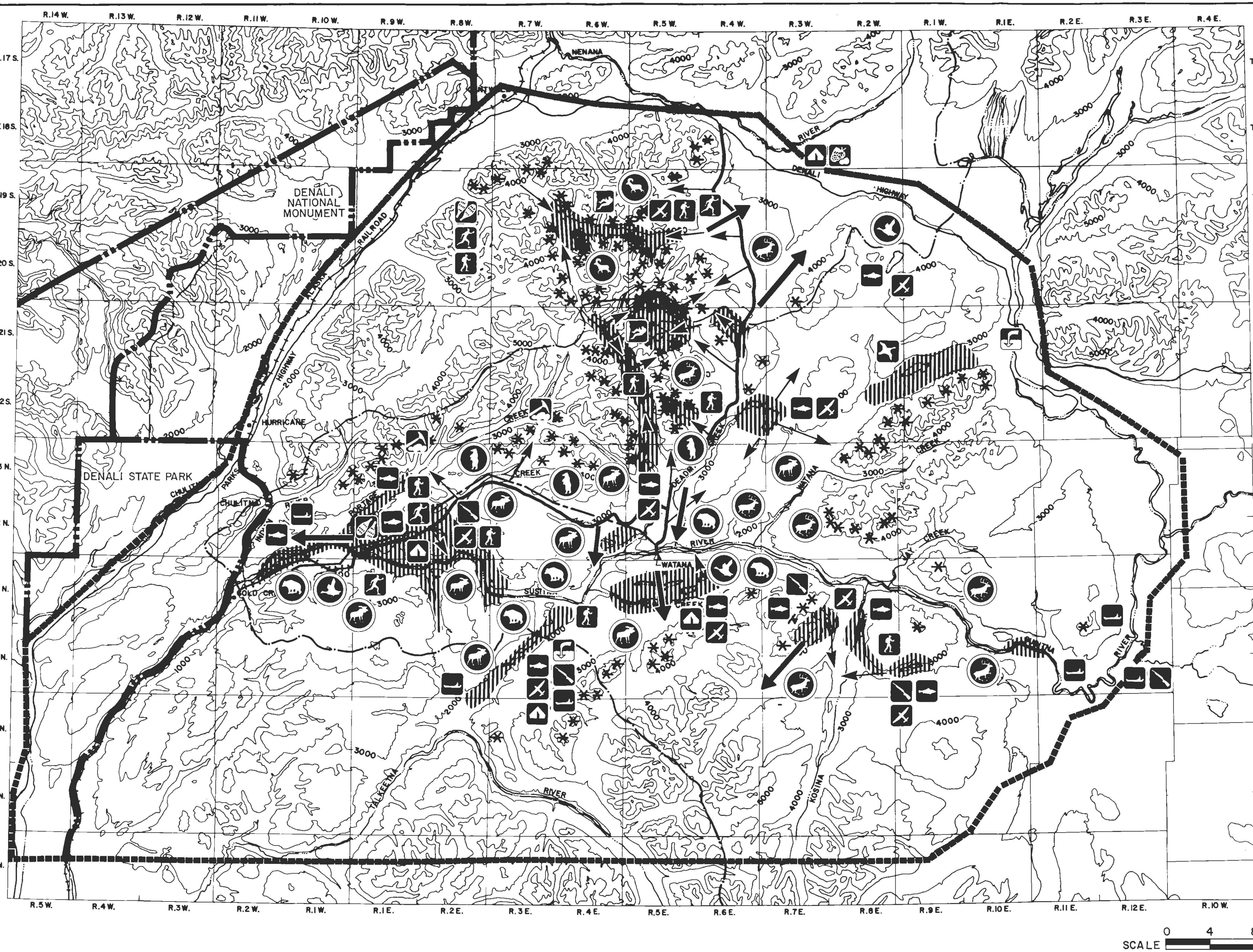
NOTE: SEE TABLE E.7.8 FOR SPECIFIC TRAIL DATA.

RECREATION LEGEND



EXISTING RECREATION

FIGURE E.7.4



RECREATION OPPORTUNITIES

FIGURE E 7.5

RECREATION ACTIVITIES:

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

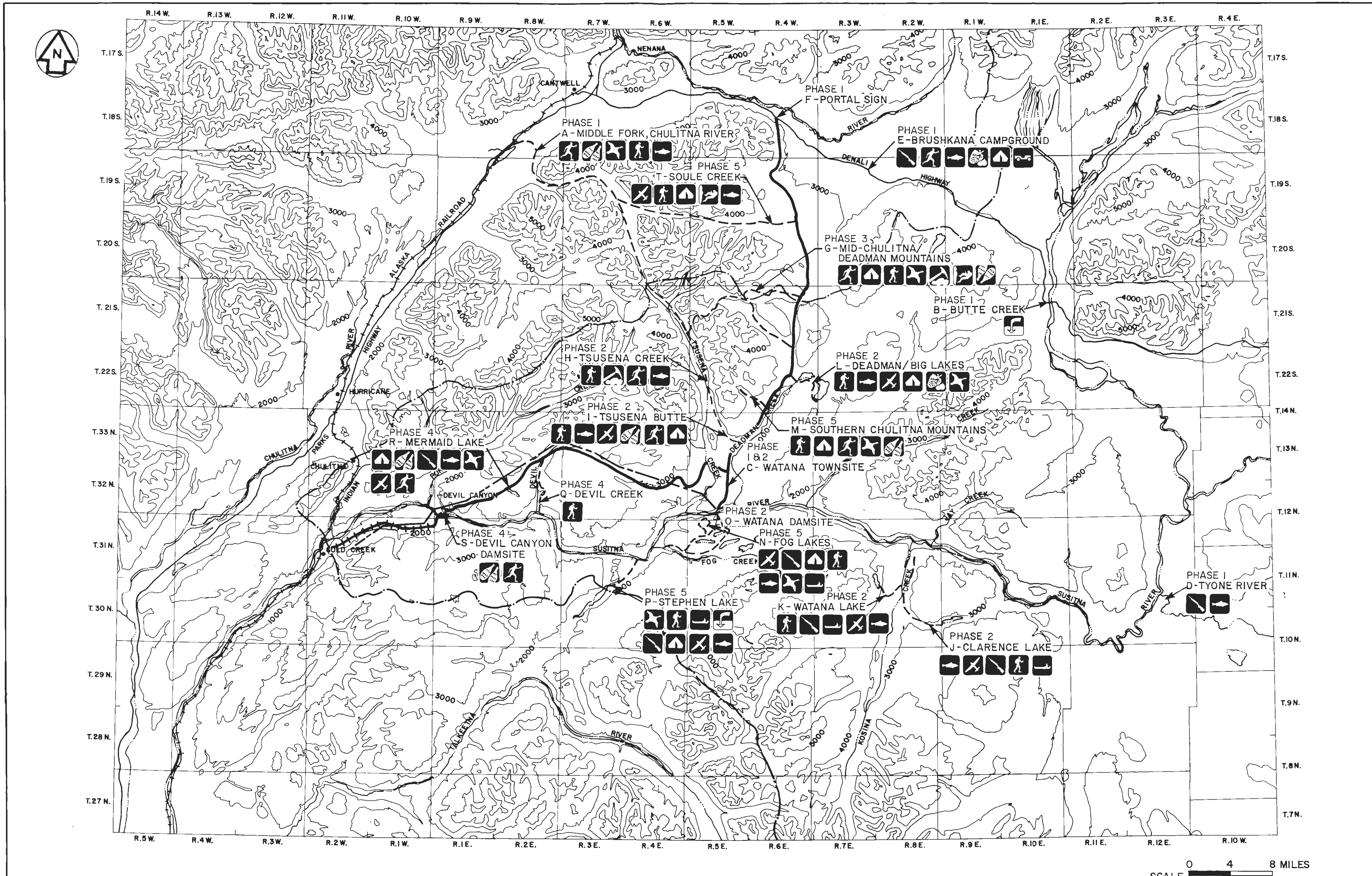
WILDLIFE:

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

PROJECT FEATURES:

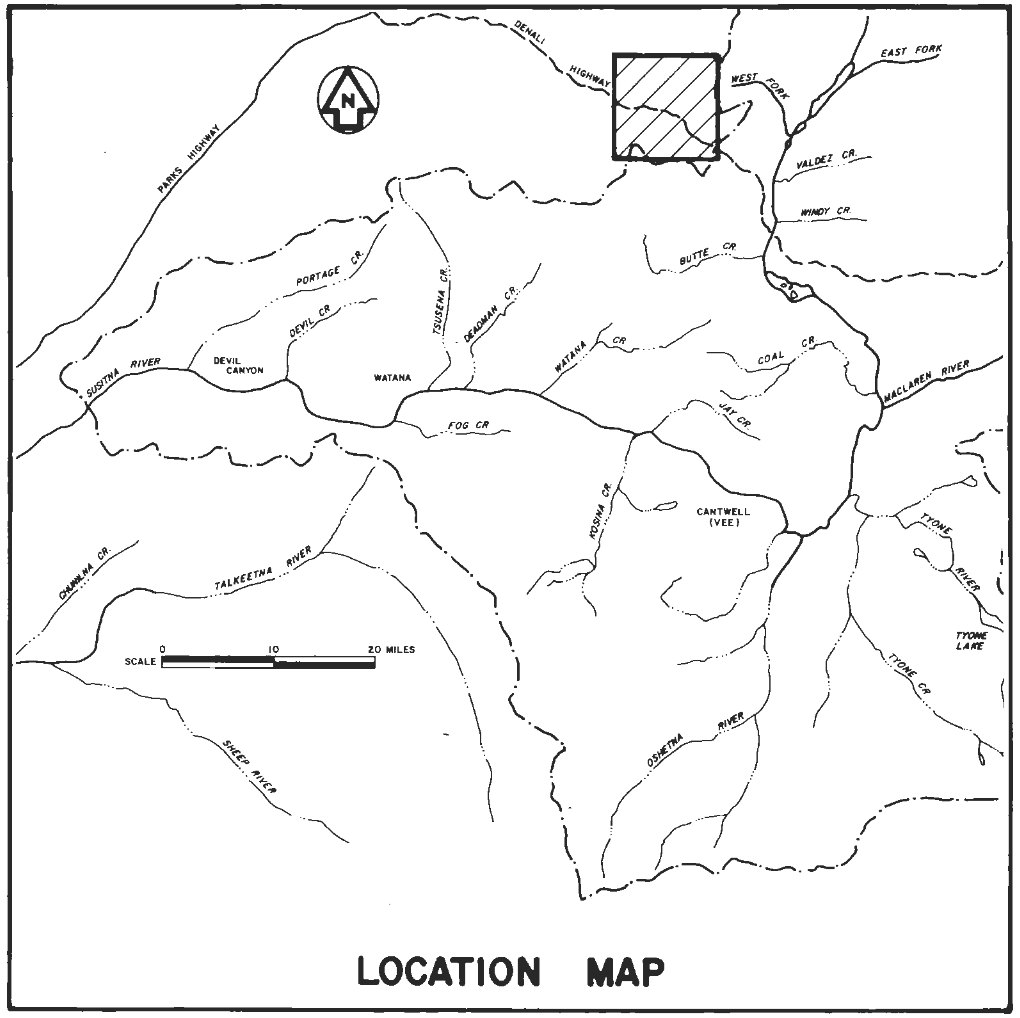
- WATERWAYS
- RAILROADS
- EXISTING ROADS
- PROPOSED ROADS
- TRAILS
- PROPOSED TRANSMISSION LINES
- RECREATION ZONES
- CAMPGROUNDS
- TRAILHEADS
- VIEWPOINTS

LEGEND FOR RECREATION AREA PLANS



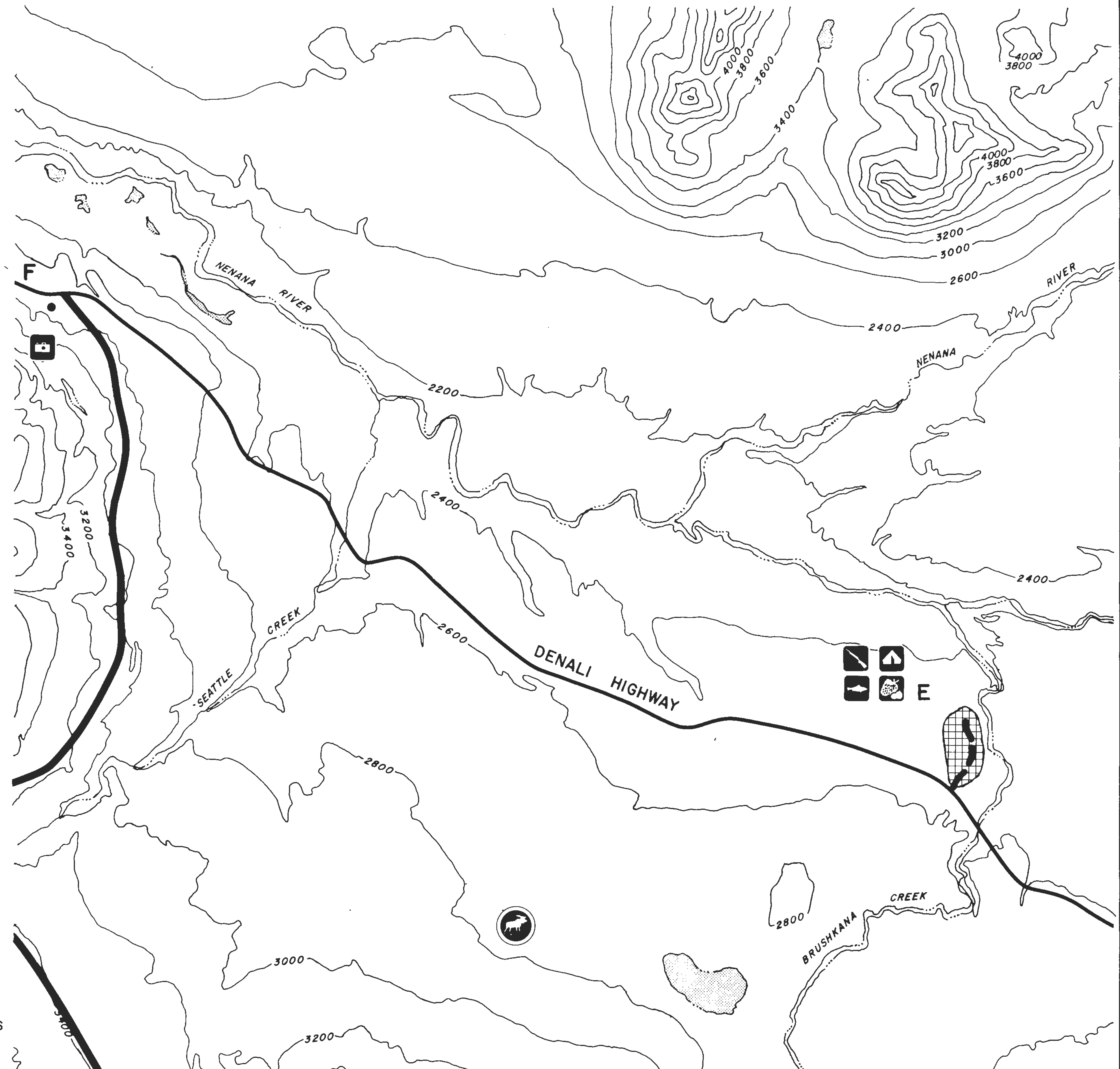
RECREATION PLAN - ACCESS

FIGURE E 7.6



E-BRUSHKANA CAMP
25 CAMPSITES
3 SINGLE VAULT LATRINES
1 BULLETIN BOARD
8 TRASH CANS
1 WATER WELL

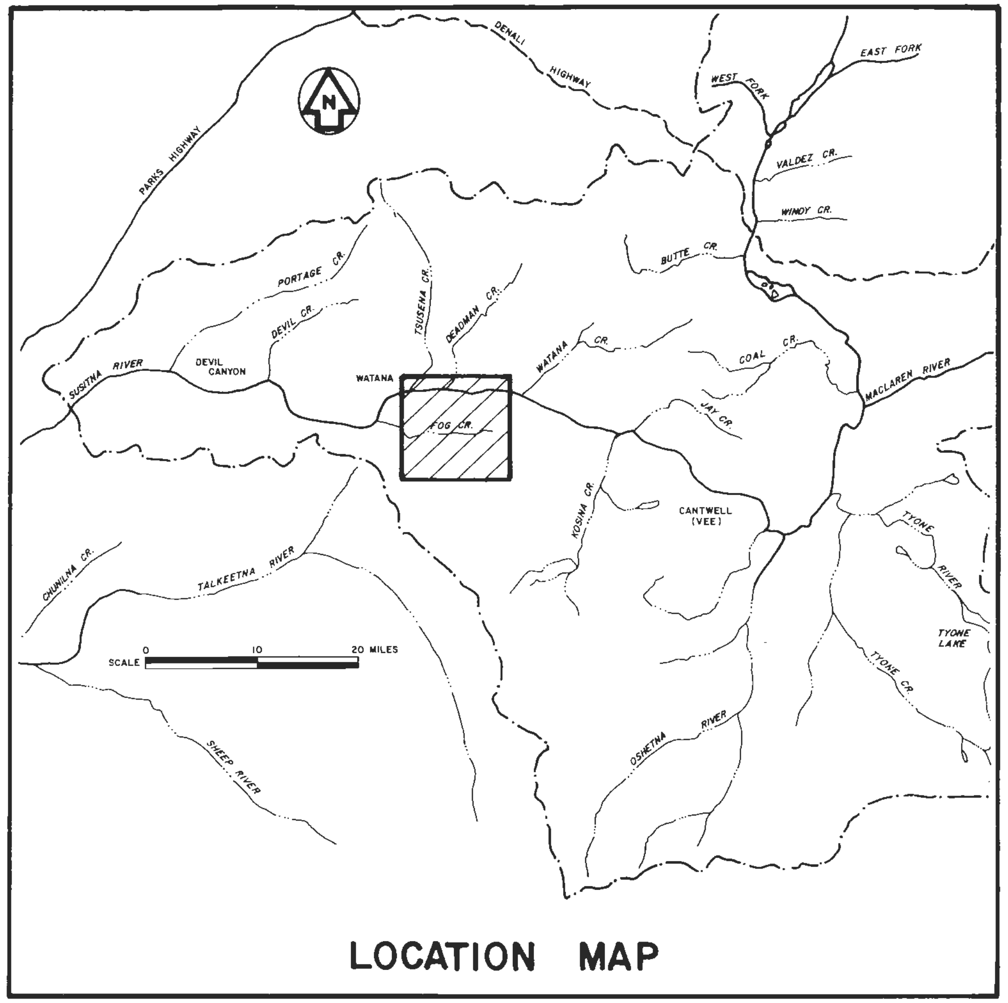
F-PORTAL ENTRY
1 ENTRY SIGN

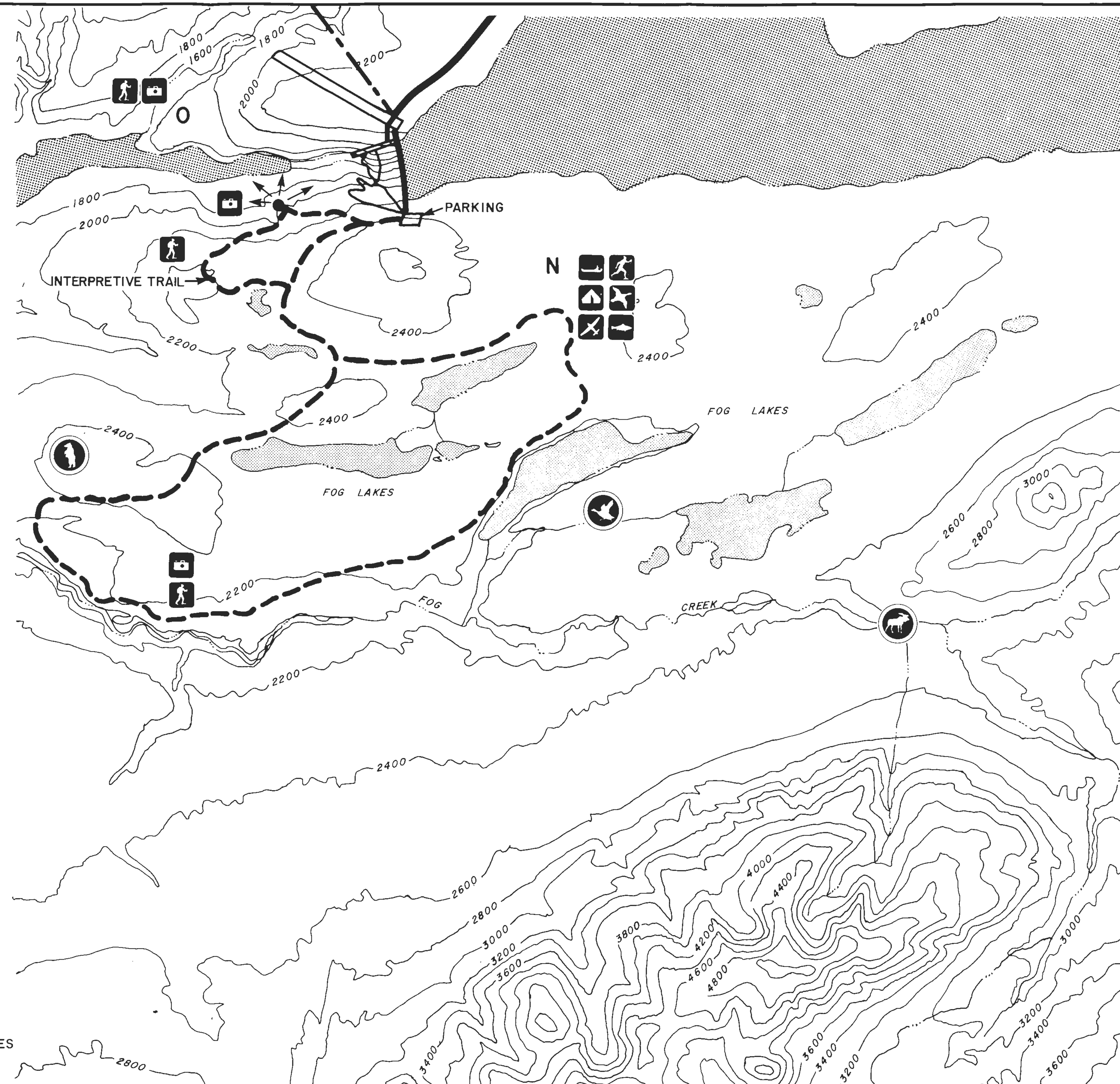


SCALE 0 1 2 MILES

RECREATION AREA: E-BRUSHKANA CAMP
F-PORTAL ENTRY

FIGURE E.7.7





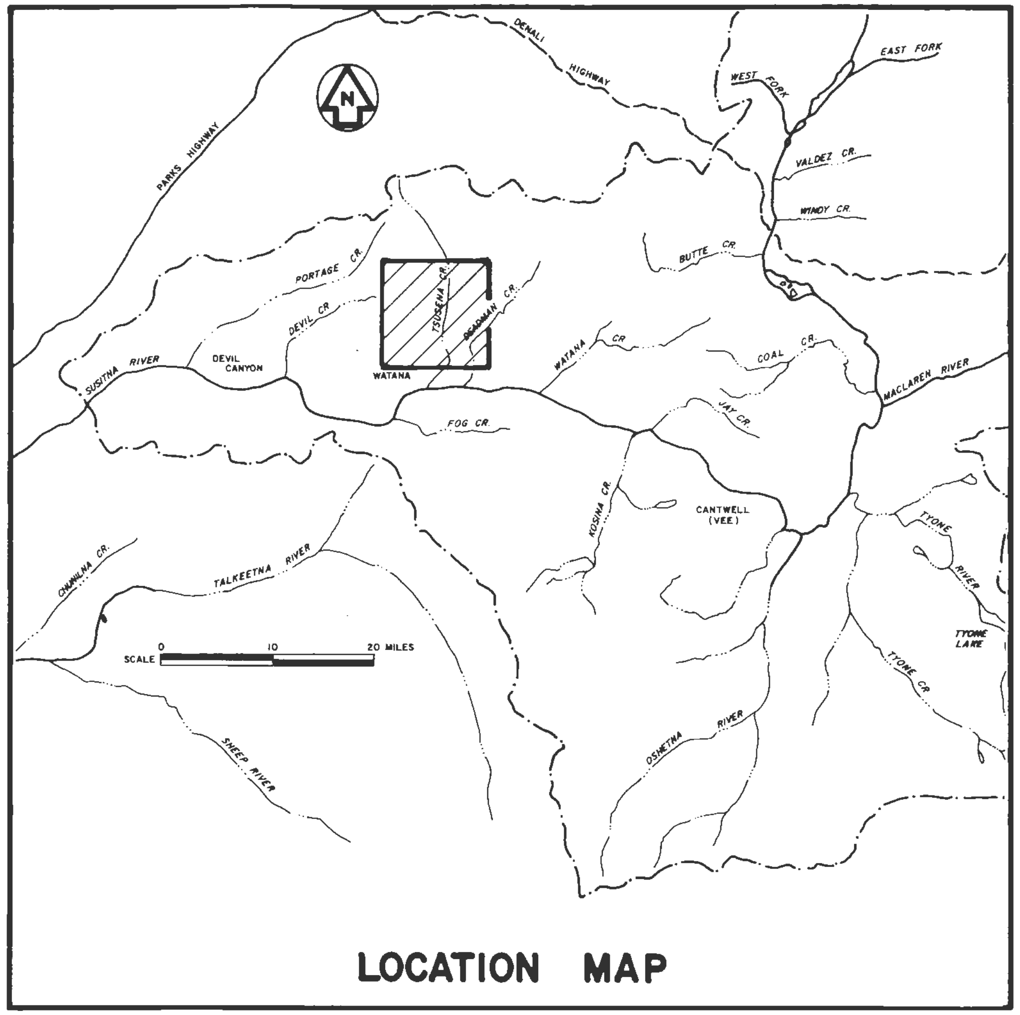
O-WATANA DAMSITE AND VISITOR CENTER
20 UNITS PARKING
.15 MILE ROAD
3000 SQ. FT. BUILDING
2 SINGLE VAULT LATRINES
1 INTERPRETIVE TRAIL
4 PICNIC SITES
1 BULLETIN BOARD
1 BOAT LAUNCH

N-FOG LAKES
15 MILES TRAIL
1 SINGLE VAULT LATRINE
15 CAR PARKING
TRAILHEAD
SIGNAGE
15 CAMPGROUND UNITS

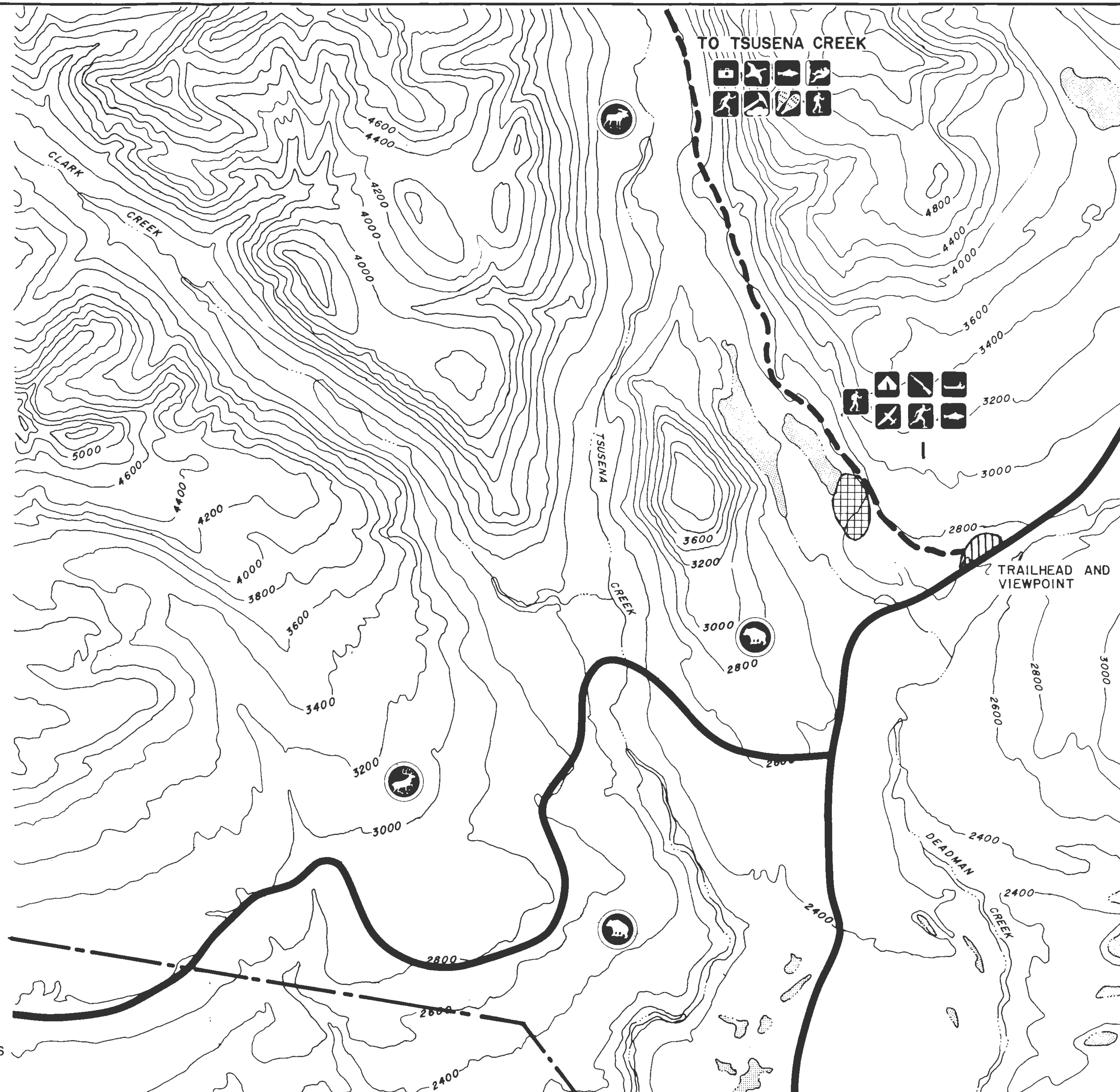
SCALE 0 1 2 MILES

RECREATION AREA: O-WATANA DAMSITE AND VISITOR CENTER
N-FOG LAKES

FIGURE E.7.8



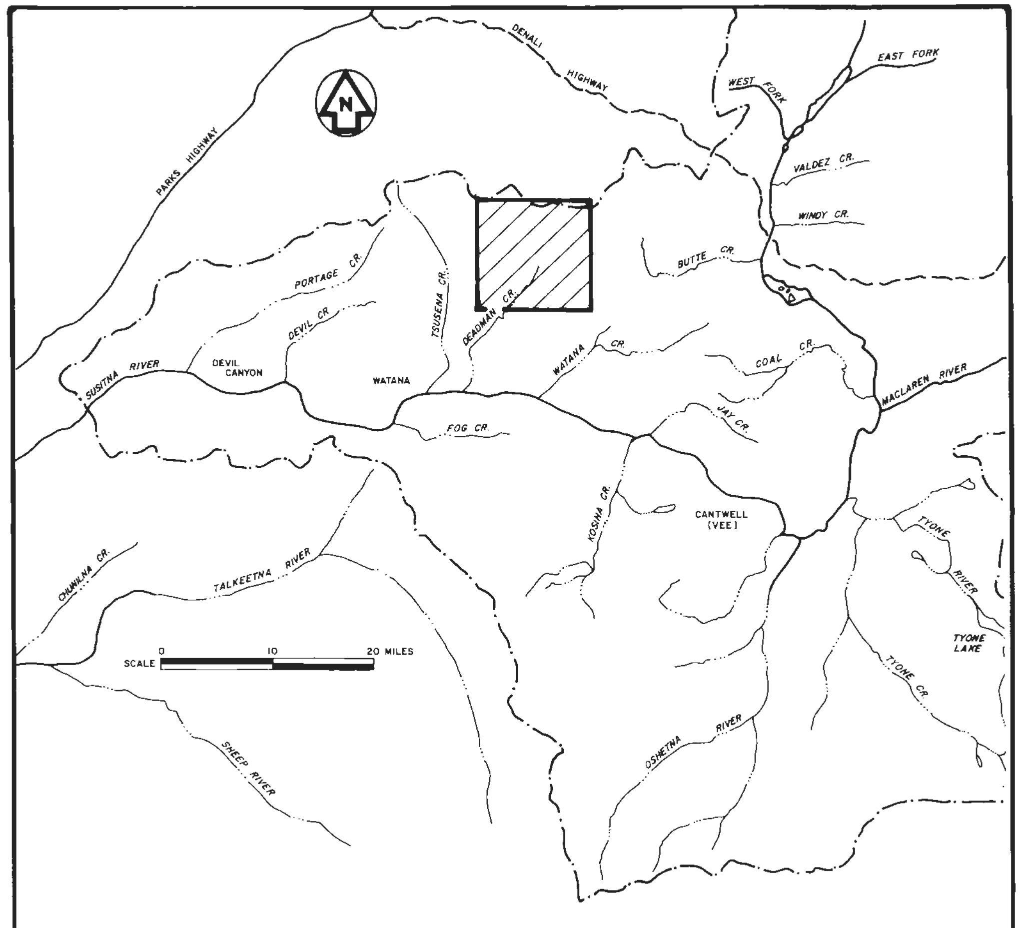
I-TSUSENA BUTTE
4 MILES TRAIL TRAILHEAD
8 PARKING
2-4 UNDESIGNATED CAMPSITES



SCALE 0 1 2 MILES

RECREATION AREAS I - TSUSENA BUTTE
H - TSUSENA CREEK

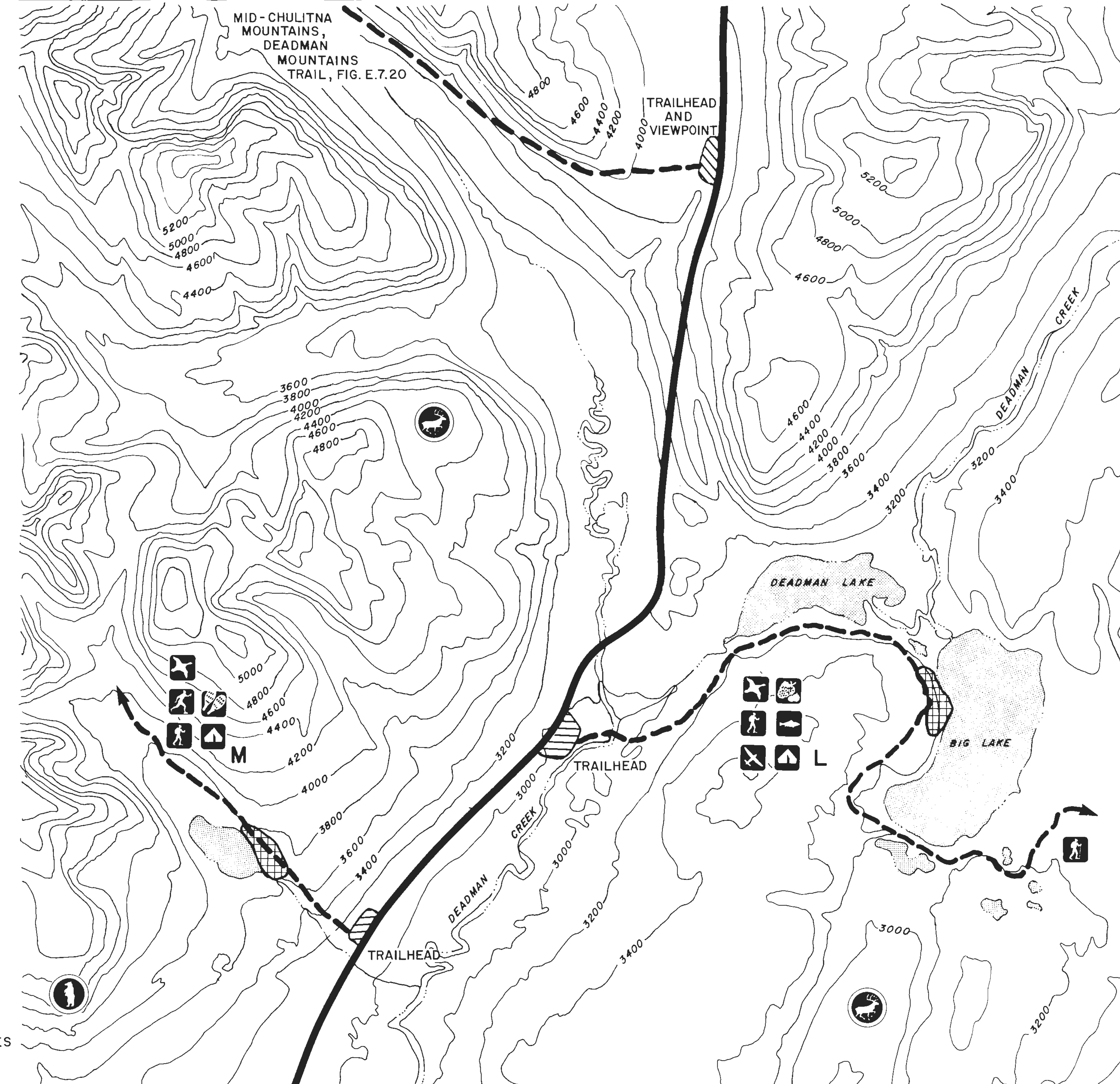
FIGURE E.7.9



LOCATION MAP

L- DEADMAN AND BIG LAKE
- 1 TRAILHEAD
- 6 AUTO PARKING
- 4 MILES TRAIL
- 4 UNDESIGNATED CAMPSITES

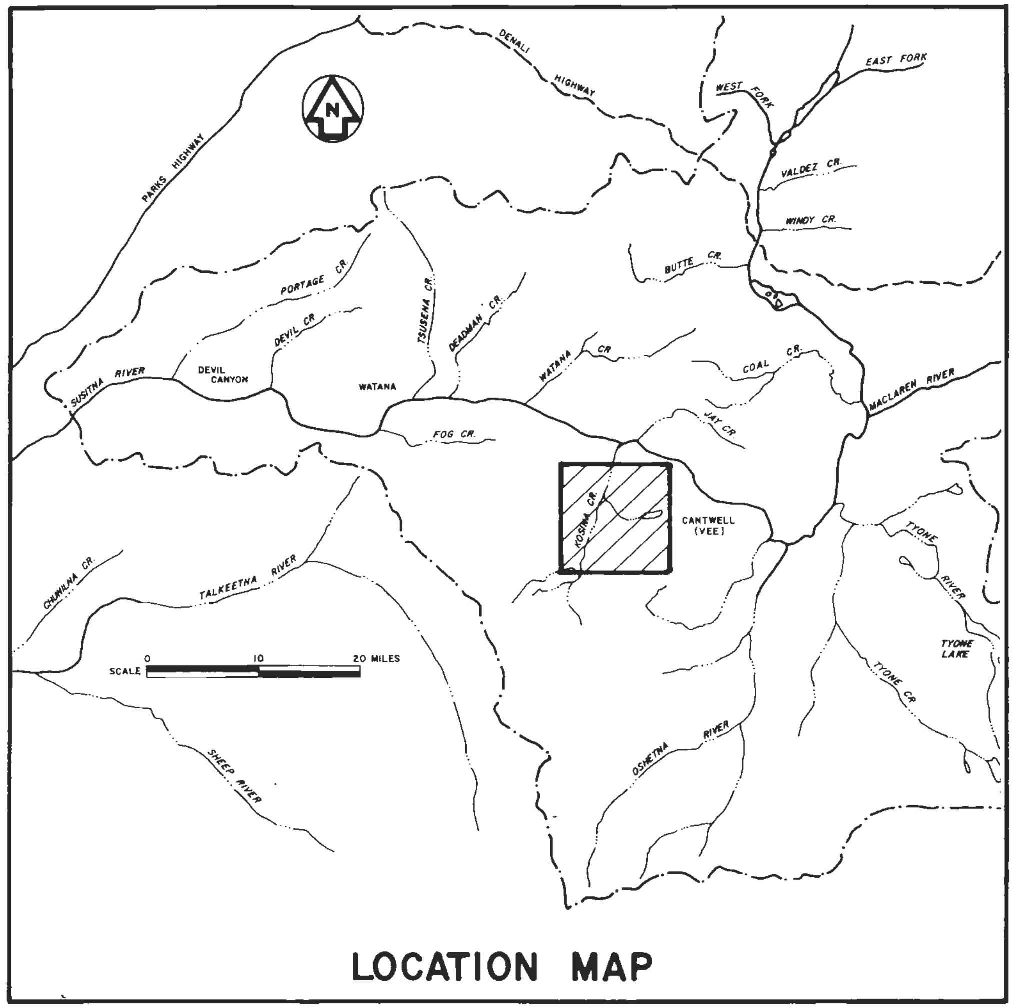
M- SOUTHERN CHULITNA MOUNTAINS
- 1 TRAILHEAD
- 3 AUTO PARKING
- 3 MILES TRAIL
- 3 UNDESIGNATED CAMPSITES



SCALE 0 1 2 MILES

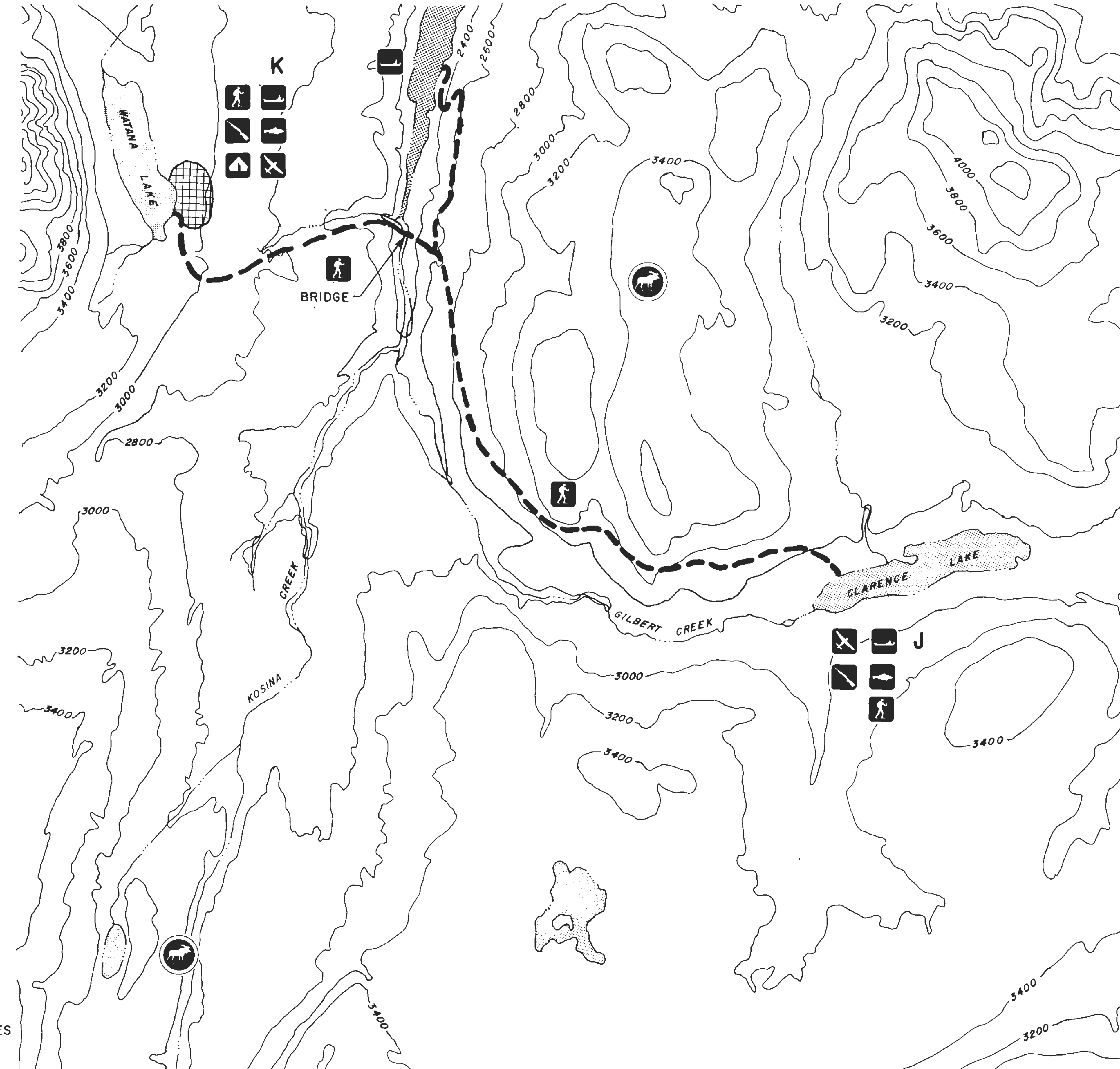
RECREATION AREA: L-DEADMAN AND BIG LAKES
M-SOUTHERN CHULITNA MOUNTAINS

FIGURE E.7.10



J-CLARENCE LAKE
9 MILES TRAIL
SIGNAGE

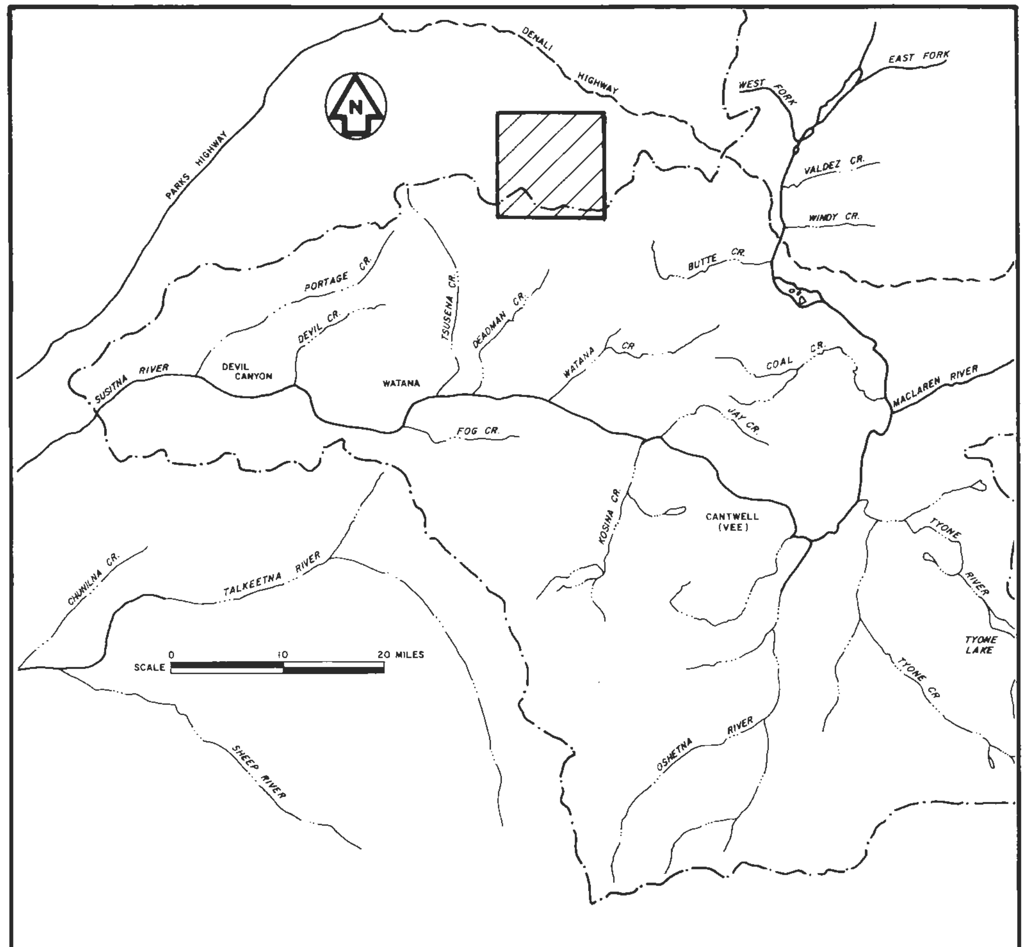
K-WATANA LAKE
2 MILES TRAIL
FOOTBRIDGE
3 UNDESIGNATED CAMPSITES



SCALE 0 1 2 MILES

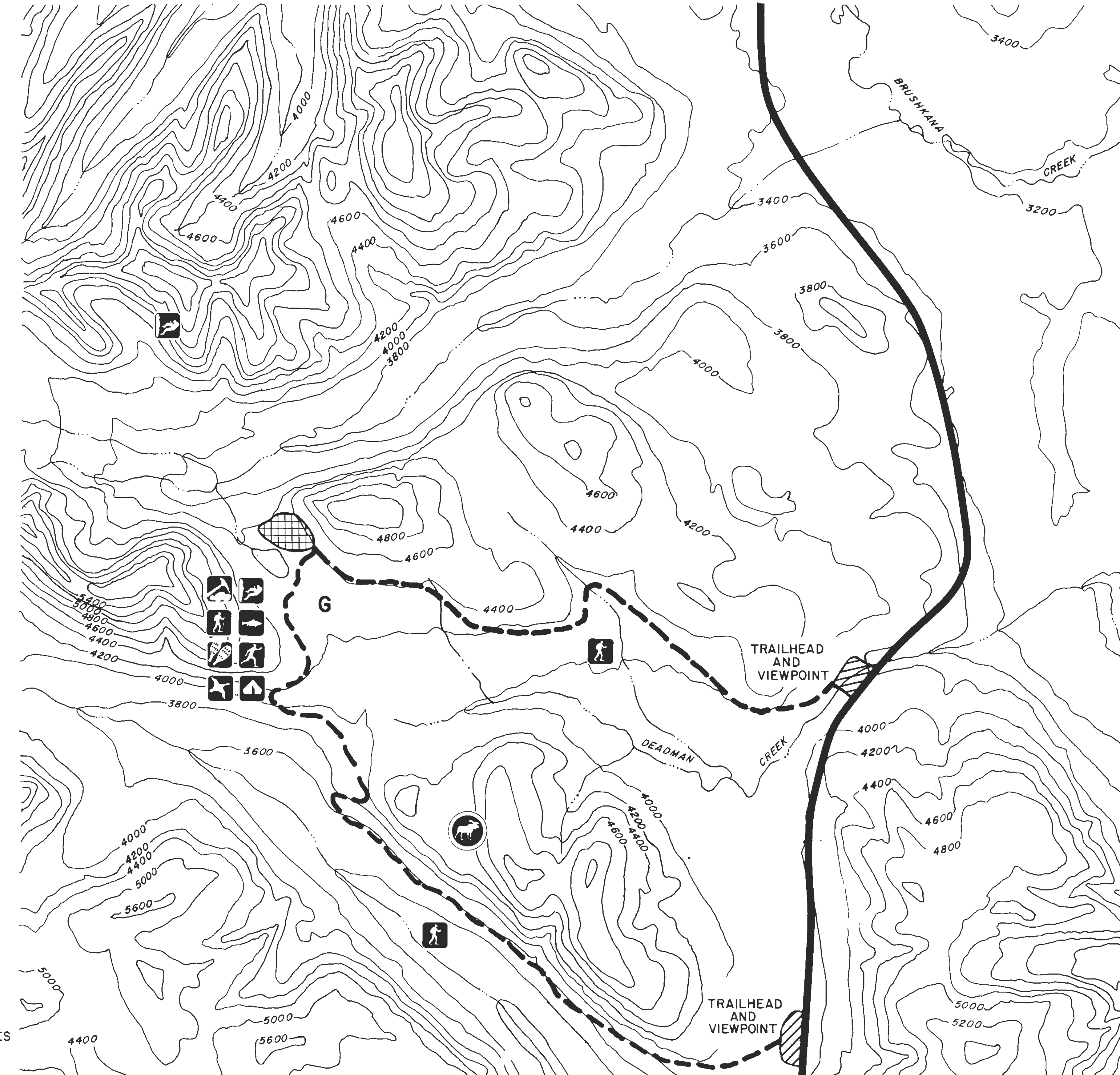
RECREATION AREA: J-CLARENCE LAKE
K-WATANA LAKE

FIGURE E.7.11



LOCATION MAP

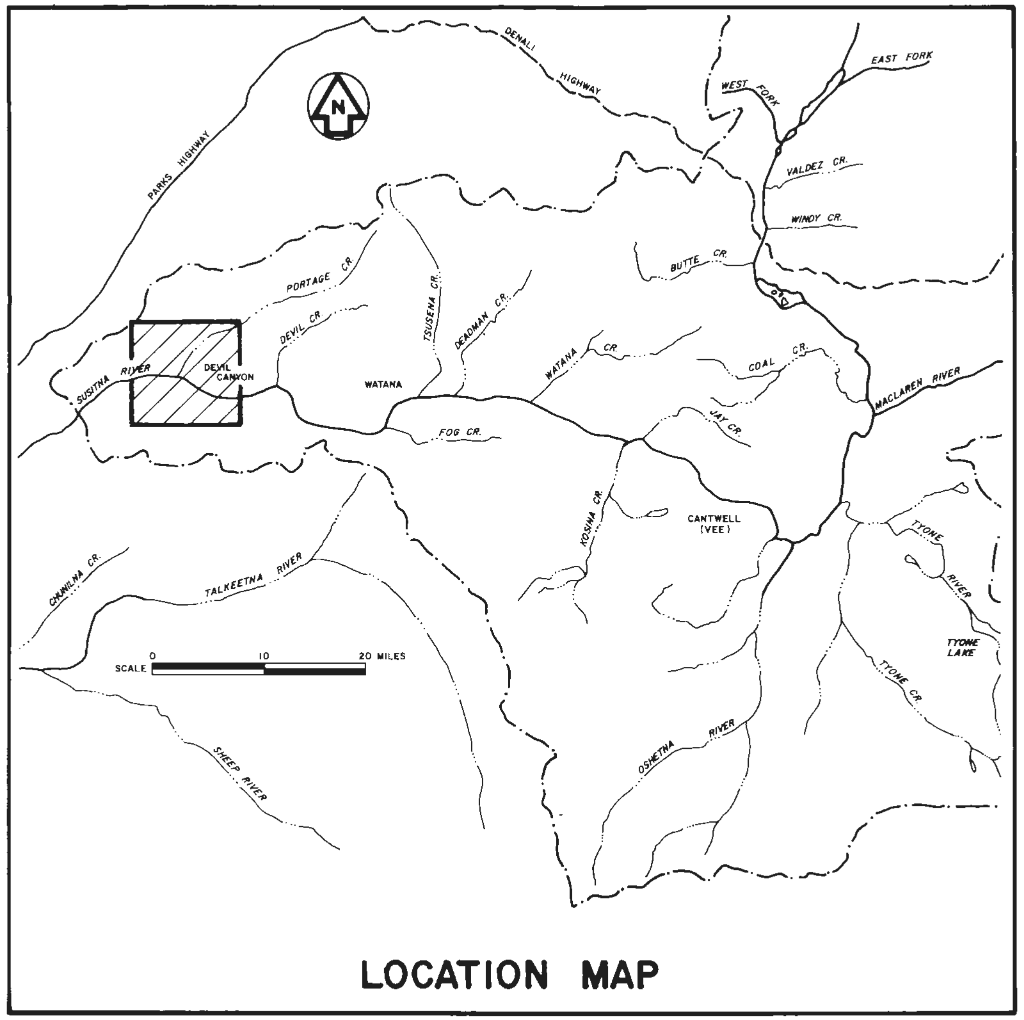
G - MID-CHULITNA MOUNTAINS, DEADMAN MOUNTAIN
10 PARKING
15 MILES TRAIL
TRAILHEAD



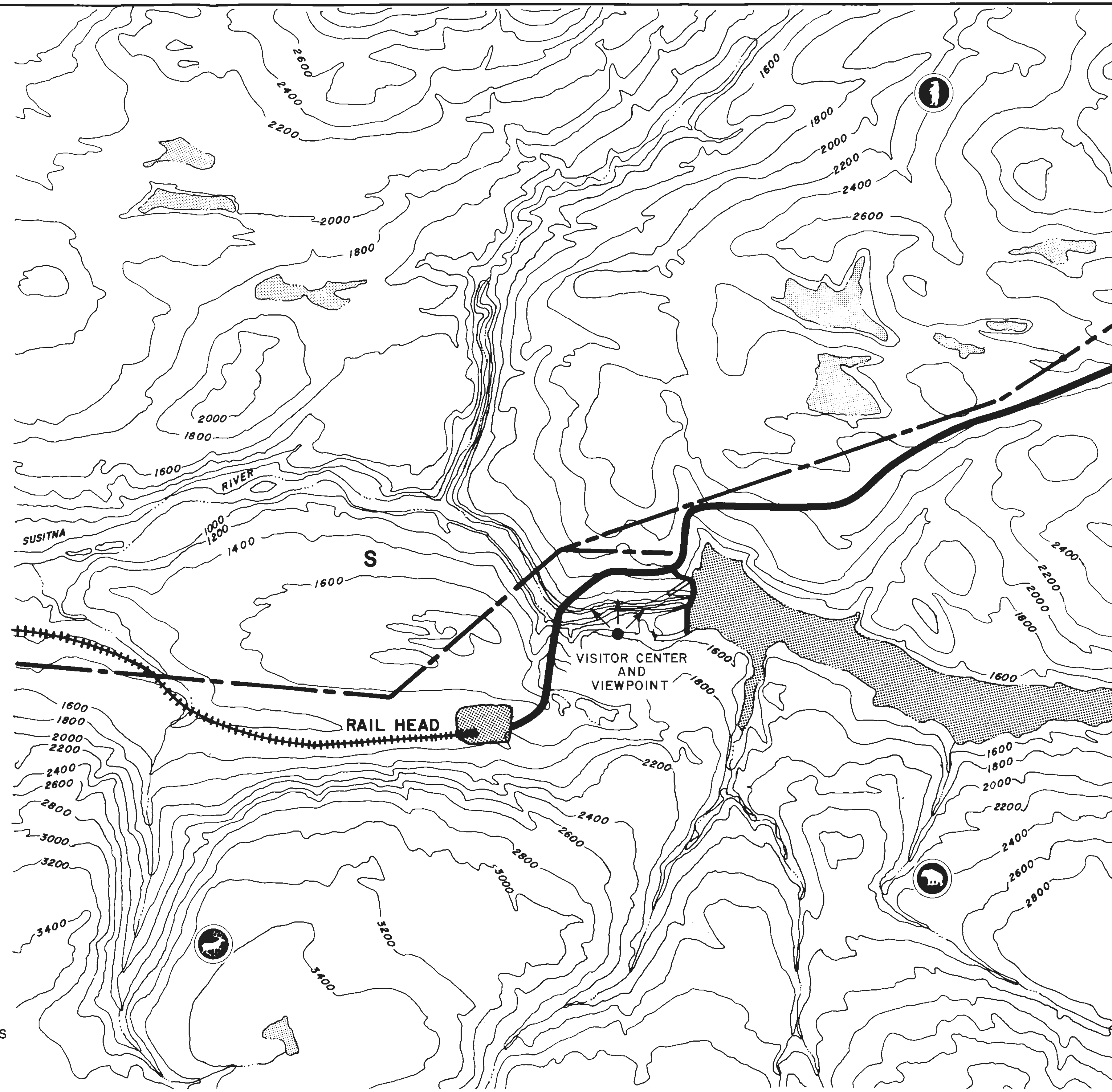
SCALE 0 1 2 MILES

RECREATION AREA: G - MID-CHULITNA MOUNTAINS
DEADMAN MOUNTAIN

FIGURE E.7.12



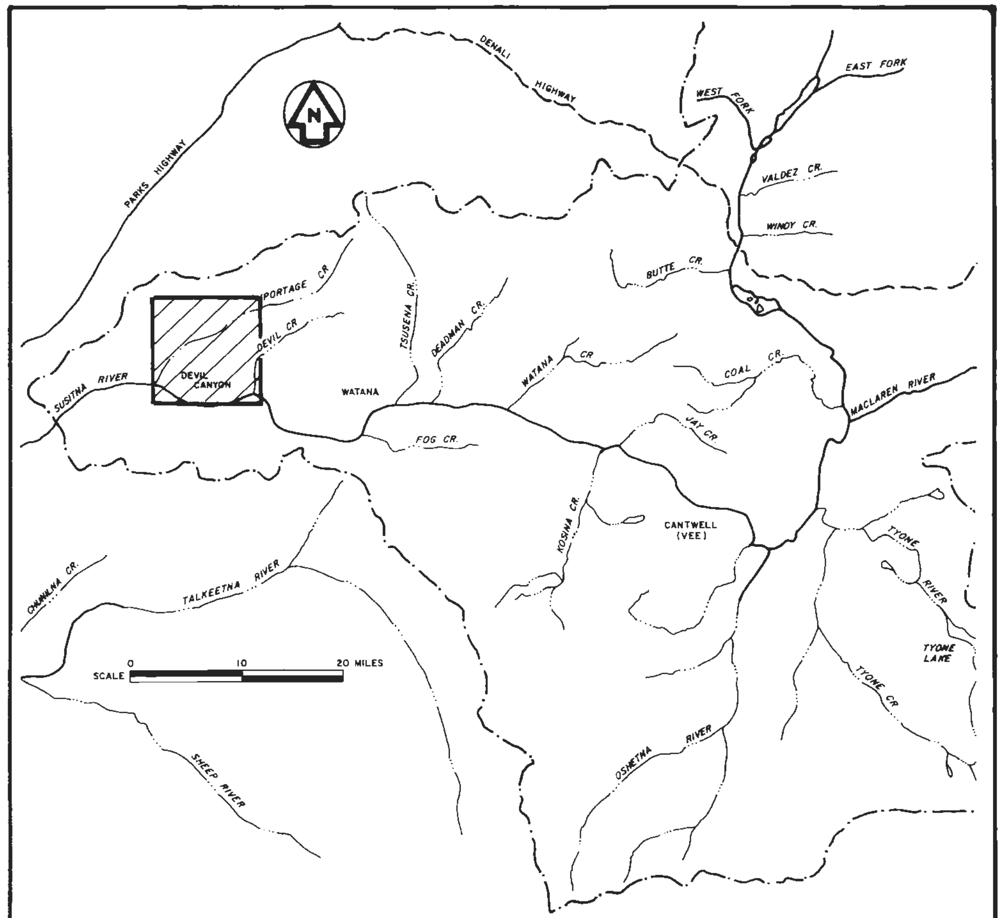
S-DEVIL CANYON DAMSITE
1 SHELTER
5,000 SQ. FT. BUILDING
8 PICNIC SITES
1 SINGLE VAULT LATRINE
15 PARKING
0.5 MILE TRAIL
SIGNAGE
3 BENCHES
1 BOAT LAUNCH



SCALE 0 1 2 MILES

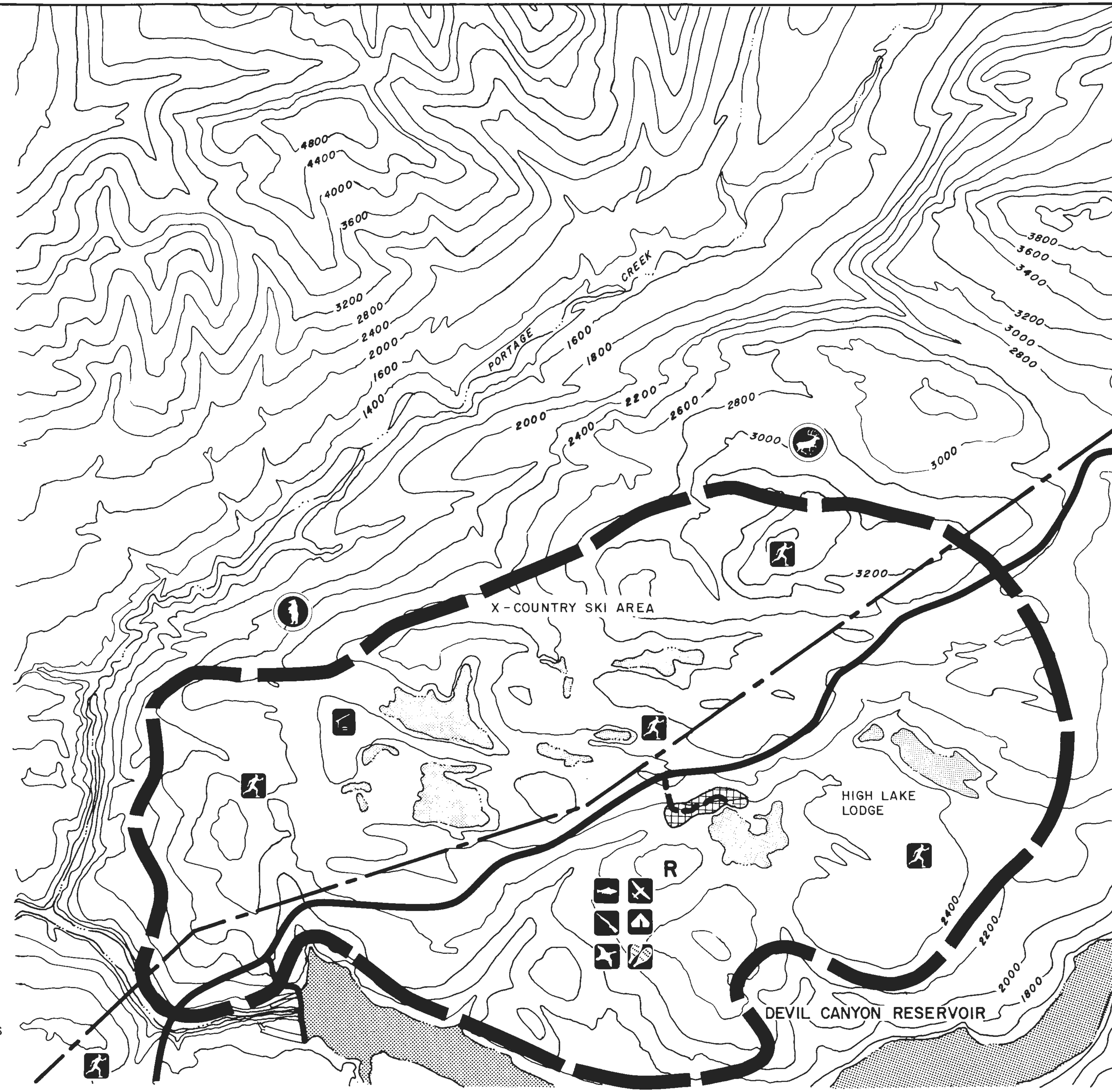
RECREATION AREA: S-DEVIL CANYON DAMSITE

FIGURE E.7.13



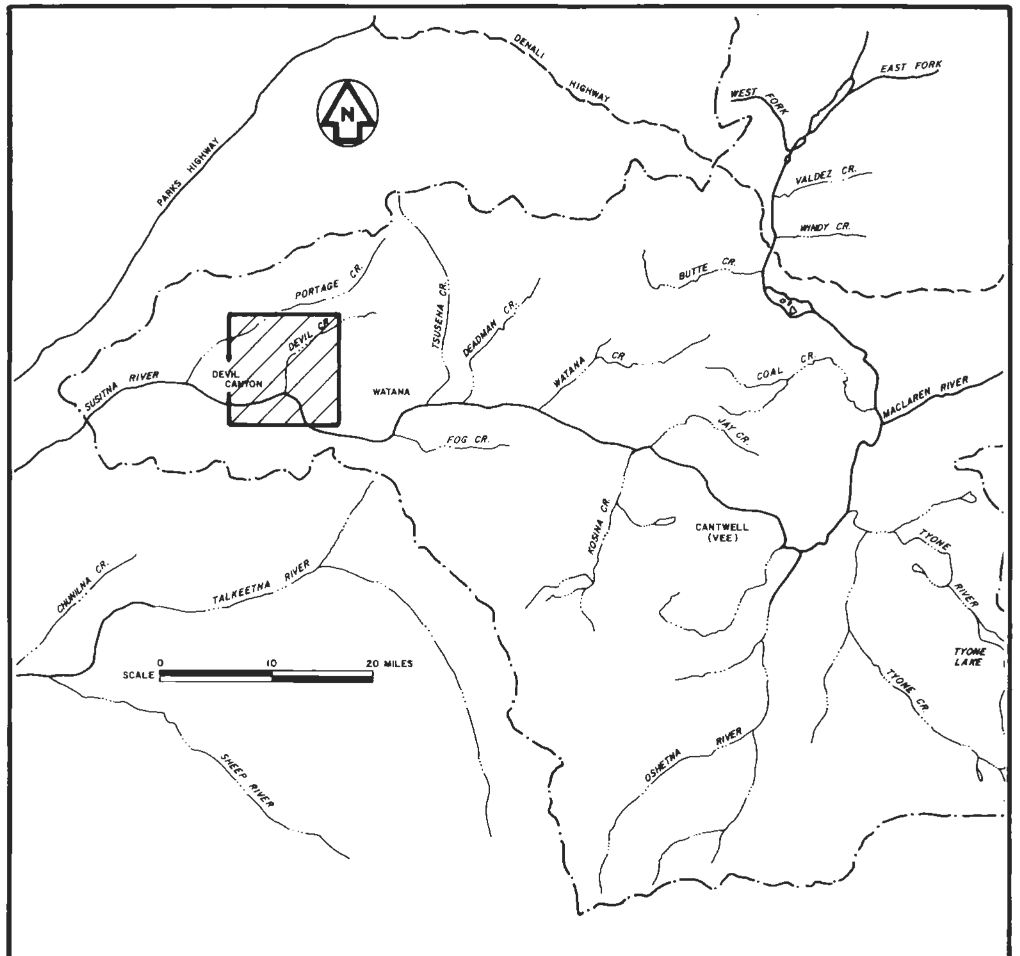
LOCATION MAP

R-MERMAID LAKE
- 8 CAMPSITES
- 1 SHELTER
- 2 SINGLE VAULT LATRINES
- WATER WELL
- BULLETIN BOARD
- 5 GARBAGE CANS
- SIGNAGE



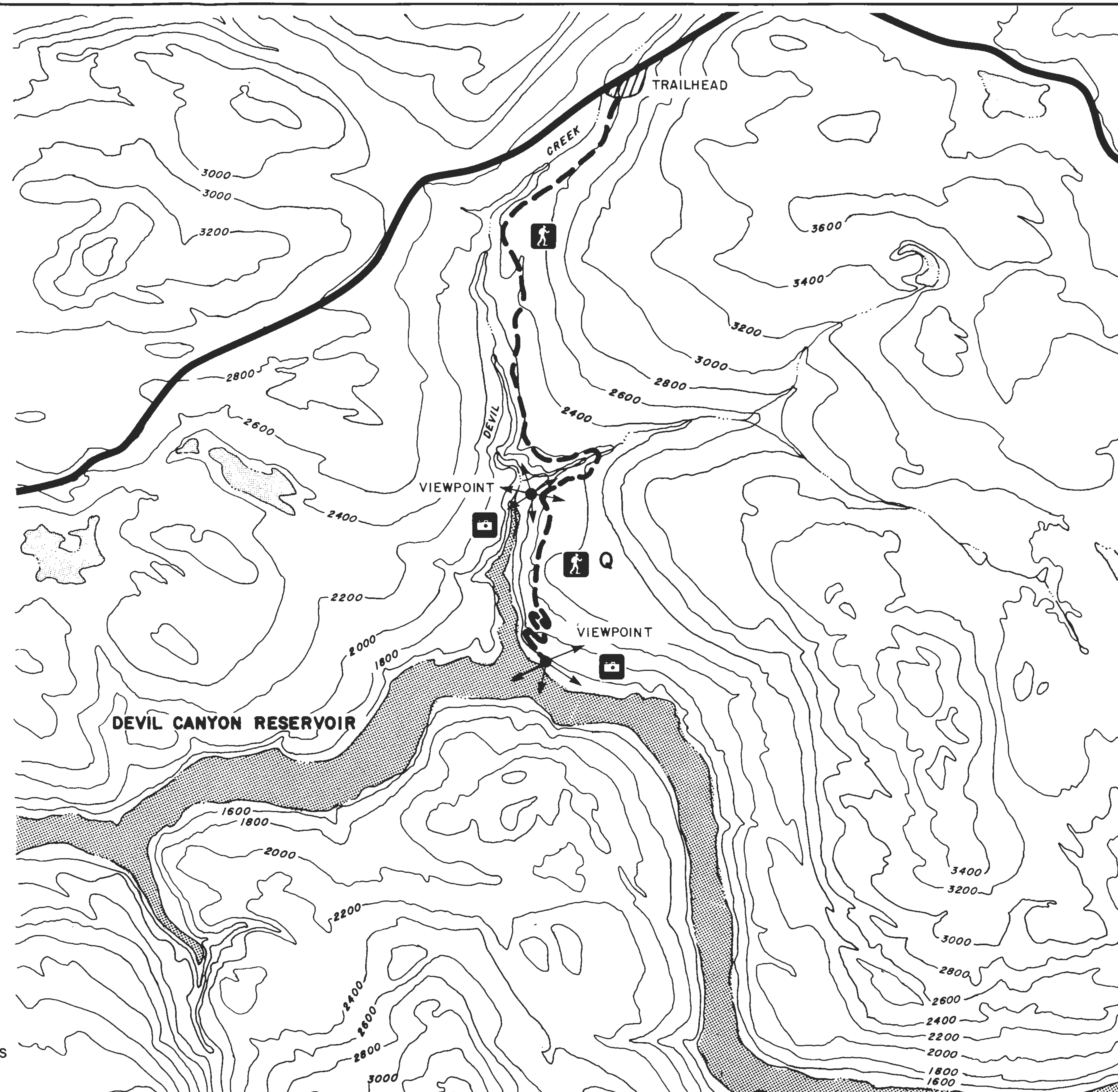
RECREATION AREA : R-MERMAID LAKE

FIGURE E.7.14



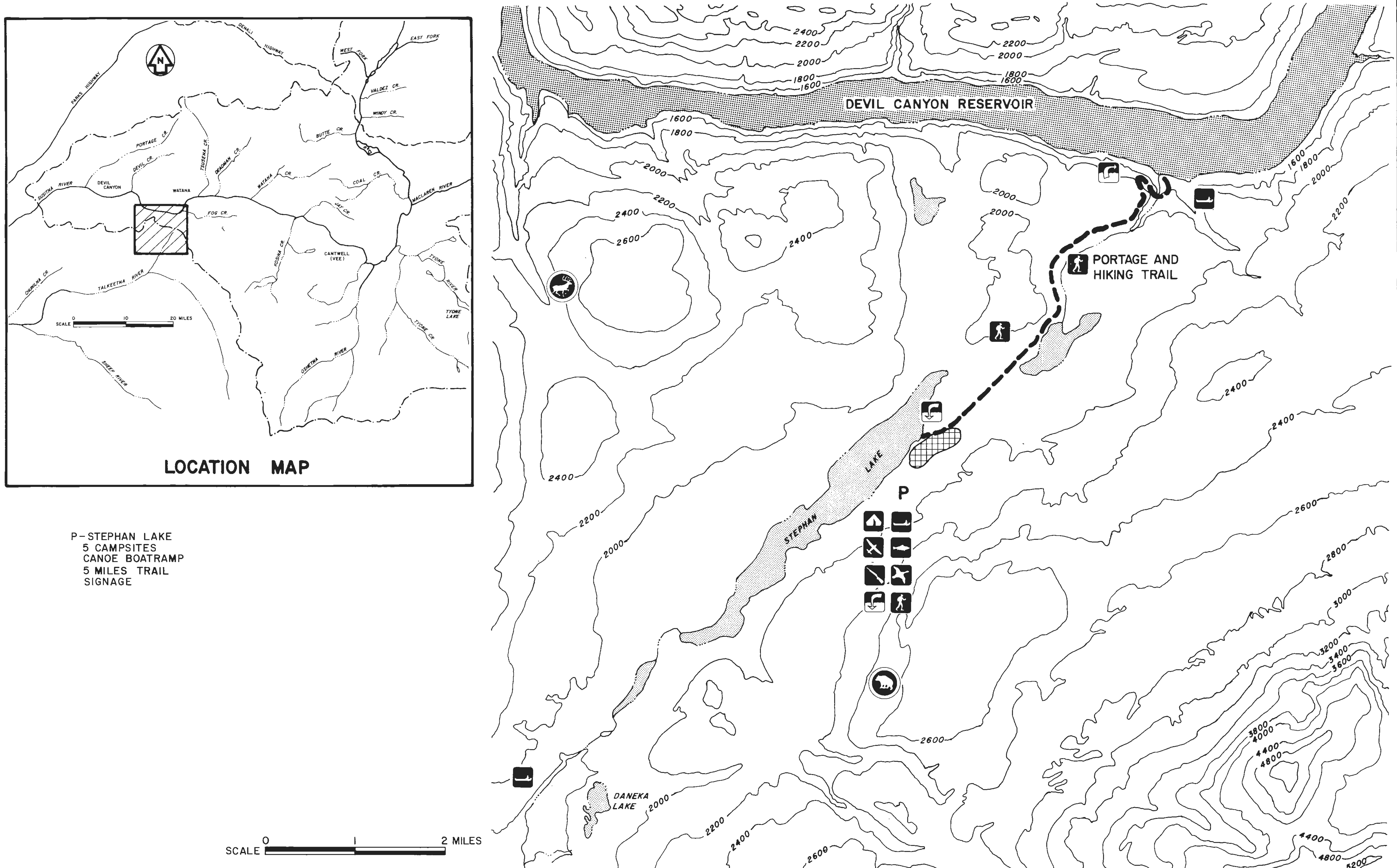
LOCATION MAP

Q - DEVIL CREEK
TRAILHEAD
5 AUTO PARKING
BENCH
SIGNAGE
9 MILES TRAIL



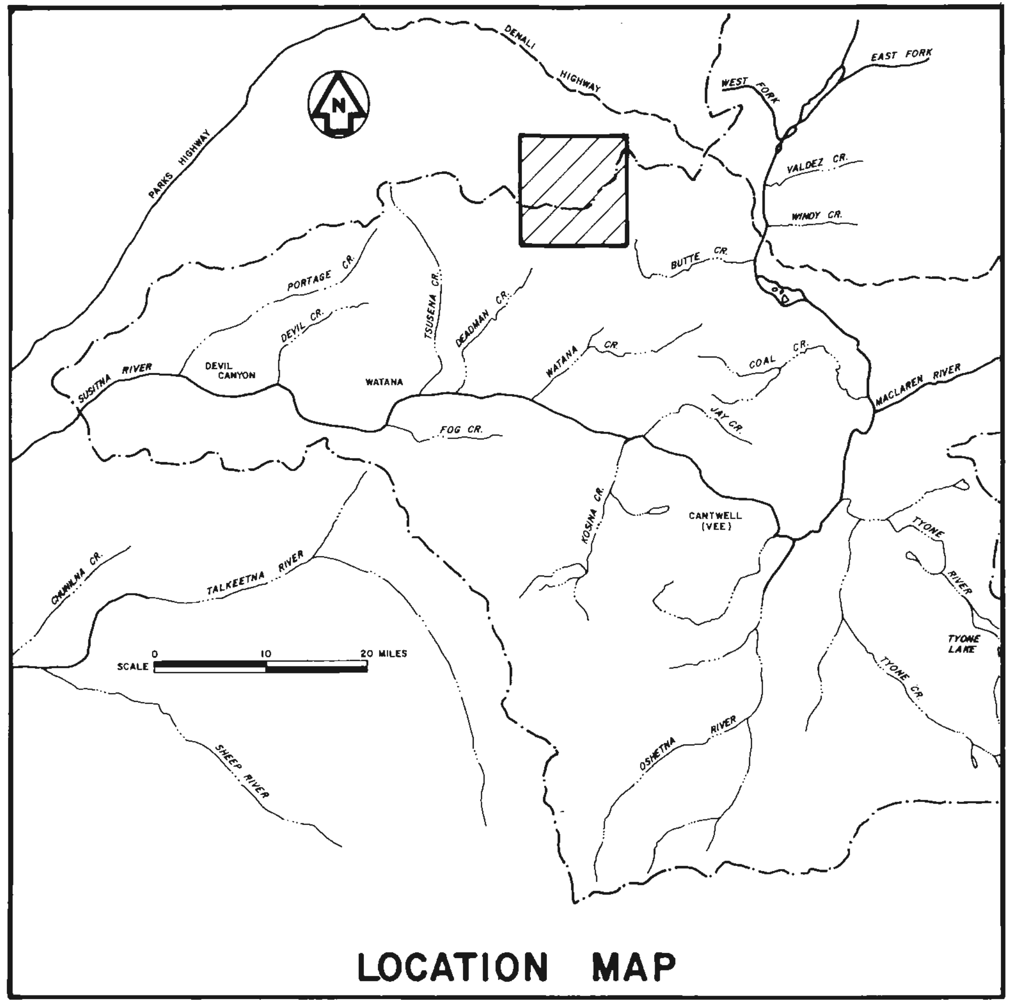
RECREATION AREA: Q - DEVIL CREEK

FIGURE E.7.15

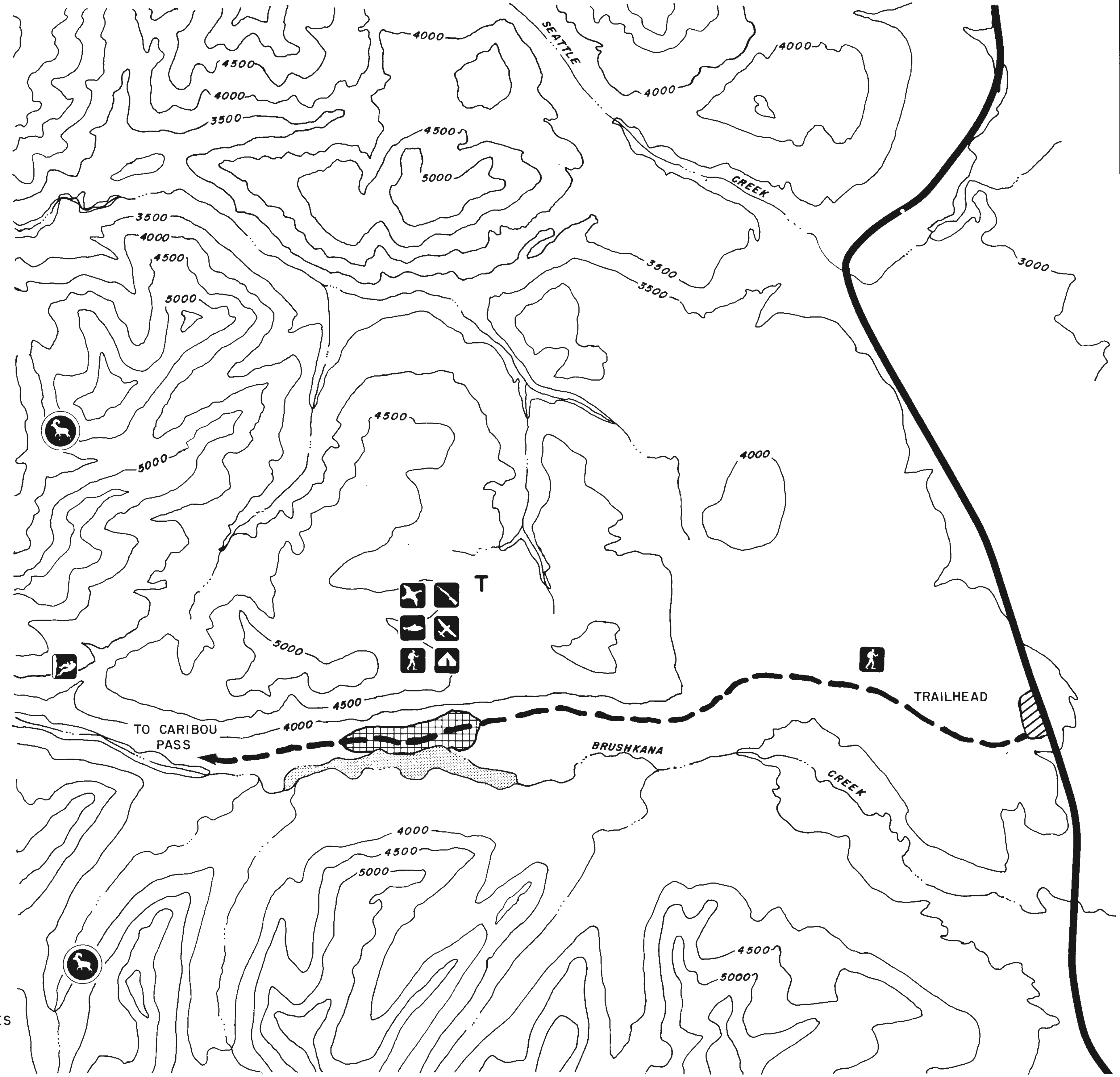


RECREATION AREA: P-STEPHAN LAKE

FIGURE E.7.16



T-SOULE CREEK
8 MILES TRAIL
TRAILHEAD
5 AUTO PARKING
5-6 UNDESIGNATED CAMPSITES



RECREATION AREA: T-SOULE CREEK

FIGURE E.7.17

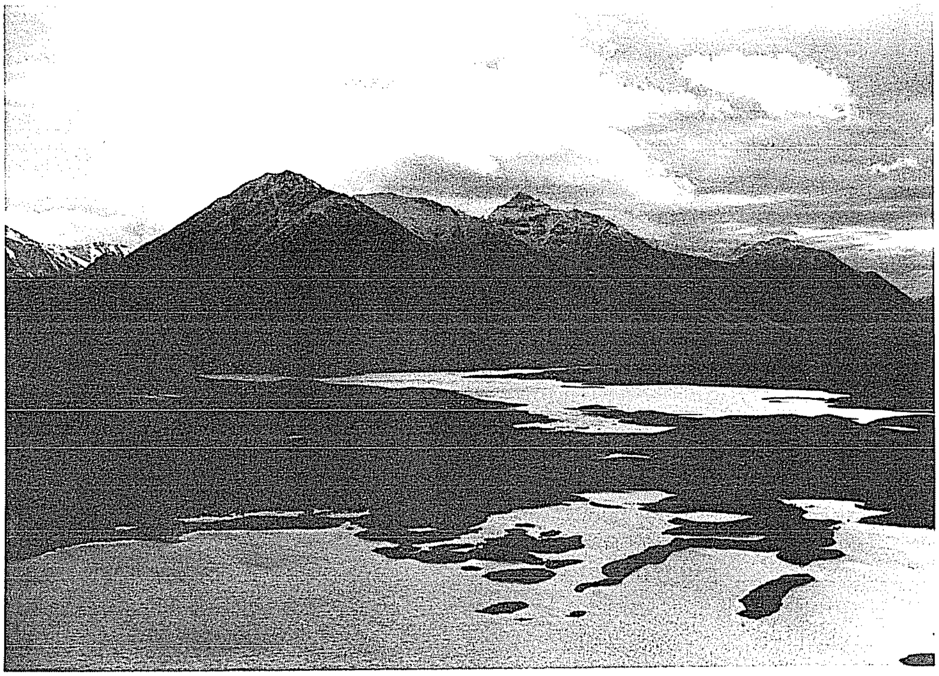


PHOTO E.7.1 MIDDLE FORK OF CHULITNA RIVER; VIEW TO THE SOUTH THROUGH CARIBOU PASS ALONG PROPOSED TRAIL

PHOTO E.7.2 SUSITNA BRIDGE ON THE SUSITNA RIVER; IMMEDIATELY NORTH OF PROPOSED BOAT RAMP

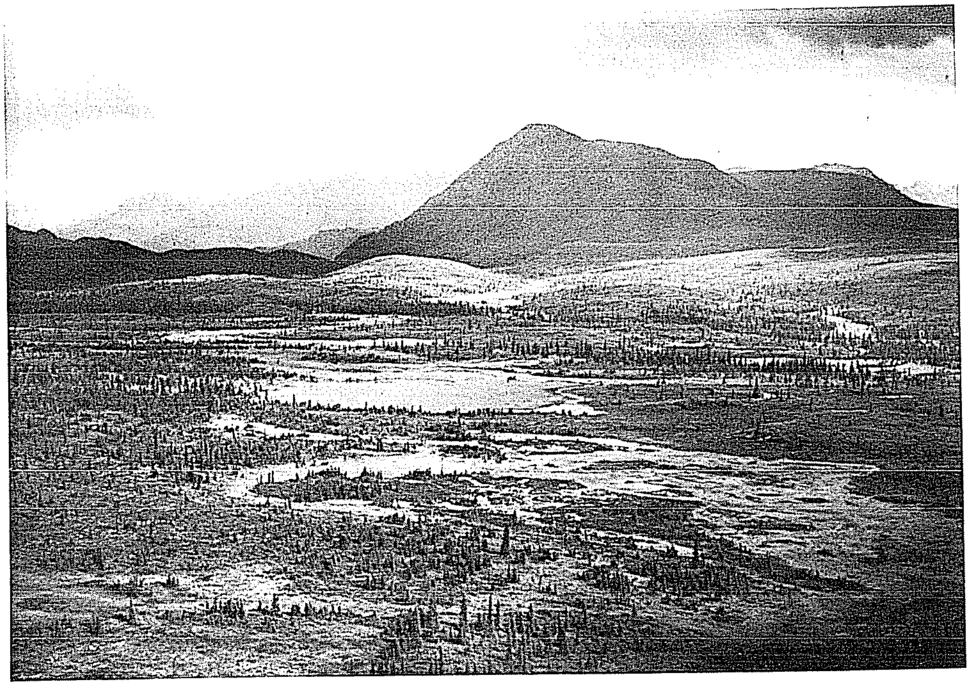


PHOTO E.7.3 WATANA TOWNSITE

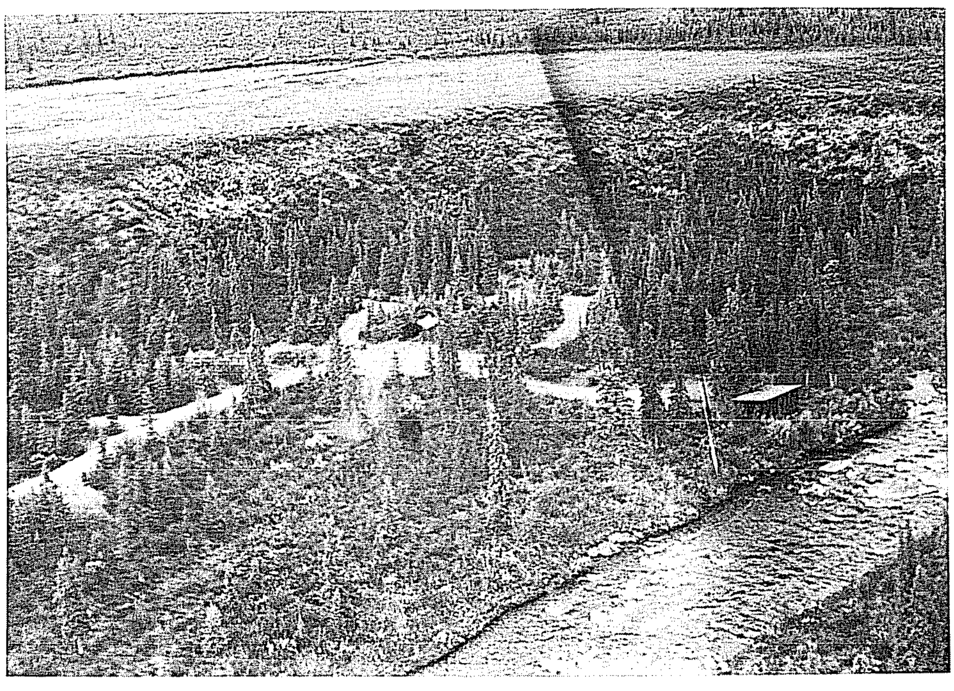


PHOTO E.7.4 BRUSHKANA CAMP; EXISTING CAMPSITE ADJACENT TO PROPOSED CAMPSITE

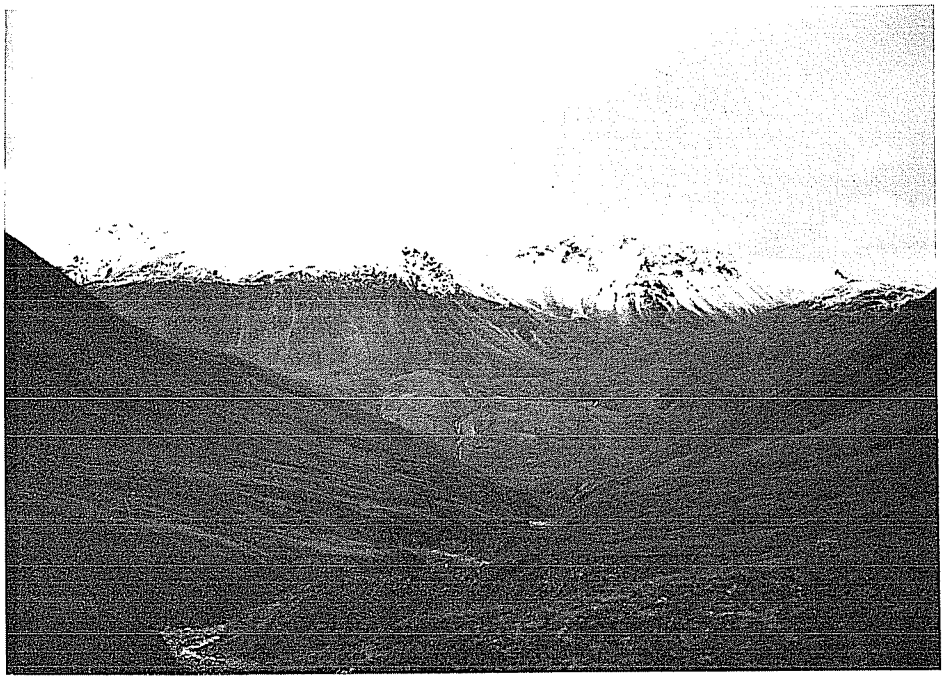


PHOTO E.7.5 TSUSENA CREEK; VIEW WEST INTO THE TSUSENA CREEK DRAINAGE FROM THE CHULITNA MOUNTAINS, FROM THE PROPOSED MOUNTAINEERING TRAIL

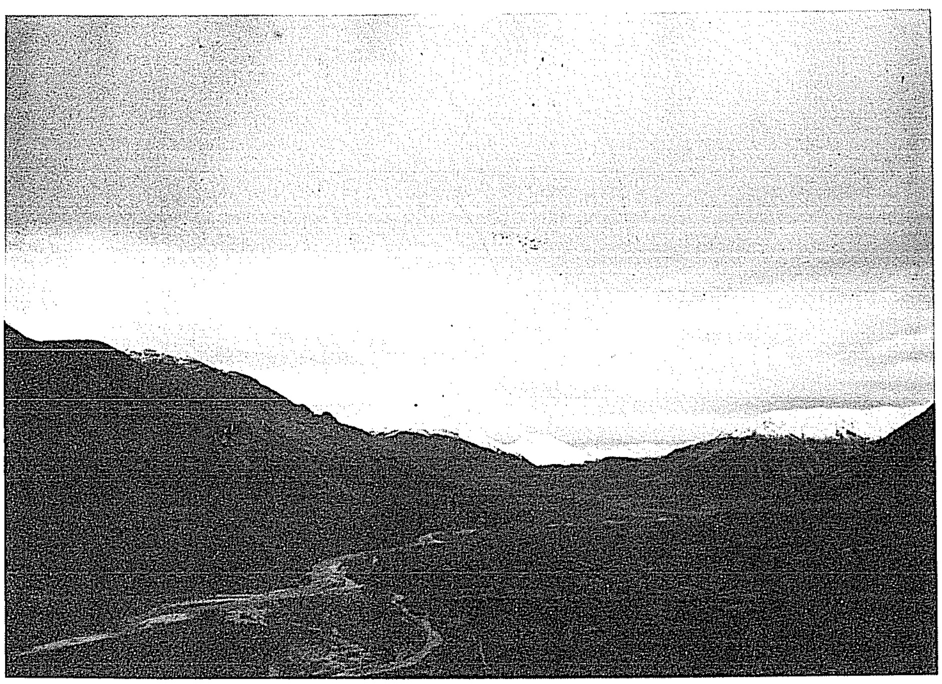


PHOTO E.7.6 TSUSENA CREEK; VIEW NORTH INTO THE CHULITNA MOUNTAINS FROM ABOVE THE PROPOSED TRAIL

PHOTO E.7.7 MID-CHULITNA MOUNTAINS; LOOKING SOUTH AT LAKE FROM PROPOSED TRAIL

PHOTO E.7.8 MID-CHULITNA MOUNTAINS; LOOKING NORTH FROM PROPOSED UNDESIGNATED CAMPSITES

PHOTO E.7.9 MID-CHULITNA MOUNTAINS

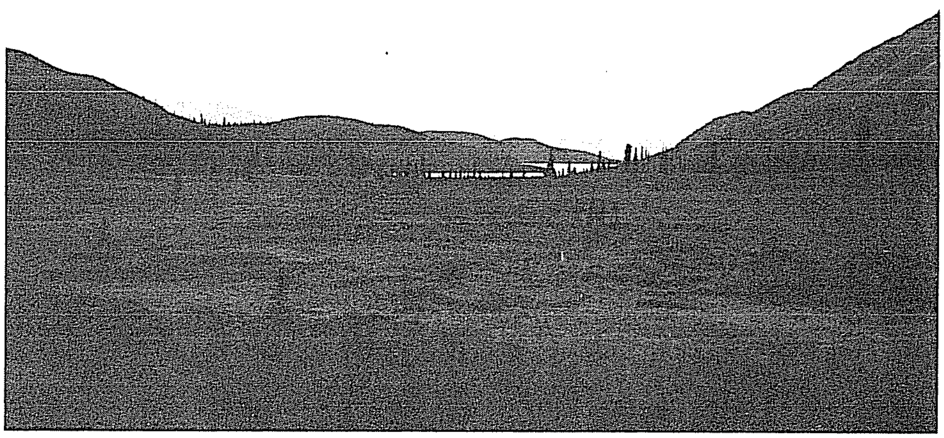


PHOTO E.7.10 TSUSENA BUTTE; LOOKING SOUTH TOWARD TSUSENA LAKES FROM PROPOSED TSUSENA CREEK TRAIL

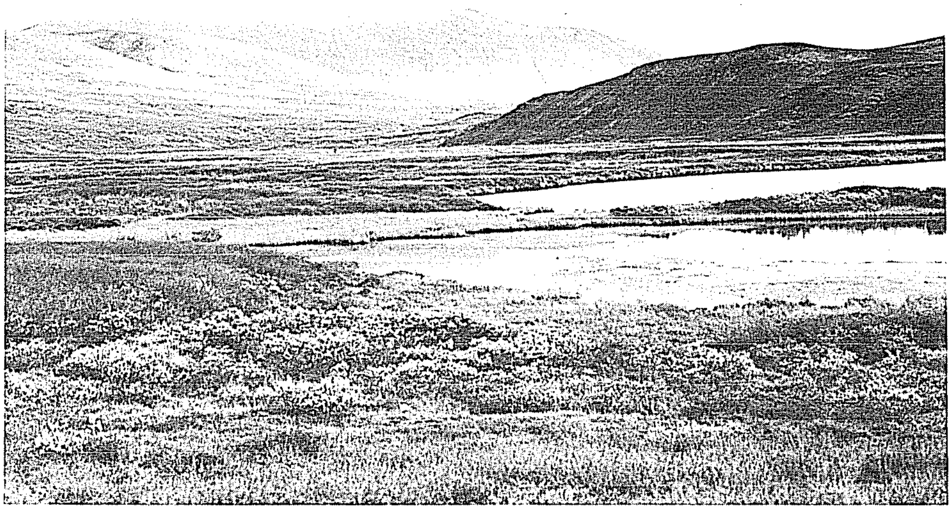


PHOTO E.7.11 DEADMAN LAKE / BIG LAKE; VIEW NORTH BETWEEN THE LAKES FROM PROPOSED TRAIL AND UNDESIGNATED CAMPSITES

PHOTO E.7.12 DEADMAN LAKE; VIEW LOOKING NORTHEAST FROM ABOVE THE PROPOSED TRAIL

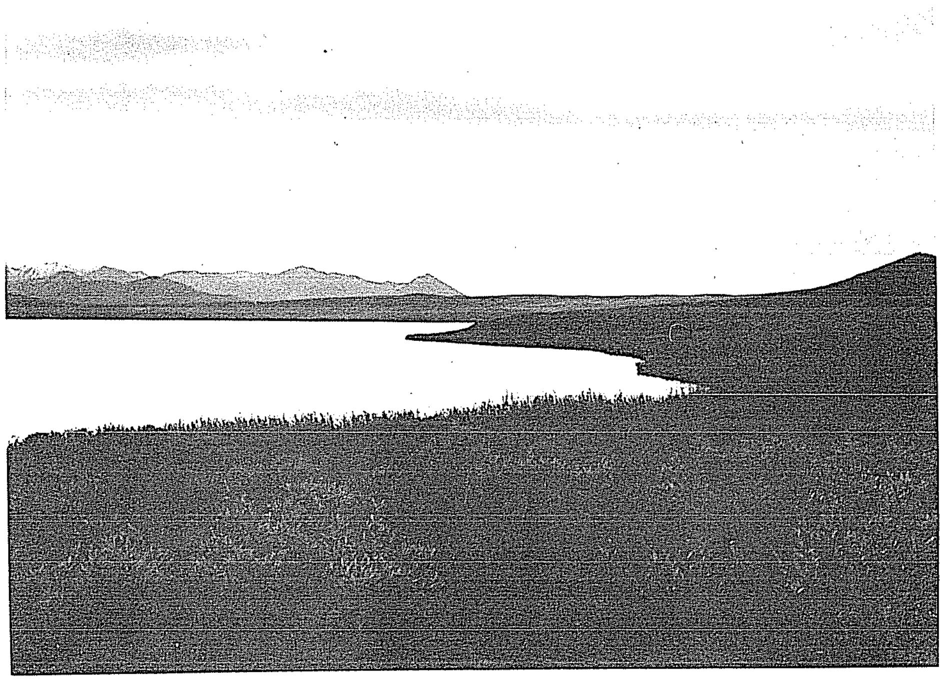


PHOTO E.7.13 BIG LAKE; VIEW TOWARD THE SOUTH END OF THE LAKE FROM THE PROPOSED UNDESIGNATED CAMPSITES

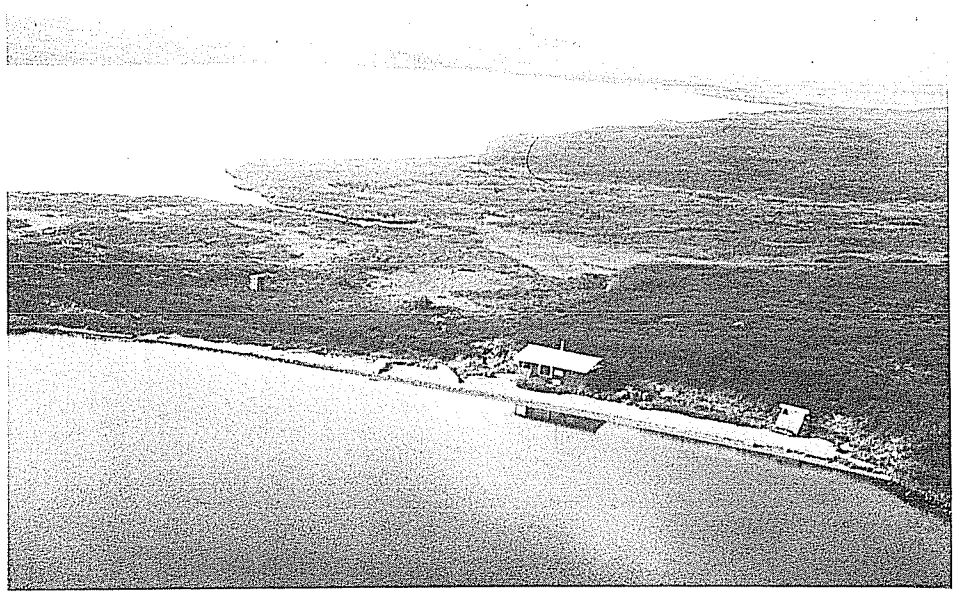


PHOTO E.7.14 CLARENCE LAKE, GILBERT CREEK VIEW WEST TOWARD PROPOSED TRAIL AND UNDESIGNATED CAMPSITES

PHOTO E.7.15 KOSINA CREEK; VIEW NORTH ALONG CREEK FROM ABOVE PROPOSED TRAIL

PHOTO E.7.16 WATANA LAKE; VIEW TOWARD THE NORTH

PHOTO E.7.17 FOG LAKES; VIEW TOWARD THE EAST

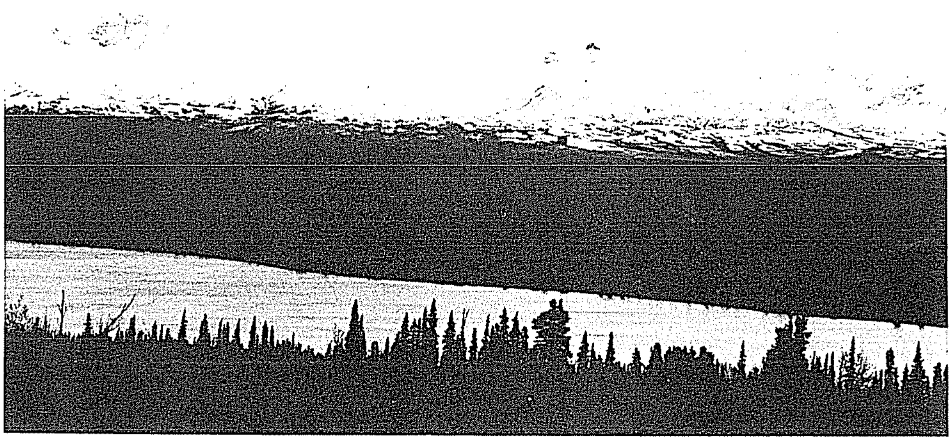


PHOTO E.7.18 FOG LAKES; VIEW SOUTH TOWARD THE TALKEETNA RANGE FROM ABOVE PROPOSED TRAIL

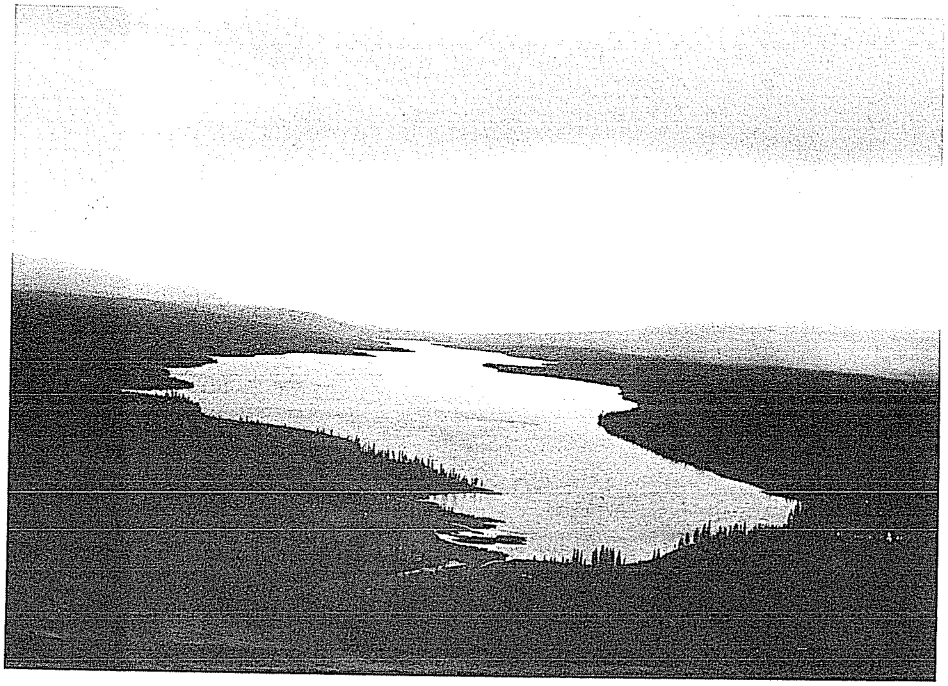


PHOTO E.7.19 STEPHAN LAKE; VIEW TOWARD THE SOUTH

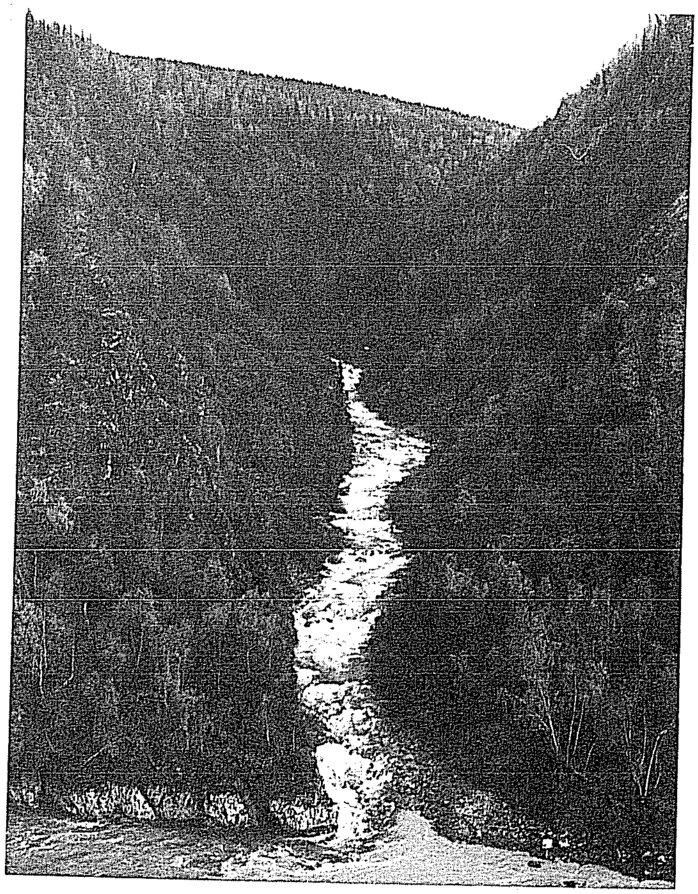


PHOTO E.7.20 DEVIL CREEK; VIEW ALONG DEVIL CREEK; AT ITS' CONFLUENCE WITH THE SUSITNA RIVER

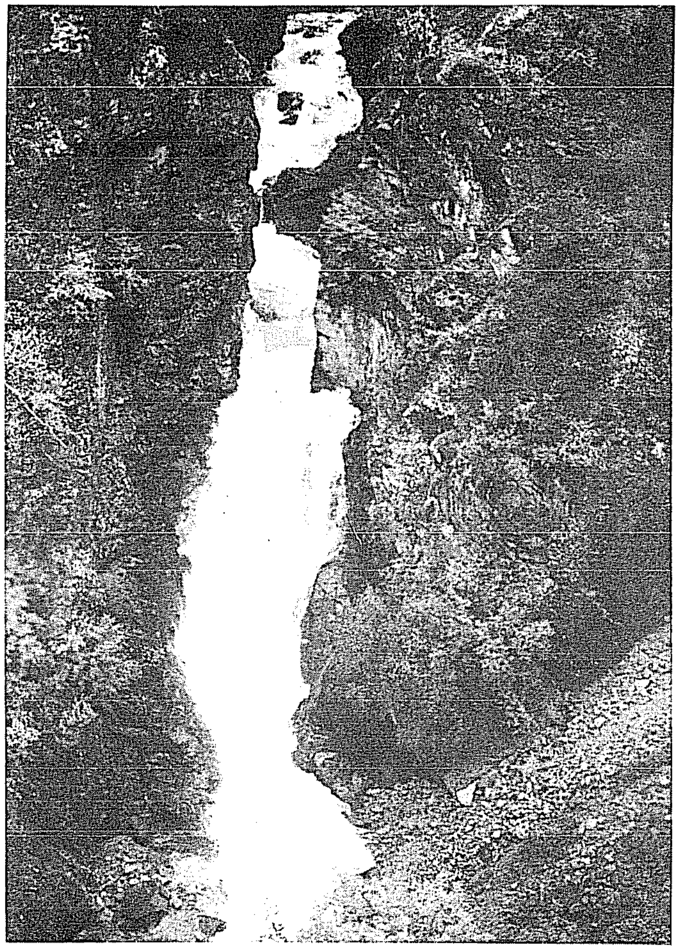


PHOTO E.7.21 DEVIL CREEK; DEVIL CREEK FALLS EAST, AS VIEWED FROM NEAR PROPOSED VIEWPOINT

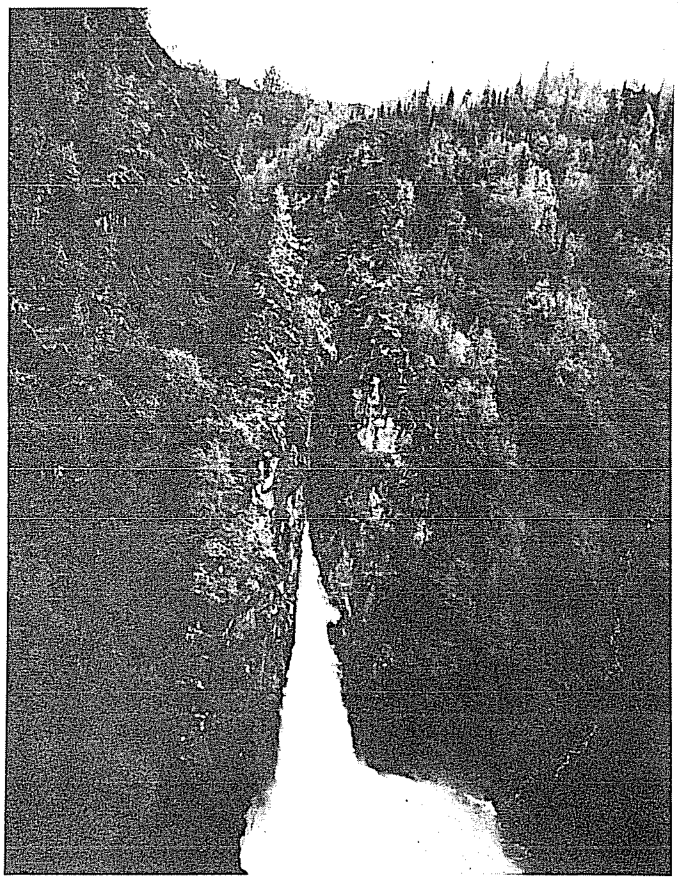


PHOTO E.7.22 DEVIL CREEK; DEVIL CREEK FALLS WEST, AS VIEWED FROM NEAR PROPOSED VIEWPOINT

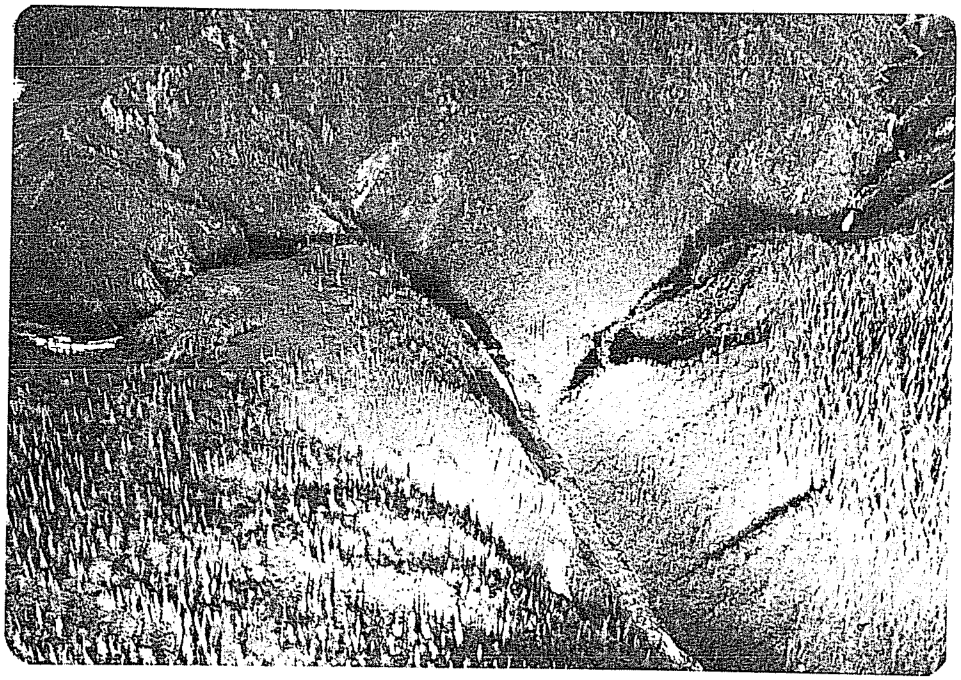


PHOTO E.7.23 DEVIL CREEK; VICINITY OF PROPOSED SCENIC TRAIL AND VIEWPOINTS

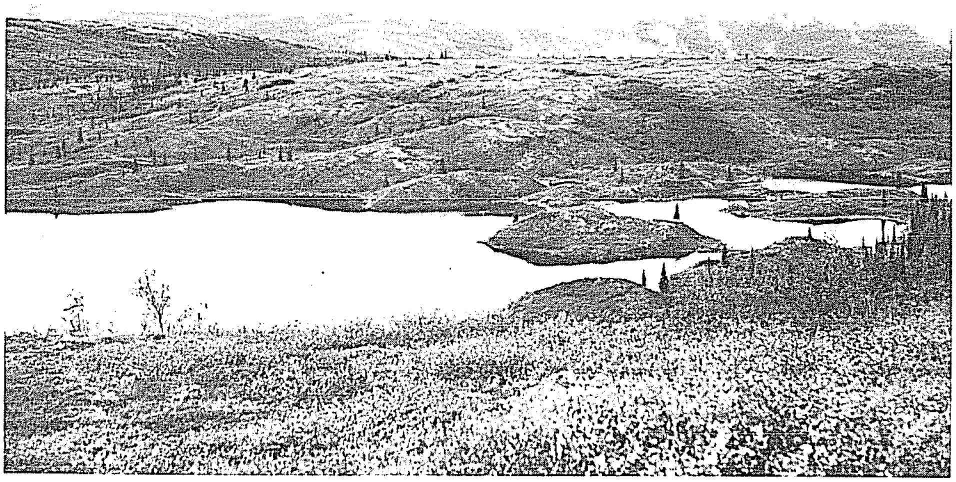


PHOTO E.7.24 MERMAID LAKE; SOUTH END OF LAKE FROM ABOVE PROPOSED CAMPGROUND

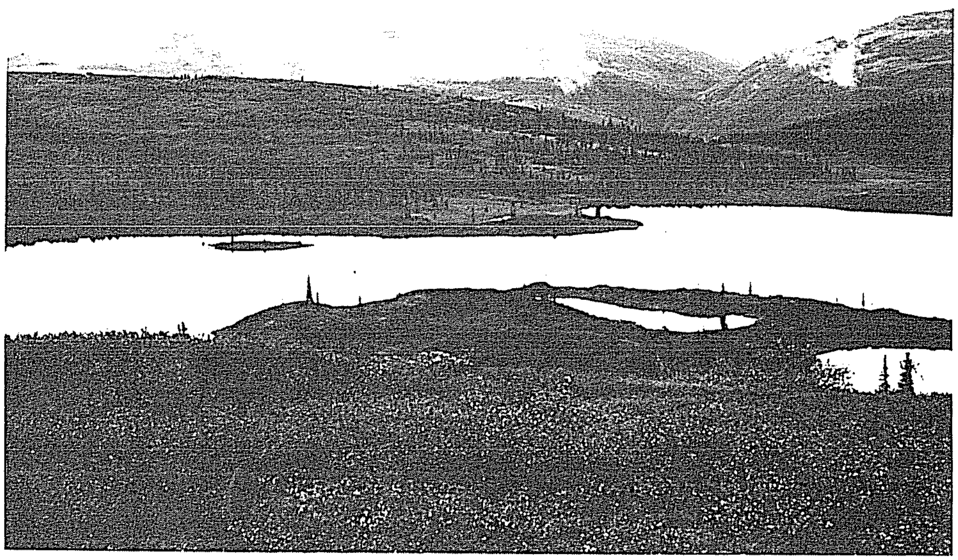


PHOTO E.7.25 MERMAID LAKE; NORTH END OF LAKE, FROM ABOVE PROPOSED CAMPGROUND

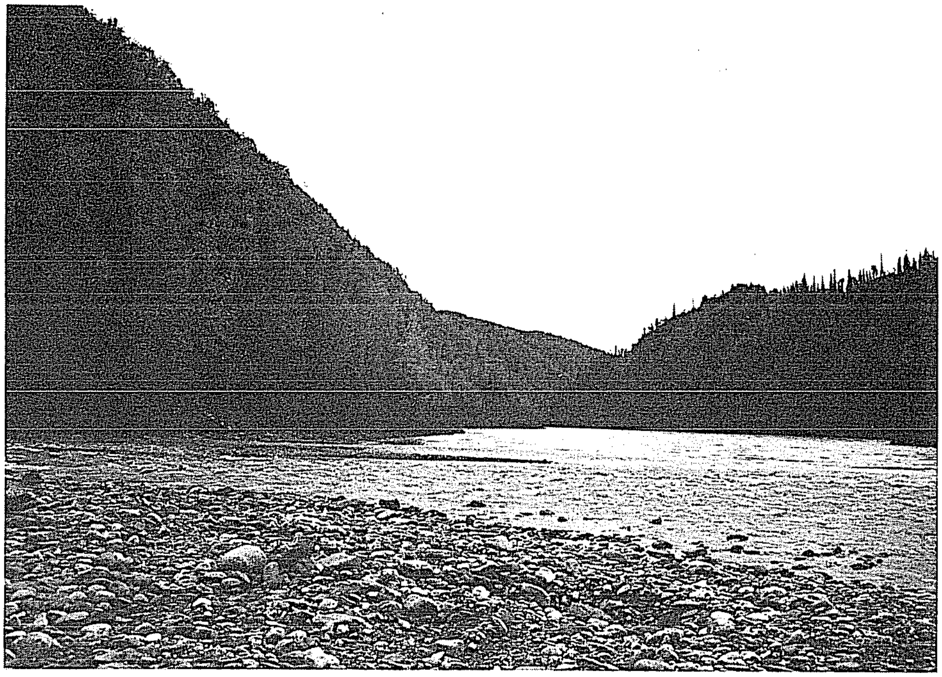


PHOTO E.7.26 DEVIL CANYON DAMSITE; VIEW OF SUSITNA RIVER FROM THE PORTAGE CREEK CONFLUENCE

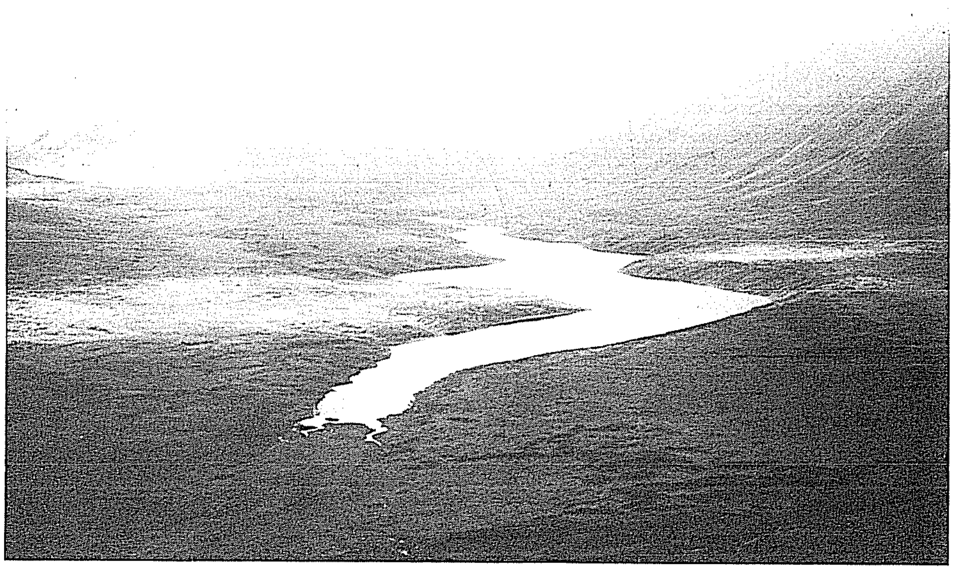


PHOTO E.7.27 SOULE CREEK; VIEW TOWARD THE WEST OF SOULE LAKE FROM ABOVE THE PROPOSED TRAIL

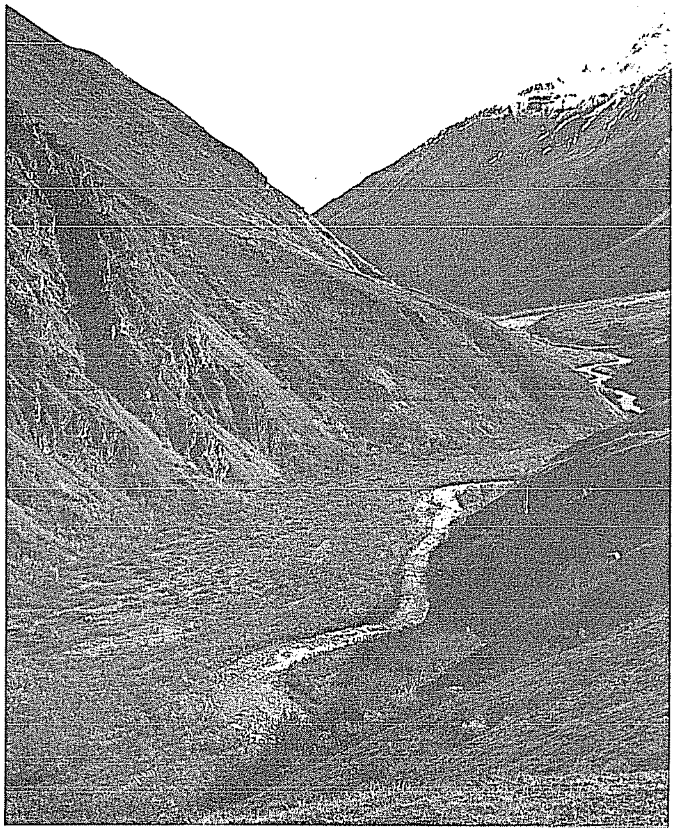


PHOTO E.7.28 SOULE CREEK, UPPER SOULE CREEK CANYON VIEWING TOWARD THE EAST ALONG THE PROPOSED MOUNTAINEERING TRAIL

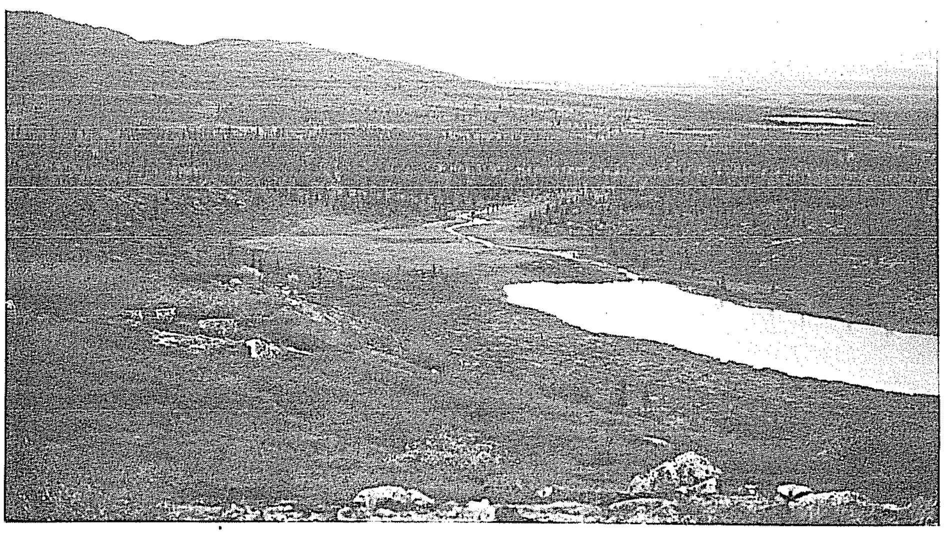


PHOTO E.7.29 SOUTHERN CHULITNA MOUNTAINS, VIEWING SOUTHEAST OVER LAKE, FROM ABOVE THE PROPOSED TRAIL

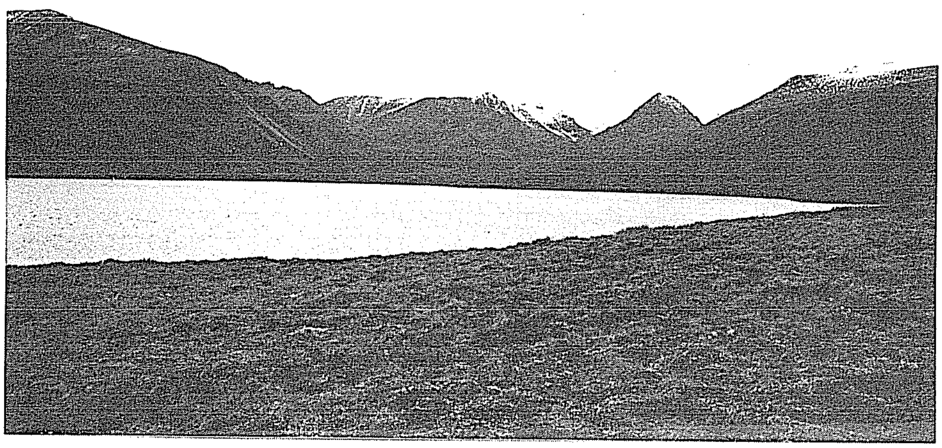


PHOTO E.7.30 SOUTHERN CHULITNA MOUNTAINS; VIEWING EASTWARD INTO THE CHULITNA MOUNTAINS ALONG THE PROPOSED TRAIL FROM THE PROPOSED UNDESIGNATED CAMPSITES

APPENDIX E7A

Further Data on Regional Recreational Facilities

APPENDIX 7.A: FURTHER DATA ON REGIONAL RECREATIONAL FACILITIES

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	45 hectares (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	17 hectares (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	20 hectares (49 acres)	8 units or 15 people
Denali Highway Recreation Development				
Denali Planning Block		Bureau of Land Management	1,821,125 hectares (4,500,000 acres)	
Brushkana River Campground	Denali Highway, Mile 105	Bureau of Land Management	19 hectares (47 acres)	33 campsites
Clearwater Creek Camping Area	Denali Highway, Mile 55.9	Bureau of Land Management	8 hectares (20 acres)	No development
Tangle Lakes Campgrounds and Boat Launch	Denali Highway, Mile 21.5	Bureau of Land Management	16 hectares (47 acres)	13 campsites
Upper Tangle Lakes Campground and Boat Launch	Denali Highway, Mile 21.7	Bureau of Land Managemeant	10 hectares (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	2,306,790 hect. (5.7 m. acres)	228 campsites

APPENDIX 7.A: FURTHER DATA ON REGIONAL RECREATIONAL FACILITIES (Cont'd)

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	170,427 hectares (421,120 acres)	Unknown
Tokositna Resort	Parks Highway, West of Mile 135	Alaska Division of Parks	170,095 hectares (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	36 hectares (90 acres)	17 campsites

APPENDIX 7.A: FURTHER DATA ON REGIONAL RECREATIONAL FACILITIES (Cont'd)

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	9,181 hectares (22,685 acres)	136 campsites
Nancy Lake Wayside	Parks Highway, Mile 66.6	Alaska Division of Parks	14 hectares (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	32 hectares (80 acres)	42 campsites
Big Lake, South and East Waysides	Parks Highway, Mile 52.3	Alaska Division of Parks	14 hectares (35 acres)	28 campsites 8 picnic sites
Finger Lake Wayside Restaurant	Parks Highway, North of Wasilla	Alaska Division of Parks	19 hectares (47 acres)	14 campsites
Rocky Lake Wayside	Parks Highway, Mile 52.3	Alaska Division of Parks	19 hectares (48 acres)	10 campsites
Recreation Areas Along the Glenn Highway				
Lake Louise Recreation Area	Glenn Highway, Mile 157	Alaska Division of Parks	35 hectares (90 acres)	Unknown
Lake Louise Wayside	Glenn Highway, West of Glennallen	Alaska Division of Parks	20 hectares (50 acres)	6 campsites
Tolsona Creek Wayside	Glenn Highway, Mile 172.5	Alaska Division of Parks	243 hectares (600 acres)	5 campsites
Little Nelchina Wayside	Glenn Highway, Mile 137.4	Alaska Division of Parks	9 hectares (22 acres)	6 campsites
Matanuska Glacier Wayside	Glenn Highway, Mile 101	Alaska Division of Parks	94 hectares (231 acres)	6 campsites
Long Lake Recreation Area	Glenn Highway, Mile 85	Alaska Division of Parks	194 hectares (480 acres)	Unknown
Long Lake Wayside	Glenn Highway, East of Palmer	Alaska Division of Parks	151 hectares (372 acres)	8 campsites

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	52 hectares (129 acres)	Unknown
Bonnie Lake Wayside	Glenn Highway, Northeast of Palmer	Alaska Division of Parks	13 hectares (31 acres)	8 campsites
King Mountain Wayside	Glenn Highway, Mile 76.1	Alaska Division of Parks	8 hectares (20 acres)	22 campsites 2 picnic sites
Moose Creek Wayside	Glenn Highway, Mile 54.7	Alaska Division of Parks	16 hectares (40 acres)	8 campsites
Mirror Lake Wayside	Glenn Highway, Mile 23.5	Alaska Division of Parks	36 hectares (90 acres)	30 campsites
Peters Creek Wayside	Glenn Highway, Mile 21.5	Alaska Division of Parks	21 hectares (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	1.6 hectares (4 acres)	4 campsites
Paxson Lake Campground and Boat Cavern	Richardson Highway, Mile 175	Bureau of Land Management	16 hectares (40 acres)	20 campsites
Dry Creek Recreation Area	Richardson Highway, Mile 117.5	Alaska Division of Parks	151 hectares (372 acres)	Unknown
Dry Creek Wayside	Richardson Highway, Northeast of Glennallen	Alaska Division of Parks	52 hectares (128 acres)	58 campsites 4 picnic sites
Sourdough Creek Campground	Richardson Highway, Mile 147.4	Alaska Division of Parks	65 hectares (160 acres)	20 campsites

APPENDIX 7.A: FURTHER DATA ON REGIONAL RECREATIONAL FACILITIES (Cont'd)

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	200,327 hectares (495,000 acres)	Unknown
Knik Wayside	Approx. 64 km (40 miles) North of Anchorage	Unknown	16 hectares (40 acres)	Unknown
Talkeetna Riverside Boat Launch	Talkeetna	U.S. Coast Guard	0.8 hectares (2 acres)	Unknown
Independence Mine Historic Area	Hatcher Pass Road	Alaska Division of Parks	110 hectares (271 acres)	Undeveloped

Site Location or Existing Site Development	Location (a)	Managing Agency	Proposed Action
Denali State Park	Parks Highway	Alaska Division of Parks	Implemented Site Plan Expend trail system further studies
Tokositna Resort	Off the Parks Highway	Alaska Division of Parks	Implemented Site Plan Expend 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
Matanuslea 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
Nance 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
Lditarod Trail (existing)	Alaska Range west of Anchorage	Alaska Division of Parks	Acquire property and implement plans

APPENDIX 7.A: FURTHER DATA ON REGIONAL RECREATIONAL FACILITIES (Cont'd)

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 Neldrina State Recreation Site (existing)	Glenn Highway	Alaska Division of Parks	Acquire 620 acres plan and implement
Neldrina 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: Alaska State Park System, South-central Region Plan, February 1982

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

APPENDIX E7B

Attractive Features - Inventory Data Forms

APPENDIX 7.B

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Soule Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Spectacular views
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/Trail Head				Trail from North Access Road along Soule Cr. to Jack R. and Caribou Pass to Cantwell or Tsusena Cr.
Access				Trail heads 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/Trail Head				Proposed trail along Soule Cr. and through Caribou Pass to Cantwell or to Tsusena Cr.
Access**				Trail head 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.

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — <u>Tsusena Creek Drainage</u>

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				
Resorts/Lodges		X		
Trails/Trail Head			**	Proposed trail through valley and continuing 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 trail head site*
Winter Sports				X-country skiing, ice fishing and snowmobiling

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

*Proposed trail follows Soule Cr. to Caribou Pass.

ATTRACTIVE FEATURES - INVENTORY DATA FORM

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

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/Trail Head				From North Access Road to lake and overlooks*
Access				Trail head 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.

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		Larger 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/Trail Head				*Proposed trail west from North Access Road
Access				North Access Road trail head 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.

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 Tundra
Dams/Reservoirs				
Campgrounds				Proposed campground at lake
Boating Facilities				Existing boat launch
Resorts/Lodges			X	Hunting/fishing cabin
Trails/Trail Head				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

APPENDIX 7.B (Cont'd)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Big Lake and Deadman Lake Area

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks			X	Views 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/Trail Head				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

APPENDIX 7.B (Cont'd)

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — <u>Butte Creek Drainage</u>

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/Trail Head			**	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 landscape with few areas of significant interest. Might best be developed for hunting access.

APPENDIX 7.B (Cont'd)

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 at lake and grayling
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 Res.
Campgrounds				
Boating Facilities				Existing launch at lake
Resorts/Lodges			X	Existing sport lodge
Trails/Trail Head				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
Visitor Information Service				
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 outlet - 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/Trail Head				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				

APPENDIX 7.B (Cont'd)

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/Trail Head				Proposed loop trail from Fog Lakes - also from Watana Lake
Access				Float plane to Fog Lakes or from proposed trail head at Watana Dam
Float Plane Facilities				If not existing - recommended
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

APPENDIX 7.B (Cont'd)

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/Trail Head				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				

APPENDIX 7.B (Cont'd)

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/Trail Head				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 trail head 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 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/Trail Head				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

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/Trail Head				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/Trail Head				Proposed overlook trail from High Lakes
Access				Devil Canyon Dam Road
Float Plane Facilities				
Visitor Information Service				
Historical/Archeological Sites				
Winter Sports				

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 E7C

Supporting Data for Susitna Drainage Fishing Activity

APPENDIX 7.C

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: 1981 Statewide Harvest Study Volume 23

Federal Aid in Fish Restoration and Anadromous Fish Studies, SW-1, Michael J. Mills, Alaska Department of Fish and Game

APPENDIX 7.C

NUMBER OF ANGLER DAYS FISHED IN ALASKA AND PERCENTAGE BY REGION AND AREA, 1977 - 1981

	ANGLER-DAYS									
	1977		1978		1979		1980		1981	
AREA FISHED	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	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: 1981 Statewide Harvest Study, Volume 23

Federal Aid in Fish Restoration and Anadromous Fish Studies, SW-1, Michael J. Mills, Alaska Department of Fish & Game

GLOSSARY

Accessibility - refers to the kind of roads, four-wheel-drive trails, foot trails, etc., which are in or surround the study area. Appropriate access to the various settings is important in maintaining the setting preferences, e.g., pristine activity preferences need to be difficult to access. This relationship is determined during the onsite field review.

Attractiveness - is a measure of a landscape's unique or special settings and features. These can be both cultural and natural. The landscape was inventoried for features, their frequency and significance, which bear on the potential for recreation.

Carrying Capacity - is 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 site through over-use or participation.

Encounter space - is 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 - is 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 - is 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 - is based upon the natural rarity of a proposed recreation setting. It 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 - is 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.

SUSITNA HYDROELECTRIC PROJECT

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EXHIBIT E CHAPTER 8

AESTHETIC RESOURCES

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AESTHETIC RESOURCES

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1 - INTRODUCTION

1.1 - Purpose

The purpose of the Susitna Hydroelectric Project Report on Aesthetic Resources is to describe the aesthetic resources of the proposed project area and the project design. The report outlines the expected impacts of project development on those resources and describes steps to be taken during project construction and operation to prevent or minimize degradation to the visual environment. Steps are also given for methods to enhance the aesthetic and related resources of project lands and waters.

1.2 - Relationships to Other Reports

This report is based, in part, upon the Project Description presented in Exhibit A and Project Operations described in Chapter 2 of Exhibit E. Important inputs to this 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

The Susitna Hydroelectric Project area is primarily within the state of Alaska's South-central Region, but also extends at least 100 miles (160 km) north into what is known as the Interior Region (see Figure E.8.1).

The South-central Region is geographically 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. Characterized by rugged mountainous terrain, plateaus and broad river valleys. The region is home to 55 percent of the state's population (Alaska Magazine, September 1981). Anchorage, with nearly half of Alaska's population and only 100 air miles (160 km) south of the project area, is located near the northeast end of Cook Inlet in the South-central Region.

Mount McKinley, the state's single most significant geographical feature, is located on the region's northwest border. Spruce hemlock and spruce-hardwood forests, wetlands, moist and wet tundra, as well as plateau uplands and a number of active glacier-bedded mountain valleys are other significant natural environments present here. This diversity of landscapes is also complemented by a wide variety of wildlife and fisheries.

The Interior Region is bordered by the Brooks Range to the north, the Bering Sea coast to the west, the Canadian border 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 significant natural feature. Again, as in the south-central region, the wildlife and fisheries are as diverse as the landscape environments (Alaska Geographic 1980).

Fairbanks, 100 air miles (160 km) north of the project area, is Alaska's second largest urban center with approximately 30,000 residents. Due to a harsh winter climate and general inaccessibility other than by air, the Interior Region is still predominately a wilderness area.

1.3.2 - Susitna River Basin

The Middle Susitna River Basin, which surrounds the proposed hydroelectric site, is located entirely in the South-central Region. The 39,000 square mile (101,400 square km) area 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, the aesthetic resources are valued because of the basin's location between the two population centers of Anchorage and Fairbanks.

The basin has distinct and diverse combinations of landforms, waterforms, vegetation and wildlife species. The deep V-shaped canyon of the Susitna River and tributaries, 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 6000 feet (212 m to over 1820 m). Distinctive landforms include panoramic tundra highlands, active and post glacial valleys, and numerous lakes of both simple and complex forms. The most well known features in the basin are the vertical-walled Devil and Vee Canyons on the Susitna River. Devil Canyon contains some of North America's roughest whitewater.

Seasonal changes in the basin, as throughout much of Alaska, are very dramatic. Lush green summers are replaced by the red, orange and golden colors of the tundra and hardwood species during a short autumn. Snow, ice and below-zero temperatures create a harsh, threatening but scenic winter landscape. Late April and May bring ice breakups on the rivers and the once snow- and icecovered ground begins to come back to life. The landscape turns green again as the cycle repeats.

1.3 - Environmental Setting

Other than the Susitna River itself, the silt-laden Maclaren and Oshetna rivers; the clear Tyone River; and Portage, Devil, Fog, Tsusena, Watana, Kosina, Jay, and Butte creeks are the major drainages in the Middle Susitna Basin. Scenic waterfalls occur on several of the creeks near their incised canyon confluences with the Susitna River, and the most notable falls occur on Devil Creek.

Spruce and mixed spruce-deciduous forests cover the bottom and slopes of river and tributary valleys below an elevation of 2500 feet (757 m) west of the Oshetna River/Susitna River confluence. 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 Basin include Dall sheep, moose, caribou, and grizzly and black bears. Avian species include bald and golden eagles, trumpeter swans, and numerous migratory waterfowl. Fisheries of the study area include all five Alaskan salmon species, grayling, burbot, rainbow, and lake trout. Because of the extremely turbulent waters of Devil Canyon, salmon are generally only found in the Susitna River below the canyon.

Existing access into the middle basin area is generally limited to hiking, float planes, all-terrain vehicles (ATV), and watercraft. Denali Highway passes through the northern portion of the basin linking the George Parks Highway to the west with the Richardson Highway to the east. Several short road/trails traverse the tundra to mining claims and fishing/hunting lodges. Primary human use of the basin includes recreational hunting and fishing. Several small mining operations are also found in the basin.

1.3.3 - Summary

The Middle Susitna Basin is an essentially uninhabited and diverse environment which has regionally important aesthetic values. Any major development here has the potential to create significant aesthetic impacts within the basin as well as to both the Southcentral and Interior Regions.

2 - METHODOLOGY

2.1 - Procedure

Figure E.8.2 illustrates the methodology followed to produce this report. Aesthetic resources were assessed according to the following outline:

2.1.1 - Step 1 - Study Objectives

- Establish study objectives through consultation with key agencies and project designers;
- Prepare a detailed work program and study outline;
- Review past Susitna Hydroelectric Project reports and other related visual studies;
- Perform air and ground reconnaissance of the project area and proposed facility/feature sites; and
- Identify specific concerns of agencies and special interest groups.

2.1.2 - Step 2 - Project Facilities and Features

- Identify and analyze the siting and design of proposed project features.

2.1.3 - Step 3 - Landscape Character Types

- Identify and describe existing landscape character types within the study area according to their land and water forms, and vegetation.

2.1.4 - Step 4 - Views

- Identify the major viewpoints within the study area.

2.1.5 - Step 5 - Aesthetic Value Rating

- Assign Aesthetics Value Ratings to each landscape character type based on the criteria of distinctiveness, uniqueness and harmony/balance.

2.1.6 - Step 6 - Absorption Capability

- Rate the absorption capability of landscape character types according to their ability to absorb visual modification, without the changes causing disharmony or degradation.

2.1 - Procedure

2.1.7 - Step 7 - Composite Rating

- Determine the composite ratings of each landscape character type based on a synthesis of Steps 5 and 6.

2.1.8 - Step 8 - Facilities' Rating

- Analyze the relationship of proposed facilities to the existing landscape character types and determine potential impacts. Using the composite ratings in Step 7, proposed facilities are determined to be in one of the following categories:

  . Compatible;
  . Compatible with mitigation;
  . Incompatible no mitigation possible; and
  . Incompatible mitigation is possible.

2.1.9 - Step 9 - Mitigation Measures

- Develop mitigation measures which will avoid or reduce adverse aesthetic impacts and provide or enhance the positive aesthetic impacts of the project on the landscape.

3 - STUDY OBJECTIVES (STEP 1)

The major objectives for this report are to:

- Identify the inherent quality of the aesthetic resources of the existing landscapes which will be directly or indirectly impacted by the Susitna Hydroelectric development;

- Protect the quality of the existing landscape by minimizing negative impacts caused by human activity and development;

- Maximize opportunities to appreciate the existing and new areas of high aesthetic quality; and

- Maximize the positive relationships between the proposed facilities and the existing landscape.

4 - PROJECT FACILITIES AND FEATURES (STEP 2)

The Susitna Hydroelectric Project has a number of facilities and features which will potentially have aesthetic impacts upon the existing landscape. General locations of these facilities are shown in Figure E.8.3. Appendix 8.A provides the proposed layout and analysis of these facilities. Appendices 8.B and 8.C include photos of facility sites. Appendix 8.B includes character sketches of major facilities. The facilities and features are as follows:

4.1 - Watana Project Area

- Earthfill dam and two temporary cofferdams;
- Reservoir;
- Main and emergency spillways;
- Borrow site (material for dams);
- Access roads;
- Switchyard at damsite;
- Temporary airstrip;
- Construction camp (single status);
- Construction village (married status):
- Permanent town;
- Two 345-kV transmission lines (Watana Dam to Intertie);
- Switchyard at Intertie; and
- 138-kV transmission line (power for construction of Watana).

4.2 - Devil Canyon Project Area

- Concrete arch dam, saddle dam and two temporary cofferdams;
- Reservoir;
- Main and emergency spillways;
- Borrow sites (material for saddle and cofferdams);
- Access roads;
- Switchyard at damsite;
- Construction camp (single status);
- Construction village (married status);
- Two 345-kV transmission lines (Devil Canyon to Intertie); and
- Railroad (Gold Creek to Devil Canyon).

4.3 - Watana Access Road

- Gravel road from Denali Highway to Watana Dam; and
- Borrow sites (material for road construction).

4.4 - Devil Canyon Access Road

- Gravel road;
- High level bridge (below Devil Canyon damsite); and
- Borrow sites (material for road construction).

4.5 - Transmission Line Stubs

- Two 345-kV transmission lines from Healy to Fairbanks (north stub); and
- Three 345-kV transmission lines from Willow to Anchorage (south stub (see Figures E.8.6 and E.8.7).

4.6 - Intertie

Initially there will be one 345-kV transmission line operated at 138 kV from Willow to Healy. For successional stages, see Figure E.8.4. It should be noted that the Intertie between Willow and Healy is not a part of the Susitna Hydroelectric Project, and its examination here will be cursory in nature.

4.7 - Recreation Facilities and Features

- Dam visitor centers;
- Road pulloffs and parking;
- Semi-developed campgrounds;
- Primitive camping;
- Trailheads;
- Developed and primitive trails; and
- Warming shelters.

5 - EXISTING LANDSCAPE

5.1 - Landscape Character Types (Step 3)

Landscape Character Types (LCT) are 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. Using aerial photographs and USGS topographic quadrangles, the basic physiographic units were identified and subsequently verified and inventoried in the field. The LCT for the basin are mapped in Figure E.8.5, and those for the transmission are shown in Figures E.8.6 and E.8.7. The inventory includes four major landscape characteristics described as follows:

- Landform: which are physiographic units in terms of their degree of enclosure, geologic history and composition, slope gradient and distinguishing landscape patterns, and exceptional natural features;

- Waterform: which delineates the location of water bodies, lakes, rivers, streams, and wetlands, and the pattern and character of their occurrence. Rarity is also inventoried.

- Vegetation: which is a description of the vegetation patterns which exist within the basin. Special or unusual vegetation situations also are inventoried.

- Views: which describe special visual characteristics within the landscape characater type and possible visitors or panoramic views to regional landscape settings.

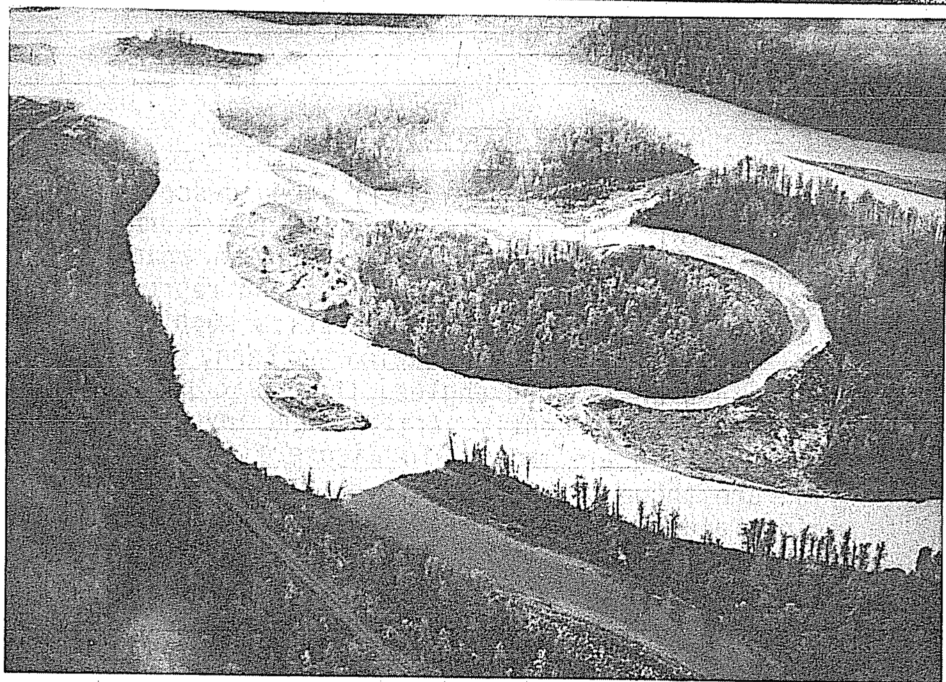
The following charts identify and summarize the landscape character types and the exceptional natural features within the area. Numbered and asterisked items identify the outstanding natural features occurring in the landscape.

These landscape character types can be evaluated for their aesthetic value (a relative measure of overall importance of the visual landscape), including such components as distinctiveness, uniqueness, harmony and balance (Step 5); and can also be evaluated for absorption capability (a measure of a landscape's natural sensitivity of a landscape to alteration). Factors such as the potential for human experience, compatible site relationships, and aesthetic values are considered (Step 6).

LANDSCAPE CHARACTER TYPE

MID SUSITNA RIVER VALLEY

PHOTO E.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.

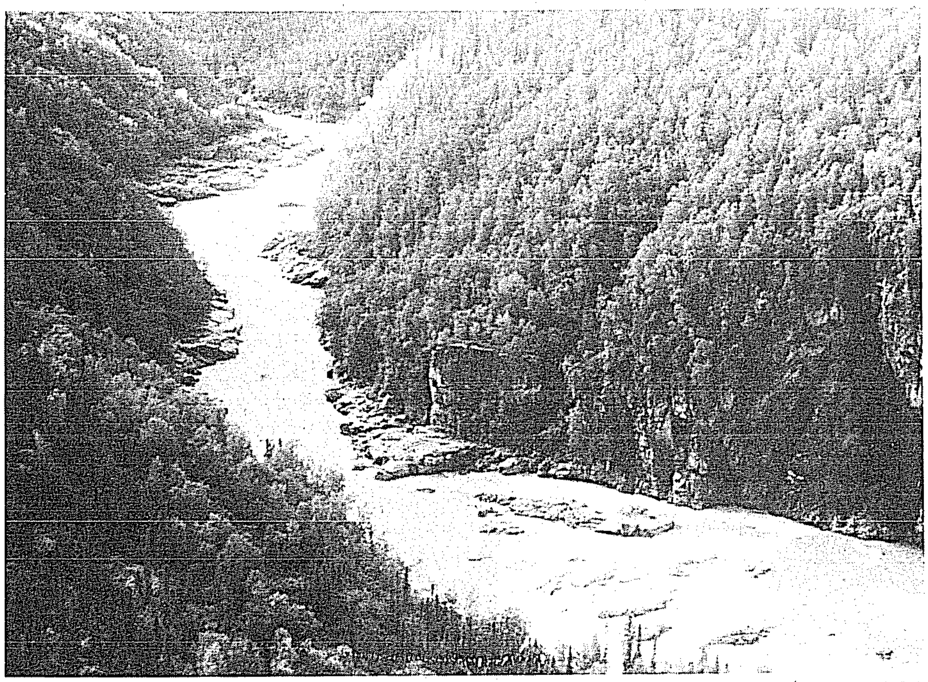
VIEWS

- 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 E.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 E.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.

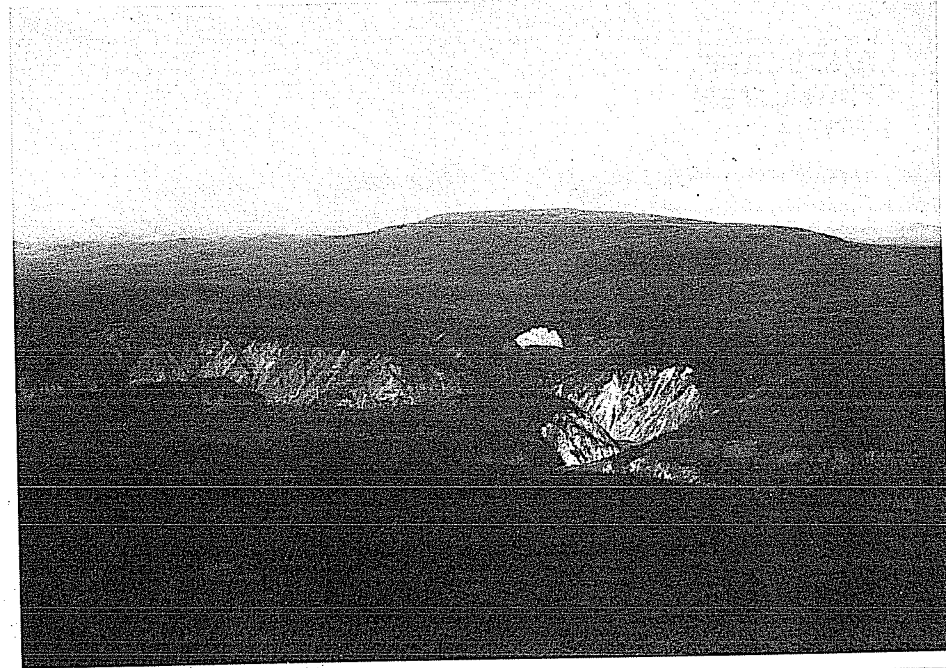
VIEWS

- 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 E.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.

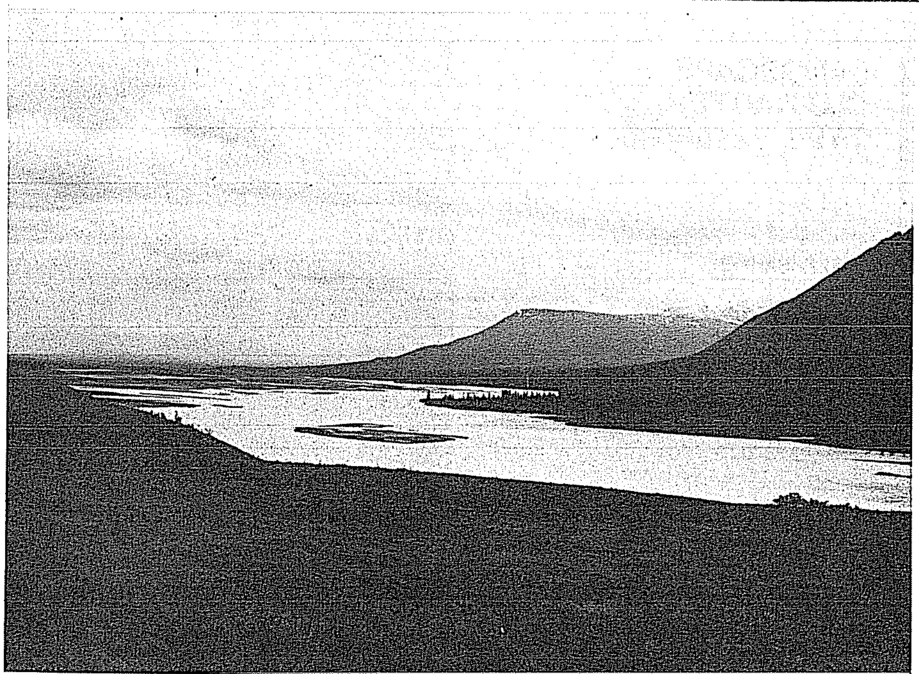
VIEWS

- 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 E.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 E.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.

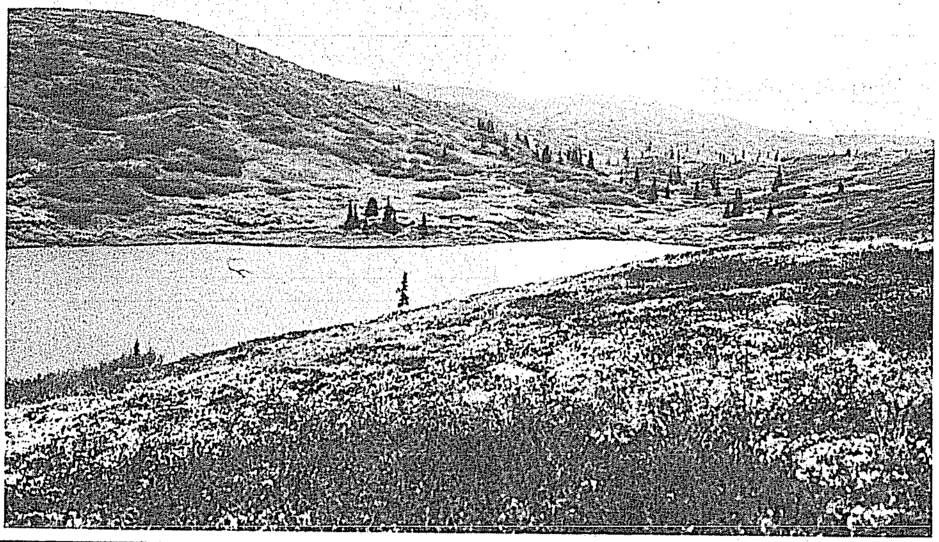
VIEWS

- 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 E.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 E.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.

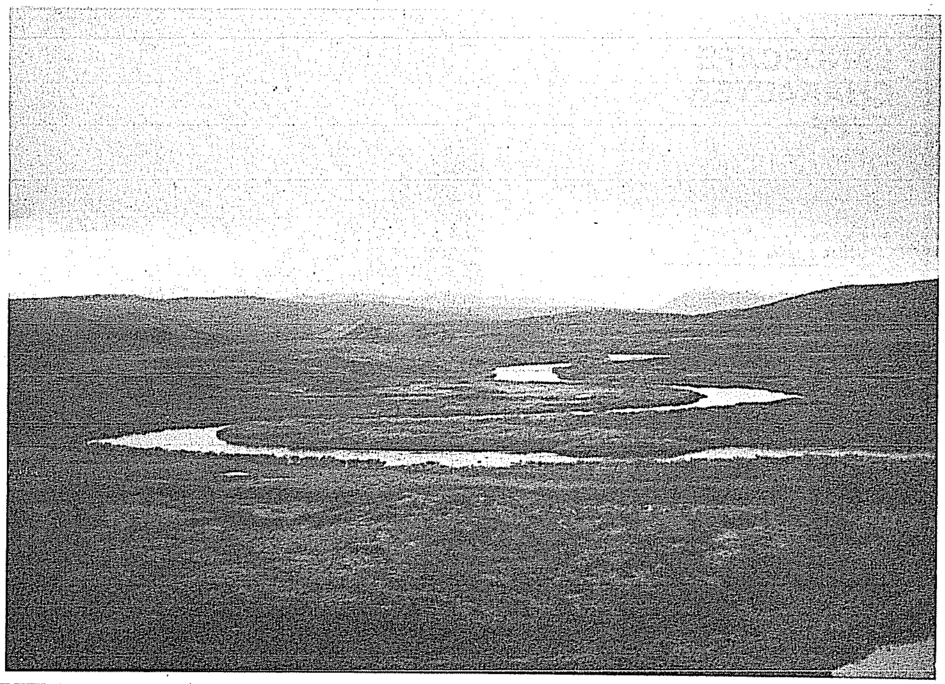
VIEWS

- 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 E.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 E.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 E.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 E.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 E.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 E.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.

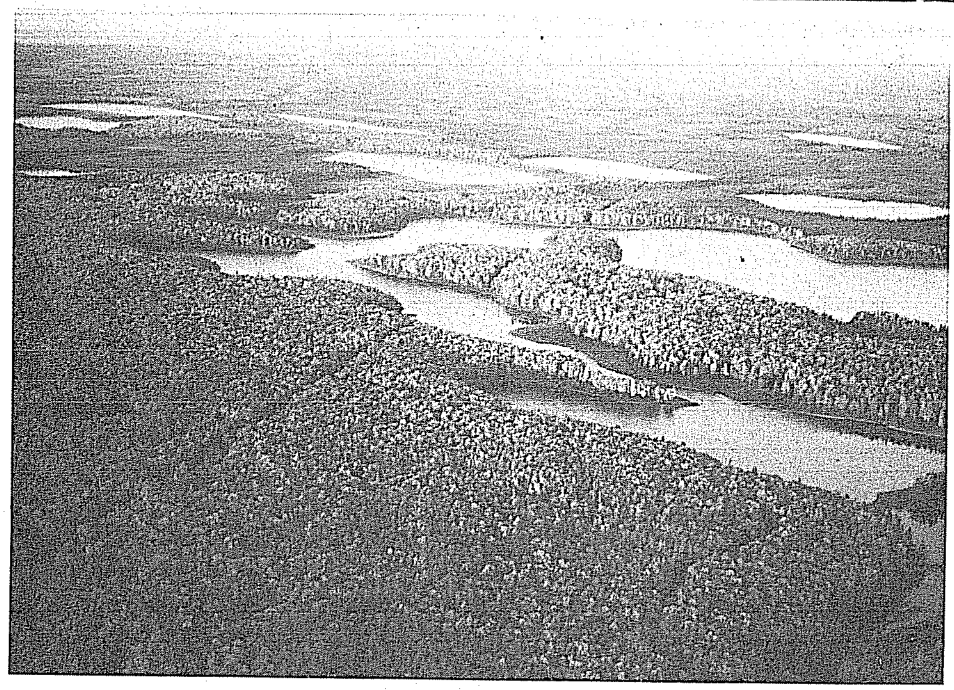
VIEWS

- 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 E.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 E.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.

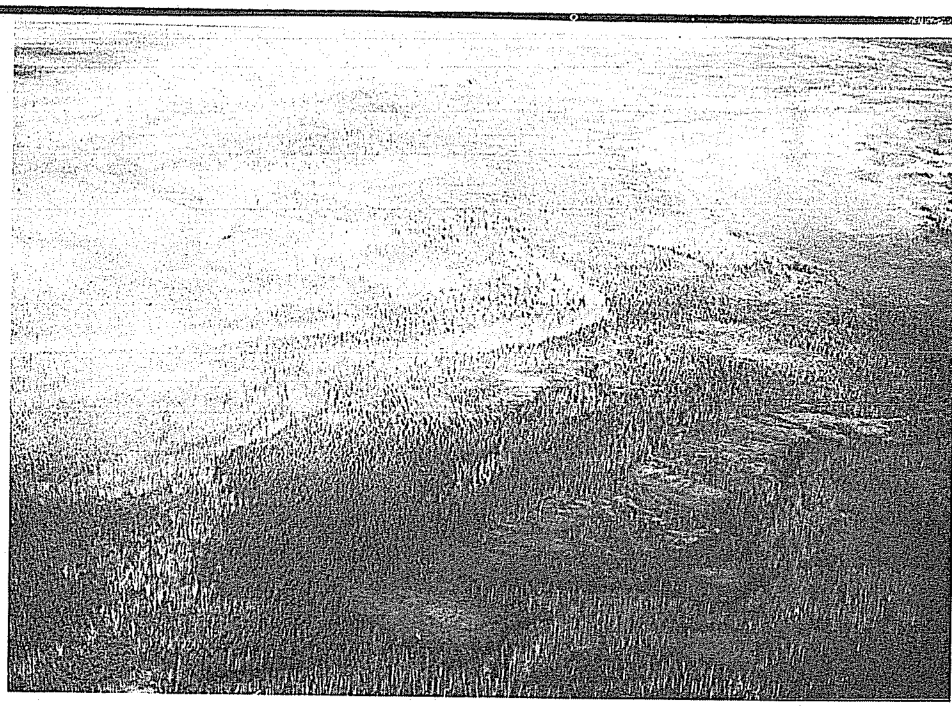
VIEWS

- 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 E.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.

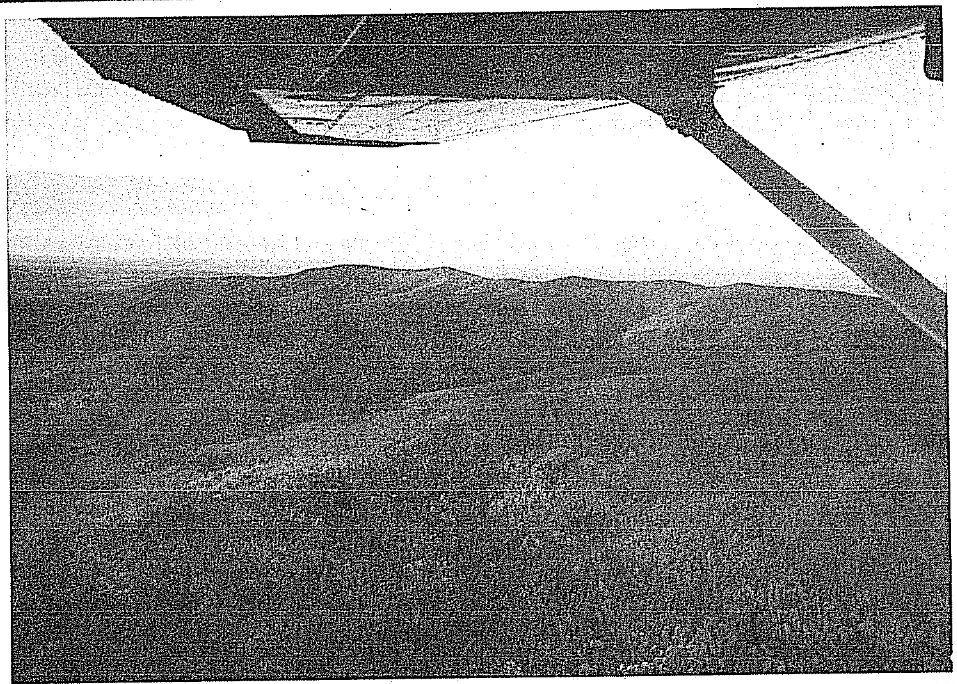
VIEWS

- 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 E.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.

5.2 - Exceptional Natural Features

These exceptional natural features of the site are identified in Figure E.8.8 and are described below.

5.2.1 - Devil Canyon Rapids

For over 10 miles (16 km) the Susitna River boils through narrow canyons as part of a spectacular and unique natural setting. The combination of high volumes of glacial water, steep inaccessible canyon walls and giant boulders highlight this turbulent and dynamic landscape. Known to kayakers as the "Mt. Everest of Kayaking", only a handful of individuals have successfully negotiated the canyon rapids (see Photographs E.8.19 and E.8.20).

5.2.2 - Devil Creek Falls

Two large waterfalls plunge through extremely narrow gorges to form Devil Creek which eventually joins the Susitna River. The setting is a combination of vertical rock walls, icy clear streams, and colorful vegetation and exposed minerals (see Photographs E.8.21 and E.8.22).

5.2.3 - Stephan Lake

Stephan Lake is a large lake lying at the base of the Talkeetna Mountains which has several sportsmen's lodges along its shores. Wetlands and gentle hills covered with mixed woods and tundra comprise the diverse natural shoreline to the lake. Stephan Lake is the starting place for kayakers and rafters on the Talkeetna River (see Photograph E.8.23).

5.2.4 - Tsusena Creek Falls

Near the proposed permanent townsite, a spectacular rocky canyon covered with mixed woods and tundra is the backdrop for an exciting series of rapids, cataracts, and the falls (see Photograph E.8.24).

5.2.5 - Tsusena Butte Lake

Located at the edge of the Chulitna Mountains, this lake was created by an old moraine. The Tsusena Creek valley shows evidence of its glacial history and includes a great variety of tundra landscapes and colorful rock formations (see Photograph E.8.25).

5.2.6 - Deadman Creek Falls

Similar to other tributary falls flowing into the Susitna River, this waterfall occurs in a steep small-scale rocky canyon. These falls will be inundated by Watana reservoir (see Photograph E.8.26).

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 (see Photograph E.8.27).

5.2.8 - Big and Deadman Lakes

These lakes are picturesquely set between three large tundra-covered buttes. There are many outstanding views out from the site into the Susitna Basin (see Photograph E.8.28 and E.8.29).

5.2.9 - Caribou Pass

Two long lakes surrounded by glaciated mountains are located in a narrow valley. Wetlands and tundra cover the valley floor where the middle fork of the Chulitna River has its headwaters (see Photograph E.8.30).

5.2.10 - Vee Canyon

Vee Canyon is a narrow vertical rock-worn canyon which encloses the Susitna River for over a mile (1.6 km) east of the Watana damsite. This canyon will remain after the inundation of Watana reservoir (see Photograph E.8.31 and E.8.32).

6 - VIEWS (STEP 4)

Evaluation of existing landscape character types and their inherent aesthetic quality is independent of the issue of visibility. Quality does not depend on visibility. However, the evaluation of aesthetic impacts is directly related to the potential for viewing any particular site.

Views are described as distant or panoramic, and near or foreground views. Panoramic views or vistas are important for perceiving and experiencing the overall landscape context. Explanatory vistas are those where the observer has the opportunity to view large scale landmark or landscape settings symbolic of Alaskan environments. An example would be the opportunity to view the Alaska range. Foreground views are those within the immediate vicinity of the observer.

The level of impacts is determined by analyzing the relationship between a proposed facility and the existing landscape. The two important aspects of this evaluation are the observer position and the duration of the view.

Observer position is the location of specific places or settings where an individual can "view" the landscape. Within the study area, this opportunity occurs principally along the access roads; however, other observer postions are included, based upon the proposed development including recreation sites, known existing use areas (e.g. High Lake Lodge), and the damsites themselves.

These observer positions were evaluated on an on-site basis regarding the relative existence of specific landscape character types, opportunities for extended views or vistas into the surrounding environments (e.g., the Alaska Range), and major views of project facilities. These are mapped in Figure E.8.8.

Within the study area, potential observer positions include aerial views from small plane traffic and ground views from vehicular traffic on project roads, random foot traffic throughout the area, boat traffic on the Susitna River, and users of the various recreation and hydroelectric facilities.

The duration of views is also an important consideration. This is a measure of the extent of time one has to view a particular landscape setting. The longer the time frame for viewing, the more significant the measurement of the observer position becomes.

These elements were considered during the evaluation of aesthetic impacts and are reflected in the charts of Appendix 8.F.

7 - AESTHETIC VALUE RATING AND ABSORPTION CAPABILITY RATING

7.1 - Aesthetic Value Rating (Step 5)

Each landscape character type (Step 3) was evaluated for its relative aesthetic value on a high, medium and low basis. Aesthetic value is defined as a relative measure of the visual landscape based upon the following characteristics.

7.1.1 - Distinctiveness

A measure of the visual impression of an area; i.e., a landscape where landforms, waterforms, rocks, vegetative or soil patterns are of outstanding and memorable aesthetic quality.

7.1.2 - Uniqueness

A measure of the relative scarcity or commonality of the landscape. Due to Alaska's vast and numerous high-quality landscapes, uniqueness will have 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 project area scale.

7.1.3 - Harmony and Balance

A measure of the degree to which all elements of the landscape form a unified composition. This includes the integration level of man-made elements in a natural setting.

These characteristics were evaluated by on-site examination of each landscape character type. This on-site approach also considered the visibility and potential for views (Step 4) in generating aesthetic value ratings.

7.2 - Absorption Capability (Step 6)

Each landscape character type was evaluated for its absorption capability, which is the relative ability of a landscape to absorb physical change. Each character type was rated on a high, medium and low basis based upon the following characteristics: aesthetic value (Step 5), topographic enclosure, vegetation cover, ground plane color and visibility. Each landscape character type was evaluated with an on-site examination of the aforementioned characteristics as related to potential project facilities. The following chart presents the ratings for the aesthetic value rating (Step 5), and the absorption capability (Step 6).

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

STEPS 5,6

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

STEPS 5,6

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

STEPS 5,6

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

STEPS 5,6

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.

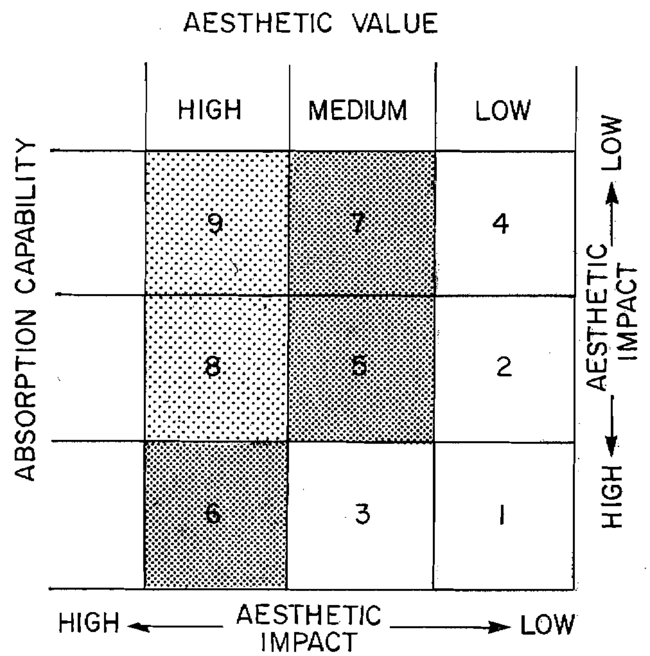
AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

STEPS 5,6

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.

7.3 - Composite Ratings (Step 7)

The aesthetic value rating and the absorption capability for each landscape character type combine to create a composite rating. The range of relationships can be stated as follows: the most durable and most easily altered character types are those with a high absorption capability combined with a low aesthetic value rating, and the most fragile and difficult to alter character types are those with a low absorption capability and a high aesthetic value rating. This relationship is expressed in the following chart:



These composite ratings were grouped into the three categories indicated in the shaded areas and defined as follows:

Composite Rating	Description	Design Criteria
9-8	Landscape has high aesthetic value with moderate to little ability to absorb man-made features. For example, the Devil Canyon character type, Photograph E.8.2.	Facility design solutions should be similar in character and equal in boldness with the landscape in order to be compatible.
7-6-5	Landscape has moderate to high ability to absorb man-made features. For example, the Talkeetna Uplands character type, Photograph E.8.10.	Facility designs should be in harmony with the surrounding landscapes.

7.3 - Composite Ratings

Composite Rating	Description	Design Criteria
4-3-2-1	Landscape has low to moderate aesthetic value with high ability to absorb man-made features. For example, the Susitna River Lowlands, Photograph E.8.15.	New elements may add to the aesthetic quality beyond existing conditions by introducing visual interest and/or complementing the landscape.

This chart summarizes the inherent quality of the landscape for aesthetic impact analysis (Step 8) and mitigation measures to reduce adverse aesthetic impacts (Step 9).

8 - AESTHETIC IMPACT RATING (STEP 8)

Aesthetic impacts are a result of introducing various project structures or manmade landscape elements such as transmission right-of-way paths into an existing environment which is subsequently seen by people. Aesthetic impacts also result from the loss or inundation of existing landscapes and their "replacement" with altered or new landscapes which have different aesthetic qualities.

Aesthetic impact ratings describe the relationship of the proposed facilities and the inherent qualities of the landscape character types. Aesthetic impacts are determined by comparison of the project features to the aesthetic impact ratings (composite ratings, Step 7) for each landscape character type. There are two categories of potential visual impact when project facilities are developed, (1) compatible aesthetic impacts are those that are in harmony with the existing landscape character, and (2) incompatible aesthetic impacts which are obtrusive in the existing landscape character.

Compatible aesthetic impact ratings are evaluated on the basis of two criteria, (1) the facility is subordinant to the landscape character type and compatible in the character of the facilities design solutions, and (2) the proposed facility design solution is high in aesthetic value on its own merits, and compatible with the existing landscape character type.

Incompatible aesthetic impact ratings are evaluated on the basis of negative contrast or visual discord between the proposed facility and the existing landscape character. Aesthetic impact ratings are described for each project feature in Appendix 8.F.

8.1 - Mitigation Planning of Incompatible Aesthetic Impacts

Except for a few project features, it is possible to reduce the aesthetic impact of features by employing appropriate mitigation planning. Each proposed feature was initially rated as currently sited and designed. If the aesthetic rating was compatible, no mitigation is necessary. If the aesthetic impact rating is incompatible and mitigation is possible, the project feature's adjusted rating is shown taking into consideration the mitigation measure applied which may change the aesthetic impact rating to compatible in some cases. In other cases, aesthetic impacts may continue to be incompatible but lessen the severity of the impact.

If mitigation can be accomplished through redesign, the feature is assigned a new rating in the last column of the chart in Appendix 8.F.

8.1 - Mitigation Planning of Incompatible Aesthetic Impacts

The type of mitigation suggested is indicated on the charts with letters; for example, a Ca rating would indicate that a project feature could be made compatible with proper employment of type (a) mitigation.

One or more of the following four generic types of mitigation can be employed to achieve the proposed level of mitigation:

- Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality;

- The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas;

- The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features; and

- The use of form, line, color or textures appropriate to the landscape character type.

The following example chart illustrates this process:

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

WATANA PROJECT AREA 1 - 9
1 WATANA DAM

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.

EXAMPLE

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

9 - MITIGATION (STEP 9)

Mitigation measures have been designed to protect the quality of the existing landscape by prevention or repair of negative impacts caused by human activity and development.

The measures are also intended to enhance the existing environment in the following ways:

- Improve opportunities to appreciate the areas of high aesthetic quality;

- Improve the aesthetic quality of proposed facilities; and

- Maximize the positive relationships of the proposed facilities to the existing landscape.

9.1 - Mitigation Measures

The four major categories of mitigation identified in Section 7.1, Mitigation Planning, include:

- Additional studies;
- Best development practices;
- Creative engineering design; and
- Use of form, line, color and texture.

The following techniques described in these categories respond to general conditions which may occur throughout the development. Specific impacts of individual project facilities are identified in the mitigation measure charts located at the end of this section.

A summary of impacts for the Watana site, Devil Canyon site, access roads and transmission lines also follows.

9.1.1 - Additional Study

During the Phase II detailed design process, an interdisciplinary design team will be assembled to resolve the aesthetic impacts identified in Exhibit E. These aesthetic impacts will be further ameliorated through site specific design analysis and development. Aesthetic impacts to the design solutions include:

(a) Siting Studies

Siting of facilities can be used to reduce visual intrusion into the existing landscape and minimize requirements for grading and other disruptions. By utilizing local conditions such as topographic changes and vegetation, the inherent absorption capabilities of landscapes can be maximized.

9.1 - Mitigation Measures

The need for mitigation measures in the facility designs also will be reduced by avoiding particularly sensitive locations such as wetlands, discontinuous permafrost zones and other areas which would require extensive modification.

Siting can be used to maximize the potential for enhancing the aesthetic experience. Examples of this include: facility locations to take advantage of spectacular view opportunities and siting facilities such that they enhance or compliment their setting.

Other specific examples of mitigation through siting include:

- Facility siting can be used to minimize requirements for clearing or removal of vegetation. Structures should be consolidated as much as possible to disturb the minimum necessary area of ground surface;

- Facility will be sited to avoid thaw-susceptible areas (discontinuous permafrost zones) capable of slumping or thermal erosion;

- Solid waste disposal sites will be located in stable, well-drained locations. Siting will utilize existing excavations such as depleted upland borrow pits. Intermittent drainages, ice-rich soils, or other erosion-susceptible features will be avoided;

- Transmission line additions should be located adjacent to established transmission corridors. Where transmission lines have a common destination, they should follow a common route; and

- Transmission corridors should follow the forest edge as much as possible (i.e., the transition zone between forest and shrub or forest and tundra) versus cutting through dense woodlands. Lines should avoid crossing wetlands.

(b) Alternative Solutions

In some instances the facility chosen to serve a specific project function may not be the design solution which least impacts the aesthetic resources. This will be considered only in cases where present solutions would be difficult to mitigate even with modifications.

9.1.2 - Best Development Practices

Construction and rehabilitation, as well as operation policies, are often as important in mitigating facility impacts as is the facilities actual design. Throughout the Susitna project, general development policies which mitigate or prevent impacts will include:

(a) Construction Techniques

Construction equipment and vehicles will be confined to gravel roads and pads or designated construction zones.

All off-road or all-terrain vehicles use will be prohibited on the site by individuals.

Temporary facilities such as roads, construction zones and storage yards will be located to minimize the impacts and therefore the rehabilitation needed.

Borrow sites will be excavated according to a site priority program developed by the design phase contractor. Those sites which will cause least impacts will be exploited first with the identified sensitive areas utilized last and only if all other sources are exhausted. Material sites will be planned and mined in such a way as to facilitate restoration.

Abandoned access roads, camp pads, and airstrips will be used wherever feasible as material sources for operations, in lieu of expanding existng sites or initiating new ones.

Where riprap is required, material produced during excavation of the powerhouse, galleries, and tunnels will be used if feasible.

Where they are not adjacent to an existing road, transmission corridors should be constructed to avoid unnecessary clearing of vegetation. In tundra location where clearing is not required for access, minimum ground disturbance vehicles such as Roligon or flat-tread Nodwell-type vehicles should be used. Transmission corridor development should avoid creating an alternative access route for all-terrain vehicles. All debris generated by construction activities will be removed after completion.

Excavation spoil will be disposed of in the future impoundment area of the dam under construction. Where haul distances prohibit this, spoil disposal sites will be placed in stable, well-drained upland locations.

Limits of construction activity and storage will be defined during the design phase so that vegetation clearing and soil disruption can be minimized. Where removal of vegetation is required, organic overburden should be segregated and stockpiled for use in subsequent rehabilitation.

(b) Rehabilitation Techniques

Disturbed rock cuts will be roughly blasted to forms similar to existing natural conditions. Construction areas not required for project operation will be "put to bed" as soon as they are no longer required (during the same season, if possible). Restoration should include scarification and fertilization. Non-operational roads will be structurally altered to restore normal drainage patterns.

Organic overburden, slash, and debris stockpiled during clearing will be distributed over the excavated areas prior to fertilization. This includes borrow sites which have ponded. Once operational material sites are depleted or no longer required, they should be rehabilitated by the end of the next growing season following last use.

Equipment, structures, and materials should be removed from a site prior to rehabilitation. The site should be graded to contours which are consistent with surrounding terrain and allow complete drainage with minimal erosion potential.

Where it can be demonstrated that erosion is not likely to be a problem, restoration should emphasize fertilization and scarification, and minimize seeding, to encourage the invasion of native plants from the surrounding parent population. Where seeding is employed, native grasses appropriate to the climate and geography of the project area should be used.

(c) Operation Policies

On project lands, off-road and all-terrain vehicles will be restricted to designated maintenance trails.

Concurrent with other educational programs for Susitna workers and residents, an organized effort will be made to increase the awareness to the aesthetic environment, i.e., refuse disposal, vandalism and indiscriminate use of fragile environments.

9.1.3 - Creative Engineering Design

Many of the project facilities are not inherently incompatible with the landscape character type in which they have been sited and represent an opportunity to enhance the existing landscape character. In the cases where this opportunity is identified, careful design study during the design phase will maximize the aesthetic value potential. The Devil Canyon dam is an excellent example of creative engineering solution resulting in a positive impact. Other design related mitigations include the following:

- Road profile elevations will be minimized and side slopes made sufficiently gentle to blend into existing contours; and

- To minimize excavation disruption, facility design will minimize gravel requirements by avoidance of wet areas or permafrost zones, structure consolidation, and balanced cut and fill.

9.1.4 - Use of Form, Line, Color, or Textures

Some aesthetic impacts caused by project facilities can be greatly reduced by modifying its appearance to blend into the surrounding landscape. This can be accomplished by repeating predominant existing conditions such as:

- The colors of soil vegetation or sky;
- Forms of topography such as massive low hills or angular rock cliffs;
- Line: This includes elements such as the vertical orientation of spruce forests or the horizontal character of a lake; and
- Texture: Existing rough and dull surfaces should be approximated and shiny materials prone to glare avoided.

9.1.5 - Mitigation Costs

The aesthetic mitigation plan is designed to reduce or eliminate adverse impacts due to development. The emphasis of the mitigation measures is to: (1) avoid critical environments including ongoing site refinements throughout the design phase: (2) use best development practices and site sensitive engineering; and (3) rehabilitation.

Avoidance of difficult or impossible site conditions will generate considerable cost savings in both site construction and operations. Many situations of this kind have been addressed in Exhibit E throughout the evolution of the various project plans. As part of ongoing supplemental and future planning throughout the design engineering phase, additional study for aesthetic mitigation will include siting studies, avoidance of difficult site specific physical conditions and visual compatibility with the existing landscape setting.

9.1 - Mitigation Measures

No additional project costs are identified on the basis of avoidance of difficult site conditions as part of the ongoing engineering planning and design work.

Future cost savings for aesthetic mitigation measures include best development practices for site design engineering and construction. Creative engineering design, progressive construction techniques, and future operation policies are prescribed as aesthetic mitigation measures. These measures will not add to the cost of engineering or construction practices and have the potential to reduce the actual cost of construction and development.

Rehabilitation techniques are an integral part of the construction process and are essential to the visual and aesthetic quality of the project. The proposed mitigation measures for rehabilitation are a normal part of good engineering practice and should not cause additional project cost. For pertinent related mitigation measures, refer to Chapter 3 of Exhibit E.

These mitigation measures will also have a positive aesthetic result.

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
WATANA PROJECT AREA	
WATANA DAM	. The scale of Watana Dam will be impressive, its size and form are incompatible with the existing highly rated character type. . However, it is compatible with the new horizontal characteristics of the reservoir. No mitigation necessary.
MAIN SPILLWAY	. As with the dam, the scale is large and it will cause significant aesthetic impacts in relation to the character type. . While no mitigation measures will render it compatible as engineered, Phase II study may result in alternate solutions which are compatible or have less adverse impacts on the landscape. . Tunnel (underground spillway) versus open channel solution would be compatible if feasible and properly designed. . Terrace steep side slope cuts to approximate characteristic slope gradients and surface textures.
EMERGENCY SPILLWAY	. The scale and form of this feature as engineered will not be compatible in the given character types and no mitigation will make it compatible. . To lessen the visual impact, study should be conducted to determine if it is possible and feasible to deposit spoil material over the rock floor of the spillway and revegetate with tundra species. . Terrace steep side slope cuts to soften form and approximate characteristic slope gradients. . A tunneled spillway would be compatible if feasible and properly designed. . Consider a curving channel form to reduce the visual impacts at the point at which the road crosses the spillway. . Revegetate the fuse plug dam with tundra species.
WATANA RESERVOIR	. Impressive scale, but expected large scale erosion and extensive drawdown make the reservoir incompatible in all character type in the impoundment area. No mitigation is possible to reach compatibility or lessen adverse visual impacts.
POWERHOUSE ACCESS ROAD	. No mitigation is possible for the construction of a road of this nature down the steep slopes of the river valley. . An elevator structure (alternative solution) down to the powerhouse with connecting tunnel would eliminate need for surface access road and its impacts. Consider accessing both powerhouse and tailrace tunnel by same or multiple elevators. . Consider road tunnel rather than surface road (alternative solution).

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
SWITCHYARD	. Because of the size, form and complexity of switchyard electrical equipment and associated structures, there are no mitigation measures possible to make the feature compatible in the character type. . Creative engineering design of the facility, along with the use of colors and/or overall forms appropriate to the character type, will help the features to be more aesthetically pleasing independent of the surroundings. . Chain-link fence, if used, should be black or brown clad chain. . Forms should be very simple, textures should not be smooth, and colors medium tone browns or black (nonreflective).
BORROW SITES	. An extensive area of the Susitna River (north side) below the Watana Dam site is proposed for potential material extraction. Significant large scale incompatible changes are probable. Careful planning, design and construction can lessen impacts. (Filling of Devil Canyon reservoir will also flood these areas.) . Engineered design of borrow sites in and along the river which positively respond to the form, line and texture of the existing area will help lessen the adverse visual appearance. . Further study by an interdisciplinary team may result in alternate site selections and/or extraction techniques which will be compatible with the character type(s). . The large proposed borrow site on the north high terrace area north of the damsite will not be compatible because of the straight edge/form indicated in proposed plans. . Irregular edges and abrupt rock forms would make the form compatible to the landscape. This edge is especially important because it will become a part of the reservoir edge when the area is inundated. . The rock quarry located between Watana Dam and Fog Lakes will have significant visual impact. Forest clearings should be linear with irregular edges to approximate existing openings. Clearings should not be symmetrical in form.
TAILRACE TUNNEL ACCESS ROAD	. See mitigation measures for Powerhouse Access Road. . If surface road (rather than elevator or tunnel) is required, consider accessing both powerhouse and tailrace tunnel with the use of one road.
TEMPORARY AIRSTRIP	. Proper siting and careful construction practices to contain clearing and grading will help minimize adverse impacts to the landscape.

AESTHETIC RESOURCES
PROPOSED MITIGATION MEASURES

STEP 9

PROJECT FEATURE	MITIGATION MEASURES
PERMANENT TOWN	. The proposed townsite and layout will be incompatible with the given character type. No mitigation possible to make it compatible. . An interdisciplinary team should be utilized to best site, arrange and design the town layout and individual features. This approach will help create a town which is aesthetically attractive to viewers and residents. . Further study by an interdisciplinary team should result in the selection of a townsite which will be more compatible with the landscape. Harmony and balance between the character type and town is possible with proper design and siting. Positive visual interest could result.
TWO 345-kV TRANSMISSION LINES (WATANA TO GOLD CREEK SWITCHYARD)	. Although the proposed route was selected for its high ability to cause minimal adverse aesthetic and environmental impacts, the large scale of the feature in relation with the highly aesthetic landscapes through which it passes results primarily in an incompatible situation. Mitigation measures are possible in many conditions to assure minimal aesthetic impacts, and in some cases make compatible relationships. . The selection of CORTEN-surfaced towers will reduce their visibility in the landscape. . Right-of-ways through forested areas should be feathered to reduce tunneled or channeled visual effect. . Complete clearing of vegetation in right-of-way is unnecessary. Trees should be topped to a 30-ft (9-m) radius of the conductors and maximum line sag. . Where possible, alignments should follow the edge of major forest/open boundaries to minimize clearing and maximize screening potential. . Ridge tops and other high points are to be avoided because of their high visibility. . Alignment through valley centers should be avoided as these areas would become major focal points as would ridge tops. . Utilizing helicopter construction methods in inaccessible and environmentally sensitive areas will help reduce adverse aesthetic impacts. . Winter construction using rolligon vehicles in open tundra areas will eliminate the potential visual impacts caused by the construction of access roads/trails during other seasons. . Use of existing roads near alignment sections will eliminate the need for new construction area access. Short roads/trails to tower construction areas should be aligned and designed to cause minimal damage to the landscape. . The crossing of Devil Canyon area with transmission lines is viewed as incompatible with no mitigation measures to make it compatible. However, creative engineering design and proper siting of towers will lessen adverse impacts. The maximum allowable span across the river, with towers at the top of the canyon, should be used to keep the lines high above the river and eliminate clearing of canyon wall vegetation. . Educate project workers and especially equipment operators in construction methods which result in minimal environmental impacts which directly relate to aesthetic impacts. Identify environmentally sensitive areas. Use visual aids to stimulate interest. . River, stream, canyon and road crossings should be made at 90-degree angles.

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
DEVIL CANYON PROJECT AREA	
CONCRETE ARCH DAM	. The scale, form, material, siting and design of this dam combine to produce a positive aesthetic impact. No mitigation is necessary.
SADDLE DAM	. Because of large scale, form and high visibility, this feature will be incompatible with no mitigation to render it compatible. . Further study may result in creative engineering design. . Minimal disturbance of forest and the creation of irregular forest edges will help overall visual impact.
MAIN SPILLWAY	. See mitigation measures for Watana Dam/Main Spillway.
EMERGENCY SPILLWAY	. See mitigation measures for Watana Dam/Emergency Spillway. . Creative design and blasting of the pilot channel to approximate typical canyon characteristics would help reduce negative aesthetic impacts.
DEVIL CANYON RESERVOIR	. Although the drawdown level of 50 ft (15 m) is considerably less than Watana, the aesthetic impact is still significant and incompatible with no mitigation possible. Like Watana, large-scale landslides and other erosion features are expected. The maximum drawdown at Devil Canyon will occur during August and September which is the highest visitation and viewing period.
POWERHOUSE TUNNEL ACCESS ROAD	. See mitigation measures for Watana Dam/Powerhouse Road.
SWITCHYARD	. See mitigation measures for Watana Dam/Switchyard. . Clearing of trees should be kept to a minimum for maximum screening potential. . Screening or barrier type fences or walls should be painted or naturally dark in color. Dark browns or greens would be best in forest areas.
TWO 345-kV TRANSMISSION LINES (DEVIL CANYON TO GOLD CREEK SWITCHYARD)	. See mitigation measures for Watana to Gold Creek Transmission Lines.

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
SWITCHYARD AT GOLD CREEK INTERTIE	. The variety of forest patterns in this character type allows this feature to be reasonably compatible. . See mitigation measures for Devil Canyon/Switchyard.
RAILROAD SPUR FROM GOLD CREEK TO DEVIL CANYON	. With proper alignment, creative engineering and design, and appropriate mitigation, the railroad could be compatible in this landscape. . Minimal clearing of forest and irregular forest edge feathering will help reduce visual impacts and maximize screening potential. . Trestle construction (heavy and dark timbers) should be considered where the alignment is along the steep sidewalls of the river and through wetland areas rather than cut and fill. These trestle structures will be aesthetically attractive and will result in far less environmental impacts than cut and fill sections. . Railhead facilities should be designed to require as little space as possible to keep area impact to a minimum. Forest clearing should be kept to a minimum and edges irregularly feathered. Forms and colors of building and related facilities should be important design criteria. Colors should blend well into the forested and tundra landscape.
WATANA ACCESS ROAD	. With an interdisciplinary alignment planning and design approach, it is possible to construct a road compatible with the landscapes through which it passes. . A maximum design speed of 40 mph (70 kmh) will result in a road which better fits the topography and requires less cut and fill work. These measures will lessen visual as well as environmental impacts. . Wooden trestle type bridges rather than concrete bridges would be more aesthetically attractive. . In areas where the road must traverse up steep slopes, a concrete-cantilevered road structure set on pilings would reduce or eliminate extensive cut and fill slopes. This would not only result in significantly less aesthetic impacts but also reduce environmental impacts. . Clearing in forested areas should be kept to a minimum. Irregular feathering of edges should be done to approximate existing natural edges. . Road dust control should be developed. Water application is recommended.
BORROW SITES FOR WATANA ACCESS ROAD	. With sensitive siting, extraction and rehabilitation methods, borrow sites are capable of being compatible in most character types. . Extraction of material in existing rock dominated uplands would be appropriate as long as access to these areas does not require extensive roads/trails. Consider winter extraction from these areas. . Contouring the borrow sites to approximate surrounding slope gradients and avoiding man-made, unnatural appearing edges and/or forms during the extraction process will assure minimal negative visual impacts. . Organic topsoil should be distributed over extraction sites and then scarified and fertilized. The site should then be left alone for invasion of natural tundra species. . Where possible, borrow sites should be filled to natural grades with spoil material. Again, organic topsoil should be distributed and the previous procedure followed.

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
DEVIL CANYON ACCESS ROAD	. See mitigation measures for Watana Access Road.
BORROW SITES FOR DEVIL CANYON ACCESS ROAD	. See mitigation measures for Borrow Sites/Watana Access Road
HIGH-LEVEL BRIDGE/ DEVIL CANYON	. The proposed bridge design is not equal in strength to its natural setting nor does it creatively respond to the strong site character. Forms and shape are in conflict with natural lines of the canyon. Symmetrical tower design and sloping road deck are in conflict with each other. . Like Devil Canyon Dam, a creatively designed bridge structure could have a positive aesthetic impact. For instance, a concrete arch bridge designed to respond to its setting could be a compatible and memorable feature.
ANCHORAGE TO WILLOW TRANSMISSION STUB LINE	. Because of the character types, relatively low aesthetic quality and their medium/high abilities to absorb visual impacts, these transmission lines can be compatible with some mitigation. . Underground routing of the transmission line is recommended for the last 3 - 4 miles (5 - 7 km) of the Anchorage end of the stub. The proposed route here passes through and adjacent to a proposed city park. . The transmission line should parallel the existing line right-of-way adjacent to the Glen Highway and through the Elmendorf Air Force Base to avoid the creation of new and unnecessary patterns and impacts. . Further study of the transmission line near the town of Willow and Willow Creek area. A state park is proposed in the area near and adjacent to Willow Creek and its confluence with the Susitna River. . See applicable mitigation measures for Watana and Devil Canyon Transmission Lines.
HEALY TO FAIRBANKS TRANSMISSION STUB LINE	. This transmission route needs further study, with particular emphasis placed on determining whether or not the new lines could parallel the right-of-way of the existing line from Healy to Fairbanks. Significant visual impacts would be eliminated if a parallel route were possible. . See mitigation measures for Watana and Devil Canyon Transmission Lines.

PROPOSED MITIGATION MEASURES

PROJECT FEATURE	MITIGATION MEASURES
RECREATION FACILITIES AND FEATURES	
WATANA DAM VISITOR CENTER	. Appropriate siting, layout and design of such a facility would assure compatibility. An interdisciplinary team should be utilized. . Form, material and color are other important design criteria.
DEVIL CANYON DAM VISITOR CENTER	. See mitigation measures for Watana Dam Visitor Center.
SHELTERS	. Appropriate siting and design of such a structure would lead to an aesthetically attractive and compatible feature. . State park shelters should be analyzed for potential use.
SEMIDEVELOPED CAMPGROUND	. Campgrounds of this nature can easily be compatible if appropriate siting, material, form and color are utilized as prime planning and design criteria. . Forms, textures and colors should blend well into the existing landscape.
PRIMITIVE CAMPING	. No mitigation is needed if good management practices and area regulations are developed.
DEVELOPED TRAILS	. Sensitive siting and construction methods of proposed trails will eliminate most or all potential aesthetic and environmental impacts.
PRIMITIVE TRAILS	. No mitigation is required if appropriate management practices and area regulations are developed.
TRAILHEADS	. Sensitive siting, design, and appropriate use of materials, colors, and textures will assure aesthetic compatibility. . Sensitive construction methods will help minimize potential aesthetic and environmental impacts. . Clearing of vegetation should be kept to a minimum. Vegetation edges should be kept as natural as possible.
SCENIC VISTA/ROAD PULLOFFS	. See mitigation measures for trailheads.

10 - AESTHETIC IMPACT EVALUATION OF THE INTERTIE

10.1 - Background

The Anchorage-Fairbanks Intertie is intended to connect the electric utility systems serving Anchorage and Fairbanks. It is a distinct and separate project from the Susitna Hydroelectric Project and has been studied in a separate visual impact assessment report prepared by Commonwealth Associates, Inc. (1982).

Since this new facility will carry power generated by the Susitna Project over a system expanded to serve the project as shown in Figure E.8.4, it is briefly discussed herein.

10.2 - Project Description

The Intertie will extend from Willow and Healy, where it will ultimately connect with Susitna Hydroelectric Project features referred to as "Stubs". Figure E.8.4 illustrates the Intertie as it is planned to be constructed in 1983; along with subsequent additions for the Susitna Project, including the stubs and dam interconnections. The Intertie will be a 170-mile (280-km) long facility constructed basically of guyed steel "X" poles. Angle structures will be three separate vertical pole structures with single-pole hillside structures. All towers will be made of self-rusting (Corten type) steel and conductors will be nonspecular. All facilities and structures will be identical to those described in the visual analysis of the Susitna Hydroelectric Project transmission lines in previous sections of this report. At initial construction, the intertie line will be energized at 138 kV.

When the Watana Project comes on line in 1993, a second parallel line will be added to the Intertie, the "stubs" will be constructed, the lines will be energized to 345 kV, and a switchyard built near Gold Creek to connect with Watana power. In 2002, when Devil Canyon comes on line, a third parallel line will be built on the Gold Creek to Willow portion of the line, and the Willow to Anchorage stub will also have a third line.

This discussion will briefly cover the Willow-to-Healy route as analyzed by Commonwealth for 1983 construction, and will comment on the 1993 and 2002 additions to the Willow-to-Healy route.

10.3 - Landscape Character Types

Commonwealth identified six landscape character types based on the Alaska Department of Natural Resources 1981 study, Scenic Resources Along the Parks Highway. They are:

- Susitna River Lowlands: Cook Inlet to the southern entrance of Denali State Park;

- Curry Ridge: Denali State Park to Curry Ridge;

10.3 - Landscape Character Types

- Chulitna River: Curry Ridge to East Chulitna River;

- Broad Pass: East Chulitna River to Denali Highway;

- Alaska Range: Denali Highway to first Nenana River crossing of Parks Highway at southern boundary of Denali National Park; and

- Nenana Gorge: Nenana River crossing to Healy.

However, for the purpose of this analysis the following types have been delineated:

- Susitna River Lowlands;
- Talkeetna Mountains;
- Chulitna River;
- Broad Pass;
- Alaska Range;
- Yanert River Valley; and
- Nenana Uplands.

Therefore, these were the units analyzed for the purposes of this report.

These landscape unit types and the approximate point of inclination (PI) of the transmission line are as follows.

10.3.1 - Susitna River Lowlands

(Willow Substation to PI 14 at the crossing of the Talkeetna River.)

Extending south from near the town of Talkeetna to its mouth on Cook Inlet, the broad and heavily braided Susitna River flows through a topographically flat, sometimes rolling landscape. Muskeg bogs and hundreds of relatively small lakes and ponds are scattered over the land.

Sparse black spruce bogs are found on the poorly drained areas while moderate to dense spruce-deciduous forests exist in areas with higher relief.

Paralleling the Susitna from near the towns of Willow and north to Talkeetna, the Parks Highway is the shortest and most frequently used access route between Anchorage and Fairbanks. A number of small communities and recreation sites occur along or near the road. In addition, the Alaska Railroad also parallels the Susitna River and Parks Highway here.

10.3 - Landscape Character Types

Many of the larger and more scenic lake areas are popular summer and permanent home sites for hundreds of south-central Alaskans. Some are accessed by road while others are only reached by floatplane.

Spacially open areas offer views to the Talkeetna and Chugach Mountains, and the Alaska Range. Mount McKinley is to the north and the flat topped Mount Susitna is nearby to the southwest.

10.3.2 - Talkeetna Mountains

(PI 14 to PI 41 above the crossing of the Susitna River.)

While the Department of Natural Resources study classifies this area as the Talkeetna Mountains, for the purposes of this transmission line study that designation has been subdivided into three subtypes:

- Talkeetna Mountains to the south and west of the transmission corridor;
- Talkeetna Lowlands; and
- Talkeetna Uplands.

The proposed alignment passes through these latter two character types which are described below.

10.3.3 - Lowlands Portion

After steeply rising several thousand feet from the Susitna River valley, the landscape in the lower Talkeetnas becomes a rolling terraced plateau. The average elevation is around 3000 feet (900 meters) with a few knobs rising above 4000 feet (1200 meters).

The dominant tundra environment here is very wet and contains hundreds of small lakes and muskeg bogs. Spruce trees are scattered throughout the area, but usually are found at lower elevations within the drainages. Gold, Cheechako, Chulitna and Disappointment Creeks are among the more scenic drainages.

The flat and rolling character of these uplands affords panoramic views to the Alaska Range, Chulitna and Talkeetna Mountains. Views of the surrounding river valleys from high points and terrace edges are also very good.

Access into the area is predominantly by floatplane, snowmobile, and use of a few existing mining and/or settlement trails.

10.3.4 - Uplands Portion

Approaching its confluence with the Susitna River, the braided Talkeetna River and western tributaries pass through a terraced and hilly landscape. This area is mostly covered with a dense spruce-deciduous forest. Muskeg bogs are common but not as expansive as in the Susitna Lowlands.

There are a number of lakes in the area used both for recreation and home or cabin sites. Approximately 4 miles (7 km) long, the narrow Larson Lake is the largest of these.

The dense forest cover restricts vision, but scenic views of the Alaska Range, the Talkeetna and Susitna Rivers, and the immediate Talkeetna Mountains proper, are possible from occasional elevated spots and widened river channels.

Access into the area is primarily by foot, floatplane, boat and a limited number of jeep, all-terrain vehicle, or horse trails.

10.3.5 - Chulitna River

(PI 41 to PI 48 on the Chulitna River.)

Dividing the Alaska Range and Chulitna Mountains, this flat-to-rolling river valley is predominantly an open tundra-covered landscape. Sparse-to-moderately-dense spruce-deciduous forested areas occur along the meandering Chulitna River and its tributaries.

The dominant Alaska Range rises gently from the valley in comparison to the steep rise of the Chulitna Mountains. Hurricane Creek and Gulch form a dramatic descent from the Chulitnas. Spectacular mountain, glacier and valley views are offered in open areas and vantage points.

The Alaska Railroad and George Parks Highway parallel the river along the upper slopes and terraces on the Chulitna Mountain side. Several small road- and railroad-related communities and a few designated recreational sites occur here in the valley. Portions of the Parks Highway between Chulitna Pass and Broad Pass have been recommended for scenic highway designation by the Alaska Department of Natural Resources.

10.3.6 - Broad Pass

(PI 48 to PI 65 north of the Nenana River.)

Over 10 miles (16 km) wide near the town of Broad Pass and narrowing to 4 miles (7 km) wide near Cantwell, this area known as Broad

Pass separates the Alaska Range and the northwest Chulitna Mountains. This open, flat-to-rolling landscape is very scenic with its long and linear lakes, variety of tundra and spruce cover patterns, and mountain views.

The Parks Highway goes through the northern side of the pass near the Denali Natural Monument boundary. The Alaska Department of Natural Resources recommended in their 1981 Scenic Resources along the Parks Highway report that the road between Broad Pass (town) and Windy be considered for scenic designation. The Alaska Railroad passes through the Summit Lake area and parallels the highway. Cantwell is the west junction of the Denali Highway with the Parks Highway.

10.3.7 - Alaska Range

(PI 65 to midway between PI 70 and PI 71 on the southern edge of the Yanert River Valley, and PI 74 to PI 83 near Moody Creek southeast of Healy.)

Featuring North America's highest mountain, the U-shaped Alaska Range extends nearly 600 miles (1000 km) from an area west of the Cook Inlet to the Alaska-Canada border. This well-known mountain range with its hundreds of glaciers is the dividing feature of the interior and south-central region of Alaska. Elevations range from approximately 2000 feet (600 meters) in adjacent valley to over 20,000 feet (6000 meters) at Mount McKinley.

10.3.8 - Nenana Uplands

(PI 83 to PI 85 Healy Substation Site.)

Extending north from the Nenana River Gorge to the flat Nenana Lowlands, the river becomes progressively more braided as it flows through a rolling and terraced valley. Sparse spruce-deciduous stands are found near the river bottom while moderately dense forests cover much of the upper terraces. Rock outcrops are common along the edges of the rising terraces.

Views are directed to the east where the terraces rise up to the higher-relief Alaska Range foothills. While the Parks Highway and Alaska Railroad do not significantly degrade the visual quality of the landscape, existing transmission lines do present a negative aesthetic impact.

10.3.9 - Yanert River Valley

(PI 71 to PI 74.)

10.6 - Impacts

A 35-mile swath through the Alaska Range east from the Nenana River, the Yanert River Valley ranges from 2 miles (3 km) in width at the Yanert Glacier to over 5 miles (8 km) at the confluence with the Nenana. The Yanert River is heavily braided for most of its length before turning into a broad fixed channel river for the last 5 miles (8 km). The valley is tundra dominated with scattered stands of spruce adjacent to the river bottom. The Alaska Range rises steeply from the valley near the glacier. Gently sloping terraces up to the mountains become progressively longer as the valley opens into the adjoining Nenana River Valley.

10.4 - Description of the Preferred Route

The preferred transmission line route extends 170.1 miles (280 km) from the proposed Willow substation site to the proposed Healy substation and can be generally described as follows.

Willow Substation is proposed to be located near Willow Creek about 1.5 miles (2.5 km) east of the Parks Highway. Then the alignment follows the Matanuska Electric Association right-of-way approximately 19 miles (32 km) north. It continues in the Susitna Lowlands until Chunilna Creek, northeast of Talkeetna, where it proceeds east and up into the Talkeetna Mountains before dropping back to the Susitna River near Gold Creek. The alignment then proceeds due northeast of Chulitna Butte and joins the Chulitna River Valley. It generally parallels the river valley, Parks Highway, Alaska Railroad corridor, through Broad Pass, and north up the Nenana River Valley to the Yanert Fork. The line then jogs east of Sugar Loaf Mountain, northwest down Moody Creek, and continues in a northwesterly direction into Healy.

10.5 - Alternatives

Many minor route adjustments and subalternatives were considered by Commonwealth. Three major alternatives were considered:

- An alignment paralleling the Parks Highway from south of Sunshine to Chulitna Pass;

- An alignment west of the highway from Broad Pass to the first Nenana River crossing of the highway; and

- An alignment along the Nenana Gorge rather than east of Sugar Loaf Mountain.

In addition, alternative pole configurations were considered and rejected.

10.6 - Impacts

10.6 - Impacts

A cursory examination of visual impacts based on aerial and limited ground inspection of the preferred and alternative alignments, study of USGS topographic maps, and analysis of the Commonwealth report, follows.

10.6.1 - Susitna River Lowlands

The line will generally be distant enough from the Parks Highway and screened by vegetation in this low landscape unit type that it will be largely unseen by most viewers on the ground.

10.6.2 - Talkeetna Mountains

The line will be highly visible as it crosses the Talkeetna River, an important recreational resource. Particularly when the Intertie is expanded to two and then three lines, visual impacts will be significant at this point. The route over the mountains north of the river will not be generally visible until it again nears the Susitna River, when it will be in full view from Curry Ridge in Denali State Park.

10.6.3 - Alaska Range

The line(s) will be highly visible along the Indian River, at two crossings of the Alaska Railroad, and from portions of the planned remote parcel land disposal areas between Gold Creek and Hurricane. Further north, between Cantwell and the Yanert Fork, the lines will pass close to the Parks Highway in areas rated by Department of Natural Resources (DNR) as having low-to-moderate absorption capability.

North of the Yanert Fork, the route east of Sugar Loaf Mountain was selected to eliminate visual impacts in the highly scenic Nenana Gorge area.

10.6.4 - Chulitna River

From about Honolulu Creek to the east fork of the Chulitna, The Department of Natural Resources has rated this portion of the Parks Highway one of moderately high scenic resources and moderate-to-low absorption capability. While predominant views are to the west, the transmission line will be visible to the east.

10.6.5 - Broad Pass

DNR recommends that this area be officially designated a scenic highway. Because of the landscape's low-to-moderate absorption capability, they recommend no development within 1 mile (1.6 km) of the Parks Highway. The alignment ranges from a few hundred feet (approximately 80 meters) to approximately 2 miles (3 km) from the highway as it passes through this unit. Visual impacts will be high. The crossing of the Denali Highway, currently under study by the Bureau of Land Management for scenic highway designation, will also be in full view.

10.6.6 - Yanert River Valley

Crossing this valley, the alignment is approximately 2 miles (3 km) east of the highway and will not have major impacts.

10.6.7 - Nenana Uplands

The location of the Healy substation near the Alaska Railroad and Nenana Railroad will be highly visible and have negative visual impacts.

11 - AGENCY COORDINATION

11.1 - Agencies and Persons Consulted

The following list documents Public Agency Native Corporation, and University of Alaska Consultations in the course of preparing this report on aesthetic resources. Written records of these conversations are available at offices of the Alaska Power Authority.

Federal Agencies	Person	Date	Communication
FERC	Mark Robinson	9/29/82	Phone
FERC	Frank Karwoski	9/30/82 10/13/82	Phone
U.S. BLM	John Rego	10/15/82	Meeting
U.S. BLM	Mike Wrabetz Bob Ward	9/1/82	Meeting
U.S. F&WS	Dave Patterson	9/21/82	Meeting
U.S. NPS	Larry Wright	9/15/82	Meeting

Alaska State Agencies	Person	Date	Communication
DNR	Sandy Rabinowitch	9/14/82	Phone
Div. Parks		9/15/82 10/28/82	Meeting Meeting
DNR	Jack Wiles	9/15/82	Meeting
Div. Parks	Pete Marks	10/20/82	Meeting
DNR	Dave Stephens	9/22/82	Phone
DNR	Bill Beatty	10/04/82	Meeting
DOT	Mile Tooley	9/14/82	Meeting
DOT	Dan Kelly	9/29/82	Meeting
DOT	Andy Zahare	9/24/82	Phone

11.1 - Agencies and Persons Consulted

Others	Person	Date	Communication
MAT-SU Borough Planning Dept.	Claudio Arenas	9/21/82 10/18/82	Meeting Phone
CIRI	Roland Shanks	9/15/82 10/14/82	Meeting Meeting
Tyonek Village Corp.	Carl Ehelebe	9/22/82 9/28/82 10/14/82	Phone Meeting Meeting
Tyonek Village Corp.	Agnes Brown	9/28/82 10/14/82	Meeting Meeting
AHTNA Development Corp. & KNIK Village Corp.	N. Roy Goodman	9/22/82 9/28/82 10/14/82	Phone Meeting Meeting
University of Alaska Museum	E. J. Dixon	9/20/82	Meeting
University of Alaska - AG Experiment Station	Alan Jubenville Jo Feyl	9/9/82 9/24/82	Phone Phone

11.2 - Agency Comments

In response to the Draft Exhibit E provided to the agencies by the Alaska Power Authority on November 15, 1982, review comments were received from the Alaska Department of Natural Resources and the United States Fish and Wildlife Service. Comments were not received from any other agencies regarding the Aesthetic Resources Chapter of Exhibit E.

The concerns raised by these two agencies include:

- Incorporation of mitigation measures in project design;
- Use of avoidance as a mitigation measure; and
- Access road location and design criteria.

In response to these concerns, the mitigation section has been expanded and strengthened to include additional mitigation measures in the project design during the detailed design phase. In addition, the Alaska Power Authority through an interdisciplinary task force will be reassessing the transmission and access road alignments before final design of these two features is undertaken.

Responses to the specific comments raised by these two agencies are included in Chapter 11.

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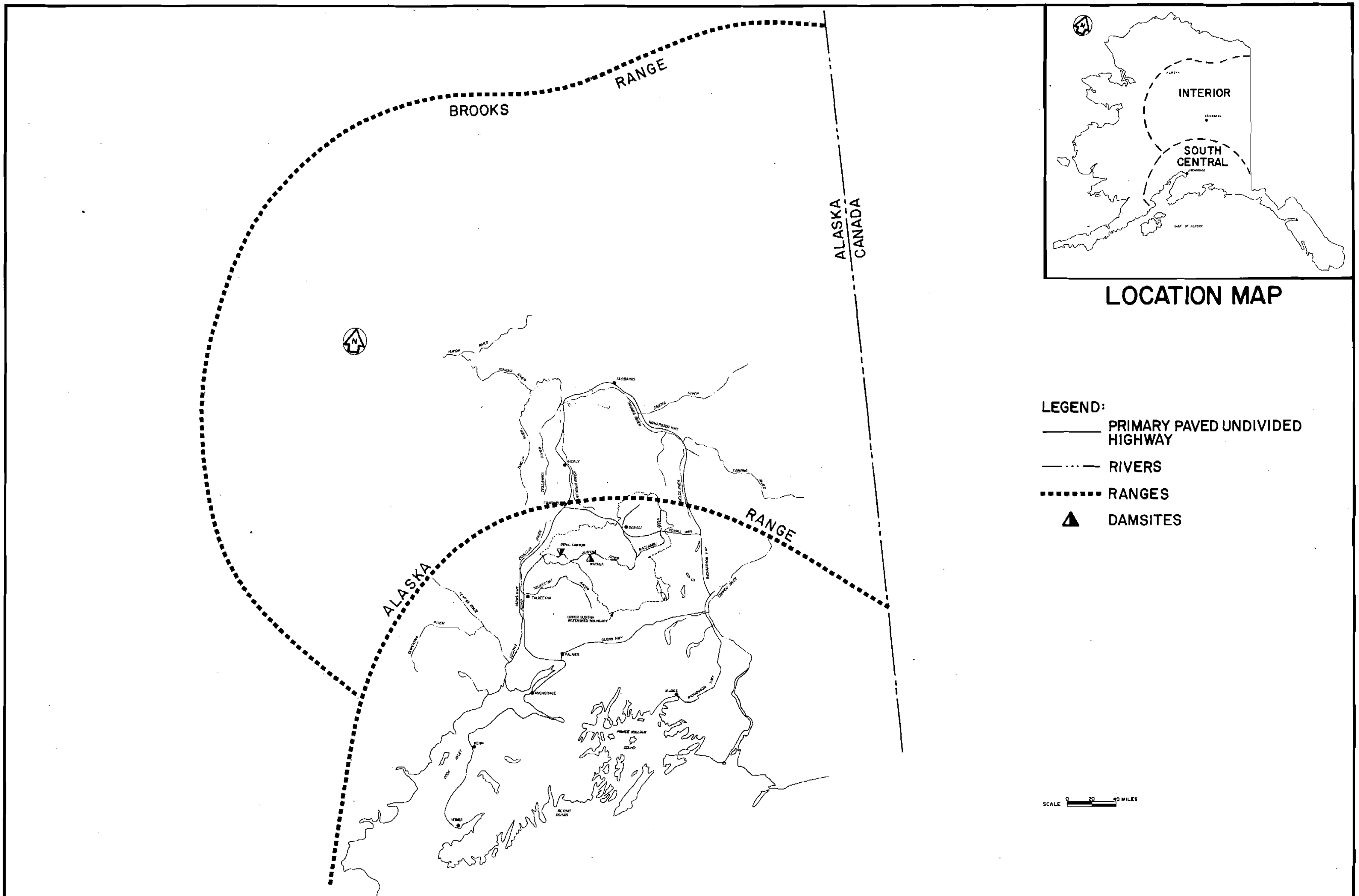
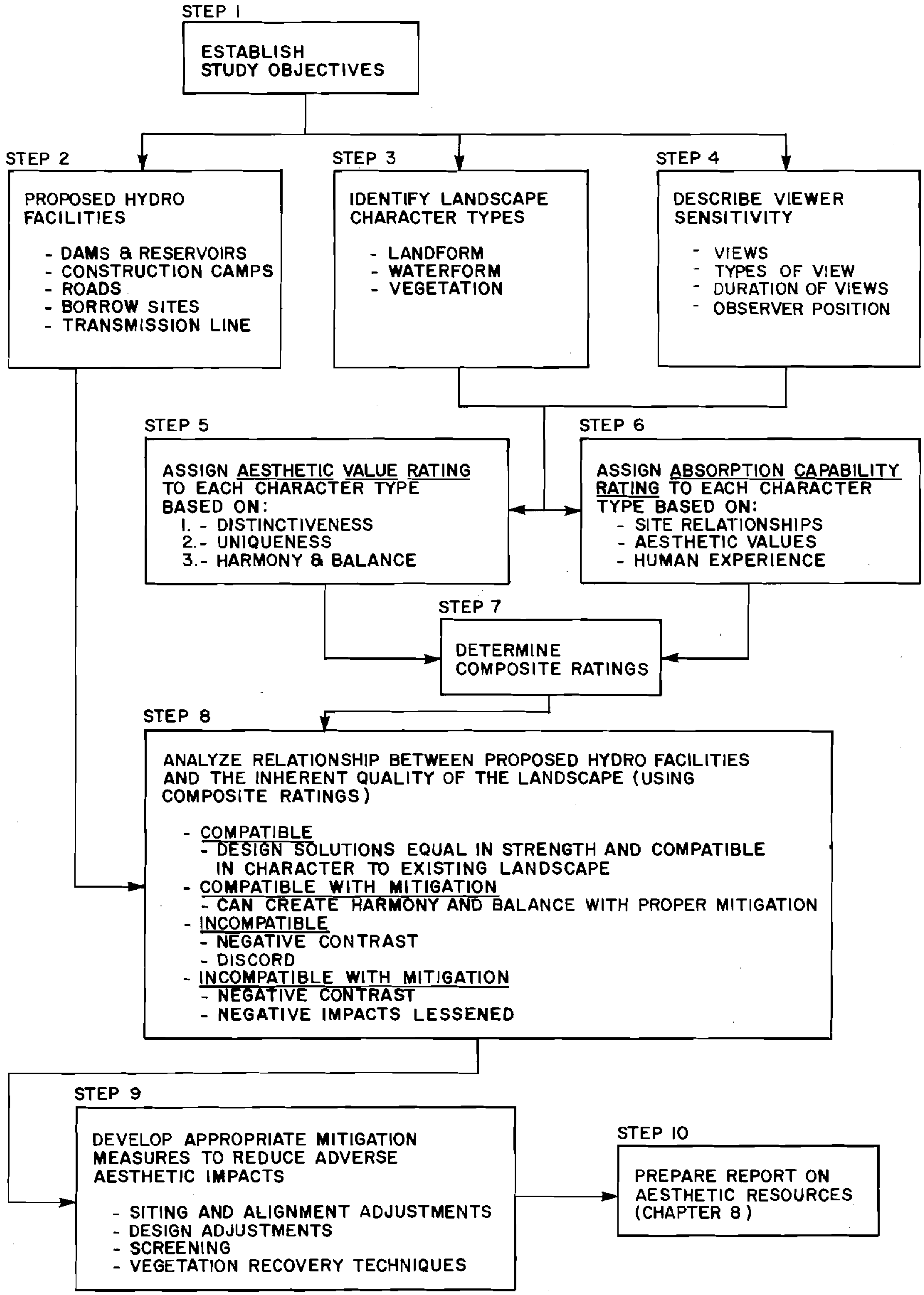


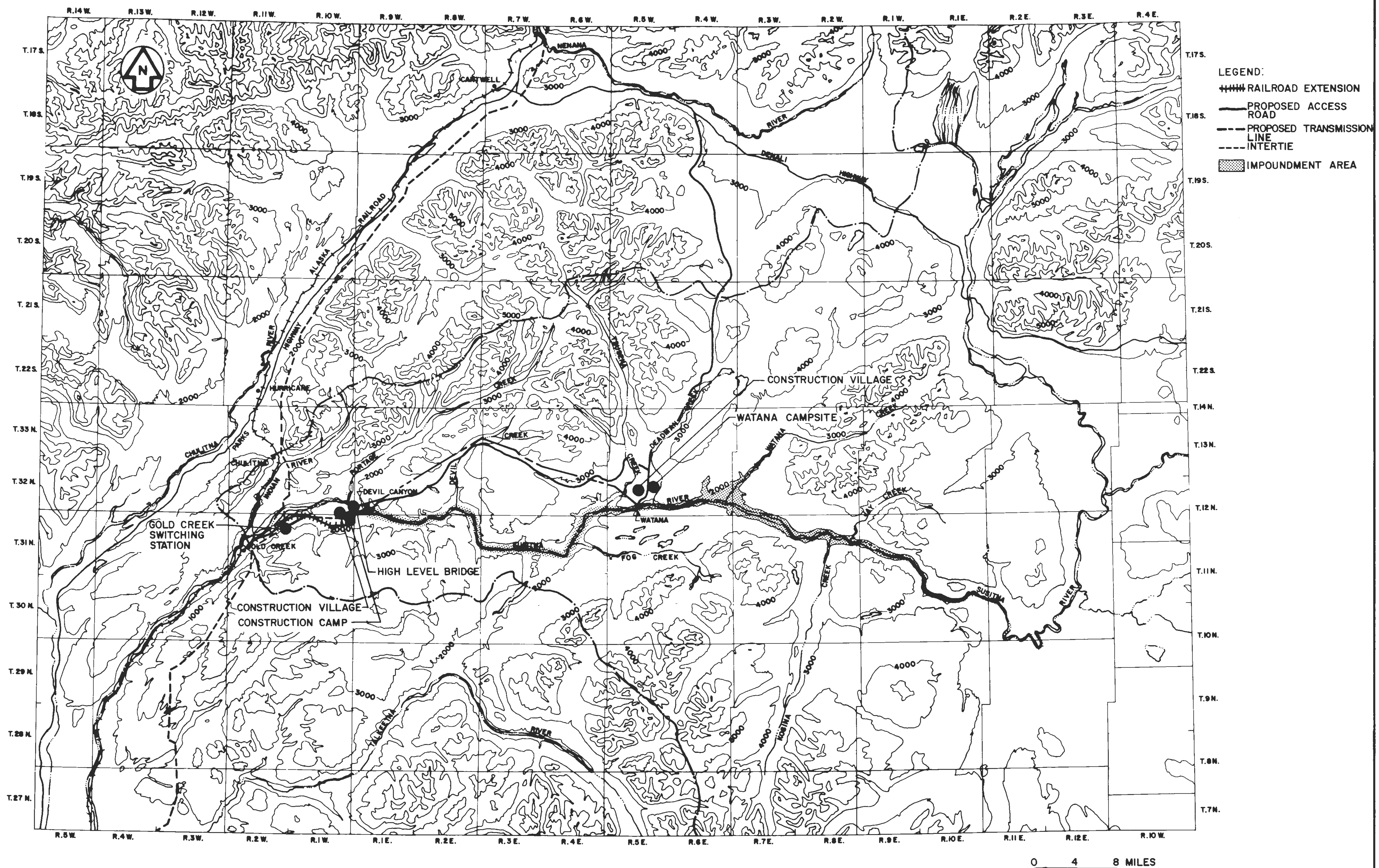
REGIONAL MAP

FIGURE E.8.1



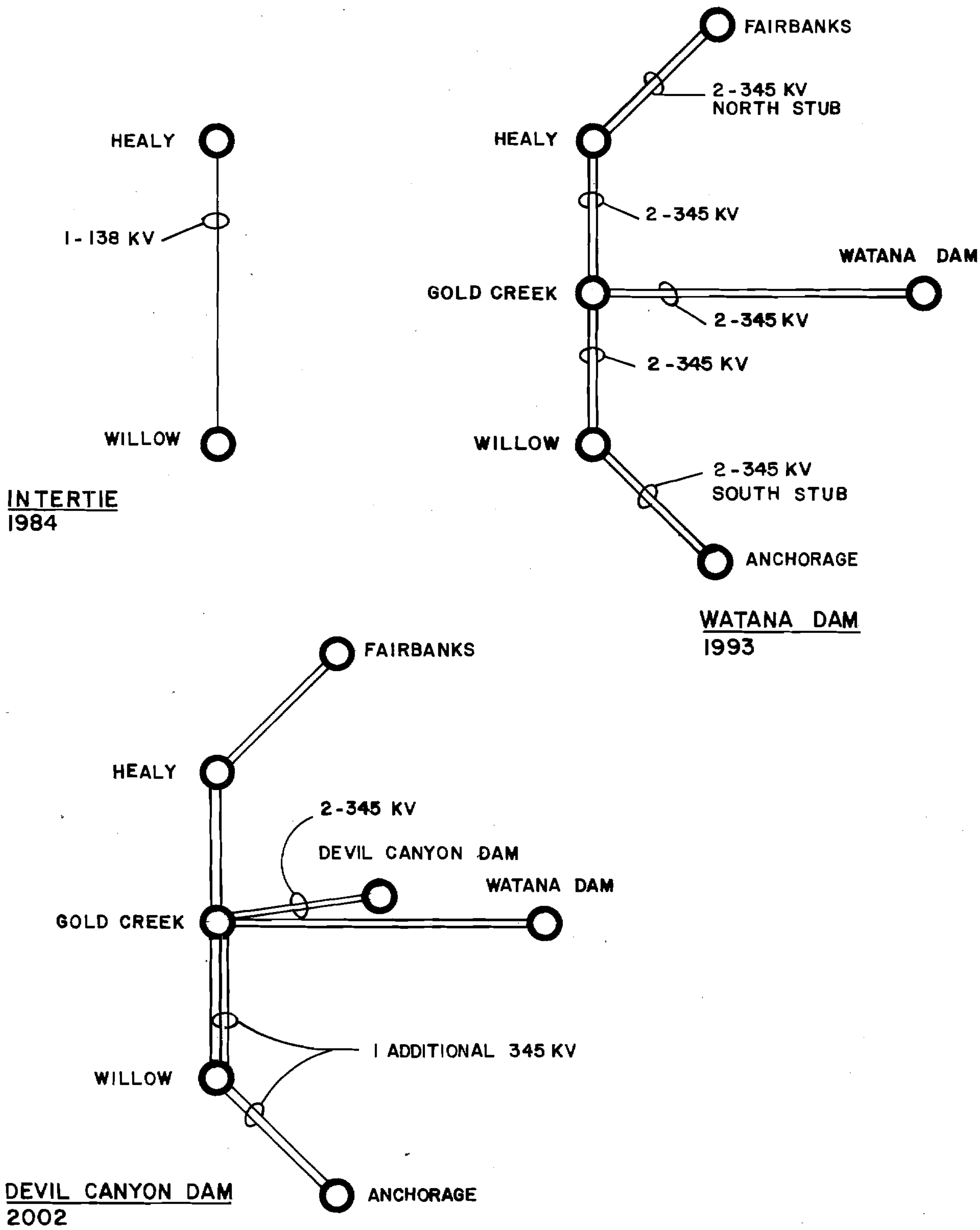
AESTHETIC IMPACT ANALYSIS METHODOLOGY

FIGURE E.8.2



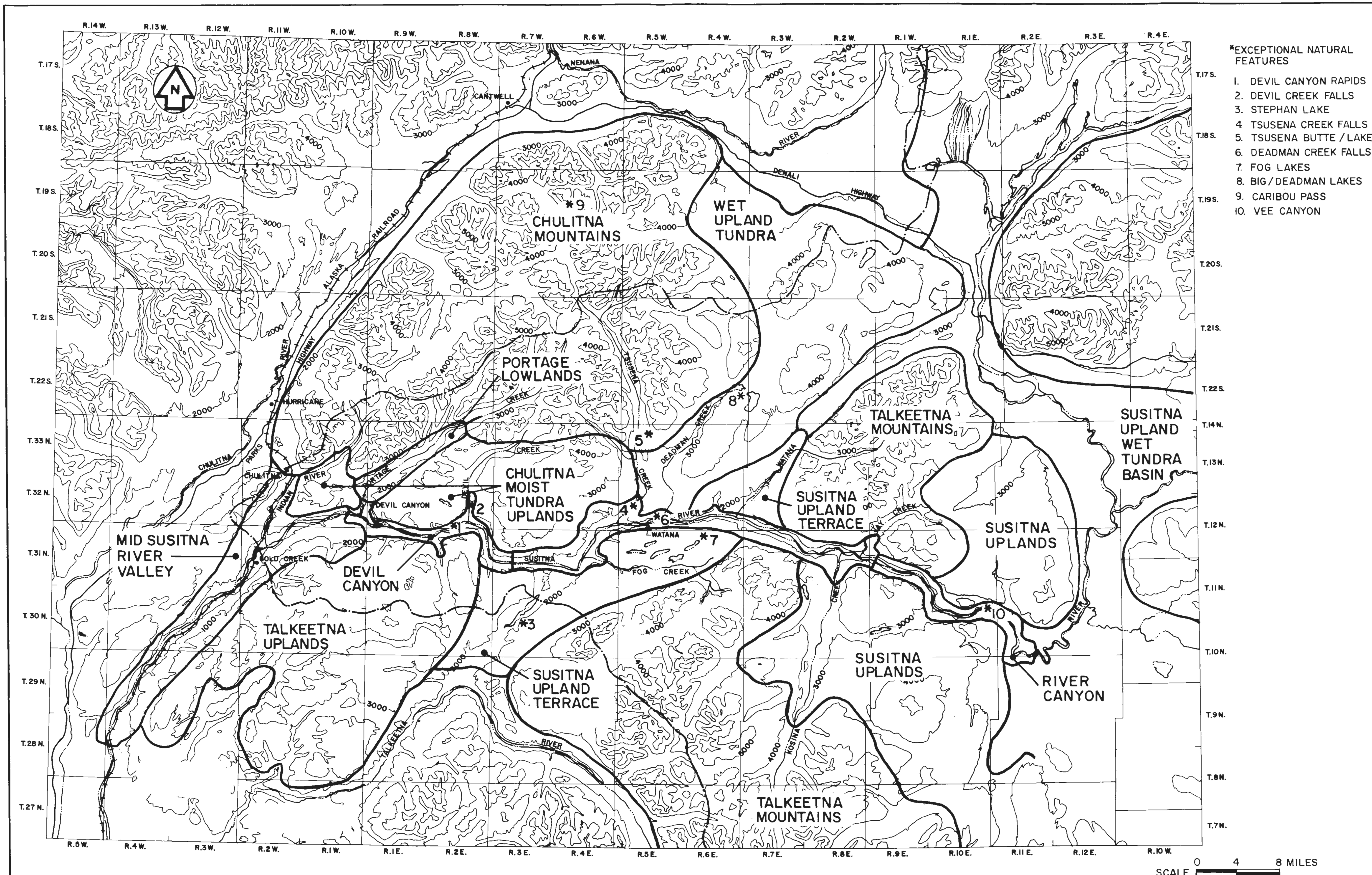
PROPOSED PROJECT FEATURES

FIGURE E.8.3



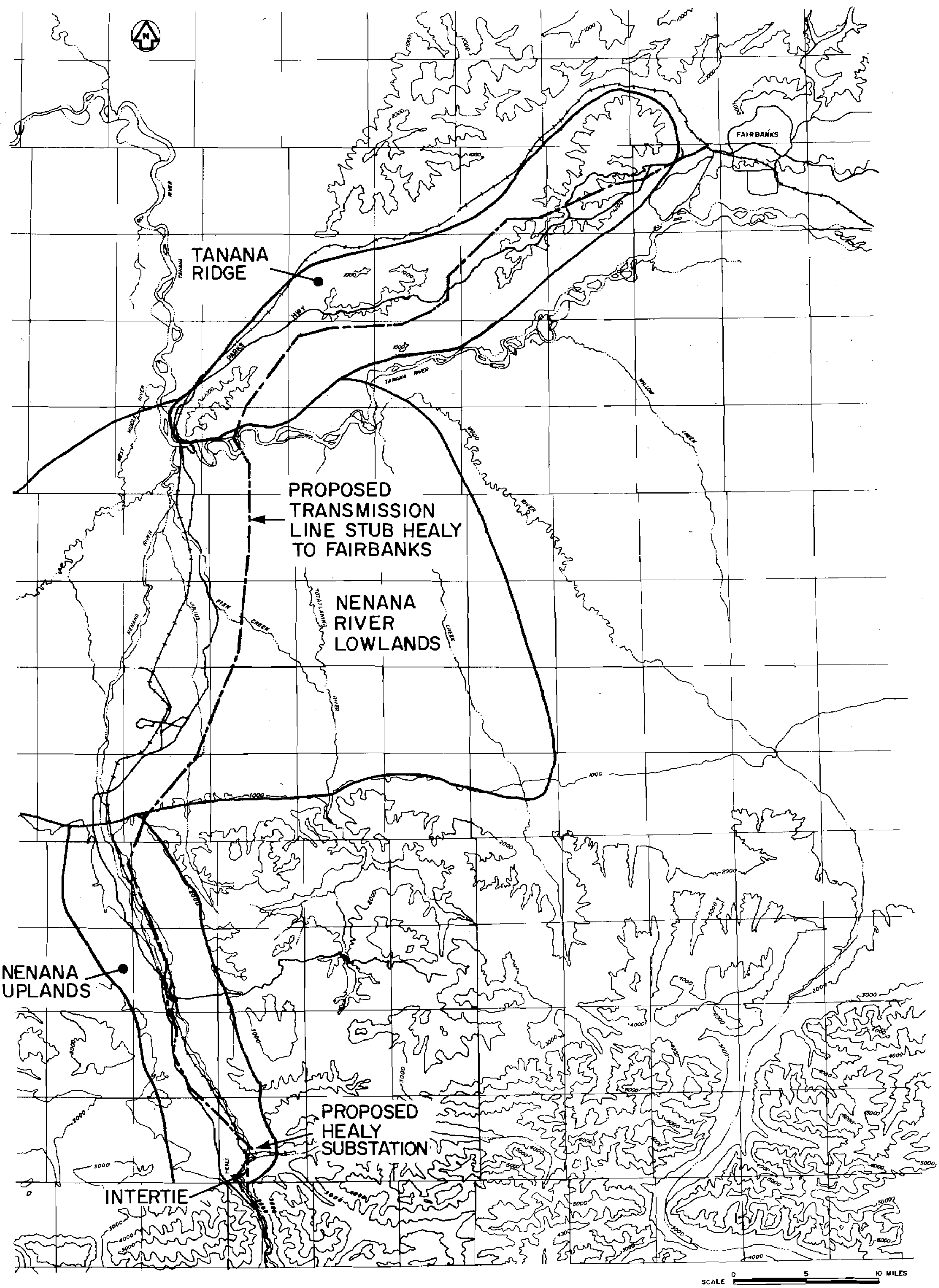
TRANSMISSION PHASING DIAGRAM

FIGURE E.8.4



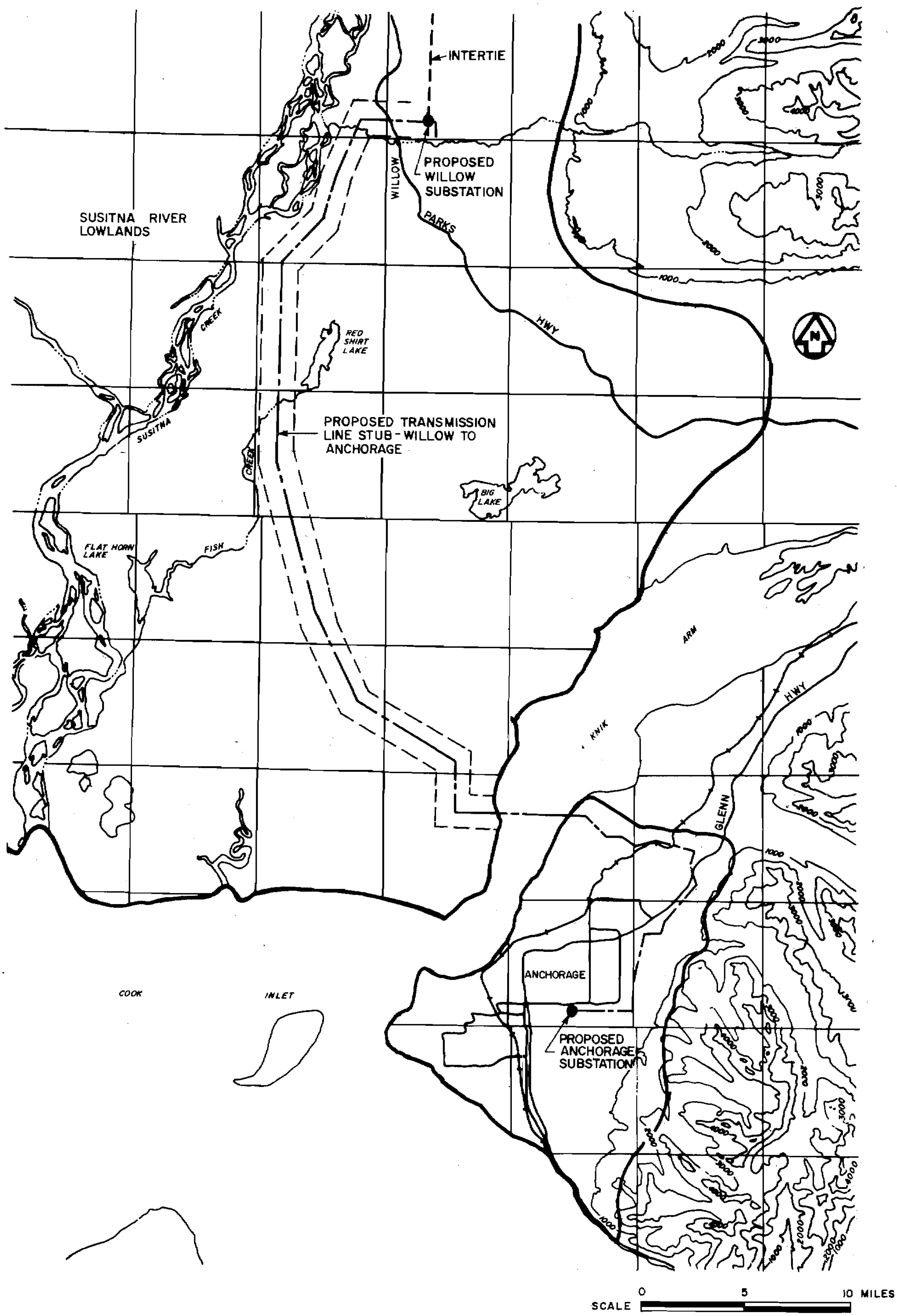
LANDSCAPE CHARACTER TYPES

FIGURE E.8.5



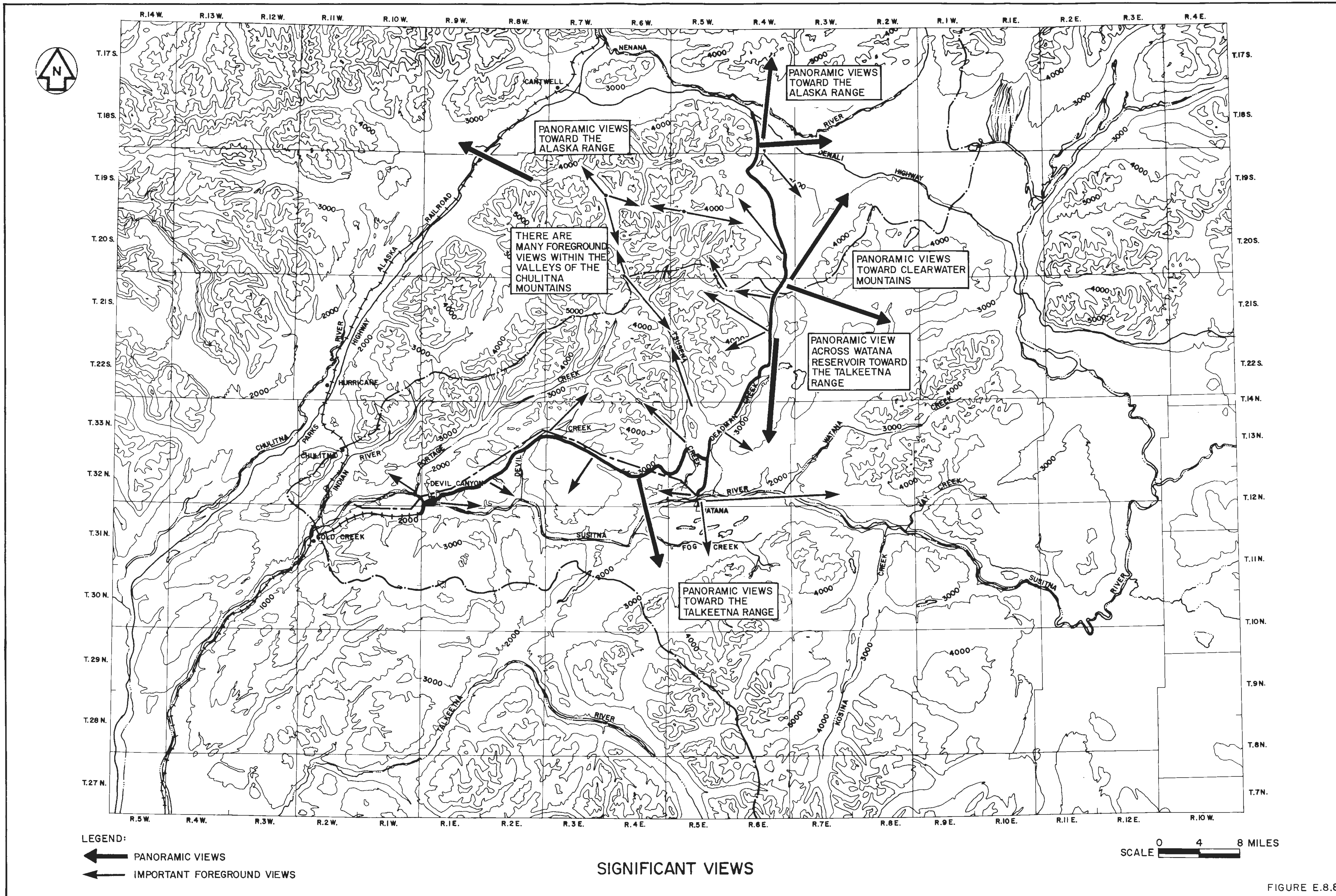
LANDSCAPE CHARACTER TYPES NORTHERN STUB

FIGURE E.8.6



LANDSCAPE CHARACTER TYPES SOUTHERN STUB

FIGURE E.8.7



SIGNIFICANT VIEWS

FIGURE E.8.8

NATURAL FEATURES #1
DEVIL CANYON RAPIDS

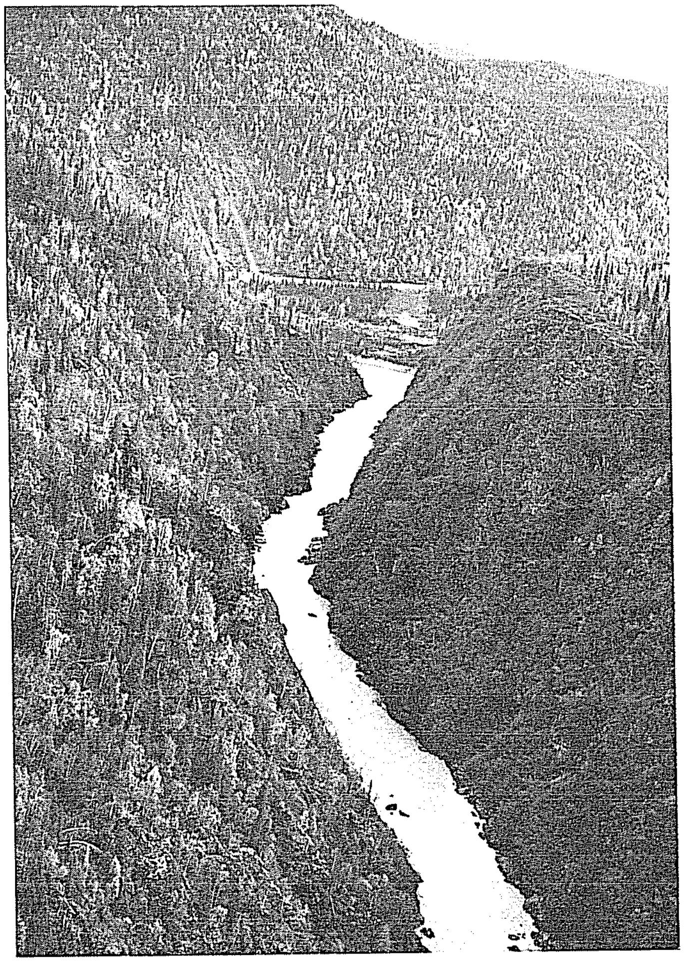


PHOTO E.8.19 DEVIL CANYON RAPIDS LOOKING UPSTREAM TO DEVIL CANYON DAMSITE

NATURAL FEATURES # I
DEVIL CANYON RAPIDS

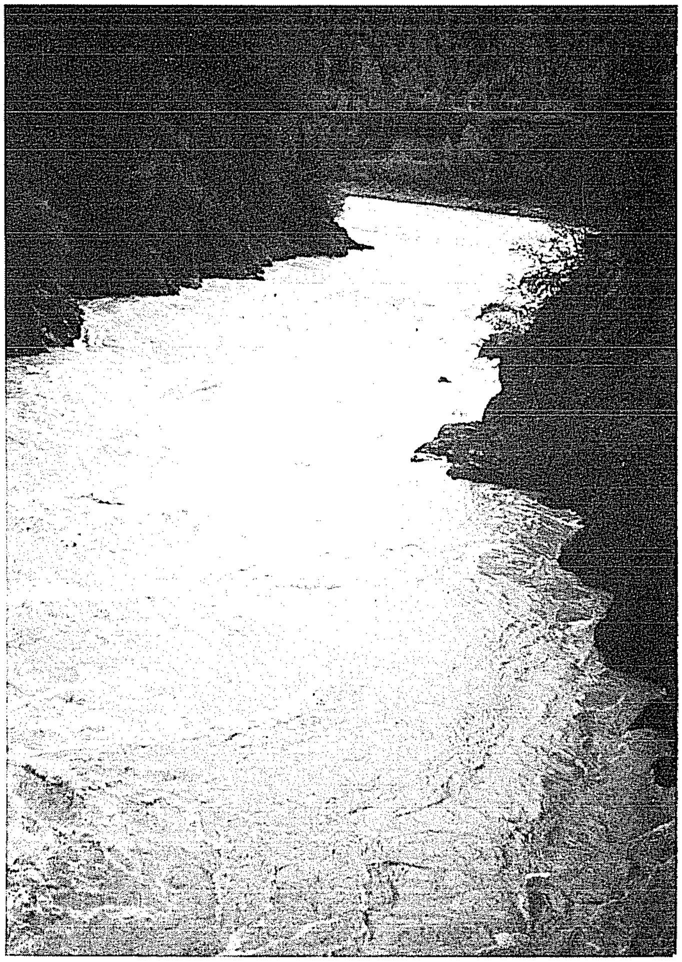


PHOTO E.8.20 DEVIL CANYON RAPIDS

NATURAL FEATURES # 2
DEVIL CREEK FALLS

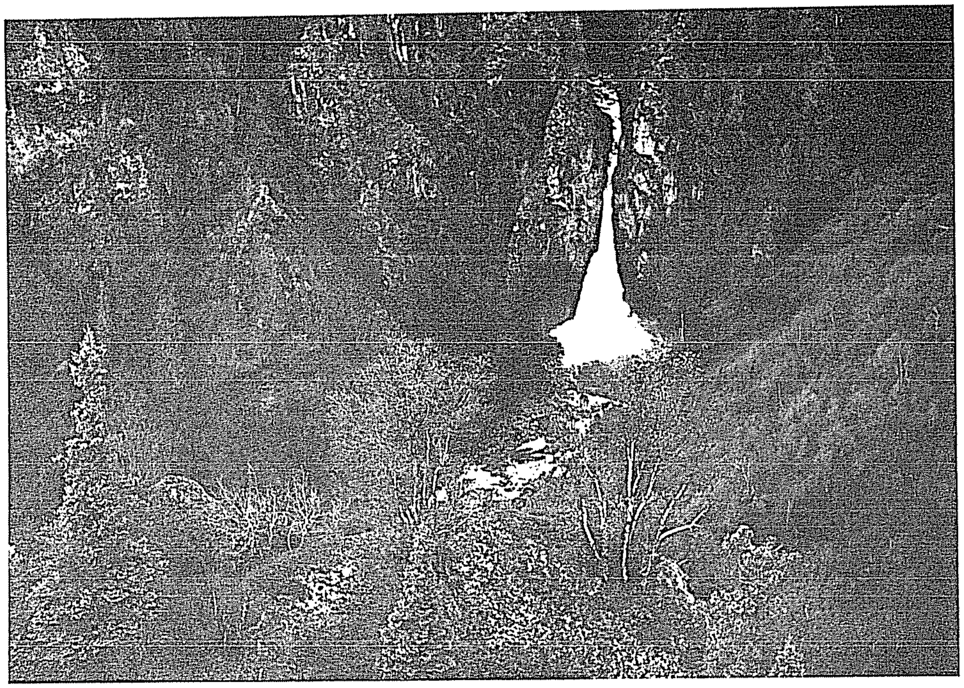


PHOTO E.8.21 DEVIL CREEK FALLS #1

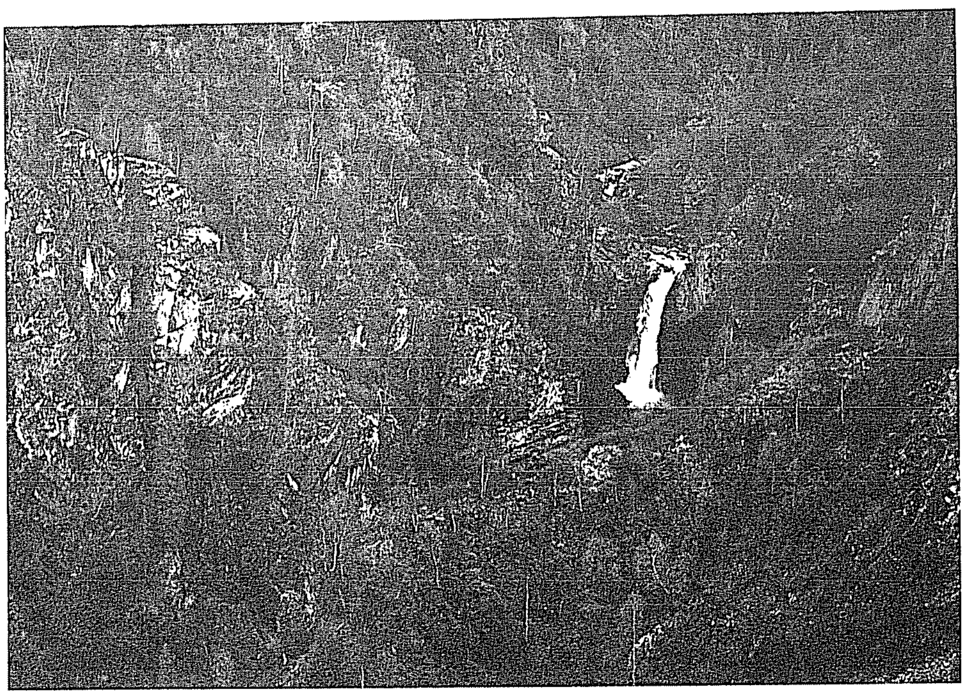


PHOTO E.8.22 DEVIL CREEK FALLS # 2

NATURAL FEATURES # 3
STEPHAN LAKE

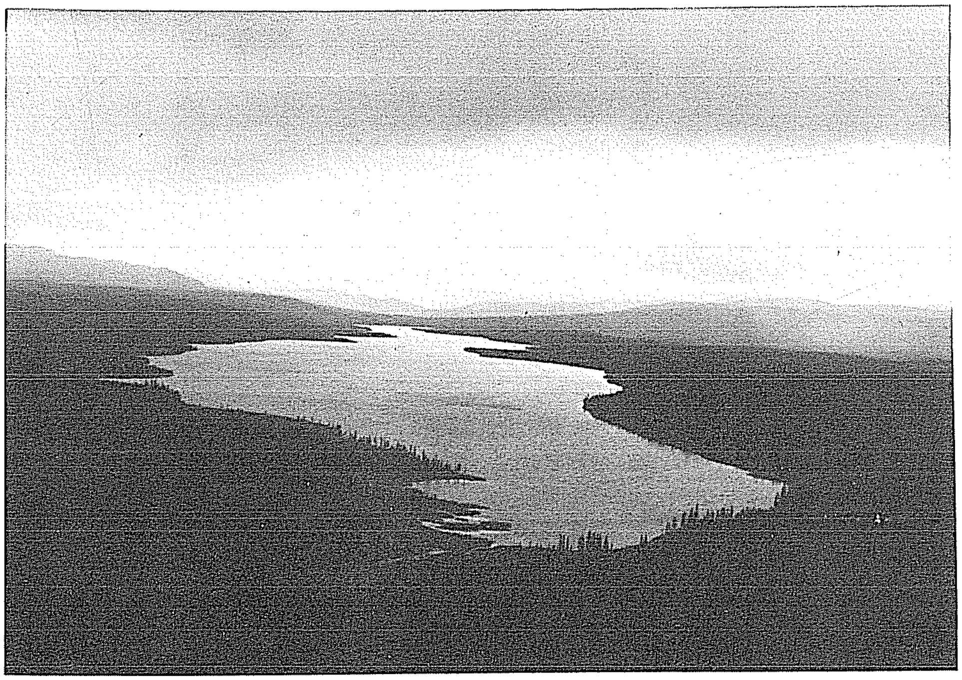


PHOTO E.8.23 STEPHAN LAKE LOOKING SOUTH

NATURAL FEATURES #4
TSUSENA CREEK FALLS

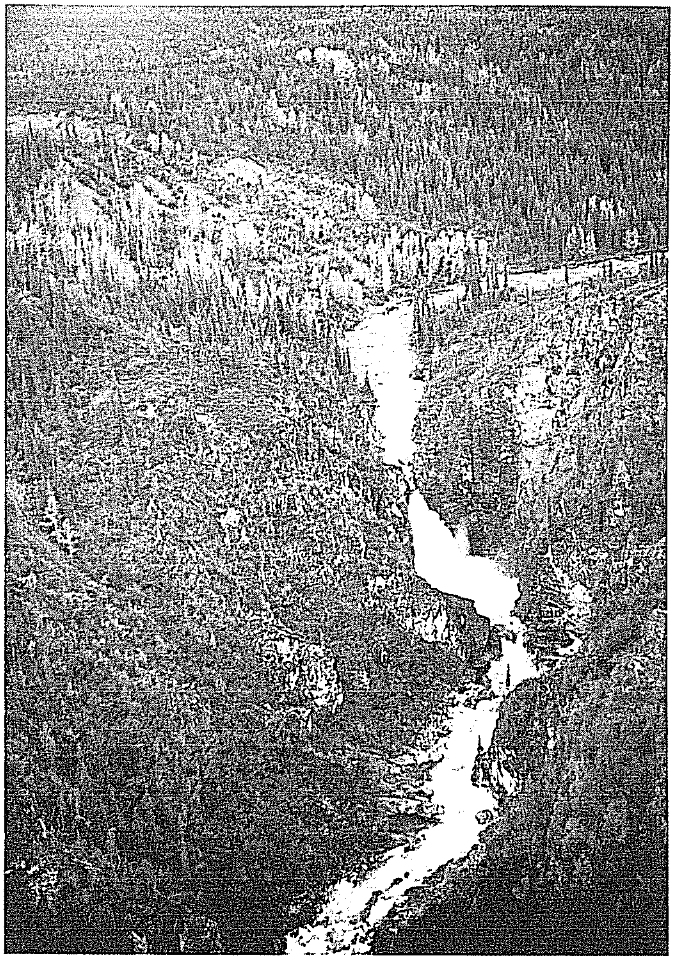


PHOTO E.8.24 TSUSENA CREEK FALLS.

NATURAL FEATURES # 5
TSUSENA BUTTE LAKE

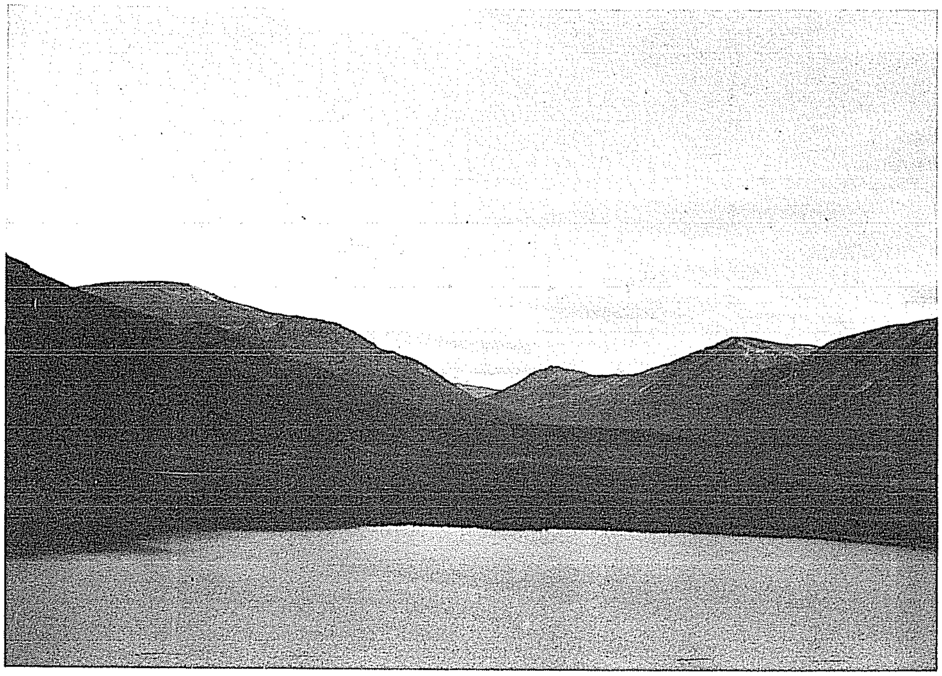


PHOTO E. 8.25 TSUSENA BUTTE LAKE LOOKING NORTH NORTHWEST.

NATURAL FEATURES #6
DEADMAN CREEK FALLS

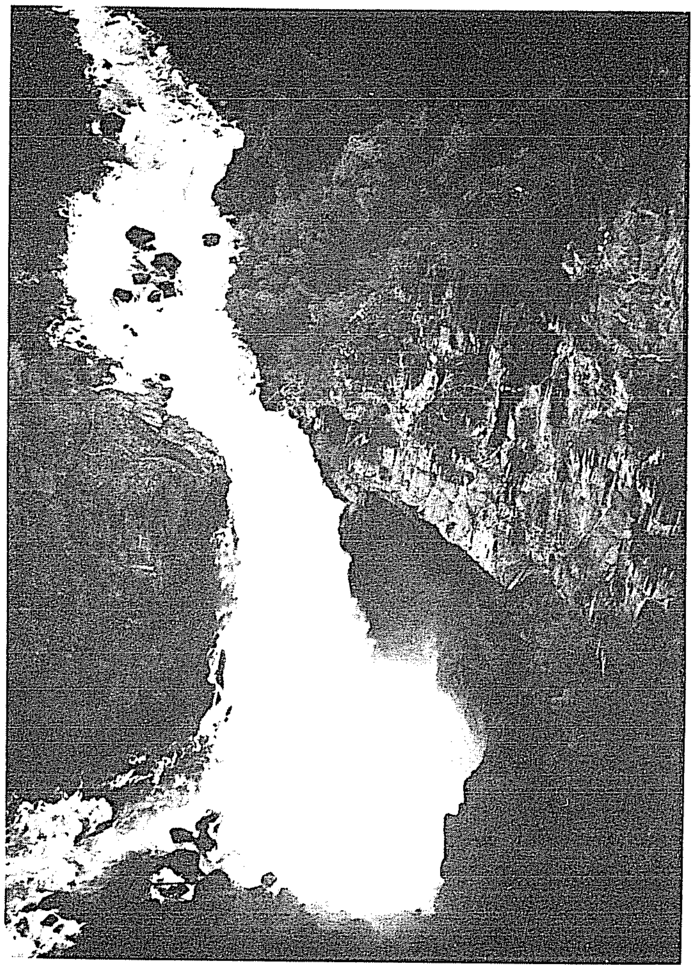


PHOTO E.8.26 DEADMAN CREEK FALLS

NATURAL FEATURES # 7
FOG LAKES

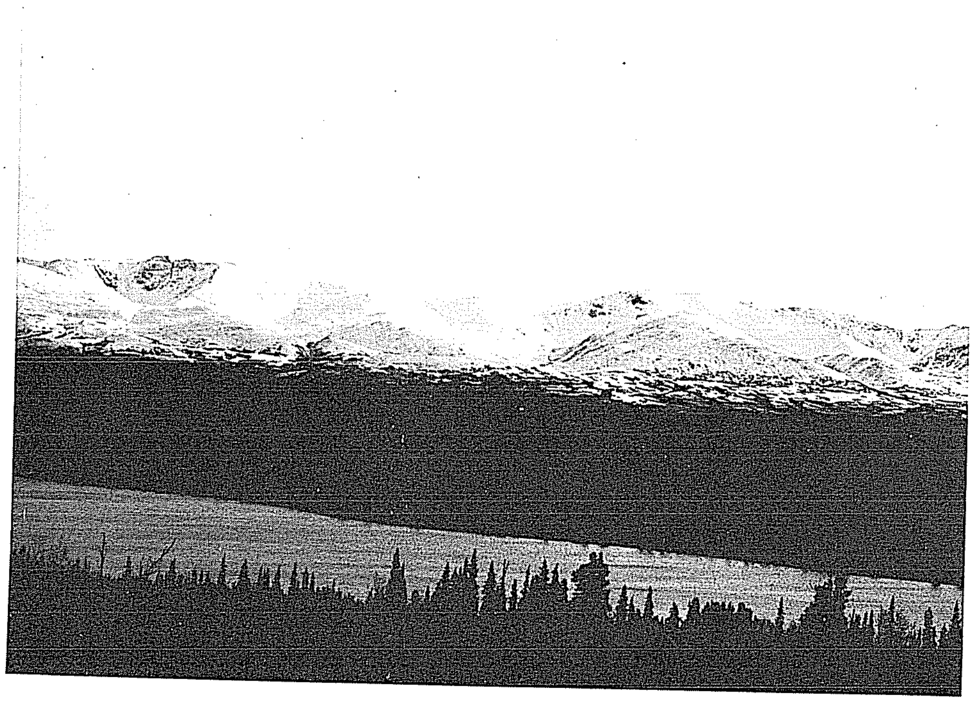


PHOTO E. 8.27 FOG LAKES

NATURAL FEATURES #8
BIG/DEADMAN LAKES

PHOTO E.8.28 BIG / DEADMAN LAKE
(THE CONNECTING LAND BETWEEN THE 2 LAKES)

PHOTO E.8.29 BIG/DEADMAN LAKE
(DEADMAN LAKE IS IN THE FOREGROUND AND BIG LAKE IN THE MIDDLEGROUND)

NATURAL FEATURES # 9
CARIBOU PASS

PHOTO E.8.30 CARIBOU LAKES LOOKING SOUTH TOWARDS THE CONFLUENCE OF SOOLE CREEK AND JACK RIVER

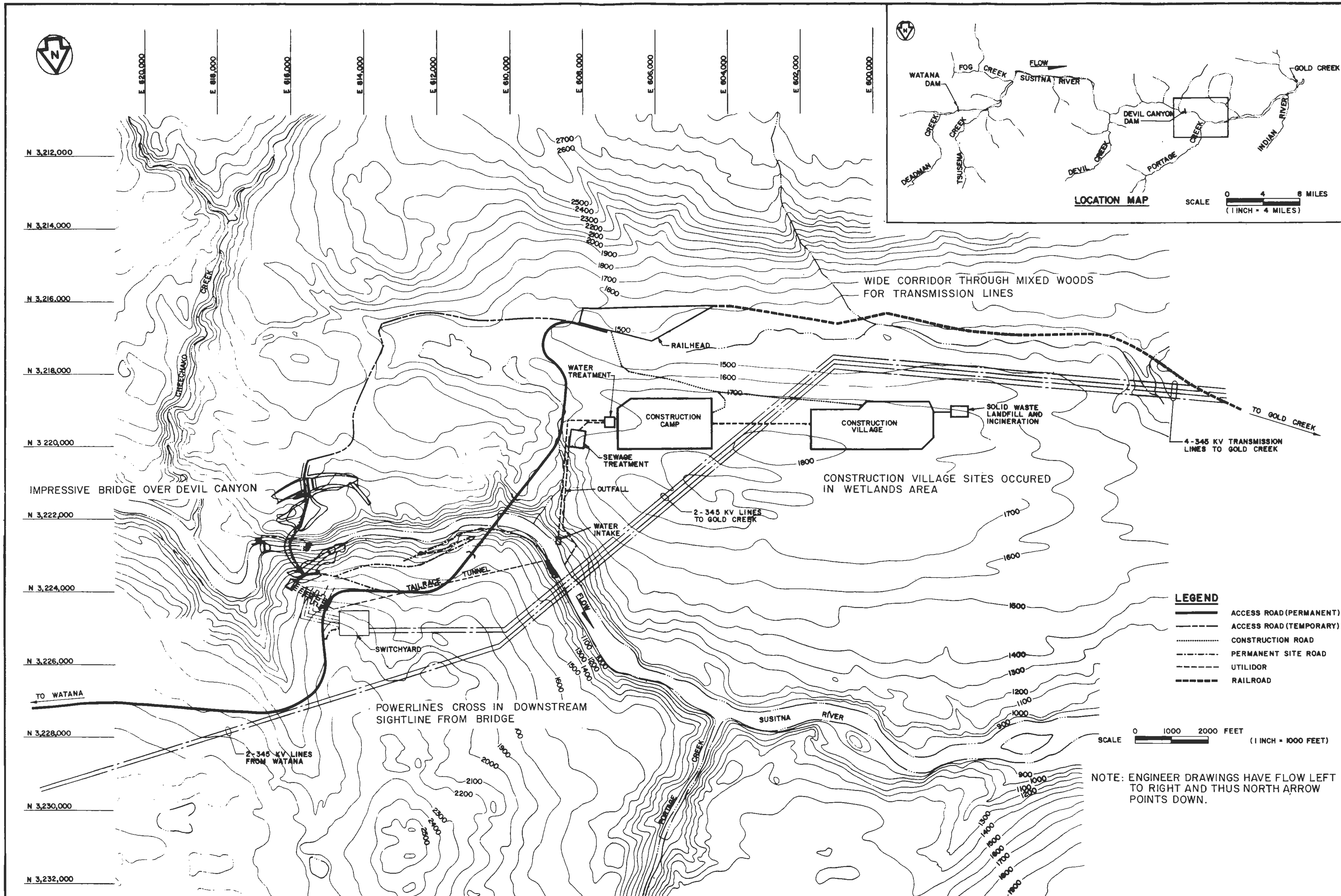
NATURAL FEATURES #10
VEE CANYON

PHOTO E.8.31 VEE CANYON AND VICINITY

PHOTO E.8.32 THE SOUTHERN WALLS OF VEE CANYON

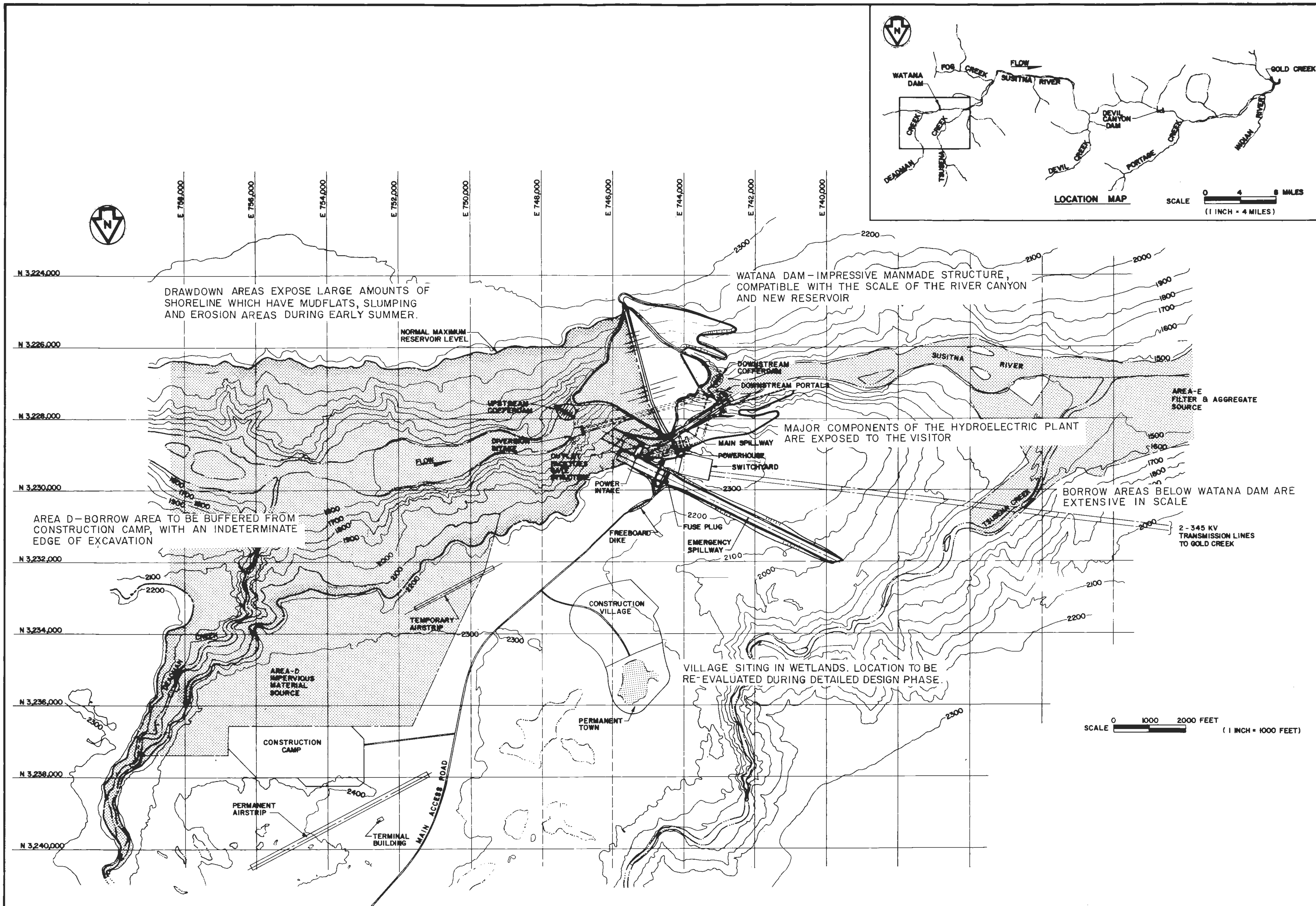
APPENDIX E8A

Proposed Facilities Design Analysis



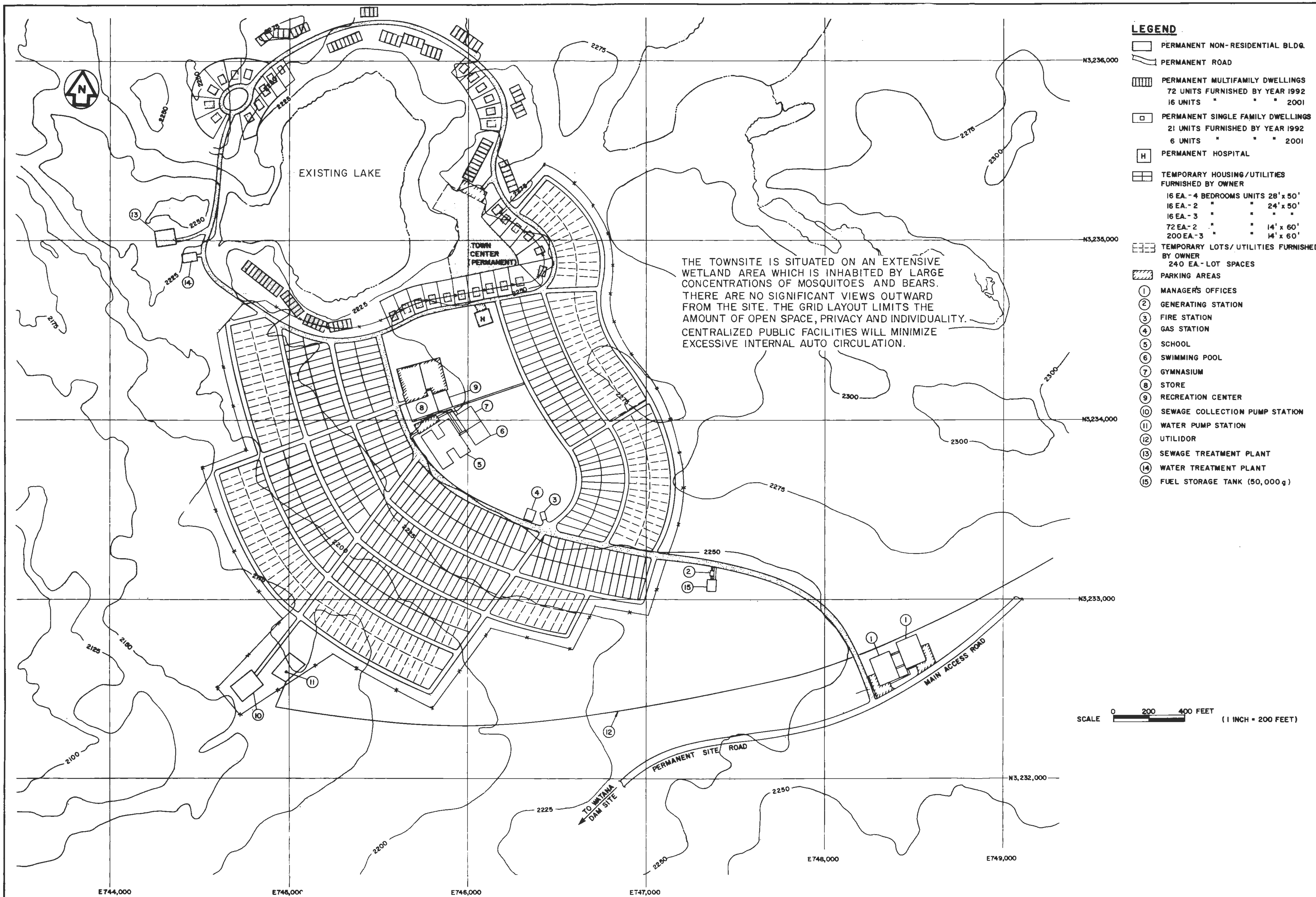
DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

FIGURE 8.A.1



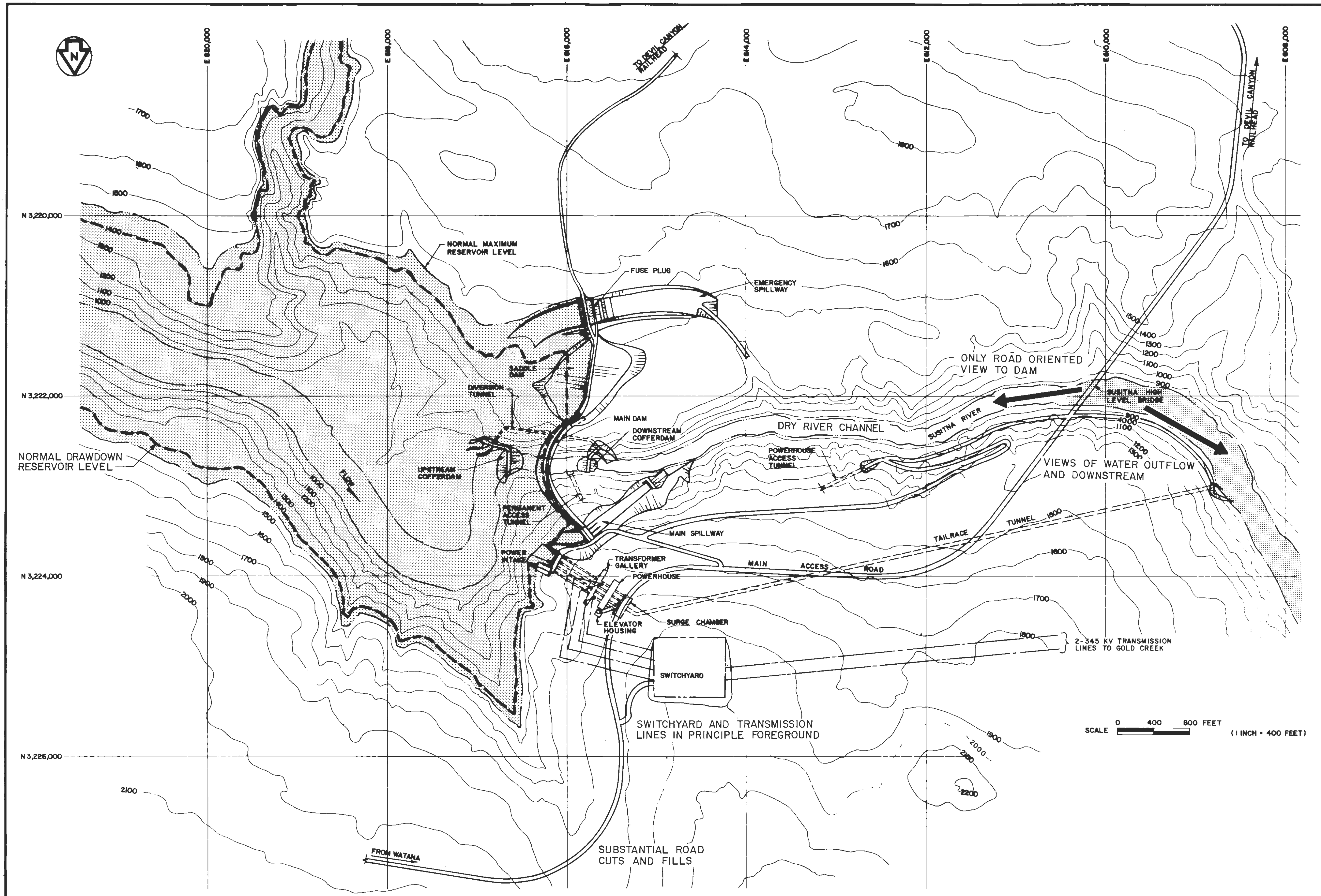
WATANA SITE LAYOUT

FIGURE 8.A.2



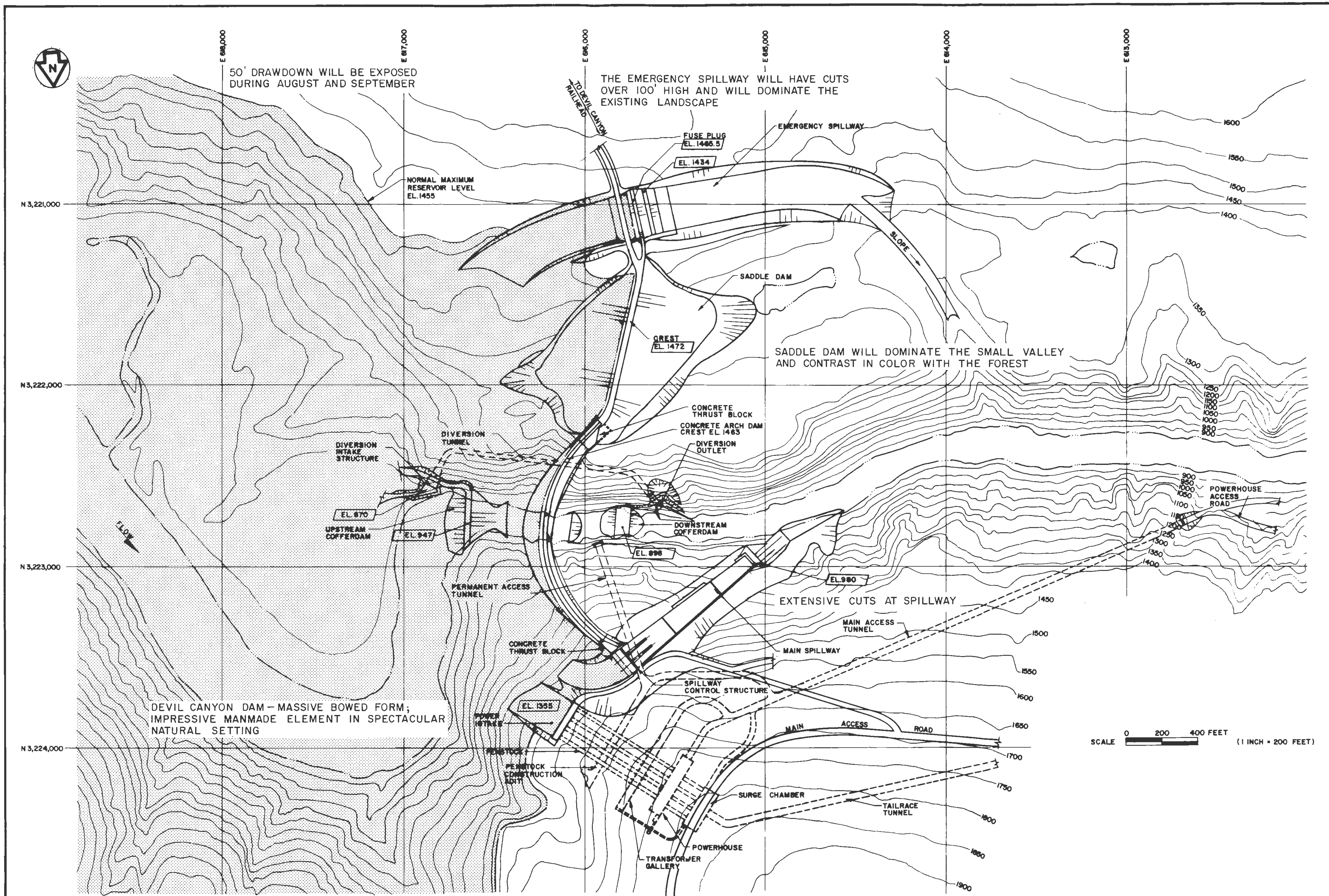
WATANA VILLAGE AND TOWN SITE

FIGURE 8.A.3



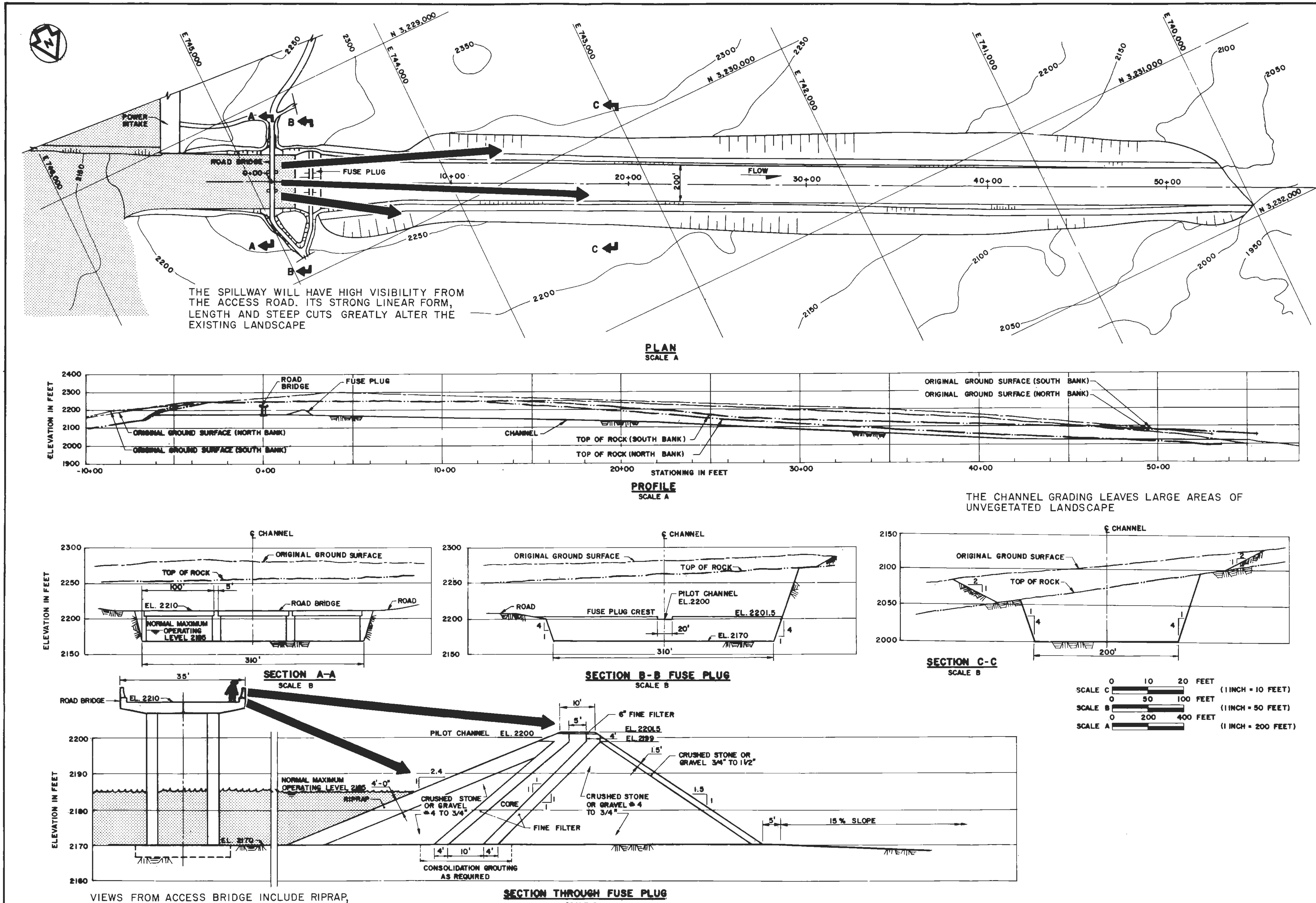
DEVIL CANYON SITE LAYOUT

FIGURE 8.A.4



DEVIL CANYON GENERAL ARRANGEMENT

FIGURE 8.A.5

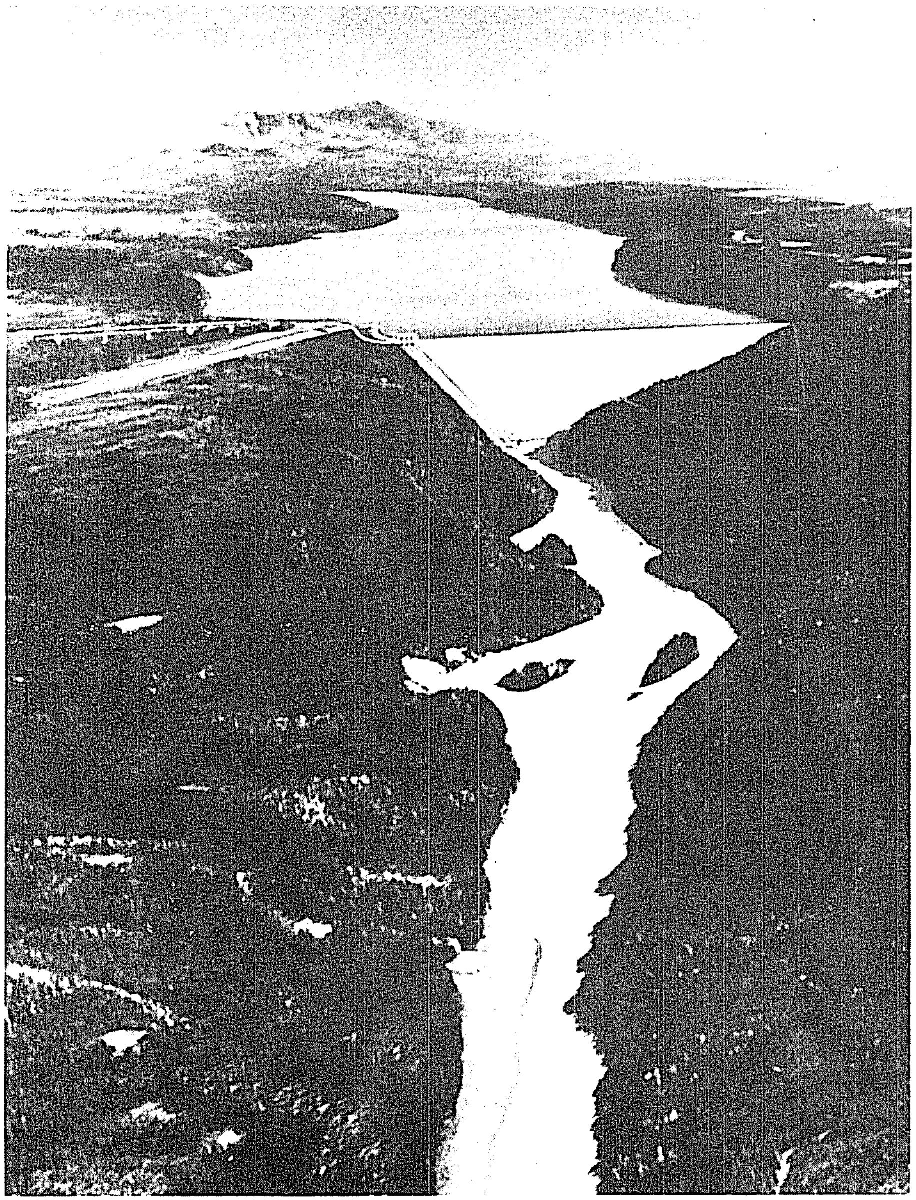


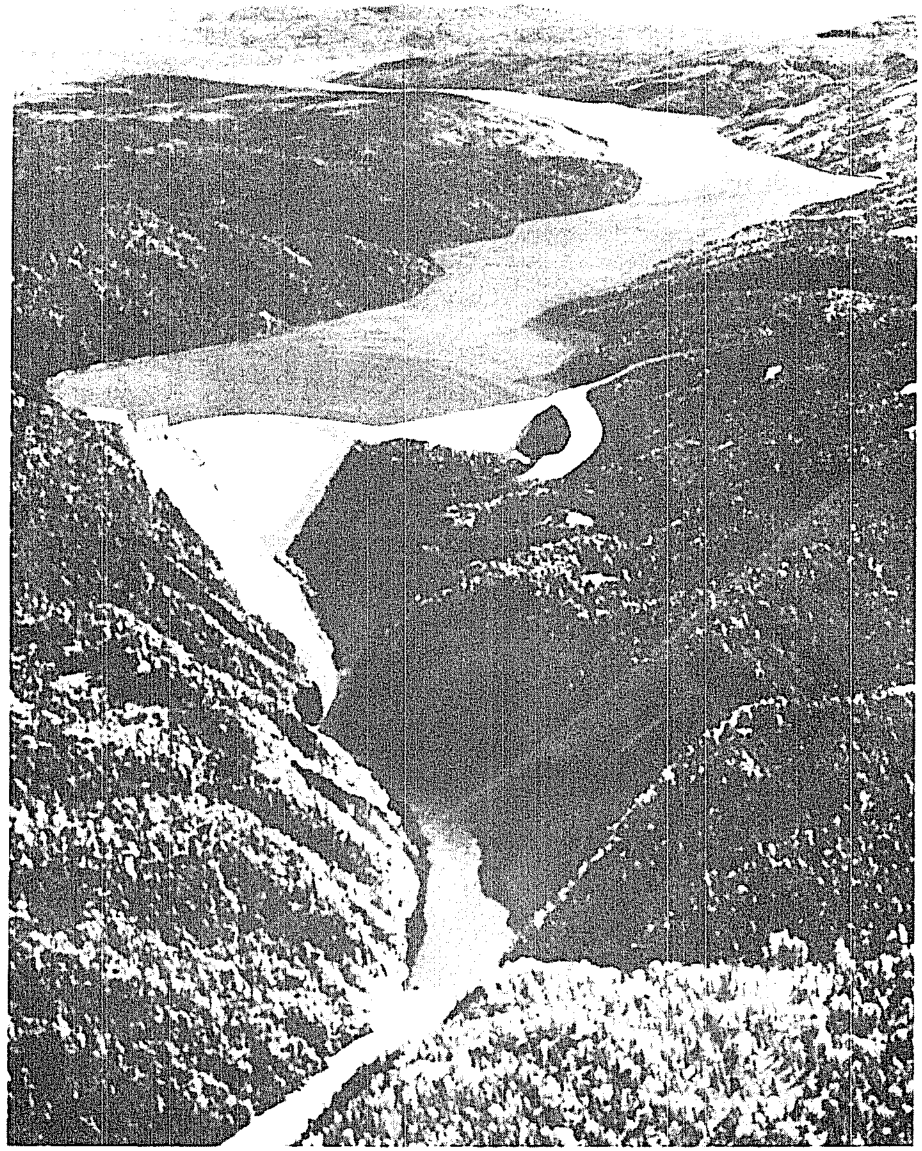
WATANA EMERGENCY SPILLWAY

FIGURE 8.A.6

APPENDIX E8B

Site Photos with Simulations of Project Facilities





These are photo renditions of the major structures at the proposed Watana (left) and Devil Canyon (right) dam sites. Several features are not shown, including: the permanent townsite; the access road; transmission lines; substations; and a runway for aircraft.

The Watana dam would be an earth-fill structure 885 feet high, 4100 feet long, with an installed capacity of 1020 MW. The Devil Canyon dam would be a concrete arch dam 645 feet high, about 1500 feet long at the crest, with an installed capacity of 600 MW. The Watana dam would create a reservoir 48 miles long; Devil Canyon a reservoir 26 miles long.

WATANA RESERVOIR

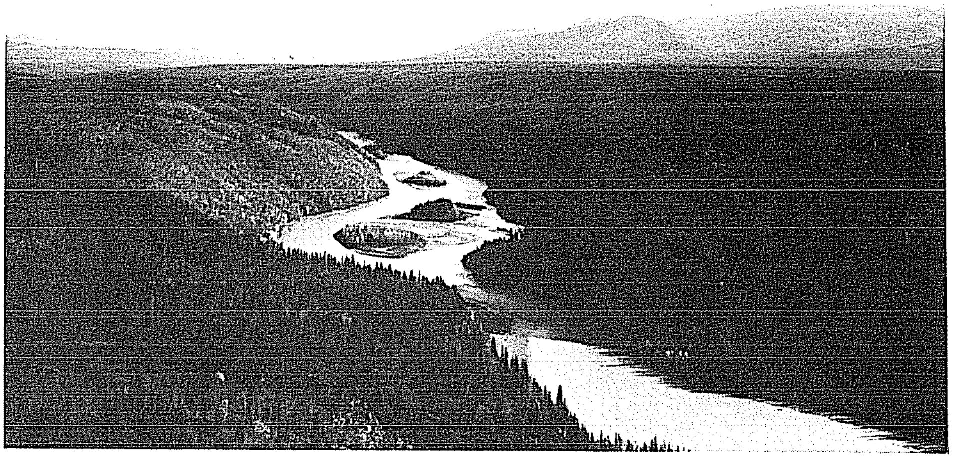
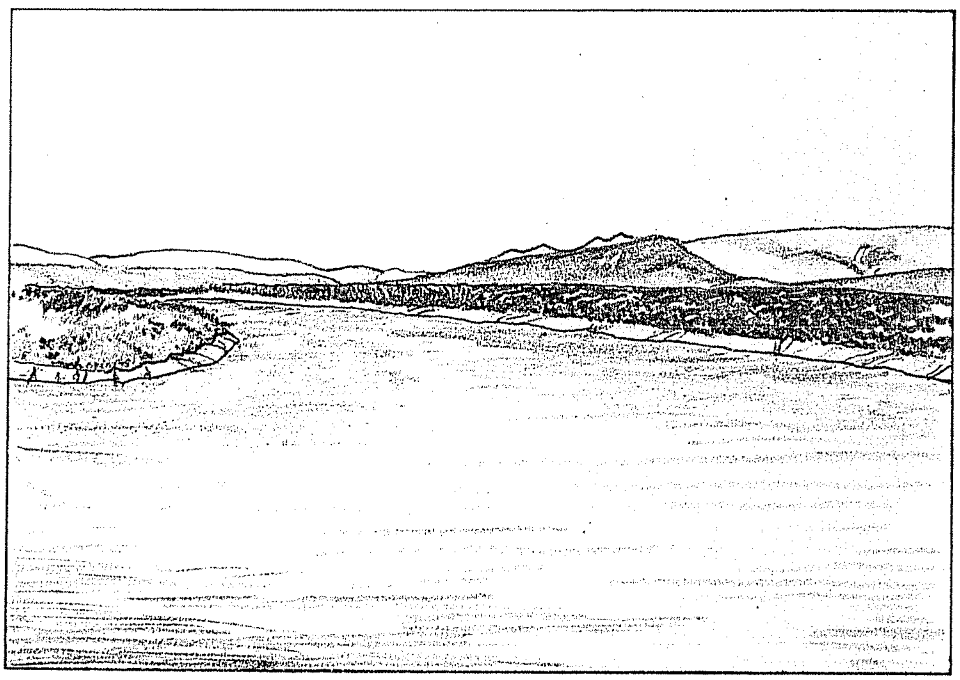


PHOTO 8.B.1 EXISTING SUSITNA RIVER (LOOKING EAST)



PROPOSED WATANA RESERVOIR AT MID DRAWDOWN

WATANA PERMANENT TOWNSITE

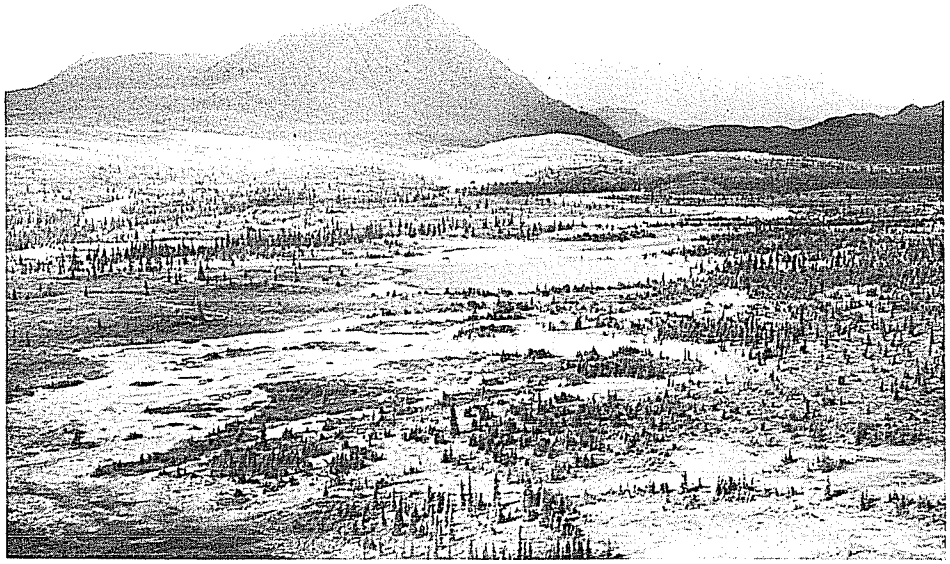
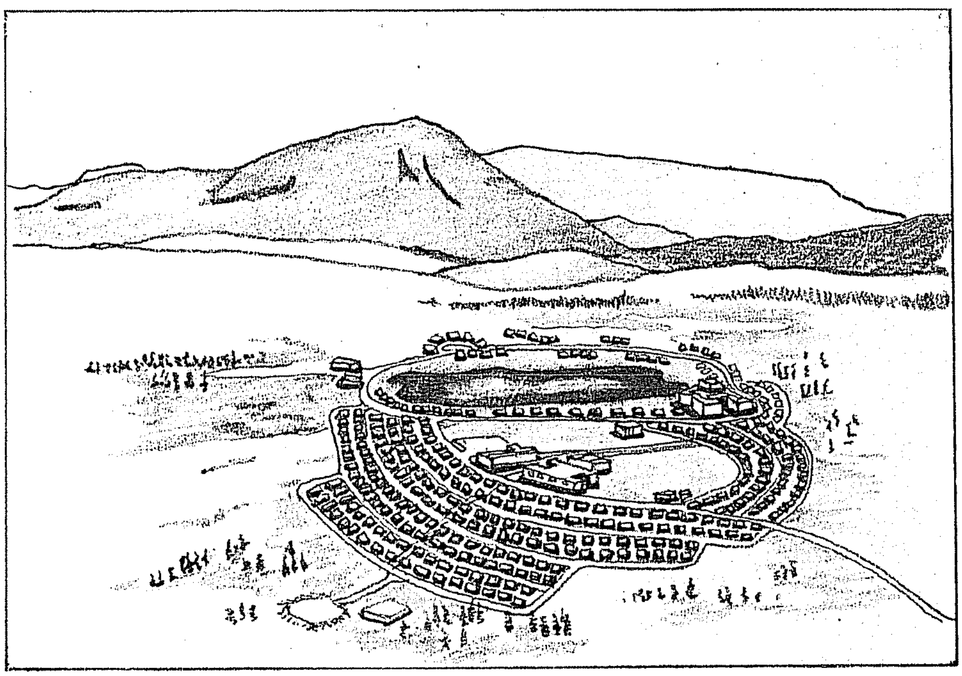


PHOTO 8.B.2 SITE OF PERMANENT TOWNSITE / CONSTRUCTION VILLAGE (LOOKING NORTH)



PERMANENT TOWNSITE - WATANA

DEVIL CANYON ACCESS ROAD

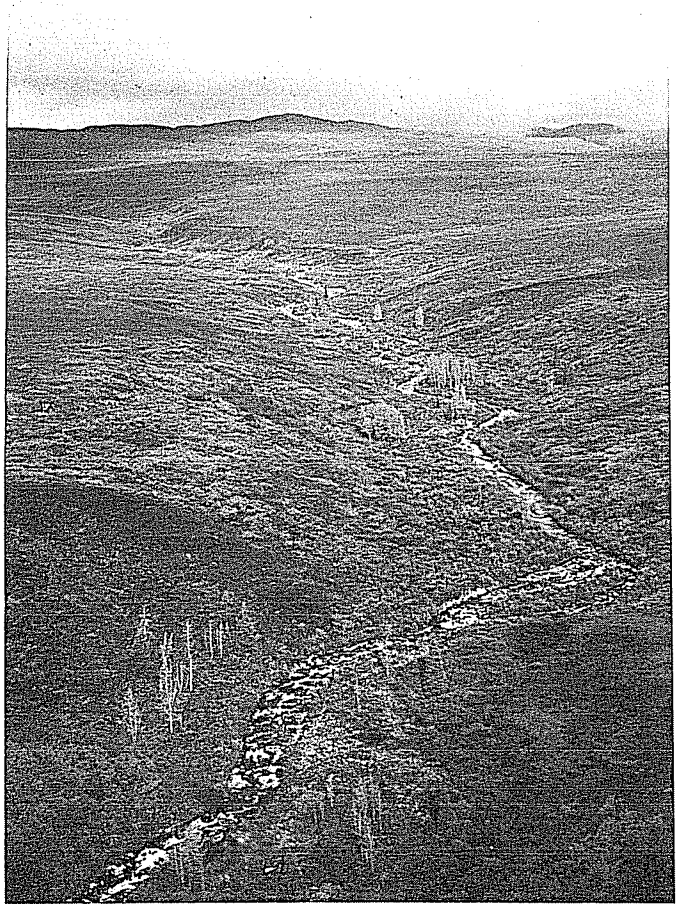
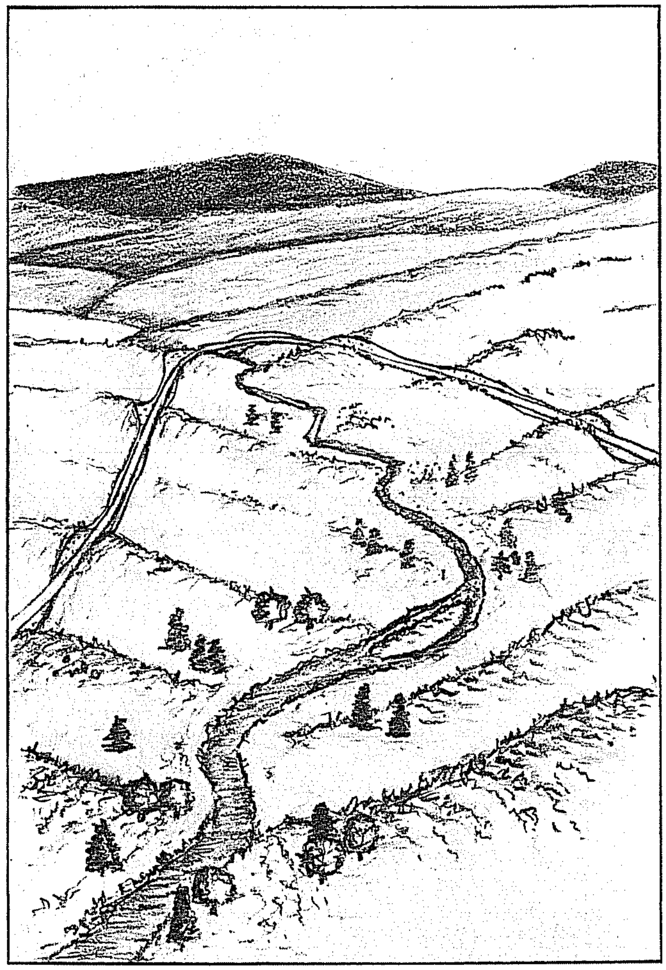
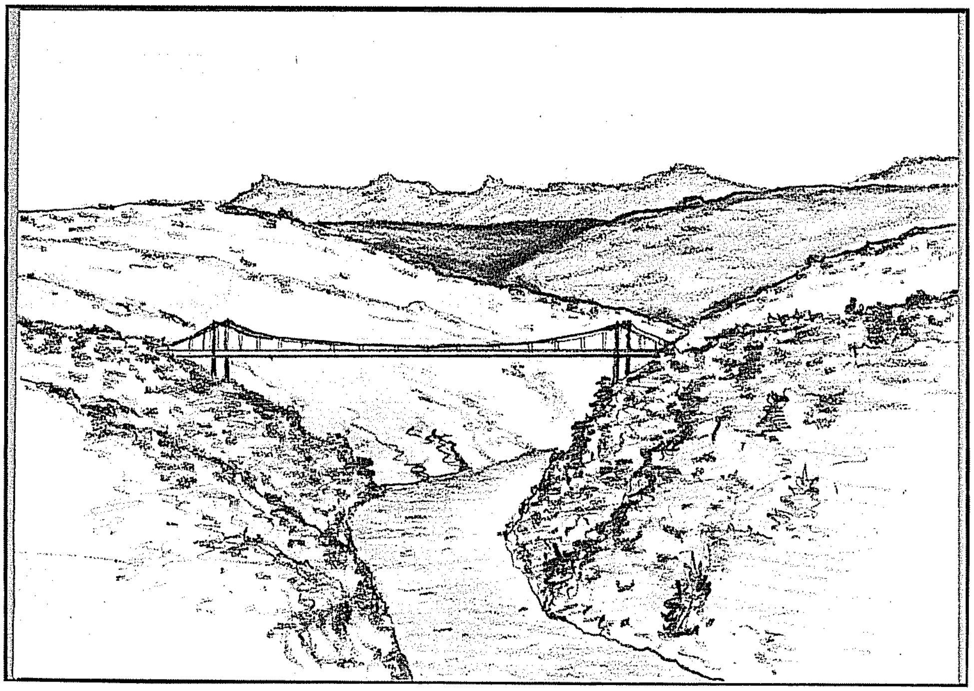


PHOTO 8.B.3 EXISTING CONDITIONS NEAR TSUSENA CREEK



PROPOSED ROAD CROSSING



PROPOSED HIGH LEVEL BRIDGE AT DEVIL CANYON

APPENDIX E8C

Photos of Proposed Project Facilities Sites

PHOTO 8.C.1 PROPOSED DEVIL CANYON CONSTRUCTION VILLAGE / CAMPSITE (LOOKING EAST)

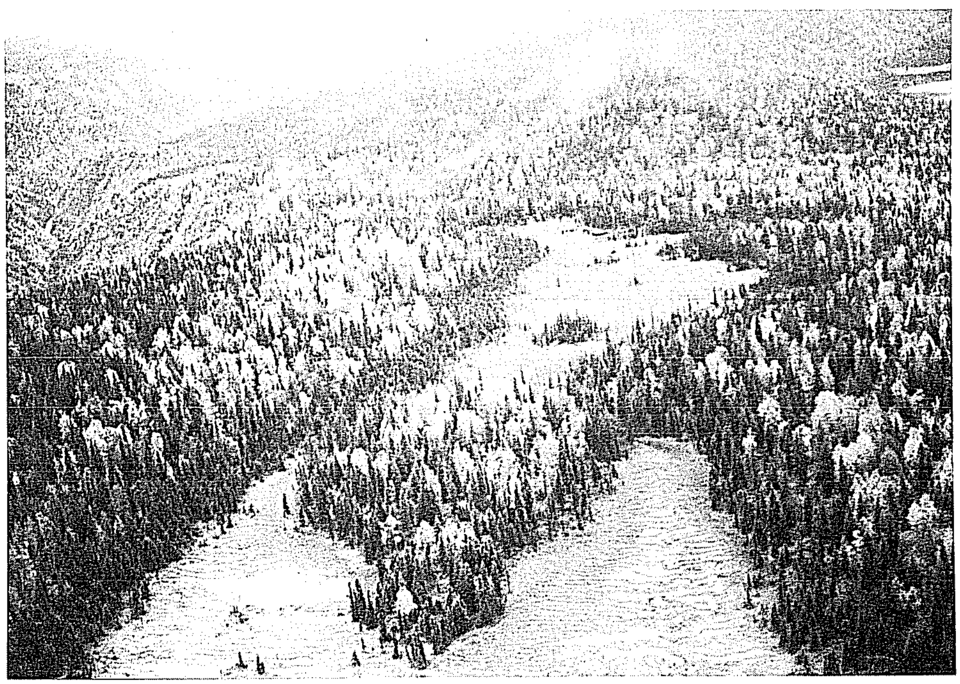


PHOTO 8.C.2 PROPOSED DEVIL CANYON CONSTRUCTION VILLAGE / CAMPSITE (LOOKING EAST)

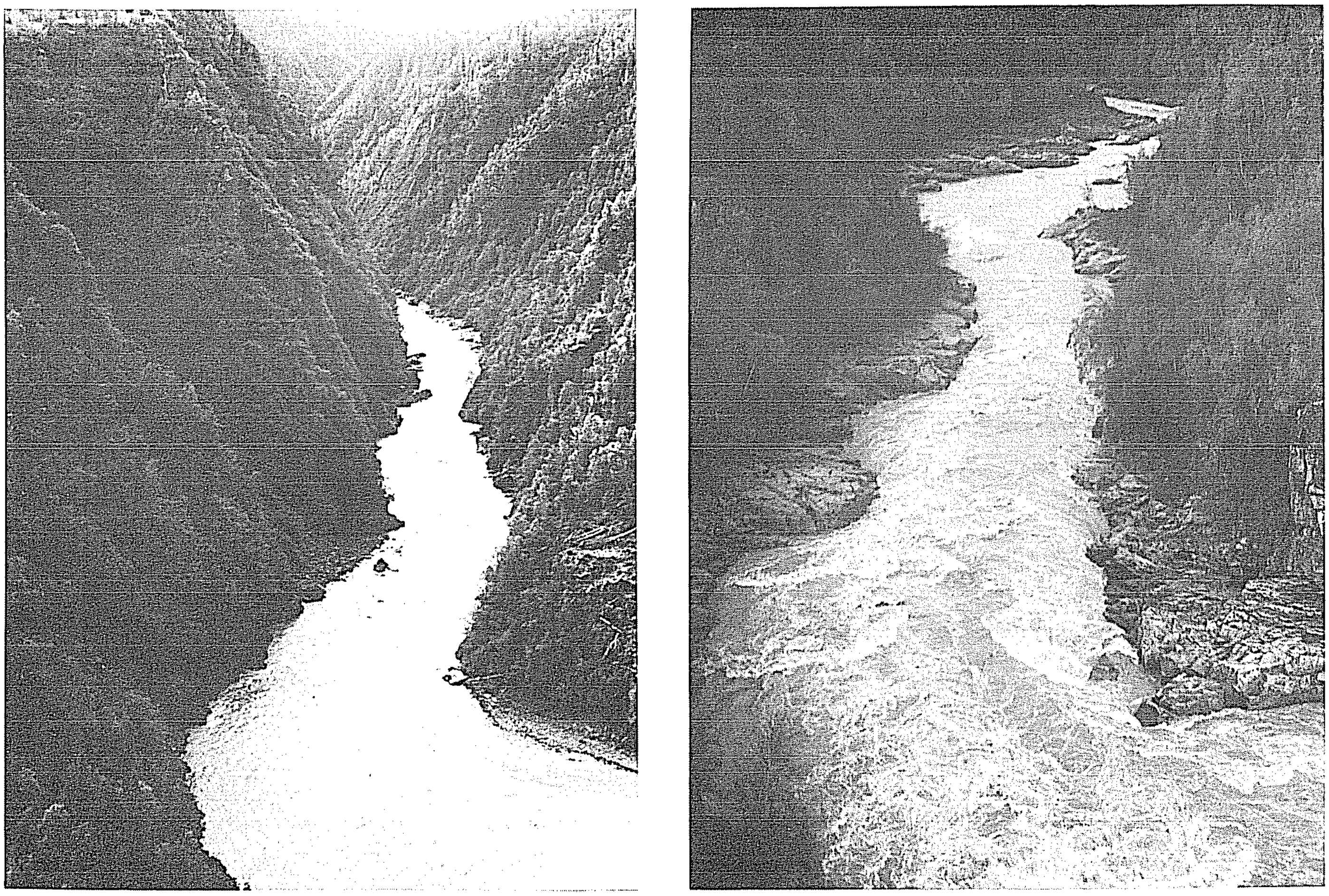


PHOTO 8.C.3 LEFT PHOTO - DEVIL CANYON DAMSITE LOOKING DOWNSTREAM. RIGHT PHOTO - RAPIDS AT DEVIL CREEK TO BE INUNDATED BY DEVIL CANYON RESERVOIR.

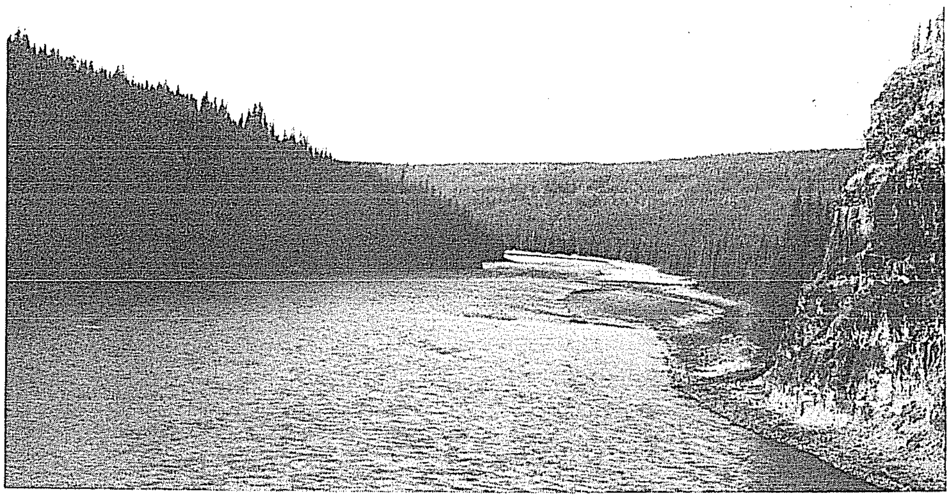


PHOTO 8.C.4 PROPOSED MAJOR BORROW AREA FOR WATANA DAM ON NORTH (RIGHT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)

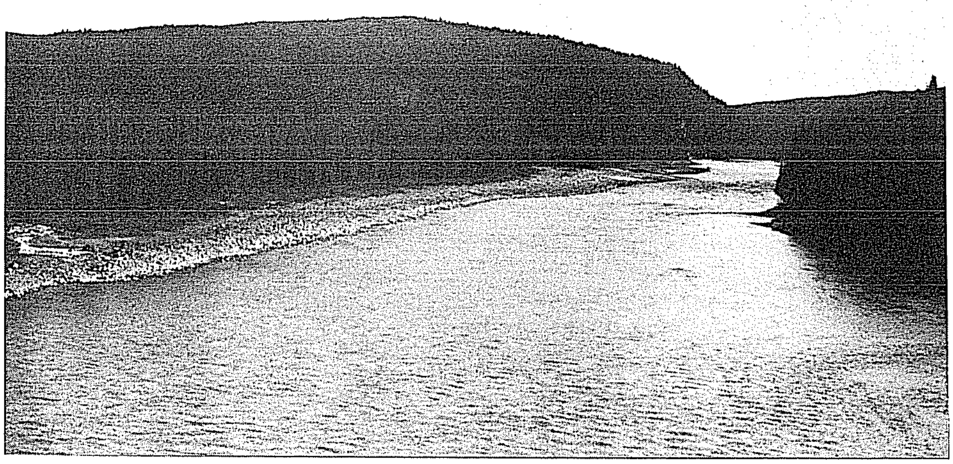


PHOTO 8.C.5 PROPOSED MAJOR BORROW AREA (SAME AS ABOVE) FOR WATANA DAM ON NORTH (LEFT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)

APPENDIX E8D

Examples of Existing Aesthetic Impacts

HIGHWAY CONDITIONS

PHOTO 8.D.1 TYPICAL ROAD PULLOUT ON THE PARKS HIGHWAY (A PAVED ROAD WAY)

PHOTO 8.D.2 BORROW AREAS NEAR THE DENALI HIGHWAY SHOW LACK OF NATURAL VEGETATION

HIGHWAY CONDITIONS

PHOTO 8.D.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

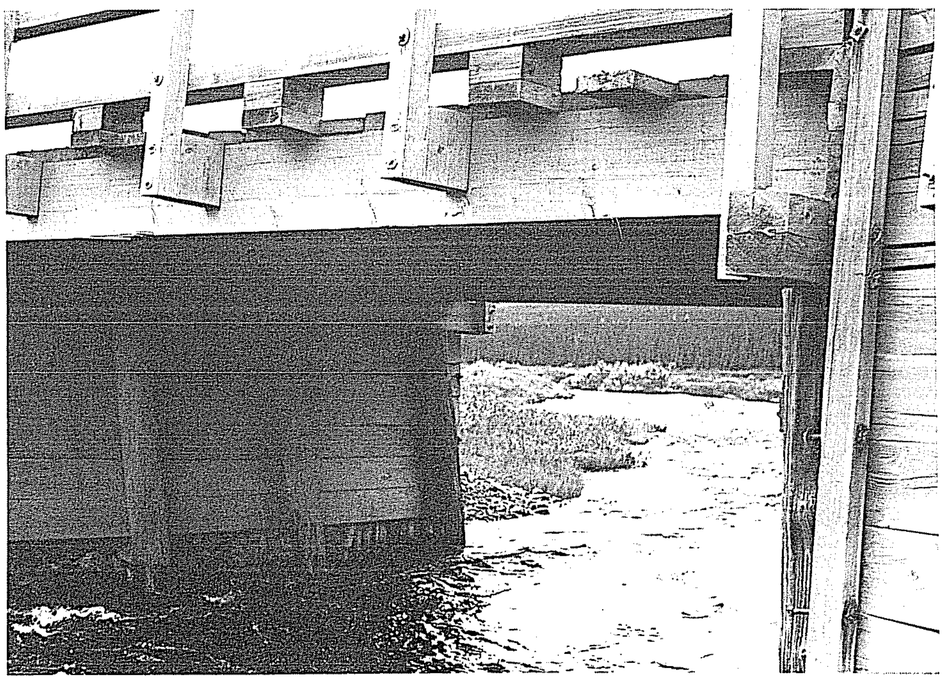


PHOTO 8.D.4 DENALI HIGHWAY BRIDGE. TYPICAL WOOD-FRAME STREAM CROSSING

OFF ROAD TRAIL IMPACTS

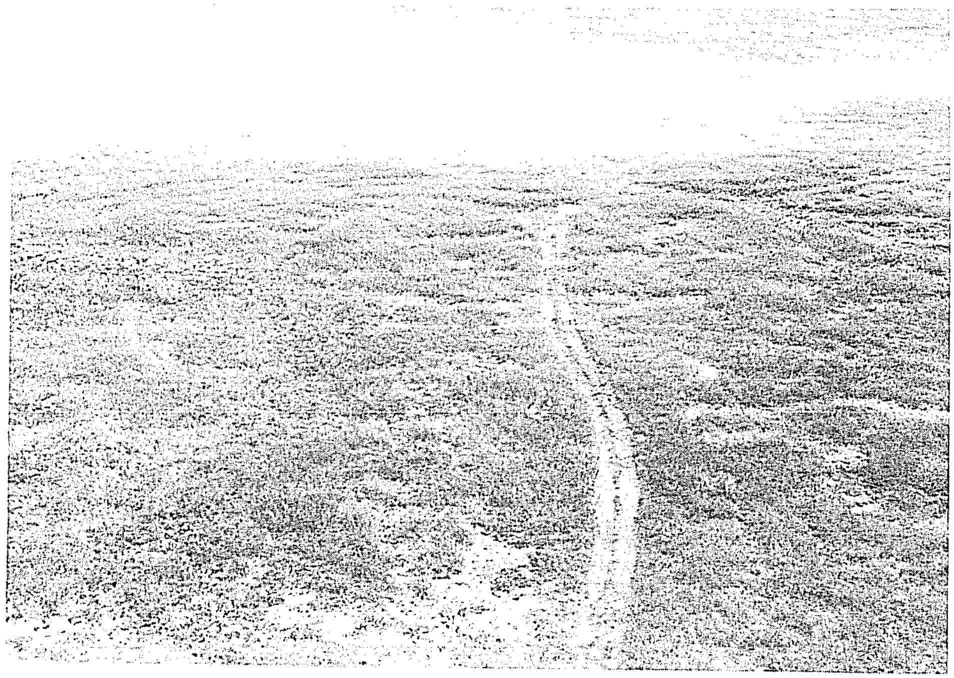


PHOTO 8.D.5 JEEP ROAD/TRAIL OFF DENALI HIGHWAY. TRACKS MADE BY VEHICLES IN THE TUNDRA ARE VIRTUALLY PERMANENT

PHOTO 8.D.6 ALL-TERRAIN-VEHICLE (ATV) TRAIL TO BUTTE LAKE. THIS TRAIL IS SEVERAL YEARS OLD AND IS CAUSING RAPID PERMAFROST THAW. EACH YEAR THE TRACK EXPANDS AS THE OLD MARKS BECOME LINEAR PONDS.

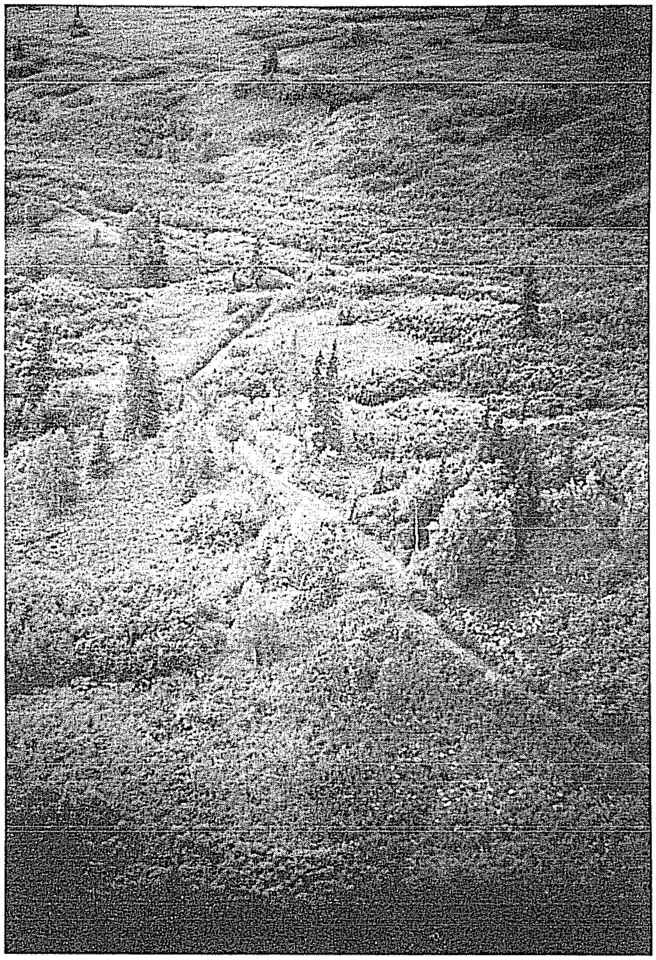


PHOTO 8.D.7 GOLD CREEK ORV TRAIL

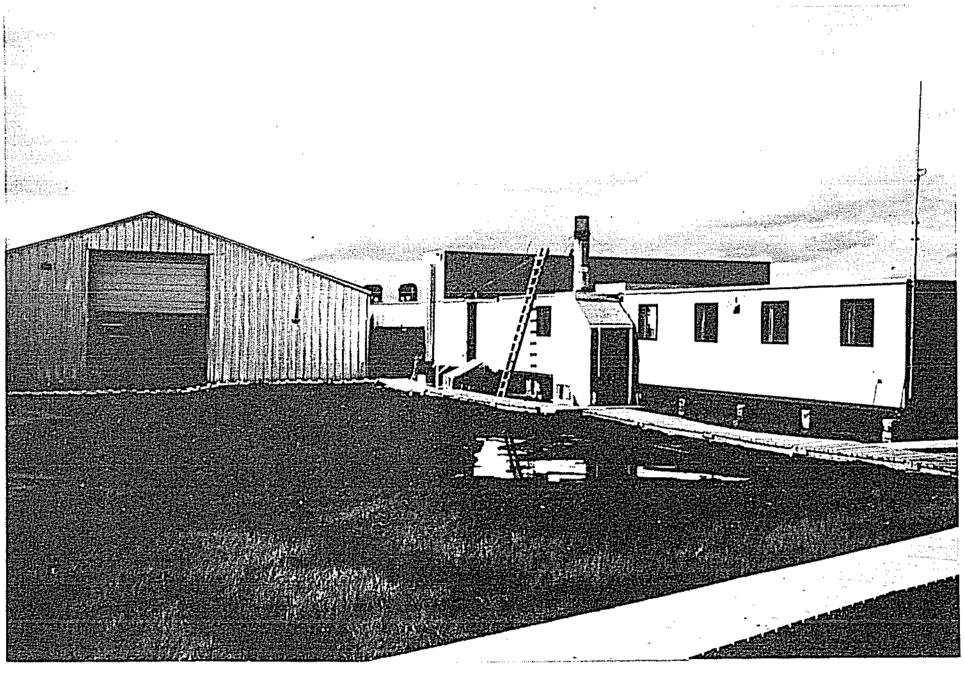


PHOTO 8.D.8 EXISTING WATANA CAMP.

CAMPSITE CONDITIONS

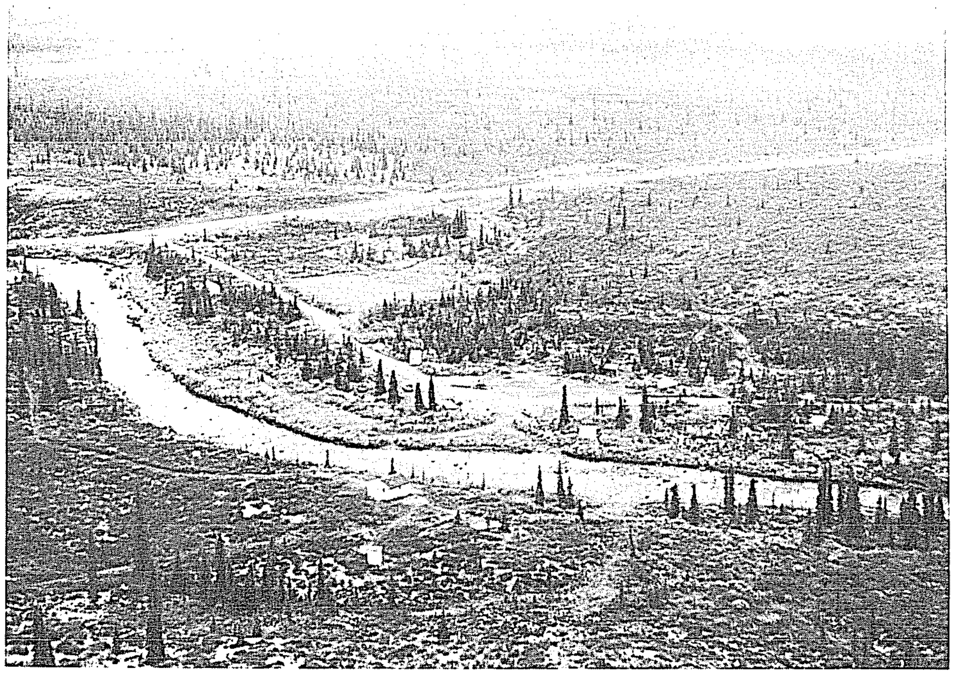


PHOTO 8.D.9 EXISTING BRUSHKANA CAMP-GROUND (BLM) OFF DENALI HIGHWAY – PROPOSED EXPANSION. THIS IS TYPICAL OF DEVELOPED CAMPGROUND DESIGN IN THE REGION. NOTE THE UNCONTROLED ORV TRACKS.

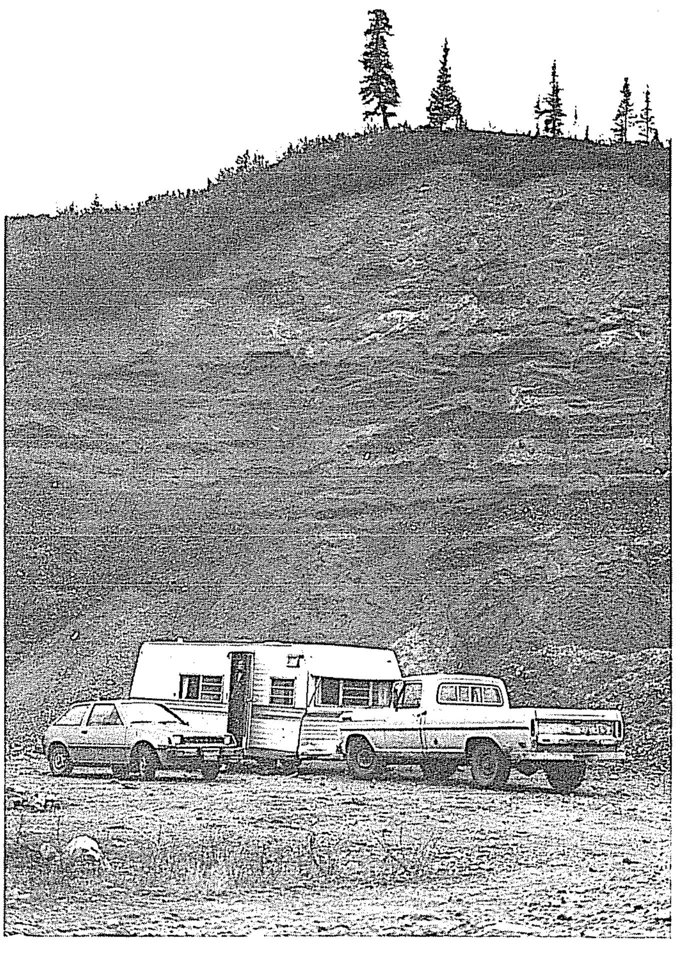


PHOTO 8.D.10 EXISTINS BORROW PIT ALONG DENALI HIGHWAY. BORROW PITS ADJACENT TO PUBLIC ROADS ARE POPULAR CAMPSITES FOR HUNTERS, FISHERMEN, AND OTHER RECREATIONISTS BECAUSE THEY ARE RELATIVELY DRY AND BUG FREE

TRANSMISSION LINE CONDITIONS

PHOTO 8.D.11 EXISTING TRANSMISSION LINES NORTH SIDE OF COOK INLET-SUSITNA RIVER LOWLANDS. NOTE THE HIGH VISIBILITY OF THE ALUMINUM TONE TOWERS

PHOTO 8.D.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 E8E

Examples of Reservoir Edge Conditions Similar to Those Anticipated at Watana & Devil Canyon Dam

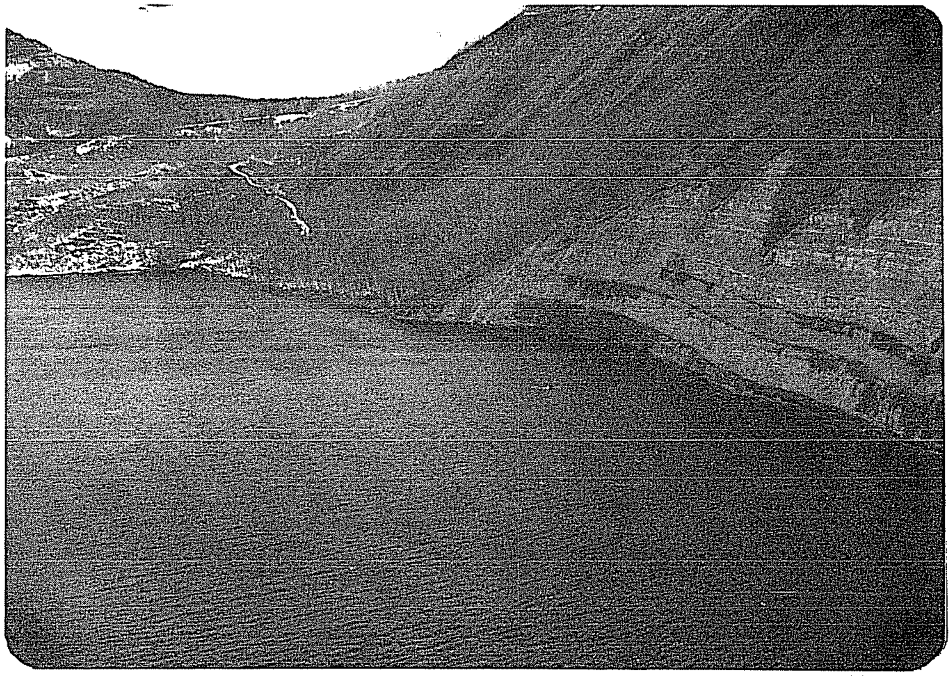


PHOTO 8.E.1 POTENTIAL RESERVOIR SLOPE / EDGE CONDITION (WILLISTON RESERVOIR - BRITISH COLUMBIA)

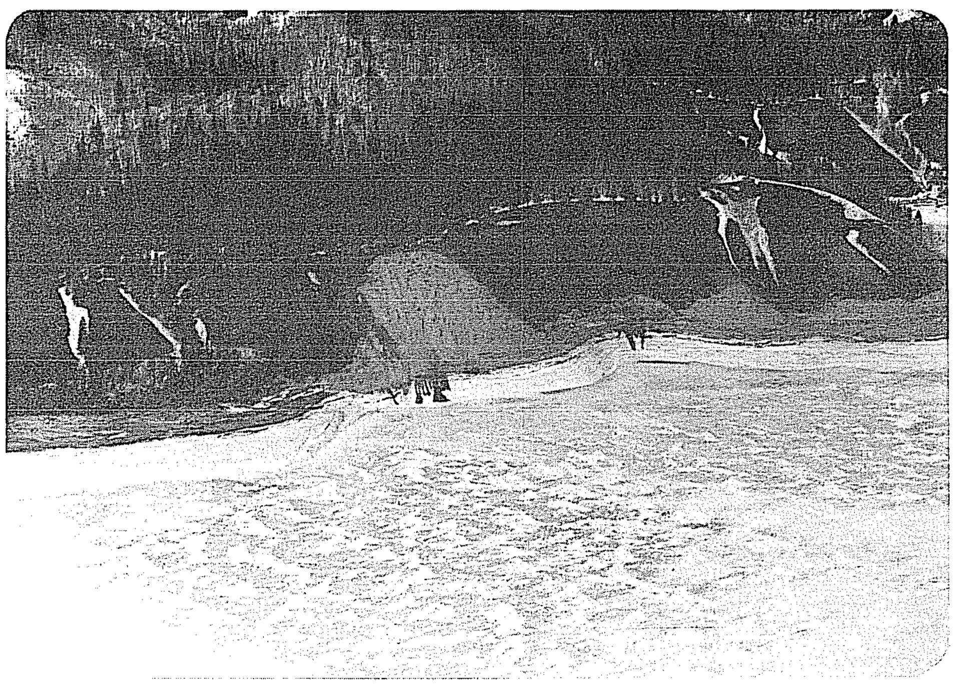


PHOTO 8.E.2 POTENTIAL RESERVOIR SLOPE / EDGE CONDITION (WILLISTON RESERVOIR - BRITISH COLUMBIA)

APPENDIX E8F

Project Features Impacts and Charts

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

WATANA PROJECT AREA 1 - 9
1 WATANA DAM

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Incompatible	
River Canyon	9 (A/L)	Incompatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Susitna River	8 (A/M)	Incompatible	Compatible (a,c)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

4 WATANA EMERGENCY SPILLWAY

FEATURE DESCRIPTION

- Rock cut channel, over 5000 ft (1515 m) long, 200 ft (60 m) wide and 30 to 50 ft (9 to 15 m) deep.
- Concrete spillway.
- As engineered will require cuts up to and over 100 ft (30 m) deep on the river's upper north terrace. The entire length will require cuts of this magnitude. Cut side slopes are 4 ft (1.2 m) vertical to 1 ft (0.3 m) horizontal.

FEATURE IMPACTS

- This spillway is also highly visible as the result of a bridge crossing (see Watana Main Spillway).
- The fuse plug dam will partially block views down the Rock Channel, however the extend cutting will be quite apparent.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Incompatible	Incompatible (c,d) Compatible (a)
Wet Upland Tundra	7 (B/L)	Incompatible	Incompatible (c,d) Compatible (a)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Incompatible	Compatible (a)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

6 WATANA SWITCHYARD

FEATURE DESCRIPTION

- Will occupy an area of approximately 650 ft (199 m) by 750 ft (227 m) above the dam on the north terrace.
- Miscellaneous electrical equipment - aluminum tone.
- Area will be paved with gravel and fenced.
- Origin point of two 345-kV transmission lines.

FEATURE IMPACTS

- Color and shapes of electrical equipment will stand out in this setting where there is little vegetation screening.
- The selected siting locates this switchyard along the view axis of the access road and causes it to be silhouetted against the skyline of certain points.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Incompatible (c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8 (A/M)	Incompatible	Incompatible (c) Compatible (a)
Wet Upland Tundra	7 (B/L)	Incompatible	Compatible (d)
Susitna Upland Terrace	7 (B/L)	Incompatible	Incompatible

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

8 WATANA PERMANENT TOWN

FEATURE DESCRIPTION

- Town Center - approximately 20 buildings.
- Road - perimeter.
- Surrounds a small lake approximately 35 acres (14 ha) in size.
- Supports 400 people of which 125 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.
- Extensive human activity in the wetland setting will cause serious degradation to the aesthetic character of the town resulting in less than optional living 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Incompatible (c,d) Compatible (a)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING Feature as Proposed	AESTHETIC IMPACT RATING W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Incompatible (a,b,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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 embracea 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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Compatible	Compatible

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Incompatible (b,c)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	
Susitna River	8 (A/M)	Incompatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Compatible (a,c)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

5 DEVIL CANYON EMERGENCY SPILLWAY

FEATURE DESCRIPTION

- Sloping rock cut channel over 1400 ft (424 m) long with an extending pilot channel - concrete - approximately 800 ft (242 m) in length. Main channel width is approximately 250 ft (75 m). Pilot channel is approximately 50 ft (15 m) wide.
- As engineered will require cuts up to 100 ft (30 m) deep on the river's high south terrace.
- Cut side slopes vary from 1.4 ft (0.4 m) vertical to 1 ft (0.3 m) horizontal and 10 ft (3 m) vertical to 1 ft (0.3 m) horizontal.
- Pilot channel terminates in a ravine which empties into the river.
- Concrete spillway - fuse plug.

FEATURE IMPACTS

Massive Rock Chute overwhelms the small scale of its natural setting and dominates the landscape setting south side of the dam.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Incompatible (c) Compatible (a)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Incompatible (c) Compatible (a)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

7 DEVIL CANYON SWITCHYARD

FEATURE DESCRIPTION

- Occupies a space of approximately 800 ft (242 m) by 1000 ft (300 m) on the north terrace above the dam.
- Miscellaneous electrical equipment.
- Area will be gravelled and fenced.
- Origin point of 2 additional 345-kV lines, which will join the 2 lines from Watana after crossing the canyon below the dam.

FEATURE IMPACTS

- Switchyard siting is in the principal view axis of the access road approach to the damsite.
- Aluminum tone and angular forms of equipment is a sharp contrast to the existing landscape character type which has little ability to absorb the facility.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Incompatible (c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Moist Tundra Uplands	8 (A/M)	Incompatible	Compatible (b,d)
Talkeetna Uplands	7 (B/L)	Compatible	Compatible (b,d)
Mid Susitna River Valley	5 (B/M)	Compatible	Compatible (b,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5 (B/M)	Incompatible	Incompatible (a,b,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5 (B/M)	Compatible	Compatible (c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5 (B/M)	Incompatible	Compatible (b,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Compatible (a,b,c,d)
Chulitna Mountains	9 (A/L)	Incompatible	Compatible (a,b,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Compatible (a,b,d)
Chulitna Mountains	9 (A/L)	Incompatible	Compatible (a,b,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Compatible (a,b,c,d)
Chulitna Moist Tundra Uplands	8 (A/M)	Incompatible	Compatible (a,b,c,d)
Devil Canyon	9 (A/L)	Incompatible	Incompatible (a,b,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Incompatible	Compatible (a,b,c,d)
Chulitna Moist Tundra Uplands	8 (A/M)	Incompatible	Compatible (a,b,c,d)
Devil Canyon	9 (A/L)	Incompatible	Incompatible (a,b,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9 (A/L)	Incompatible	Compatible (c)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	**W/ Mitigation**
Anchorage, Alaska	1 (C/H)	Compatible	Compatible (a,b,d)
Susitna River Lowlands	1 (C/H)	Compatible	Compatible (a,b,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Mid Susitna River Valley	5 (B/M)	Compatible	Compatible (b,d)
Devil Canyon	9 (A/L)	Incompatible	Incompatible (b,c)
Susitna River	8 (A/M)	Incompatible	Incompatible (b)
Chulitna Moist Tundra Uplands	8 (A/M)	Incompatible	Compatible (b,d)
Talkeetna Uplands	7 (B/L)	Compatible	Compatible (b,d,)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Nenana Uplands	5 (B/M)	Incompatible	Incompatible (b,d) Compatible (a,b,d)
Nenana River Lowlands	1 (C/H)	Compatible	Compatible (a,b,d)
Tanana Ridge	7 (B/L)	Incompatible	Incompatible (b,d) Compatible (a,b,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Susitna River	8 (A/M)	Compatible	Compatible (a,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

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	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Chulitna Moist Tundra Uplands	8 (A/M)	Compatible	Compatible (a,c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

3 SHELTERS

FEATURE DESCRIPTION

- Rustic log cabin type structures of 200 to 300 square ft (18 square m to 27 square m) in size.
- Used as a warming shelter and place to get in from the weather.

FEATURE IMPACTS

- Shelters are located in landscapes which are capable of absorbing this use.
- Specific sites will be chosen for minimal disruption.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Moist Tundra Uplands (Mermaid Lake)	8 (A/M)	Compatible	Compatible (c,d)
Chulitna Mountains (Tsusena Creek-Caribou Pass)	9 (A/L)	Compatible	Compatible (c,d)
Susitna Upland Wet Tundra Basin (Tyone River confluence W/Susitna)	7 (B/L)	Compatible	Compatible (c,d)

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

4 SEMI-DEVELOPED CAMPGROUND

FEATURE DESCRIPTION

- Walk-in designated campground area with hardened tent pad and fire pit for each unit.
- Rest rooms (pit toilet).

FEATURE IMPACTS

- Landscape settings contain sufficient topography and vegetation to absorb development with little aesthetic impact.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna Upland Terrace (Fog Lakes and Stephen Lake)	7 (B/L)	Compatible	
Chulitna Moist Tundra Uplands (Mermaid Lake)	8 (A/M)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

5 PRIMITIVE CAMPING

FEATURE DESCRIPTION

. General area designated but no development.

FEATURE IMPACTS

. No impacts anticipated.
. Overuse might cause vegetation and soil degradation in popular areas.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Mountains	9 (A/L)	Compatible	
Wet Upland Tundra	7 (B/L)	Compatible	
Susitna Uplands	7 (B/L)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

6 DEVELOPED TRAILS

FEATURE DESCRIPTION

- Cleared and hardened (compacted) trail 2 to 3 ft (0.6 m to 0.9 m) wide. Portions of established game trails may be utilized.
- Trail destination and mileage markers.
- Explanatory signage-landscape-environment-views.

FEATURE IMPACTS

- Trails will follow natural landforms and avoid areas where vegetation and soil degradation would result from human activity.
- Visual intrusion will be minimized.
- No impacts are anticipated.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Mountains	9 (A/L)	Compatible	
Wet Upland Tundra	7 (B/L)	Compatible	
Chulitna Moist Tundra Uplands	8 (A/M)	Compatible	
Devil Canyon	9 (A/L)	Compatible	
Susitna Upland Terrace	7 (B/L)	Compatible	
Susitna Uplands	7 (B/L)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

7 PRIMITIVE TRAILS

FEATURE DESCRIPTION

. Suggested trail corridors. No physical trail development.

FEATURE IMPACTS

. No impacts are anticipated from normal use.
. Potential negative impacts would result with overuse causing degradation of vegetation and soils.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Chulitna Mountains	9 (A/L)	Compatible	
Talkeetna Mountains	9 (A/L)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

8 TRAILHEADS
(Located along Access Roads, Reservoir Landings and at Lakes)

FEATURE DESCRIPTION

- Road pulloffs with parking for 3-5 cars. Same gravel surface as road.
- Trail destination and mileage markers.
- Reservoir trailheads will be anchored boat tie-ups.

FEATURE IMPACTS

Increases the scale of the access roads and potentially larger cuts and fills in these areas.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING: Feature as Proposed	AESTHETIC IMPACT RATING: W/ Mitigation
Wet Upland Tundra	7 (B/L)	Compatible	
Chulitna Mountains	9 (A/L)	Compatible	
Chulitna Moist Tundra Uplands	8 (A/M)	Compatible	
Devil Canyon	9 (A/L)	Compatible	
Susitna River	8 (A/M)	Compatible	
Susitna Uplands	7 (B/L)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

d. The use of form, line, color or textures appropriate to the landscape character type.

PROJECT FEATURES IMPACTS

STEPS 7,8

PROJECT FEATURE

9 SCENIC VISTA/ROAD PULLOFFS

FEATURE DESCRIPTION

- Parking for 3-5 cars adjacent to road. Same gravel surface as road.
- Explanatory signage of landscape-environment-views.

FEATURE IMPACTS

Increases the scale of the access roads with potentially larger cuts and fills in these areas.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7 (B/L)	Compatible	
Chulitna Mountains	9 (A/L)	Compatible	
Chulitna Moist Tundra Uplands	8 (A/M)	Compatible	

DEFINITIONS

a. Additional study required to consider alternative solutions, sites or corridor alignments with less impact on scenic quality.

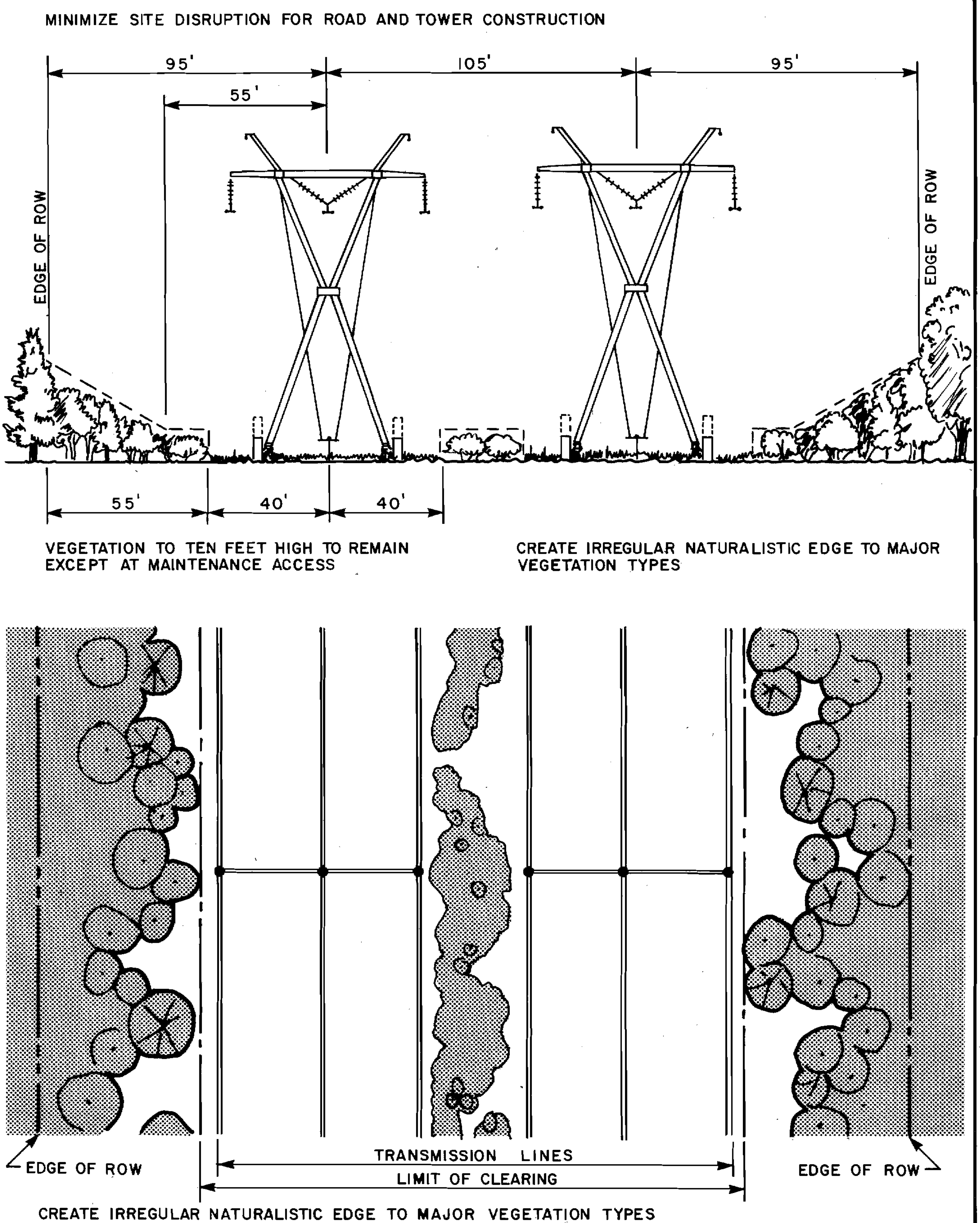
b. The use of best development practices to minimize construction-related effects on the landscape and to guide post-construction cleanup and rehabilitation of disturbed areas.

c. The use of creative engineering design to assure that project features are well designed and are in themselves positive visual features.

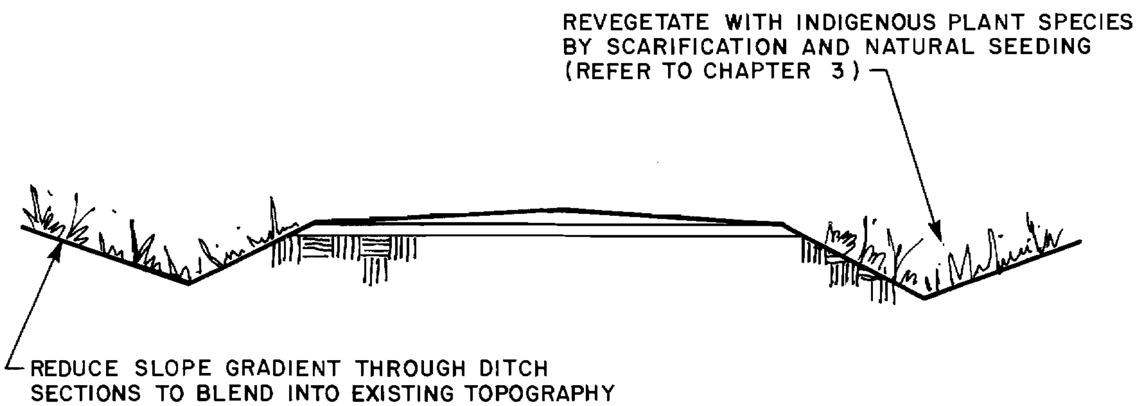
d. The use of form, line, color or textures appropriate to the landscape character type.

APPENDIX E8G

Illustrations of Possible Mitigation Measures

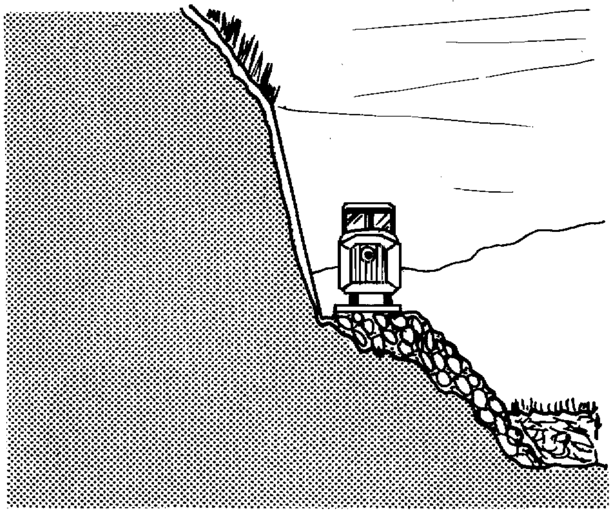


TYPICAL TRANSMISSION LINE CORRIDOR PLAN AND SECTION



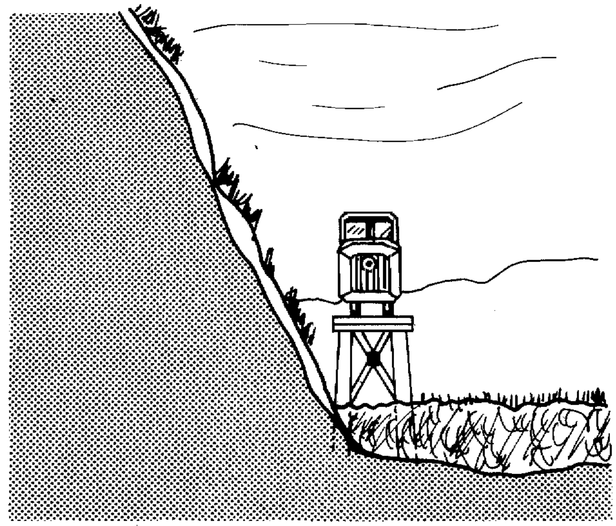
TYPICAL ROAD SECTION

PROPOSED RAILROAD SECTION

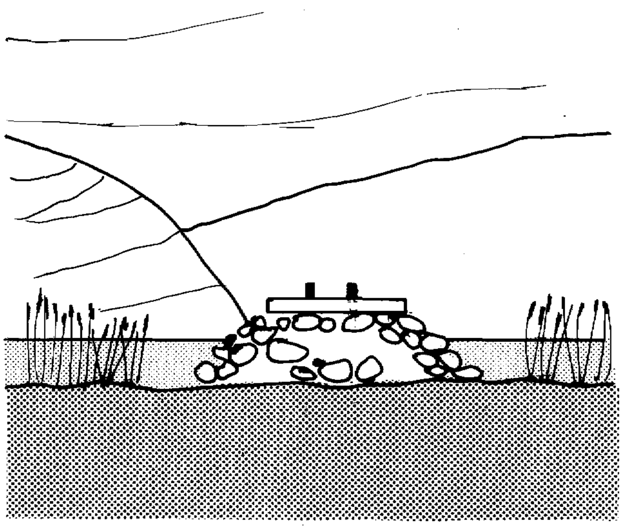


TO AVOID NEGATIVE VISUAL IMPACTS, CUTTING OF STEEP RIVER SIDE SLOPES SHOULD BE AVOIDED (MAXIMUM CONDITION).

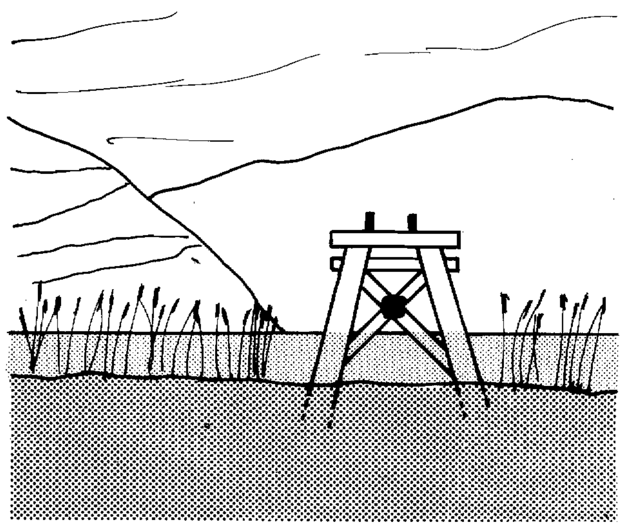
MITIGATION



TRESTLE STRUCTURES WOULD MINIMIZE SLOPE DISTURBANCE AND BE AN ATTRACTIVE FEATURE.

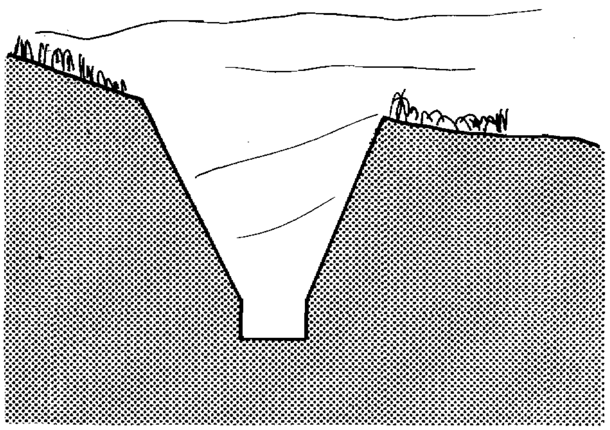


RAILROAD BEDS CONSTRUCTED WITH SUCH A FILL SECTION OVER WETLAND AREAS WILL RESTRICT NATURAL WATER FLOW RESULTING IN POTENTIAL BIOTIC AND AQUATIC IMPACTS.



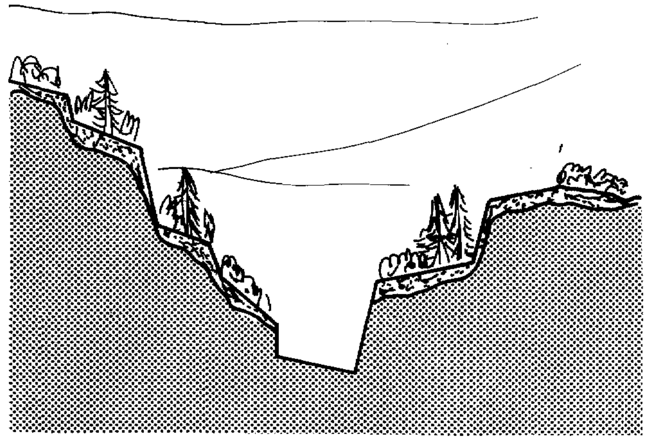
TRESTLE STRUCTURES OVER WETLAND AREAS WILL ALLOW NATURAL DRAINAGE AND LESSEN ENVIRONMENTAL AND AESTHETIC IMPACTS.

PROPOSED EMERGENCY SPILLWAY (BOTH DAMS)



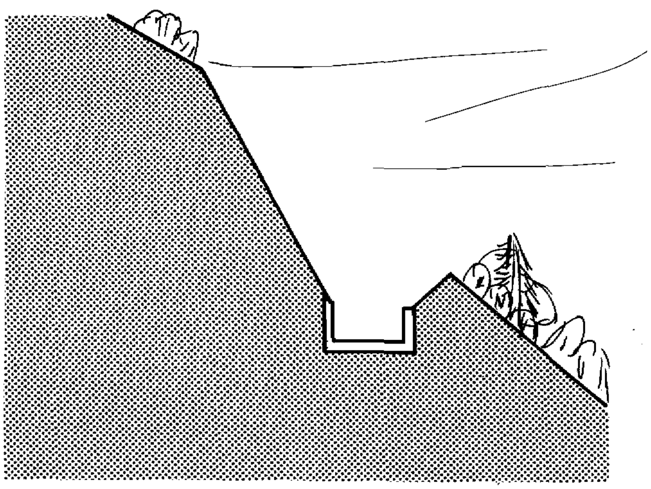
AS PROPOSED, THE EMERGENCY SPILLWAYS FOR BOTH DAMS WILL RESULT IN SIGNIFICANT VISUAL IMPACTS.

MITIGATION



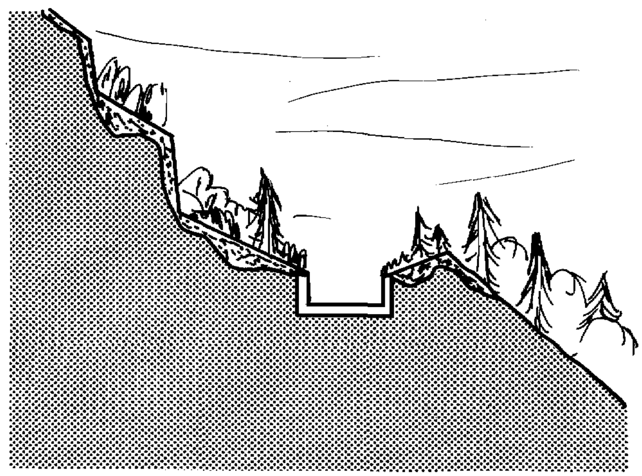
TERRACED SIDE SLOPES WOULD LESSEN ADVERSE VISUAL IMPACTS AND BE MORE IN CHARACTER WITH THE EXISTING LANDSCAPE.

PROPOSED MAIN SPILLWAY (BOTH DAMS)



STEEP CUT SIDE SLOPES DEVOID OF VEGETATION WILL BE VISUALLY UNATTRACTIVE.

MITIGATION



TERRACED SIDE SLOPES WITH SOIL POCKETS FOR INVASION OF NATIVE PLANT SPECIES WILL LESSEN ADVERSE VISUAL IMPACTS.

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) - Landscape Character Types are 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.

View Duration - The length of time an individual views the landscape from a particular position.

Rarity - A measure of the relative scarcity or commonality of the landscape. Due to Alaska's vast and numerous high-quality landscapes, rarity will have two levels of meaning for the purpose of this report.

SUSITNA HYDROELECTRIC PROJECT

VOLUME 8

EXHIBIT E CHAPTER 9

LAND USE

SUSITNA HYDROELECTRIC PROJECT

VOLUME 8

EXHIBIT E CHAPTER 9

LAND USE

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9 - LAND USE

1 - INTRODUCTION

The direct and indirect effects of the Susitna Hydroelectric Project on land use are analyzed and changes in use that would occur with and without the project are addressed in this chapter. The analysis considered project components, including the dams, reservoirs, the access transportation system, transmission, and construction camps and villages. The potential effects of the project are assessed in relation to three major land use factors: land use development, dispersed use and activity, and land ownership/stewardship. To avoid redundancy, certain land use aspects have been addressed in other chapters of Exhibit E. These are: Recreation in Chapter 7, Aesthetics in Chapter 8, Wetlands in Chapter 3, Navigation in Chapter 2, and Socioeconomics in Chapter 5.

Since the 1940s, the Susitna River has been considered for hydropower development and several preliminary plans for such development have been prepared (see Figure E.9.1). 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 and focuses on a two-dam development: one at Devil Canyon and one near Tsusena Creek (Watana damsite). These two structures would create elongated reservoirs 0.5 to 1 mile (0.8 to 1.6 km) wide, except for a portion of the Watana reservoir, which would be 5 miles (8 km) wide.

Land use activity and development within the project area has been minimal. Historical land use activity has been hunting, fishing and trapping. Land use development has been related mainly to hunting and fishing activities.

Summaries resulting from land use analysis have been presented previously in Alaska Power Authority, Susitna Hydroelectric Project, Environmental Studies Subtask 7.07: Land Use Analysis, Phase I Report, April 1982.

1.1 - Purpose and Approach

1.1.1 - Objectives

The land use analysis includes an evaluation of the changes in land use likely to be caused by the project and provides the basis for summarizing the overall land use impacts of the project. The analysis was designed to provide baseline data and an impact assessment to:

1.1 - Purpose and Approach

- Describe past, present, and future land use;
- Identify potential changes in land use resulting from the development of the project;
- Describe past, present, and potential future land status;
- Identify potential changes in land status resulting from the project development;
- Evaluate the project's impacts on land use and land status; and
- Identify mitigative measures to minimize impacts.

The scope of work is temporally limited from 1940 to present and geographically by study area boundaries established during the first year of the analysis (Chapter 1 of Exhibit E).

The land use analysis describes and evaluates land development, dispersed use activities and land management. It does not generate data concerning the use of the land by various animal species, nor does it include other detailed descriptions of the physical environment. Information on these subjects is provided in Chapters 3 and 6 of Exhibit E.

1.1.2 - General Discussion of Land Use Evaluation Procedures

Present land use development in the Susitna Project area is subtle and widely dispersed. Aerial photographs and topographic maps were used to locate cultural features such as trails, structures, and other indications of past and present land use. An oral history technique was employed to aid in identifying present dispersed land use activities. Present patterns of human land use within the project area and the forces that created different types of use were evaluated. Aerial and ground surveys verified many of the present land use patterns discernible from the oral history interviews.

The land use analysis is divided into two parts: historic and existing land use, and future land use. Land use during these periods is described by summarizing acquisistion and settlement, land management, and the use or alteration of specific resources.

Three categories were considered when analyzing land use change: 1) dispersed and isolated non-site-specific activity; 2) land use inherently associated with site-specific activity; and 3) resource management.

Dispersed and isolated non-site-specific activity includes patterns of activity that are generally non-contiguous and do not involve a commitment of resources at any particular site. These include consumptive, recreational, or subsistence activity such as hunting and fishing; and dispersed activity such as camping, hiking, and photography.

Land use inherently associated with site-specific activity includes that involving some form of long-term development or other commitment of resources. These include residences, commercial properties (primarily recreational), mining, agriculture, and transportation.

Resource management involves consideration of present and proposed land management plans developed by agencies with existing or pending jurisdiction. Examples are fish and wildlife management, dispersed recreation management, and off-road vehicle management prepared by federal, state, or local agencies, or Native corporations. Native claims, land values, and status of land ownership were also considered during land use analysis.

1.2 - Summary of Current Land Status Issues in the Project Area

The land status in the project area is complex. Most of the land in the Susitna drainage area is owned by the Bureau of Land Management (BLM). There are two state land disposal areas west of the project, and small, private parcels, and Native-conveyed land in the project area. The Alaska Statehood Act of 1958 and the Alaska Native Claims Settlement Act of 1971 (ANCSA) withdrew the land in the project vicinity from development and acquisition. The Statehood Act authorized the state to select 100 million acres (40 million ha) of federal land in Alaska. These land selections triggered Alaska Native protests over the land selections. The resolution of the dispute over possessory rights of the Alaska Natives was the enactment of ANCSA (Price 1982). Under ANCSA, the Alaska Natives received over 40 million acres (16 million ha) of land and approximately $1 billion. Furthermore, the Alaska Native villages were required to incorporate under state law. Most of the lands in the dam and impoundment vicinity have been withdrawn for Native and state selection (Arnold 1978).

The Cook Inlet Region, Inc. (CIRI) and associated village corporations have selected lands along the river. Some lands along the river have been conveyed from the BLM to CIRI, and are subject to Section 24 of the Federal Power Act.

The state also selected land along the Susitna River. State selection has been suspended until the Native corporations complete their selection. Upon conveyance of Native selections, the state will assume the remaining selected lands for its selection allotment.

1.3 - Summary of Land Use in the Project Area

1.3.1 - Historical Land Use

The magnitude, isolation, and location of the Susitna project area in a subarctic environment result in extremely low-density land use. Historical artifacts are of great significance for the overall characterization of activities within a certain time period and geographic location. Their existence indicates explicit human activity and provides a clear description of the basic activity carried on by man in that area.

Historical artifacts which were identified to describe past activities included manmade objects used in the project area between 1940 and 1980. Information relating general location and use to each existing artifact was reported by oral history interviewees directly associated with the project area, current-day users of the project area, and researchers working at specific project area locations. All reported artifacts were located and verified in the field and were used to identify previous land use in the project area. Historical artifacts found within the project area were 1) structures, which include cabins, cabin foundations, food caches, lean-to's, storage sheds, buildings, lodges, and tent platforms; 2) roads, trails, airstrips; and 3) other objects, such as abandoned vehicles, bridges, etc.

Structures are associated with activities such as hunting, fishing, trapping, food or equipment storage, research, recreation (such as skiing, swimming, and photography), and mining. Basic categories covering the frequency in which the existing structures were used consist of: 1) no use; 2) past seasonal use; 3) past and present seasonal use; 4) past year-round use; 5) past and present year-round use; and 6) no use information.

Most of the historical artifacts are associated with some means of access. Unpaved roads and trails were used for access to and from certain points in the project area. Horses, as well as vehicles such as tracked vehicles, four-wheel drive vehicles, rolligons, and dog sleds were used for freighting, for transportation within the area, and for access to the project area. Airstrips on gravel bars or flat ground were commonly located in the proximity of other historical artifacts such as cabins, trails, or lodges. Trails emanate from existing structures and connect with airstrips, lakes (on which ski or floatplanes landed), fishing streams, or another structure.

A review of the historical artifacts reveals that they were sparsely distributed throughout the project area and used on a seasonal basis. The majority of the artifacts were used for hunting, fishing, trapping, boating, mining, or other general recreation purposes, such as cross-country skiing or photography.

The artifacts were most densely located near the aggregations of lakes that are accessible by air.

Details of historical land use in the project area are presented in the Alaska Power Authority, Susitna Hydroelectric Project, Environmental Studies, Subtask 7.07, Land Use Analysis, Phase I Report, April 1982.

1.3.2 - Existing Land Use

Existing land use activity and development has evolved from the utilization of the resource base as a source of income, food, shelter, and recreation. As in the past, access continues to determine the types and levels of land use in the Middle Susitna River Basin. Trails represent environmental modifications and reflect general use patterns.

(a) Land Use Activity

Existing use patterns have been identified for hunting, fishing, trapping, mining, recreation, and hydroelectric research. Access is by means of road, trails, waterways or air. The most intensive activity is concentrated along the Denali Highway and at established lodges and cabins.

(b) Land Use Development

Developments typically include small clusters of cabins. There are approximately 109 structures within 18 miles (30 km) of the Susitna River between Gold Creek and the Tyone River, including four lodges involving 21 structures. Concentrations of residences, cabins, or other structures are near Otter Lake, Portage Creek, High Lake, Gold Creek, Chunilna Creek, Stephan Lake, Clarence Lake, and Big Lake. Some sections of the transmission corridor, particularly near the Alaska Railroad and Parks Highway, include land developments; other sections have virtually no developed land use.

The greatest concentrations of development are in the Stephan Lake area (13 cabins, one lodge, outbuildings, and airstrip) and the Portage Creek mining area (19 cabins and related buildings). Chunilna Creek and Gold Creek also have some mining development. Three commercial lodge operations are located at High, Tsusena, and Stephan lakes.

1.4 - Summary of Land Use Management Planning in the Project Area

There has been little land management, and there are no definitive comprehensive land use plans in effect for the project area. The state and Mat-Su Borough have initiated preliminary resource studies that serve as the basis for policy development.

1.5 - Summary of Major Anticipated Land Use Changes

The construction of a two-dam hydroelectric project, access transportation system, transmission facilities, construction camps and villages, recreation facilities, and other components is a major development, especially in a wilderness area. It will create developed areas, increase access and activity patterns, effect transfer of land ownership, and redirect land management.

1.5.1 - Land Status

The proposed project will be located in areas involving significant amounts of Native and state selected lands. Implementation of the project will require purchasing or obtaining rights-of-way to project lands. Increased land management will be required to respond to increased use.

1.5.2 - Land Use Activity

The project will result in significant increases in activity patterns in the middle Susitna Basin involving hunting, fishing, camping, boating, and dispersed recreation. Persons who currently use the Middle Susitna Basin will have to adjust to the increased use or move to other areas.

1.5.3 - Land Use Development

The project will result in removal of ten structures in the impoundment areas. Construction and emplacement of facilities will involve conversion of land to project use.

Significant impacts involve the loss of Devil Canyon and Deadman Falls, and considerable surface disturbance resulting from construction activities. The remote character of many areas will diminish with the installation of large-scale, man-made facilities. The access road will pass within 1.5 miles (2.5 km) of a remote wilderness lodge on the shores of High Lake.

Some negative impacts can be reduced through careful placement of project facilities and the rehabilitation of disturbed surface areas. Policies to control the extent and location of use can be instituted to minimize and confine negative impacts resulting from increased access.

Assessment of project construction and operation impacts involves comparison of the potential direct and induced changes in land use with the land use patterns likely to evolve in the absence of any project. Making a definitive forecast of future land use for the project area is affected by many factors, including:

- Subtle and dispersed land use patterns;

- Little active land management; there are no comprehensive management plans that would indicate future use;

- Unresolved questions of land ownership and tenure: federal and state agencies and Native groups are presently involved in a process of selection and transfer of lands; and

- Minimal land use activity due to the remoteness of the area.

2 - DESCRIPTION OF EXISTING LAND USE

2.1 - Description of Existing Land Status in the Project Area

The procedures for land acquisition in Alaska are complex, as illustrated in Figure E.9.2.

Table E.9.1 displays various land holdings in the vicinity of the proposed project impoundment area, and Table E.9.2 summarizes those holdings by status/ownership category.

Figure E.9.3 illustrates the land status in the impoundment area. Figure E.9.4 illustrates the land status in the vicinity of the Anchorage-Willow transmission line. Figures E.9.5 and E.9.6 illustrate the land status of the Healy - Fairbanks transmission line vicinity.

The following definitions of land classifications pertain to the lands within the vicinity of the Susitna project.

Federal: Lands under jurisdiction of the BLM, the Alaska Railroad, or the U.S. Department of Army or Air Force.

Native Allotments: Native individuals were allowed by the Native Allotment Act of 1906 to file for allotments of up to 160 acres on unoccupied federal land.

State Selected: The state receives land from the federal government in a three-step process. The state first applies to the BLM for land that becomes classified as state selected.

State Selection Tentatively Approved or State T.A.: State selected land approved by the federal government for transference to the state.

State Selection Patented: Federal lands conveyed to the state.

Once patented, the state of Alaska will classify land in one of the following classifications to identify its resource value.

Agricultural	Material	Resource Assessment
Commerical	Mineral	Resource Management
Forest	Private Recreation	Utility
Grazing	Public Recreation	Watershed
Greenbelt	Reserved Use	Wildlife Habitat
Industrial	Residential	Unclassified

Land may be reclassified or declassified if a new land use plan, or an amendment to the original land use plan, determines that such action is appropriate.

2.1 - Description of Existing Land Status in the Project Area

The following classifications have been made in the vicinity of the project, including the transmission lines.

- Private Recreation Land: Land classified as private recreation because its rural location, physical features, or adjacent development is suitable for private, low-density recreational development. No land may be classified private recreation until present and potential public recreation needs in the area have been considered. Private recreation land is available for mineral leasing, sale, lease, or disposal, including remote parcel disposal.

- Agricultural Land: Land classified as agricultural because its location, physical features, and climate may be suitable for agricultural use. Agricultural land is available for mineral leasing, disposal of materials and timber, and for sale or lease of agricultural rights to private individuals for agricultural use. Each agricultural parcel has a 5 acre homesite available for patent.

- Material Land: Land classified as material land is most appropriately used for the extraction of materials such as sand, gravel or stone, and where the removal of the material would prevent other use. Material land may be used for purposes other than the extraction of materials if such uses are compatible with the primary use. The area must be restored to a condition compatible with adjacent uses once material removal is complete. Material land is not available for disposal.

- Resource Management Land: Land classified resource management is an area identified as containing surface or subsurface resources (i.e., minerals, timber) that are especially suited to multiple-use management. Resource management land is not available for disposal.

- Utility Land: Land classified utility does not lend itself to classification under other categories because of small or irregular tract size or because its proposed use is not covered under other categories. Utility land is available for lease and disposal.

- Unclassified Land: Unclassified land is available for mineral leasing, the acquisition of rights to locatable minerals, the limited disposal of material and timber, the lease of small scale right-of-ways, and municipal selection.

Borough or Municipality Approved or Patented: If state patented land is vacant, unappropriated, or unreserved for a particular use, a borough or a municipality can select the land until it fulfills its entitlement through a process similar to that used by the state in selecting federal lands. Borough or municipal selections can be made from utility or unclassified land. State classification is inapplicable upon conveyance.

2.1 - Description of Existing Land Status in the Project Area

State Selection Suspended: Due to the conditions in land status in south-central Alaska, some state selections in the project vicinity were suspended until lands selected by Natives have been conveyed under the provision of ANCSA. The Cook Inlet Land Exchange, Public Law 94-204, has an extensive Terms and Conditions document which allows the state to acquire previously selected land after the conveyance of corporation selected lands to CIRI.

Regional Corporation Selection: Lands selected by the regional corporations under provisions of ANCSA are selected similarly to those by the state.

Region Corporation Selection Patented: Federal lands conveyed to the corporation. Interim conveyance is allocated to the corporation if the selected lands have not been surveyed.

Village Selection: Federal lands selected by Alaskan Natives, under provisions of the ANCSA. The lands have traditionally been used for their commercial resource value and subsistence hunting and fishing. Most village corporations select land near villages or along rivers. The village receives the surface rights and the regional corporation receives the subsurface rights.

Village Selection Patented: Village selection conveyed to the village corporation by the BLM. Interim conveyance is allocated to the corporation if the selected lands have not been surveyed.

Village corporations in the Cook Inlet Region receive village-selected land by reconveyance from the regional corporation, not the BLM. The procedure for conveyance and reconveyance in the Cook Inlet Region is exceptional to ANCSA. Normal procedures are that the region and village corporations select preferred land and the BLM conveys land directly to the corporation.

By 1971, land in the Cook Inlet region had been patented to such an extent that the Native corporations could not select their allocation of usable lands within a BLM requirement of contiguity. The BLM classifies these lands the Talkeetna Mountain Deficiency Lands.

Public law 94-456 allows the CIRI corporations to select land in a checkerboard pattern. The BLM will convey a contiguous land selection to CIRI and CIRI will reconvey the alloted lands selected by the villages.

The BLM had owned all the land in the project area except for some small private parcels. Mining claims for placer mining presently occur primarily on federal and state land near Ester. Three low to medium density mining areas are in the project impoundment vicinity. Private parcels occur near Healy at the south end of the corridor, and in the vicinity of Ferry, Nenana, and along Ester Creek in a mining district at the north end of the Healy-Fairbanks transmission route.

2.1 - Description of Existing Land Status in the Project Area

State selection suspended land exists above and below the Native selection along the Susitna River.

The Devil Canyon and a portion of the Watana impoundment areas lie within the boundaries of CIRI selected land. Portage Creek, Stephan and Fog Lakes are also within CIRI selection. Other Native regional corporation selections include land in the Cantwell vicinity selected by Ahtna, Inc., and Doyon, Ltd. selected land in the Healy-Fairbanks transmission line route.

The BLM has interimly conveyed to CIRI some sections adjacent to the Susitna River. Part of these lands, however, have been filed as valuable lands to the United States for water-power sites. Therefore, the sections of land within the project impoundment area that have been conveyed to CIRI are subject to the reservations of Section 24 of the Federal Power Act. The land is open for entry and selection as a power site and will not be destroyed for use as a power site by the owner. No claim to compensation shall accrue from the occupation of the land by the owners. Payment of damages to land use improvements will be made to the owner in the case the site is selected for water-power development. Controversy exists about the interpretation of the rights of the landowner and of the water-power license under Section 24 of the Federal Power Act.

The Watana-Devil Canyon access road traverses the state lands and Native selected land. The Denali Highway - Watana access road traverses across BLM land. The Denali Highway from Cantwell to the access road intersection traverses across state selection patented or tentatively approved land, and Native village and regional selected land.

The Indian River Subdivision and Remote Parcel are private recreational land west of the project impoundment area north of the Susitna River. The Indian River Subdivision (T33N, R2W, Seward Meridian) lies near mile 168 of the Parks Highway, northwest of Chulitna Butte. The disposal area has been subdivided into roads and 139 lots averaging 5 acres (2 ha) per lot. The Indian River Remote Parcel, located northeast of the confluence of the Susitna and Indian Rivers, is south of the Indian River Subdivision. This remote parcel (T31-32N, R2W S.M.) is located east of, and adjacent to, Denali State Park. The Indian River Remote Parcel will be divided into 75 parcels.

The Willow - Anchorage transmission corridor extends across Fort Richardson Military Reserve for 18 miles (29 km), then across the municipality of Anchorage patented and selected lands, and Matanuska - Susitna Borough property located approximately 10 miles (16 km) north of Anchorage and east of Knik Arm. The Susitna Flats State Game Refuge is resource management land within the Anchorage - Willow transmission route. The predominant resources identified are public recreation and wildlife habitat. Approximately 5 miles (8 km) of the line will traverse across the Point MacKenzie agricultural sale property. The remainder of the transmission line route extends across state land until the vicinity of Willow. At Willow the study area encompasses Holstein Heights Subdivision, state private recreation land in Section 20, Township 15 North, Range 4 west of the Seward Meridan (see Figure E.9.10). Private land is interspersed with Mat-Su Borough selected land. The selection of the proposed route avoided private lands to minimize the impact of the line to residents (see Figure E.9.4).

The Healy-Fairbanks transmission corridor traverses the U.S. Air Force Clear M.E.W.S. Military Reserve land for approximately 10 miles (16 km) in the vicinity of Anderson. The line extends across state selected land, much of which has been patented or tentatively approved. The transmission route between Healy and Fairbanks will pass the Keystone Extension (Section 10, T1S, R2W, FM), Alder View (Section 21, T1S, R3W, FM), Healy Small Tracts (Section 12, T1S, R8W, FM), and Northridge Subdivisions (Section 17, T1S, R2W, FM) on the west side of the Parks Highway. The proposed line will parallel an existing transmission line when traversing these private recreation disposal areas. Numerous material land sites are located within the Healy-Fairbanks transmission line route. The Healy-to-Fairbanks transmission route extends across Fairbanks North Star Borough selected land at the north end of the corridor (see Figure E.9.5 and E.9.6). A number of proposed land disposal areas exist along the transmission corridor. The exact location, future status, and potential for impact of these areas is being discussed with the Alaska Department of Natural Resources.

Existing values for land required for project use have not been established by any federal, state or Native agency. State land disposals have been acquired privately by lottery. The right-of-way for the Alaska Power Authority's Willow-Healy transmission intertie line has been appraised. Land value of the proposed transmission routes may be similar where adjacent to that route and higher as the proposed routes encroach upon the increased land use development and management of Anchorage and Fairbanks.

2.2 - Description of Existing Land Use in the Project Area

2.2.1 - Description of Land Use Evaluation Procedures

Specific procedures and steps involved in the land use analysis are discussed below.

(a) Study Areas

Based upon preliminary project descriptions, three study areas (Zones 1, 2, and 3) were defined for existing land use analysis (Figure E.9.7). These zones were designated according to geographic and land use relationships with the proposed project and extend in varying widths from the Susitna River between the mouth of the Tyone River and Gold Creek.

2.2 - Description of Existing Land Use in the Project Area

Zone 1 includes those structures and land uses that would be affected by inundation. Zone 2, extending about 6 miles (10 km) from Zone 1, is based upon the location of lakes which characterize aggregations of land use. Zone 3, extending approximately 12 miles (20 km) beyond Zone 2, is distinguished by fewer aggregations of land use; existing structures and land use are sparse. In addition to an assessment of the effects of the dams and impoundments and closely related facilities, the land use analysis also involved evaluating the impacts of the transmission line routes. To investigate these concerns the transmission corridors between Anchorage and Willow and between Healy and Fairbanks were analyzed.

(b) Literature Review

A general literature search was initially conducted to determine what land use and resource management might be expected in the project area. The search included a review of available public and private agency planning documents, historic accounts of the area, and any specific historical documents. As they became available, additional private and public agency documents were acquired and researched.

(c) Aerial Photography and Map Reconnaissance

Aerial photographs and topographic maps were used to locate certain cultural features such as trails, habitations, and other indications of past and present land use. Old maps from historical texts and early geological surveys were reviewed for foot and sled trails and for mining sites. Maps available at the University of Alaska library and museum and from the U. S. Geological Survey were reviewed for indications of past land use. Agency maps and aerial photos were examined to obtain information concerning all-terrain vehicle (ATV) access, tractor trails, roads, landing strips, and guide camp locations.

(d) Interviews

Two types of interviewing were used. Oral history interviewing was undertaken to reconstruct a land and resource use history of the Middle Susitna Basin. This history focuses primarily on the area surrounding the Susitna River between Gold Creek and the Denali Highway, where the proposed project would be located. Consideration of adjacent areas was necessary, however, to put the history of the project area into perspective. The interviews were nondirected, in that, while there was specific format and data needs, the interview was conducted so as to appear informal to the respondent. The interview process and a list of interviewees are available in Subtask 7.07 of Alaska Power Authority, Susitna Hydroelectric Project, Environmental Studies, Phase I Report, 1982.

A second type of interviewing was designed to seek information from land management agencies concerning present land use, current management direction, and alternative future management strategies, depending upon whether or not the Susitna Hydroelectric Project is built. Management agencies contacted and the questions asked of agency personnel are available in Subtask 7.07 referenced above. Additional contacts with agencies have been made during the course of the study to provide for exchange of information and data.

(e) Field Reconnaissance

Field surveys permitted existing land use data to be certified and refined by locating, mapping, inspecting, and photographing the historical artifacts reported during the interviews. Field surveys were approached from a dual perspective: by aerial surveys and by ground verification surveys. Field surveys in proposed development locations were employed to locate important natural features and to estimate potential impacts on the area's resources.

Aerial surveys accounted for the macroscopic verification (geographic location) of the reported historical artifacts and use information. Once located, these artifacts were recorded, mapped, and photographed. Information from aerial surveys was also used as a basis for establishing priorities for ground truthing. These priorities were based on sites of historic interest and sites for which limited information was available.

(f) Compilation of Land Use Inventory

Land use data were summarized both chronologically and geographically. Since land use was analyzed within a temporal as well as a geographic context, time cut-offs and zone boundaries were established for analysis and expression of data. The data were summarized by decade and then analyzed according to a combined geographic time period interaction to detect any major data gaps.

Information concerning existing land uses, dispersed use activity, land status and ownership patterns, and management activity was summarized.

2.2 - Description of Existing Land Use in the Project Area

(g) Access Road and Transmission Line Analyses

Land use was a consideration in the evaluation of alternative routes for the access road and selection of the recommended corridor and route for transmission lines. Techniques specific to these project components were employed both in the selection process and in the impact assessment for the proposed routes.

(h) Project Impact Assessment

Various project facilities were assessed to identify changes in baseline land use likely to occur as a result of the project. Impacts were determined by making qualitative and quantitative estimates of the potential changes in the baseline land use.

(i) Mitigation

Mitigative measures that would minimize project impacts were identified. In some cases, project impacts have been reduced through selection of design options having less impact than others. Where this was not possible, mitigative proposals have been identified for consideration in subsequent planning and design refinement.

2.2.2 - Existing Land Use Activity

Figure E.9.8 identifies the location of land use aggregations for recreation, mining, and residential activities, and quantifies the intensity of use.

Low intensity areas contain one dwelling or less per acre. Medium intensity designates a concentration of two to four dwellings per acre. High intensity areas support five or more dwellings per acre (ADNR 1980).

(a) Zone 1

Little activity in the way of trapping and mining currently takes place in Zone 1, especially compared to those pursuits in Zone 2 and Zone 3. Although hunting is also less common in this zone than in either of the other two, some hunting does occur, especially from tent camps.

River-related activities 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.

Another Zone 1 activity involves hydroelectric research. Following preliminary studies, the Bureau of Reclamation proposed in 1952 that the Susitna be considered for potential hydroelectric development. Since then, there have been many feasibility, design, and environmental studies of the proposed inundation zone and adjacent areas. These studies combined most likely have contributed more total man-days of use in the area in the past twenty years than all other uses.

(b) Zone 2 and Zone 3

Zone 2 is the area extending about 6 miles (10 km) from Zone 1. Thus, Zone 2 encompasses the area downstream from Devil Canyon, including the river. Some significant activity occurs along the river in this region. Salmon fishing represents an important activity in this part of Zone 2 since salmon are found to migrate up the Susitna as far as Devil Canyon. Individual and 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 many tributaries. Some canoeing and rafting takes place from just below Devil Canyon to Talkeetna. Some canoe enthusiasts portage between the lakes in the Stephan Lake vicinity and canoe to Talkeetna via Prairie Creek and the Talkeetna River.

(i) Hunting

Lodges typically handle 15 to 25 guests at a time and about 140 guests per season. The increasing popularity of sport hunting in the 1960s caused an increase in the number of small cabins on many of the lakes in the project area. Both guided and non-guided hunting occur within the project area, particularly near Stephan, Fog, Clarence, Watana, Deadman, Tsusena, and Big Lakes, in addition to many of the area's smaller lakes. Both lodges and cabins provide the field bases for many hunters.

(ii) Fishing

Fishing in the project area occurs either as a separate pursuit or in close association with other activities, such as hunting and trapping. Fish present in the area's lakes and streams include burbot, grayling, rainbow trout, Dolly Varden, lake trout, and whitefish. 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.

(iii) Trapping

Present 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 set sporadically by aerial trappers in the easternmost portions of the Susitna valley.

(iv) Mining

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. Placer mines working alluvial deposits for minerals are found in sites throughout Mat-Su Borough. Active mining has been more concentrated in Gold, Chunilna, and Portage Creeks than in areas of the Upper Susitna Basin. Other active claims are around Stephan and Fog Lakes, Jay Creek, and the Watana Hills east of Jay Creek.

Coal is the major mineral resource in Mat-Su Borough. Extensive coal deposits occur in the Beluga area. No coal mining activity occurs in the project area.

2.2.3 - Existing Land Use Development

In both the past and present, the sparsely distributed developments throughout the project area have been used predominantly on a seasonal basis. The majority of the land use development or artifacts has been utilized for hunting, fishing, trapping, boating, mining, and other general recreation purposes, such as cross-country skiing or photography. Existing structures in the project area are shown in Figure E.9.9, and Table E.9.5. Land use development of the Anchorage-Willow and Healy-Fairbanks transmission lines is illustrated in Figures E.9.10, E.9.11, and E.9.12.

(a) Zone 1

Types of developments located in Zone 1, the inundation zone plus 200 feet (61 m), include structures, trails, and airstrips.

Ten isolated structures are located in Zone 1 on the shores of the river or on its steep banks. Of these structures, only three are maintained and then only used on a seasonal basis. Two others, though not actively maintained, appear to be used sporadically by transient hunters, fishermen, or boaters. The remainder are not currently usable.

(b) Zone 2

The greatest number of existing land use development and historical artifacts are located in Zone 2, which is a much smaller area than Zone 3. Types of development found in Zone 2 include structures, trails, roads, airstrips, and mines. General types of use associated with these artifacts consist of hunting, trapping, fishing, boating, mining, recreation, and research.

Although the primary distribution of use throughout the project area is low density, the aggregations of existing development are particularly noteworthy. The nuclei of these aggregations are the small lakes and lake systems located throughout Zone 2 that provide access by air. The aggregations of development consist of cabins and related structures, lodges, roads, trails, and airstrips.

(c) Zone 3

Fourteen of the 25 existing structures in Zone 3 are currently used during some portion of the year. Aggregations of use occur in the areas of Chunilna and Prairie Creeks south of the project area.

Structures, use types, and access are categorized by land use zones and are summarized in Table E.9.3. The major trails into the project area represent substantial environmental modifications and reflect general use patterns; they are presented in Table E.9.4.

2.2 - Description of Existing Land Use in the Project Area

Land use east of Talkeetna and Chase is dominated by the land disposals along the Talkeetna River. Parcels within the Talkeetna Agricultural Disposal are available for agricultural use. A few homesteads exist around Larson Lake, east of Talkeetna. The Larson Lake residents could develop the lake for residential recreation. There are five landing strips in the Talkeetna area; two within the village of Talkeetna which are registered public landing strips.

Residential and commercial land development occurs west of Curry Ridge and along Petersville Road near Trapper Creek. There is some scattered residential land use along the Parks Highway and Chulitna River within Denali State Park. The areas of principal concentration are where residents desire to keep the land in a natural, pristine condition. Within the Curry area is Byers Lake State Campground, which contains hiking trails to Curry Ridge and Troublesome Creek.

Land use development east of Curry Ridge along the Alaska Railroad includes the Indian River Land Disposal and the Indian River Remote Parcel. Both are recreation oriented. The disposal is surveyed into 5-acre (2-ha) lots having utility easements. Only a limited amount of residents remain the year round. The disposal is within the Talkeetna Mountains Special Use District, which requires the residents to get a permit before constructing a dwelling. The Remote Parcel will have a specific number of residents able to obtain lots ranging between 5 and 40 acres (2 and 16 ha). Homesteads occur along the Alaska Railroad at Chulitna, Gold Creek, and the Susitna and Indian Rivers. There are two private landing strips at Gold Creek, one at Curry and Chulitna.

Land use development between the Middle Fork and East Fork of the Chulitna River and along the Chulitna River is limited to a few residences on the Parks Highway.

Residential and commercial land use development has become established at Cantwell, Summit and Broad Pass. Land use development such as the Cantwell Community Center is expected to continue along the Denali Highway. The Golden North Airport is situated east of Cantwell along the Denali Highway and is a registered public airport. There are two other landing strips in the Summit area. Also present are the Parks Highway, the Alaska railroad, and the eastern boundary of Denali National Park and Preserve.

2.2 - Description of Existing Land Use in the Project Area

Residential and commercial land use developments exist along the Nenana River and the Parks Highway near the Denali National Park and Preserve and prior to entering the Nenana Gorge. The Alaska Railroad and the Parks Highway wind through the gorge. There is residential and commercial land use around the Healy Generating Station. Other developed land use near the northern transmission corridor is low density residential with travel-oriented commercial developments located along the Parks Highway. Two private landing strips are located in Healy.

2.2.4 - Special Lands

(a) Wetlands

Proposed land use development is contingent on wetland and floodland locations. Potential wetlands cover large portions of the Middle Susitna River Basin, including riparian zones along the mainstem Susitna, sloughs, and tributary streams, and numerous lakes and ponds on upland plateaus. In addition, extensive areas of wet sedge-grass tundra are classified as wetlands by the U.S. Army Corps of Engineers for purposes of Section 404 permitting. Wetland areas of particular importance in the project area include Brushkana Creek, Upper Deadman Creek, the area between Deadman and Tsusena Creeks, the Fog Lakes area, the Stephan Lake area, Swimming Bear Lake, and Jack Long Creek.

All wetlands within the proposed impact area were classified according to Cowardin et al. (1979) into appropriate wetland classes (Acres/TES 1981). Maps delineating wetland types constructed by using the vegetation/habitat maps can be found in Chapter 3 of Exhibit E. This was done with little consideration of soil moisture conditions since this information was unavailable.

Vegetation and wetland classes found in the proposed Susitna project areas are as follows:

Mapping Unit (Viereck & Dyrness 1980)	FWS Wetland Class (Cowardin et al. 1979)
Lakes, ponds	Lacustrine unconsolidated bottom, aquatic bed, unconsolidated shore
Rivers, streams	Riverine Upper Perennial rock bottom, unconsolidated bottom, rocky shore, unconsolidated shore

Wet sedge-grass	Palustrine or Lacustrine emergent
Low shrub	Palustrine scrub-shrub
Birch shrub	Palustrine scrub-shrub
Willow shrub	Palustrine scrub-shrub
Open black spruce	Palustrine forested
Woodland black spruce	Palustrine forested
Open white spruce	Palustrine forested
Closed white spruce	Palustrine forested
Open balsam poplar	Palustrine forested
Closed balsam poplar	Palustrine forested

Wet sedge-grass types dominate half of the tundra. Tundra vegetation/habitat types are generally located above the limit of forests. Approximately 24 percent of the Middle Basin is covered with tundra. The tundra types are characteristic of high elevations less than 3200 feet (970 m) and their distribution is associated with the mountains of the Alaska Range and the Talkeetna Mountains. Only in the vicinity of Devil Canyon and Jay Creek are there substantial acreages of tundra in close proximity to the impact areas.

Shrubland is the largest overall group of vegetation/habitat types occurring in the Middle Basin, covering almost 40 percent of the total area, 30 percent of that by shrub birch and willow. These types are found at intermediate and low elevations throughout the basin, primarily on the broad flat areas.

Conifer forests (spruce) cover approximately 19 percent of the Middle and Upper basins. They occupy a wide range of sites, from the floodplains to the mountains, but seldom above the 3200-foot (970-m) elevation. Conifer forests are 25 percent more extensive in the impact areas than in the Middle Basin. This is because the impact areas are restricted to lower elevations where conifer forests are located.

2.2 - Description of Existing Land Use in the Project Area

Balsam poplar is restricted in distribution to less than 2.5 percent of the Middle Basin. This vegetation/habitat type is found below the 2300-foot (697-m) elevation and in the floodplain. Open and closed balsam poplar stands are the predominant vegetation types found on the floodplain downstream to Talkeetna.

The Susitna Hydroelectric Project will require approval from the U.S. Army Corps of Engineers prior to construction. This approval is in the form of permits required by Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The purpose of the permit system is to assure that projects will not interfere with navigation and will not unnecessarily pollute waters and wetlands. Land ownership has no bearing on the need for a permit.

Federal regulations define wetlands as areas that, under normal circumstances, would support vegetation typically adapted to saturated soils. Approximately one-third of Alaska is wetlands. All wet tundra, and various amounts of other tundra types, are considered wetlands.

Where soil is saturated with water, photosynthesis occurs rapidly. Such areas are highly productive biologically and rich in nutrients that support microscopic plants and animals which are food sources of higher life forms. Wetlands support a greater diversity of wildlife species per unit area than most other habitat types in Alaska. Riparian wetlands provide winter browse for moose and can be a critical survival factor for this species during severe winters. Wetlands are also important because they help to maintain water quality throughout regional watersheds.

Detailed wetland mapping of much of the state will eventually be completed by the National Wetlands Inventory, conducted by the U.S. Fish and Wildlife Service. Aerial photographs, soil maps, topography charts, and field reconnaissance are presently employed to determine wetland locations (USCOE 1980).

A more specific description and maps of the vegetative/habitat types and wetlands are found in Chapter 3 of Exhibit E of the Alaska Power Authority's Susitna Hydroelectric Project application FERC license.

The Cowardin system of wetland mapping has been adopted by the U.S. Fish and Wildlife Service, and is acceptable to the U.S. Corps of Engineers for permit applications. Lakes, ponds, rivers, and streams were not specifically classified.

2.2 - Description of Existing Land Use in the Project Area

There is a considerable amount of potential wetlands within the project area. The estimates of total palustrine wetland areas were liberal since the wetlands were highly integrated with non-wetlands and supporting hydro soil data and periodic ambient water conditions were not available. Portions of these areas may thus be eliminated by further considerations of soil and water conditions.

(i) Dams and Impoundments

Within the approximate boundaries of Zone 1, there are potential wetlands of various types, including riverine. The Watana dam, spillway, and impoundment will cover 26,967 (10,787 ha) acres of potential wetland types. The Watana camp, village, and airstrip will be on 371 acres (149 ha) of wetlands. The Devil Canyon dam, spillway, and impoundment facilities will cover 4117 acres (1647 ha) of wetland types. The Devil Canyon construction camp and village is not mapped but appears to occupy potential wetland areas.

(ii) Access

Potential wetlands dominate the access corridor from the Denali Highway south to Watana and then east to Devil Creek. Sixty-one percent of the total access road is Palustrine scrub-shrub wetland type broken only by occasional creek crossings. These potential wetlands are located for 16 miles (26 km) extending south of Denali Highway and for 30 miles (50 km) south of Deadman Lake (see Figures in Chapter 3 of Exhibit E).

Twelve percent of the corridor is 50 percent Palustrine scrub-shrub wetland. This location is west of Devil Creek where Palustrine scrub-shrub wetland predominates. Radiating from this point 4 miles (7 km) east and west along the corridor the Palustrine scrub-shrub wetland wanes to 50 percent.

Four percent of the corridor, an area north of Deadman Lake, is 50 percent Palustrine scrub-shrub and 50 percent Palustrine emergent wetland types. As the corridor extends north from Deadman Lake, it becomes 50 percent Palustrine emergent wetland type only. Seven percent of the corridor is Palustrine emergent.

The corridor south of the Susitna River, predominantly the railroad corridor, is within 2 miles (3 km) of the river. Isolated areas of Palustrine forested wetland types occur in this section of the corridor. It is 16 percent of the total corridor length.

(iii) Transmission

Wet sedge grass and potential wet spruce areas within the Anchorage-Willow and Healty-Fairbanks transmission corridors are illustrated in Chapter 3 of Exhibit E.

- Dams to Intertie

The central corridor is not separate from that of the dam and impoundment impact area which extends 10 miles (16 km) in all directions from the Middle Susitna River. Palustrine forested is the only wetland type in the central corridor and exists in slopes and benches.

- Anchorage-Willow

The Anchorage-Willow corridor passes through relatively flat terrain and is approximately 24 percent Palustrine or Lacustrine emergent meadows.

- Healy-Fairbanks

The southern portion of the Healy-Fairbanks corridor has Palustrine forested wetland along the ridges with Palustrine scrub-shrub and Palustrine or Lacustrine emergent wetlands occupying the flatter areas. The central corridor segment is covered by a complex mosaic of wet Palustrine forested and Palustrine scrub-shrub wetlands. The gradiation 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.

(b) Floodlands

The National Oceanic and Atmospheric Administration does not have an office of Coastal Zone Management in Alaska. The U.S. Corps of Engineers, Floodplain Management, conducts hydraulic analysis 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" (E.O. 11988). Special area management plans are prepared for FEMA in areas of potential land use development where floodplains have not been delineated. No such management plans have been prepared in the Middle Susitna Basin due to the remoteness of the area.

A preliminary final Flood Insurance Study, Mat-Su Borough, has been completed by the U.S. Army Corps of Engineers for the Federal Emergency Management Agency. No reference has been given to the Susitna River. Detailed study included the Little Susitna River, and Disception and Willow Creeks. An approximate study has been made on the Matanuska and Knik Rivers and in the Bodenburg Butte Area.

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 River has been mapped within the corporate limits of Talkeetna. The U.S. Geological Survey has tabulated streamflow and suspended sediment data for the Susitna River at Gold Creek since 1949. The Gold Creek peak discharge of record is 90,700 cfs.

Talkeetna is subject to flooding from the Talkeetna, Chulitna and Susitna Rivers. The floodplain of the Talkeetna River at Talkeetna is wide and developed only on the south side at the mouth of the river. Open spaces in the flood plain are extensive and may come under pressure for future development. The properties in Talkeetna are primarily residential and commercial.

<u>The Floodplain Information Report, Talkeetna, Alaska</u>, (U.S. Corps of Engineers 1972) is a basis for the adoption of land use controls to guide floodplain development and prevent intensified loss and damage. Peak discharge for the Intermediate Regional Flood, or the 100-year flood, at Talkeetna is 268,000 cfs. Peak discharge for the Standard Project Flood is 315,000 cfs.

Figure E.9.13 illustrates the 100-year floodplain on the Susitna River at Talkeetna. The 100-year floodplain between Talkeetna and Devil Canyon based on the 100-year flood discharge at Gold Creek is shown in Chapter 2 of Exhibit E on Figures E.2.12 through E.2.20. The calculated 100-year flood discharge at Gold Creek is 118,000 cfs.

Susitna Hydroelectric Project - Regional Flood Studies (R&M 1981) provide flood peak information for assessing pre-project flood conditions in the Susitna River reaches located downstream and upstream from the damsites. Susitna Hydroelectric Project River Morphology (R&M 1982) discusses the existing flow, sediment and river regimes from Devil Canyon to the mouth of the Susitna River.

(c) Prime Lands

The U.S. Soil Conservation Service has determined that there are no prime or unique farmlands, rangelands, or forests within the Middle Susitna Basin.

2.3 - Description of Existing Land Use Management Plans for the Project Area

The BLM, the Alaska Department of Natural Resources, Mat-Su Borough, and CIRI and associated village corporations have various management concerns in the project area.

Federal lands to the north of the project area are managed by the BLM (BLM 1982). These lands are included in the Denali Planning Block (Figure E.9.14). A Decision Record-dated July 1982, authorized the Denali/Tiekel Amendment to the South-central Management Framework Plan to be a Finding Of No Significant Impact (FONSI). The attachment of A Decision Record authorizes the draft report to be final. The planning blocks address oil and gas, mineral entry, wildlife and scenic values, and settlement/disposal.

Management in the Denali Unit and in those areas not yet conveyed to the Natives or the state is essentially passive. Very few management activities are taking place. BLM's objective is to protect the natural environment of the area, with particular attention to caribou calving areas and river recreation routes. Fire control is also a current management consideration. BLM has a cooperative fire control agreement with the state of Alaska that covers the project area.

A Denali Scenic Highway Feasibility Study draft report will be available for public review in March 1983. The BLM is the lead agency for the study. Other study participants include the National Park Service, Federal Highway Administration, ADNR, Alaska Department of Transportation and Public Facilities, ADF&G, Ahtna, Inc., village corporations, and Mat-Su Borough.

The Alaska Land Use Council consists of federal and state agency representatives to oversee joint management plans as designated by the Alaska National Interest Lands Conservation Act. The Alaska Land Use Council will give its recommendation about the scenic highway proposal to the Secretary of the Interior, the President of the United States, and Congress in September, 1983.

Finally, BLM is also developing a wildlife habitat management plan in cooperation with ADF&G for the Alphabet Hills between the Tyone and Maclaren Rivers (T11-12N, R2-9W, Copper River Meridian). This plan will involve moose habitat manipulation. As yet, however, only study plots for this project have been mapped out.

In the project area, the state had, until recently, done only a resource assessment for those lands it is proposing to select. In 1982, a planning background report was completed with the cooperation of the Mat-Su Borough, Kenai Peninsula Borough, ADF&G, and the Alaska Department of Transportation and Public Facilities (ADNR 1982). Currently, ADNR's Division of Research and Development is undertaking a comprehensive assessment of the resource base in general. The Susitna Area Plan for state land is being developed in cooperation with Mat-Su Borough. A Susitna Area Planning Team is comprised of state resource agencies including all divisions of ADNR, ADF&G, Alaska Department of Transportation and Public Facilities, and Mat-Su Borough. The Susitna Area Planning Team is designated to plan appropriate land use of state and borough lands within Mat-Su Borough. The state has requested coordination between the Susitna Hydroelectric Project and the regional land use plan, specifically in the two following areas:

- The planning team can review and comment on information regarding regional, indirect impacts of the plan (i.e., population growth changes in resource demand, etc.); and

- The plan can be used as a tool to guide use of public lands to mitigate or control secondary impacts of the proposed project.

The state's primary management goals for state classified land on project effected land is to:

- Provide for private recreational use of rural areas by allowing private recreational development to occur in an orderly fashion;

- Preserve agricultural land for either present or future use;

- Allow for the sufficient and orderly extraction of materials and to assure restoration compatible with adjacent uses; and

- Allow variable management plans to be specified upon resource identification.

The Draft Land Use Plan for Public Lands in the Willow Sub-basin (ADNR 1981) identifies future agricultural land sales in the vicinity of Willow and programs for protecting wildlife habitat and sportmen's access. No additional agricultural disposals have been identified for the project area or within the transmission line routes.

2.3 - Description of Existing Land Use Management Plans

Mat-Su Borough is involved in three separate management efforts which affect the project area. These are the Mat-Su Borough Comprehensive Plan (1978), the Talkeetna Mountains Special Use District, and the Mat-Su Borough Coastal Management Program. The current Mat-Su Borough Comprehensive Plan (1978) contains very little discussion of the Susitna area lands. The borough has already selected more than its entitlement and is concentrating its selection in the Lower Susitna Basin near existing highways. Thus, it is unlikely that the borough will select any lands in the project area.

The borough, by ordinance, has created the Talkeetna Mountains Special Use District, through which the borough can exercise planning and permitting authority over all lands within the district's boundaries; this special use district includes the project area. The Indian River Subdivision and Remote Parcel are also within the special use district. The Mat-Su Borough plan will allow recreation cabins at these sites but not permanent residences.

The ordinance provides for multiple resource use of the district and takes into account unique scenic values. Thus, lands within the special use district are subject to permit requirements for specified developments (roads, subdivisions, etc.).

The borough is updating its comprehensive plan, and additional studies are currently being performed (Dowl Engineers 1982). The project area is considered a mixed-use zone which would permit hydroelectric development. Management objectives for the project area will probably not be refined until the current hydroelectric studies are complete.

Through a cooperative arrangement with the Office of Coastal Zone Management (National Oceanic and Atmospheric Administration, U.S. Department of Commerce) and the Alaska Coastal Management Program (Division of Community Planning, Alaska Department of Community and Regional Affairs), Mat-Su Borough is preparing a Coastal Management Program. Preliminary studies were completed in May 1981; originally the Susitna River through Devil Canyon was designated to be within the biophysical boundaries of the program (Figure E.9.15). At present the dam is not included within the program.

CIRI received conveyance of selected Native lands to hold in trust until these lands are conveyed to the appropriate villages (Chickaloon-Moose Creek, Tyonek, and Knik). Currently, no land management activities are being carried out. When the villages obtain their lands, the different village ownerships will create a checkerboard pattern. Immediate land problems and land reconveyance to villages are being handled by the Village Deficiency Management Association, a group made up of representatives from each of the concerned villages. Because of the checkerboard pattern of ownership described above, any management of Native lands may be undertaken by this association.

3 - DESCRIPTION OF LAND USE CHANGES RESULTING FROM THE PROJECT

Brief descriptions of the major facilities are presented below; details may be found in Exhibit A of the FERC license application for the Susitna Hydroelectric Project.

Construction and operation of the dams and related facilities will cause impacts on area resources. The development of the two-dam facility, the establishment of the camps and villages and their associated commercial and recreational development, the increased public access into the Susitna Basin, and the improved public recreation potential in the region will escalate the land value in the project area. The increase of adjacent commercial, recreational and residential development will appreciate the value of land belonging to owners along the Parks and Denali Highways. The land value along the transmission line easement will remain unchanged by the existence of the line; however, the resale potential may be limited if adjacent lands of similar value are available for sale.

Before determining the extent of the land use changes, land use priorities were assessed in terms of land use activity and development verses conservation and preservation of specific ecosystems. In few cases, these resource values are identified in agency management programs that apply to the area. Section 2.3 described the existing land use management plans; Section 4 discusses the changes in land use management plans resulting from the project.

Project facilities will create immediate, direct impacts on the landscape. Some of these impacts will be temporary, such as the construction camps and construction activity. Other aspects of the project will create permanent and often subtle changes in the type, nature, and intensity of development and activitiy. Chief among these aspects is the provision for automobile access to an area currently remote.

3.1 - Dams and Impoundment Areas

3.1.1 - Proposed Facilities

Figure E.9.16 illustrates the location of the proposed facilities in the impoundment area.

(a) Watana

The Watana Dam will be a 885-foot (270-m) high, gravel-fill structure, with a crest length of 4100 feet (1250 m). The dam will be located at Susitna River mile 184, approximately 2 miles (3 km) upstream from the mouth of Tsusena Creek. It will impound approximately 54 miles (80 km) of river to the 2185-foot (666-m) elevation and inundate about 38,000 acres (16,000 ha). A general layout of site facilities is shown on Figure E.9.17.

3.1 - Dams and Impoundment Areas

(b) Devil Canyon

Devil Canyon Dam will be a 645-foot (197-m), concrete thin-arch dam and a rock-filled saddle dam constructed at river mile 152 in Devil Canyon. Its crest length will be 2475 feet (754 m). The dam will impound miles (42 km) of river to the 1455-foot (444-m) elevation. Approximately 7800 acres (3157 ha) of land will be inundated. A general layout of site facilities is shown on Figure E.9.18.

3.1.2 - Induced Land Use Changes

(a) Land Use Development

The emplacement of the Watana dam and impoundment will inundate six structures. These structures are numbered 90, 91, 92, 111, 112, and 120 on Figure E.9.9. One structure is actively maintained as indicated in Table E.9.5. Number 90 is a lean-to for hunting and fishing purposes.

The emplacement of Devil Canyon Dam and impoundment will inundate three structures (2, 6, and 107), as illustrated in Figure E.9.9. As indicated on Table E.9.5, only Number 2, a boat cabin, is currently maintained for boating and hunting.

(b) Land Use Activity

Hunting activity will increase and current patterns will change as a result of impoundments. The reservoirs and access to them will facilitate floatplane landing and boat travel, and thus permit easier penetration by big game hunters into rarely visited areas. An increase in moose and caribou hunting will occur immediately adjacent to the proposed impoundments. Hunting for moose or caribou will increase only to the maximum allowed by the permit system. Game will be reduced by the effects of increased hunting and by the resource emigration caused from increased human population. Big game hunting guides will be affected by reduced hunting activity and therefore reduced income. Guides may need to find a different occupation or move elsewhere.

There is potential for increased fishing for resident species in tributaries feeding into the impoundments. A limited reservoir fishery may also develop. Salmon fishing in Portage Creek could increase due to the accessibility created for the Devil Canyon facility. Regulations can be requested to manage this fishery area.

Fur resources will be eliminated in Zone 1 by the impoundments. Access to the reservoirs will cause disruption of present trapping patterns within Zones 2 and 3.

3.1.3 - Mitigation

The land management plans developed with the cooperation of jurisdictional agencies will include control of land use activities and will be implemented upon operation of the facilities. The land use plans will direct land use activities for the reduction of the impact on the game, fish, and furbearers resulting from increased land use activity.

3.2 - Construction Camps and Villages

3.2.1 - Proposed Facilities

One construction camp (single worker housing), village (family housing), and associated facilities will be located at each damsite within the immediate project area; see Figure E.9.16 for their location. Construction of Watana Dam is proposed to begin in 1985, at least nine years later, construction at Devil Canyon will begin. Plans are to build a construction camp and village at Watana for use until the dam construction phases down. The camp components will then be relocated to the Devil Canyon damsite to the greatest degree practical. A permanent town will be constructed at Watana to provide housing and community facilities for workers who will operate the dams following construction. No permanent village is planned for the Devil Canyon site.

The proposed camp and village at Watana will be constructed northeast of the damsite between Deadman and Tsusena Creeks (Figure E.9.17). Approximately 1 mile (2 km) will separate the construction camp from the village. Work on the village will begin about one year after construction of the camp has begun. Structures at the camp will be of factory-built, modular design to facilitate their relocation to Devil Canyon.

Facilities and services to be provided at the construction camp include housing modules (dormitories) for about 3000 workers, camp offices, food services, warehousing, fire and security protection, banking and postal services, hospital care, recreation, communications, and power generation. Facilities at the village will include family housing (to accommodate about 1000 people), a gymnasium, recreation center, shopping center (food supermarket, department and specialty stores), generating station, and structures for other support activities.

Camp and village utilities will include a potable water supply system, sewage system, power supply and distribution system, communications, fuel storage, and a solid waste disposal system. The water supply is expected to serve an estimated peak population of 4030 (3070 in the camp and 960 in the village) including workers, families, and visitors. The water source will be from Tsusena Creek and ground water wells. The treatment plant, also of modular design, will fulfill Environmental Protection Agency (EPA) requirements.

Permanent facilities required for project operation at Watana include a small community of approximately 130 staff members and their families. The town is planned at the site of the construction village.

The facilities at the Devil Canyon construction camp and village will be similar to those at Watana, though fewer workers will be accommodated. Up to 1900 people will be housed during the peak construction period at Devil Canyon. The camp will be situated south of Portage Creek and west of Devil Canyon on the south side of the Susitna River. The village will be temporary, unlike the one at Watana, and will be west of the camp (Figure E.9.18).

Additional details on the construction camps and villages may be found in Exhibit A and in Chapter 5 of Exhibit E.

3.2.2 - Induced Land Use Changes

(a) Watana

(i) Land Use Development

The construction camp and village will result in the dedication of 370 acres (150 ha) to community use during the construction phase. After construction has been completed and the camp and temporary village removed, the permanent town at Watana will occupy 90 acres (36 ha). Additional land will be required for connecting roads, an airstrip, and other facilities related to dam construction.

Facilities and services constructed for the Watana camp and village will be available for use by the residents of the permanent village. Once living facilities are constructed during the Watana construction phase, no further impacts are anticipated during Watana operation and Devil Canyon construction phases, or during the operation phase of both dams. All operations maintenance personnel and their families will live onsite at the Watana permanent village.

Water supply and sewage treatment will be maintained onsite for use by the permanent village. Landfills will be provided for the disposal of solid waste. Police protection, fire protection equipment, and volunteer fire personnel will be available for onsite residents. Health care will be administered from a 20-bed hospital; hwoever, major illness and accident victims may need to be transported to other Mat-Su Borough facilities. A school building will be provided for the 300 school children anticipated. Education administration will be operated by the Mat-Su Borough.

The permanent village of Watana will be established on land presently selected by the state only. Lands in proximity have been selected by and conveyed to CIRI. CIRI will study any potential for development on project and adjacent lands. All the Native corporations have shown interest in offering profit oriented services to the village. Other land developments compatible with the project and with the corporation incentives are being investigated, such as various recreation plans. Land use development established by the Native corporation will be identified individually as the need arises.

(ii) Land Use Activity

Among the project's effects upon activity patterns are those impacts related to access. The chief effect of the Watana camp will be the activity associated with the ten-year construction period. The extent of impact on general patterns of activity in the Middle Susitna Basin will depend on the actual operating policies established for the camp during the construction period. Dispersed recreational activity by construction workers could increase significantly in the absence of such policies. Conversely, if there are extensive policies limiting dispersed recreation and other activities outside of camp, the effects on the basin will be minimized.

(b) Devil Canyon

(i) Land Use Development

Approximately 85 acres (34 ha) of presently undeveloped land will be converted to community uses for the construction period. Additional areas will be required for connecting roads and related facilities. After construction is complete in 2002, all camp and village facilities will be removed.

(ii) Land Use Activity

The chief effects of the Devil Canyon camp will be the associated construction activity during the construction period from 1994 to 2002. Controlled activities outside of camp will determine the extent the construction workers will impact the activity pattern. Change in the activity pattern is expected to be less than that for Watana because of the smaller work force required for Devil Canyon.

3.2.3 - Mitigation

Proposed development focuses recreational activities on core recreational facilities and indirectly diverts the users away from sensitive environmental areas outside the project area. Impacts from human use can be reduced if trails outside the proposed camps are established and if specific areas are designed for leisure activity. Land use activities could be confined to project construction areas to discourage increased hunting, fishing and trapping in the project area.

Posting and enforcing construction camp rules will help make project personnel aware of adverse environmental impacts. Other mitigation measures to reduce increased land use development of the camp and village and to increase construction worker productivity may include restricting the use of private vehicles and providing transportation services. Transportation services could include air, bus, or van services, park and ride lots, travel schedules and/or travel allowances. Travel services may also influence construction worker travel schedules which would alleviate pressure on land use development and activity.

Impacts from facilities associated with housing, such as sewage treatment lagoons and landfills, can be reduced if they are located away from existing or proposed developments.

3.3 - Recreation

3.3.1 - Proposed Facilities

Presently, there are no publicly developed recreational facilities within the vicinity of the project except for road related facilities on the Denali and Parks Highways. Three privately-owned lodges exist at Stephan, High and Tsusena Lakes. Recreational facilities to be provided in the project area as part of the overall hydroelectric development plan will reflect both the recreational potential which exists in the area and public input from the recreation surveys conducted as part of the recreation study.

The recreation plan will be implemented in five phases as described below:

(1) Watana Construction Phase
(2) Watana Implementation Phase
(3) Devil Canyon Construction Phase
(4) Devil Canyon Implementation Phase
(5) Post-construction Monitoring Phase

The construction phases will consist of projects intended to mitigate the impacts of recreation opportunities lost due to construction, and to provide recreation opportunities to construction workers. Recreation facilities planned in each phase will be developed when the respective project construction begins.

The implementation phases consist of recreation features intended to mitigate the impacts of recreation lost due to project operation, to provide for the recreation use potential, to accommodate project-induced recreation demand, to allow public access and to protect environmental values. The implementation phase of recreation projects will be developed within three years of the operation date of the respective projects.

The fifth phase consists of a recreation use monitoring program to begin when the first project recreation facilities are developed. Monitoring is necessary to determine actual recreation use of the project features and to trigger adjustments in the recreation plan if required. Recreation projects planned in Phase Five will be implemented when necessary agreements are made between the agencies and when demand requires the facilities. CIRI Native corporations have shown interest in participating in recreation development to the extent of negotiating a recreation scheme for the benefit of the Native corporation shareholders.

3.3 - Recreation

Recreation projects in Phase One consist of an expansion of an existing campground on the Denali Highway, a shelter at the Tyone and Susitna River confluence, a boat launch and vehicle-trailer storage at the Denali Highway bridge over the Susitna River, a trailhead and parking at Summit, and a 25-mile (40-km) primitive trail along the Middle Fork of the Chulitna River to the headwaters of Tsusena Creek, with two overnight shelters. Other phase projects include new campgrounds, shelters along proposed trails, temporary camp and townsite facilities, and a visitor center at Watana and Devil Canyon. (See Chapter 7 of Exhibit E).

3.3.2 - Induced Land Use Changes

When the access road is open to the public, it is anticipated that, in addition to the attraction created by the new dam and reservoir, recreation enthusiasts will be attracted to the newly opened land. The wide variety of available recreation opportunities is a major reason people move to and stay in Alaska. The percentage of Alaska's population that participates in outdoor recreation activities is among the highest in the nation. Alaskans have increasing amounts of leisure time and with flexible working schedules are able to devote longer periods of time to recreation. This may result in longer trips at greater distances from the urban centers. Alaska is reportedly experiencing some over-crowding in existing recreation areas near Anchorage and Fairbanks due to recent population growth. Recreational opportunities at weekend travel distances are increasingly popular.

The primary land use impacts of initial construction activities extend beyond the relatively small physical areas being disturbed. An immense change in image will affect a large part of the river basin as the prevailing ambience of an untouched, inaccessible wilderness changes to one of intense activity.

Impacts which physically change the natural resources have positive and negative effects on the preference of and use probablity of existing recreation activity types and levels. Indirect impacts are those related to changes in user demand levels. These include the impacts of construction worker recreation and the influx of recreationists as a result of new road openings.

(a) Land Use Development

The recreation concept is based on minimal and primitive development having only limited access within a managed wilderness area, as was determined preferable by the public. Facilities should be developed and managed on an as-needed basis, starting with minimal services and expanding only when demand warrants it.

3.3 - Recreation

The highest quality recreation opportunities are in the diverse landscapes adjacent to the reservoir sites, not at the reservoirs themselves. The complex recreation needs of the temporary construction camp workers and the permanent village were considered. The recreation plan will provide a variety of highly developed indoor and outdoor recreation facilities, which will satisfy demands without taxing the areas limited recreation capacity.

(b) Land Use Activity

A total of 50,000 visitor days per year are projected for post-project conditions in the year 2000. The recreation plan was developed to accommodate growth phased to Watana and Devil Canyon portions of the project. The proposed recreation facilities will provide for a challenging variety of activities and experiences within a development range from natural wilderness to semi-primitive recreation facilities.

Rail service may become available for public use at the completion of the Devil Canyon damsite construction. Rail service will provide access with the project area within four hours from Anchorage, instead of the seven hours required to travel the road access. This will constitute a positive impact on recreational use with minimal effects caused by increased areas.

3.3.3 - Mitigation

The recreation plan proposed for the Susitna Hydroelectric Project will provide organized recreational development for project waters and adjacent lands. The recreation plan is designed to allow public access that protects the scenic, public recreational, cultural and environmental values of the area. It estimates and provides for recreation user potential, accommodates project-induced recreation demand, and offsets recreational resources lost. The plan is intended to fit within the framework of the regional recreation plans and to provide additional opportunities. The impacts of construction and operation activities extend beyond the physical areas being disturbed and can be partially mitigated by careful management of the remaining lands for public recreation and appreciation.

Road and ORV access has been limited. Other access options such as boating, hiking and skiing have been provided in certain areas. Recreational development focuses activities on core recreational facilities and diverts the greatest number of users away from sensitive operations or environmental areas.

3.4 - Access

Details concerning recreation facilities are described in Exhibit E, Chapter 7, Recreational Resources.

3.4 - Access

3.4.1 - Proposed Facilities

The access plan is shown on Figure E.9.16. Transport of materials and supplies to the Watana damsite will commence in part at the existing Alaska Railroad at Cantwell. A road will extend 2 miles (3.2 km) east from a proposed rail marshalling yard and storage facility, and will follow an existing route to the junction of the George Parks and Denali Highways. Transport will proceed 21.3 miles (34 km) eastward on the Denali Highway.

The road will be paved in the community of Cantwell from the 40-acre (16-ha) marshalling yard to 4 miles (6.5 km) east of the George Parks and Denali Highway intersection. This will eliminate dust and flying stones in the residential district. Speed restrictions should be imposed by the state along this segment for safety measures.

A new access road will extend south from the Denali Highway at milepost 21.3. The road will be constructed for 41.6 miles (67 km) across Brushkana and Deadman Creeks, extend south on the west side of Deadman Mountain across a tributary of Deadman Creek at milepost 28, and then parallel along Deadman Creek to the Watana damsite. The road will cross Deadman Creek via a bridge to ensure adequate drainage and fish passage.

The crown of the Denali Highway-Watana road will only be 2 to 3 feet (0.6 to 0.9 m) above the original ground level. Borrow excavation will be confined to a 50- to 70-foot (15 to 27 meter) trench on each side of the roadway. The side slopes of the trench will be smooth and revegetated. Several pull-outs will be constructed along the access road to permit viewing of natural areas and some of the project facilities.

Access to the Devil Canyon development will consist primarily of a 12.2-mile (20-km) extension of the existing Alaska Railroad at Gold Creek to a marshalling yard and storage facility adjacent to the Devil Canyon camp area. Materials and supplies will be distributed using a system of site roads.

The railroad will climb gently and steadily for 12.2 miles (20 km) from Gold Creek to the marshalling yard near the Devil Canyon camp, except for a 2-mile (3-km) section where the route traverses steep terrain alongside the Susitna River. Several streams will be crossed requiring the construction of large culverts; however, no bridges will be needed.

3.4 - Access

The railroad extension will be designed not to exceed a maximum grade of 2.5 percent nor a maximum curvature of 10 degrees. These parameters are consistent with those presently being used by the Alaska Railroad. Required right-of-way width will generally be 200 feet (60 m) for the gentle-to-moderate side slopes of the road and railroad. The few areas of major sidehill cutting and deep excavation will require additional width.

The Devil Canyon and Watana damsite will be connected by a 37-mile (60-km) road to provide access to construction and operation and maintenance personnel stationed at Watana. From the marshalling yard at Devil Canyon the connecting road will be built to a high level suspension bridge approximately 1 mile (1.6 km) downstream from the damsite. The bridge deck will extend over the Susitna River at an elevation of 1420 (430 (430 m), and the bridge length will be 1790 feet (540 m) with a main span of 1250 feet (380 m). The design of a high suspension bridge will reduce traffic congestion by maintaining travel speed at 40 mph (65 kmh) and reduced travel distance. Travel across a low bridge would require increased time due to reduced speed and travel across 8 miles (13 km) of switchback road.

The Watana-Devil Canyon route extends northeast from the high suspension bridge, across Devil Creek and past Swimming Bear Lake, then southeast through a wide pass at an elevation of 3500 feet (1060 meters). The road continues east across Tsusena Creek to the Denali Highway-Watana road. The moderate slopes will allow roadbed construction without deep cuts, balanced with the required fill amounts to minimize borrow excavation.

Assessment of projected traffic volumes and loadings during construction resulted in the selection of the following design parameters for the access roads.

Surfacing	Unpaved
Width of Running Surface	24 feet
Shoulder Width	5 feet
Maximum Grade	6 percent
Maximum Curvature	5 degrees

The 21.3 miles (33.5 km) of the Denali Highway will be upgraded to these design standards. Required realignment should be possible within the existing easement.

Grades and curvatures consistent with current highway design standards for a 55 mph (90 kmh) design speed were chosen for the efficient and economical movement of supplies. Since extensive grades and curvatures could result at some locations, the design speed will be reduced in certain areas to 40 mph (65 km) to allow steeper grades and shorter turn radii. Flexibility of design speed allows the road to follow the topographical contour more closely.

3.4.2 - Induced Land Use Changes

The access route will be built for construction and operation of the dam facilities. Many of the effects will be related to long-term consequences after construction is complete. The road will provide access to Native conveyed land in the section north of each damsite and, when constructed, over the dam at Watana and across the Susitna River via suspension bridge at Devil Canyon. Increased access into this existing remote area is the major land use impact of the project.

As discussed in the previous subsection, the existing land use is predominantly individual recreational use and commercial recreation development. Access will introduce an influx of people and will instigate activity within the basin that will affect population concentrations, isolated residences, peripheral commercial establishments and transportation systems, resource utilization, the level of recreation activity, and the overall character of the area. These effects could influence changes in land value and will initiate comprehensive land use management.

Access extending from the Denali Highway will cause effects in the Cantwell area. Land use changes at Cantwell are further discussed in Subsection 3.4.2 (a). Road access will cause both the disruption of present land use and the inducement of future land use. Provision of access into the Susitna Basin is a more significant impact than is the physical road. The provisions of easy, inexpensive road access into the area will cause alterations to the Susitna Basin's character. The remote wilderness, presently accessible only by air, ORV, foot or water will become an area of hydroelectric development intensely used by project related personnel, people interested in observing the hydroelectric facilities and the variety of Alaskan environments offered in the Middle Susitna Basin, and by residents as far away as Anchorage and Fairbanks for recreational purposes.

Rail access to Devil Canyon originating at Gold Creek will allow the transportation of materials, equipment, and labor through Gold Creek. There will be a significant impact on Gold Creek and on Hurricane and Talkeetna, the last railroad junctures with highway access to the north and south of Gold Creek, respectively. The use of the railroad to ship materials to Devil Canyon Dam will cause less of an impact to other communities along the Parks Highway.

3.4 - Access

Goods or people could travel by rail to the Devil Canyon site. This will reduce the extent of impact on community land use along the Parks Highway. Access by road from the Denali Highway to Watana would increase off-road vehicle use in areas where it is now low. This introduction could aggravate alterations to the terrain.

The proposed access would likely cause less of an effect to residents along the Parks Highway since direct access from the Parks Highway is precluded. The road from the Denali Highway would permit car travel by the public into the interior of the basin. The Fairbanks population is considerably smaller than that of Anchorage; therefore, potential human use of the basin via a new road would be reduced with access extending from the Denali Highway due to the increased distance from Anchorage. In addition, virtually no development exists along the Denali route, so disruptions to existing land use would be minimal.

The Denali access road will provide access to CIRI and village corporation lands for possible resource development. This is considered a positive step by the corporations. Recreation, mining, and timber harvesting have been suggested as possible activities.

(a) Land Use Development

Improved access, increased use, and markets for commercial services will make the land in the project vicinity more attractive to prospective commercial and residential buyers. Commercial and residential development may increase, escalating the land value.

A total of approximately 374 project-induced households are expected to settle in the Mat-Su Burough between 1983 and 1990, the height of construction at Watana. This in-migration is not expected to cause dislocations in the borough's housing market. The majority of project-related housing demand will be concentrated on the northern part of the borough. Low vacancy rates are expected in Trapper Creek and Talkeetna, since additional housing will be built only to satisfy demand. It is expected that housing for project-related households at Cantwell will be available due to entrepreneurial activity. Most of the privately-owned land in Cantwell is owned by Ahtna, Inc. Development for housing will be subject to Ahtna's appraisal of the economic feasibility of the development. Under a moderate impact scenario, it is projected that housing will be available for less than half of the 115 project-related household demand between 1984 and 1986.

3.4 - Access

The access roads between the Denali Highway, Watana, and Devil Canyon, and the railhead at Cantwell, will not directly create significant impacts on land use development. Jobs will be created for their construction and operation. The indirect influence the access road will have on the local communities will be more significant as labor and materials pass within their vicinity (TES et al. 1981).

The termination of the rail system at Cantwell, the closest community to the damsites via road, will create a significant change to Cantwell. The size of population influx into Cantwell will be heavily influenced by the development of housing in the community by private individuals and by mitigating measures that can be implemented. Support sector employment will develop as personnel arrive that are directly employed toward the construction or operation of the proposed facilities. As the community population increases, individual developers will need to increase maintenance to continue current levels of road service, and additional roads may need to be built to serve additional subdivisions. Increased police protection, emergency health care, educational capabilities, and business activity will require development and construction proportional to the increased population.

The population may increase by over 200 percent of the level expected without the project at Cantwell and over 100 percent at Trapper Creek. Talkeetna will experience a 10-50 percent increase in population. Construction and land use development will increase proportionally. Palmer, Wasilla and Houston will experience less than 2.5 percent increase in population, housing and schools, but a 2.5-10 percent increase will be experienced in the development of service sector employment, business activity and transportation facilities.

The extent of land use development will be determined by regional communities. Cantwell, Palmer, Wasilla and Houston are generally in favor of the changes discussed above. These communities want more economic development, particularly jobs. Residents of Trapper Creek and Talkeetna have indicated that rapid, uncontrolled change is not desired. Residents who would like to have controlled economic development want to consider potential changes to their community as a result of the project before committing to a growth plan. Some communities are already governed by land use stipulations. For example, the Indian River Subdivision is restricted to recreational use by the Talkeetna Mountain Special Use District regulations.

3.4 - Access

The railroad will traverse through Gold Creek to a railhead at Devil Canyon. This rail spur will significantly impact population and the development of support sector employment, business activity, housing and transportation in Gold Creek and, to a lesser extent, Talkeetna.

The extent of land use development in surrounding communities will depend on the transportation program employed; this could include combinations of airplane, bus, personal vehicle with associated park and ride lots, travel schedules, and/or travel allowances.

(b) Land Use Activity

The population increase of Mat-Su Borough as a result of project construction will be cumulatively (on- and offsite residents) 4700 in 1990. When the access road is opened to the public, recreation enthusiasts will enter the project area for the wide variety of available outdoor recreational opportunities at weekend travel distances. Post-construction recreation visitor days per year are projected to be 50,000 in the year 2000. The volume of this recreation increase will change the existing land use activity patterns significantly.

Hunting will increase to the maximum allowed by the permit system for moose, caribou, and bear along the access corridor. The increased number of hunters will disrupt existing hunters and force them to adjust to reduced resources or to relocate into other remote areas. Locations accessible to hunters will be greater if ORV use is substantial.

Fishing will increase with potential effects on reduced resources and on people who currently fish in the area.

Improved access to the mining aggregations along Portage Creek and Gold Creek may improve the economic feasibility of mineral exploration and mining.

The Watana-Devil Canyon access road will disrupt current use patterns at High Lake Lodge. Disruption might also occur to fly-in fishing and hunting around the lakes near Devil Canyon. Some trapping territories recently established around the High Lake area would also be altered. In addition to increased hunting and fishing, this area will also receive increased recreational use for hiking, backpacking, sightseeing, and other activities.

3.4 - Access

Topographical conditions occurring along the Watana-Devil Canyon access road may induce ORV use, degrading the roadless experience of current users. The primary users affected will include fishermen, trappers, miners, and travelers using the existing sled road in the project area. Disturbed users will also include lodge and cabin visitors. All of the access route segments will affect the dispersed recreation currently enjoyed by hunters, winter enthusiasts, and back country hikers.

3.4.3 - Mitigation

To reduce impacts from the proposed access route, several management techniques can be designed. The access route should not cross unstable soils or wetlands to the greatest degree practical. Disturbed sites could be restored to a stable condition. Staging areas and parking lots used during construction could be planned and designed to be used for future scenic and recreation pullouts for the public. A fire protection and prevention plan could be formulated to decrease the fire hazard associated with increased access.

Land use activity will be confined to within project construction areas until the facilities are built. This will reduce the impact of land use activity until the implementation of the land use management plans takes place.

If the use of off-road vehicles (ORV) originating from the access route becomes a disturbance, measures will need to be taken to inhibit this activity. Such measures would include a buffer strip designated for non-motorized use adjacent to the access route, natural conditions employed as subtle but absolute deterrents to ORV use, designated and planned ORV trails in locations that will neither conflict with other land use nor damage the environment, and, if necessary, ORV restriction between the proposed damsites. Spur roads to private holdings and mining claims will be designed, located, and constructed similarly.

Recreational use extending from the access route will be directed to sites designed to support such use. The proposed recreational facilities will accommodate recreational demand and replace opportunities lost.

3.5 - Transmission

3.5.1 - Proposed Facilities

Maps of the transmission route are included in Exhibit G. The central transmission route is illustrated in Figure E.9.16. The land use aggregations and existing structures for the project impoundment area are illustrated in Figures E.9.8 and E.9.9, respectively.

Figures E.9.4 and E.9.10 illustrate land tenure and land use development of the Anchorage-Willow transmission line. Figures E.9.5, E.9.6, E.9.11, and E.9.12 illustrate land tenure and land development for the Healy-Fairbanks transmission line. The corridor width studied was 3 to 6 miles (5 to 10 km), included both sides of the river, so therefore, was 14 miles (23 km) wide in some central corridor segments. The transmission route analysis involved mapping within the corridor, the land use development and activity, and land tenure.

The process of environmentally screening the original 22 corridors involved comparison of study area options based on the following eight constraints categories: length, topography/soils, land use, aesthetics, cultural resources, vegetation, fish, and wildlife. Following review of the environmental and engineering analyses, one transmission corridor was selected for each of the three study areas. Constraints within that corridor were then examined and a 0.5-mile (0.8-km) route within the corridor was selected.

From Watana to Devil Canyon, two single-circuit lines will be constructed in a 300-foot (90-m) wide right-of-way specified within the proposed 0.5-mile (0.8-km) wide corridor. Four single-circuit 345-kV lines will extend from Devil Canyon to the intertie near Gold Creek. A 510-foot (155-m) wide right-of-way will be selected for the proposed Devil Canyon-Gold Creek corridor. Watana to Gold Creek was considered the central study area.

The location of the Watana-Gold Creek transmission line is generally from the Watana dam across and adjacent to the north side of the Watana-Devil Canyon access road. It will cross the Gold Creek-Devil Canyon railroad twice. Specifically, the central transmission lines extend from the Watana Substation, located in the Southwest Quarter of Section 28, Township 32 North, Range 5 East of Seward Meridian. The right-of-way will extend northwest for 2.2 miles (3.7 km), west by northwest for 7.4 miles (12 km), northwest for 6.5 miles (10.9 km), and then southwest for 12.5 miles (20 km). At this location, two lines from the Devil Canyon Substation located 0.7 miles (1.1 km) east in the Northwest Quarter of Section 32, Township 32 North, Range 1 East of Seward Meridian, parallel the Watana-Gold Creek lines. Four lines extend southwest from this junction for 2.2 miles (3.7 km) then west by northwest for 5.3 miles (9 km). The Devil Canyon Switching Station is located in the Northwest Quarter of Section 1, Township 32 North, Range 2 West of the Seward Meridian.

3.5 - Transmission

Three lines will extend from Gold Creek to Anchorage. The right-of-way will be 400 feet (120 m) wide and will include the Alaska Power Authority's intertie to Willow. Between Anchorage and Willow the southern transmission study area parallels Chugach Electric Associations existing transmission line east of Knik Arm.

From Gold Creek two lines will extend north including the Alaska Power Authority's intertie to Healy (Commonwealth Associates, Inc. 1982). The right-of-way will be 300 feet (90 m) including the intertie's right-of-way. The corridor of the northern study area to Fairbanks parallels Golden Valley Electric Association's (GVEA) transmission line for many miles.

Most of the towers will be X-shaped structures approximately 100 feet (30 m) tall. Two cable guys will extend from the crossbar of each tangent structure to a centerline anchor on each side of the structure.

Each line will have 105 feet (31 m) between the centerlines and 95 feet (29 m) of right-of-way on either side. The vegetation in an 80-foot (24-m) strip below each transmission line will not extend above 2 feet (0.6 m). The 25-foot (7.6-m) strip between transmission lines will have vegetation growth 10 feet (3 m) tall, cut in an irregular fashion to break up the visual linearity of the corridor. Traverse strips 30 feet wide (9 m) of low vegetation, will extend between the transmission structures of each line.

Tree clearing along the outside edges of the right-of-way will be feathered. At approximately 40 feet (12 m) from the centerline the tree height will be 10 feet (3 m). Tree height will increase as the distance from the centerline increases at a 30° angle from ground level. Trees along the outside edge of the right-of-way will be acceptable to approximately 45 (13.6 m) feet tall on level terrain. Trees growing outside of the right-of-way that could encroach on minimum conductor clearance when falling will be flagged and felled by hand tools or hand held power tools.

Double circuit construction may be required in areas such as the Municipality of Anchorage to allow a narrower right-of-way. Double circuit structures will be similar in design to the single circuit structures, only 50 feet (15 m) taller.

The transmission routes have been located to avoid recreation areas, residential areas, and special interest land. For example, the Anchorage-Willow transmission line avoided the Nancy Lake State Recreation Area, and the Susitna Flats State Game Refuge is only marginally traversed. The Healy-Fairbanks route deviates from Golden Valley Electric Association's (GVEA) transmission route and parallels the Alaska Railroad for 7 miles (11 km) in an effort to avoid multiple crossings of the Parks Highway. Private land holdings and communities such as Willow were major considerations in route selection.

The proximity of the transmission line to the access road will provide ground access to the line in all weather conditions. A trail will extend from the access road to each transmission structure. A minimum standard access trail will extend the entire length of the transmission route suitable only to all-terrain vehicle use. These trails will not be maintained during winter but cleared only as necessary, unlike the Watana-Devil Canyon access road.

3.5.2 - Induced Land Use Changes

Construction activities cause both short- and long-term impacts on resources. The creation of new access will add significantly to the potential for disturbance caused by the transmission line. Efforts were made to parallel existing utility corridors and to utilize existing access wherever appropriate.

Maintenance activities during the operational phase of the lines can also cause adverse impacts as a result of right-of-way clearing. Impacts will vary depending upon the timing and method of right-of-way maintenance and can be minimized through careful prescription of maintenance techniques.

(a) Land Use Development

The Anchorage-Willow route crosses or parallels numerous trails, including the Iditarod Trail, seismic survey lines, tractor and pioneering ORV trails, and several recreational trails near Willow (ADNR 1980), as illustrated in Figure E.9.10.

Residential use occurs in Willow, Red Shirt Lake, and on many of the small lakes east of the Anchorage-Willow route. Scattered cabins in the vicinity of Willow are close to the Alaska Railroad and Parks Highway. Red Shirt Lake has approximately 25 cabins along its shores. Seven other lakes have several cabins along their shores, and a few cabins are widely scattered elsewhere. The proposed route will not directly affect these existing structures, although the lines and towers may be visible in areas west of Long Lake, Red Shirt Lake, and smaller lakes where topography is not sufficient to screen them from view.

3.5 - Transmission

The Anchorage-Willow line route traverses 5.3 miles (8.9 km) across the Point MacKenzie Agricultural Sale located north by northwest of Point MacKenzie (see Figure E.9.10). Land within a transmission right-of-way can still be cultivated, but the towers would displace small areas of existing and potential farmland and disrupt normal patterns of cultivation and future agricultural development.

The corridor and portions of the western boundary of the Anchorage-Willow route include the northeast corner of the Susitna Flats State Game Refuge. All land use development in a game refuge must be determined to be compatible with the purposes for which the refuge was created.

On the east side of Knik Arm inlet the line route passes through the Fort Richardson Military Reservation parallel to the existing Chugach Electric Association, Inc.'s Point MacKenzie-University Substation line.

The Healy-Fairbanks line route parallels Golden Valley Electric Association's (GVEA) existing line for 12 miles (20 km), then parallels the Alaska Railroad for 7 miles (11 km). The line continues north on the east side of the Parks Highway and railroad to avoid multiple crossings of the highway. The GVEA existing transmission line extends from an existing substation at Healy to an existing substation at Ester. The Healy-Fairbanks line route parallels the GVEA line intermittently for 15 miles (25 km) before entering the Ester substation.

There are several moderate concentrations of land use developments along or adjacent to the proposed route between Healy and Fairbanks. Significant among these is the development at Healy, Nenana, and Ester. In Healy and Ester, existing land use and the proposed transmission route will be juxtaposed. Other residential areas passed by the proposed line include communities adjacent to the Parks Highway or the Alaska Railroad. These include Lignite, Ferry, and Brown. Few cabins exist in the vicinity of the Healy-Fairbanks transmission route.

Numerous trails, light-duty roads, and a sled road are in the vicinity of the Healy-Fairbanks transmission route as well as the Parks Highway and the Alaska Railroad (ADNR 1982). Many landing strips or airports are in the vicinity as well as the U.S. Air Force Clear M.E.W.S. Military Reserve. These include one at Healy, two at Lignite, one at Rex, and an airport at Nenana and Fairbanks.

As illustrated in Figure E.9.11, some agricultural land development exists north of Healy through which the proposed transmission line will traverse approximately 3 miles (5 km).

(b) Land Use Activity

The proposed route between Willow and Knik Arm northeast of Point MacKenzie will traverse an area that receives dispersed but increasing use. Boating occurs along the Susitna and Little Susitna Rivers, Willow Creek, and on numerous small lakes. Potential conflicts between the proposed lines and private lands and boating use may occur wherever the lines and towers will be visible. Floatplane flight patterns may be affected where the lines pass near lakes used for landing and taking off.

Trails that receive substantial ORV use are located near Willow, Red Shirt Lake, and Knik Arm. The proposed route will not affect the physical use of trails, although visual conflicts may occur where the lines pass the trails.

Extensive mining occurs along the Healy-Fairbanks transmission route concentrated at Ester and to its west.

3.5.3 - Mitigation

Efforts were made to select transmission line routes that would minimize negative impact. Proper alignment of the transmission line right-of-way within the route could reduce the line's obtrusiveness. Techniques employed to reduce the impact of the transmission line include following the Chugach and GVEA existing transmission corridors and initiating their structure design, spacing, and conductor material. Other techniques used to minimize disturbance include right-of-way clearing designed to be unobtrusive by breaking up the linearity and feathering the tree height, locating the right-of-way away from private and special interest land, and by maintaining the access roads only when necessary in winter.

The impact of the transmission line routes from Gold Creek to Healy and Willow will be minimal because the route will be within the same corridor as the Alaska Power Authority's Healy-Willow intertie transmission line. The construction of the Power Authority's Willow-Healy intertie will be complete upon commencement of the proposed Susitna transmission construction. The impact of the proposed transmission lines will be reduced because they will parallel and be adjacent to the approved intertie right-of-way.

3.6 - Changes in Land Use Without the Project

Agencies, Native corporations, and the private sector have been heavily involved in the selection and transfer of land ownership under the Alaska Statehood Act and the Alaska Native Claims Settlement Act. Land selection is complete. Without the development of the Susitna Hydroelectric Project the urgency to determine the ownership of the land in the project area will be lessened. The conveyance of land will continue in the project area; however, other areas of proposed development will have higher priorities for the state and Native corporations.

The project area has not been exploited in the past because of limited economic feasibility. Discussions with land owners/managers and consideration of present market conditions indicate that, without the project, little change is likely to occur in existing land use patterns. Even if the state of Alaska or the Cook Inlet Region, Inc. and village corporations sell remote parcels surrounding the accessible lakes, it is unlikely that there will be any significant change unless access into the area is improved. Native land owners have expressed intentions to exploit the mineral potential of lands south of the project area; however, no specific plans have been identified due to limited access.

4 - DESCRIPTION OF CHANGES IN LAND STATUS AND MANAGEMENT

4.1 - Land Status Changes Resulting from the Project

The land required for the dams, the Devil Canyon reservoir, and a portion of the Watana reservoir has been selected by the Natives. The proposed locations for the Devil Canyon camp and village, as shown in Figure E.9.16, have been selected by CIRI as illustrated in Figure E.9.3, and could be transferred to CIRI and associated Native village groups. The proposed locations for the Watana camp and village are on state selected land. The transmission line routes are primarily on state land. Sections of the northern transmission corridor crosses land that has been designated for village selection within Doyon, Ltd. boundaries. Sections of the southern corridor are owned by CIRI.

Transfer of title for state selected land will not be affected by the project. A means of land acquisition will have to be established for the access road and transmission line corridor, either through purchase or by obtaining a right-of-way, before the initiation of construction.

A decision by the state to proceed with the Susitna project would entail transfer of ownership of substantial land areas to the state. The process for such transfer has not yet been established but could entail purchase and/or an exchange of other state selected lands with Native corporations.

The exchange of fee simple land between the state and a regional Native corporation will involve each agency's determination of parcels suitable for exchange. Market value and appraisals are made for each parcel and are compared for exchange. A comprehensive status check is performed to determine if the land is subject to regulations. A land use report and land classification may be required and public hearings will be held.

ADNR and the Native corporations have expressed interest in identifying the project related land use requirements and alternatives in a manner that will prevent irreversible impacts to land management. In order to prevent this issue from being a potential delay in project progress, recommendation has been made to convene in a multiagency, multidisciplinary effort. Carefully determined decisions could result in a multipurpose project which could facilitate and enhance other uses of the surrounding land. Future management problems for landowners and land managers could be minimized.

4.2 - Land Status Changes Without the Susitna Hydroelectric Project

With the exception of a few scattered parcels, most lands in the project area are presently under federal title, withdrawn from acquisition or development pending conveyance of Native and state selections authorized by ANCSA and the Statehood Act, respectively. Significant changes in the land selection are not anticipated in the project area whether the project proceeds or not. Land exchanges are being considered between Ahtna, Inc. and CIRI. CIRI and the village corporations have not completely determined which method CIRI will reconvey land to the village corporations.

4.3 - Land Management Changes Resulting from the Project

Based on available information and agency interviews, it has been determined that little comprehensive management exists at present. Agencies establishing management plans have been influenced by the feasibility analysis of the Susitna Hydroelectric Project. Not all the management plans described below were instigated by the Susitna Hydroelectric Project; however, as feasibility of the Susitna Project became probable, comprehensive plans have been adjusted accordingly.

The Bureau of Land Management (BLM) has no proposals for management planning in the study area, other than the existing Denali/Tiekel Planning Blocks.

A draft Denali Scenic Highway Feasibility Study and recommendations regarding the proposal will be released in March 1983. The Susitna Hydroelectric Project access road was considered in the analysis of the scenic highway feasibility report. The project proposal, construction, and land use are not expected to impact the scenic highway proposal. Public hearings for the Scenic Highway Study will be held in March 1983. The Alaska Land Use Council will make its recommendation following the receipt of public comments and after reviewing the compatibility of the Scenic Highway proposal and other plans. The compatibility of the Susitna Hydroelectric Project and the Denali Scenic Highway will be determined at that time.

The ADNR is preparing a land use report that describes and categorizes potential land use in the south-central region of Alaska which will be completed by approximately May 1983. A land use plan will be completed by the ADNR in 1986. The ADNR recommends close coordination between the development of the Susitna Hydroelectric Project and the Susitna Area Comprehensive Land Use Plan.

The ADF&G has developed species-specific objectives for the region, but it has no land management authority. Other agencies have preliminarily addressed land management concerns. The generation of hydroelectric power will become the predominant land use in the area, and the presence of the project will be an importance factor when agencies eventually develop comprehensive land management plans.

The Mat-Su Borough has prepared a planning background report. The Mat-Su Borough will complete a draft comprehensive land use plan in January 1983.

The Fairbanks North Star Borough is preparing a borough-wide, comprehensive plan. The first section will describe the potential land use and will give a general comprehensive plan; it will be available in July 1983. By 1985 specific land use plans, policies, and regulations for subdivisions and zoning will be available.

Increased access will allow land use activity to become more intense, especially by individual users. Therefore, the provision of access will result in a need for increased management and use controls in the Middle Susitna Basin. After titles or legal rights-of-way are obtained for construction and operation of facilities, public access could result in increased use levels of private lands; fishing and general use of the project area are probable. These activities may require increased fish and wildlife management and/or may result in surface-disturbing activities.

Specific controls may be required to protect resource value within the project boundaries. Land use control would derive from management plans designed by the land owners/managers. These plans should be coordinated with adjacent land owners/managers to be compatible with adjacent land management. Controls could include establishing acquisition limits for hunting and fishing, permitting a limited public entry, ORV management, and other land use management.

If the Alaska Power Authority leases project-required land from the Native corporations, the Native land owners will dictate the land use policy by virtue of a permit system subject to federal or state law. The Native land owners will implement the land use control authorized to them by the U.S. Congress via ANCSA in 1971. Such control could include restrictions to trespass, use of ORVs, rockhounding, and access to recreational trails that cross their land. Permits to hunt, fish and use Native land will be the tools to regulate the restrictions.

Finalizing specific management plans and mitigation measures for transmission line right-of-way, access, recreational use, and residential accommodations will proceed during Phase II of the Susitna Hydroelectric Project. The Alaska Power Authority will work closely with the aforementioned development of land use plans.

4.4 - Land Management Changes Without the Project

Land management in the project area is tenuous because of the emphasis on the determination of land ownership and the uncertain outcomes of the Alaska National Interest Lands Conservation Act and the Susitna Hydroelectric Project (USOTA 1977). The BLM Denali Planning Block will dictate the policy for lands within its boundaries and may influence management decisions on BLM land in the vicinity.

Ahtna, Inc. and its village corporations will establish land value and the economics of recreational, mining and residential land use upon the BLM's conveyance of land. CIRI and its village corporations will do so after the procedure for CIRI's reconveyance of land to the villages has been determined and implemented.

The ADNR and Mat-Su Borough have recently increased their effort to establish management plans in the project area as a result of project feasibility studies. Land management plans completed for the project area will not change should the hydroelectric project not be constructed. The implementation of those plans will proceed at a slower rate. The establishment or completion of new plans may be postponed. The efforts of personnel of the Susitna Area Planning Team may be redirected to areas of greater activity such as south and west Mat-Su Borough where development will establish along the highways and railroad as a result of growth in Anchorage and south-central Alaska.

5 - AGENCY CONSULTATION AND MITIGATION PLANS

Agency consultation is described specifically in Section 6, Authorities Contacted. Comments received from the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service included comments on mitigation measures. The following general response is toward those comments, and is more specifically addressed in the Chapter 9 text. Specific agency comments and responses are itemized in Chapter 11.

Measures to mitigate the land use impact will be determined along with juristictional agencies such as the Alaska Department of Natural Resources, Matanuska-Susitna Borough, Fairbanks North Start Borough, The Municipality of Anchoragee, and the regional Native Corporations when these agencies have determined the preferred techniques to implement increased land use management.

Chapter 9 has described the limited historical land use of the project impoundment area and the progress of land management plans. Land management has only become a concern in Alaska in the last twenty years. Agencies have recently been selecting land to acquire and will develop management plans upon the completion of land acquisition. The agencies have anticipated the approval of the Susitna Hydroelectric Project and have increased emphasis on land management in the project area. Once the scope of the project and the potential impacts to the resources are identified, the agencies can coordinate management plans to minimize the project impact, manage the land use effectively, and facilitate and enhance other use in adjacent areas.

Specific mitigation measures addressed in Chapter 9 include designing housing facilities that minimize environmental impact; directing personnel away from environmentally sensitive areas via proposed recreational facilities; providing recreational opportunities that offset recreational resources lost with a recreation plan compatible with the regional recreational framework; inhibiting ORV activity if it becomes a disturbance; aligning the transmission line according to the terrain and the existing and potential land use; and designing and managing the transmission line right-of-way to reduce visual, biological, and human impact.

Restrictive access has historically limited public use of the project area. Unlimited access into the area could bring about excessive public use and associated socioeconomic and biological distress. The recreation plan will accommodate recreational demand and replace recreational opportunities lost as it simultaneously directs activity to more resilient ecosystems.

Specific mitigation measures to reduce the impact of the transmission line are presented in Subsections 3.5.1 and 3.5.3. Right-of-way management techniques include feathering adjacent tree height; linear and transverse undulation of the cut tree line; and clearing the transmission line access road, only as required for maintenance access to the transmission structures.

6 - AUTHORITIES CONTACTED

The following list documents the authorities contacted in the course of preparing the Land Use Chapter for the FERC permit application for the Susitna Hydroelectric Project. Written records of these conversations are available at offices of the Alaska Power Authority.

AUTHORITIES CONTACTED

Agencies	Person	Date	Communication	Subject
FEDERAL				
U.S. Department of Agriculture				
Soil Conservation Service	Sterling Powell: Physical Engineer, Water Resource Specialist	10/19/82	Meeting	Special Lands
U.S. Department of Commerce				
National Oceanic and Atmospheric Administration		11/02/82	Phone	Floodplain and Coastal Zone Management
		11/02/82	Phone	Air Landing Areas
U.S. Department of Defense				
Army Corps of Engineers, Alaska District	Larry Boyles: Floodplain Management Branch	11/02/82	Meeting	Floodplains
	Alan Churchill: Floodplain Management Branch	12/16/82 and 12/20/82	Phone	Floodplains
	Ted Rockwell: Regulatory Functions Branch	12/17/82	Meeting	Wetlands Permit
U.S. Department of Interior				
Bureau of Land Management	Paula Benson: ANCSA	12/14/82	Phone	Land Status
	John Rego: Geologist	10/07/82 and 12/14/82	Phone	Land Use
	Sandy Thomas: ANCSA	10/27/82	Phone	Land Status

AUTHORITIES CONTACTED

Agencies	Person	Date	Communication	Subject
U.S. Department of Interior (Cont.)				
Bureau of Land Management (Cont.)	Bob Ward: Environmental Planner	10/20/82, 11/01/82 and 12/14/82	Meeting Phone Phone	Land Use Management
National Park Service	Larry Wright: Outdoor Recreation Planner	11/08/82	Phone	Land Use
STATE				
Department of Commerce and Economic Development				
Alaska Power Authority	Bruce Bedard: Inspector, Native Liaison	10/04/82 10/12/82 11/09/82 11/29/82 12/14/82	Phone Phone Phone Meeting Meeting	Land Use Land Status Land Management
Department of Community and Regional Affairs				
Coastal Zone Management	Christy Miller	11/02/82	Phone	Floodplains
Department of Fish and Game				
Division of Habitat Protection	Dan Huttman	12/02/82	Phone	Land Status
	Carl Yenigawa	10/07/82	Phone	Land Use

AUTHORITIES CONTACTED

Agencies	Person	Date	Communication	Subject
Alaska Land Use Council				
	Lisa Parker: Executive Director	10/14/82 and 10/20/82	Phone Meeting	Land Status
Department of Law				
	Bob Price	10/14/82	Phone	Land Status
Department of Natural Resources				
Division of Forest Land and Water Management	Arlan DeYong: Assistant Planner, District Classification Officer	12/14/82 12/15/82 12/17/82 12/20/82	Phone Meeting Phone	Land Classification
	Keith Quintavell: Land Management Officer	12/14/82	Meeting	Land Status
Division of Reseach and Development	Christopher Beck: Regional Planner	10/13/82 and 10/14/82	Phone Phone	Land Use Land Management
	Al Carson: Deputy Director	10/13/82 and 12/16/82	Phone Phone	Land Use
	Randy Cowort	12/16/82 and 01/18/82	Phone Meeting	Land Use Management Land Use Development
LOCAL				
Fairbanks Northstar Borough	Paula Tevelker: Planner II	10/11/82	Phone	Land Use

AUTHORITIES CONTACTED

Agencies	Person	Date	Communication	Subject
LOCAL (CONT.)				
Matanuska-Susitna Borough	Claudio Arenas: Planning Director	10/07/82	Phone	Land Use
		10/14/82	Phone	Land Management
		10/30/82	Meeting	Land Management
		12/14/82	Phone	Land Use
		12/15/82	Phone	Land Management
Alrtna, Inc.	Lee Adler: Director	10/08/82	Phone	Land Status
		11/29/82	Meeting	Land Status
Cantwell Village Planning Council	Charles Hubbard	10/08/82	Phone	Land Status
Cook Inlet Region, Inc.	Don Marx	12/20/82	Meeting	Land Status Management
	Steve Clanehan	12/20/82	Meeting	Land Status
	Roland Shanks	10/08/82 and	Phone	Land Status
		12/01/82	Meeting	Land Status and Management
Dowl Engineers	Rick Feller	10/07/82	Phone	Land Management Plans
Hollmes and Narver	Warren Samples: Susitna Project Manager	10/7/82	Phone	Land Status
Knik/ADC	Ray Goodman	10/21/82	Meeting	Land Status
Land Field Services	Jay Sullivan	10/14/82	Phone	Land Status
	Morene Bockman	10/15/82	Meeting	Land Status
Tyonek Native Corporation	Agnes Brown: President	10/25/82	Phone	Land Status

REFERENCES

Acres American Incorporated/Terrestrial Environmental Specialists, Inc. 1981. Susitna Hydroelectric Project, Environmental Studies Subtask 7.07: Land Use Analysis. Prepared for the Alaska Power Authority, Anchorage, Alaska.

Alaska Department of Natural Resources, Matanuska-Susitna Borough. 1981. Draft Land Use Plan for Public Lands in the Willow Sub-basin. Alaska Department of Fish and Game.

Alaska Department of Natural Resources, et al. 1982. Land Use Issues and Preliminary Resource Inventory, Planning Background Report. Volume 1. Prepared for the Matanuska-Susitna-Beluga Cooperative Planning Program.

Alaska Department of Natural Resources, 1980. Susitna Basin Land Use/ Recreation Atlas Planning Background Report. Prepared in cooperation with the U.S. Department of Agriculture, Social Conservation Service.

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Arnold, R.D. 1978. Alaska Native Land Claims. Alaska Native Foundation, Anchorage, Alaska.

Bureau of Land Management. 1982. Amendment to the Southcentral Alaska Land Use Plan for the Denali/Tiekel Planning Blocks (Draft).

Commonwealth Associates, Inc. 1982. Environmental Assessment Report, Anchorage - Fairbanks Transmission Intertie. Prepared for the Alaska Power Authority, Anchorage, Alaska.

Dowl Engineers 1982. Growth Potential, Development Issues, Settlement Patterns (Draft). Volume 2. Matanuska-Susitna-Beluga Cooperative Planning Program. Prepared for the Matanuska-Susitna Borough.

Executive Order 11988. 1977. Floodplain Management.

Maynard and Partch/Woodward-Clyde Consultants. 1981. Coastal Management Program Phase II Progress Report. Prepared for Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Price, R.E. 1982. Legal Status of the Alaska Natives: A Report to the Alaska Statehood Commission. Prepared by Department of Law for the Alaska Statehood Commission, Fairbanks, Alaska.

R&M Consultants, Inc. December 1981. Susitna Hydroelectric Project - Regional Flood Studies. Prepared for Acres American Incorporated.

R&M Consultants, Inc. January 1982. Susitna Hydroelectric Project River Morphology. Prepared for Acres American Incorporated.

Terrestrial Environmental Specialists, Inc., Frank Orth & Associates and the University of Alaska. 1981c. Susitna Hydroelectric Project, Environmental Studies Report Subtask 7.14: Access Road Environmental Analysis - Environmental, Socioeconomic and Land Use Analysis of Alternative Access Plans. Prepared for the Alaska Power Authority, Anchorage, Alaska.

Terrestrial Environmental Specialists and the University of Alaska. 1981b. Susitna Hydroelectric Project, Environmental Studies Annual Report Subtask 7.12: Plant Ecology Studies. Prepared for the Alaska Power Authority, Anchorage, Alaska.

U.S. Corps of Engineers 1980. Protecting Alaska's Waters.

U.S. Corps of Engineers 1972. The Floodplain Information Report, Talkeetna, Alaska.

U.S. Office of Technology Assessment. 1977. Analysis of Laws Governing Access Across Federal Lands, Options for Access in Alaska. Washington, D.C.

TABLE E.9.1: PARCELS BY LAND STATUS/OWNERSHIP CATEGORY[(a)]

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location	Acreage
C-1	Federal	T29N, R12E SM[(b)]	3,200
		T30 & 31N, R11E SM	11,840
	Federal (SSS)[(c)]	T29-31N, R10 & 11E SM	28,160
	State Selection	T29N, R10 & 11E SM	23,040
	Regional Selection	T30 & 31N, R12E SM	12,800
C-2	Federal (SSS)	T29-31N, R8-10E SM	86,400
	State Selection	T29 & 30N, R8-10E SM	51,840
	Private (Clarence Lake)	T30N, R9E, SM Sections 19, 20, 21	12
C-3	Federal (SSS)	T30 & 31N, R5-8E SM	56,639
	State Selection	T29 & 30N, R5-8E SM	81,920
	Native Selection	T31N, R5E, SM	998
	Private (Watana Lake)	T31N, R7E SM Sections 25 & 36	15
C-4	Federal (SSS)	T30N, R3-5E SM	18,304
	State Selection	T29 & 30N, R3-5E SM	73,088
	Native Selection	T29-31N, R2-5E SM	47,872
	Private (Stephan Lake)	T30N, R3E SM Sections 9,16,17,20,21	42
C-5	Federal (SSS)	T30 & 31N, R1W, 1&2E SM	52,006
	State Selection	T29 & 30N, R1W, 1&2E SM	52,480
	Native Selection	T29-31N, R1 & 2E SM	32,665
	Private	T29N, R2E SM Section 15	5

(a) Status and ownership are subject to change through administrative and court proceedings.

(b) Seward Meridian

(c) SSS - State Selection Suspended

(d) TA - Tentatively Approved

(e) Fairbanks Meridian

Source: Compiled from various sources including Land Status Maps prepared by CIRI/H&N 1980 and 1981; Alaska Department of Natual Resources, State Land Disposal. Brochures 1979, 1980, 1981; U.S. Department of Interior, Bureau of Land Management Records, 1982.

TABLE E.9.1 (Page 2)

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location	Acreage
C-6	Federal (SSS)	T29-31N, R1 & 2W SM	23,999
	State Selection	T29 & 30N, R1 & 2W SM	30,399
	State Patented (TA)	T31N, R2W SM	5,760
	Native Group Selected	T30N, R2W SM	3,840
	Private (north of Chunilna Creek)	T30N, R2W SM Sections 23, 26	403
	(south of Gold Creek)	T31N, R2W SM Sections 29, 30	84
	Mining Claims	T29N, R2W SM Sections 2,3,10, 11,15,16	Unknown
D-6	Federal (Railroad Withdrawal)	T22S, R11W FM[e] Sections 22, 23, 26 27, 33, 34	1,984
		T33N, R2W SM Sections 15-17	257
	(near Chulitna)	T32N, R2W SM Sections 1, 2 & 11	180
	Federal (SSS)	T31N, R1W SM	2,303
		T33N, R1W SM	3,840
	Denali State Park	T31-33N, R2W SM	25,600
	State Selection	T32 & 33N, R2W SM	10,240
		T32 & 33N, R2W SM Sections 6 & 31	479
		T22S, R11W FM	5,120
	State Selection TA	T31N, R2W SM	9,600
		T22S, R10W FM	3,200
	Native Selection	T31 & 32N, R1W SM	7,680
	Private (Indian River Remote	T31 & 32N, R2W SM Sections 2-4,9,10,13 24,25-27,33-36	6,400
	(Indian River S.D.)	T33N, R2W SM	1,280
	(near Chulitna)	T32N, R2W SM Sections 1,2,11,12	371
	(near Gold Creek)	T31N, R2W SM Sections 17,19-21, 29,30	959
	(Pass Creek)	T33N, R2W SM Section 27	2
	(Summit Lake)	T33N, R2W SM Section 34	5
	(Chulitna Pass)	T33N, R2W SM Section 35	2
	(near Alaska Railroad)	T31N, R2W SM Section 9	2

TABLE E.9.1 (Page 3)

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location	Acreage
D-5	Federal (SSS)	T31N, R1W, 1 & 2E SM	17,860
		T33N, R1W SM	11,520
	State Selection	T32 & 33N, R1W, 1&2E SM	61,438
	State Selection TA	T22S, R8-10W FM	29,119
	Native Selection	T31-33N, R1W, 1&2E SM	52,198
	Private (High Lake)	T32N, R2E SM Section 20	111
	(north of Devil Canyon)	T32N, R1E SM Section 16	12
		T32N, R1E SM Section 30	7
		T32N, R1W SM Section 9	5
		T32N, R1W SM Section 10	12
		T32N, R1W SM Section 23	7
D-4	Federal (SSS)	T31N, R3E SM	12,160
	State Selection	T32 & 33N, R3-5E SM	95,039
	State Selection TA	T22S, R5-8W FM	29,440
	Native Selection	T31 & 32N, R3-5E SM	37,914
	Private (Tsusena	T33N, R5E SM	
	Butte area)	Sections 16, 21	49
D-3	Federal	T32 & 33N, R8E SM	2,560
	Federal (SSS)	T31 & 32N, R5-7E SM	26,880
	State Selection	T32 & 33N, R5-7E SM	82,560
	State Selection TA	T32N, R8E SM	2,081
		T22S, R2-4W FM	21,760
		T22S, R5W FM	5,760
	Native Selection	T31 & 32N, R5W-7E SM	28,160
	Private (Fog Lakes Area)	T31N, R5E SM	
		Sections 13 & 24	52
D-2	Federal	T31-33N, R8-10E SM	110,080
		T22S, R1 & 2W, 1E FM	26,240
	Federal (SSS)	T31N, R8-10E SM	30,720
	State Selection TA	T32N, R8E SM	4,480
		T22S, R2W FM	3,519
D-1	Federal	T31-33N, R10-12E SM	78,080
		T22S, R1-3E FM	12,800
	Federal (SSS)	T31N, R10E SM	154
	Regional Selection	T31 & 32N, R12E SM	17,280
	Fish & Wildlife Service	T33N, R11E SM Section 20	Unknown
USGS Healy Quad			
A-1	Federal	T22S, R1 & 2E FM	3,840
	Regional Selection	T22S, R1 & 2E FM	960
A-2	Federal	T22S, R1E, 1 & 2W FM	30,720
	Private	T22S, R2W FM Section 3	5

TABLE E.9.1 (Page 4)

A-3	Federal	T22S, R2-5W FM	24,320
	State Selection TA	T22S, R5W FM	5,760
A-4	State Selection TA	T22S, R5-7W FM	29,440
A-5	State Selection TA	T22S, R8-10W FM	21,120
A-6	Federal (Railroad Withdrawal)	T22S, R11W FM	2,303
	State Selection	T22S, R11W FM	2,240
	State Selection TA	T22S, R10W FM	3,200
	Private	T22S, R11W FM Section 1	32

TABLE E.9.2: SUMMARY OF LAND STATUS/OWNERSHIP IN PROJECT AREA[(a)]

Land Status/Ownership Category	Total Area Acres
Federal	303,680
Federal (State Selection Suspended)	370,945
Federal (Railroad Withdrawal)	4,724
State Selection	569,883
State Selection Patented or TA	174,239
Denali State Park (within study area)	25,500
Regional Selection	31,040
Native Group Selection	3,840
Native Selection	207,487
Village Selections (included in Native selection total)	
Chickaloon	5,120
Tyonek	20,480
Knik	39,680
Private	9,874

(a) Summarized from Table E.9.1.

TABLE E.9.3: USE INFORMATION FOR EXISTING STRUCTURES IN THE MIDDLE SUSITNA RIVER BASIN

	Zone 1	Zone 2	Zone 3
PRESENT CONDITION OF STRUCTURE			
Remains of structured foundations only (no use)	1	5	-
Badly weathered; partial structure remains - use no longer possible	2	-	1
Structure intact; not currently maintained			
- seasonal use - past and present	2	2	2
- no current seasonal use	2	7	1
Structure intact; maintained, with seasonal use - past and present	3	49	12
Structure intact; maintained, with year-round use	-	9	3
Structure intact; maintained; no current use information	-	4	3
USE TYPES			
Hunting, fishing, trapping	3	7	1
Hunting, fishing	2	43	3
Hunting only	1	7	2
Fishing only	-	1	-
Boating	1	21	-
Skiing	-	6	-
Mining	-	4	1
Research/exploration	3	2	-
ACCESS			
Air:			
Airstrip	3	26	6
Floats/skis	2	34	6
ATV	1	20	5
4WD	1	16	1
Boat	3	3	1
Foot, dog team	6	37	9
Snowmachine	-	6	1
Horse	-	4	-
Rail	-	1	2
Car	-	1	2

TABLE E.9.4: MAJOR TRAILS IN THE MIDDLE SUSITNA RIVER BASIN

Type	Beginning	Middle	End	Years Used
Cat, ORV	Gold Creek		Devil Canyon	1950s-present
Cat, ORV	Gold Creek	Ridge top west of VABM Clear	Confluence of John & Chunilna Creeks	1961-present
Packhorse	Sherman		Confluence of John & Chunilna Creeks	1948
Cat	Alaska Railroad, Mile 232		Chunilna Creek	1957-present
Foot	Curry		Cabin 2 miles east of VABM Dead	1926
Packhorse,	Talkeetna	North of Disappointment Creek	Stephan Lake	1948
Packhorse, old sled road	Chunilna	Portage Creek	Lake west of High Lake	1920s-present
ATV	Denali Highway	Butte Lake	Tsusena Lake	1950s-present

TABLE E.9.5: 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.9.5 (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 fisning and hunting.

TABLE E.9.5 (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 out-reach 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 inter-national 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.9.5 (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 48 49	Cabin Cabin 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.9.5 (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.9.5 (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.9.5 (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.9.5 (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 96	Cabin 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.
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.

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.

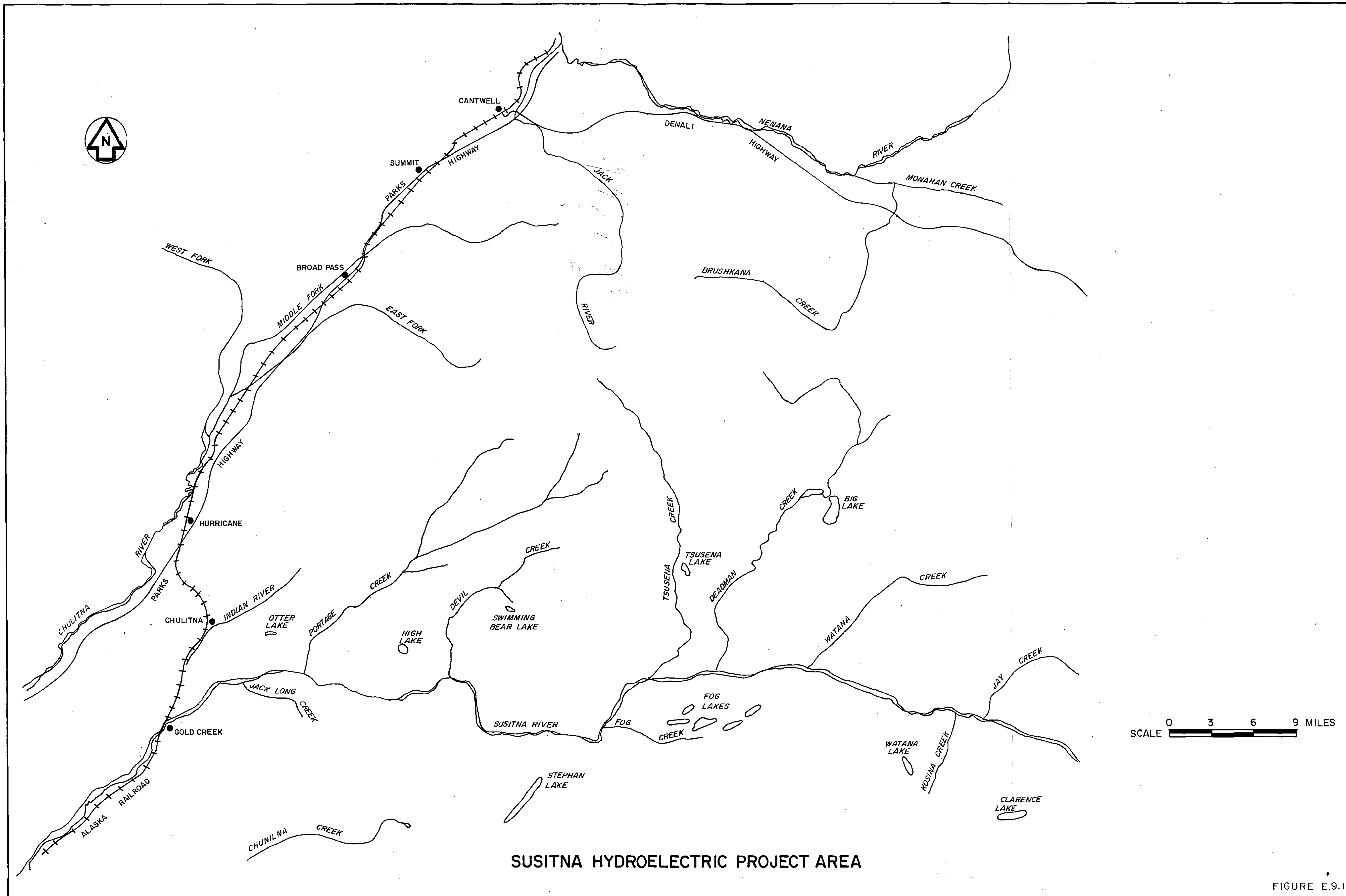
TABLE E.9.5 (Page 10)

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)

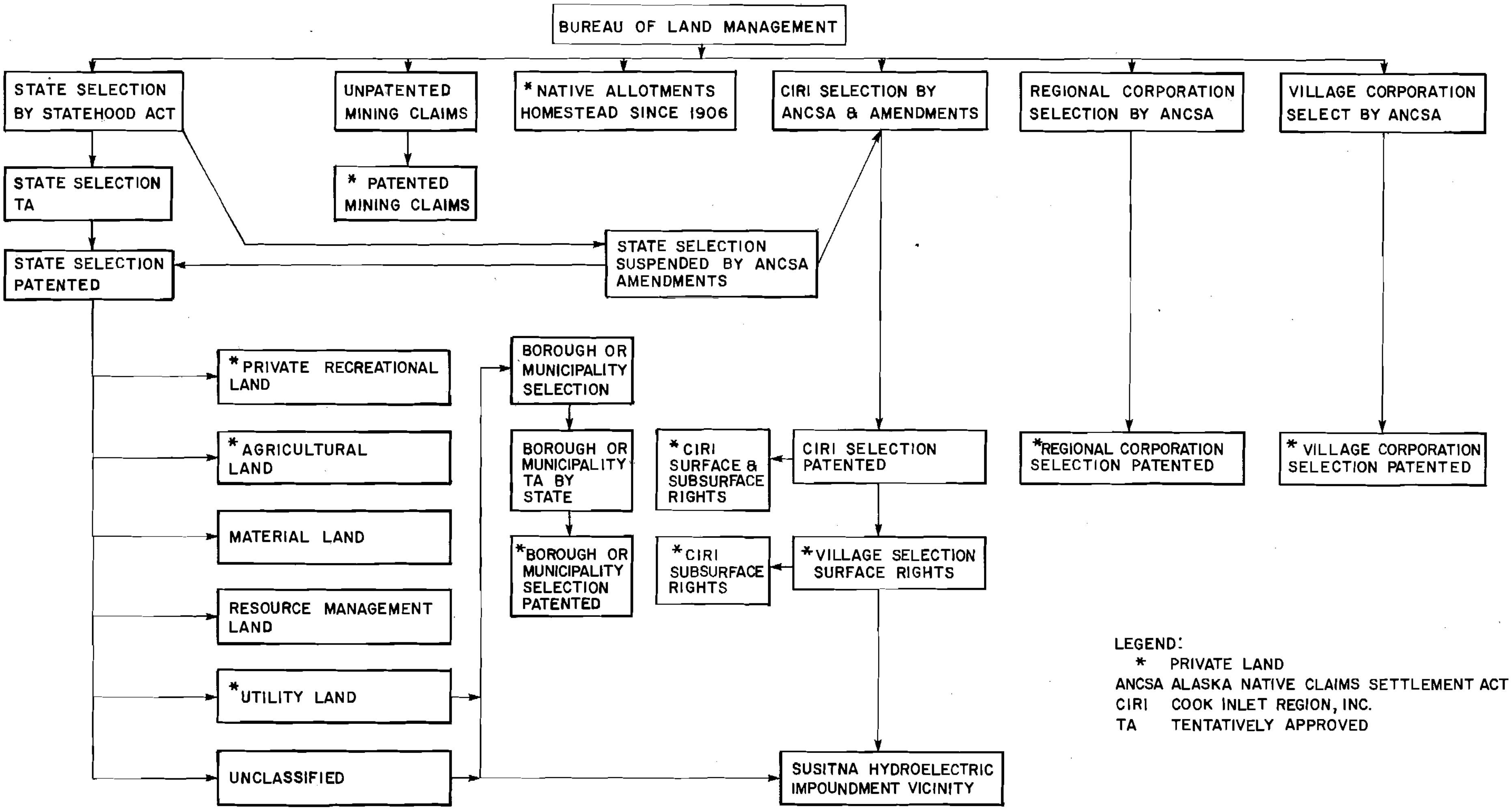
(a) Zone 1 is the impoundment zone plus a 200 foot perimeter.
Zone 2 is the 6 mile perimeter around Zone 1.
Zone 3 is that zone between 6 and 12 miles from the impoundment.

(b) Almost all sites are accessible by helicopter.



SUSITNA HYDROELECTRIC PROJECT AREA

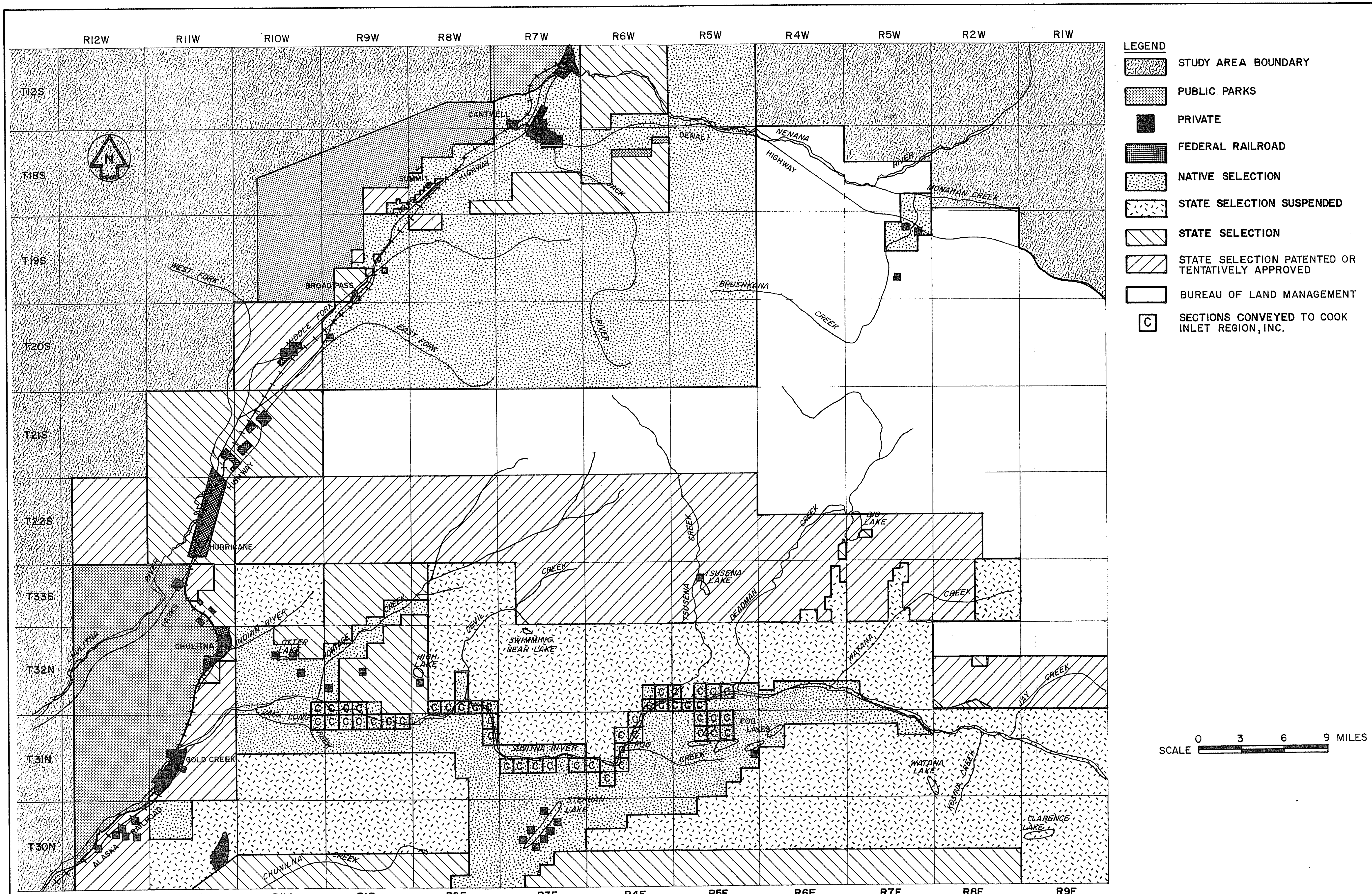
FIGURE E.9.1



PROCEDURES FOR ALASKA LANDS ACQUISITION

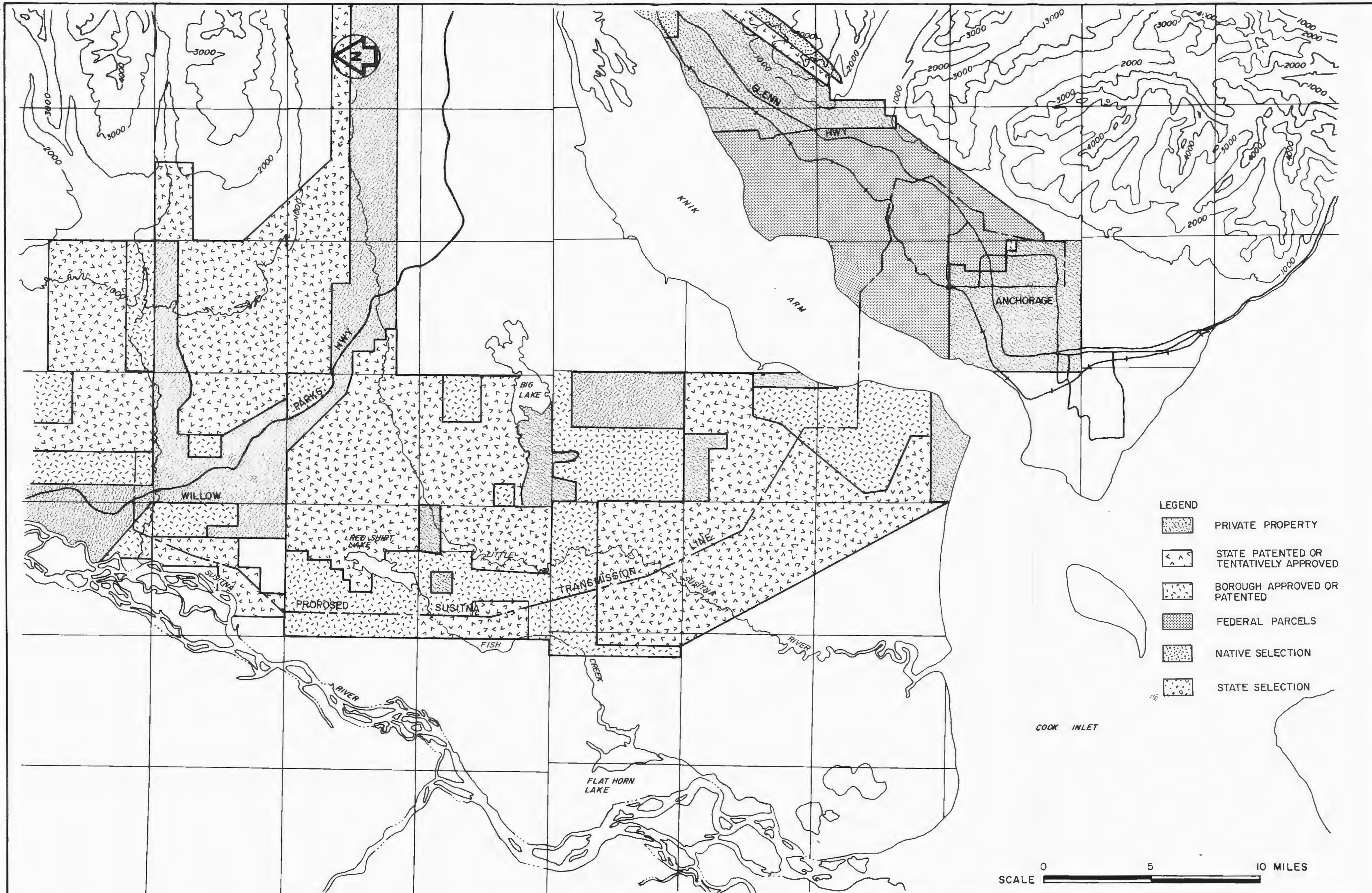
(NOT REVIEWED BY ALL AFFECTED AGENCIES 12/82)

FIGURE E.9.2



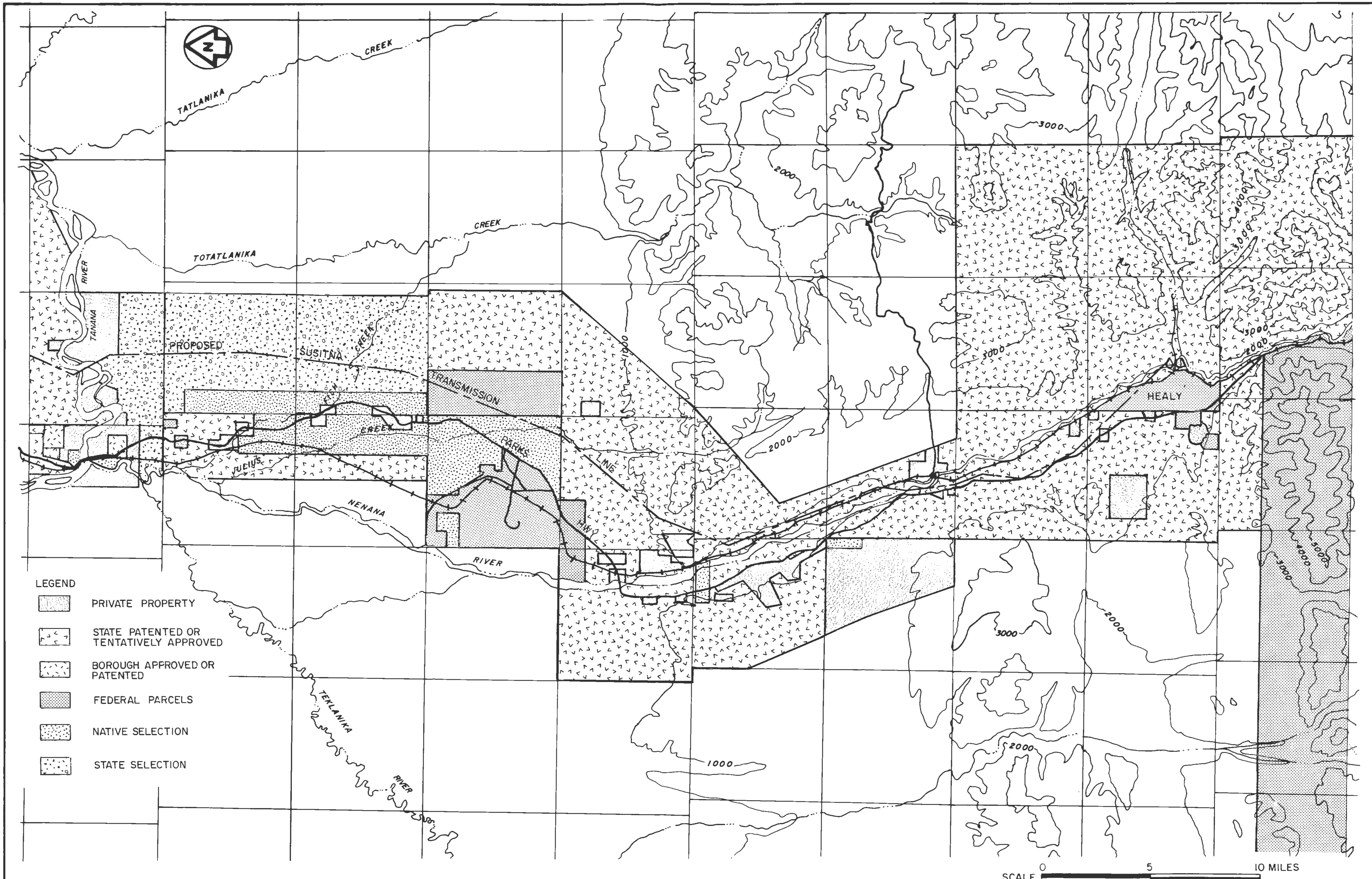
LAND STATUS OF THE SUSITNA HYDROELECTRIC PROJECT AREA

FIGURE E.9.3



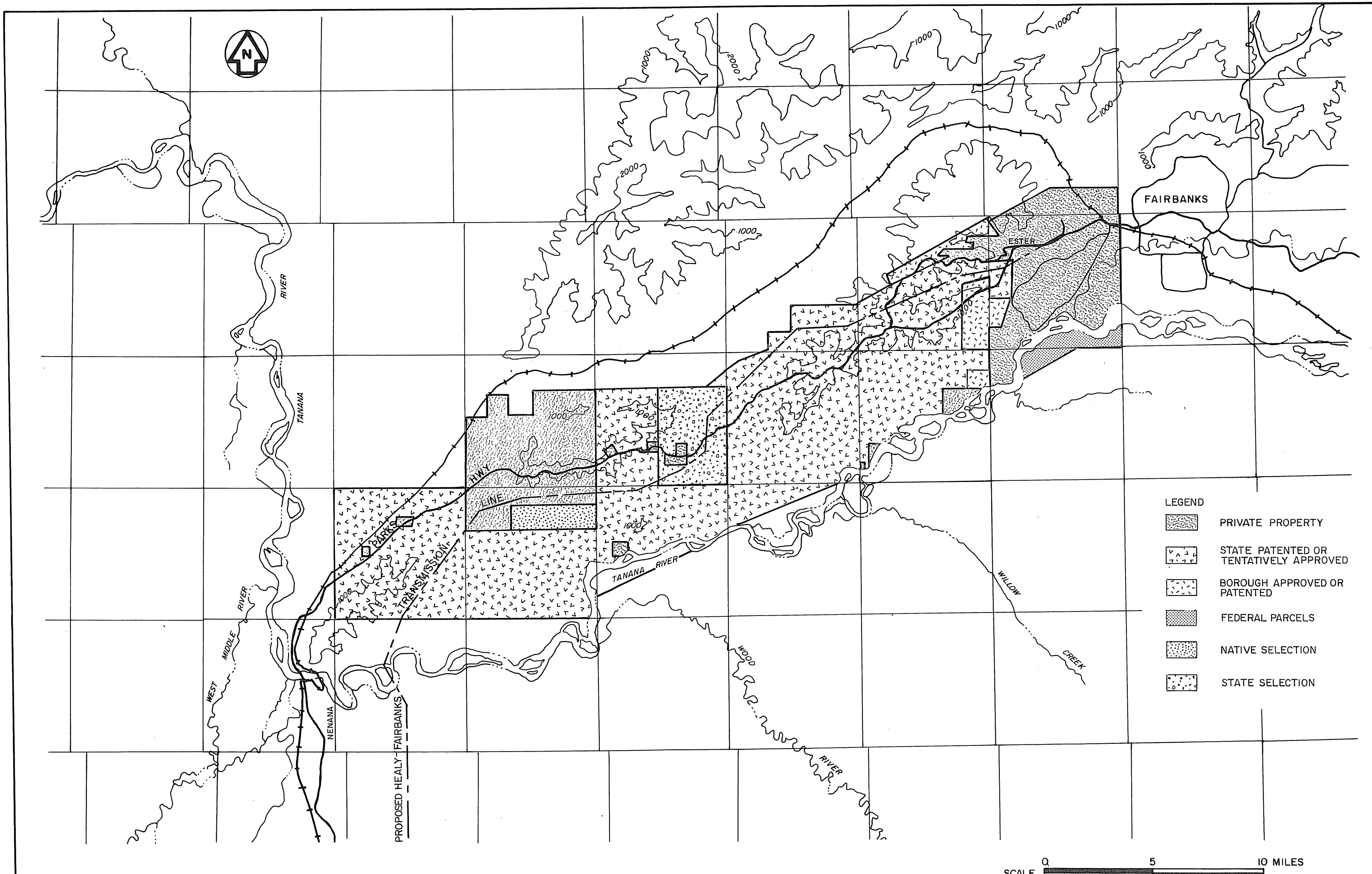
LAND STATUS OF THE ANCHORAGE - WILLOW TRANSMISSION LINE

FIGURE E.9.4



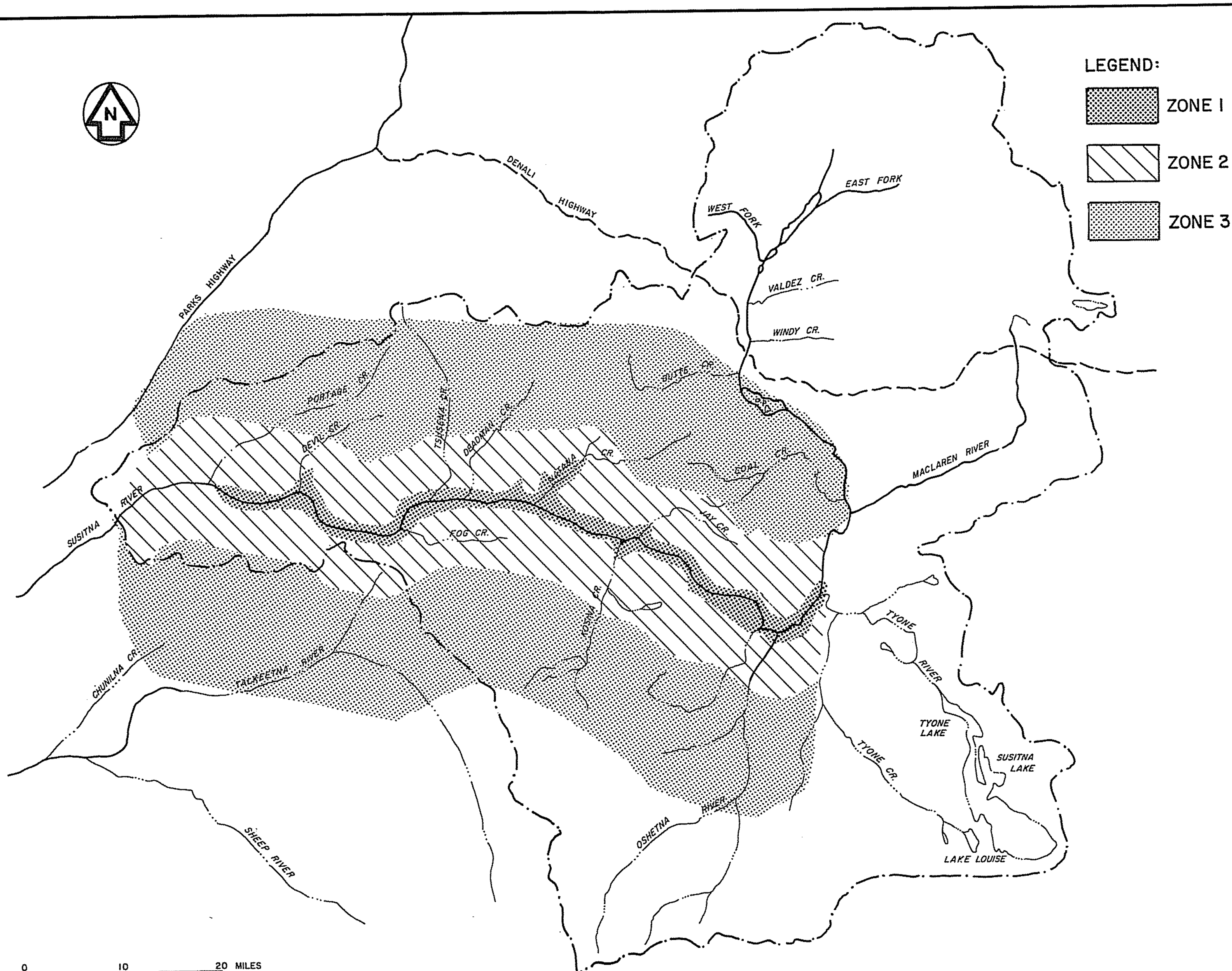
LAND STATUS OF THE HEALY – FAIRBANKS TRANSMISSION LINE SOUTH

FIGURE E.9.5



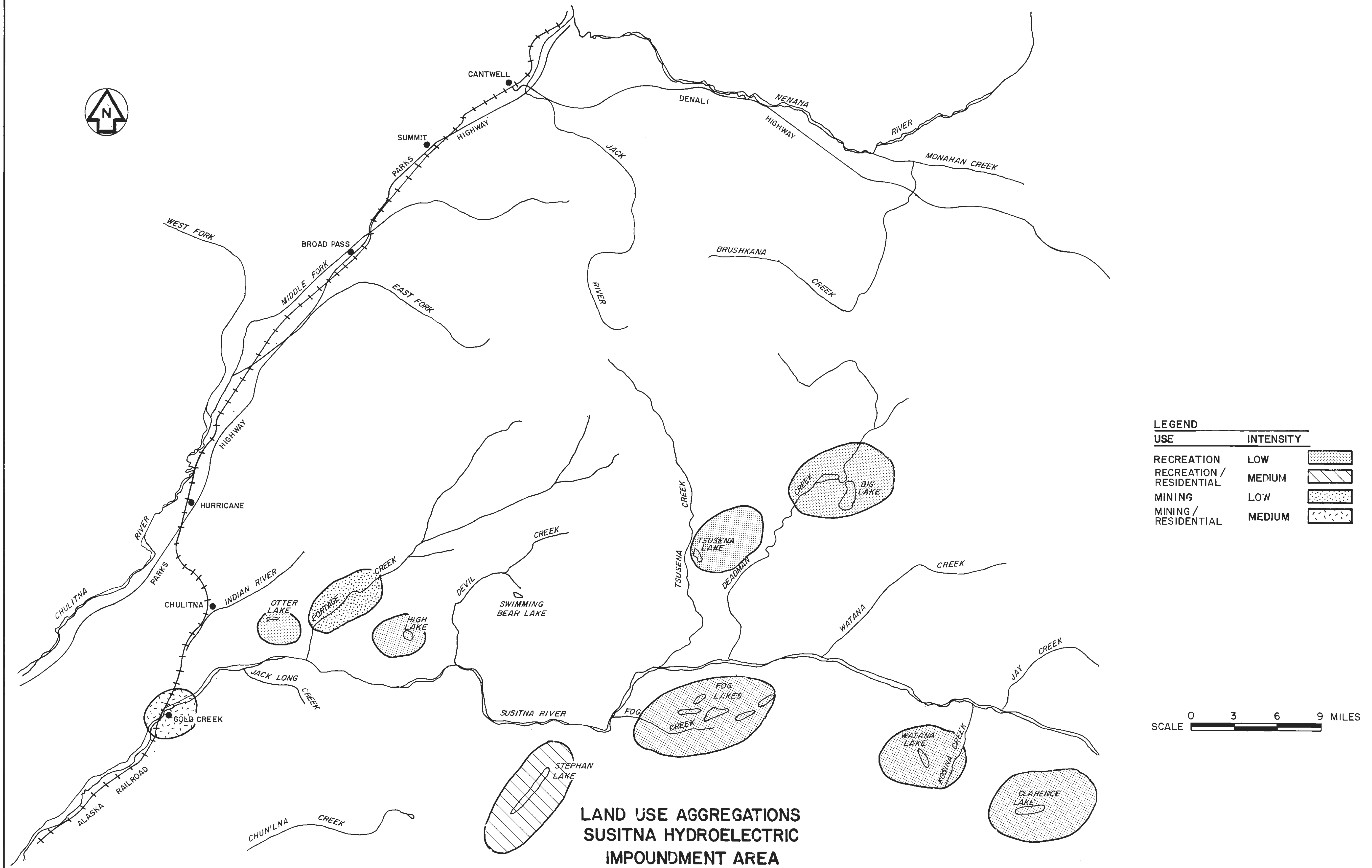
LAND STATUS OF THE HEALY-FAIRBANKS TRANSMISSION LINE NORTH

FIGURE E.9.6



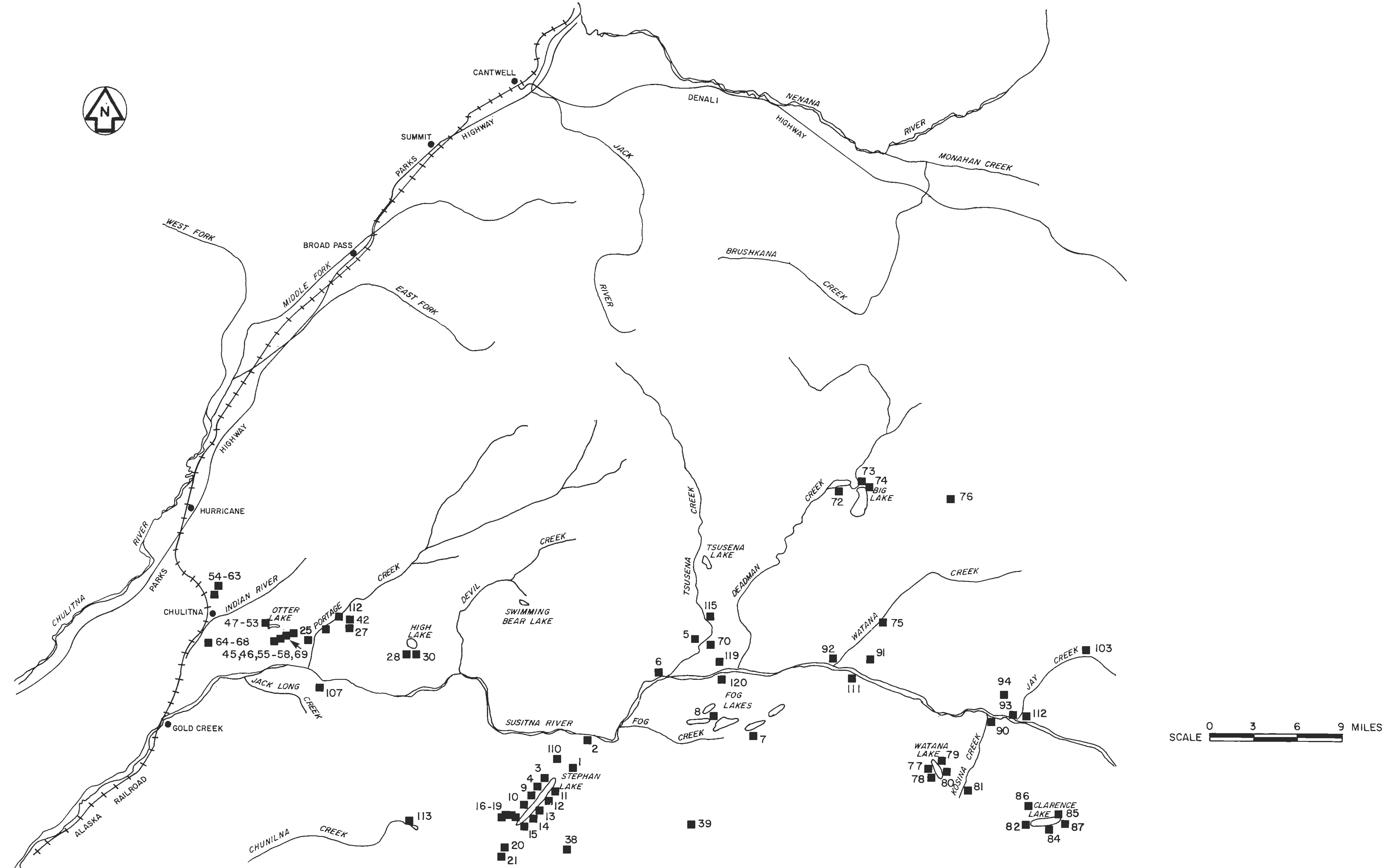
STUDY AREAS FOR LAND USE ANALYSIS

FIGURE E.9.7



LAND USE AGGREGATIONS
SUSITNA HYDROELECTRIC
IMPOUNDMENT AREA

FIGURE E.9.8



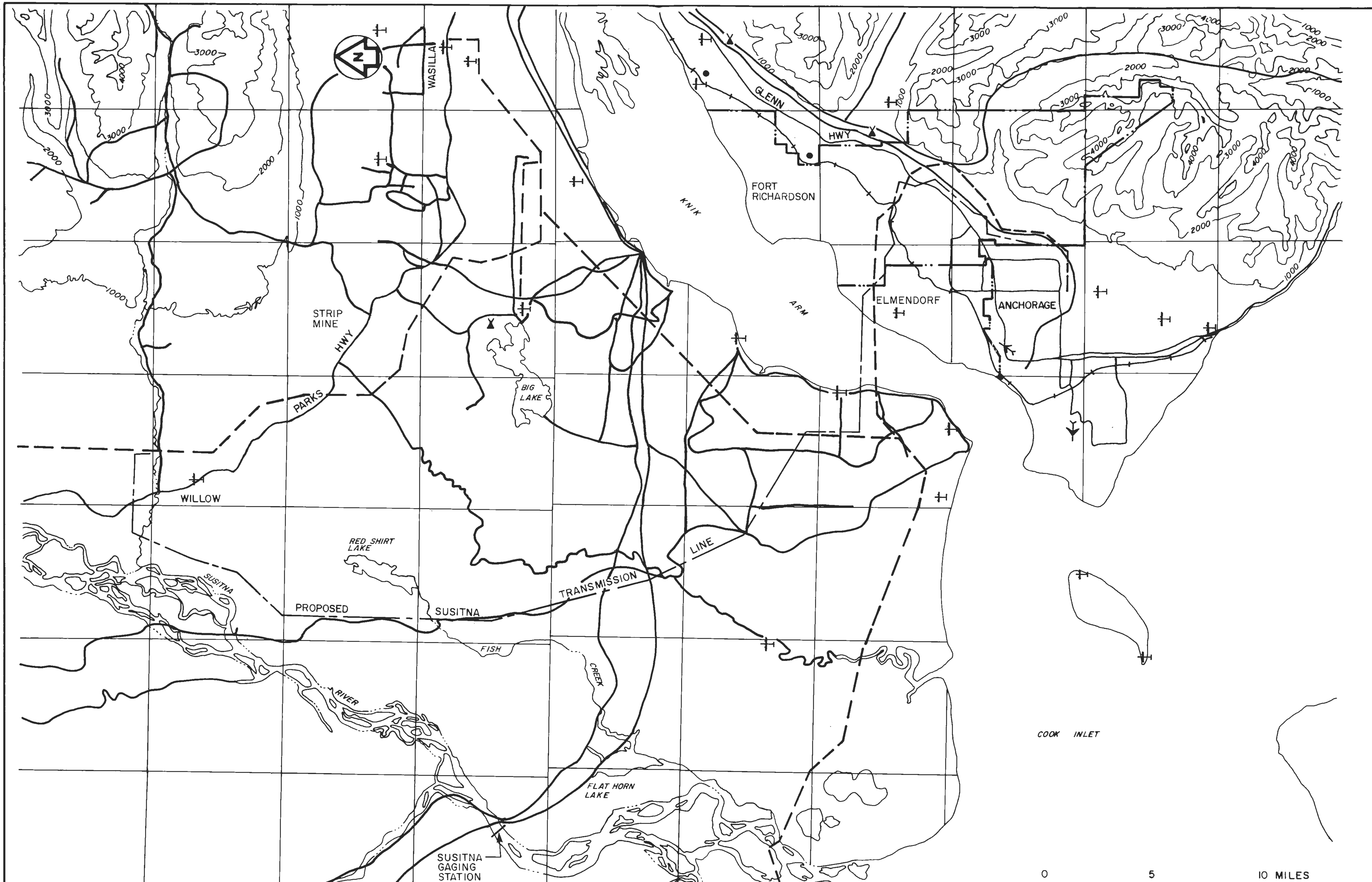
EXISTING STRUCTURES SUSITNA HYDROELECTRIC IMPOUNDMENT AREA

FIGURE E.9.9

LEGEND:

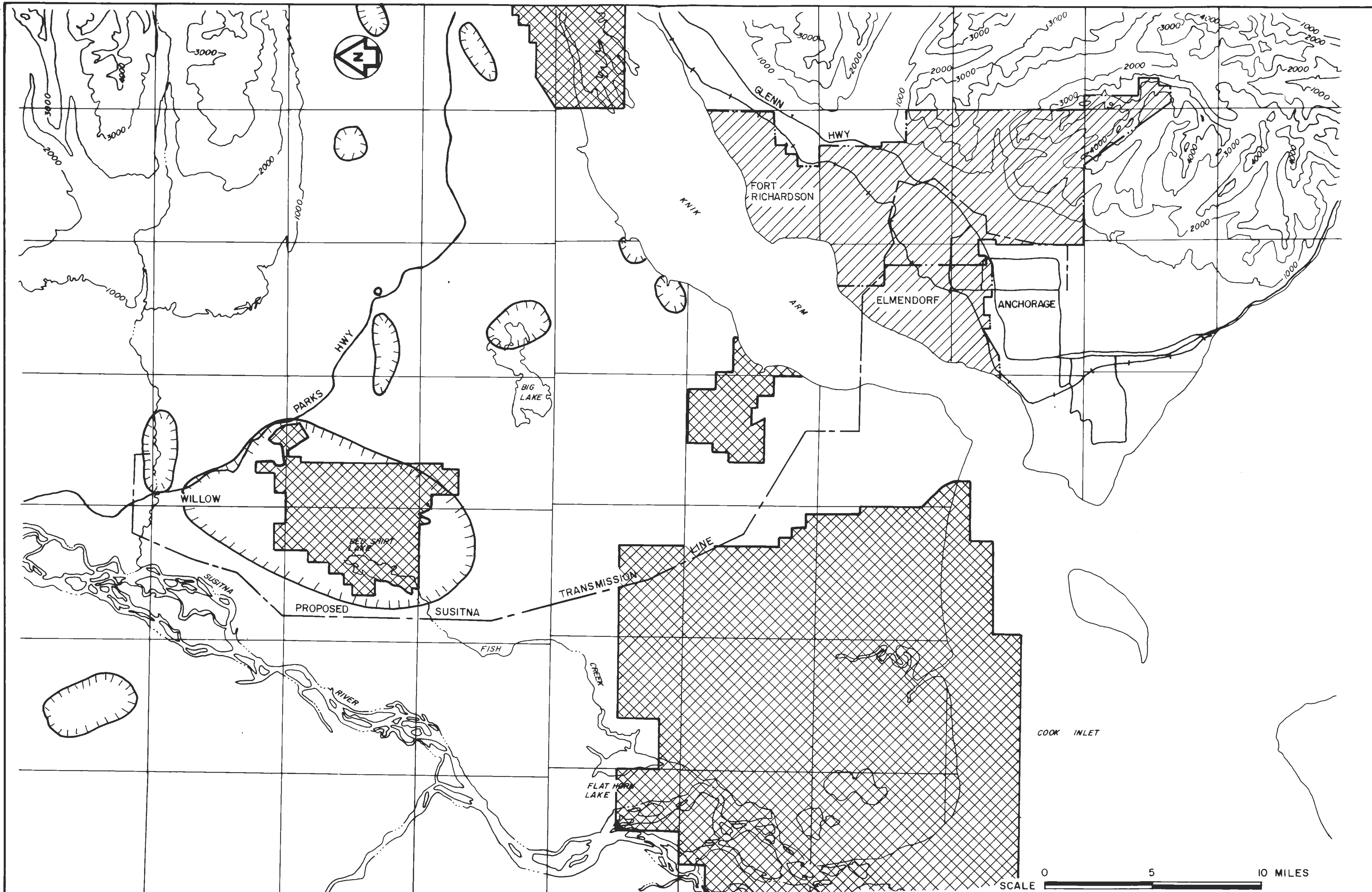
- LANDING STRIP OR AREA
- AIRPORT
- HIGHWAYS, TRAILS, GRAVEL & PAVED ROADS
- RAILROAD RESERVE
- CAMPGROUNDS
- TRANSMISSION LINE
- GENERAL RECREATION AREA
- GENERAL RECREATION AREA INTENSIVELY USED
- GENERAL RECREATION AREA MODERATELY USED
- STATE RECREATION & STATE GAME REFUGE AREAS
- GENERAL MINING AREA
- AGRICULTURAL AREA
- POINT McKENZIE AGRICULTURAL AREA
- MILITARY INSTALLATION
- RESIDENTIAL / COMMERCIAL DEVELOPMENT

LEGEND FOR FIGURES E.9.10, E.9.11 AND E.9.12



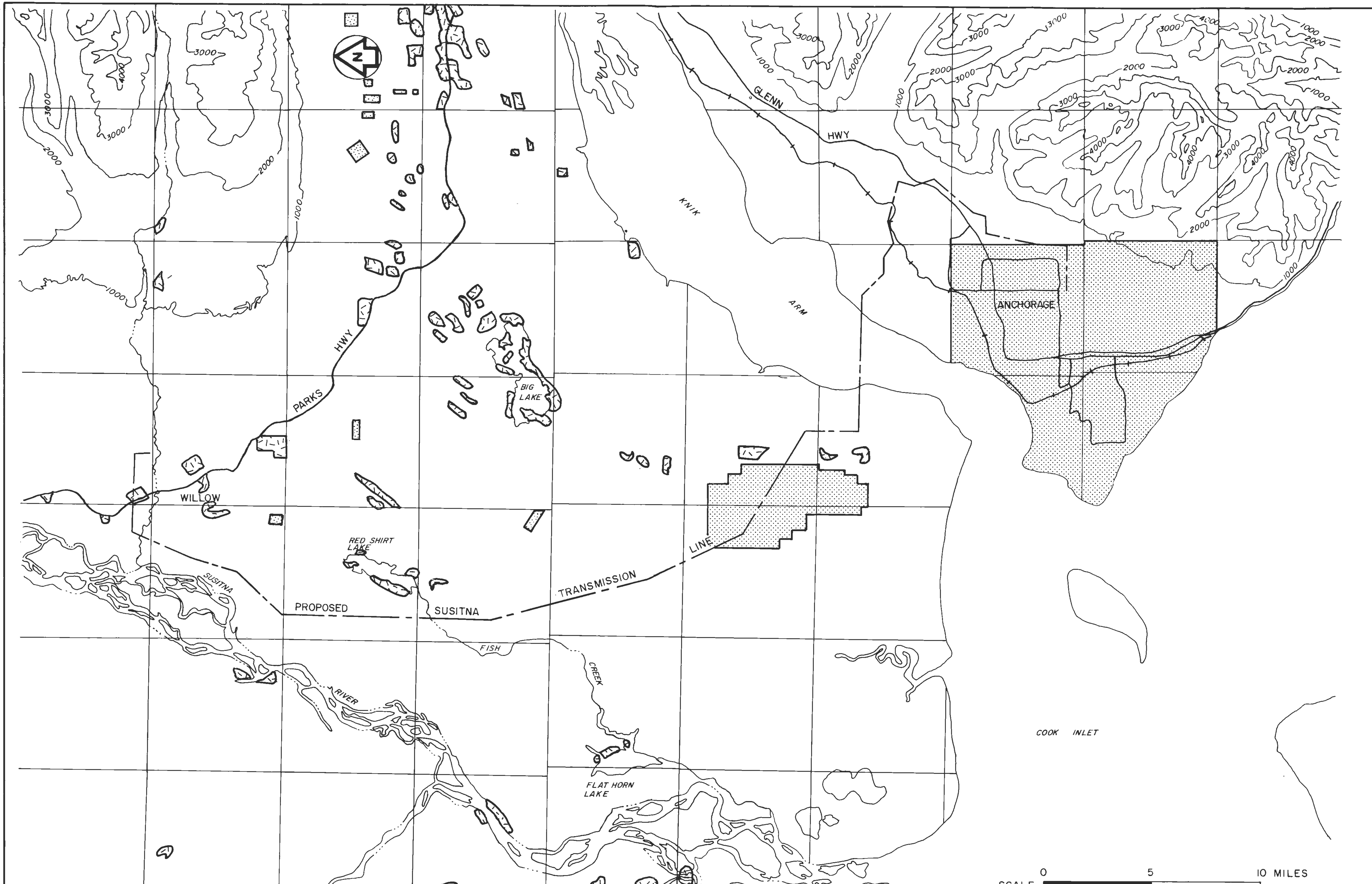
ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 1 OF 3

FIGURE E.9.10



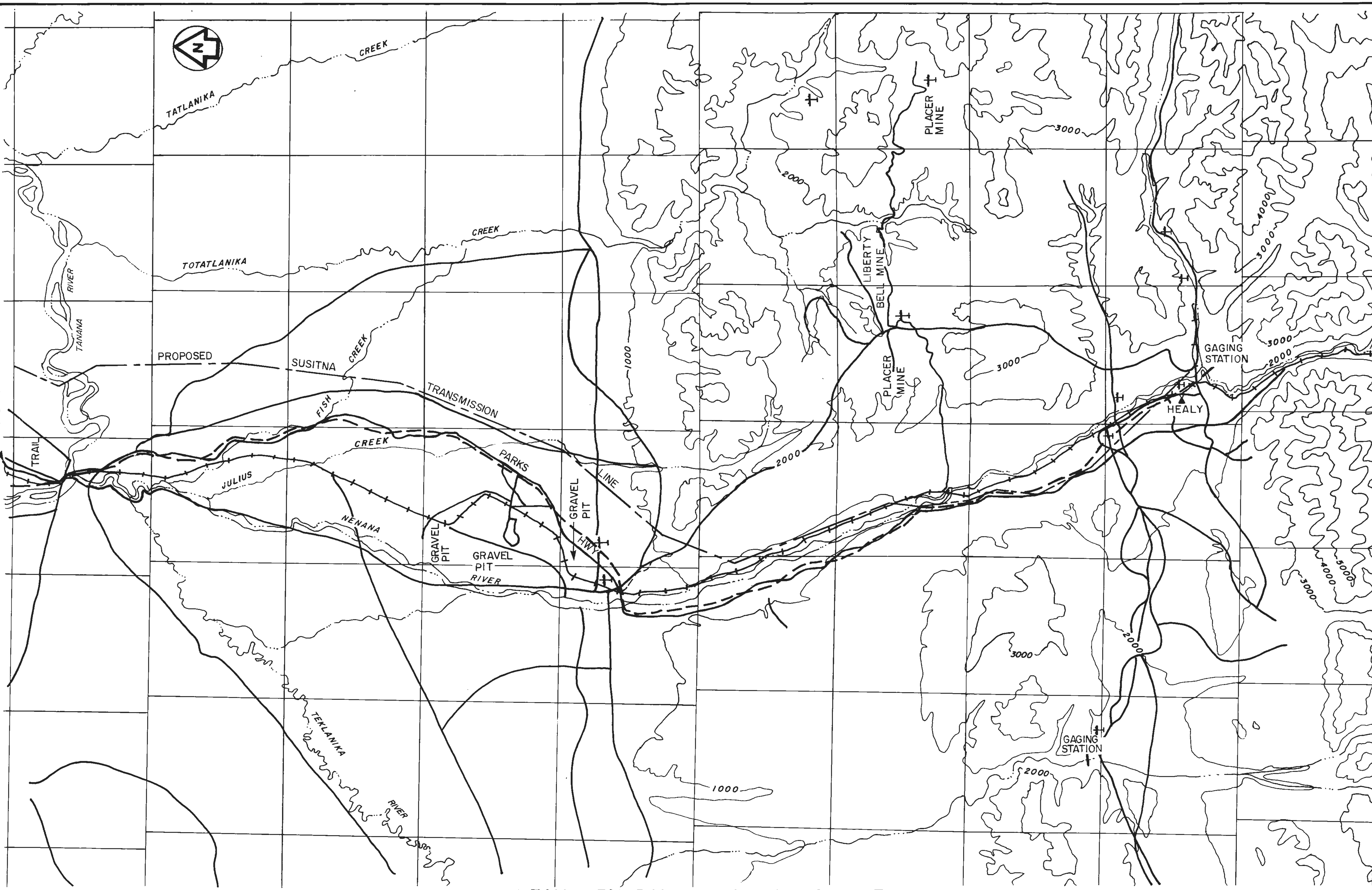
ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 2 OF 3

FIGURE E.9.10



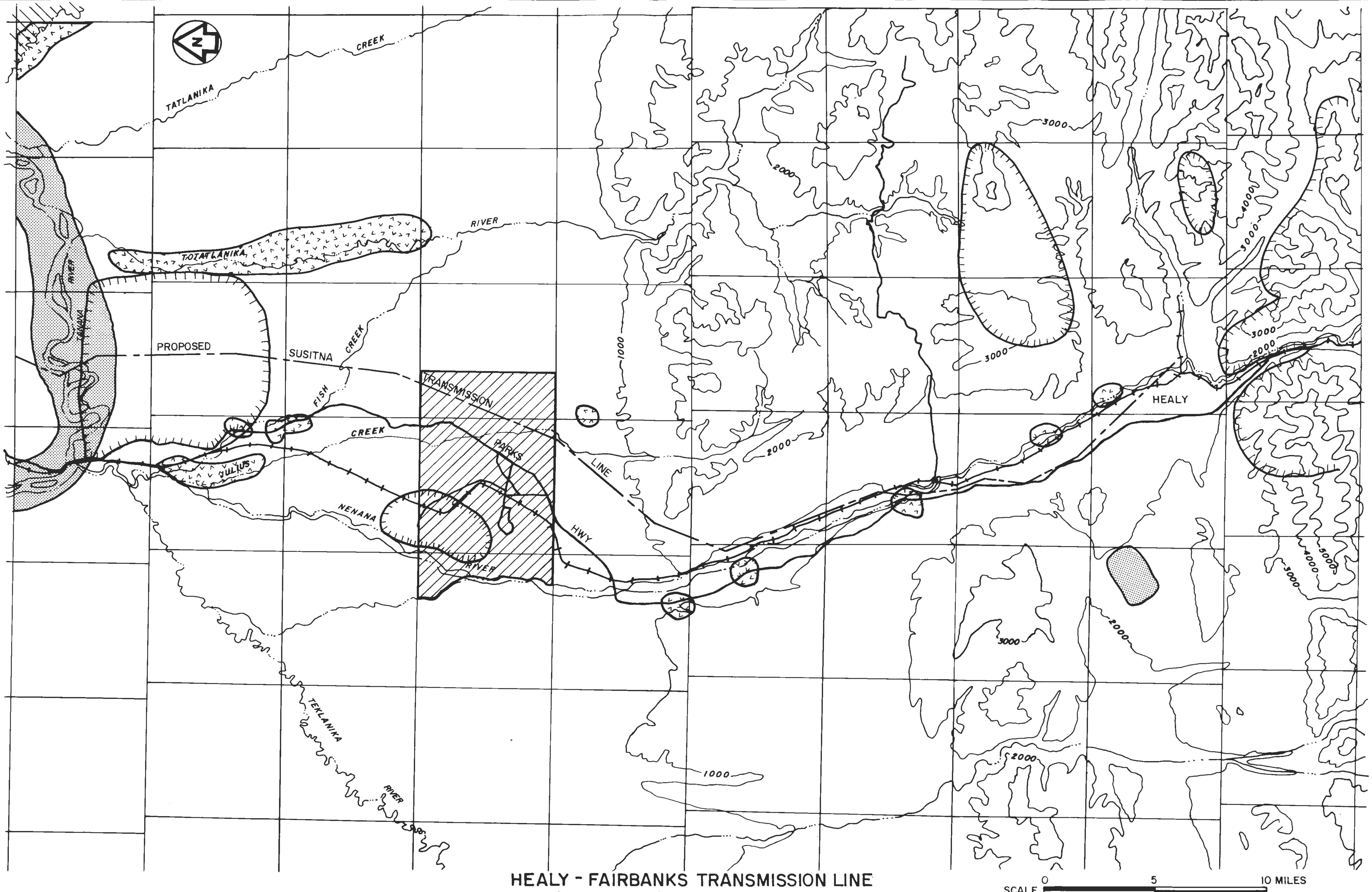
ANCHORAGE - WILLOW TRANSMISSION LINE LAND USE DEVELOPMENT
SHEET 3 OF 3

FIGURE E.9.10



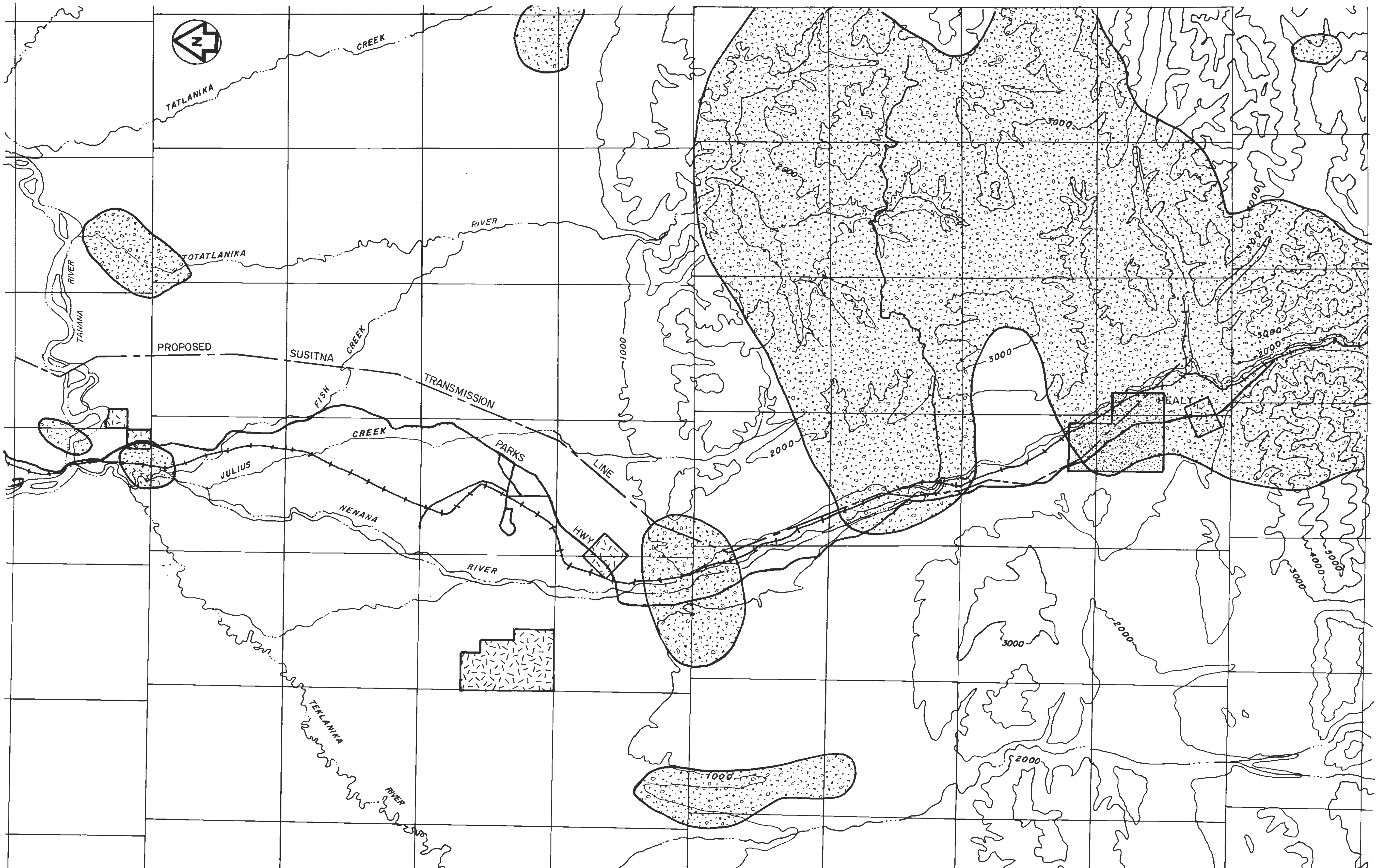
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 1 OF 3

FIGURE E.9.11



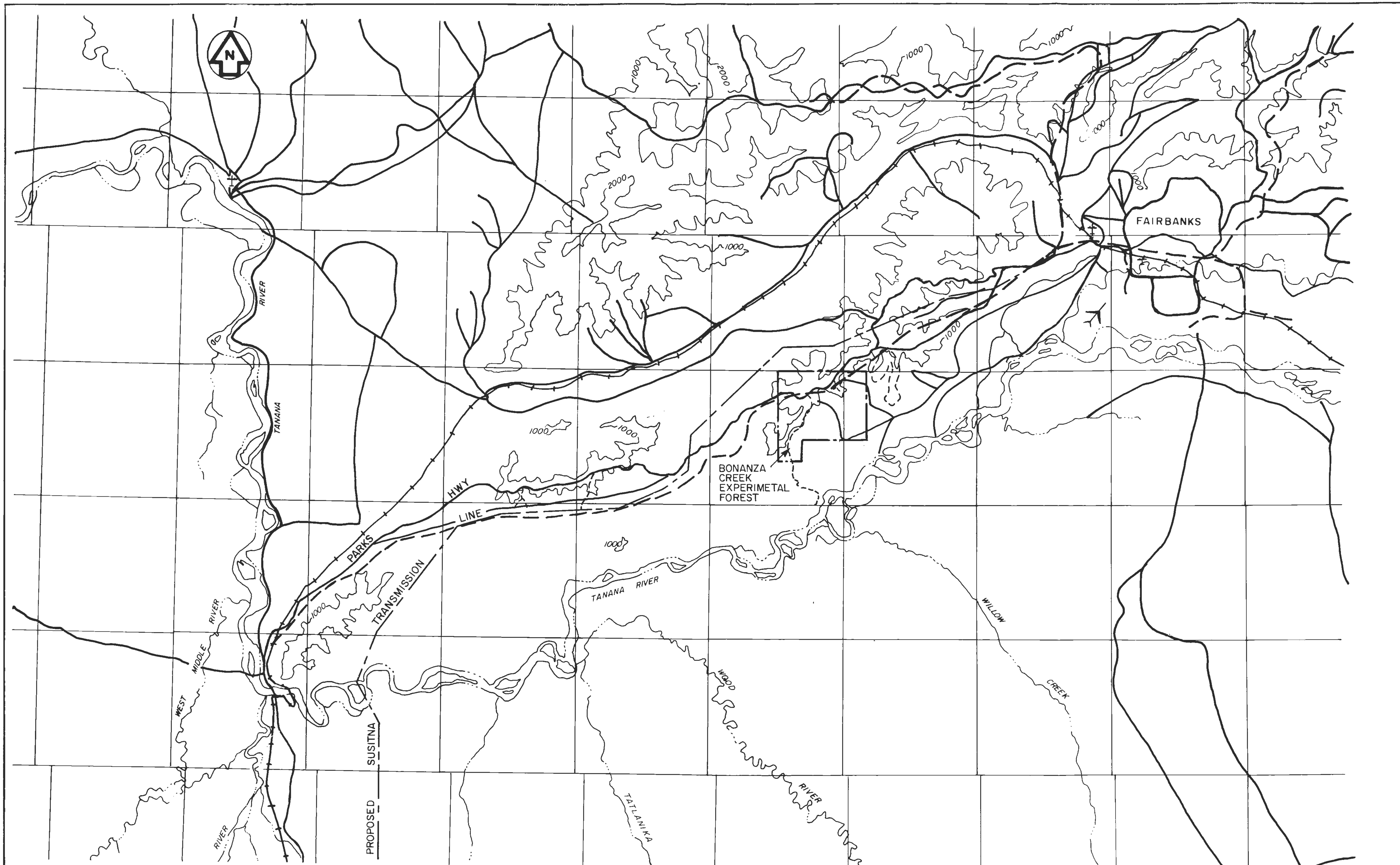
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 2 OF 3

FIGURE E.9.11



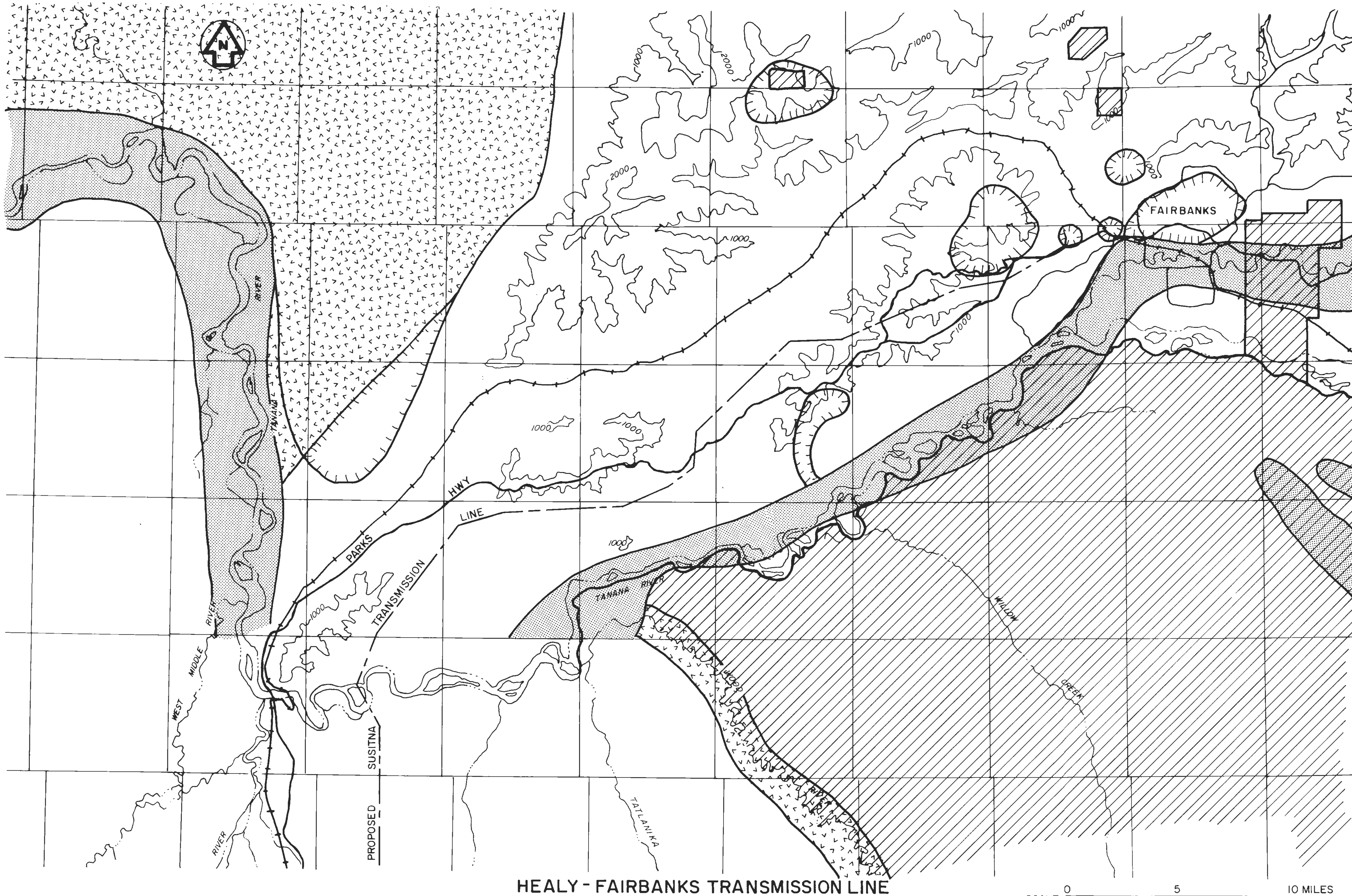
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - SOUTH
SHEET 3 OF 3

FIGURE E.9.11



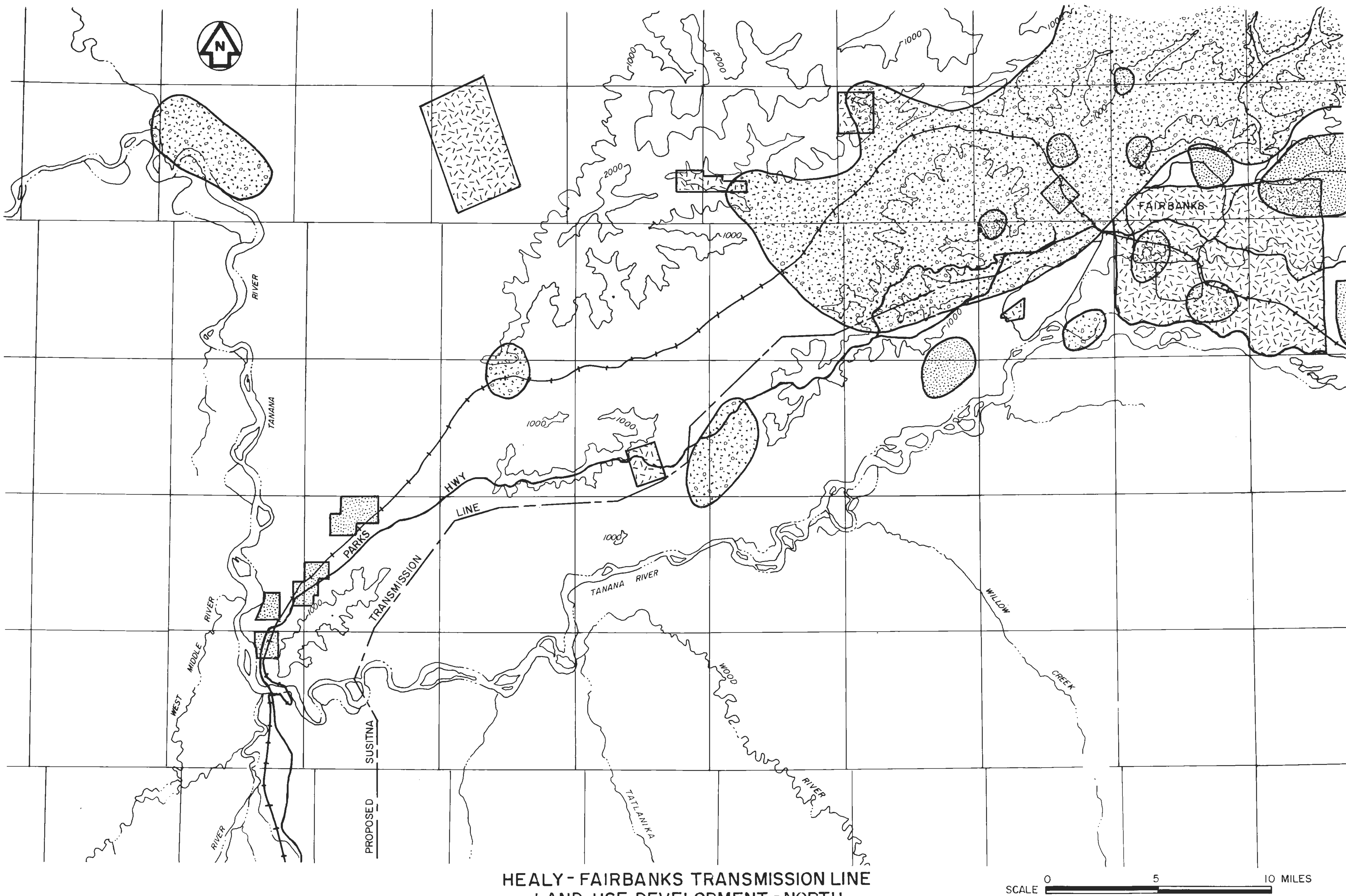
HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 1 OF 3

FIGURE E.9.12



HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 2 OF 3

FIGURE E.9.12

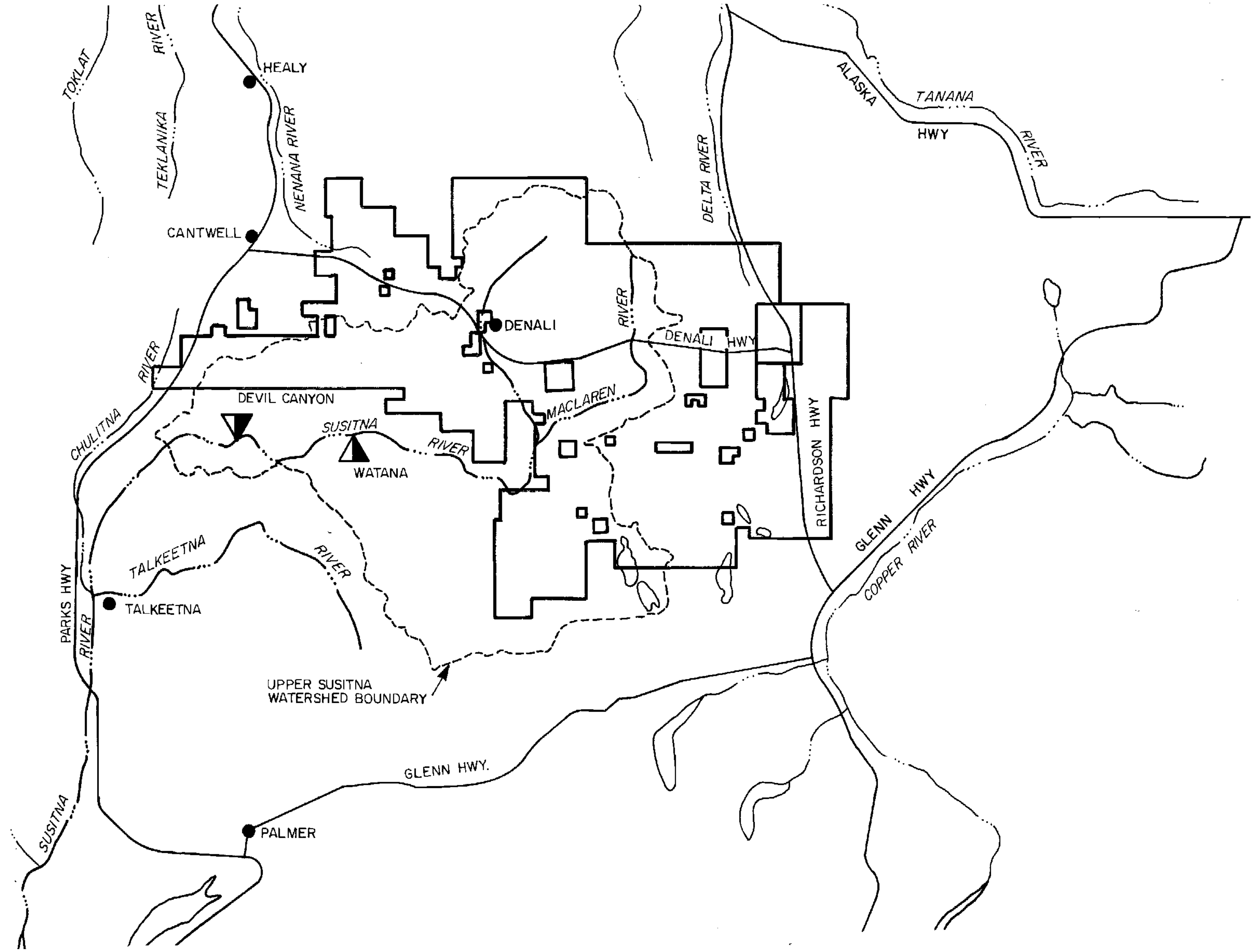


HEALY - FAIRBANKS TRANSMISSION LINE
LAND USE DEVELOPMENT - NORTH
SHEET 3 OF 3

FIGURE E.9.12

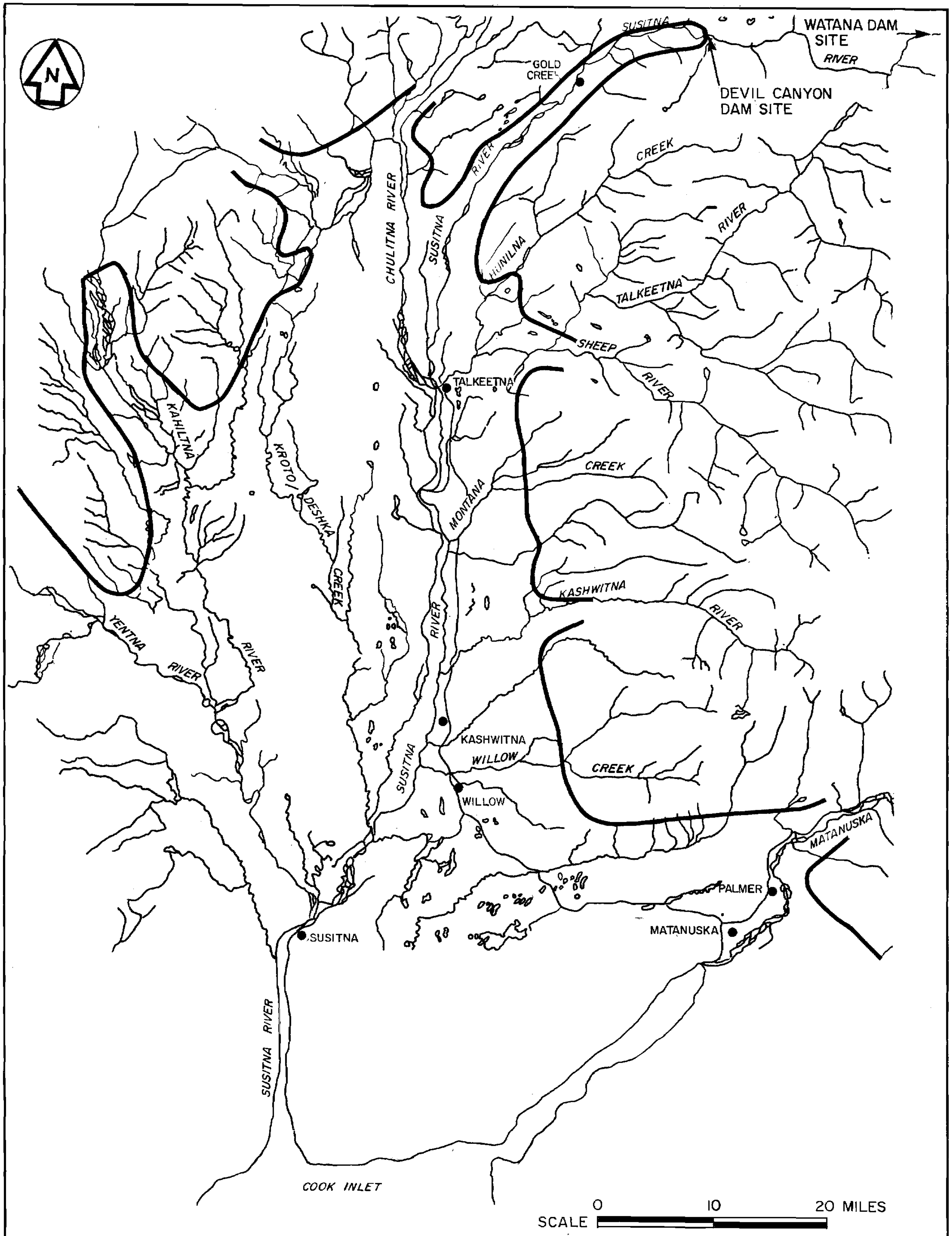
FLOOD PLAIN INFORMATION - TALKEETNA, ALASKA

FIGURE E.9.13



BUREAU OF LAND MANAGEMENT
DENALI PLANNING BLOCK

FIGURE E 9.14

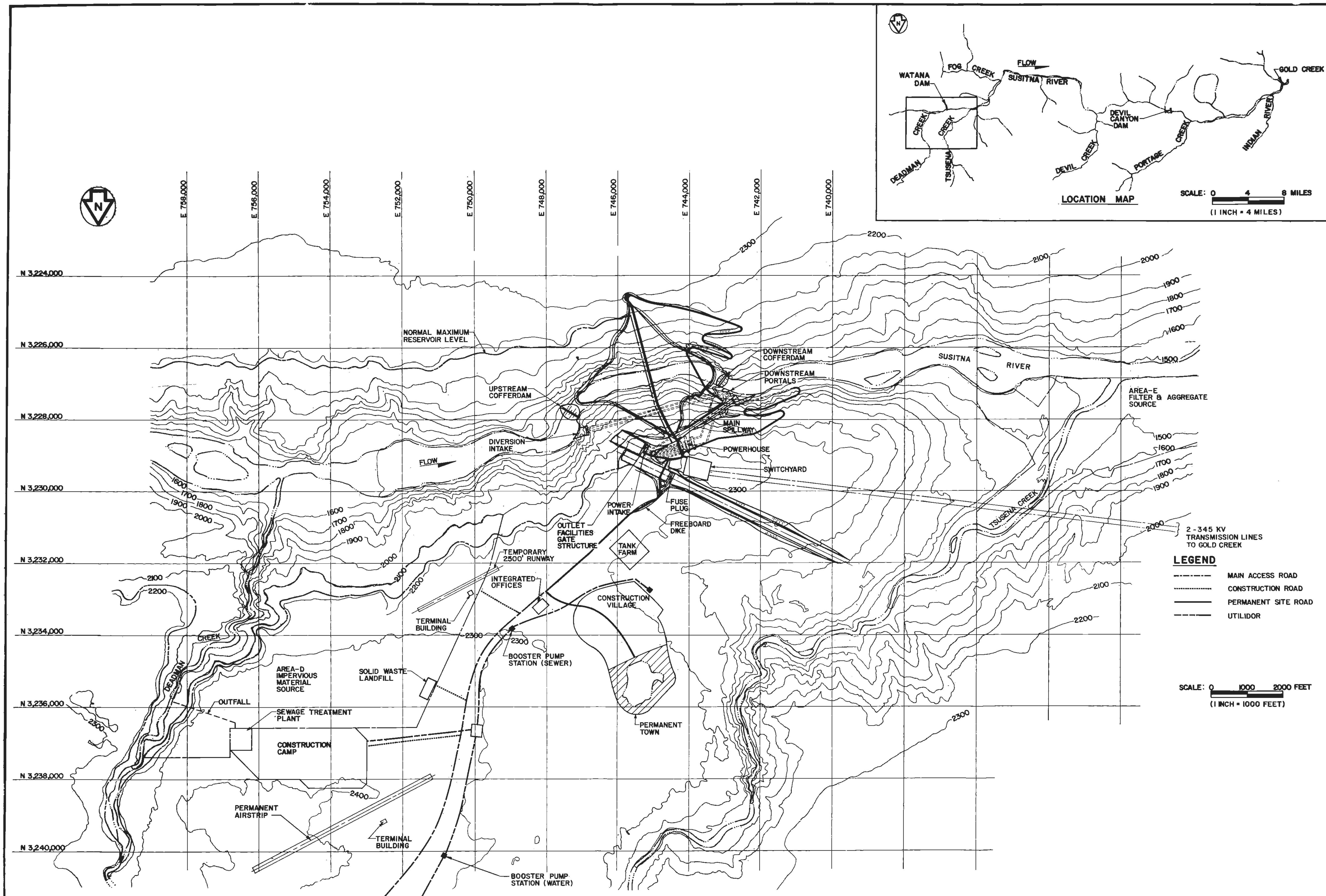


BIOPHYSICAL COASTAL BOUNDARY MATANUSKA-SUSITNA BOROUGH COASTAL MANAGEMENT PROGRAM

FIGURE E.9.15

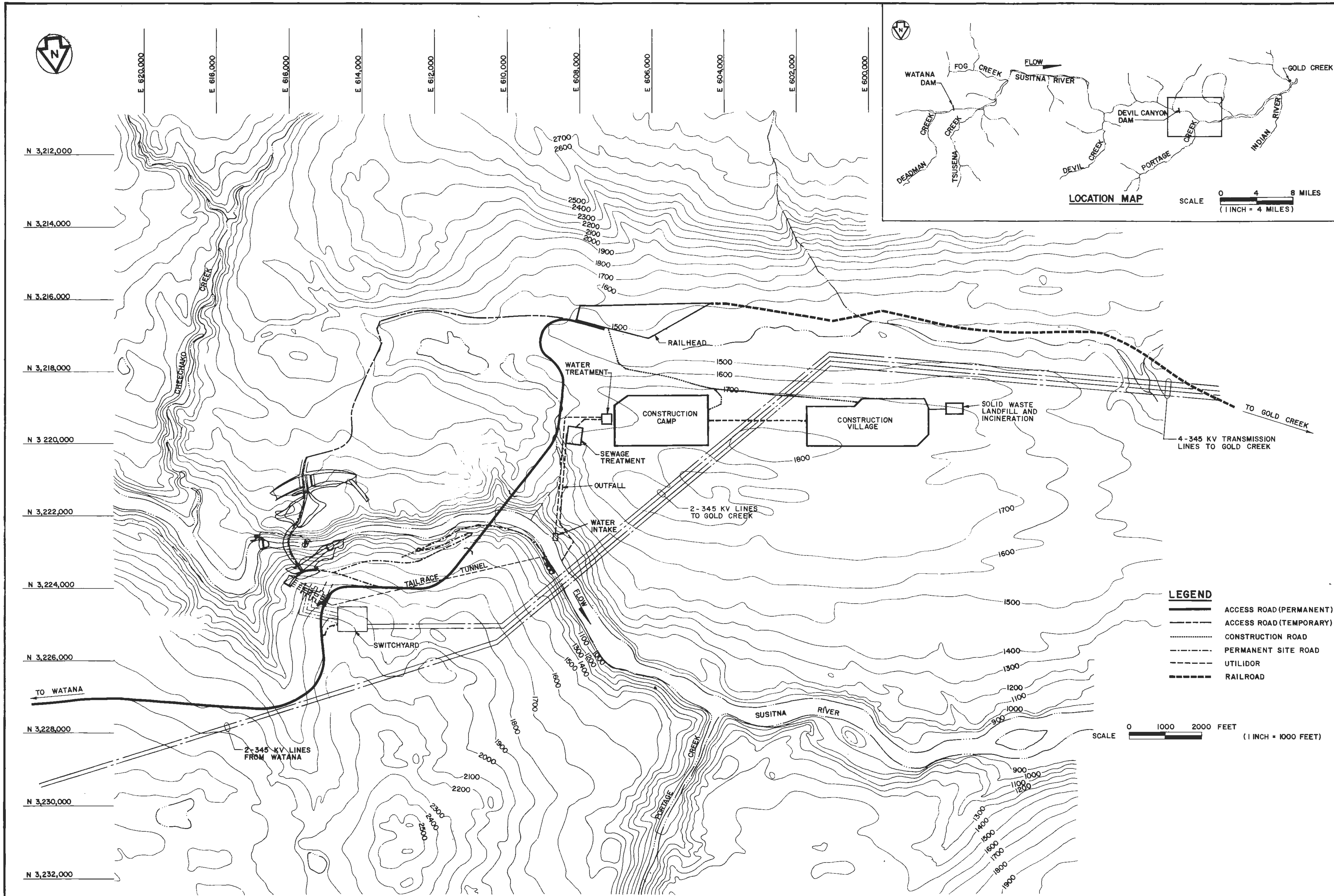
SUSITNA HYDROELECTRIC PROJECT FACILITIES

FIGURE E.9.16



WATANA GENERAL LAYOUT SITE FACILITIES

FIGURE E.9.17



DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

FIGURE E.9.18