SUSITNA HYDROELECTRIC PROJECT

FERC LICENSE APPLICATION

EXHIBIT E

CHAPTERS 7, 8 AND 9

DRAFT

NOVEMBER 15, 1982

Prepared by:

ACRES

ALASKA POWER AUTHORITY

Susitna Hydroelectric Project, FERC Lic. Appl.
Exhibit E, Ch. 7, Recreational Resources

E-7-39: 1,500 angler-days/yr. sport fishing?

	E. Sus.	W. Sus.	M. Sus.
	angler-days		
1977	12,501 (5)	9,474 (11)	22,130 (8)
1978	14,970 (5)	9,431 (11)	13,334 (7)
1979	12,639 (7)	9,192 (13)	18,895 (8)
1980	12,216 (7)	7,997 (13)	16,636 (8)
1981	7,850 (7)	6,706 (9)	15,297 (7)

Not comparable numbers year to year. Taking significant fisheries out year by year 1977-1979. No trends for these years. 1981 was a very unusual year, so cannot consider it the end of a trend.

Paragraph on methods
- Per capita Participation method compared with 4 other methods

Assumptions; p. E-7-36

May use reservoir as navigation corridor to up river fishing.

E-7-36, Para. 7
Assumptions & judgmental evaluations to derive regional demand.

E-7-9 20 yrs. = < 2% per yr, 11% per yr. in 1st 2 yrs. 1980, 81
closer to 9 days/angler 1980 freshwater fishing
angler-days increased 11.5%/yr in Cools Inlet area 1977-1980
which is more than 6% projected E.7.10.

Used info from 1970 rec. plan on participation days. Sport fish info shows not accurate. ~~assumptions~~

E-7-38, para. 1
Pop growth rates & demand %'s are conservative. Maybe not. May underestimate.

Table E.7.12. 85,000 fish in freshwater. Average 9 day per
85,000 X 9 = 765,000
Freshwater demand for anch. anglers. Double what says.

E-7-39. days effort has been ~~increasing~~ decreasing. Has not been.

(246,352/(7.7) = 1,896,910 502,000

Susitna Hydroelectric Project

FERC license application

Exhibit E

Review of Vol. 3, Ch. 5, Section 3.7

Local and Regional Socioeconomic Impacts on Fish and Wildlife Users Groups

Methodology: "Impacts result from loss of habitat not fish" Result from both.

Commercial Fishery: One year losses not indicative of total losses. Potential?

Sport Fishery: "area and level of impact to resident & migratory fishery resources has not been determined." "Research is currently underway to more fully define the level of impacts to the sport fishery & place a value to sport fishermen of the fishery resources which would be potentially lost." What research? By whom? Would like to review methods. Nothing on guides, guide services, lodge operators as are for Game.

Subsistence: Uses potential conceptual evaluation methods. Too vague to comment on.

Jenny Corin, 605 W 4th Ave., Room C, ASH 81 Anch, 99501

Ed Bush, Comm & Reg. Affairs 264-2255

SUSITNA HYDROELECTRIC PROJECT

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7 - RECREATIONAL RESOURCES

SUSITNA HYDROELECTRIC PROJECT

EXHIBIT E

VOLUME 4 CHAPTER 7

RECREATIONAL RESOURCES

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7 - REPORT ON RECREATIONAL RESOURCES

1 - INTRODUCTION

1.1 - Purpose

The purpose of the Susitna Hydroelectric Project Recreation Plan is to provide organized recreational development for project waters and adjacent lands and to focus public access in the project area. This plan is intended to be compatible with the existing environment and consistent with the planned construction and proper operation of the hydroelectric project. The plan has been designed to meet four primary objectives:

- To focus public access on project lands and waters and to protect 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 Archaeological Resources; Chapter 5, Socioeconomic Impacts; and Chapter 9, Land Use, so that they may assess its impacts.

1.3 - Study Approach and Methodology

(a) Approach

The planning approach is guided by the following factors;

- Construction phasing 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.

Section 1.4 describes the proposed Sustina Hydroelectric Project. Section 2 describes the existing recreation within the 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 on recreation of the Watana and Devil Canyon project features, access routes, and the transmission lines, and projected demand for recreation with and without the Susitna Project.

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

Section 5 is the Recreation Use Plan including intrinsic recreation potential, recreation opportunity evaluation, development levels and proposed 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 of a more general nature. Particular emphasis has been given to the Susitna Hydroelectric Project Subtask 7.08 Report, Recreation Planning, May 1982, prepared for Acres American Incorporated by Terrestrial Environmental Specialists, Inc. and the University of Alaska, Fairbanks. 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.

(b) 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 Alaska Power Authority. Objectives of each agency were determined as they relate to this Recreation Plan. They are reported 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 on-site inventory of existing recreation potential. This activity involved study of existing relevant project documents and previous studies, and extensive on-site 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 alternative and recommended recreation plans for the project.

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

A detailed discussion of specific methodolgy employed is found in the 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.

(a) Construction

(i) 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-mile 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 3,480 workers and a construction village ultimately housing 350 families (1,120 population) will be developed. These and the various contractor yards and appurtenant construction facilities will be served by a temporary 138-kV transmission line following the Denali Highway and the Watana access route to the construction site. Construction labor for the 885-foot-high, 4,100-foot crest length embankment dam and the 1020-MW powerhouse will peak in 1990 with about 3,500 workers.

Construction of the two 33.6-mile-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 38,000-acre, 54-mile-long reservoir 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.

(ii) Devil Canyon Dam and Reservoir

Devil Canyon construction is planned to begin as Watana approaches completion. Between early 1992 and mid-1994, an 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 14-mile railroad from Gold Creek. A single-status camp for 1,780 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-kW Watana transmission lines will be tapped for construction power and the temporary construction line from Cantwell to Watana will be dismantled. Construction workforce for the 646-foot-high, 1650-foot crest-length thin-arch concrete dam and the 600 MW powerhouse will peak at about 1,800 workers in 1999 and extend to 2002. Two additional 8.8-mile-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 7,800-acre, 32-mile-long reservoir 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.

(b) Operational Characteristics of the Project

(i) Watana Dam and Reservoir

The Watana Dam and Hydroelectric Power Plan is 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 base loaded 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 one mile, widening at tributary streams to a maximum of five miles at maximum water level at Watana Creek. Crest elevation of the dam will be 2210 feet, and water surface elevation

during maximum probable flood conditions will be 2202 feet. Normal maximum operating elevations will be 2185 feet in September with a low of 2065 feet in April or May. During breakup and through the most imporant recreation months of June, July, August and September water levels will be increasing, reaching a peak in 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 miles in flatter areas such as Watana Creek. (See Figures E.7.8, E.7.9, and E.7.10.

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 below Devil Canyon; Sunshine, approximately 49 miles further downstream, and Susitna, another 53 miles downstream. At Gold Creek, flows approach 6,000 cubic feet per second (cfs) in October, the start of the water year. This rapidly decreases in November, December, January, February and March (low: 1,123 cfs) as the river freezes for the winter. At breakup, flows are over 13,000 cfs in May and peak at about 27,700 cfs in June. 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 to both moderate these wide fluctuations and also to redistribute flows, raising them in the winter, to provide energy in these high demand months. Flows will fluctuate only from about 7,700 cfs (April) to 13,400 cfs (August) contrasted with 1,100 cfs (March) to 27,700 cfs (June) under natural conditions. Flows will increase over natural conditions in seven months: October through April. They will decrease in the remaining months. In the important recreation months of June through September, 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.

(ii) Devil Canyon Dam and Reservoir

The Devil Canyon Dam and Power Plan is intended to provide base load 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 7,800 acres, with a length of 32 miles, contained in a narrow

canyon generally one-quarter to one-half mile wide. It will extend nearly to the toe of Watana Dam at maximum elevation. Crest elevation of the dam will be 1472 feet, and water surface elevation during maximum probable flood conditions will be 1466 feet. Normal maximum operating elevation will be 1455 feet most of the year with a low of 1405 feet in October (normal dradown: 50 feet). (See Figure E.7.4.) 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 draw down in August and September, be at a minimum elevation of about 1405 feet 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 slighlty 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 river canyon experience which attracts a very small number of kayakers and other river runners will be changed into a lake experience between Vee Canyon and Devil Canyon.

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

- The large drawdowns, particularly at Watana, will create large 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. In either instance, development of boating facilities will be extremely difficult.

- Large bank slumps, landslides and scales will be unattractive and potentially dangerous.

- 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.

- Hunters, and to a lesser extent sports fishermen, will continue to fly into the area.

- The image of the area will continue to be one of a very distant location remote from population centers as the road position causes the dams to be over 5 hours away from both Fairbanks and Anchorage. The "dead-end" nature of the access road will discourage casual drive-through tourism.

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

- Opportunities are primarily for primitive-level recreation facilities except at the dam and powerhouse sites themselves where some visitor interpretation and related facilities are appropriate.

2 - DESCRIPTION OF EXISTING AND PLANNED RECREATION

2.1 - Statewide Setting

(a) Background

Recreation environments and the people who recreate in Alaska are quite different in many ways from 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 with 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 recreation 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. The conveyance is still in progress; however, many of the selected lands include established recreation areas. In addition, the State Legislature has directed the Alaska Department of Natural Resources (DNR) make available to the public state lands for settlement or agriculture. Although the law has been amended to establish an assessment method for determining the need of private lands by region, this process continues to remove over 20,000 acres a year from public ownership.

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

Alaska State Parks, a division of the Department of Natural Resources, was formed in 1971, and currently controls 3 million acres of land and water. DNR's policies and programs reflect the recent land status changes. In 1979 DNR 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 of Alaska's 367.7 million acres are now classified as public recreation. This inventory is presented in Table E.7.2.

(b) Regional Setting

The Susitna hydroelectric study area lies within the Southcentral Region of Alaska. Recreation planning for this development must fit within the framework of existing and future regional recreation. Therefore, it is important to understand the regional recreation patterns and trends as well as the Division of Tasks plans for the future.

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 large diversity of landscapes and resources here offer a wide variety of outdoor recreational opportunities making it an attractive recreation environment. See Figure E.7.4 for Existing and Proposed Regional Recreation Areas.

More than half of Alaska's population lives in Southcentral 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.

Southcentral 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 many areas. An extensive airport system ranging from the international level to gravel strips and water bodies permit plane access into much of the remaining areas. The Alaska Railroad and ferry systems also serve large portions of the region. All of these transportation systems combine with the population concentrations to make the Southcentral region's recreational opportunities the most easily accessible and heavily used in Alaska. See Table E.7.3 for inventory of statewide recreation facility distribution by regions.

(c) Existing Facilities

The Alaska State Parks System includes 82 park units; 53 of these are in the Southcentral Region of the state. Table E.7.3

describes the distribution of facilities throughout the state by region and illustrates this development concentration. Outdoor recreation developments in the Southcentral 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 north of Anchorage and 125 miles 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 recreation visitors in 1981. Facilities and services include several lodges, visitor centers, campgrounds as well as trials, gas and bus service. The adjacent Denali State Park, also accessed by the Parks Highway, abuts the Susitna study area. It contains over 324,000 acres and offers 37 miles of scenic driving, a major roadside campground, trials, picnic grounds and canoeing and fishing areas. A total of 519,000 visitors utilized this park in 1981.

Seventy miles from Anchorage, Nancy Lake State Park has 23,000 acres and 130 lakes and ponds. It is heavily used by Anchorage residents for water-related recreation as well as hiking and camping (100 units). Chugach State Park, 10 miles to the east of Anchorage, provides extensive hiking and cross-country skiing opportunities. The park covers 494,000 acres and offers major campgrounds (91 units), hiking, hunting, boating and fishing. Lake Louise, northeast of Anchorage and reached off of the Glenn Highway, is a popular fishing, boating and hunting area. The lake is a destination point for boaters and provides access to the upper Susitna and Tyone rivers.

North of the Susitna project site, the Bureau of Land Management maintains the 4.4-million-acre Denali Planning Block. This area encompasses much of the Denali Highway and includes several archaeological sites of national significance. The Bureau maintains several small campgrounds and picnic areas along the highway, boat launches, canoe trail, and two campgrounds at Tangle Lakes. There are campgrounds 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 absorb a large portion of recreation demand for the southern portions of the Southcentral Region. A great many recreationists from Anchorage go to the world-famous Kenai Peninsula parks, over 100 miles south of the city. This area offers the widest range of Alaska 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 recreation opportunities. These include remote lodges, cabins, restaurants, airstrips and flying services, guide services, white-water rafting and other boat trips.

The town of Talkeetna 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 recreation points. In addition to mountain climbing, other recreation activities which serve as Talkeetna's economic base include: hunting, fishing, guiding, tours, and sightseeing.

A listing of existing recreation opportunities in the region is included in Appendix E.7.A.

(d) Existing Regional Recreation Use

Outdoor recreation is a way of life in Alaska. According to the major source document 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 being close to the wilderness was the third most important reason Alaskans gave in a recent survey. (Selected Findings from the Alaska Public Survey, USFS, NPS, and University of Washington, 1981). The percentage of Alaska's population that participates in outdoor recreation activities is among the highest in the nation. According to that recent statewide recreation survey, 59 percent of the respondents in the southcentral area 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 lists and ranks the percentage of participation in various inland activities within the region. Southcentral residents rank their favorite recreation as fishing, tent camping, hunting, trail-related activities, baseball and bicycling in that order. (Alaska Outdoor Recreation Plan, 1981). In contrast, tourists to the area have indicated driving for pleasure as their favorite activity followed by camping, hiking and sports fishing. (Alaska Division of Tourism, 1977).

Table E.7.5 outlines the total visitor count summary for Alaska State Parks 1978 to 1980. Figures for the Mat-Su and Copper Basin Park districts describe 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. Recreation growth rates are difficult to predict with confidence, as 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 main reasons tourists give for being interested in Alaska were studied in a poll by GMA Research Corporation in 1980 for the Division of Tourism (Alaska Outdoor Recreation Plan, 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 out-of-state tourist areas in Alaska are the Gulf of Alaska, Anchorage, and the Denali National Park which is within 80 miles of the future Susitna dam sites.

(e) Future Recreation Trends

Southcentral Alaska is reportedly experiencing overcrowding in some existing recreation areas near Anchorage and Fairbanks due to recent population growth. Assuming that the present recreation participation rate remains constant, the region will experience a significant annual increase in demand. However, recreation participation in the United States and Alaska may increase faster than the population growth if current trends continue. 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. In recreation areas which have received 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 recreation season has lengthed by several weeks. (Source: Alaska State Park System Southcentral Region Plan).

According to the Southcentral Regional Plan, sports fishing license sales increased 40 percent from 1975 to 1980. Increased use of accessible fishing streams has caused overcrowding in popular areas throughout the region and in particular those streams nearest the urban centers. Interest in boating is also rising. Sales of boating equipment increased significantly in the late 1970s, and the Knik Kanoers and Kayakers Club of Anchorage has experienced rapid growth in recent years. There is also evidence of a rapid increase of interest in winter recreation as surveys of winter recreation equipment sales over the last seven years show. (Clark & Johnson, 1979 public survey).

A statewide 1981 public survey (Selected Findings from the Alaska Public Survey) polled Southcentral residents to determine their recreation needs and priorities. 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. Bad weather, lack of free time, closed seasons, overcrowding and high transportation costs are reportedly

the most common reasons that prevent residents 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, hiking trails, develop recreation trails, backpacking campsites and boat trails. However, Alaskans would prefer only to maintain existing wilderness areas, not expand these further.

Also in the 1981 survey, sixty-one percent of the Southcentral residents are reported to like more recreation opportunities at weekend travel distances, and 62 percent would like more community recreation 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 weeked trip. This is generally believed to be supported by existing travel patterns.

The features that people most desired in out-of-town recreation areas include:

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

Source: Alaska Outdoor Recreation Plan, 1981

(f) Future Facilities

In 1982 the State Parks Division published an aggressive plan to expand recreation opportunities within the Southcentral Region. This plan reflects the leading role the State Parks Department has in providing outdoor regional recreation. The plan has chosen to respond to all of the existing unsatisfied demands and projected needs of the region. (See Figure E.7.4 and Table E.7.7 for future Regional Facilities.)

State Parks development priorities include several recreation sites that will affect the Susitna Hydroelectric Project Recreation Plan. They are listed in Figure E.7.6 and include 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 skiiing 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 ever be developed, it would accommodate significant proportions of projected recreation demand in the state.

In other areas of the Denali State Park development is going for additional picnic areas, campgrounds, boating facilities and trails. Along the eastern portions of the park future trailheads have been designated in conjunction with railroad stops. These trails would connect into the western-most portion of the Susitna study area.

The existing Lake Louise Recreational Area to the southeast of the Susitna study area is a popular boating and fishing area. Current expansion plans will add 300 acres to the existing 50 and will include several campgrounds, boating facilities and canoe portage trails. This development also a high priority as the lake is experiencing heavy use. The adjoining Susitna Lake and Tyone River have been identified as possible boating recreation areas for possible development at a later time. Boaters are able to float from the Susitna bridge on the Denali Highway down the Susitna and up to Lake Louise. Other opportunities for boating include Tangle Lakes, Big Lake, and Kepler Lakes.

The State Parks Division has also identified the Talkeetna River as a possible State Recreation River. These lands have been selected by the 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. Boaters currently fly in to Stephan Lake located at the head of Prairie Creek, which is in the Susitna study area; then they float the Talkeenta River down and into the Susitna River at the town of Talkeetna. This Class IV waterway attracts 4-5 parties per year, of 3-6 people each, and takes 2-3 days. (Personal communication, Mary Kay Hession, Knik Kanoe and Kayak Club).

Several other proposed new parks and park expansions given a high priority by DNR are listed in Appendix E7B, Future Regional Recreation Opportunities.

2.2 - Susitna River Basin

(a) Background

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

- National Park - Preserve System
- Wild and Scenic River System, (including recreation)
- National or Historic Landmark Status
- Wilderness Preservation System
- National Trail System
- National Forest System
- State Park System

As no federal withdrawals were made, both the State and Native Corporations have selected lands for transfer to state or Native ownership.

(b) Existing Facilities and Activities

The upper Susitna River has yet to be developed as a signficant recreation resource and the present level of use is limited as a result of several major restrictions. The study area is immense, and isolated. Road access is limited to the edges. For the purposes this Recreation Plan, the study area which was evaluated for recreation sites is generally defined by the Parks Highway on the west, the Denali Highway on the north, the Susitna River on the east, and about 20 miles south of the Susitna River. The Parks Highway is separated from the area by a steep ridge system. Denali Highway is about a five-hour drive from Anchorage and three-hours from Fairbanks, which puts the area beyond the limits of a one-day auto trip for most residents in the region. Interior road access consists of a few all-terrain vehicular (ATV) trails and rought roads into a few settled areas. Plane trips into the river take approximately 2 hours from Anchorage and Fairbanks. Small planes are the most common form of access into the area although a few ATV and hiking trails do exist. Boat access is possible on a limited basis. Various types of watercraft float and motor along parts of the river above Vee Canyon and its tributaries.

As a result of this acceess limitation people who do not live nearby utilize the area only on weekends or on other overnight visits and 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 is at a low level of intensity. See Figures E.7.6, E.7.7 and E.7.8 for Existing Recreation Patterns.

(i) Facilities

No public recreation facilities presently exist within the study area except for the road-related facilities on the Denali, Parks and Richardson 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 are the 33-site campground at Brushkana Creek and the boat launch at the highway bridge over the Susitna River.

A complete listing of the existing public and commercial developments within and adjacent to the study area is listed in Table E.7.6.

Existing private recreation 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 existing 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.

The greatest concentrations of physical developments are located around Stephan Lake and Portage Creek. Portage Creek is a mining area with some summer cabins; it contains 19 cabins and other structures. Stephan Lake is a commercial lodge site. Other developments at Chunilna and Gold creeks are primarily mining establishments. The 10 small cabins along the Susitna River banks are currently used by boaters, hunters, etc. passing through. 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 complex lodge with 11 structures and 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 summer field research.

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

The existing trail systems were built for access by prospectors, hunters, trappers and fishermen. (See Table E.7.8 and Figures E.7.5, E.7.6, and E.7.7 for a complete listing of trail locations, condition and use). At figures present these trails and rough roads are used by horses, tracked vehicles, rolligons, dogsleds and hikers. They connect a few scattered recreation developments and mining settlements and the camps used for researching the area's hydroelectric potential. Trails emanate from scattered structures out to airstrips, lakes and adjacent fishing streams.

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 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.

The following trail information was reported in the Area Notes prepared by DNR Division of Research and Development 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 summer, autumn and winter months. Recreation activities include moose, brown bear, caribou hunting; fishing, camping, off-road vehicular use, picnicking, wildlife observation, berry picking, snow machining, overnight camping, and cross-country skiing.

The Portage Creek Trail follows a sled road from Chulitna to Portage Creek. Hikers access the trail via the Alaska Railraod at Chulitna. The trail is used in the autumn, summer, and winter months. The trail 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 transverses Cook Inlet Region, Inc. (CIRI)-selected lands.

The Butte Lake Area is used during summer, winter and autumn months. There is a CAT trail connecting the Denali

Highway and Butte Lake. This trail is used by skiers, snowmachiners, 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 Denali downstream along the west 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. This trail is used by off-road vehicle drivers, snowmachiners, hunters of caribou, moose and brown bear, fishermen and possibly dog mushers. Bird watching is also popular along the Denali Highway between the Susitna Lodge and Swampbuggy Lake.

(ii) Activities

Aside from these isolated lodges, cabins and trails which constitute a commitment to a particular site, the predominant recreation 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.

Sports and Trophy Hunting is a traditional activity in the Upper 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. (Source: Environmental Studies Subtask 7.07, Land Use Analysis). In addition, many hunters fly into the larger lakes and utilize the small lakeside cabins for both guided and unguided 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.

Fishing 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, Watana, Tusena, 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 upstream on the Talkeetna River to Prairie Creek. Other popular salmon fishing spots include lower Portage and Chunilna creeks and Indian River. There is litle stream fishing elsewhere in the area. Lack of road access is an important limiting factor on fishing in the area. There are many popular salmon fishing areas further downstream on the Susitna River and its tributaries.

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.

Rock Hounding. Much of the mineral exploration which currently takes place within the study area is commercial in nature and as such is discuseed in Exhibit E, Chapter 5, Socioeconomic Impacts. This will change now that the BLM lands have been opened for exploration and as lands are conveyed to Native Corporations.

Boating. There is summer boating on many of the larger lakes by visitors who are flown in. Riverboat and guide services are offered from Talkeetna and from the various lodges downstream of Devil Canyon. The river is considered navigable by a variety of craft including rafts, canoes, airboats and riverboats up to Portage Creek.

The Susitna River itself 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 canoeing. Some boaters reportedly float the river from the boat launch on the Denali Highway down to the Tyone River then motor up to the lake at its source. A small number of boaters continue down the Susitna to the gaging station above Vee Canyon where they pull out and portage to Watana 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, and air access is usually into 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. Alternate put-in

points may be available by landing on sandbars in the Talkeetna River. The take-out point is usually at the town of Talkeetna. This is a two-three day trip (personal communication, Mary Kay Kession, Knik Kanover and Kayak Club).

Riverboat traffic is heavy on the Talkeetna up to the Larsen Creek confluence. Riverboat and airboat traffic is also common to the confluence of Prairie Creek, but is not as intense as it is downstream. Fishermen boat to the mouth of Larsen Creek and walk a mile into Larsen Lake. Fishing is light on Larsen Creek and Lake as well as at the mouth of Disappointment Creek.

Two to three parties of two to three individuals venture down through the rapids of Devil Canyon each year. This wild stretch of river, classified Class VI, which roars through 11 miles of a narrow vertical canyon is described by veteran kayakers as the Mt. McKinley of kayaking. The first successful running occurred in 1978. Less than 40 kayakers from various parts of the world have attempted it since that time, and at least five people have died trying.

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 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.

(c) Future Activities and Facilities

Should the Susitna hydroelectric project not be developed, the major obstacles which have limited past recreation activities will continue make it difficult in the future, although Native Corporations may seek to develop their lands for recreational uses. Unless vehicular access is developed into the study area, no major shift in the existing low-level recreation patterns is anticipated. The parties which will control future recreation activities and development in the study area include: Alaska state government, U.S. Bureau of Land Management, several Native corporations and various other private landholders.

The policies of these groups concerning the land parcels they control along with overall increased pressures for recreation opportunities from Alaska residents will largely determine the future

patterns. The exact nature of specific activities and developments is difficult to predict as land ownership decisions are in abeyance and not likely to be resolved for several years. In addition, several major projects within the region could significantly affect future recreation. These are listed in Section 3.5 of this report. Additional public land sales could also change the recreation emphasis in the area.

The Native corporations have selected much of the land adjacent to the 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.

Development possibilities which have been discussed include: mineral extraction and recreation home land development. Access appears to be the prime determenent 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 areas (which include the Susitna study area). They project a demand for 29,000 acres 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 home sites 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 (Land Use Issues and Preliminary Resource Inventory, Volume 1, May 1982). However, without improved road access 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.

BLM policies for the Denali Planning Block reflect the goals of increasing recreation use of the area. 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 along the highway to 130 in the year 2000. Existing ADT is 50 cars. Formal designation of BLM land for additional ATV use appears to be no longer under consideration. BLM lands have, however, recently been opened to mineral exploration and mining entry.

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.

(d) Projected Demand Without the Project

Projections of demand within the study area assuming the Susitna Hydroelectric Project is not constructed were calculated as a part of this Recreation Plan in order to provide baseline data. These calculations and the preparation methodology appear in Section 3.5.

3 - PROJECT IMPACTS ON EXISTING RECREATION

Impacts that the Susitna hydroelectric development will have on the existing recreation patterns are of two types, having either a direct or indirect effect. Direct effects are defined as those which relate to physical changes to the natural resources which constitute recreation settings. Impacts to this setting might either increase or decrease the desirability and probability of existing recreation activity types and levels. They may also make possible new levels and types of activity. In many cases the direct impacts on recreation settings are synonymous with concerns for the environment expressed in the fish, wildlife and botanical chapter of Exhibit E. In this section, such cases will be referenced to the detailed discussions in the corresponding sections. Indirect impacts are those related to changes in user demand levels. These include the impacts of construction worker recreation and the influx of recreationalists as a result of the new road openings. This first section deals with direct impacts and discusses major project developments separately. Construction and operational impacts are also distinguished in each case.

3.1 - Watana Development

(a) Reservoir

(i) 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 and other borrow locations for dam fill material, blasting for the underground powerhouse and other features as well as other heavy construction activities at the dam site. In addition, an access road will be constructed from the Denali Highway and the construction camps built near the damsite. (The access raod is discussed in Section 3.3) The 38,000-acre reservoir area will be cleared of trees prior to inundation. It is anticipated to require three years to fill the entire impoundment area. The primary 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, unaccessible wilderness changes to one of 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 for public recreation and appreciation. Specific impacts of construction within the disturbed land areas include the elimination of small areas of wildlife habitat in the primary construction areas to the north of the damsite. This area contains a small concentration of black bear that would be eliminated,

therefore reducing hunting opportunities. Some fishing impacts will occur as a result of the effects of riverine construction on water quality. Tsusena Creek and the Susitna itself will be affected by gravel removal during construction. Impacts are expected to be quickly dissipated in the Susitna River and not significantly affect recreational fishing other than precluding actual construction areas from recreational use.

The 38,000-acre reservoir impoundment will inundate 10 small river-front cabins which are used seasonally by hunters, fishermen and other recreationist 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 either fewer hunters, particularly trophy hunters of black bear, will be attracted to the area or that those who do will be less successful. Specific impacts and mitigations for this loss are discussed in Exhibit E, Chapter 3, Fish, Wildlife, and Botanical Resources.

(ii) Operations

Operational impacts on existing recreation are related to the schedule, quantity, quality and temperature of water retained in the reservoir and released from the reservoir.

Within the new reservoir area an entirely new recreation setting will have been created which bears little similarity to the existing river recreation patterns. Operations will heavily impact this new setting through water fluctuation schedules. During the prime recreation months of July and August, water levels will be rising, with a peak in September.

The lake shorelines will contain large mudflats and steep banks of exposed tree stumps, and slumping soils. The situation will severely limit the development of the reservoir as a recreation opportunity. A lack of fish population, silty waters and cold water temperatures in the reservoir reinforce this recreation limitation.

(b) Talkeetna to Devil Canyon Fishery

(i) Construction

Impacts of construction on this downstream sports fishing area are directly related to the water quality changes caused by gravel and soil dredge-and-fill operations in the channel. Some periodic minor modification in turbidity levels can be expected.

Recreational fishing could also be negatively affected during the three year filling period in which summer flows will be reduced. About 20 sloughs utilized for spawning and/or rearing will potentially be impacted, and the fishing experience may be somewhat diminished temporarily by the lower water levels.

(ii) Operations

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 of the dam may clear up and become somewhat more fishable, particularly for coho and chinook salmon. There may be minor increases in winter turbidity between Talkeetna and the damsite, but an overall improvement in fishing opportunities is anticipated.

(c) Other River-Related Recreation

(i) Construction

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 actual filling of the reservoir begins. At that time, water levels downstream will decrease in summer recreation months. Depending on the precipitation and natural water level during filling, the reach of the Susitna one to three miles below Sherman (about six to nine miles 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. Rafting and kayaking from upriver will be restricted during construction for those few users who currently raft down the Susitna and pull out in the area of Stephan Lake and for the very small group of kayakers who run the Devil Canyon Rapids (40 in 5 years). During construction, these boaters will have to portage the construction area. This obstacle will significantly affect the wild river experience, even though the actual length of river where construction is in sight and sound is short.

(ii) Operations

Downstream 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 further down the river will be much less affected.

Continuous river trips by kayakers or rafters who float down to a take-out below Stephan Lake or go on through Devil Canyon will be eliminated as portage around the Watana Dam would be difficult. Upstream the float trip will change from a river to a lake experience as the reservoir backs 54 miles up the river valley. With a loss of rapid river water movement, boaters will need manual or mechanical propulsion to navigate the new lake. New activities such as float planing and large motorized boats will increase as recreationists take advantage of the recreation setting created by the lake and the new access through Vee Canyon. The experiece will be quite different in character and can be expected to attract a different clientele than the present users.

A major impact of this new reservoir is the loss of the existing pristine riverine setting. The aesthetic experience for future boaters will be greatly deteriorated by the effects of water fluctuation on the new shoreline. These visual impacts such as mudslides, mudflats, etc. are discussed in Exhibit E, Chapter 8, Aesthetics. Safety will also be a concern for future boaters using the lake as the great length and breadth of the impoundment may lead to treacherous conditions for small craft in high winds.

(d) Other Land Related Recreation

(i) Construction

The land-based recreation activities and resources within areas that Watana construction will effect have already been modified by the presence of project researchers who currently live and work in the vicinity. However, their low level recreation activities have not caused adverse impacts.

It is anticipated that during construction all land areas associated with this project will be closed to the recreation public. Thus any existing activities and resources will be eliminated for the duration of construction activities.

Existing recreation activities consist of hunting and fishing in the area; these activities can easily shift to other public lands for the duration of work. However, if construction practices cause permanent degradation to the recreation environment or the fish and wildlife habitat, the activities could be lost permanently.

(ii) Operations

After construction the land areas associated with the dam will either be rehabilitated or utilized for operations facilities and a permanent townsite. The rehabilitated areas may return to use as natural recreational areas. The operations areas, however, will continue to be unavailable for public recreation use. The presence of workers and their families will also continue to impact the recreation resources. However, with proper control by land owners and managers, these effects will not be detrimental.

3.2 - Devil Canyon Development

(a) Reservoir

(i) Construction

Construction of the thin concrete arch Devil Canyon Dam related features involves construction of a high-level bridge across the canyon, cofferdams and diversion of the river, land clearing and blasting, and a major concrete mix plant at the damsite. In addition, a railroad spur will be constructed from Gold Creek, a road will be built between Watana and Devil Canyon, and construction camps will be built near the damsite. The 7,800-acre reservoir itself is located within a steep canyon and will require less clearing than the Watana reservoir. As at Watana, the primary recreation impacts of construction will result from the conversion of a wilderness area to a construction area inhabited by 1,780 single workers and 170 married workers (550 people). Construction of the 34-mile road connecting Watana and Devil Canyon will introduce a developed land use and access pattern into an existing wilderness area.

The Devil Canyon reservoir, unlike Watana, will be relatively narrow and largely confined within the canyon walls, particularly the downstream reaches. The major impacts resulting from its creation will be the loss of 11 miles of Class VI 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), this does not diminish the significance of the loss. An additional 32 miles of river canyon upstream from Devil Canyon will also be lost. However, since a portage around Vee Canyon is necessary to reach this area today, it is also used by only a few recreationists.

(ii) Operations

Operationally the Devil Canyon reservoir will show the same limitations that effect the recreation opportunities of Watana Reservoir, although lower drawdowns and steeper sides will result in less severe mudflats. The loss of rapids and canyon will be complete as the reservoir fills.

(b) Talkeetna to Devil Canyon Fishery

(i) Construction

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

(ii) Operations

Operation of Devil Canyon will cause only minor changes in flows from Watana operation flows below the dam and is not expected to further affect the river downstream. Likewise, minor increases in winter turbidity are not expected to affect recreational fishing.

(c) Other River-Related Recreation

During the construction and operation period of Devil Canyon Dam no other impacts are anticipated.

(d) Other Land-Related Recreation

Land-related recreation impacts for construction and operations at Devil Canyon dam are similar to those anticipated at the Watana Dam development.

3.3 - Access

(a) Watana Access Road

(i) Construction

The 41-mile road from the Denali Highway to the Watana damsite will provide logistics support for construction to the dam. Construction will include a small temporary construction camp near the Brushkana drainage and several borrow pits as material is required for construction.

The road will traverse a large area not presently accessible by highway vehicle. While APA proposes to reserve decision until completion of Watana construction, for the purposes of this recreation plan, it is assumed that after completion of the Watana Dam Phase in 1993 the public will be allowed to use the road to access the areas south of the Denali highway. Prior to 1993, use of the road is expected to be 20-30 construction vehicle trips per day. An additional 200 private vehicle trip/days are anticipated as construction workers living off-site commute from Cantwell or elsewhere.

The roads will be designed for a maximum driving speed of from 40 mph to 60 mph. Two driving lanes will be 12 feet wide with additional 6-foot shoulders on each side. Road surfacing will be compacted gravel.

Within the proposed road corridor, existing recreation consists of dispersed and low-level activities such as hunting, fishing and hiking. During construction of the road these patterns will be somewhat impacted by increased activity and disruption to the environment. However, due to their inherent mobility and non-site specificity, these activities will temporarily be absorbed by the surrounding land.

More important than this are the impacts that the construction activities and increased numbers of people on site will have on the natural resources which constitute the activity setting. Within the 100-foot corridor identified for the road, the recreation setting's major components consist of fish and wildlife habitats and visual quality of the landscape. Specific impacts and the guidelines for protection of these areas are discussed in Exhibit E, Chapter 3, Fish, Wildlife and Botanical Resources, and Chapter 8, Aesthetics. Current road alignments will adversely impact sensitive wetlands and fish streams of the Brushkana, Soule, and Deadman Creek drainages.

(ii) Operations

In 1993 if the road were opened to the public, it is anticipated that in addition to the attraction created by the new dam and reservoir, additional hunters, fishermen, sightseers and other recreationists will be attracted to the newly opened lands. The Recreation Plans as presented in Section 5 is intended to focus this new influx of users to allow them to utilize the new recreation opportunities created.

(b) Devil Canyon Access Road

(i) Construction

This 34-mile 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/fill sections. The selected road corridor will also affect the private recreation lodge at High Lake. Passing within a mile of the development, the new access will change the character of the facility from a remote fly-in retreat to a more auto-oriented commercial facility.

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

(ii) Operations

After construction work is complete in 2002, Devil Canyon road may be opened to the public. Operations personnel will also continue to travel to the Devil Canyon Dam from the permanent townsite at Watana. Devil Canyon Dam is expected to become more of a tourist attraction than Watana because of its striking design and impressive setting. The road will function as an important recreation facility in that regard. The impacts of the public in this corridor area are similar to those for the Watana access road.

(c) Gold Creek - Devil Canyon Railroad

(i) Construction

The construction of the railroad spur to the Devil Canyon Damsite will have little effect on existing recreation patterns. The areas which it crosses are largely unused as a recreation resource. As with the case of the road construction, care must be taken not to degrade the existing recreation setting. This involves protection of the shorelines of the Susitna and streams crossed by the tracks as they constitute both fish/wildlife habitats and aesthetics resources. Potential sources of impacts include: major cut/fill operations, borrow excavation and stream crossings. Impacts and mitigations for these issues appear in the Fish, Wildlife and Botanical Resources and Aesthetics Chapter 3 and 8.

(ii) Operations

After construction is completed at the Devil Canyon damsite, rail service will no longer serve an exclusive project function. At this time it may become available to the public use. As such it will constitute a positive impact on recreation use. It has the potential of providing recreational access into the project area within four hours from Anchorage compared to the alternative road access which will take seven hours. It is likely that demand would not be high enough to provide this service without some subsidy however.

(d) Other Land-Related Recreation

(i) Construction

The primary areas of construction and related construction areas support numerous game animals. The noise and dust of construction and the disruption caused by heavy equipment operations along with the presence of 3,600 construction workers will disturb the habitats of area wildlife. Careful plans should be made to contain the areas of disruption, the result from construction activities, and increased human presence to prevent unnecessary degradation of the adjacent recreation environment. An important impact will be the introduction of civilization into an essentially wild area. It is anticipated that all hunting by project personnel will be prohibited. Fishing activity will be managed by the State Department of Fish and Game. For purposes of enforcement, it is likely that all recreation access, by project personnel and the general public, will have to be managed during construction. It is likely that some areas now utilized for hunting and fishing by persons using floatplanes and all-terrain vehicles will be managed more restrictively during construction than at present.

(ii) Operation

During operation, only a few hundred people will reside in Watana village, and personnel and operation/maintenance activities will have only a minor impact on recreation resources.

3.4 - Transmission

(a) Project Area

Construction of the east-west connection from the powerhousesdams to the Intertie will be done primarily in winter, except for the western portion from Gold Creek to an unnamed creek south of the Susitna River about four miles west of Devil Creek, where a

pioneer road already exists. No impacts are anticipated on the existing recreation patterns either during construction or during operation of these lines.

(b) Intertie and Stubs

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 effect existing recreation patterns during construction. 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 APA to develop a recreation plan related to these corridors.

3.5 - Indirect Impacts -- Project-Induced Recreation Demand

(a) Background

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

- Alaska Recreation Environment. As discussed in Section 2 of this Report, 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 recreation experience. Recreation patterns and uses do not follow those common at many hydroelectric projects in the lower 47 states. Usual recreation standards are not, for the most part, applicable in Alaska.

- Newness. 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 recreation 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.

- 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.

- 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 cylces can occur and be "missed" by the decennial census.

- Climate. Winters in the project area are long and severe. The Denali Highway, the only ground route penetrating the area, is not maintained in winter. Landing strips and lakes used for airplace access are also hazardous during the winter season. In addition, the short winter daylight period decreases available time for outdoor work, recreation and travel.

- 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.

- 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 recreation access to most lands within the state are changing in some instances.

- 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 recreation levels in Alaska may vary greatly according to unpredictable outside influences.

(b) Assumptions

The proposed recreation plan is designed as a mitigation for recreation opportunities due to project development, to utilize the recreation opportunities gained due to project development, and to provide for the demand induced by project development.

In projecting demand, a number of simplifying assumptions have been made which obviate the effects of the uncertainties in Alaska's recreation 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 recreation conditions change.

Assumptions of these demand projections include the following:

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

- 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 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 and Fairbanks and other appropriate governmental units will continue to pursue their plans for increased recreation facilities to serve increased demand. Many of the facilities documented here will be closer to population centers than the Susitna project and will accommodate a portion of future demand by city dwellers.

- The Alaska 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 recreation 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 Native corporations will pursue a course of paced development of their lands, including selected mineral development, recreation home development and commercial recreation development. These uses are assumed to be complementary to this Recreation Plan.

- 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.

- 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 recreation potential.

  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 recreation 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.

- 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 recreation 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 recreation 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 summar (mid-June to mid-September) recreation resource.

(c) Estimated Recreation Demand

Available recreation studies were surveyed and evaluated for applicability to the Susitna Hydroelectric Project. A wide variety of non-comparable and to some extent disparate data were found. A series of per capita participation projections developed by the U.S. Soil Conservation Service for the Susitna River Basin Study (John O'Neill, November 1978, unpublished) 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 recreation 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
- Opinion Survey Comparison

(i) Per Capita Participation Method

This method was developed by the U.S. Soil Conservation Service and applied to the 13-million-acre Talkeetna Subarea in 1978 as part of the Susitna River Basin Cooperative Study, a joint effort 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 outdoor recreation activities and applies them to existing population figures.

The demand projection presented in this report uses the general methodology and recreation data developed by S.C.S. 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 utilzied to estimate 1980 recreation demand:

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

To estimate 2000 recreation demand:

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

This procedure is followed for each of eight separate activities. Populations used are shown in Table E.7.9. Recreation participation is shown in Table E.7.10.

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 River Basin Cooperative Study utilizes the travel cost method, which is based on the premise that other things, being equal, per capita use of recreation 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.7.11. 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 recreation demand undoubtedly exceeds these areas, it is anticipated that population growth rates and demand percentages are sufficiently conservative to adequately represent maximum demand.

The centroid of the project recreation area is assumed to be 10 miles north of the Watana damsite, determined by observation. Table E.7.12 gives estimations of total recreation demand (in user days) for all recreation sites within 250 miles (or 5-6 hours) of Anchorage, 200 miles (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 5-6 hours' 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 S.C.S., 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 recreation activity using the population given in Table E.7.9, the factors in Table E.7.10 and the distances in Table E.7.11.

Table 7.13 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 south of the Susitna River on the south. This area was determined based on the areas directly affected by development, known recreation resources of the area and the recreation opportunity settings determined by the study team in the field.

It also takes into consideration Alaska Department of Fish and Game Management subunits. Since those units relate to big game (moose) management areas and not human recreation areas, it was neither necessary nor desirable to correspond exactly to those boundaries.

- Alaska Department of Fish and Game 1981 Geowonderland 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 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.7.14 and Table E.7.15 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.7.13.

- 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 1,885 in 1977 to 1,195 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.

- While these data do not directly correspond to the project area, in combination with personal conversations with knowledgeable local sources, the project team estimated 1,500 angle 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 were assumed to be 4,000 at the only developed campsite in the area. The BLM camp at Brushkana Creek on the Denali Highway was 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. As hiking trails are not rigorously designed for specific capacities at the primitive level of design anticipated, and as picnicking in this remote area is most frequently associated with camping, this simplifying assumption is appropriate.

- 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.7.15, it is calculated that approximately 6,700 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.7.9) and increased participation rates (Table E.7.10) are applied to the 1980 usage. That is, usage in the year 2000 will increase as does population and propensity to recreate, given no other actions such as construction to access roads into the area. This simplication does not take into consideration the changing attraction values of other recreation opportunities in the state. Those would be assumed to 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 9,700 user days, it is typical for campground supply to lag demand for the unaccommodated increment to go to undeveloped sites. The BLM Denali Block Management Plan calls for three three-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 recreation demand in the year 2000, assuming the Susitna Hydroelectric Project is built, the baseline (without project) recreation growth rates shown in Table E.7.14 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 recreation opportunities assessment and study of alternative opportunity was applied to the area.

- For big game hunting, increased road access will lead to an increased activity. The 1981 Geowonderland data base indicates that most hunters currently fly into the area. Because the resource is limited and regulated, a maximum increase of 0.2 percent is assumed (from today's capture rate of 0.3 percent of total demand in the hourly interval to a year 2000 capture rate of 0.5 percent). (See Tables E.7.14 and E.7.15.)

- No waterfowl hunting increase over baseline figures is anticipated as no proposed project features will affect the waterfowl hunting lakes.

- Presently freshwater fishing is very limited due to lack of automobile access. Most existing fisheries 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 4,000 to 6,000 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 recreation uses, such as driving and sightseeing, are assumed to be included in

this estimate. This appears to be a reasonable assumption because recreation 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.

(ii) Willingness to Drive Comparison

The Alaska Public Survey (1982) indicates that 20 percent of the population is willing to drive five hours to a weekend recreation opportunity, and an additional 11 percent will drive six or more hours. Applying these data to the projected year 2000 population (.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 captor 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.

(iii) Denali National Park Comparison

The entrance to Denali National Park is about 80 highway miles from the Watana site. With Mt. McKinley, North America's largest mountain, the Park is a world-renouned recreation attraction. In 1981, the ara attracted 256,500 recreation visitors and has shown generally a high rate of increase since the Parks Highway was opened in 1971. (See Table E.7.16.) 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 (Alaska Department of Natural Resources, June 1, 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 recreation 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 too is similar to that estimated in the per capita participation method.

(iv) 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 e ısting and future recreation traffic volumes along the highway. Results from a 1975 University of Alaska outdoor recreation study for the Denali Highway area (Off-Road Vehicle Use and Its Impact on Soils and Vegetation on Bureau of Land Management Land Along the Denali Highway, Alaska: A Report on the 1975 Outdoor Recreation Survey, L. 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 .90 recreation = 135,656 recreation trips per year.

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

(v) Recreation Participation Survey Method

The University of Alaska and TES Inc. conducted recreation participation surveys as a part of early studies of the Susitna Project (Phase I Environmental Studies Report Subtask 7.08 Recreation Planning, Analysis of Participation Survey Results. Terrestrial Environmental Systems. May 1982). The survey was mailed to a random sample of 3,116 Railbelt residents; 603 were returned by respondents, a response rate of 23 percent. Of those who responded, 148 or 25 percent stated that they currently use the study area for recreation purposes. By simple extrapolation, 25 percent of the 1980 Railbelt population (284,166) is given in that report as 65,973 persons who could presently recreate in the area. If, however, non-response to the questionnaire were assumed to be a no-use response, as few as 14,339 persons reportedly were considered to recreate there by the authors of that study. Based on detailed knowledge of activities in the area, it seems highly unlikely that this many people recreate there (see Table E.7.15), and that the responses were skewed to "yes" replies from persons who recreate there and who responded in higher proportion than their proportion in the entire population. 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.

Estimates of future use in that study based on questions regarding anticipated future use of the project are not considered reliable due to changes in the project features since the survey and the generally unreliable nature of asking how people would like to recreate rather than how they actually recreate.

(vi) Conclusion

Project demand for recreation is estimated using method (i) to be: 43,520 - 50,220 user days/year. In comparison, other estimates are:

Comparison (ii): 46,000
Comparison (iii): 51,000
Comparison (iv): 45,100
Comparison (v): 62,200

Based on the assumptions set forth in this section, and considering the variable predictability of recreation 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.7.15 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 phasing and access;
- Operational characteristics of the project;
- Recreation use patterns and demand;
- Management objectives of the interested agencies and Native corporations;
- Facilities design standards; and
- Financial obligation and responsibility of the Authority.

These factors were analyzed and utilized to set parameters for the plan determination process. An iterative process of plan generation, refinement and component selection was used to maximize congruence with these factors. The first two factors were described in Section 1.4. The third factor was discussed in Section 3.5. 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.

(a) 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 APA 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.

- 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 recreation experience, the general intent of this policy can be imputed to 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 opportunities and constraints;

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

- The plan shall be compatible with acceptable public safety and environmental health requirements;

- Recreation should be designed and operated in a manner such that they will not 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 which complements existing regional facilities and provides a balance of recreation opportunity should be taken in programming recreation activities and facilities.

(b) Alaska Division of Parks

The following 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 recreation needs as expressed through an assessment process and based on full public participation;

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

- Promote and balance the development of outdoor recreation opportunities in proximity to or within urban and rural communities;

- 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 assitance programs;

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

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

- Foster the growth and development of a strong, central role of the State in meeting outdoor recreation needs through a system of park and recreation units and historic and recreation 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 for 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 recreation network;

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

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

The Alaska State Parks System Southcentral Region Plan, February 1982, published by the Alaska Division of Parks (pg. 66), 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. Current division thought is that the objectives of this plan may be met without actual legislative designation. Portions of this area have been selected for conveyance to the CIRI Village Corporations, including Stephan Lake, Prairie Creek, and the upper reaches of the Talkeetna River.

(c) 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 Authority "to mitigate the negative impacts of the Susitna project on the fish and wildlife resources." (April 1982, Paragraph 3.1).

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 of 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.

(d) 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 for Southcentral Alaska: A Summary, September 22, 1980. This plan acknowledges development of the Susitna project and the access cooridor from the Denali Highway which can serve to: "facilitate public access to the back country." Specific policy statements which can relate to development of 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;
- 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 archaeology;

- 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 Brush/Kana 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 (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. Clearwater 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 the highway.

(e) CIRI 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 the Bureau of Land Management. With statehood, Alaska was allowed to select lands from federal holdings for patenting to the State. In 1971 when the Alaska Native Claims Settlement Act (ANCSA) was passed, 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. Cook Inlet Region, Inc. (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 who 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 portion 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 recreation 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 recreation uses, to meet future tax liabilities;

- Native corporations want to actively participate in the recreation 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 recreation use of Native lands; and

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

The Native corporations have expressed willingness to participate in a cooperative recreation planning process to assure provision of recreation 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 recreation use.

(f) 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 (Draft, September 1, 1982), includes the Susitna River up to Devil Canyon where the river ceases to be navigable from downstream, and the Talkeetna River south of the study area. The Devil Canyon damsite is designated a "potential" Areas Meriting Special Attention(AMSA) in that document. Under Alaska statute, should the area be designated an AMSA, a proposed management scheme would have to 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 participates 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.

(g) 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, November 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, and on significant interagency coordination. Upgrading 134 miles of roadway will correct roadway structure deterioration and substandard elements and will accommodate recreational use demand along the highway. 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 location and environmental impact studies done in 1981.

4.2 - Facilities Design Standards

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

4.3 - Financial Obligation and Responsibility of the Alaska 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. This commitment varies with the number and complexity of other factors addressed within overall project plans and must be viwed in light of these and general project goals. However, Alaska Power Authority, as a state agency, has stated that it will provide for the public interest and implement an appropriate recreation plan. The ultimate responsibility and obligation for development, operation and maintenance of the recreation facilities relative to the project rests with APA. The Alaska Department of Natural Resources expects the licensee to be responsible for meeting initial and future project-related recreation needs for the duration of the license. The extent and nature of the licensee's 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 cost for providing for changes and the level of financial and operational responsibility between the parties concerned will be negotiated at that time subject to approval by FERC.

5 - RECREATION PLAN

5.1 - Recreation Concept

(a) Introduction

The intent of this Recreation Plan is to satisfy recreation demands created by hydroelectric development and to accommodate public use and access of the project areas. The Plan offers compensation for recreation opportunities lost as a result of development. It does not attempt to exactly duplicate or replace these opportunities. The Plan is also intended to fit within the framework of regional recreation opportunities and to provide additional options. The proposed Plan accommodates these diverse recreation 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. It 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 also offer a wide variety of plant communities and wildlife inhabitants. This area has great potential for a wide variety of recreation uses.

The recreation concept was formulated to take advantage of these opportunities and the best natural features of the Susitna Basin rather than responding only to specific project facilities. The Plan, therefore, encompasses lands beyond the project boundaries.

In fact, after analysis the highest quality recreation opportunities were found to be in the diverse landscapes adjacent to the reservoir sites and not at the reservoirs themselves.

(b) Public Input

During earlier studies of recreation 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 recreation planning process. The questionnaire pertaining to public preferences for activities and level of development as well as their perceptions of recreation potential in the project area were mailed to potential users in Anchorage, Fairbanks, and other areas of the Railbelt. An abbreviated form of this was also used at public workshops to gain additional information regarding public interests and desires regarding recreation development.

Early concept plans were incorporated into these questionnaires which 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 and these identified preferences serve as the framework of the proposed recreation plan.

The 2,145 survey 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 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 when demand warrants it. This preference has been reflected in the proposed phased implementation program.

(c) The Concept

The recreation concept was developed after a careful evaluation of the recreation opportunities and constraints within the study area, regional recreation concerns, and estimated demands. It also utilizes information gained from early public participation programs, and recognizes that the Division of Parks number one priority is the development of more trails in the State. A principal objective of the recreation concept is to help meet this priority in appropriate portions of the project area.

The resulting concept provides for a challenging variety of activities and experiences within a development range from natural wilderness to semi-primitive recreation facilities. Road and access has been limited. Other options such as airplane, boat, train, and foot access are also provided to certain areas. Off-road vehicular use will continue in existing BLM areas.

Trails as proposed in this Plan, meets the Division of Parks "Priorities Trails" standard. They are intended to have an 18"-24" tread surfaced in the parent material, with half logs in wetlands. They would be brushed out to 48" where necessary. They would be hand constructed and following existing topograpy. Development focuses activity on a core of recreation facilities and diverts the greatest number of users away from sensitive operations or environmental areas. Hydroelectric facilites which have appeal as a recreational resource have been incorporated into this concept.

A primitive undesignated camp does not evision any developed hardened sites, but rather signifies the estimated carrying capacity of each site. Shelters are log structures of a design prepared by the Division of Parks.

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

5.2 - Recreation Opportunity Inventory

The site inventory includes three steps to define the recreation resources inherent to the site;

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

The aim of the approach is to inventory the land base of those landscapes which support the most diverse a range of possibilities.

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 featues 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 timberline, 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, snow-fields, 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.

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

(a) Review all planimetric information, USGS quadrangles, previous inventories and aerial photographs.

(b) Locate the occurrence of all attractive features as understood from (a), and including local knowledge and previous work, (e.g., the recreation plan published in Phase I Environmental Studies, Subtask 7.08 for the Susitna Hydroelectric Project, May 1982).

(c) Field check all sites located in (b) plus new potential sites, using the inventory shown in Appendix B. Define the quality and extent of the various landscape features.

(d) Map all features and settings depicting of the distribution and location of the recreation resources. Included are indications of special or significant views and vistas. (See Figures E.7.8, E.7.9, and E.7.10--Recreation opportunities and constraints.)

(e) 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.

A principal objective of the Recreation Plan is to provide a variety of recreation activities within a spectrum of recreation "preference types" (USDA Recreation Opportunity Inventory and Evaluation). The preference types in 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. Patterned after the USFS Recreation Opportunity Spectrum (ROS) approach, the four recreation preference types used in this report are:

- active-appreciative: 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;

- active-extractive: natural or semi-primitive 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, and difficult to access;

- passive-appreciative: semi-primitive, lightly developed locations, natural surroundings, a source of relaxation. The appropriate physical settings are natural-semi-primitive sites, with relatively easy access; and

- 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:

- active-appreciative: mountaineering, kayak-canoeing, backpacking, hiking, snow-shoeing, ski touring, nature study, and photography.

- active-extractive: backpacking, hiking, photography, nature study, big game hunting, fishing, rock hounding, berry picking, and plant gathering.

- passive-appreciative: car camping, pleasure driving, boating, lodges, snowmobiling, hiking/walking, and picnicking.

- 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 recreation 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.

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 "access" new areas to 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., active-appreciative activity preferences need to be away from road access. This relationship is determined during the on-site field review.

5.3 - Recreation Opportunity Evaluation

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

- Physical characteristics;
- Relative scarcity;
- Inherent durability;
- Visual quality;
- Carrying capacity; and
- Present land status.

(a) Physical Characteristics

The physical characteristics of a site are those site features and settings which define and describe the site. These characteristics establish the relationship of the site's own experiential potential to the regional opportunities available.

(b) Relative Scarcity

Relative scarcity is an extension of the physical characteristic's relationship to the regional and local scales. The sites were evaluated on an on-site basis in a three-level rating:

- High: unique local resources, or state resources, symbolic of Alaska landscapes or carrying unique recreation potential;
- Medium: moderately uncommon, expressive of local characteristic landscapes, exposure to abundant recreation resources; and
- Low: commonly occurring landscapes with few features with recreation potential.

(c) Inherent Durability

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. 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

(d) 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
several special features and settings	High	Medium	Low
encroachment and created landscapes	Medium	Medium	Low

(e) Carrying Capacity

Carrying capacity is a measure of the intrinsic durability of a particular place. The goal is not to reduce the experiential potential through over-use. The carrying capacity is measured by examining the site variables of size, location, degree of access, design capacities, usability, and seasonal availability. Often intensity of recreation use is the major factor in determining capacity.

There are three categories of use intensities used in this study:

(i) High--which have high impact, high number of users, formal management and control. Highly developed parks, horse camps, ORV trails are examples;

(ii) Medium--which are for smaller groups, with less accessibility, small-scale facilities; campgrounds and trails are examples; and

(iii) Low--which have low impacts, little or no access, minimal development. Foot trails, mountaineering sites, and undesignated camping are examples.

The general carrying capacity of the various preference settings are as follows:

- Active-appreciative: low carrying capacity;
- Active-extractive: low, moderate carrying capacity;
- Passive-appreciative: moderate carrying capacity; and
- Developed: high carrying capacity.

The carrying capacities of the active-appreciative, active-extractive and passive-appreciative sites were field checked on a site-specific basis. The demand is far exceeded by the capability of the resources, therefore, limiting the conflict of over-use.

The above criteria are evaluated and field checked to determine the appropriate Recreation Opportunity Summary. This is a compilation of appropriate recreation activities as a result of the above inventory and evaluation. The selections also consider the variety and diversity of the available resources to best suit the site. The choices also integrate the recreation needs inventoried in Section 3.5 of this report.

The proposed recreation facilities are determined on the basis of supporting the proposed recreation activity within the setting. They are introduced to fit within existing operational and management guidelines and objectives of the APA and the various rearranging agencies within the study area, (Sections 4 and 6).

5.4 - Recreation Plan

The Susitna Hydroelectric Project Recreation Plan includes the following sites and proposed facilities. There are three maps (Figures E.7.12, E.7.13, and E.7.14) which cover the entire study area, indicates extensive facilities such as long trails, and locate the other site-specific recreation facilities. All sites have a key letter relating to text and maps. There are eleven additional maps which depict important features of the individual recreation sites. Projects are described by their phase of development and are as follows:

Phase One - Watana Construction Phase

Key Number	Name
E	Brushkana Campground
D	Tyone Confluence with Susitna

Phase One - Watana Construction Phase

Key Number	Name
B	Butte Creek
A	Middle Fork-Chulitna River
H	Tsusena Creek, northern half
C	Watana Town Site
F	Portal Entry

Phase Two - Watana Implementation Phase

O	Watana Dam Site
U	Watana Town Site
H	Tsusena Creek, southern half
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

(E) Brushkana Camp

(i) Physical Characteristics

An existing developed campground with 33 campsites, including picnic, fire, and toilet facilities on the Denali Highway. Although surrounded by wonderful views to 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 semi-natural state.

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness:	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; high.	
Present Land Status:	Bureau of Land Management	

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

25 new campsites, similar to the existing development, with tables, fire, and toilet facilites; and

1/4-mile circulation road for proposed site.

(vi) Accessibility

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

(D) Tyone River

(i) Physical Characteristics

The site is located at the confluence of the Tyone and Susitna rivers at a point where the Susitna River becomes a fixed-channel river just beyond the eastern limits of the Watana Reservoir site within a rolling open landscape the Gulkaa uplands. See Photograph E.7.5.

(ii) Recreation Preference Type

Active-extractive; a natural environment with enjoyable settings, which offers game species, and has difficult access.

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness:	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:	Active-extractive; low.	
Present Land Status:	State of Alaska, Department of Natural Resources	

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

1 shelter

(vi) Accessibility

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

(B) Butte Creek

(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 of the Denali River crossing, the river is broad, braided and shallow. See photograph E.7.2.

(ii) Recreation Preference Type

Butte Creek: Active-appreciative; a natural unmodified environment with aesthetic stimulation.

Butte Lake: Active-extractive; a semi-primitive experience, with a natural setting.

Susitna River: Passive-appreciative; 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) Recreation Opportunity Evaluation Summary

Natural Uniqueness: 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 amongst moderately sloped mountains, this is a pristine environment.

Carrying Capacity: Active-appreciative; low.

Present Land Status: Bureau of Land Management

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

Butte Creek: No additional recreational developments.

Butte Lake: No additional recreational developments; consider removing ATC 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: ATV's and airplanes currently access the lake.

Susitna River: The Denali Highway and boats.

(A) Middle Fork Chulitna River

(i) Physical Characteristics

Extending from the town of Summit through the Summit Lake chain, this corridor runs 27 miles east into the Chulitna Mountains. It follows along the Middle Fork of the Chulitna River, and 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, at El. 3,900, 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

Active-appreciative: a natural unmodified environment, which offers solitude, aesthetic stimulation, 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
- Meet state priority of trail development.

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness:	High	
Inherent Durability:	abiotic:	Moderate
	vegetation:	Moderate
	wildlife:	Moderate
	encroachment:	Fragile
Visual Quality:	Moderate; much of the corridor consists of line environments. Opportunities for panoramic views of the Alaska Range exist throughout the corridor. There are many areas of foreground interest areas, and waterforms which offer a high level of visual interest and integrity.	
Carrying Capacity:	Active-appreciative; moderate.	
Present Land Status:	Bureau of Land Management and Ahtna Village Corporation selection.	

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

2 overnight shelters along trail;
Primitive Trail development, 25 miles; 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.

(H) Tsusena Creek

(i) Physical Characteristics

Descending from the headwaters of Tsusena Creek and adjoining the Middle Fork of the Chulitna River receation setting, the valley runs southward toward the Tsusena Lakes which are almost 250 acres in size. Evidence of its glacial history, there are many unusual and interesting rock formations, waterfalls, and glacial deposits. 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

Active-appreciative; 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
- Meet state priority of trail development.

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness: 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, 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: Active-appreciative; low.

Present Land Status: Bureau of Land Management

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

2 shelters; and
Primitive trail development, 20 miles Phase One; 20 miles Phase Two.

(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).

(C) Watana Town Site

See Section 5.6, Photograph E.7.3.

(F) Portal Sign

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.

(O) Watana Damsite

(i) Physical Characteristics

Located above the Watana damsite on the south side of the Susitna River 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. See photograph E.7.13.

(ii) Recreation Preference Types

Developed; a man-made environment with easy access

(iii) Recreation Opportunity Summary

Viewpoint
Visitor information
Photography
Picnicking
Walking

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness: Moderate

Inherent Durability:
abiotic: Moderate
vegetation: Moderate
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, high

Present Land Status: Private (CIRI Village Section) within designated Pryell Boundary

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

Access road, .15 mile;
Parking, 20 cars;
Exhibit building:
- Souvenir shop;
- Museum;
- Restrooms; and
- Food service.

Indigenous plants botanical trail; and
4 picnic sites.
Boat ramp to reservoir, possibly via emergency spillway.

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

(vi) Accessibility

Access road across Watana Dam.

(U) Watana Townsite Phase II

See Section 5.6.
Photograph E.7.3

(I) Tsusena Butte

(i) Physical Characteristics

The southern extent of the Tsusena Valley divides around Tsusena Butte, which is a prominent 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

Passive appreciative; a semi-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 Uniqueness: 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 lodge at the lake adds a cultural feature in this otherwise pristine environment.

Carrying Capacity: Moderate

Present Land Status: Bureau of Land Management

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

Primitive trail development, 4 miles;
Trailhead, with 10 parking spaces; and
2 to 4 undesignated campsites.

(vi) Accessibility

Auto, via the Watana access road, mile _____.

(L) Deadman Lake/Big Lake

(i) Physical Characteristics

Two lakes of approximately 1,800 acres lie at the southern base of Deadman Mountain amongst 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

Active-appreciative; a natural, stimulating, unmodified environment, offering solitude, and possessing great aesthetic merit.

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness:	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:	Active-appreciative; low.	
Present Land Status:	Bureau of Land Management, State Selection Suspended Lands.	

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

Primitive trail development, 4 miles;
4 undesignated campsites; and
Trailhead, with 6-space automobile parallel parking.

(vi) Accessibility

Airplane at Big Lake. Foot trail to the Watana access road, mile _____.

(J) Clarence Lake

(i) Physical Characteristics

This popular fly-in fishing lake is set in a rolling upland terrace above the Susitna River. The lakes 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

Active-expressive; a natural or semi-primitive environment, for the enjoyment of game species and removed from human influences that is difficult to access.

(iii) Recreation Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness: Low

Inherent Durability:

abiotic:	Low
vegetation:	Medium
wildlife:	Medium
encroachment:	Medium

Visual Quality: Medium; the site has many opportunities for views out to the surrounding mountains in all directions. The primary views and experiences relate to the streamside, where small canyons, woodlands, and stream create a pleasant and interesting microenvironment.

Carrying Capacity: Active-extractive; moderate.

Present Land Status: State suspended lands

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

Primitive trail development, 9 miles;
1 footbridge; and
4 to 6 undesignated campsites.

(vi) Accessibility

Airplane on Clarence Lake; and
Primitive trail from Watana Reservoir river mile _____
(boat only access).

(K) Watana Lake

(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

Active-expressive; a natural or semi-primitive 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 Uniqueness:	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 sportsmen's cabins on the lake edge.	
Carrying Capacity:	Active-extractive; moderate	

Present Land Status: State-suspended lands.

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

Primitive trail development, 3 miles
3 undesignated campsites

(vi) Accessibility

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

(G) Mid-Chulitna Mountains, Deadman Mountain

(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 multi-colored 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

Active-appreciative; 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; and
- Meet state priority of trail development.

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness: 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: Active-appreciative; low.

Present Land Status: Bureau of Land Management

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

2 vista auto pull-off areas, 7 autos;
1 trailhead with 3-car parallel parking;
Primitive trail development, 7 miles; and
2 to 4 undesignated campsites.

(vi) Accessibility

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

(Q) Devil Creek

(i) Physical Characteristics

Set in an upland tundra landscape of great complexity, Devil Creek cascades down into the Susitna River gorge. 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

Active-appreciative; 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 Uniqueness: High

Inherent Durability:

abiotic:	Moderate
vegetation:	Moderate
wildlife:	Moderate
encroachment:	Fragile

Visual Quality: High; this is 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: Active-appreciate; low

Present Land Status: State suspended lands, CIRI Village Selection Lands

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

Primitive trail development, 9 miles.

(vi) Accessibility

Gravel road, the Devil Canyon access road.

(S) Devil Canyon Damsite

(i) Physical Characteristics

Above the Devil Canyon dam, perched high above the Susitna River, are openly forested uplands. Expansive views west and north, but of particular note into the very deep canyon below. See photograph E.7.25.

(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 Uniqueness: 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; high

Present Land Status: Private (CIRI Village Selection) within designated Project Boundary.

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

1 shelter;
- Exhibit building;
- Food service;
- Souvenirs shop; and
- Restrooms

8 picnic sites; and
15 parking sites
Boat access and ramp down river of dam via project construction road

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

(vi) Accessibility

Devil Canyon access road.

(R) Mermaid Lake

(i) Physical Characteristics

This is 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 southern edge. See photograph E.7.23.

(ii) Recreation Preference Type

Passive-appreciative; a semi-primitive location in a natural surrounding, with relatively easy access.

(iii) Recreatoin Opportunity Summary

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

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness: High

Inherent Durability:

abiotic:	Moderate
vegetation:	Fragile
wildlife:	Moderate
encroachment:	Moderate

Visual Quality: High, a unique visual environment, this area has great foreground appeal, and Vistas toward the colorful Chulitna Mountains. Tremendous fall color potential n this setting.

Carrying Capacity: Passive-appreciative; moderate

Present Land Status: Bureau of Land Management, State Selection Suspended Lands

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

8 campsites, tables, tent pads, parking;
1/4 mile small-scale road;
2 toilet facilities; and
1 shelter.

(vi) Accessibility

Airplane, Mermaid Lake, and High Lake, auto; and
Devil Canyon access road, mile _____.

(T) Soule Creek

(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 to 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 multi-colored rock with a large hidden lake basin of 5 miles containing a long (2 miles) linear lake, this valley is a strikingly complex, natural environment. See photographs E.7.26 and E.7.27.

(ii) Recreation Preference Type

Active-appreciative.

(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 Uniqueness:	High	
Inherent Durability:	abiotic:	Moderate
	vegetation:	Moderate
	wildlife:	Fragile
	encroachment:	Fragile
Visual Quality:	High; this is a symbolic mountainous landscape, offering exploratory vistas to the Alaska Range. A high degree of natural diversity of landforms, rock and snow landscapes, and waterforms exists here.	
Carrying Capacity:	Active-appreciative, low	
Present Land Status:	Bureau of Land Management	

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

Primitive trail development, 8 miles;
5-6 capacity undesignated campsites at the northern edge of the lake; and
5 car parallel park trailhead.

(vi) Accessibility

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

(M) Southern Chulitna Mountains

(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.7.28 and E.7.29.

(ii) Recreation Preference Type

Active-appreciative; 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 Uniqueness: High

Inherent Durability:

abiotic:	Fragile
vegetation:	Fragile
wildflife:	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: Active-appreciative; low

Present Land Status: Bureau of Land Management

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

Primitive trail development, 3 miles;
3 undesignated campsites; and
Trail head with 3 parallel auto parking spaces.

(vi) Acccessibility

The Watana Dam access road.

(N) Fog Lakes

(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 from a dissected, glaciated complex landscape to the south. Fog Creek originates here and cascades through its small canyons to the Susitna River (see Photograph E.7.17).

(ii) Recreation Preference Type

Passive-appreciative, the area is semi-primitive, lightly developed, with natural surroundings and relatively easy access.

(iii) Recreation Opportunity Summary

- Hiking;
- Car camping;
- Nature observation;
- Wildlife observation;
- Photography;
- Fishing; and
- Meet state priority trail development.

(iv) Recreation Opportunity Evaluation Summary

Natural Uniqueness:	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:	Passive-appreciative, Moderate	
Present Land Status:	Private land	

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

15 campground units, picnic tables, fire pits, and tent pads
3 toilet facilities
Primitive trail development, 15 miles

(vi) Accessibility

Airplane to Fog Lakes
Road access across Watana Dam

(P) Stephan Lake

(i) Physical Characteristics

Stephan Lake is a 3-1/2-mile-long lake set in a wooded valley in the uplands south of the Susitna River. The area contains Prairie Creek which winds its way south to the Talkeetna River. The Talkeetna Mountains form the southern boundary to the valley setting and evidence the glaciated history of the area. See photograph 7.15.

(ii) Recreation Preference Types

Active-extractive; a semi-primitive 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 Uniqueness:	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 into the Talkeetna Mountains in the distance.	

(v) Proposed Recreation Facilities (See Plate E.7.12)

Primitive trail development, 5 miles, and
5 campsites.

(vi) Accessibility

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

(W) Rehabilitation Sites

In addition to those recreation opportunities which are intrinsic to the natural environment, there are areas under consideration for development within construction activity areas such as the proposed borrow areas. Under these circumstances, additional recreation improvements and activities could occur as necessary to meet unforeseen recreation demand.

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 re-create 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.

These rehabilitated 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. They have not been given a specific location or preferred use, designation in order to be flexible to unforeseen demand and recreation needs.

5.5 - Recreation Plan for Construction Camps and Permanent Townsite

(a) Background

Because of its remote location, Alaska Power Authority is planning for sequential development of construction camps at both the Watana and Devil Canyon sites, each to be occupied for approximately 8 years, by at least a part of the work force. Because 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, 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 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% of that year's peak will continue through December and January. The work pattern is planed to be four weeks on and one week off. There will be two 10-hour shifts per day, seven days per week.

Current estimates by the project are that 50 percent of the workers will travel to the jobsite by project-organized bus; 35 percent by private vehicle; 10 percent by project-organized air services (senior management); and 5 percent by private airplane. (Letter, M.M. Grubb to P. Rogers, September 13, 1982). While some Watana workers may choose to live in Cantwell or elsewhere, it is assumed that the vast majority will live at the camp and commute to their families' places of residence only periodically.

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

(b) Project Plans

Table 7.20 indicates recreation facilities proposed in the March 1982 Susitna Hydroelectric Project Feasibility Report, Vol. 3.

A single-status worker camp with a peak capacity of 3,600 workers and a family- status vilage designed for a peak capacity of 350 families (1,120 people). The village is currently planned to be located about 1-1/2 miles north of the damsite, and the construction camp another 1-1/2 miles 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 pre-construction 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 vllage located about three and four miles, respectively, from Devil Canyon. The camp is planned for a peak of 1,780 workers and the village for 170 workers and their families, totalling 550 persons. No permanent residential facilities are planned for Devil Canyon.

The temporary camps and vilages are designed to be largely self-contained and fenced. They will have highly regulated environments. It is anticipated that hunting by project personnel will be prohibited and that fishing will be regulated. Recreation programs sponsered by the camp management will occur largely within these compounds.

The Feasibility Report programs major recreation facilites for each of the four temporary camps. Table 7.18 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

Quality of life objectives are very difficult to achieve at construction camps. The type, number and quality of recreation facilities and non-structural 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 non-recreation 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 recreation 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 non-structural recreation will increase the range of recreation opportunities. While the peak work force at Watana will reach 3,480 in June and July 1990, the average annual work force will more closely approximate 1,600 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, and 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:	1,600 workers
Family Village:	160 workers (500 total population)

For Devil Canyon, comparable working forecasts are:

Single-Status Camp:	1,100 workers
Family Village:	110 workers (350 total population)

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 1,000
Tennis	1 per 2,000
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 3,000 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 1,000 population, typically 1.5 acres per 1,000 for field sports (adults and older children) and 1.0 per 5,000 population for tennis, outdoor basketball and other sports. (DeChiara & Koppelman, 1978 pp. 363-5).

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 over-use; 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

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 7.18.

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, including:

- DeChiara and Koppelman, Urban Planning and Design Criteria, Von Nostrand Reinhold Company, New York, 1975.

- Mountain West Research, Inc., Construction Worker Profile: Final Report. Old West Regional Commission, Tempe, Ariznoa, 1976.

- Myhra, David, Energy Plant Sites: Community Planning for Large Projects. Conway Publications, Atlanta, 1980.

- DeChiara and Koppelman, Site Planning Standards. McGraw-Hill Book Company. New York, 1978.

- DeChiara and Callender. Time-Saver Standards for Building Types. McGraw-Hill, Inc. New York, 1973.

Many of these proposed recreation uses can be accommodated in multi-purpose space. For instance, the gymnasium can be a multi-purpose 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 camp fire 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 multi-purpose sports. Utilization of recreation directors is an important component both in maximizing the multi-use potential of the facilities and in contributing to the quality of life for the residents.

It is also recognized that some of the non-structural activities recommended in this plan carry liability risks for the APA. 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 APA progresses with policy decisions regarding details of the construction program and as actual facility design is undertaken.

5.7 - 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. In addition, the "no recreation facility" alternative was considered.

(a) 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 encourge 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 recreation demand due to improved access be accommodated. Not only will project roads increase access, but the reservoirs wil become transportation routes for hunters.This alternative was therefore rejected and other recreation resources, not reservoir based, were considered for development of the Plan.

(b) Additional Facilities and Development

In addition to the proposed recreation plan, the alternative of additional recreation 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 considerd which had limited potential for recreation which 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 a one-site basis for each site.

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

(c) Other Access Route Alternative

Many access route alternatives have been considered by project designer for access to the Watana and Devil Canyon damsites. The proposed recreation plan and subsequent phasing has been determined considering accessibility as a major determinent. 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 4 to Phase 2 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 4 when the railroad would convert to recreation use.

As part of the Phase 5 monitoring, new sites might be located if demand warrants.

(d) Future Additions

Because of uncertainties in both recreation 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 5 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 Phase 1 through 4 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 as which reservoirs are filled and dates at which project access roads are opened to the public;

- Agreement among APA and the various parties 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 recreation activity in Alaska, and the extremely long and phased construction period;

- Satisfactory and timely agreement among the agencies and private landowners regarding possible recreation 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 recreation 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:

Phase 1, Watana Construction Phase, consists of recreation features intended to mitigate the impacts of recreation opportunities lost due to construction activities and associated land closures, to provide recreation opportunities for project construction workers, and to provide the general public with some early-on recreation benefits derived from the public investment in Watana. Phase 1 projects are generally planned to be developed contemporaneously with the start of project construction.

Phase 2, Watana Implementation Phase, consists of recreation features intended to mitigate the impacts of recreation lost due to the operation of Watana, to provide for the recreation use potential of the project, to accommodate project-induced recreation demand, to allow public access to project lands and waters, and to protect the environmental values of the project area. Phase 2 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.

Phase 3, Devil Canyon Construction Phase, consists of projects intended to mitigate the impacts of recreation opportunities lost due to Devil Canyon construction activities and to provide recreation opportunities for construction workers. Phase 3 projects are generally planned to be developed contemporaneously 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 post-project recreation demand at Watana.

Phase 4, Devil Canyon Implementation Phase, consists of recreation features intended to mitigate the impacts of recreation lost due to the operation of Devil Canyon, to provide for the recreation 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 4 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.

Phase 5, Post-Construction Monitoring Phase, consists of monitoring recreation use. To begin when the first project recreation facilities are available in order to determine actual recreation 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 Phases 2, 3 and 4 plans and at 10-year intervals thereafter throughout the life of the project license.

The following list indicates elements of the Recreation Plan by their intended Phase of development.

PHASE ONE (Sites E, D, B, A, H, C, F)

E	Brushkana Camp	25 campsites west of existing camp water supply 3 vault toilets
D	Tyone River confluence with Susitna	1 shelter

E	Brushkana Camp	25 campsites west of existing camp water supply 3 vault toilets
D	Tyone River confluence with Susitna	1 shelter
E	Butte Creek	1 boat launch at Susitna Bridge
C	Watana Town Site	Temporary camp and town facilities
A	Middle Fork Chulitna River	2 overnight shelters 25 miles primitive trail trailhead and parking
H	Tsusena Creek northern half of proposed trail	2 shelters 20 miles of primitive trail Trailhead and parking
F	Portal sign	Explanatory entry sign 2-3 can pullout

PHASE TWO (Sites O, U, H, I, L, J, K)

O	Watana Dam Site Visitor Center	Parking, 20 spaces Visitor exhibit building Food service Souvenir shop Museum Restrooms Powerhouse tour facility Indigenous botanical trail Boat launch
C	Watana Town site (Phase 2)	2 miles of primitive trail to Tsusena Falls Trailhead/parking
H	Tsusena Creek southern half of trail	2 shelters 20 miles of primitive trail
I	Tsusena Butte	4 miles of primitive trail 1 trailhead 3-4 capacity primitive camp
L	Big Lake/Deadman Lake	1 trailhead 5-6 capacity primitive campsite 4 miles of primitive trail

J	Clarence Lake	9 miles of primitive trail 4-6 capacity primitive campsite 1 foot bridge
K	Watana Lake	3 miles of primitive trail 2-3 capacity primitive campsite

PHASE THREE

G	Mid-Chulitna Mountains Deadman Mountain	2 vista pull-offs 1 trailhead 7 miles of primitive trail 2-4 primitive designation camps

PHASE FOUR (Sites Q, S, R)

Q	Devil Creek Drainage	7 miles of trail
S	Devil Canyon Damsite Visitor Center	Shelter Visitor center Dam exhibit Food service Souvenir shop Restrooms Boat launch
K	Devil Canyon/ Mermaid Lake	8-10 campsites, tent pads Shelter Restrooms

PHASE FIVE - To be developed only if demand requires.
(Sites T, M, N, P, W)

T	Soule Creek	8 miles of primitive trail 5-6 capacity primitive campsite
M	Southern Chulitna Mountains	3 miles of primitive trail 5-6 capacity primitive campsite Trailhead and parking
N	Fog Lakes	15 miles of primitive trail 15 units campground
P	Stephan Lakes	5 miles of primitive trail 5-7 campsites, semi-primitive (fire pits, tent pads) 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 (19 years from filing of FERC application to operation of Devil Canyon);
- Changing land ownership; and
- Geographic extent of project area, and the extensive nature of Alaska recreation.

Therefore, Phase I of the Recreation Plan would be initiated at the time of starting construction. Phases 2, 3 and 4 may be modified based on Phase 5 monitoring. In general, the Alaska Power Authority's commitment beyond Phase 1 is to acquire and develop the facilities listed in Phases 2, 3 and 4 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 5, Post Construction 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 tied to acquisition of necessary agreements with the Native corporations. If, at a reasonable amount of time, the Authority and the Native corporations are not able to reach agreement on a particular element of the recreation plan, the 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.

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 1 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 Authority will jointly meet to evaluate recreation use patterns and to plan schedules and levels of subsequent development accordingly. The Phase 2 (Watana Implementation) Plan will be evaluated at this time and will be verified or modified as required consistent with the Recreation Opportunity Spectrum (ROS) classification appropriate for each proposed element. Construction of the Phsae 2 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 3 (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 Spectrum classification of each project element. Phase 3 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 3, whichever is earlier, the Division and the Authority will jointly meet to evaluate the Phase 4 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 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 Alaska 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 Authority. It is also anticipated that agreements of similar intent will be entered into with the U.S. Bureau of Land Management and the Native corporations as appropriate.

It is intended that the Authority will commit to the costs of the facilities specified in this Recreation Plan. Should any phase be modified by joint agreement of the 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 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 1, 2, 3 and 4 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 following 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 adminster 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 5 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.7.18. Breakdowns for these costs by project features are shown in Table E.7.19. 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.7.20 estimates additional equipment necessary to operate the proposed facilities. Table E.7.21 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 - AGENCIES AND PERSONS CONSULTED

The following 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.

AGENCIES AND PERSONS CONSULTED

Federal Agencies	Person	Date	Communication	Subject
F.E.R.C.	Mark Robison	9/29/82	Phone	Land Status Phasing Implementation Demand
F.E.R.C.	Frank Karwoski	9/30/82 & 10/30/82	Phone	Land Status Phasing Implementation Fish & Wildlife Demand Access Routes Alternatives
F.E.R.C.	John Haimes	9/29/82	Phone	Impacts
U.S.B.L.M.	John Rego	10/15/82	Meeting	Review Proposed Recreation Plan
U.S.B.L.M.	Dave Dapkus	9/17/82	Meeting	Recreation Data
U.S.B.L.M.	Mike Wrabetz Bob Ward	9/17/82	Meeting	Visual Study Denali Highway
U.S.F.&W.S.	Date Patterson	9/21/82	Meeting	Rec. Demand
U.S.F.S. Chugach Natl. Forest	Jim Tellerico	9/22/82	Phone	Rec. Data
U.S.N.P.S.	Larry Wright	9/15/82	Meeting	Rec. Data Demand
U.S.N.P.S. 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	Sandy Rabinowitch	9/14/82	Phone	State Rec. Planning
Div. Parks		9/15/82	Meeting	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	Jack Wiles	9/15/82	Meeting	Rec. Data
Div. Parks	Peste Martin	10/20/82	Meeting	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 & Archaeological Resources Rec. Plan
Ag. Expt. Station	Alan Jubesville Jo Feyl	9/9/82 9/24/82	Phone Phone	Rec. Plan Data Sources

BIBLIOGRAPHY

1. Acres American Incorporated, Susitna Hydroelectric Project, Transmission Line Selection Route, prepared for the Alaska Power Authority, Final Draft, March 1982.

2. _____, Susitna Hydroelectric Project, Transmission Line Corridor Screening Closeout Report, Task 8 Transmission Final Report, prepared for the Alaska Power Authority, March 1982.

3. _____, Susitna Hydroelectric Project, Access Plan Recommendation Report, prepared for the Alaska Power Authority, August 1982.

4. _____, Susitna Hydroelectric Project, Feasibility Report, Vol. 1-7, Final Draft, prepared for the Alaska Power Authority, undated.

5. Alaska Department of Fish and Game, Susitna Hydroelectric Project, Big Game Studies, Vol. I-VIII, Phase I, Final Report, submitted to the Alaska Power Authority, March 1982.

6. Alaska Department of Natural Resources, Division of Parks, Alaska Recreation Trail Plan 1972.

7. _____, Chugach State Park Master Plan, February 1980.

8. _____, Alaska Outdoor Recreation Plan 1981.

9. _____, Estimated Facility Costs, unpublished, January 1981.

10. _____, Catalogue of the Alaska State Park System, July 1981.

11. _____, Alaska State Park System: Southcentral Region Plan, February 1982.

12. _____, Alaska State Park System: Statewide Framework, June 1982.

13. _____, and USDI National Park Service, Environmental Investigation and Site Analysis, Tokositna Study Area, Denali State Park, July 1980.

14. Alaska Department of Natural Resources, Division of Research and Development, Recreation Use Patterns and Recreation Area Notes, unpublished appendices to Susitna River Basin Land Use/Recreation Atlas, 1980.

15. _____, Susitna River Basin Land Use/Recreation Atlas, 1980.

16. _____, Scenic Resources along the Parks Highway, 1981.

17. _____, Statewide Natural Resources Plan, FY 81, October 1981.

18. _____, Statewide Natural Resources Plan, FY 81, Appendix I, undated.

19. _____, Statewide Natural Resources Plan FY 81, Appendix II, Allocation Units, undated.

20. _____, et al., Matanuska-Susitna Beluga Cooperative Planning Program - Land Use Issues and Preliminary Resource Inventory, Vol. 1, May 1982.

21. Alaska Department of Transportation and Public Facilities, Denali Highway Environmental Assessment, Fall 1981.

22. _____, Denali Highway Location Study Report, RS-0750(I), Fall 1981.

23. Alaska Division of Tourism, Alaska Travel Directory, June 1981.

24. Alaska Geographic, A Photographic Geography of Alaska, Vol. 7, No. 2, 1980.

25. Alaska Magazine, The Alaska Almanac, 1982 Edition, September 1981.

26. Alaska Power Authority, Susitna Hydroelectric Project, Fish and Wildlife Mitigation Policy, Revised April 1982.

27. American Association of State Highway Officials, Geometric Design Guide for Local Roads and Streets, Washington, D.C., 1971.

28. Braund, Stephen R. and Associates, Susitna Hydroelectric Project, Subtask 7.05, Socioeconomic Analysis, Sociocultural Report, Final Draft, prepared for Acres American Incorporated, March 1982.

29. Carter, M. Floating Alaskan Rivers, Aladdin Publishing, 1982.

30. Childers Associates, Roadside Recreational Facilities Study, Richardson Highway, M 82.6-185.5, prepared for the Alaska Department of Natural Resources, Division of Parks, July 1, 1982.

31. Clark, Roger N., and Johnson, Darryll R., Selected Findings from the Alaska Public Survey - A Summary of Responses from Southeast and South Central Alaska, Joint Report of U.S.D.A. Forest Service and University of Washington, College of Forest Resources, August 1981.

32. Cook Inlet Region, Inc., 1981 Annual Report.

33. DeChiara, Joseph and Callender, John, Time-Saver Standards for Building Types, McGraw-Hill, Inc., New York, 1973.

34. _____, and Koppelman, Lee, Urban Planning and Design Criteria, Van Nostrand Reinhold Company, New York, 1975.

35. _____, Site Planning Standards, McGraw-Hill, Inc., New York, 1978.

36. Economic Research Associates, Summary - Denali State Park Visitor Facility Market Analysis and Economic Feasibility Study, prepared for the Alaska Department of Natural Resources, June 1, 1980.

37. Feyhl, Jo and Jubenville, Alan, The Recreation Plan for the Proposed Susitna Hydroelectric Project, University of Alaska, Fairbanks, Agricultural Experiment Station, April 1982.

38. Joint Federal State Land Use Planning Commission for Alaska, Outdoor Recreation in Alaska, January 1979.

39. Jones, Sally W. and Associates, Sno-Engineering, Inc., Trigon Sports International, Inc., 1981 Winter Recreation Facilities, Preliminary Projections for Use and Conceptual Design, prepared for the Municipality of Anchorage, February 1981.

40. Jones and Jones, Upper Susitna River - An Inventory and Evaluation of the Environmental, Aesthetic and Recreational Resources, prepared for D.O.A., Alaska District, Corps of Engineers, 14 March 1975.

41. Jubenville, Alan, Procedures Manual: Recreation Planning for the Susitna Hydroelectric Project, Subtask 7.08/10.06, June 1980.

42. Matanuska-Susitna Borough, Trails System, Discussion Draft, 1982.

43. Maynard and Partch, Woodward-Clyde Consultants, Matanuska-Susitna Borough Coastal Management Program, Public Hearing Draft, September 1, 1982.

44. Mills, Michael J., Statewide Harvest Study - 1980 Data, Alaska Department of Fish and Game, 1981.

45. _____, Statewide Harvest Study -- 1981 Data, Alaska Department of Fish and Game, 1982.

46. Mountain West Research, Inc., Construction Worker Profile: Final Report, prepared for the Old West Regional Commission, 1976.

47. Myhra, David, Energy Plant Sites: Community Planning for Large Projects, Conway Publications, Atlanta, 1980.

48. Nash, Roderick, "Tourism, Park and the Wilderness Idea in the History of Alaska," Alaska in Perspective, Vol. IV, #1, 1981.

49. R & M Consultants, Inc., Susitna Hydroelectric Project, Processed Climatic Data, Vol. 1-6, prepared for Acres American, Incorporated, March 1982.

50. Terrestrial Environmental Specialists, Inc., Susitna Hydroelectric Project, Land Use Analysis, Navigational Use, prepared for Acres American, Incorporated, April 1982.

51. _____, Susitna Hydroelectric Project, Subtask 7.07 Land Use Analysis, Phase I Report, prepared for Acres American, Incorporated, April 1982.

52. _____, and University of Alaska, Fairbanks, Phase I, Environmental Studies Final Report, Subtask 7.08, Recreation Planning, prepared for Acres American Incorporated, May 1982.

53. The Alaska Environmental Group, Summary Development Guide for the Lake Louise Study Area, undated.

54. Trihey, E. Woody, Susitna Hydroelectric Project, Instream Flow Assessment, Issue Identification and Baseline Data Analysis, 1981 Study Plan, prepared for Acres American Incorporated, May 31, 1981.

55. U. S. Bureau of Land Management, BLM Land Use Plan for Southcentral Alaska - A Summary, September 22, 1980.

56. _____, Federal Land Opening for Mineral Leasing and Mineral Entry, Denali Planning Block, undated.

57. U. S. Department of Agriculture, Forest Service, Planning Considerations for Winter Sports Resort Development, undated.

58. _____, Northern Region, Recreation Opportunity Inventory and Evaluation, June 1974.

59. _____, The Recreation Opportunity Spectrum: A Framework for Planning, Management and Research, GTR PNW-98, December 1979.

60. _____, Summary Draft Environmental Impact Statement, Chugach National Forest Plan, June 1982.

61. U. S. Department of the Interior, Heritage Conservation and Recreation Service, A Proposal for Protection of Eleven Alaskan Rivers, undated.

62. U. S. Geological Survey, Alaska Accomplishments During 1977, Circular 772-B.

63. _____, Alaska Accomplishments During 1978, Circular 804-B.

64. U. S. Government, 96th Congress, P.L. 96-487, Alaska National Interest Lands Conservation Act, 94 Stat. 2371, Dec. 2, 1980.

65. University of Alaska Agricultural Experiment Station, Fairbanks, Exhibit E, Report on Recreation Resources, Subtask 7.08, undated draft, received by Acres American Incorporated 24 June 1981.

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	5,757	2,568	1,793	1,463	1,243	1,123	1,377	13,277	27,658	24,383	21,996	13,175
-Post Project Watana	8,014	9,186	10,693	9,708	8,951	8,327	7,740	10,404	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	13,690	5,829	4,199	4,199	2,952	2,631	3,177	27,717	64,198	63,178	55,900	32,304
-Post Project Watana	16,029	12,362	13,017	13,017	10,620	9,811	9,517	24,866	47,881	48,290	47,407	28,970
-Post Project Watana & Devil Canyon	15,819	12,943	13,604	13,664	11,837	10,726	9,838	23,185	46,202	47,579	46,792	29,595
Susitna												
-Pre Project	30,055	12,658	8,215	7,906	7,037	6,320	6,979	60,462	123,698	131,932	110,841	65,963
-Post Project Watana	32,392	11,991	17,033	16,108	14,705	13,500	13,319	57,611	107,381	117,044	102,348	62,629
-Post Project Watana & Devil Canyon	32,184	19,772	17,620	16,973	15,922	14,415	13,640	55,930	105,702	116,333	101,733	63,254

Source: Acres American Inc., October 11, 1982

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

Southcentral Region

Activities	Percentage of Participation
Driving for Pleasure	59%
Walking/Running for Pleasure	53%
Fishing (freshwater)	42%
Attending Sports Events	37%
Tent Camping	31%
Motor Boating	30%
Cross Country 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 PUBLIC AND COMMERCIAL DEVELOPMENT WITHIN AND ADJACENT TO THE STUDY AREA

Site Development	Location	Managing Agency	Capacity/Units	Total Area
WITHIN THE PROJECT AREA:				
1 Stephan Lake Lodge	16 miles SW of Watana damsite at Stephan Lake	Private	45 people	17 hectares (42 acres)
2 Tsusena Lake Lodge	10 miles SW of Watana damsite at Stephan Lake	Private	15 people	20 hectares
3 High Lake Lodge	3 miles NE of Devil Canyon damsite at High Lake	Private	15 people	45 hectares (111 acres)
ADJACENT TO THE PROJECT AREA:				
4 Denali National Park and Preserve		National Park Service	228 campsites	2,306,790 hectares (5,696,000 acres)
A Riley Creek Campground				
B Morino Campground				
C Savage River Campground				
D Sanctuary River Campground				
E Teklanika River Campground				
F Igloo Creek Campground				
G Wonder Lake Campground				
5 Denali Planning Block		Bureau of Land Management		1,821,125 hectares (4,500,000 acres)
A Brushkana River Campground	Denali Highway, Mile 105		33 campsites	

Source: The recreational plan for the Proposal Susitna Hydroelectric Project, April 1982, University of Anchorage.

TABLE E.7.7

FUTURE REGIONAL RECREATION DEVELOPMENT

Site Development	Location	Managing Agency	Proposed Action
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	"	"
Kepler-Bradley State Recreation Area (existing)	Glenn Highway	"	Acquire 330 acres and develop plan.
Independence Mine State Historic Park (existing)	WIllow Creek Road		Develop existing 271 acres, acquire and develop additional area.
Hatcher Pass State Recreation Area (proposed)	Hatcher Pass Road	"	Acquire land and develop.
Nancy Lake State Recreation Area (existing)	Parks Highway	Alaska Division of Parks	Acquire additional 150 acres, and trail 12 O.W. expand development particularly winter recreation opportunities.
Willow Creek State Recreation Area (existing and proposed)	Parks Highway	"	Upgrade existing site
Lditarod Trail (existing)	Alaska Range west of Anchorage	"	Acquire property and implement plans.
Lake Creek State Recreation (proposed)			
Little Susitna State Recreation River (proposed)	Near Cook Inlet		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 State Recreation River (proposed)	"	"	"
Lake Creek State Recreation River (proposed	"	"	"
Kroto Creek State Recreation River (proposed)	"	"	"

TABLE E.7.7

FUTURE REGIONAL RECREATION DEVELOPMENT (Cont'd)

Site Development	Location	Managing Agency	Proposed Action
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	"	Acquire 620 acres plan and implement.
Neldrina Tazlina State Recreation River	Glenn Highway	"	Designate river corridor, prepare river plan.

Source: Alaska State Park System, Southcentral Region Plan, February 1982

TABLE E.7.8

MAJOR TRAILS IN THE UPPER SUSITNA BASIN

Type	Beginning	Middle	End	Years Used
Cat, ORV	Gold Creek		Devil Canyon	1950's-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 3 km (2 mi.) east of VABM Dead	1926
Packhorse, Foot	Talkeetna	North of Disappontment Creek	Stephan Lake	1948
Packhorse, Old Sled Road	Chunilna	Portage Creek	Mermaid Lake	1920's-present
ATV	Denali Highway	Butte Lake	Tsusena Lake	1950's-present

Source: Susitna Hydroelectric Project, Land Use Report

TABLE E.7.9

REGIONAL POPULATION - EXISTING AND FUTURE

	1980	2000	%
Anchorage	174,431	252,940	+ 45%
Fairbanks/Northstar[1]	53,983	119,130	+121%
Mat-Su Boroush[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.7.10

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 Plan

TABLE E.7.11

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 Study, John McNeill, 11/78

TABLE E.7.12

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. John O'Neill, Nov. 1978.

TABLE E.7.13

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.7.14

ASSUMED 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.7.15

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.7.16

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.7.17

MAJOR RECREATION FACILITIES AS PRESENTLY PROGRAMMED

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

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

TABLE E.7.18

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.7.18 (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.7.19

ESTIMATED CAPITAL COSTS FOR THE SUSITNA HYDROELECTRIC PROJECT RECREATION PLAN

	Capital Costs 1983 Dollars
Phase One	565,836
Phase Two	1,136,354
Phase Three	188,759
Phase Four	891,251
Total Facilities	$2,651,547*
Phase Five, if developed	$ 354,476

*These estimates are based upon January 1, 1983 cost figures.

TABLE E.7.20

ESTIMATED COSTS OF RECREATION PLAN PROJECT FEATURES

Recreation Setting	Facilites	1983 Unit Cost	1983 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.7.20

ESTIMATED COSTS OF RECREATION PLAN PROJECT FEATURES (Cont'd)

Recreation Setting	Facilites	1983 Unit Cost	1983 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	
					$825,991
K Watana Lake	3 miles trail	7,238	21,714		
	footbridge	15,052	15,052	36,766	
					862,757
PHASE THREE					
G Mid-Chulitna Mountains	10 parking	1,810	18,100		
	7 miles trail	7,238	7,238		
	trailhead	762	762	69,528	
					69,528
PHASE FOUR					
Q Devil Creek	5 auto parking	1,810	9,050		
	bench	320	320		
	signage	300	300	75,574	
					75,574
S Devil Canyon Center	1 shelter	17,920	17,920		
	5000 sq ft building	120 sq ft	600,000		
	8 picnic sites	2,027	16,216		
	1 single vault latrine	9,157	9,157		
	15 parking	1,810	27,150		
	.5 mile trail	7,238	3,619		
	signage	1,000	1,000		
	3 benches	320	960		
	1 boat launch	NA		676,022	
					751,596
R Mermaid Lake	.25m/14 ft	344,960/mi	86,240		
	8 campsites	9,047	72,376		
	1 shelter	17,920	19,920		
	2 single vault latrines	9,157	18,314		
	waterwell	19,040	19,040		
	bulletin board	439	439		
	5 garbage cans	140	700		
	signage	200	200	215,229	
					966,826
TOTAL Construction Cost Phase 1-4, 1983$					$2,651,547

TABLE E.7.20
ESTIMATED COSTS OF RECREATION PLAN PROJECT FEATURES (Cont'd)

Recreation Setting	Facilites	1983 Unit Cost	1983 Total Cost	Facility Total	Phase Total
PHASE FIVE					
T Soule Creek	8 miles trail	7,238	57,904		
	trailhead	762	762		
	5 auto parking	1,810	9,050	$ 67,716	
					67,716
M Southern Chulitna Mountains	3 miles trail	7,238	21,714		
	trailhead	762	762		
	3 auto parking	1,810	5,430	27,906	
					95,622
N Fog Lakes	15 miles trail	7,238	108,570		
	1 single vault latrine	9,157	9,157		
	15 car parking	1,810	27,150		
	trailhead	762	762		
	signage	300	300	145,939	
					241,561
P Stephan Lake	5 campsites	9,047	45,235		
	canoe boatramp	31,360	31,360		
	5 miles trail	7,238	36,190		
	signage	400	400	113,183	
					$354,476

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

Land acquisition costs for private land not included.

TABLE E.7.21: ADDITIONAL FACILITIES AND EQUIPMENT TO BE PURCHASED FOR OPERATION AND MAINTENANCE AS PART OF THE SUSITNA HYDRO-ELECTRIC PROJECT RECREATION PLAN - 1983 $

Phase	Facilities & Equipment	Unit Cost	Total Cost 1983 $
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

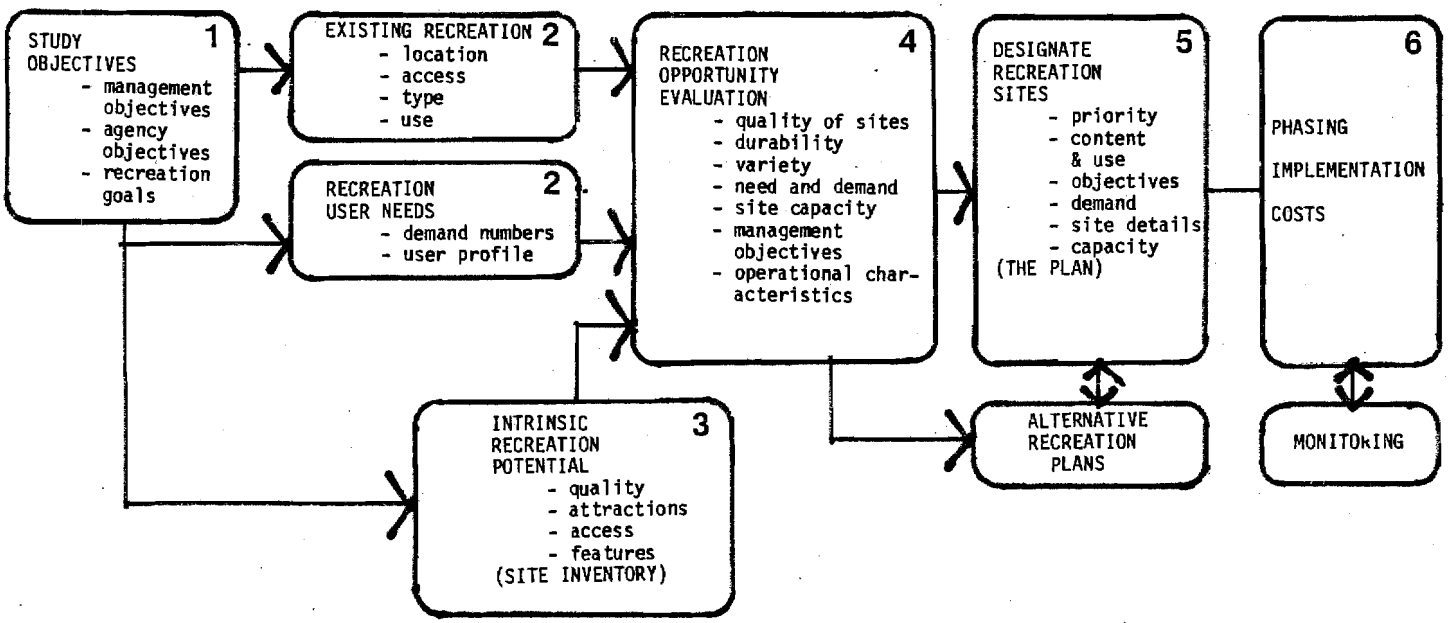
* to be provided by APA in project buildings

TABLE E.7.22: ADDITIONAL STAFF REQUIRED AND ANNUAL STAFF EXPENSES TO OPERATE AND MAINTAIN SUSITNA HYDROELECTRIC PROJECT RECREATION FACILITIES

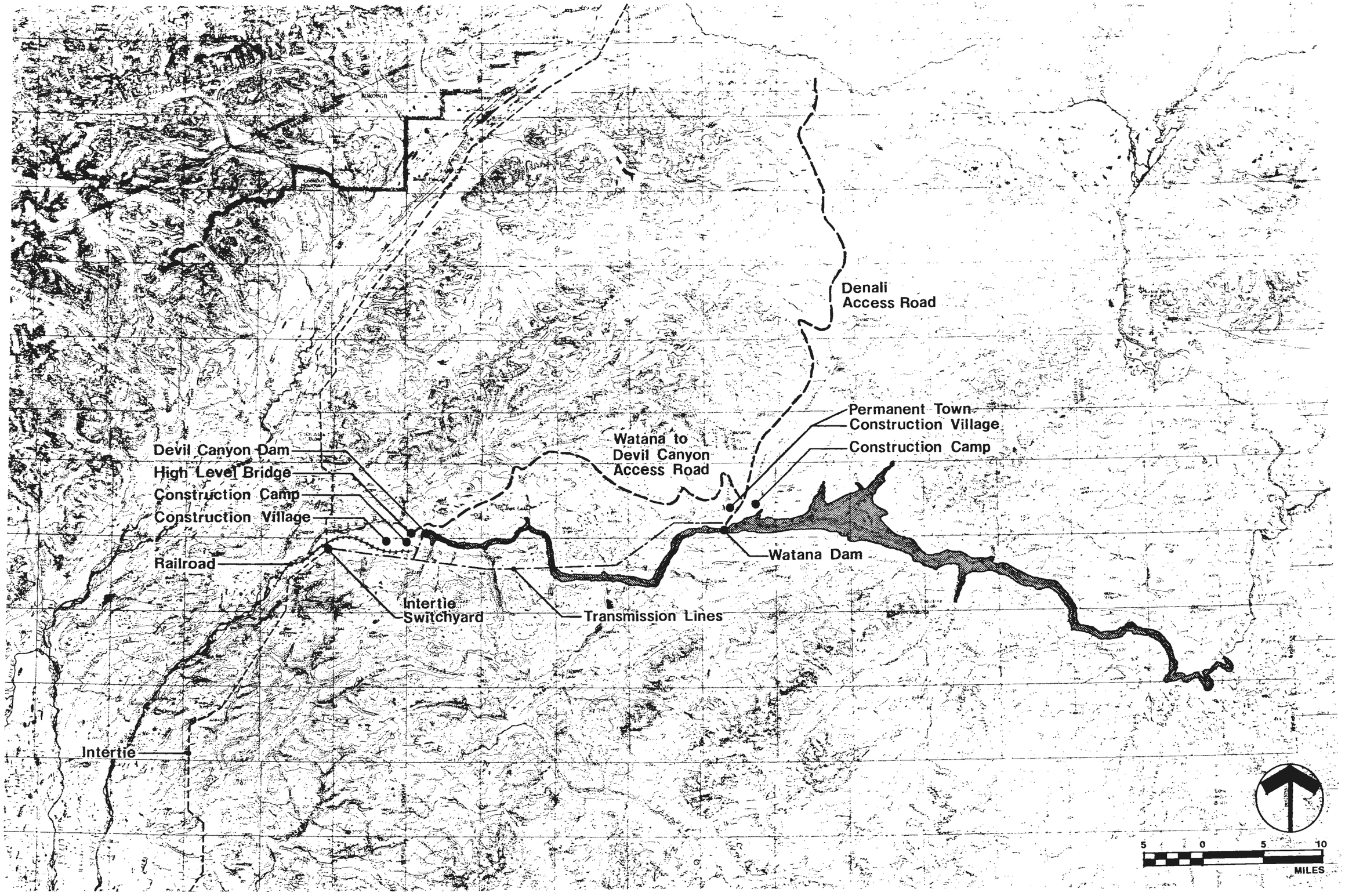
Phase	Job Class	Annual Cost 1983 $
ONE	1 park technician, 6 mos.	10,500
	uniform allowance	300
	+ 25% administration costs	2,700
		$ 13,500
TWO	2 park technicians, 6 mos.	21,000
	1 ranger, 12 mos.	28,800
	uniform allowance	900
		$ 58,800
	+ 25% administration costs	14,700
		$ 73,500/year
THREE	no additional 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:

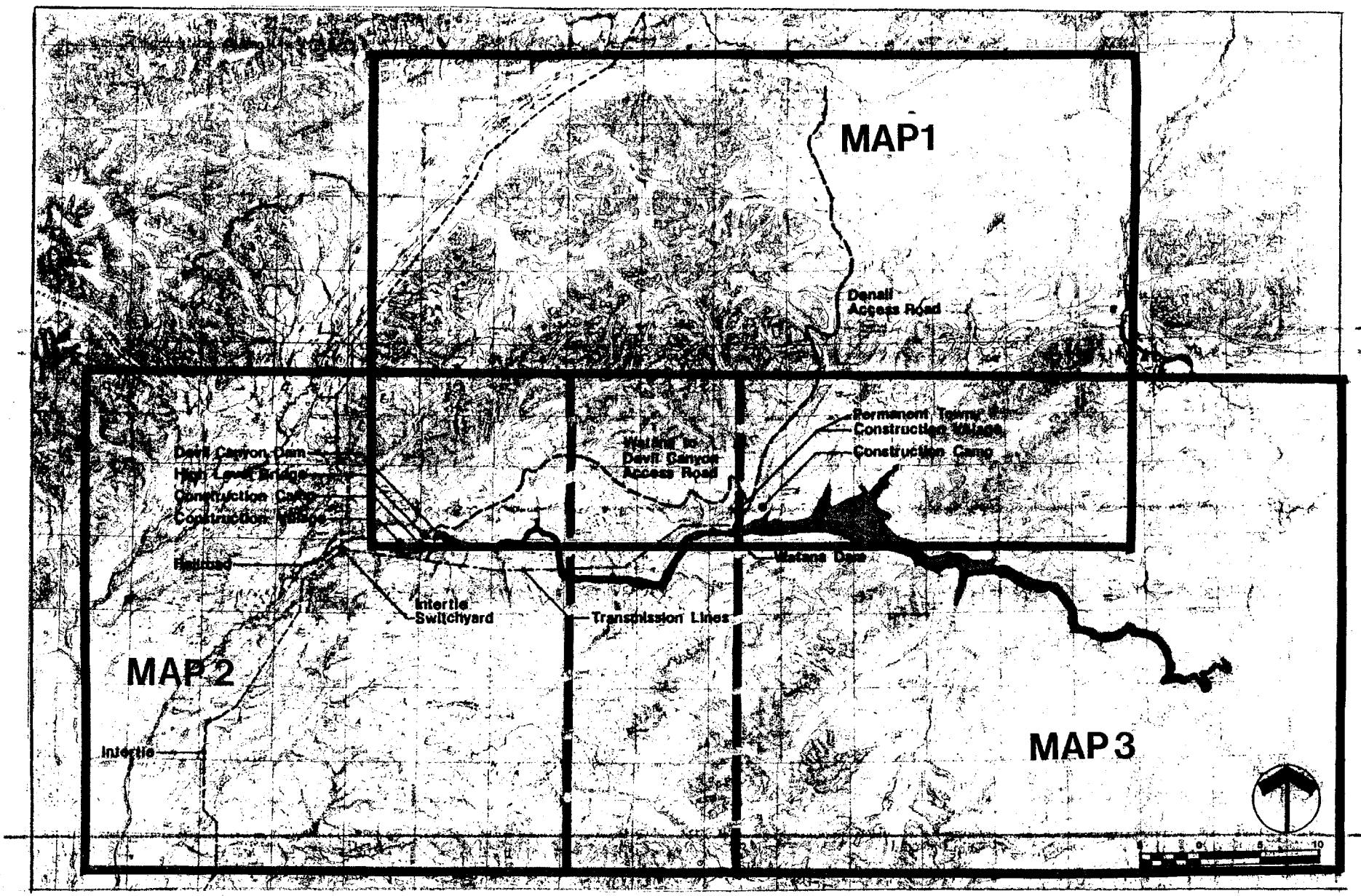
Phase	1983 $
One	$ 13,500
Two	87,000
Three	87,000
Four	136,100



STUDY METHODOLOGY
Figure 7.1



PROPOSED PROJECT FEATURES Figure 7.2



KEY MAP
Figure 7.5

EXISTING RECREATION
LEGEND


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


DUCK/GOOSE


BROWN BEAR


BLACK BEAR

STRUCTURES

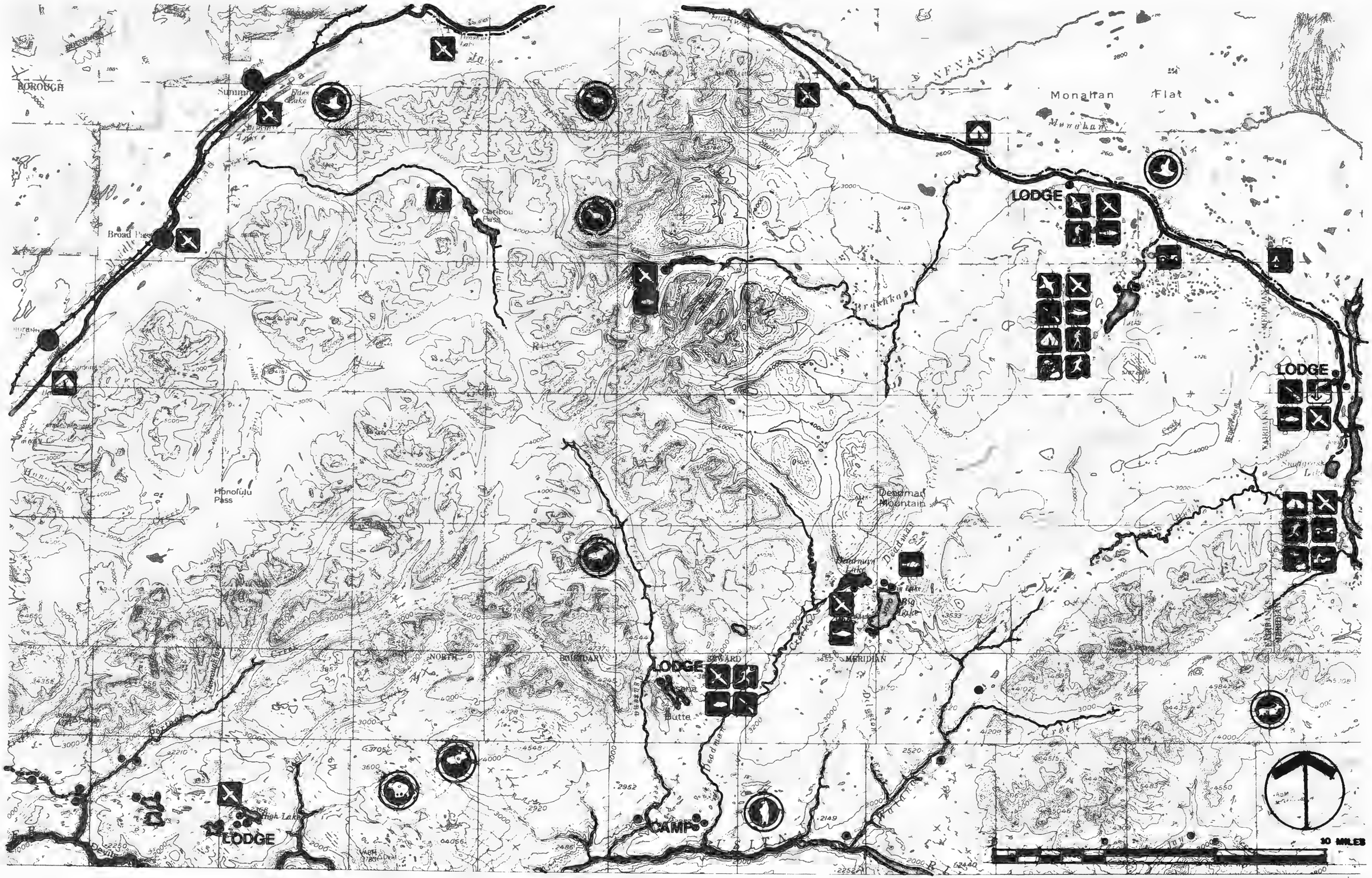
PORTAGE TRAIL

EXISTING ROADS

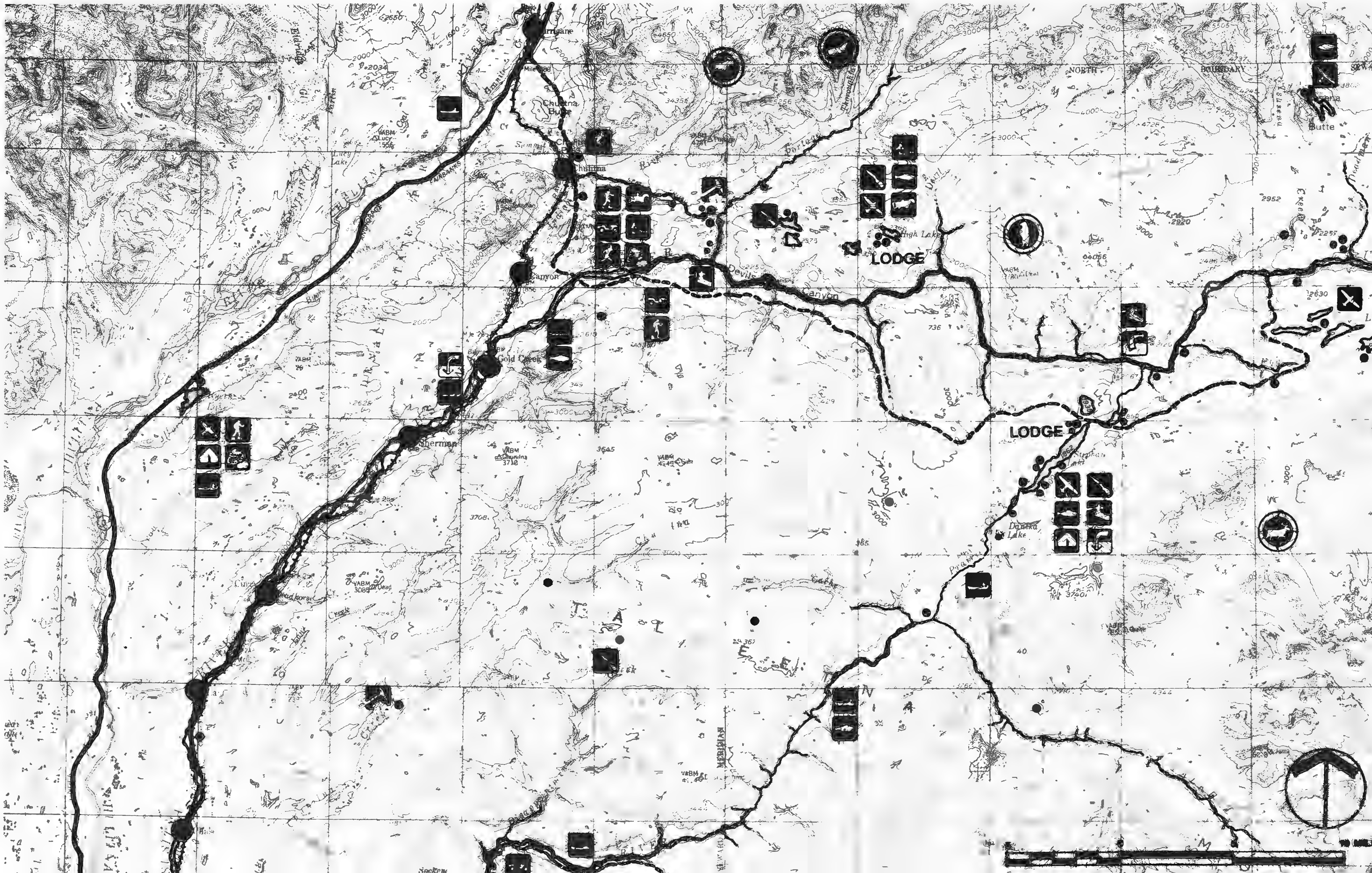
TOWNS

ROUGH ROADS

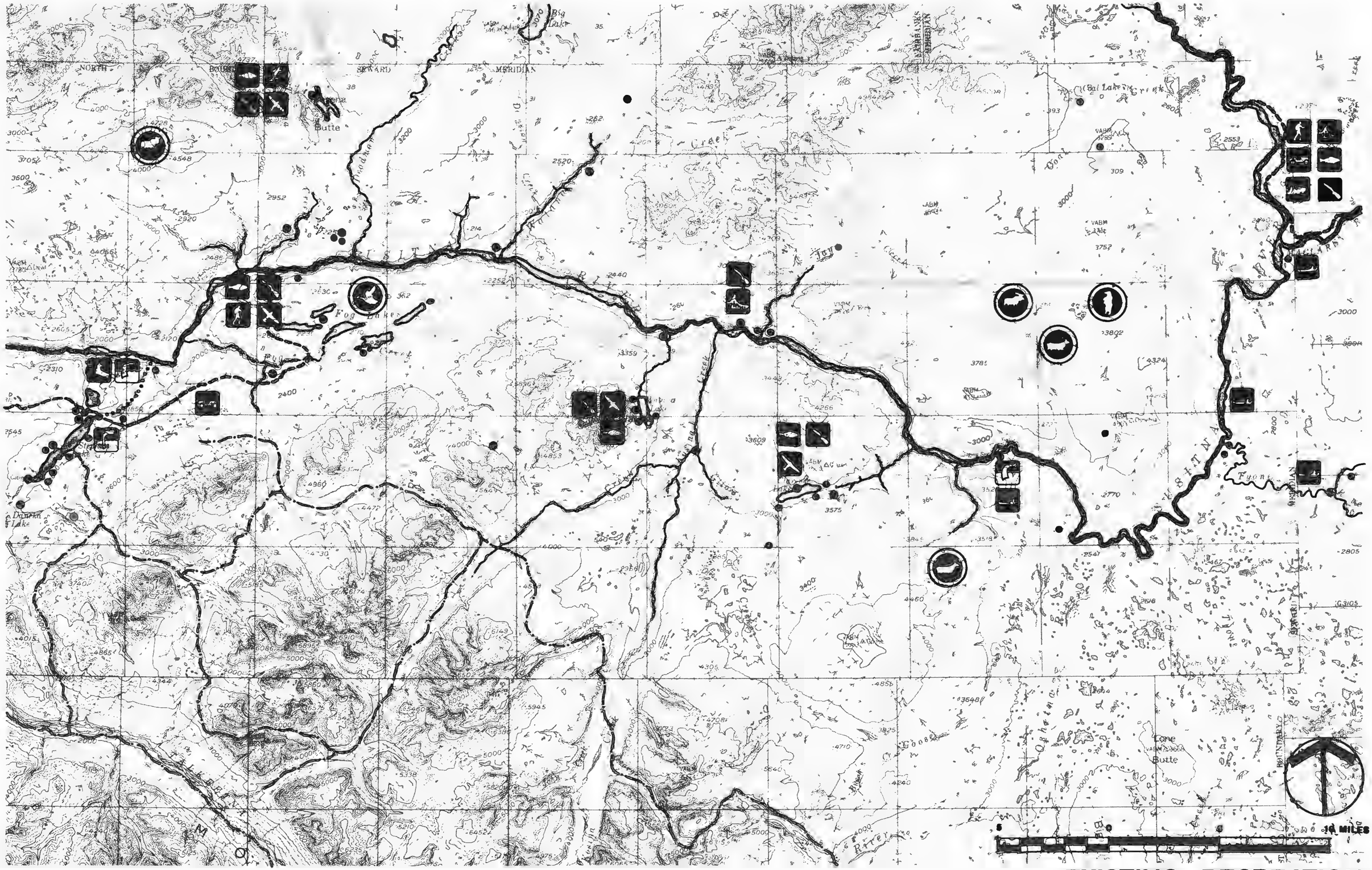
TRAILS



EXISTING RECREATION
Figure 7.6



EXISTING RECREATION
Figure 7.7



EXISTING RECREATION
Figure 7.8

RECREATION OPPORTUNITIES
LEGEND


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


DUCK/GOOSE


BROWN BEAR


BLACK BEAR

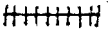

VIEWS

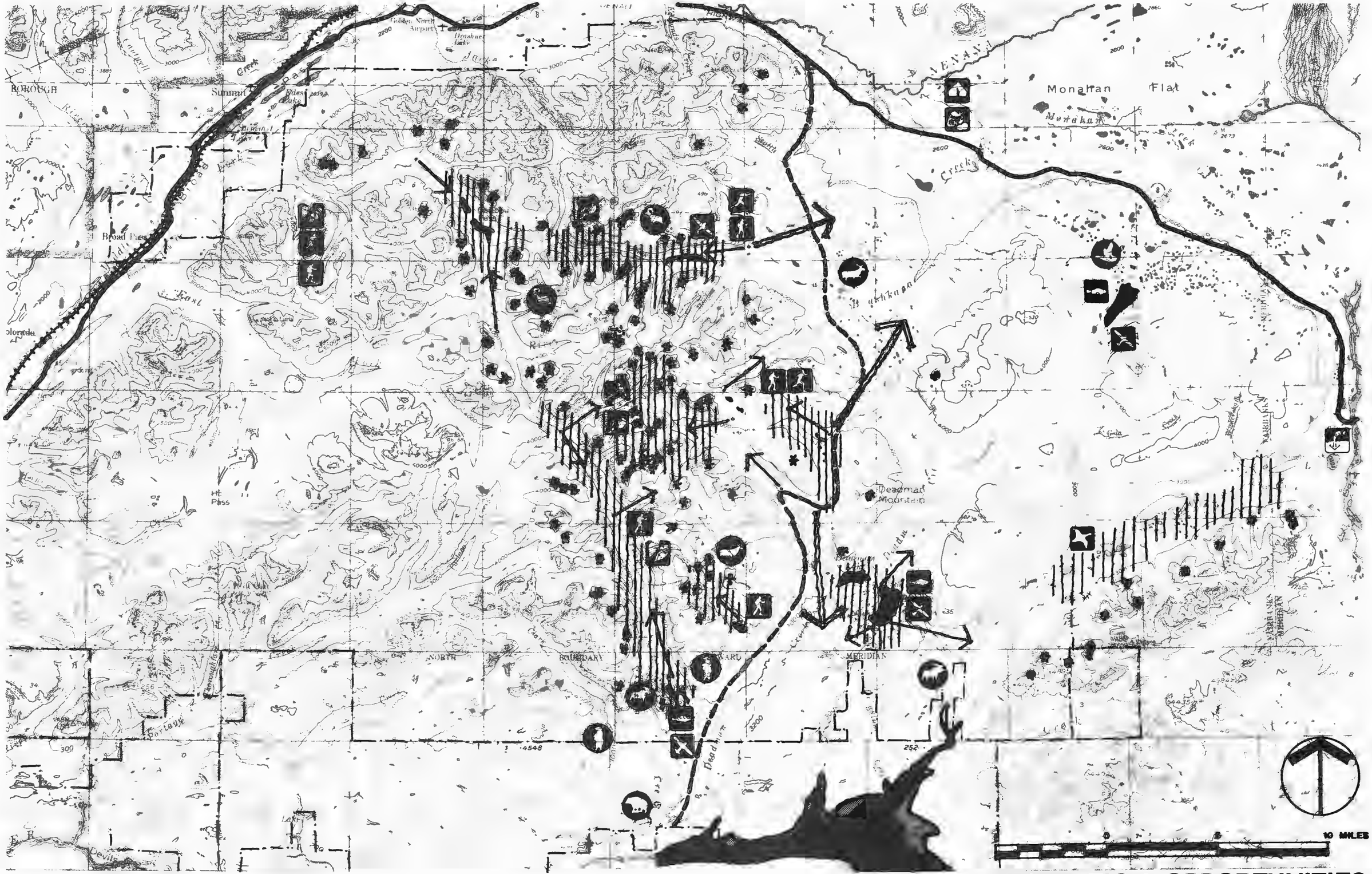

SIGNIFICANT LANDSCAPE SETTINGS


HIGH POINTS

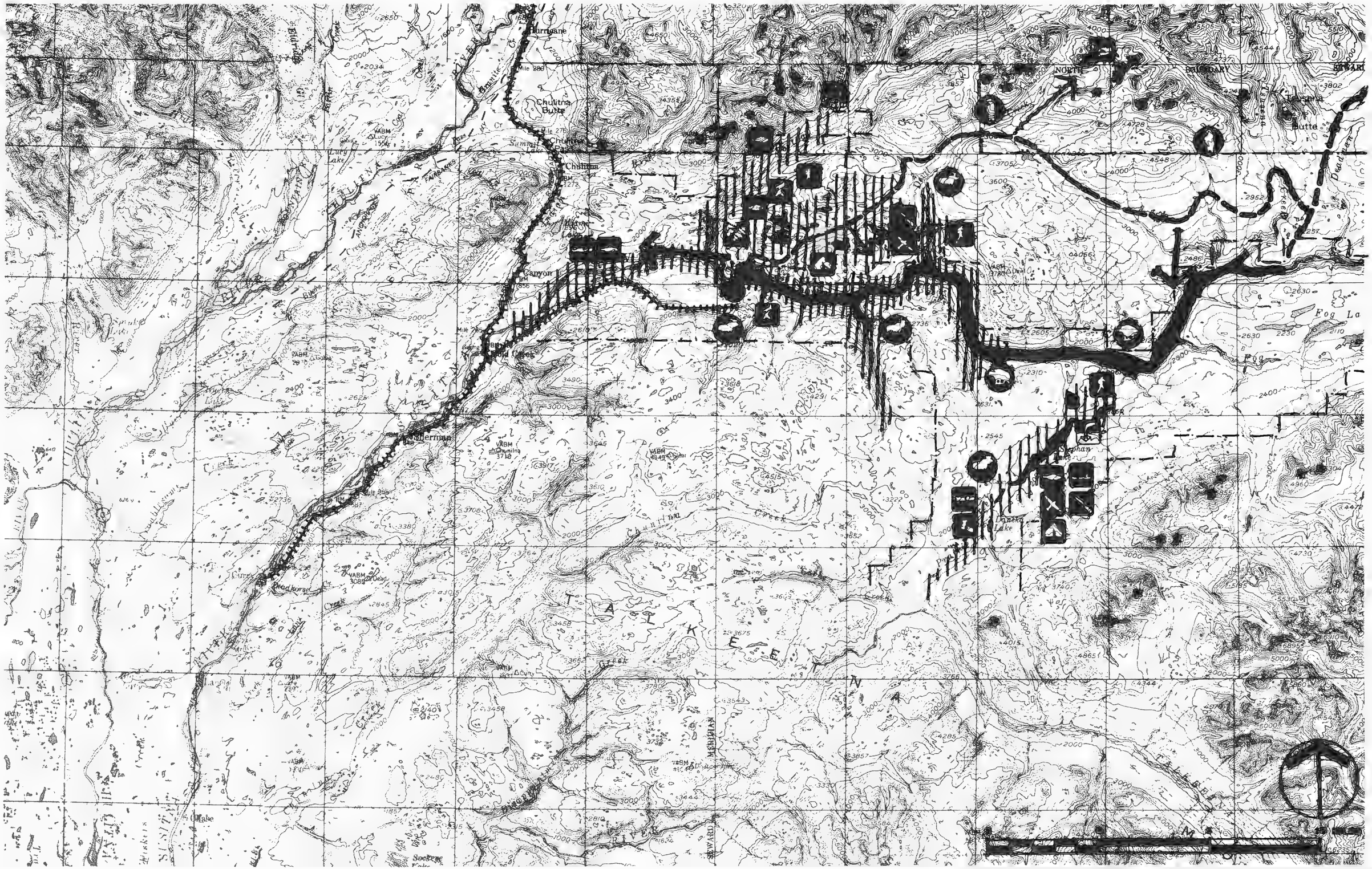

PROPOSED ROAD


EXISTING ROAD


RAILROAD

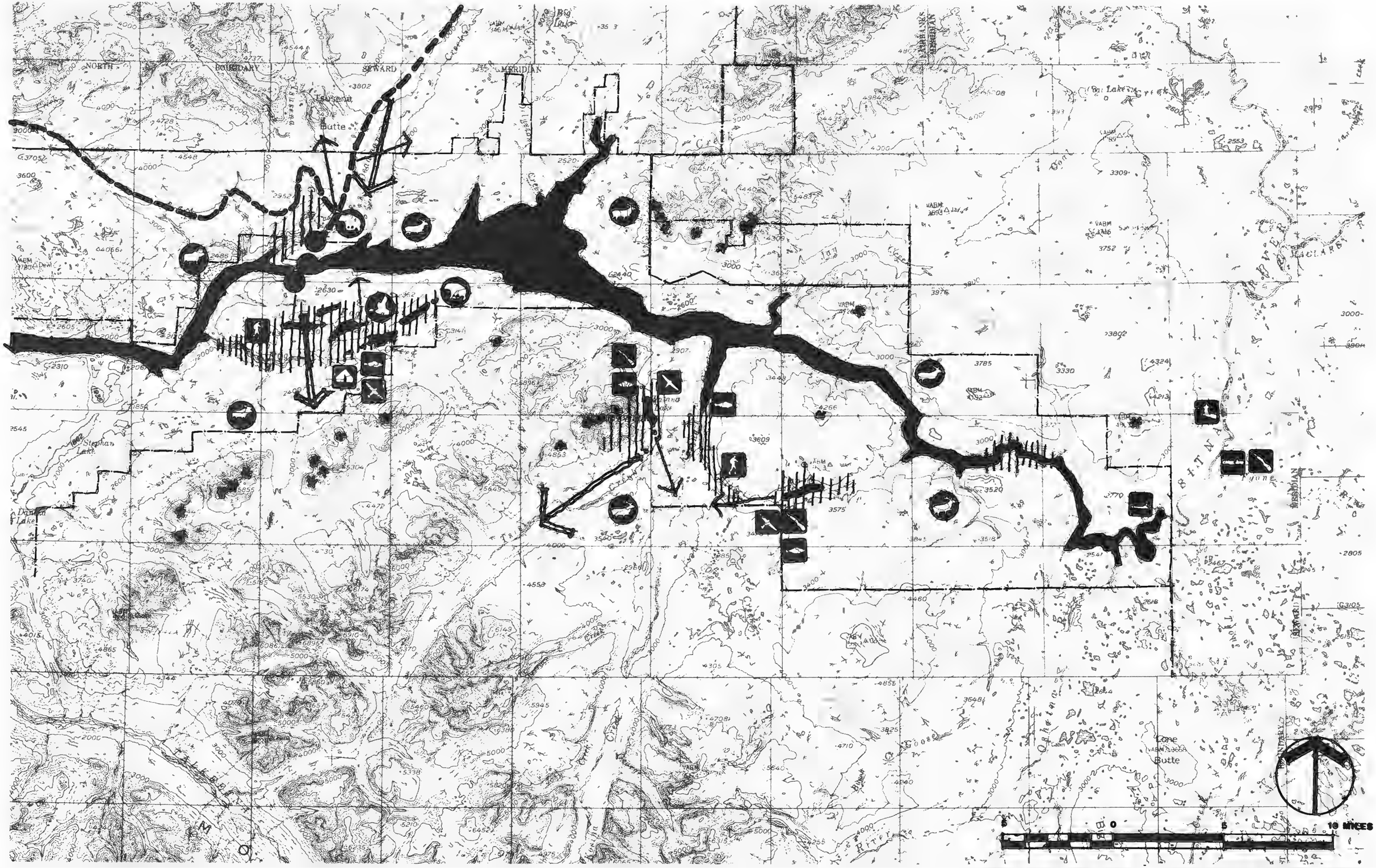


RECREATION OPPORTUNITIES
Figure 7.9



RECREATION OPPORTUNITIES

Figure 7.10



RECREATION OPPORTUNITIES
Figure 7.11

RECREATION PLAN

LEGEND

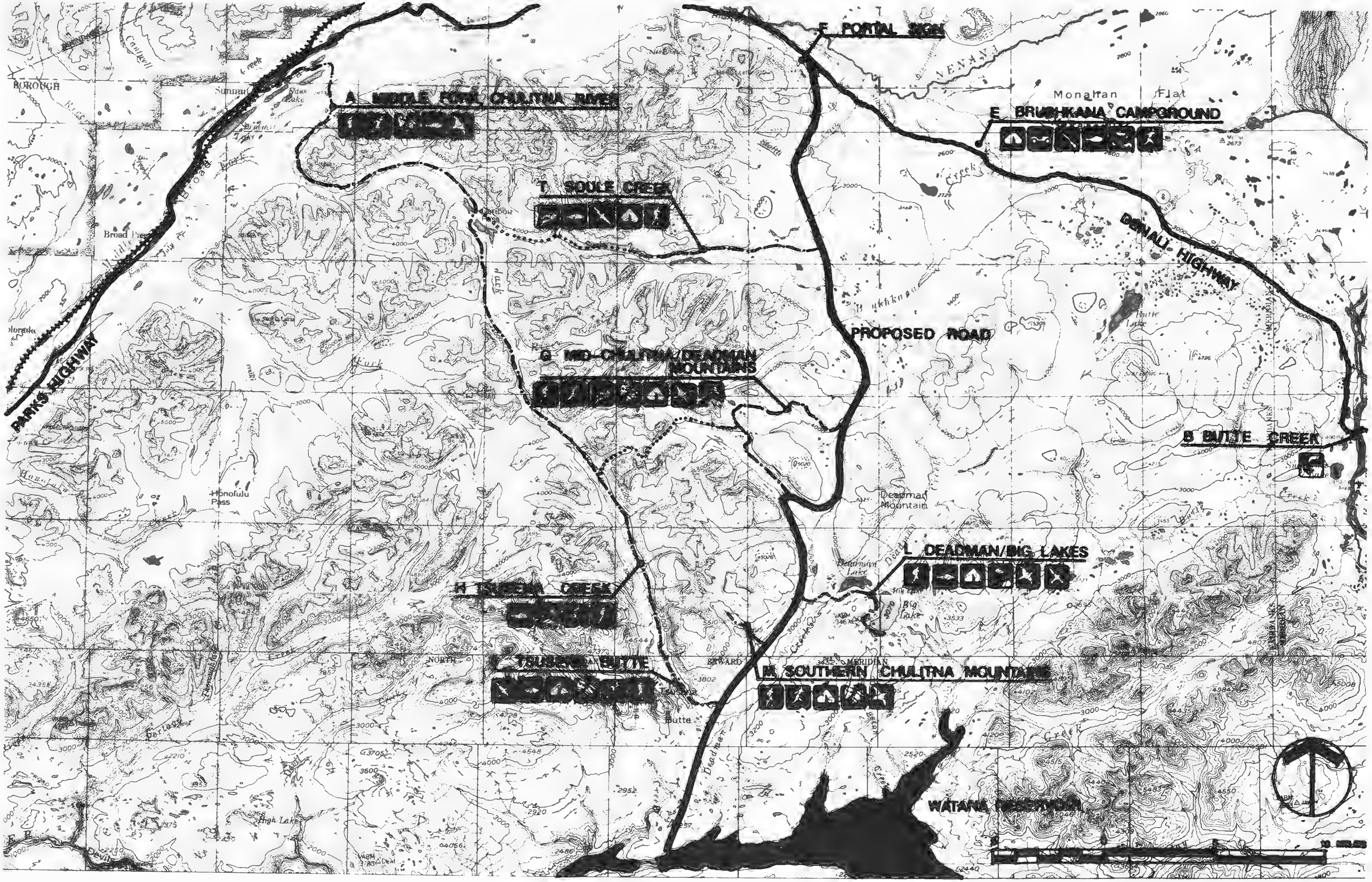
- HIKING
- BOATING
- CAMPING
- HUNTING
- FISHING
- FLYING
- BIRD WATCHING
- CROSS COUNTRY SKIING
- ROCK HUNTING
- SNOW MACHINING
- SNOWSHOEING
- MOUNTAINEERING
- OFF-ROAD DRIVING
- HORSEBACK RIDING
- DOG SLEDDING
- BERRY PICKING

- TAKE–OUT POINT
- PUT–IN POINT
- PHOTOGRAPHY
- SHELTER

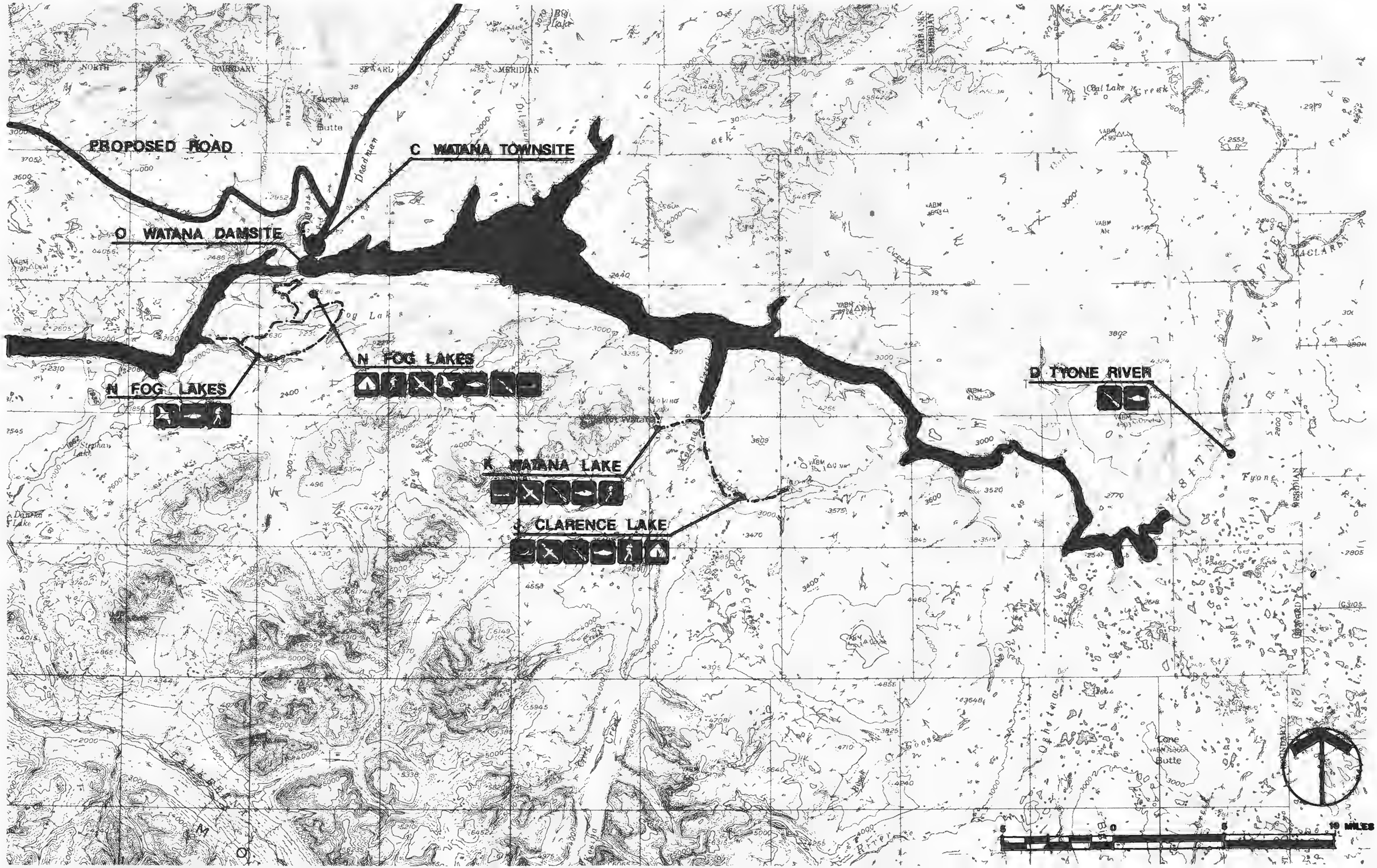
WILDLIFE

- MOOSE
- CARIBOU
- SHEEP
- DUCK/GOOSE
- BROWN BEAR
- BLACK BEAR

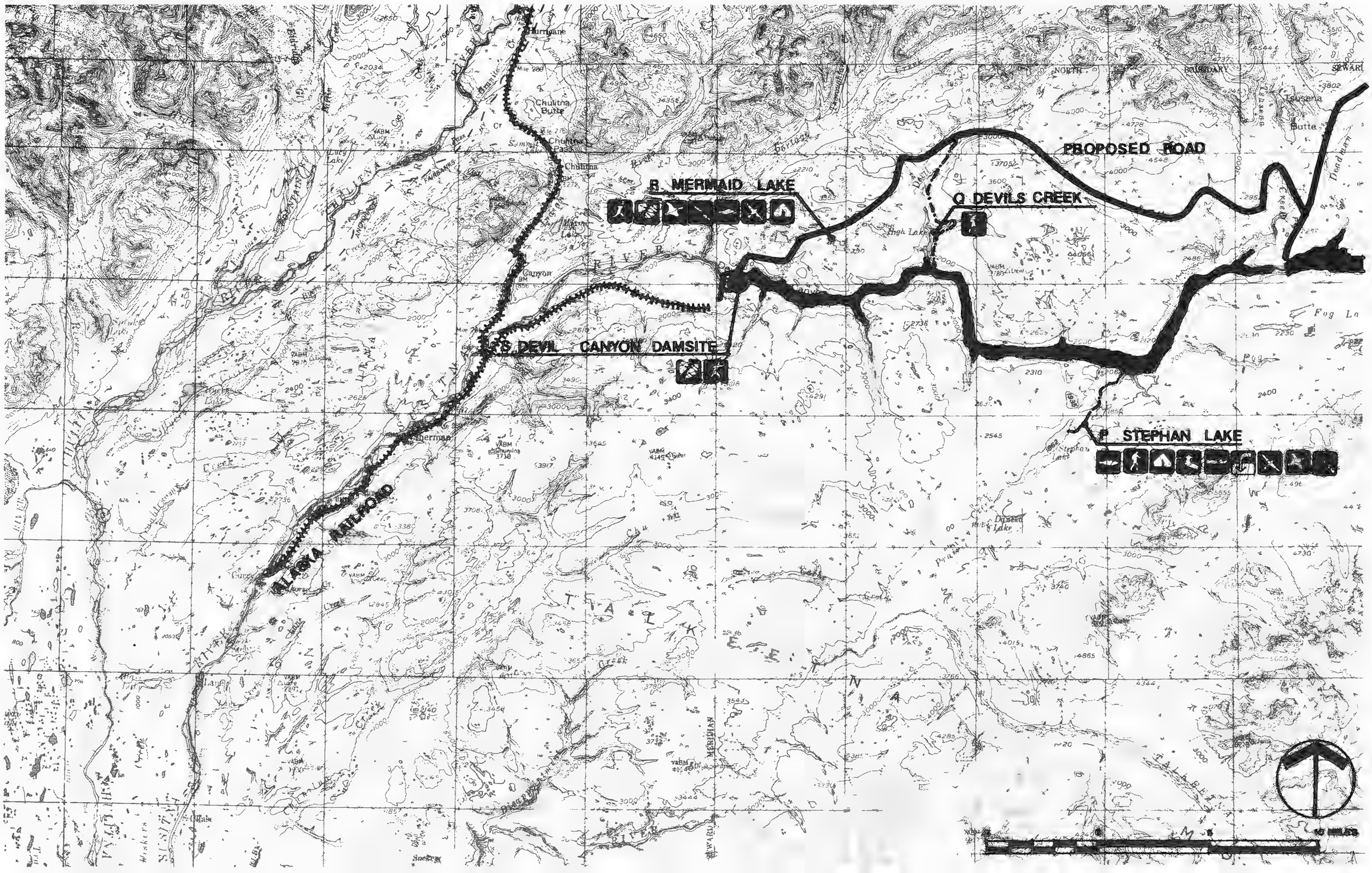
- CAMPGROUNDS
- VIEWS
- TRAILS
- PROPOSED ROAD



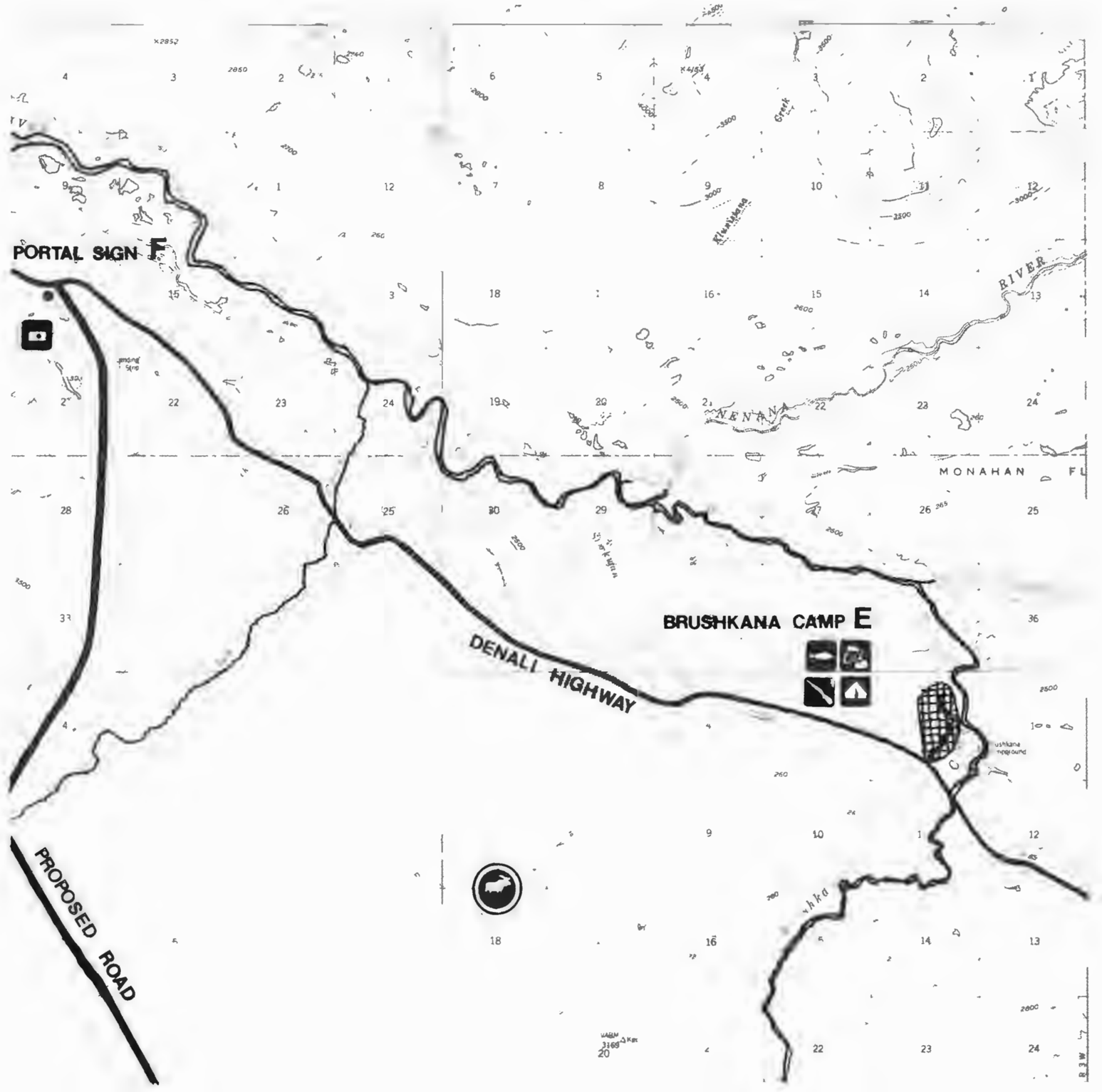
RECREATION PLAN
Figure 7.12

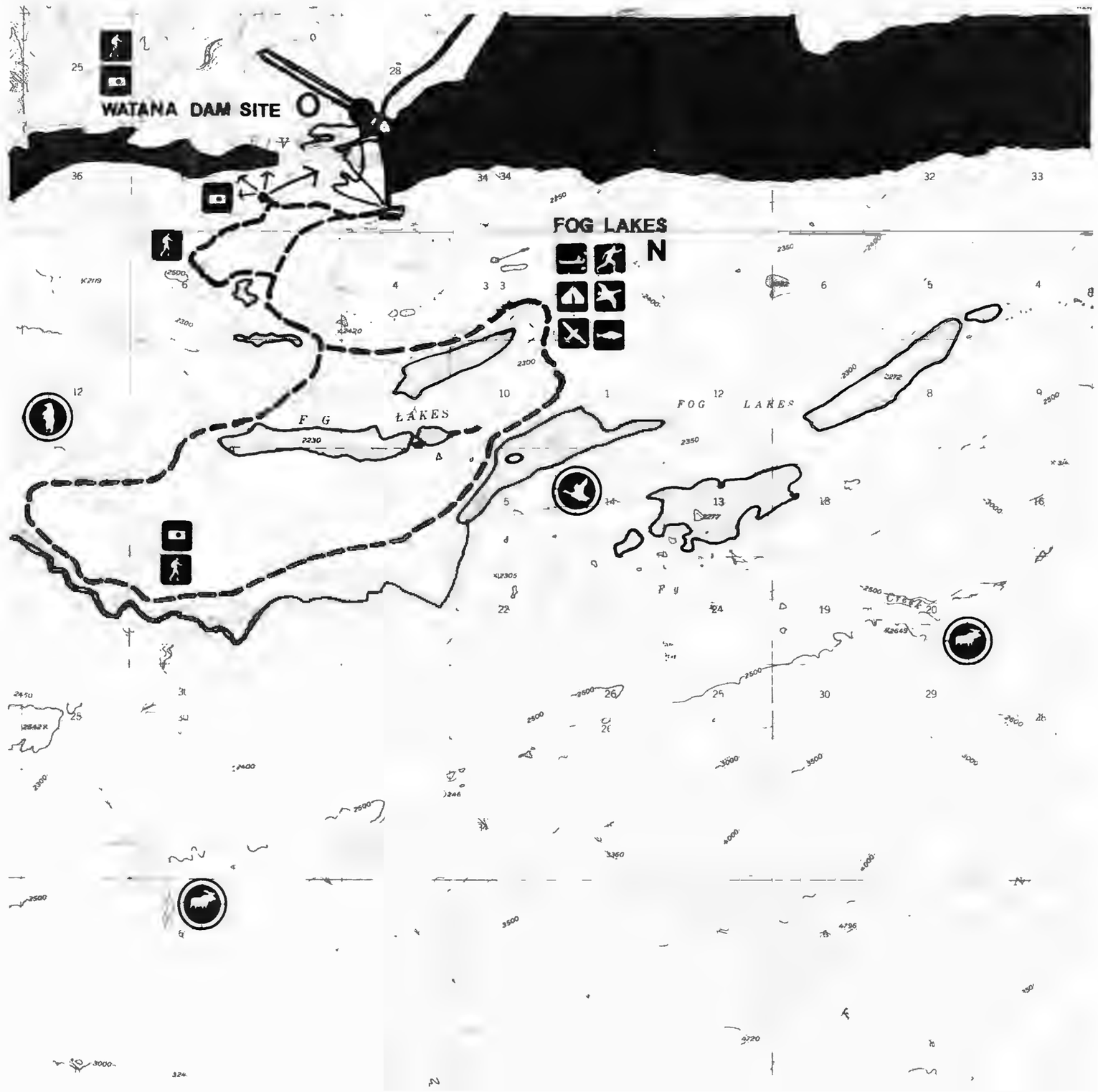


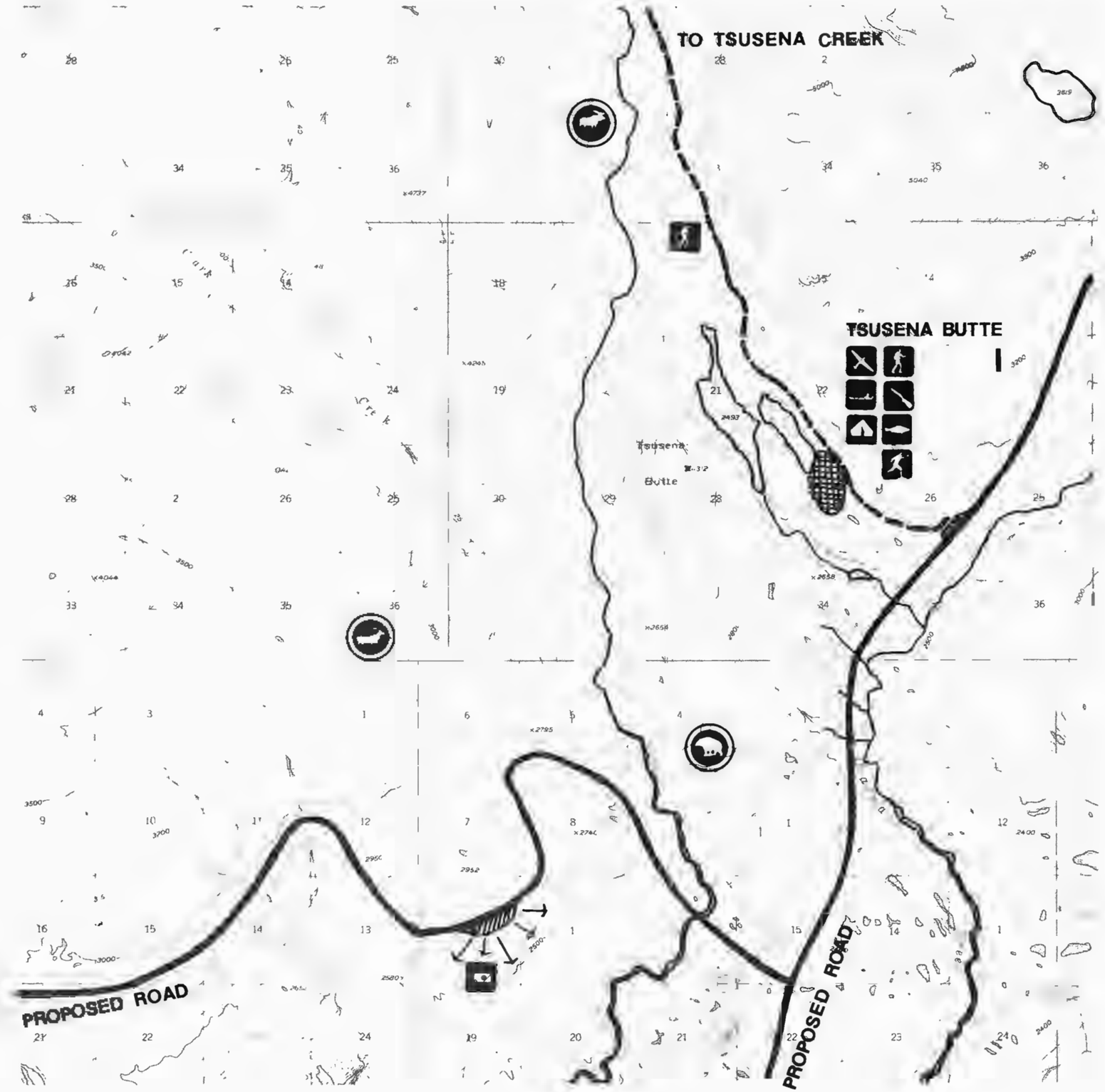
RECREATION LAN
Figure 7.13

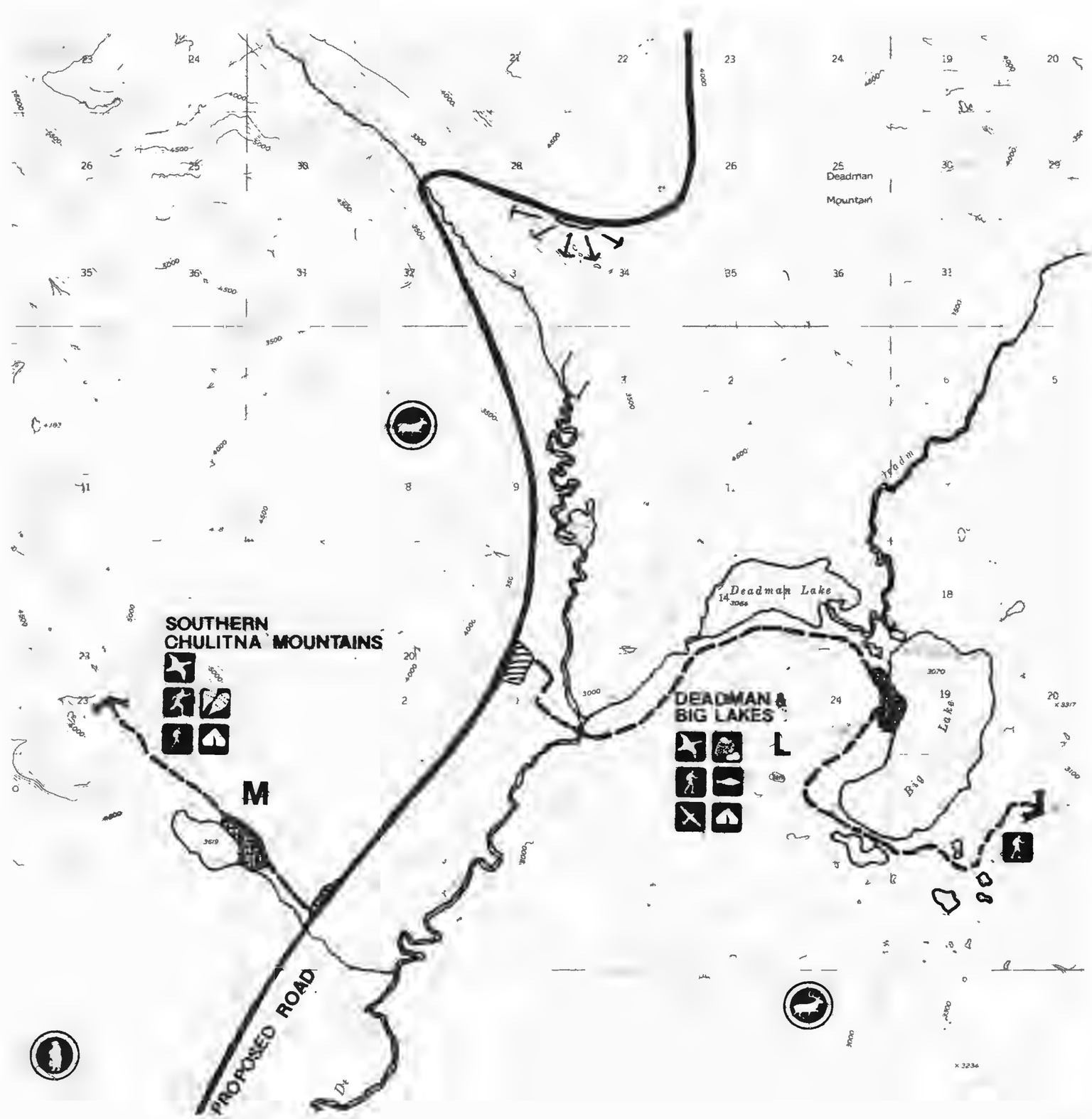


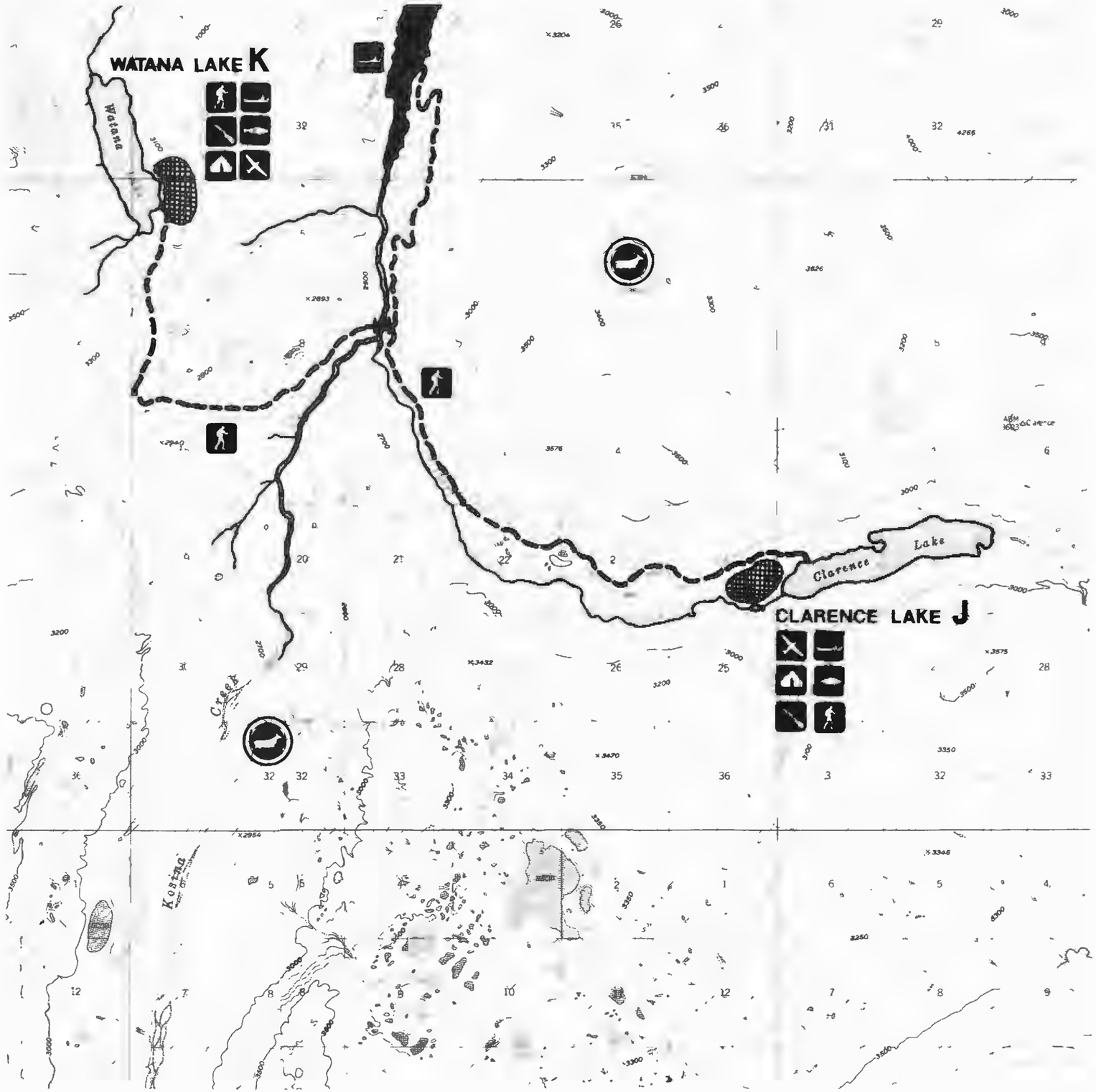
RECREATION PLAN
Figure 7.14

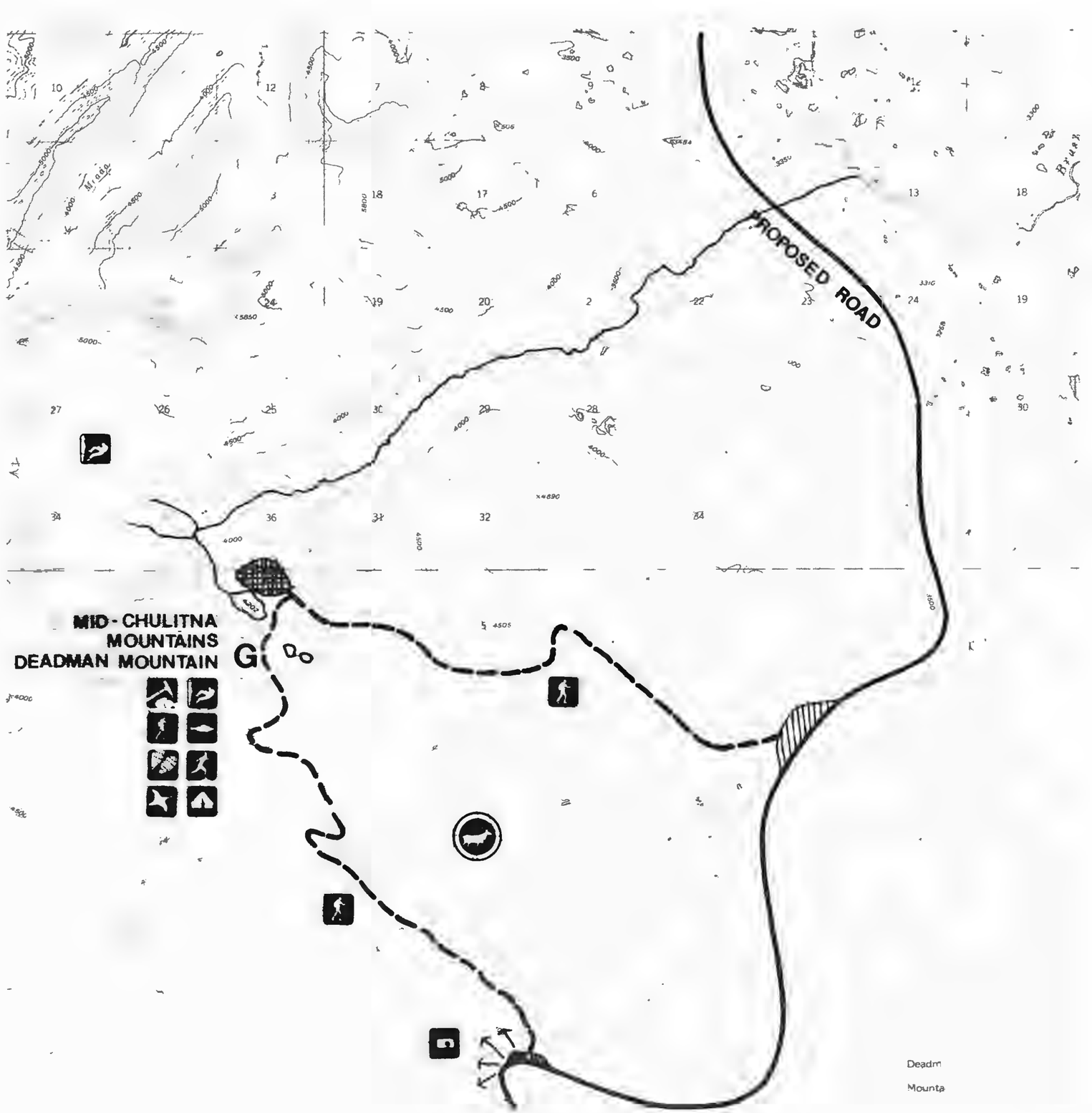

PORTAL SIGN F
PROPOSED ROAD
DENALI HIGHWAY
BRUSHKANA CAMP E
RIVER
NENANA
MONAHAN

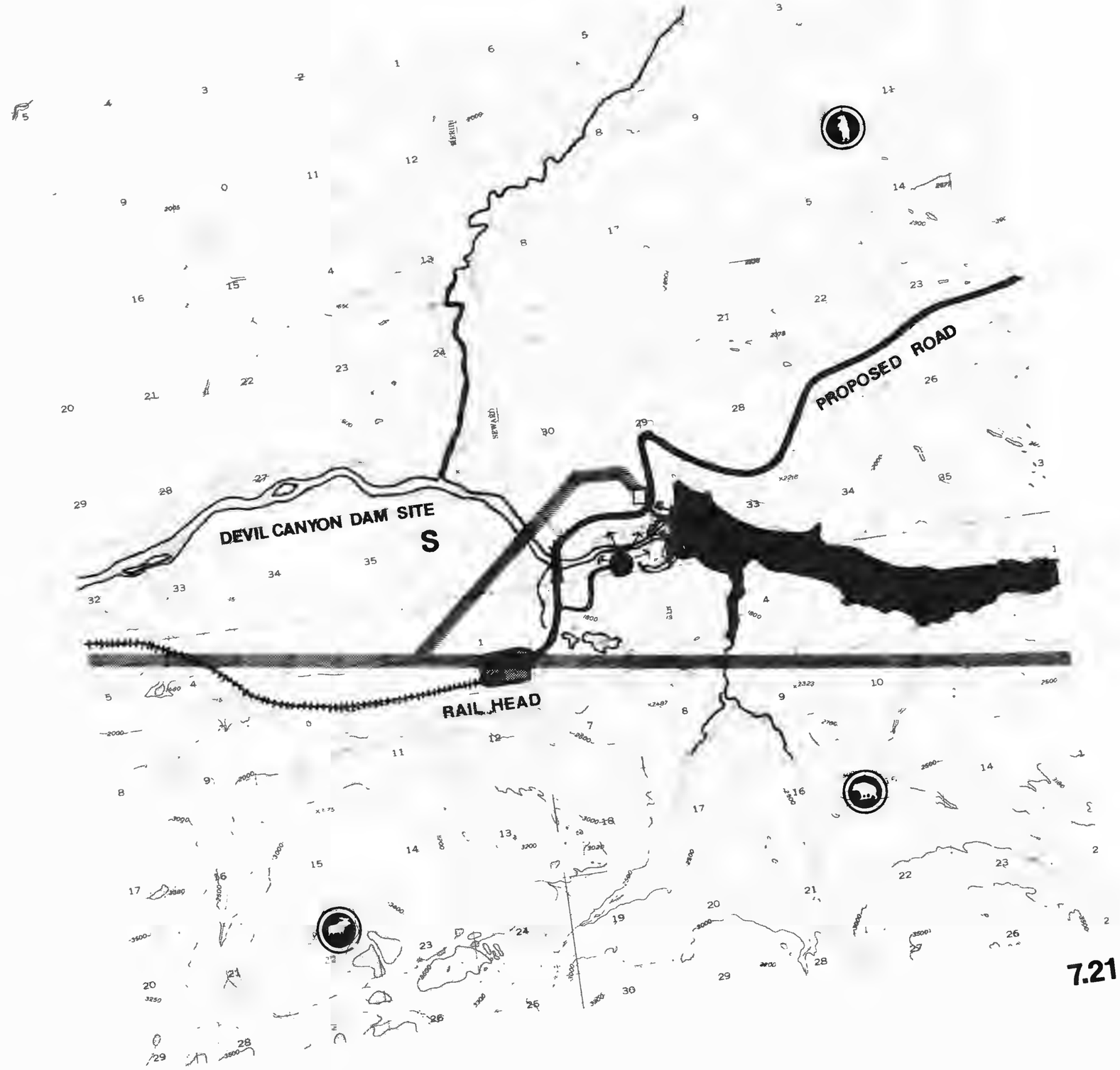

WATANA DAM SITE
FOG LAKES
N
F G LAKES
FOG LAKES


TO TSUSENA CREEK
TSUSENA BUTTE
PROPOSED ROAD
PROPOSED ROAD


Deadman
Mountain
Deadman Lake
SOUTHERN
CHULITNA MOUNTAINS
M
DEADMAN &
BIG LAKES
L
Big Lake
PROPOSED ROAD


WATANA LAKE K
CLARENCE LAKE J
Watana
Creek
Clarence
Lake
Kosina
Creek


PROPOSED ROAD
MID-CHULITNA
MOUNTAINS
DEADMAN MOUNTAIN
Deadm
Mounta



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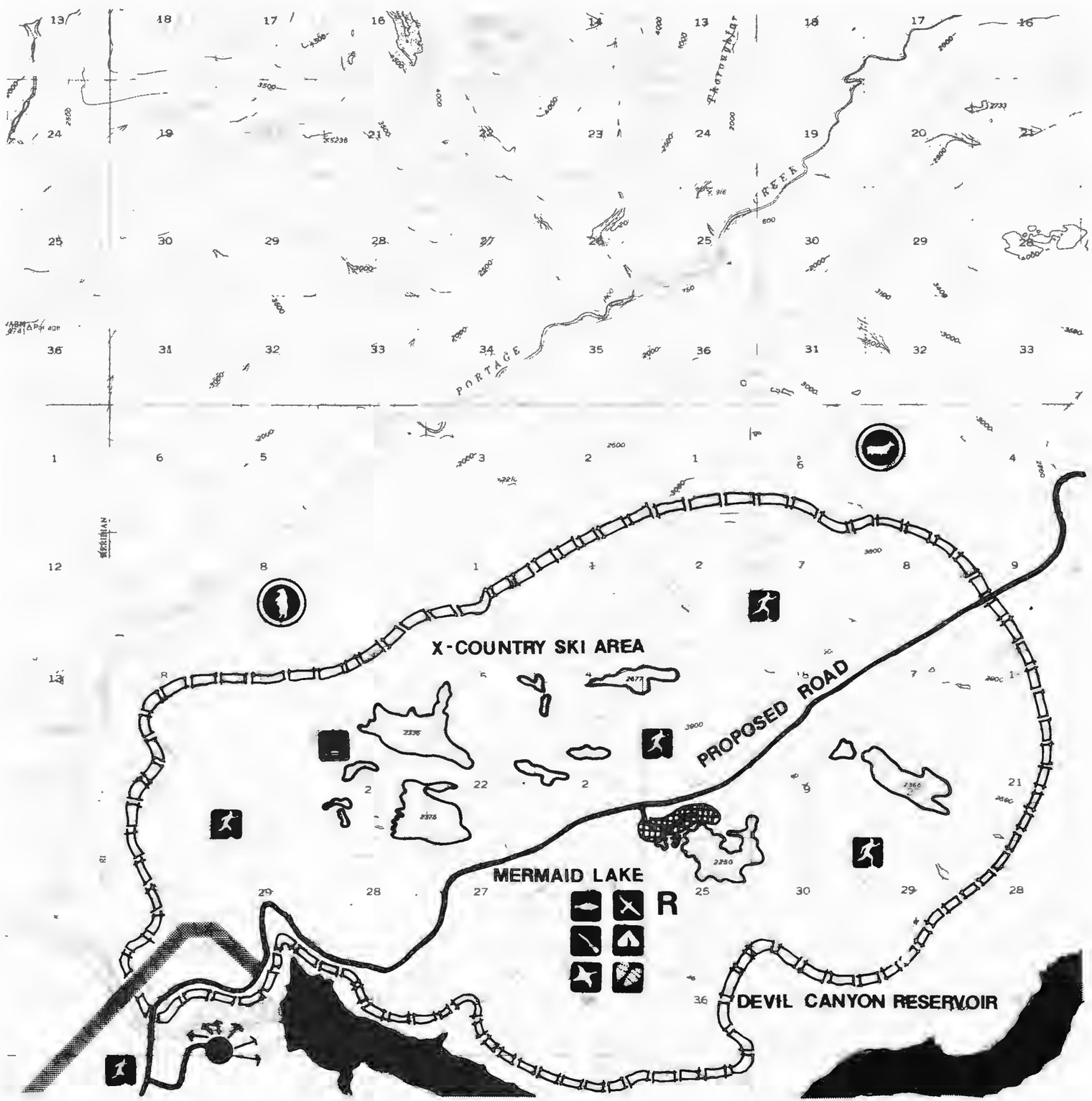
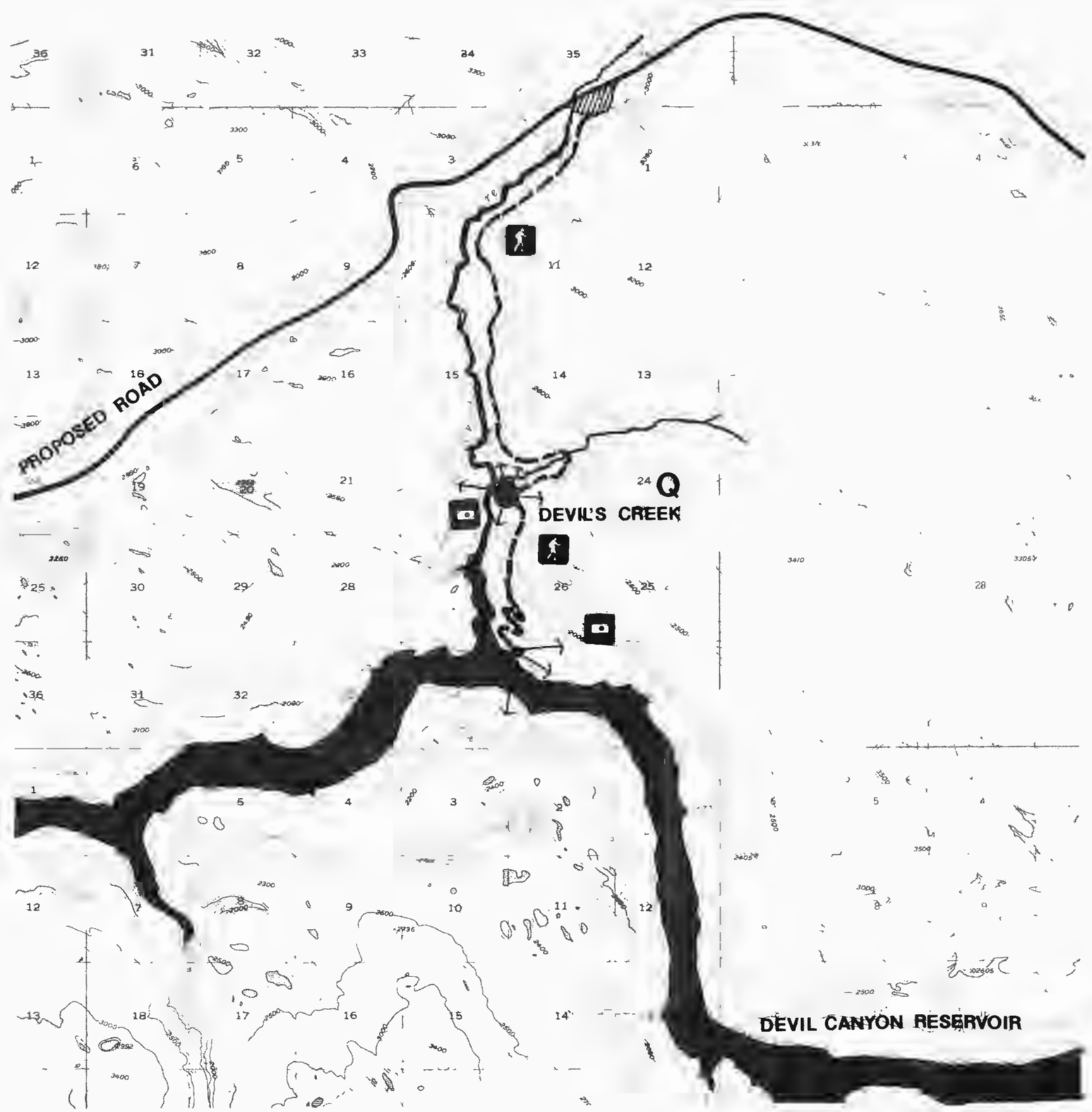
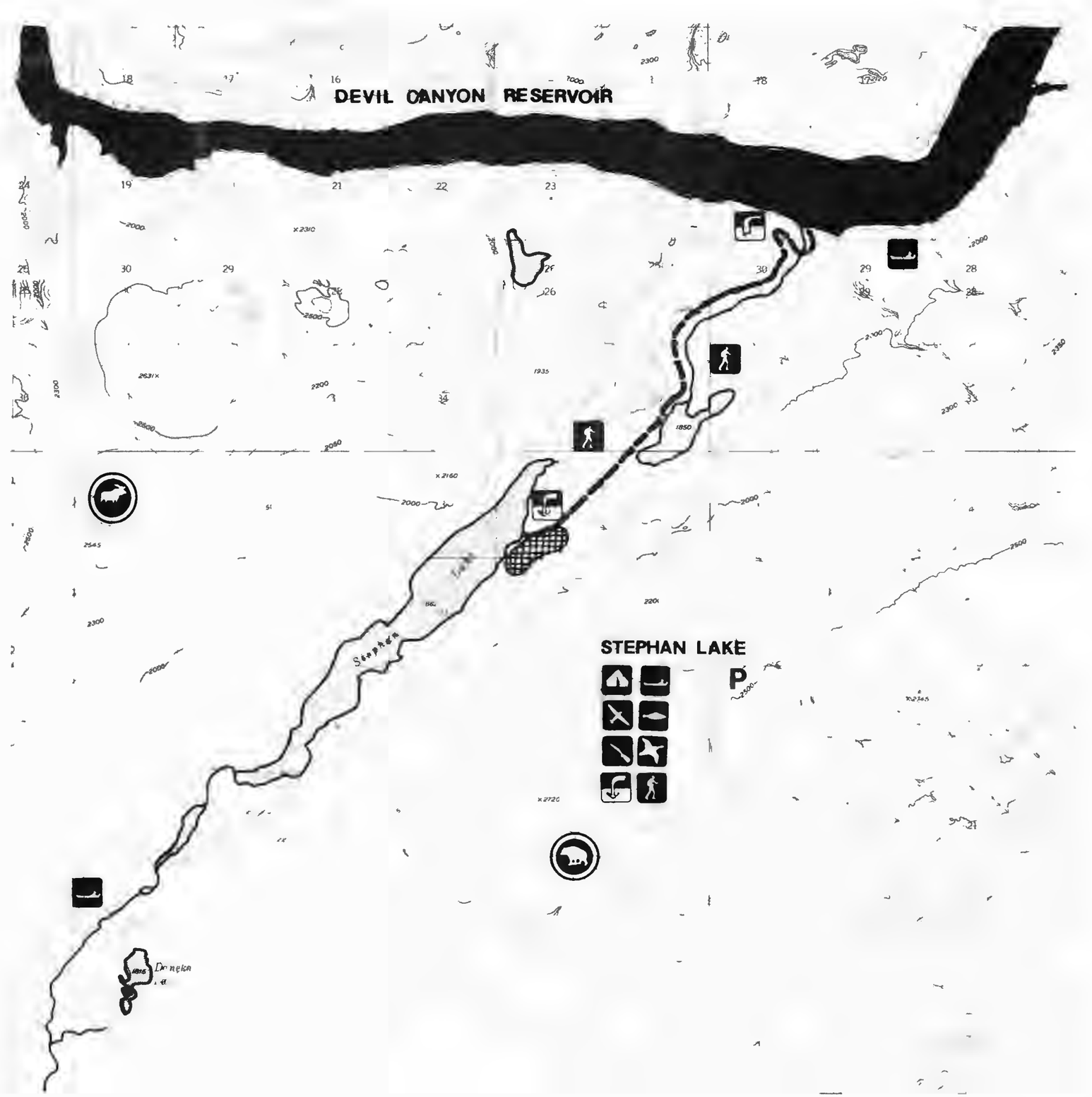
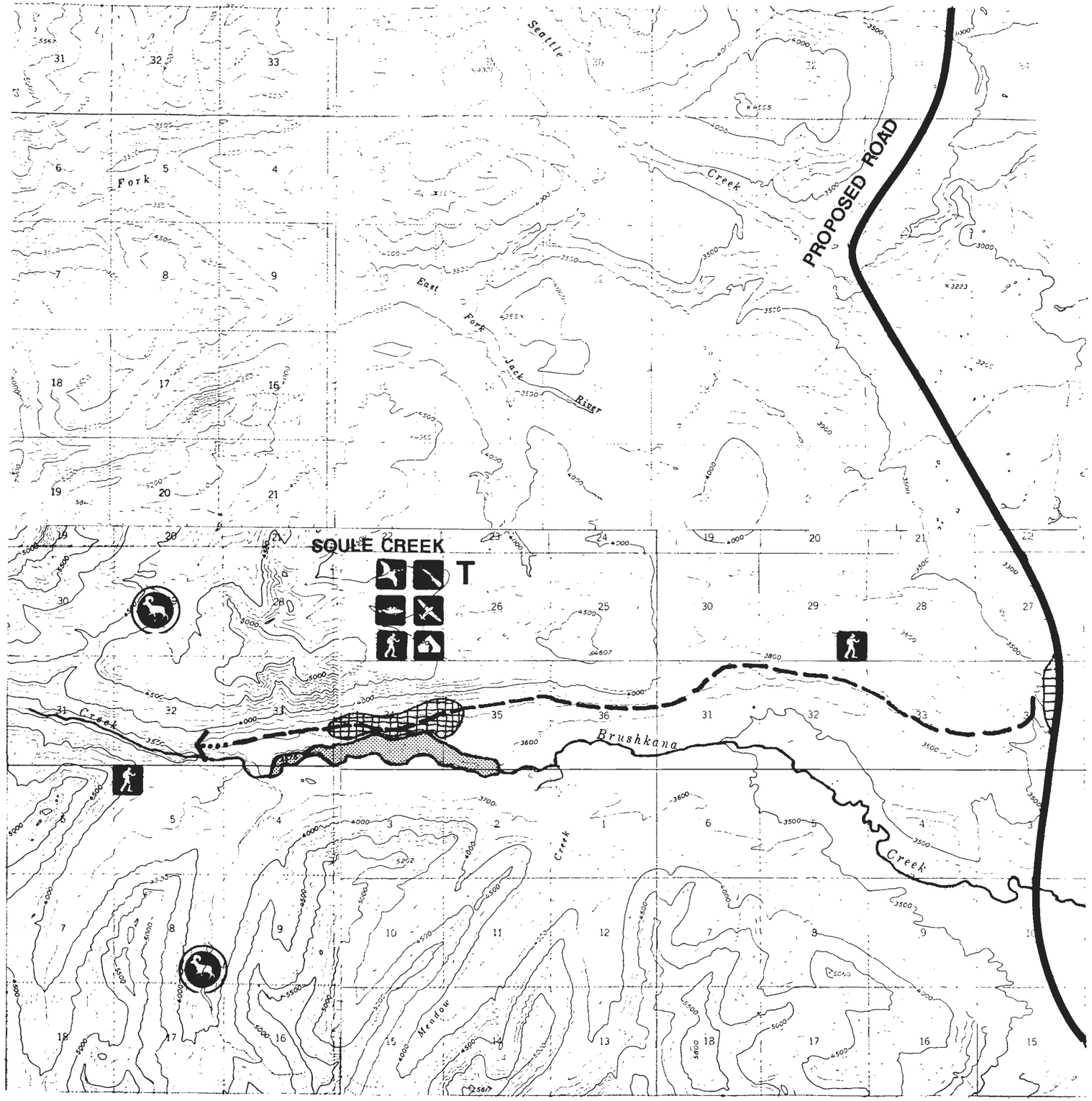

PLATTE RIVER
PORTAGE
X-COUNTRY SKI AREA
PROPOSED ROAD
MERMAID LAKE
R
DEVIL CANYON RESERVOIR


PROPOSED ROAD
DEVIL'S CREEK
DEVIL CANYON RESERVOIR


DEVIL CANYON RESERVOIR
STEPHAN LAKE
P
Susitna


PROPOSED ROAD
SOULE CREEK
T
Seattle
Creek
East
Fork
Jack
River
Fork
Creek
Brushkana
Creek
Creek
Meadow

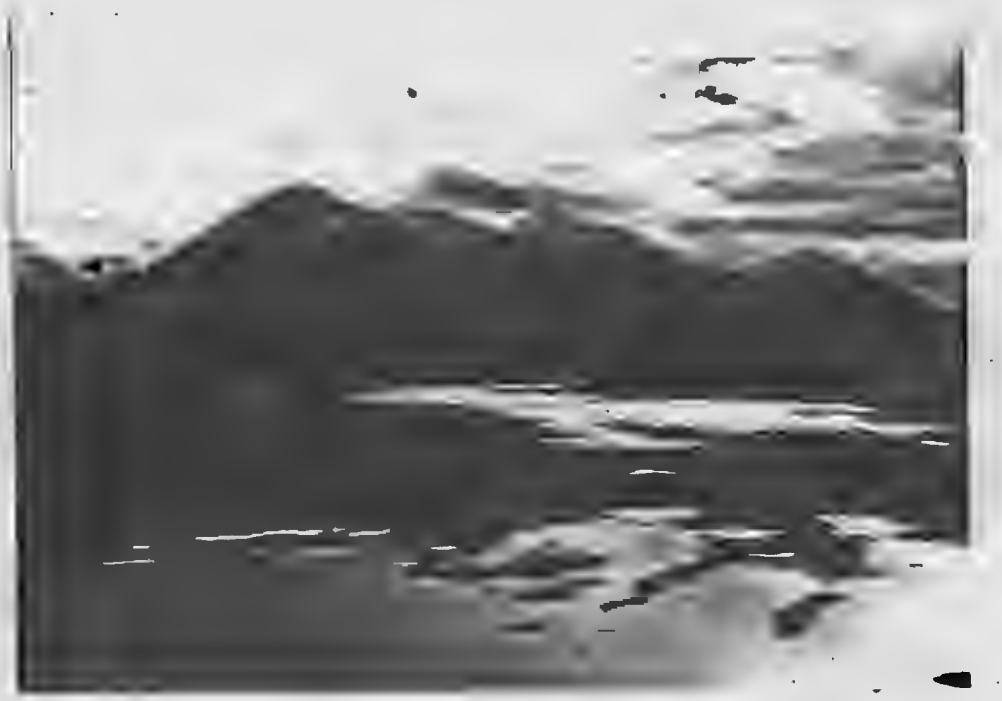


Photo E.7.1 Middle Fork of Chulitna River; view to the south through Caribou Pass

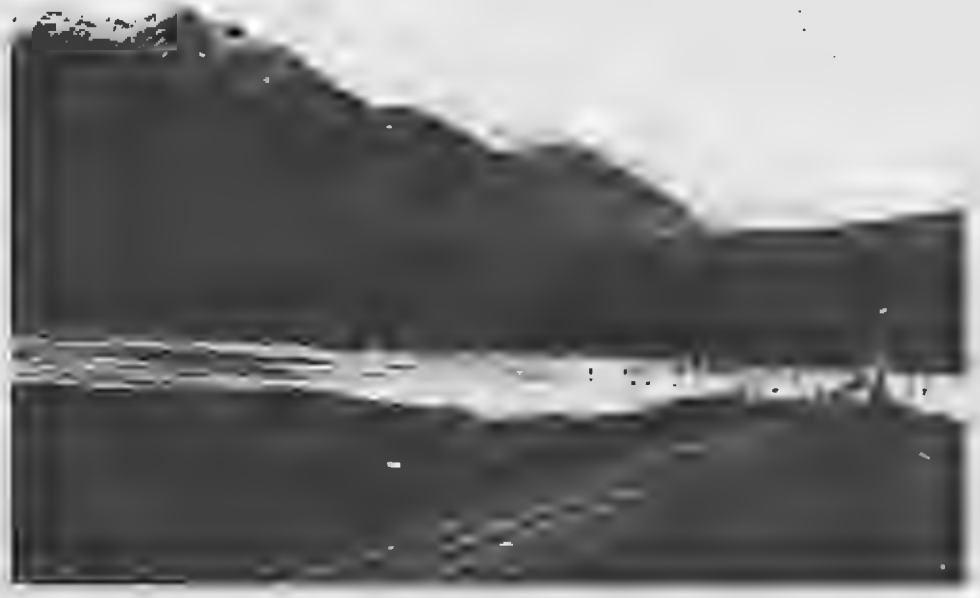


Photo E.7.2 Butte Creek; Susitna Bridge on the Susitna River

Photo E.7.3 Watana Townsite

Photo E.7.4 Brushkana Camp

Photo E.7.5 Tsusena Creek; view west into the Tsusena Creek drainage from the Chulitna Mountains

Photo E.7.6 Tsusena Creek

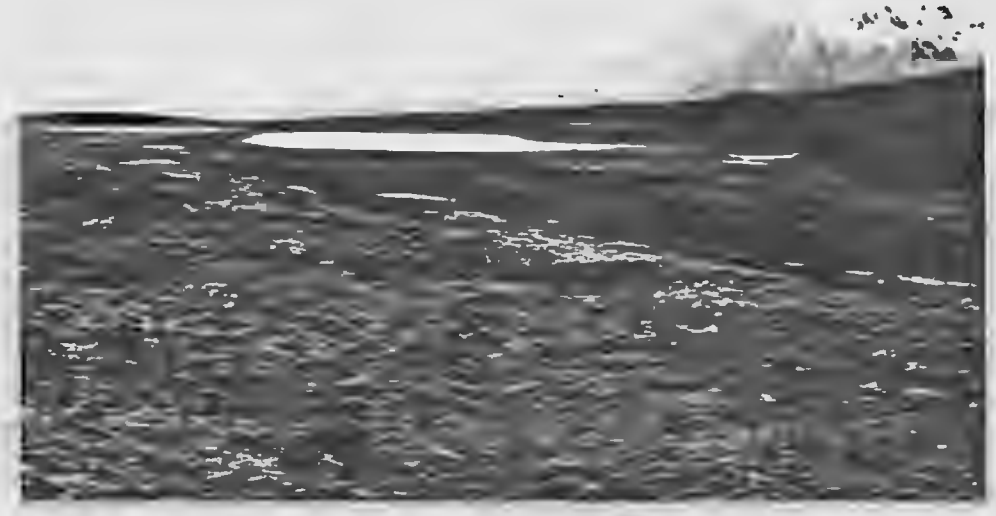


Photo E.7.7 Mid-Chulitna Mountains; looking south at lake

Photo E.7.8 Mid-Chulitna Mountains

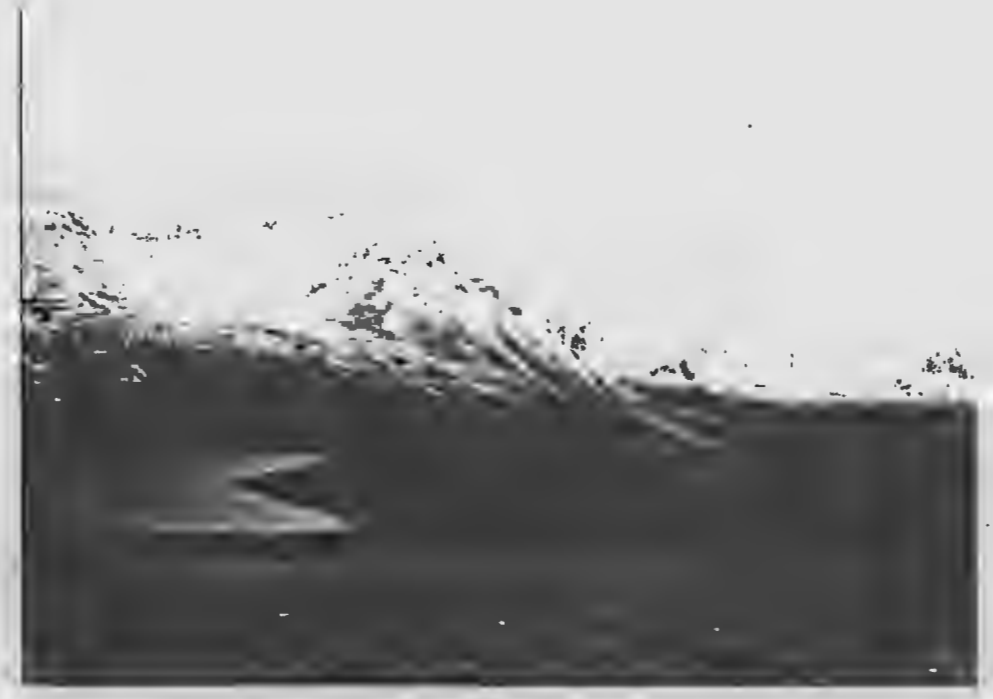


Photo E.7.9 Mid-Chulitna Mountains

Photo E.7.10 Tsusena Butte; looking south toward Tsusena Lakes from Tsusena Creek

Photo E.7.11 Deadman Lake/Big Lake; view north between the lakes

Photo E.7.12 Deadman Lake; view looking northeast

Photo E.7.13 Big Lake; view toward south end

Photo E.7.14 Clarence Lake; Gilbert Creek view west

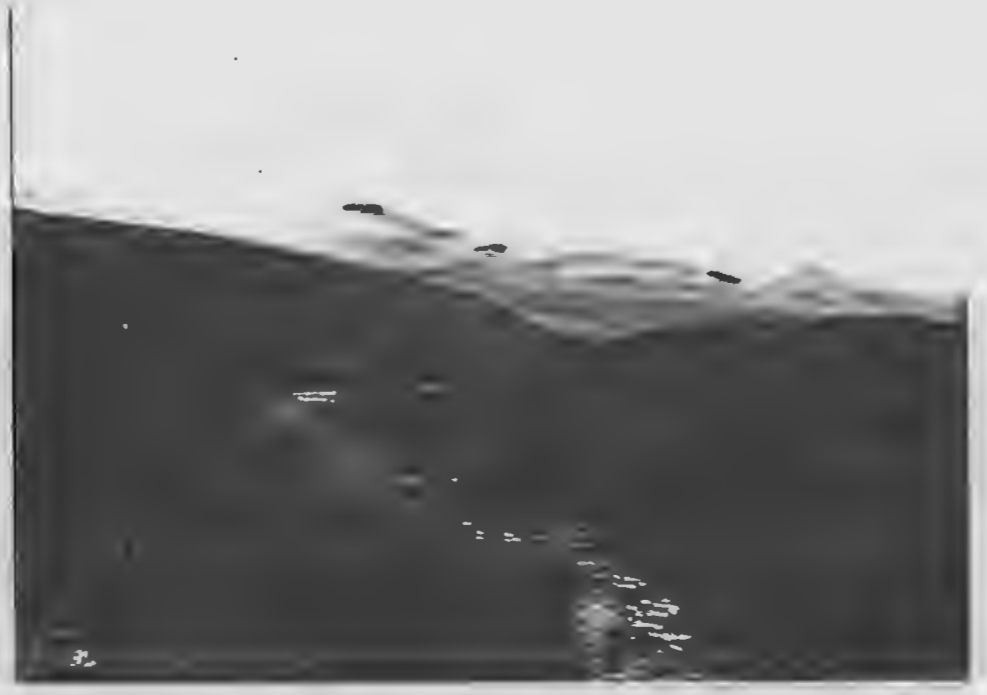


Photo E.7.15 Kosina Creek; view north along creek

Photo E.7.16 Watana Lake; view toward the north

Photo E.7.17 Fog Lakes; view toward the east

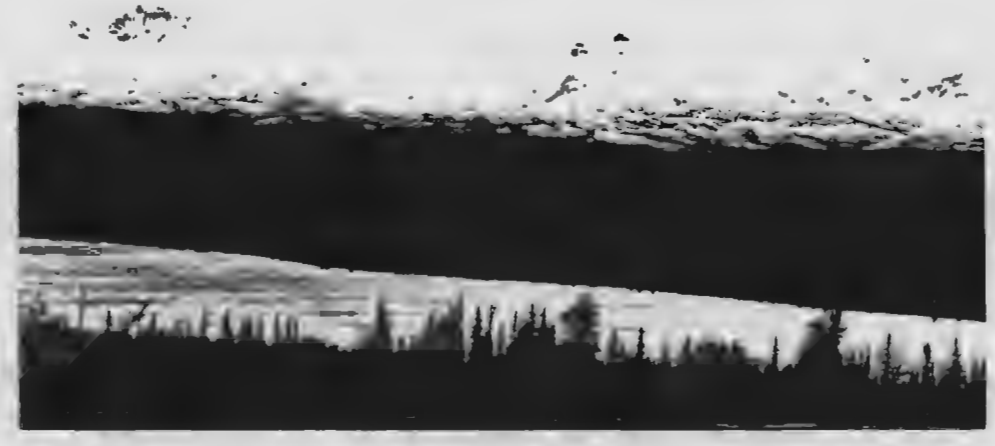


Photo E.7.18 Fog Lakes; view south toward the Talkeetna Range

Photo E.7.19 Stephan Lake; view toward the south

Photo E.7.20 Devils Creek; view along Devils Creek

TO BE ADDED AT A LATER DATE

Photo E.7.21 Devils Creek; Devils Creek Falls

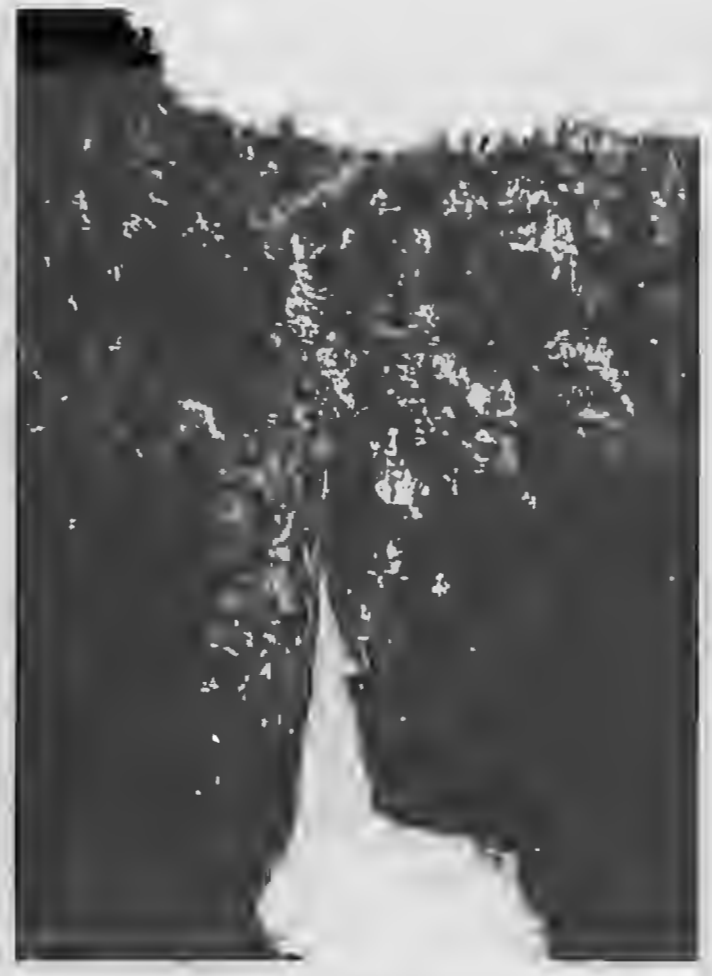


Photo E.7.22 Devils Creek; Devils Creek Falls

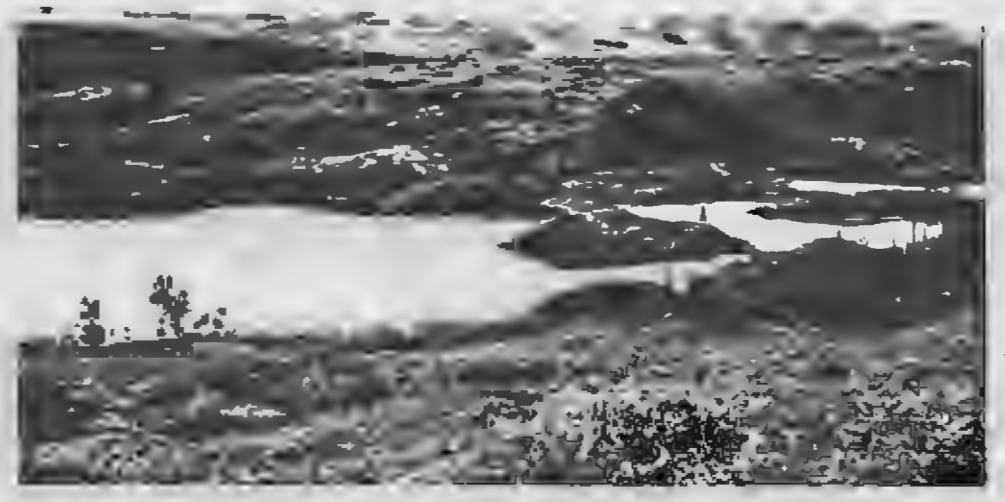


Photo E.7.23 Mermaid Lake; south end of lake

Photo E.7.24 Mermaid Lake, north end of lake

Photo E.7.25 Devil Canyon Damsite; view of Susitna River from the Portage Creek confluence

Photo E.7.26 Soule Creek; view toward the west of Soule Lake

Photo E.7.27 Soule Creek; upper Soule Creek Canyon viewing toward the east

Photo E.7.28 Southern Chulitna Mountains; viewing southeast from lake

Photo E.7.29 Southern Chulitna Mountains; viewing eastward into the Chulitna Mountains

APPENDIX 7A : REGIONAL RECREATIONAL FACILITIES

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
Stephan Lake Lodge and Airstrip	16 km (10 miles) S.W. of Watana damsite at Stephan Lake	Private	17 hectares (42 acres)	24 units
Tsusena Lake Lodge and Airstrip	16 km (10 miles) N.W. of Watana damsite at Tsusena Lake	Private	20 hectares (49 acres)	8 units
Denali Highway Recreation Development				
Brushkana River Campground	Denali Highway, Mile 105	Bureau of Land Management	19 hectares (47 acres)	17 campsites
Adventures Unlimited Lodge & Cafe	Denali Highway, Mile 100	Private (b)	Unknown	Unkown
Gracious House Cabins, Cafe, Guide Services	Denali Highway, Mile 82	Private	Unknown	Unknown
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
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 (5.7 m. acres)	228 units

APPENDIX 7A : REGIONAL RECREATIONAL FACILITIES (Cont'd)

Site Development	Location (a)	Managing Agency	Area	Accommodations
Parks Highway Recreation Areas (Cont'd)				
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
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
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

APPENDIX 7A : REGIONAL RECREATIONAL FACILITIES (Cont'd)

Site Development	Location (a)	Managing Agency	Area	Accommodations
Parks Highway Recreation Areas (Cont'd)				
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
Denali State Park	Parks Highway, Mile 132 to 169	Alaska Division of Parks	170,427 hectares (421,120 acres)	Unknown
Tokositna	Parks Highway, West of Mile 135	Alaska Division of Parks	17,095 hectares (43,240 acres)	Undeveloped
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
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
Bonnie Lake Recreation Area	Glenn Highway, Mile 82.5	Alaska Division of Parks	52 hectares (129 acres)	Unknown

APPENDIX 7A : REGIONAL RECREATIONAL FACILITIES (Cont'd)

Site Development	Location (a)	Managing Agency	Area	Accommodations
Recreation Areas Along the Glenn Highway (Cont'd)				
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 7A : REGIONAL RECREATIONAL FACILITIES (Cont'd)

Site Development	Location (a)	Managing Agency	Area	Accommodations
Other 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

(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.

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

APPENDIX 7B

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 — Tsusena Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks	X			Elevations range from 2600' to 5800'
Glaciers		X		Glacier in mountains North of Tsusena Cr.
Geological Interest Sites		X		
Gorges/Cliffs/Bluffs	X			Valley - floor is approximately 1 mile wide
Talus Slope/Rock Environment	X			
Cirques				
Rock/Mineral Collection Sites		X		
Big Game Hunting Habitats	X			Moose and bear - Dall sheep in mountains
Fishing Habitats	X			Grayling and trout
Wildlife Observation Areas	X			Potential
Lakes	X			East side of Tsusena Butte
Waterfalls/White Water		X		Some white water
Rivers/Streams	X			Tsusena Cr. and tributaries
Bogs			X	Along water course
Vegetation Patterns	X			Tundra - on mountain slopes and mixed forest on valley floor
Botanical Interest Sites	X			Diverse vegetation types
Dams/Reservoirs				Drains into Susitna below Watana Dam site
Campgrounds				Non-developed - primitive
Boating Facilities				
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 — Mountain Area West of Proposed North/South Access Route Midway/West of Deadman Mountain

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

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

ATTRACTIVE FEATURES - INVENTORY DATA FORM

RECREATION OPPORTUNITY SETTING — Butte Creek Drainage

SIGNIFICANCE RATINGS	H	M	L	NOTATIONS
Mountain Peaks		X		Immediate area is not spectacular - views are fair to good
Glaciers				
Geological Interest Sites			X	
Gorges/Cliffs/Bluffs			X	Broad, flat valley primarily
Talus Slope/Rock Environment				
Cirques				
Rock/Mineral Collection Sites				
Big Game Hunting Habitats		X		Moose, bear and caribou
Fishing Habitats		X		Grayling - lake trout at Butte Lake
Wildlife Observation Areas		X		
Lakes		X		Butte Lake - large number of small lakes - Snodgrass Lake
Waterfalls/White Water				Insignificant
Rivers/Streams			X	Tributaries/Butte Cr. - close to Watana Cr.
Bogs			X	Most of the drainage is in a flat, poorly drained area - large percentage of bogs
Vegetation Patterns		X		Mixed forest and tundra (upland slopes)
Botanical Interest Sites			X	
Dams/Reservoirs				
Campgrounds				Recommend primitive
Boating Facilities				Butte Lake
Resorts/Lodges			X	Existing sport lodges at Butte Lake
Trails/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.

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				

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				

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				

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				

8 - AESTHETIC RESOURCES

SUSITNA HYDROELECTRIC PROJECT

EXHIBIT E

VOLUME 4 CHAPTER 8

AESTHETIC RESOURCES

TABLE OF CONTENTS

LIST OF FIGURES

8 - REPORT ON AESTHETIC RESOURCES

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 Exhibit B. Important inputs to this plan can also be found in Exhibit E, Chapter 3, Report on Fish, Wildlife, and Botanical Resources, and Chapter 4, Report on Historic and Archaeological Resources.

1.3 - Environmental Setting

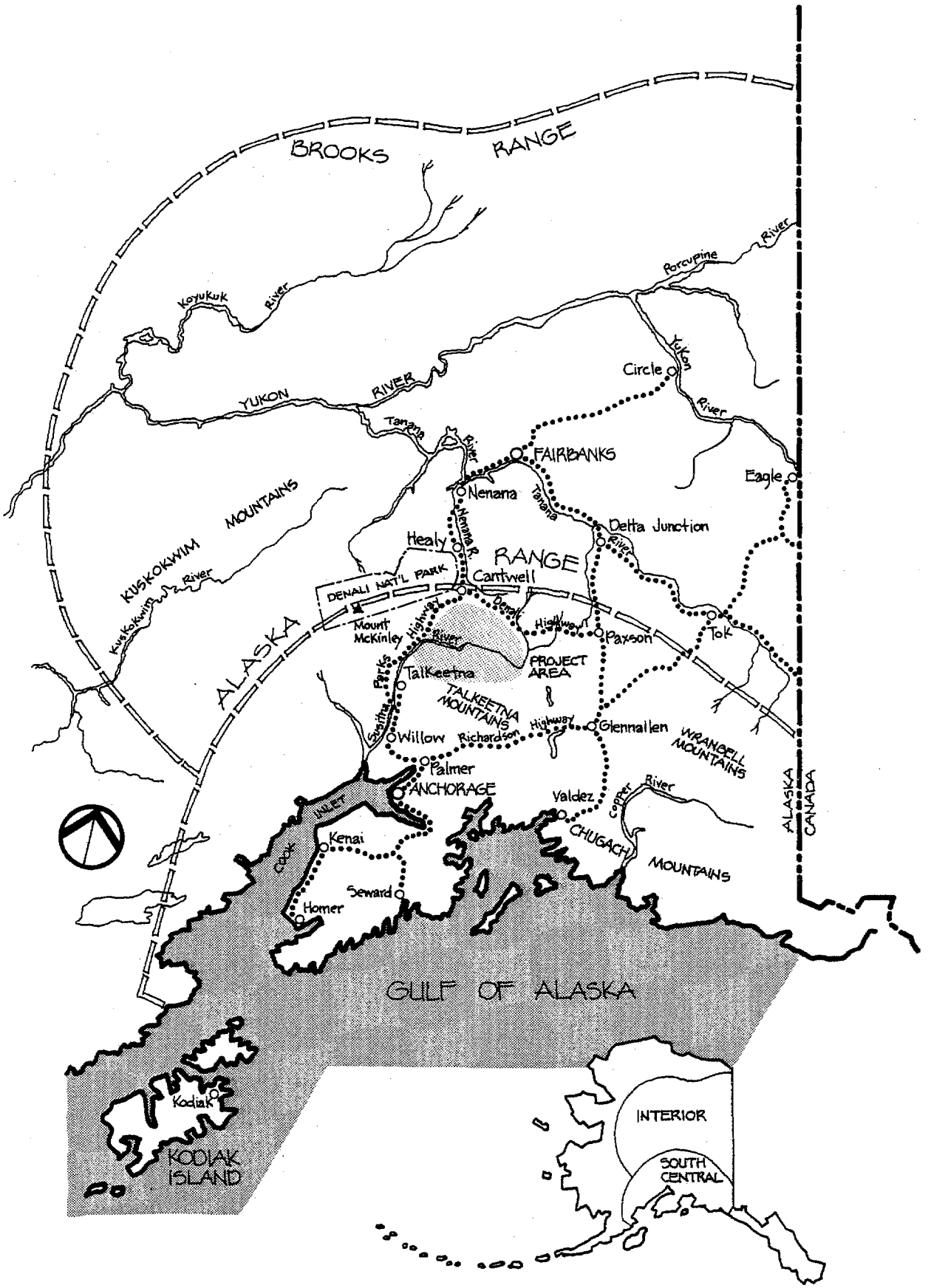
(a) Regional Setting

The Susitna Hydroelectric Project area is primarily within the State of Alaska's Southcentral Region, but also extends at least 100 mi north into what is known as the Interior Region (see Figure E.8.1).

The Southcentral 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 (1982 Alaska Almanac). Anchorage, with nearly half of Alaska's population and only 100 air miles from the project area, is located near the northeast end of Cook Inlet in the Southcentral 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 here. In addition, this diversity of landscapes is complemented with 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



REGIONAL MAP
Plate 8.1

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 Southcentral region, wildlife and fisheries are as diverse as the landscape environments.

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

(b) Susitna River Basin

The Susitna River Basin is located entirely in the Southcentral Region. The 39,000 square mile 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 as 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 tributary valleys, the Talkeetna Mountains and upland plateau to the east are the dominant topographic forms. Elevations in the basin range from approximately 700 feet to over 6000 feet. 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 the short autumn. Snow, ice and below zero temperatures create a harsh, threatening but scenic winter landscape. Late April and May brings ice breakups on the rivers and the once snow- and ice-covered ground begins to come back to life. The landscape turns green again as the cycle repeats.

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

Spruce and mixed spruce-deciduous forests cover the bottom and slopes of river and tributary valleys below 2,500 feet elevation and west of the Oshetna River/Susitna confluence. Tundra and muskeg replace the mixed forests to the east and on the highlands with more drought resistant vegetation. Mountain slopes are bare or lightly covered.

Wildlife species in the 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 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 below the canyon.

Existing access into the interior of the basin 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 is recreational hunting and fishing for subsistence use by local residents. Small mining operations are also found in the basin.

In general, the Upper Susitna Basin is a relatively uninhabited diverse environment with regionally important aesthetic values. Any major project has the potential of creating significant aesthetic impacts to the basin and to the Southcentral and Interior Regions. The lower Susitna Basin contains a significant portion of the State's population and development while retaining extensive areas of both undeveloped and wilderness land.

2 - METHODOLOGY

2.1 - Procedure

Figur E.8.2 illustrates the methodology followed to produce this report on Aesthetic Resources. Project resources were assessed according to the following steps:

(a) Step 1

- 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/features sites; and
- Identify specific concerns of agencies and special interest groups.

(b) Step 2

- Identify and analyze locations, design and aesthetic character of proposed project features.

(c) Step 3

- Identify and describe existing landscape character types within the study areas.

(d) Step 4

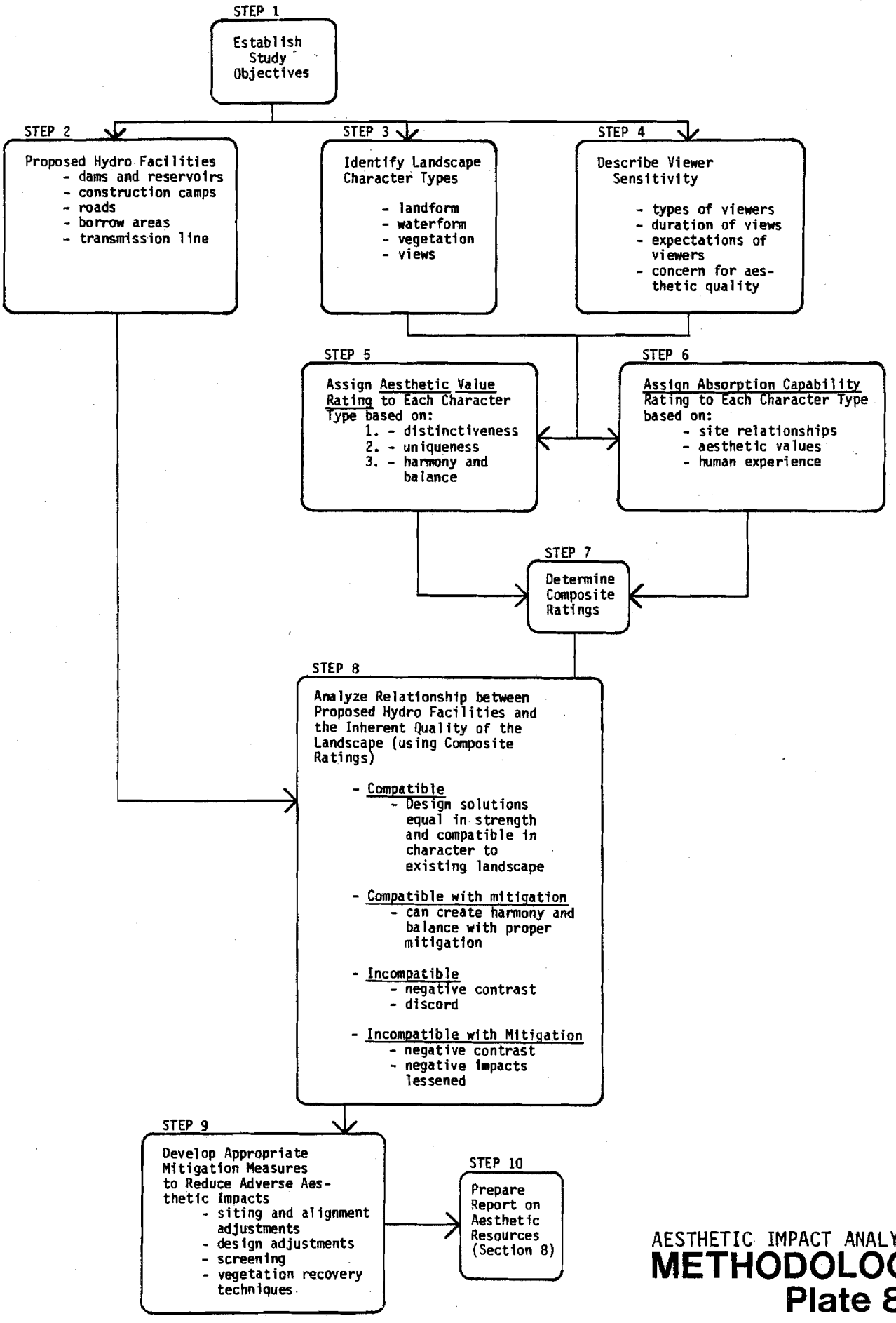
- Identify viewer types and their estimated sensitivity to Aesthetics.

(e) Step 5

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

(f) Step 6

- Rate the absorption capability of landscape character types according to their ability to absorb visual modification on the basis of such factors as vegetation type and density, slope and topographic features.



AESTHETIC IMPACT ANALYSIS

METHODOLOGY

Plate 8.2

(g) Step 7

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

(h) Step 8

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

  . compatable
  . compatable with mitigation
  . incompatable no mitigation possible
  . incompatable mitigation is possible

(i) Step 9

- Develop mitigation measures to reduce adverse aesthetic impacts of the project on the landscape.

2.2 - Definitions

The following definitions apply to terms used in this report.

(a) Landscape Character Type

A unit of the landscape used as a frame of reference to classify the physical features of a given area. This is based to a large degree on physiographic sections as defined by Wahrhaftig (1965).

(b) Compatibility

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.

(c) Viewer Sensitivity

An indicator of peoples' concern for aesthetic quality and their level of expectation of aesthetic qualify; necessarily somewhat subjective.

(d) Aesthetic Value

A relative measure of overall importance of the visual landscape, including such components as distinctiveness, uniqueness, harmony and balance.

(e) 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.

(f) 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 unique on a statewide scale; and

- Landscapes and natural features may or may not be unique on project area scale.

(g) 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.

(h) 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 commonly considered.

2.3 - Proposed Project Facilities and Features (Step 2)

The Susitna Hydroelectric Project has proposed a number of facilities and features which will potentially have aesthetic impacts upon the existing landscape. The facilities and features are as follows: Appendix 8A shows the proposed layout of these facilities, and Appendix 8B includes photos of the sites for major items along with simulations of the facility itself.

(a) Watana Project Area

Earth-fill dam and two temporary cofferdams
Reservoir
Main and Emergency Spillways
Borrow Area (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
138-kV transmission line (power for construction of Watana)

(b) Devil Canyon Project Area

Concrete arch dam, saddle dam and two temporary cofferdams
Reservoir
Main and emergency spillways
Borrow areas (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)
Railroad (Gold Creek to Devil Canyon)

(c) Watana Access Road

Gravel road from Denali Highway to Watana Dam
Borrow areas (material for road construction)

(d) Devil Canyon Access Road

Gravel road
High level bridge (below Devil Canyon damsite)
Borrow areas (material for road construction)

(e) Transmission Line Stubs

Two 345-kV transmission lines from Healy to Fairbanks (north stub)
Three 345-kV transmission lines from Willow to Anchorage (south stub)
(See Figures E.8.4a and E.8.4b)

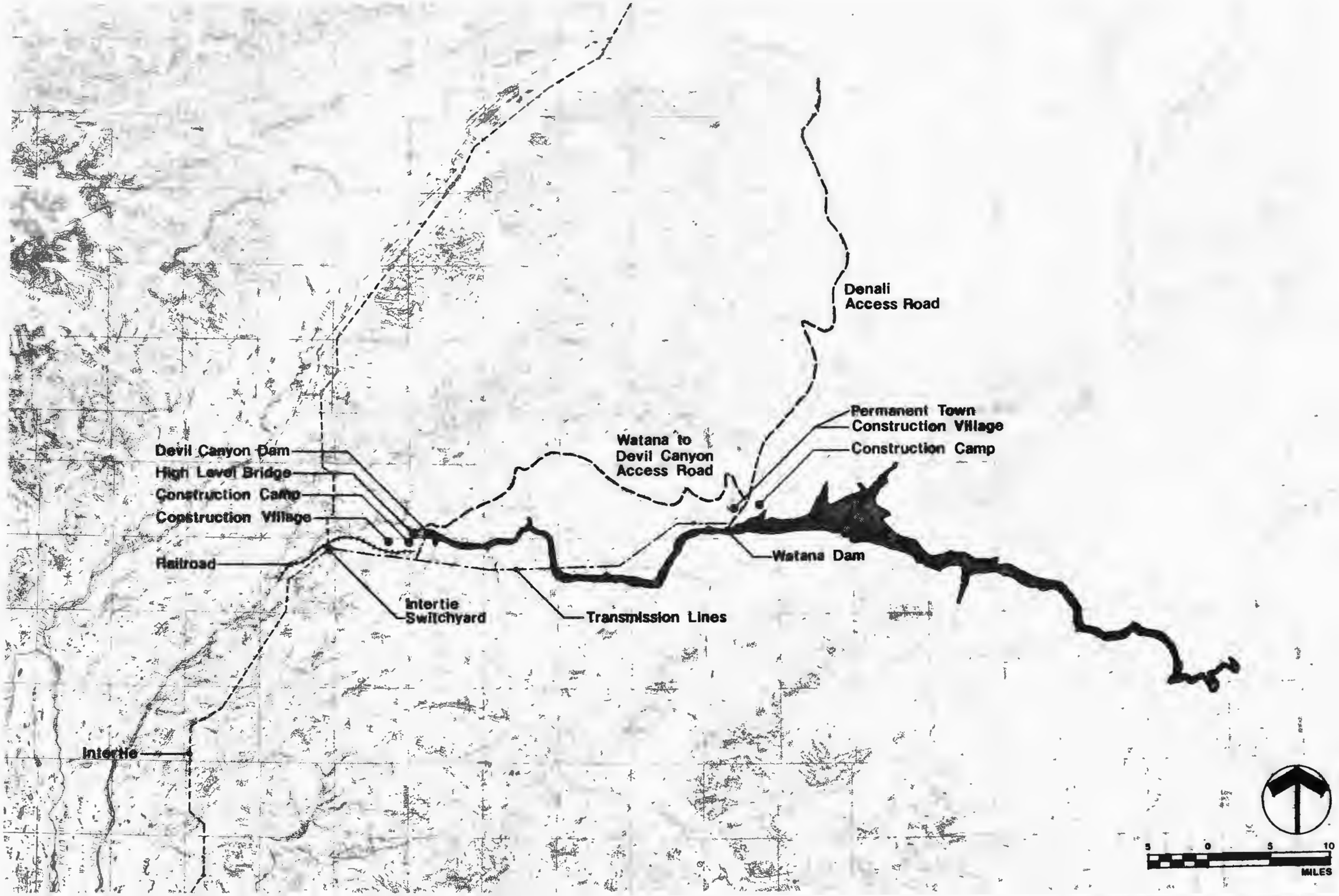
(f) Intertie

Initially one 138-kV transmission line from Willow to Healy. For successional stages, see Figure E.8.5. It should be noted here 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.

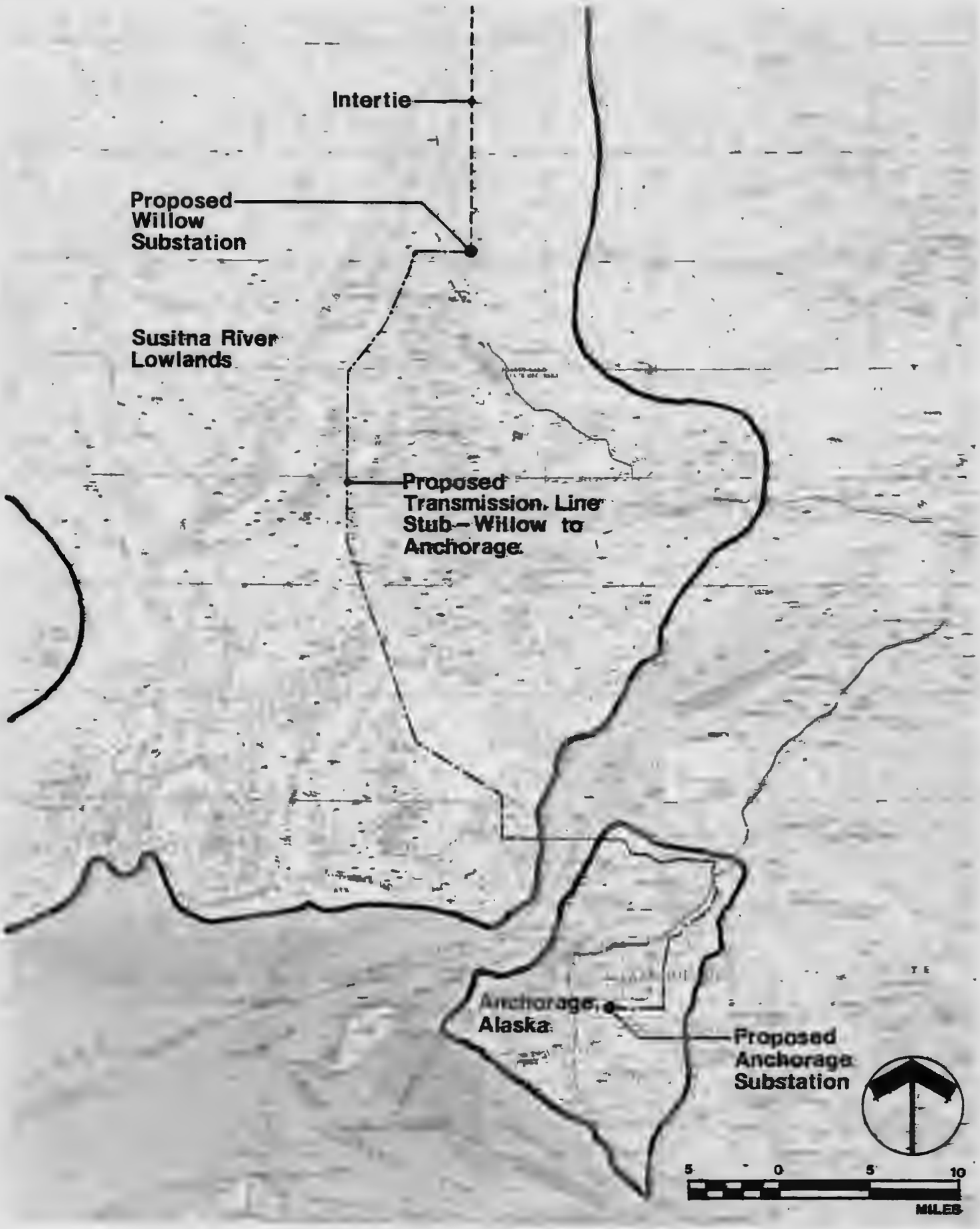
(g) Recreation Facilities and Features*

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

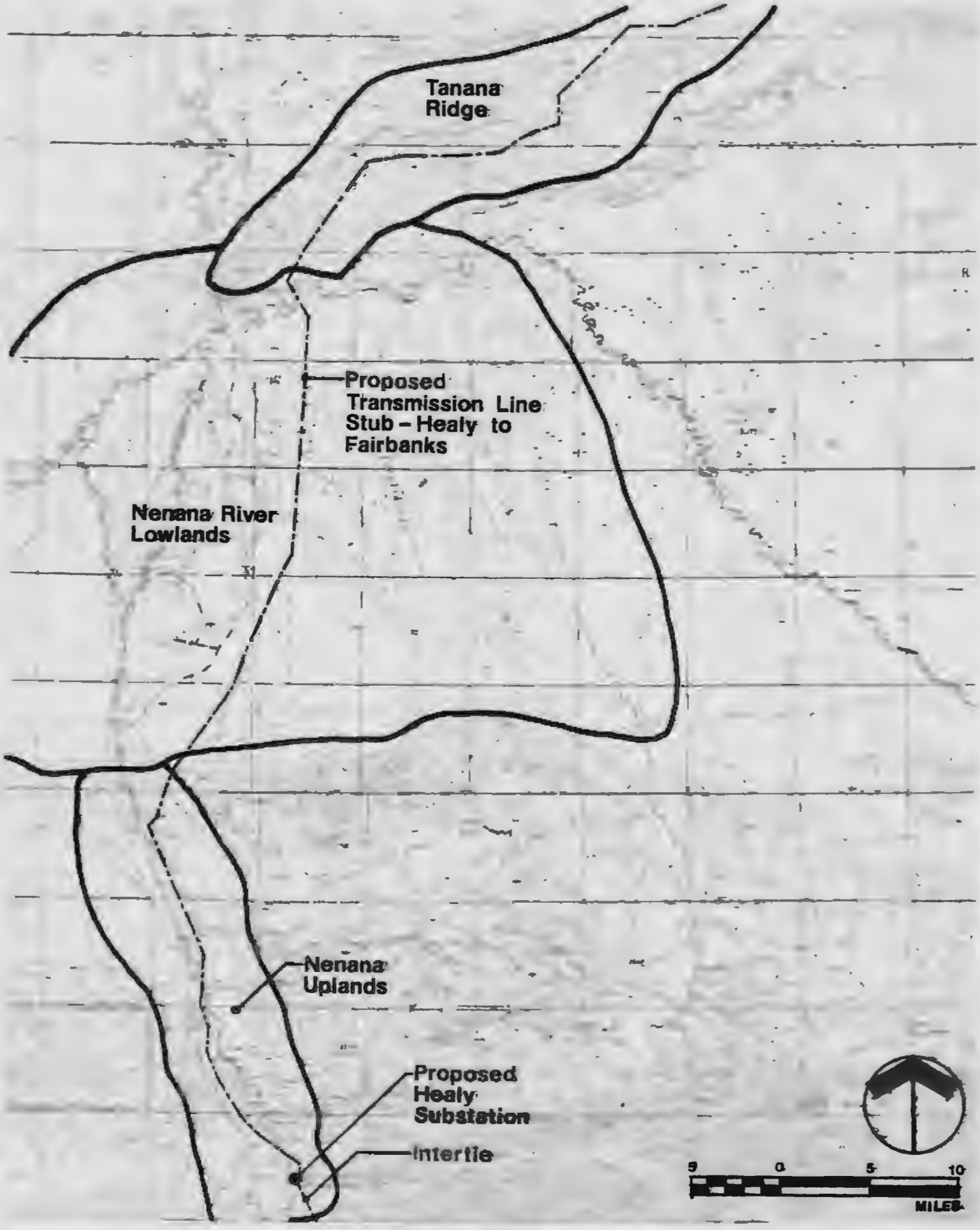
*These facilities are described in Detail in Exhibit A, Project Description, or Chapter 7, Recreation Plan.



PROPOSED PROJECT FEATURES Plate 8.3

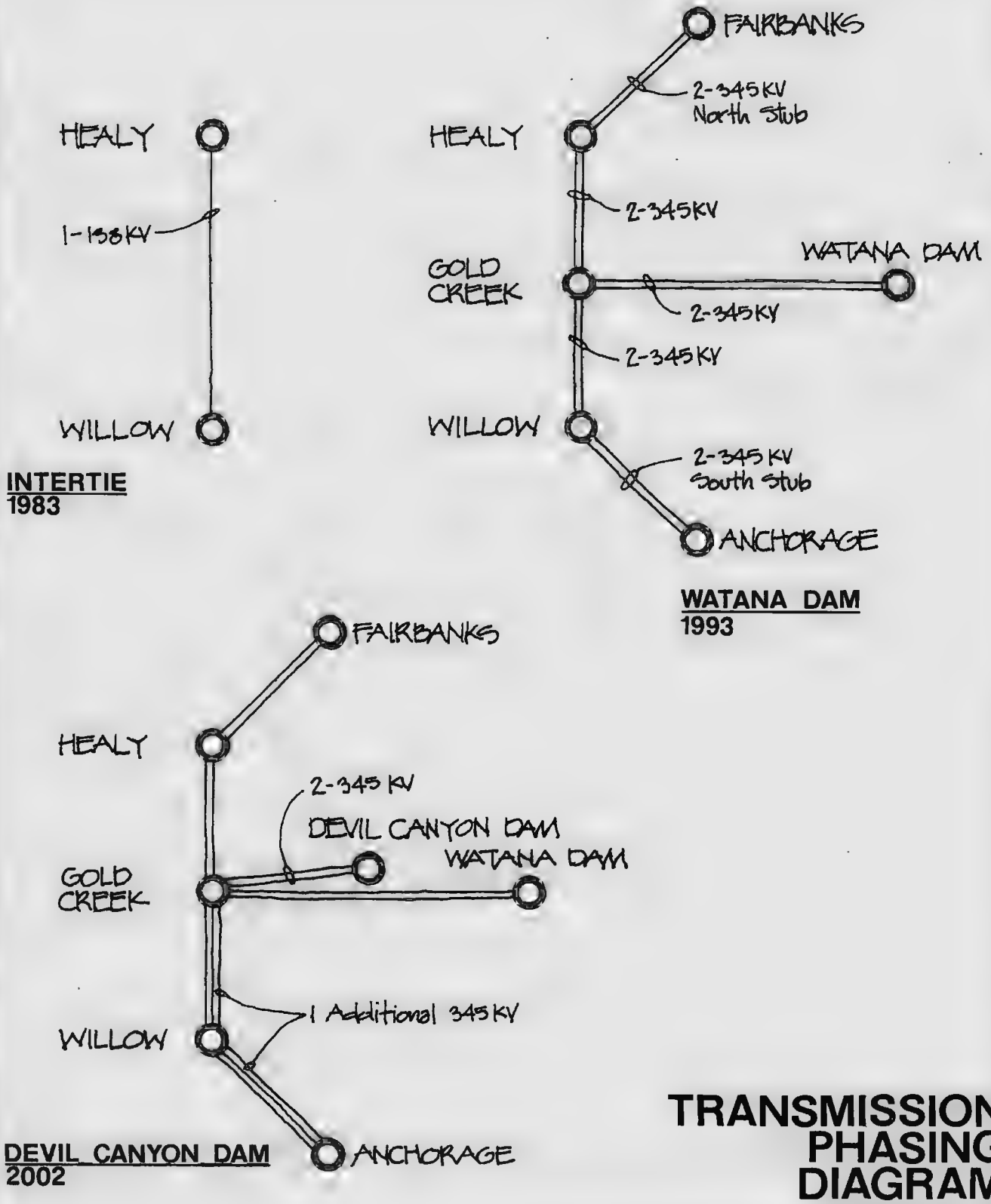


LANDSCAPE CHARACTER TYPES SOUTHERN STUB Plate 8.4a



LANDSCAPE CHARACTER TYPES NORTHERN STUB

Plate 8.4b


HEALY
1-138KV
WILLOW
INTERTIE
1983
FAIRBANKS
2-345KV
North Stub
HEALY
2-345KV
WATANA DAM
GOLD
CREEK
2-345KV
2-345KV
WILLOW
2-345KV
South Stub
ANCHORAGE
WATANA DAM
1993
FAIRBANKS
HEALY
2-345 KV
DEVIL CANYON DAM
WATANA DAM
GOLD
CREEK
1 Additional 345KV
WILLOW
ANCHORAGE
DEVIL CANYON DAM
2002
TRANSMISSION
PHASING
DIAGRAM
Plate 8.5

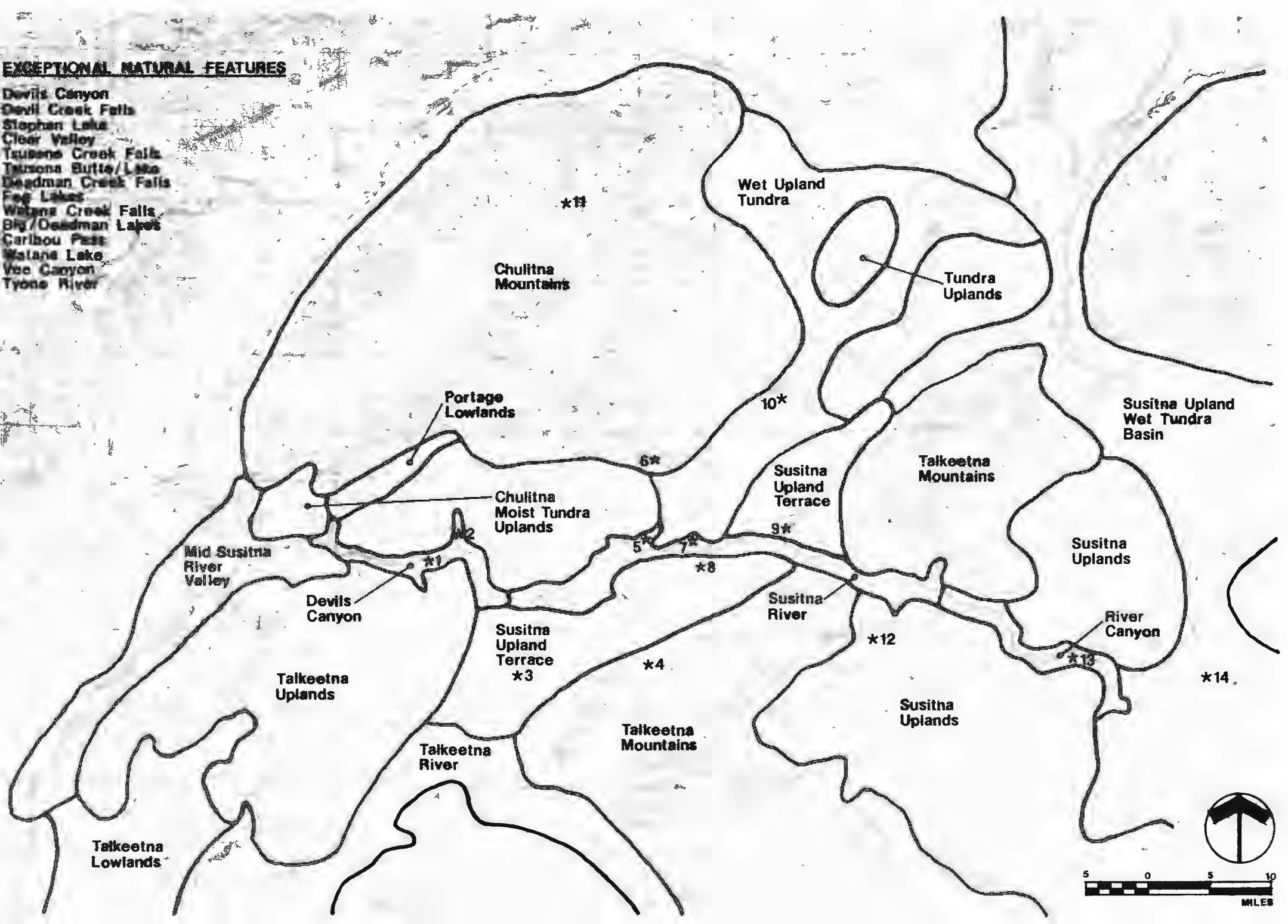
3 - EXISTING ENVIRONMENT (STEP 3)

3.1 - Landscape Character Types

Landscape Character Types are a description and classification of coherent units of the landscape 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, water form and vegetation pattern. They are an important factor in aesthetic analysis and form the basis for evaluating the impacts of change on the landscape. Figure E.8.6 and the following charts (Step 3) identify the landscape character types used to classify lands in the vicinity of the project area.

★ EXCEPTIONAL NATURAL FEATURES

1. Devils Canyon
2. Devil Creek Falls
3. Stephan Lake
4. Clear Valley
5. Tsusena Creek Falls
6. Tsusena Butte/Lake
7. Deadman Creek Falls
8. Fog Lakes
9. Watana Creek Falls
10. Big/Deadman Lakes
11. Caribou Pass
12. Watana Lake
13. Vee Canyon
14. Tyone River

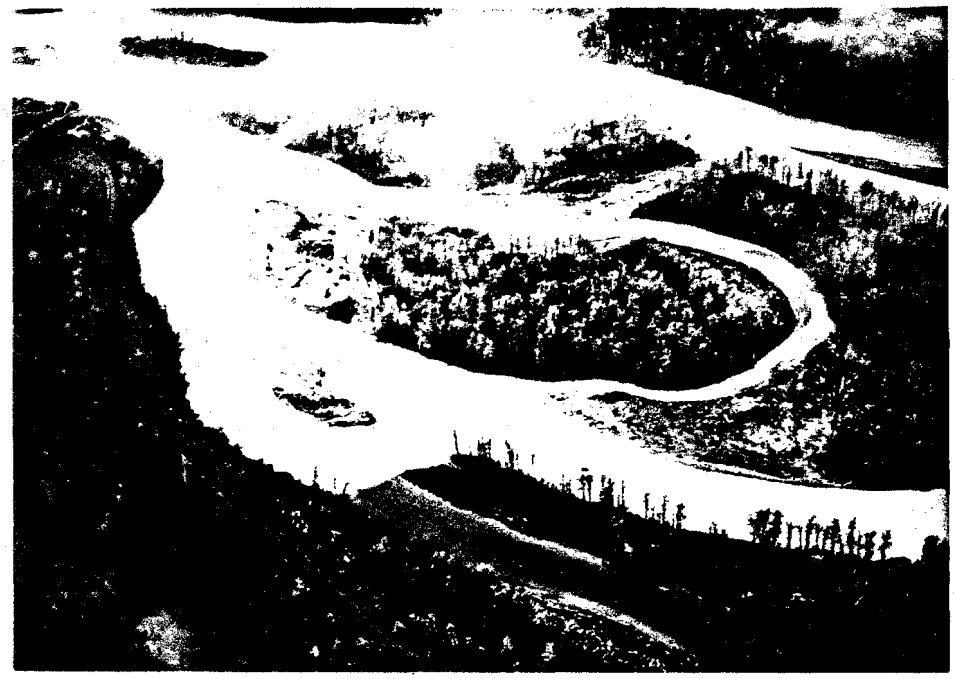


LANDSCAPE CHARACTER TYPES

Plate 8.6

LANDSCAPE CHARACTER TYPE

MID SUSITNA RIVER VALLEY



LANDFORMS

. Valley is 2 to 6 mi 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 miles 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

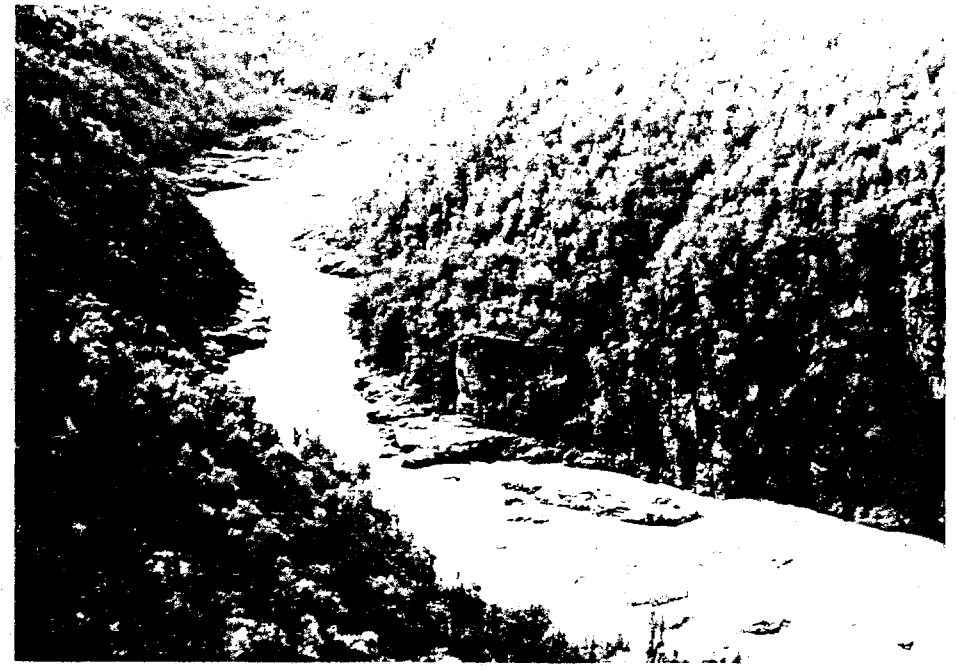
. Dense mixed forest of spruce and deciduous trees.
. Tundra and brush species only on steeper valley slopes.
. Spruce/green is most prominent color - small amount of yellow/gold fall color by deciduous trees and willows.
. Tundra cover provides good red/orange tones in the fall.

VIEWS

. Views are directed within the river channel, valley slopes and the commonly snow-capped Chulitna Mountains to the North.

LANDSCAPE CHARACTER TYPE

DEVIL CANYON



LANDFORMS

- Steep to vertical rock canyon walls - medium to dark brown colors for several miles - nearly 1,000 feet deep. Unstable environment.
- Deeply incised valley overall for over 20 miles.
- 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 stretch of world class kayaking whitewater (Class VI).
- Portage, Cheechako and Devil creeks are all notible - steep to vertical canyoned tributaries.
- Devil Creek Falls are the most scenic falls in the basin.

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

LANDFORMS

- Broader valley - up to 4 mi 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.

VEGETATION

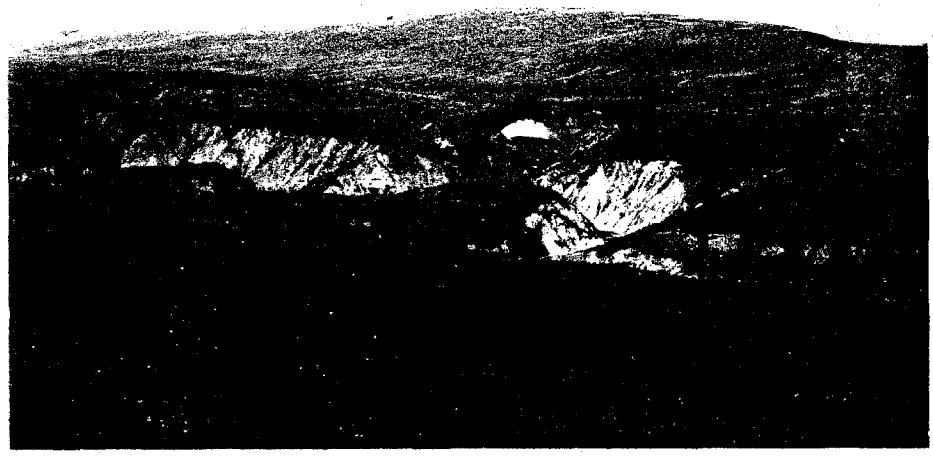
- Moderately dense to dense spruce-deciduous forest covers much of the river and tributary valleys. Good fall color.
- Willow and other shrub species are found along the river banks and terraces.

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

RIVER CANYON



LANDFORMS

- Steep and meandering river valley.
- The 1/4 mile to 1 mile wide valley rises up over 500 feet 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.

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

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 voer 1 mile wide.
. Several hundred lakes ranging from very small to over 500 acres in size. Dense patterns.
. Oshetna, Tyone and Maclaren rivers and Clearwater, Butte, Windy and Valdez creeks are all significant tributaries.

VEGETATION

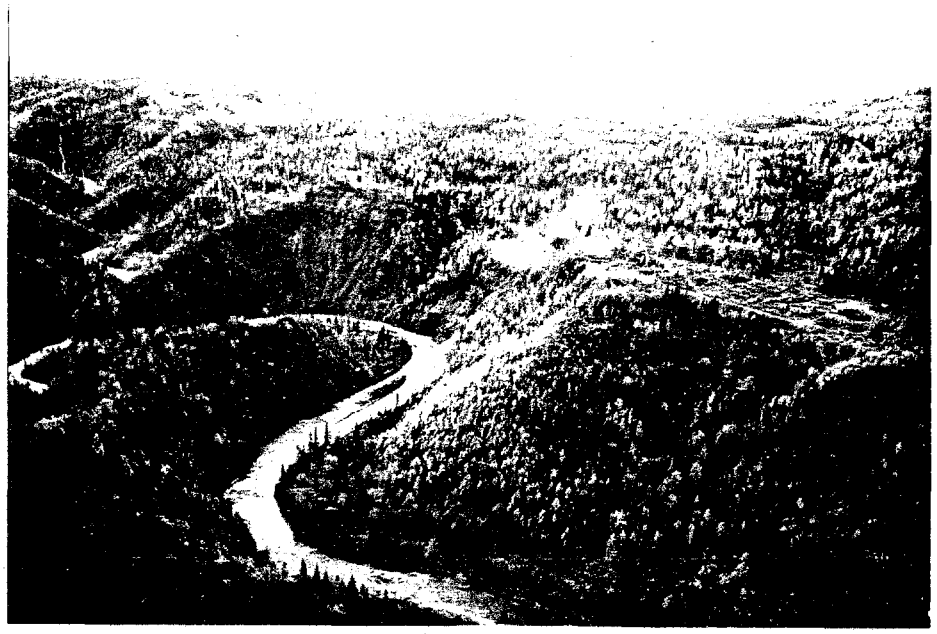
. Tundra (wet) is the dominant vegetation type.
. Sparse stands of spruce are scattered throughout the area.
. Dense willow and other shrub types are found along the river and many lake banks.
. The tundra foliage in the fall creates an extensive variety of colorful patterns over the landscape.

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 30-50 miles distant.
. Views in the foreground landscape are not particularly scenic - except the fall tundra color.

LANDSCAPE CHARACTER TYPE

PORTAGE LOWLANDS



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 2,500 feet.
- The well mixed forest provides scenic fall color.
- Bright green spring foliage of the hardwoods 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

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

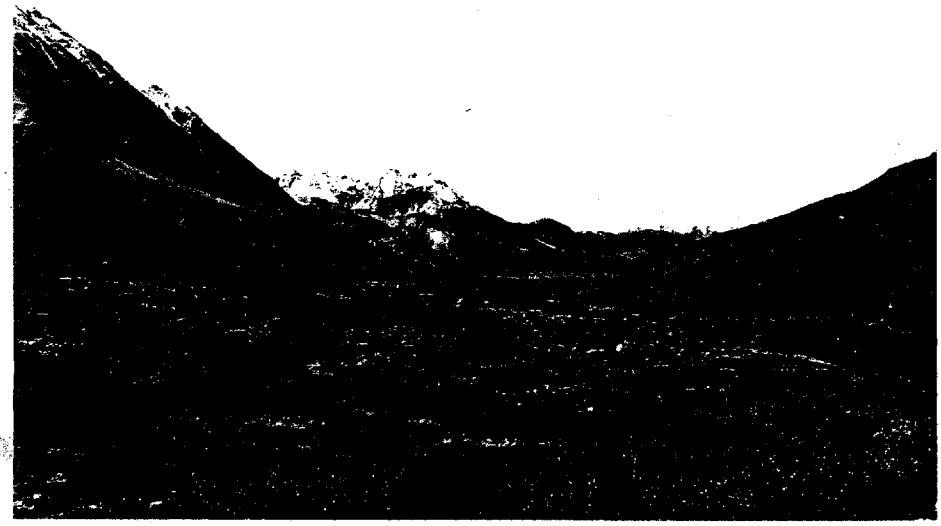
- The upland area east Portage Creek is predominantely tundra.
- The upland area west of Portage Creek is covered with a moderately dense spruce forest.
- Willow and other shrub species are commonly found in dense cover near lake banks and wetland areas.
- Scattered and sparse stands of spruce are found east of Portage Creek and mixed woods in the creek valley.
- Tundra colors are gold and light brown during winter months - If 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



LANDFORMS

- Over 900 square miles of rugged glacially carved mountains.
- Narrow and broad v-shaped valleys.
- Glaciers and permanent ice fields. Rock glaciers.
- Steeply rise up to over 6,000 feet in elevation.
- Many extensive talus slopes.

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

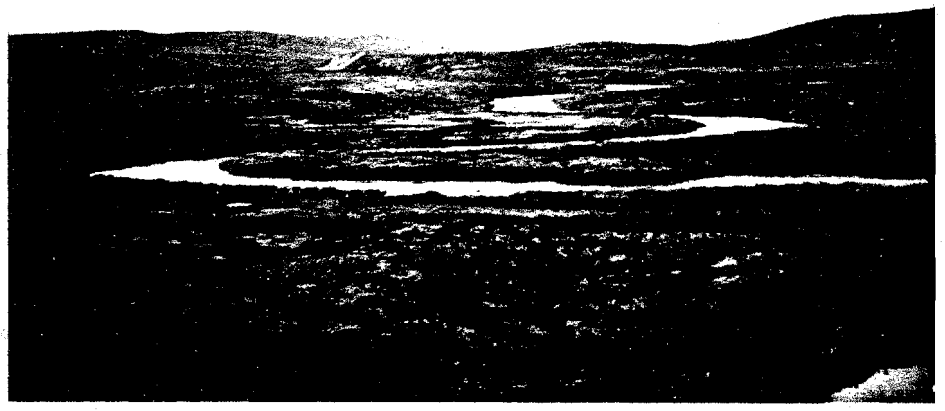
- Tundra and shrub species cover the valley floors and slopes creating an interesting edge as they meet the barren steeper rock slopes.
- Scattered stands of spruce-hardwoods along the Jack, Middle and East Fork Chulitna rivers.
- Tsusena Creek forms a unique green spruce-deciduous forest over 20 mles 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



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 1,080 acres.
- Deadman Creek is a long 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.

VEGETATION

- Wet tundra cover is prevalent with occassional 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

LANDFORMS

- Flat to rolling upland plateau.
- Slopes are primarily moderately steep to steep.
- Several knobs rise above 4,000 ft with the average elevation of 3,000 ft.
- 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 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

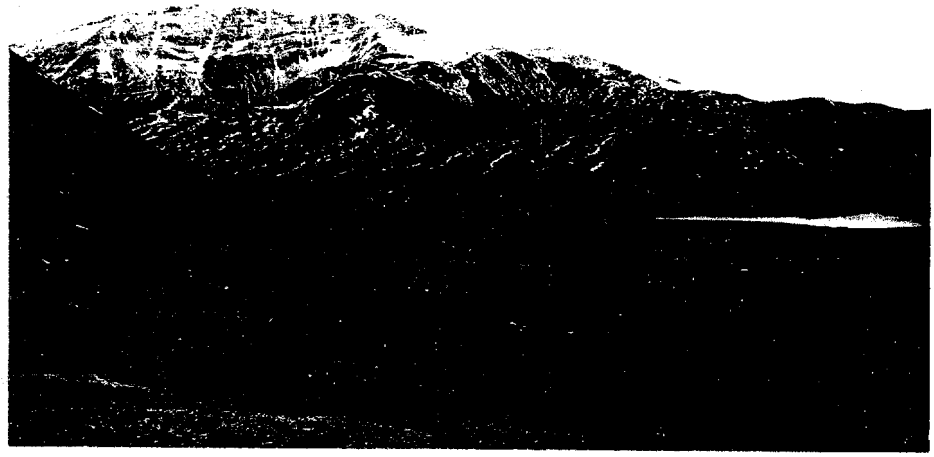
- Moist and west tundra is dominant.
- Moderately dense spruce-deciduous tree cover is primarily restricted to drainages.
- Chunilna Creek valley is densely forested.

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



LANDFORMS

- Rugged and steep sloped mountain range covering several thousand square miles.
- Elevations over 8,000 ft.
- Large glaciers, permanent ice fields and glacial features.
- Large moderately sloped terraces.
- Long, narrow and broad v-shaped valleys.
- Large talus slopes.

WATERFORMS

- Cirque lakes.
- Numerous lakes up to several hundred acres in size. Scattered to dense concentrations.
- Over ten rivers and creeks.

VEGETATION

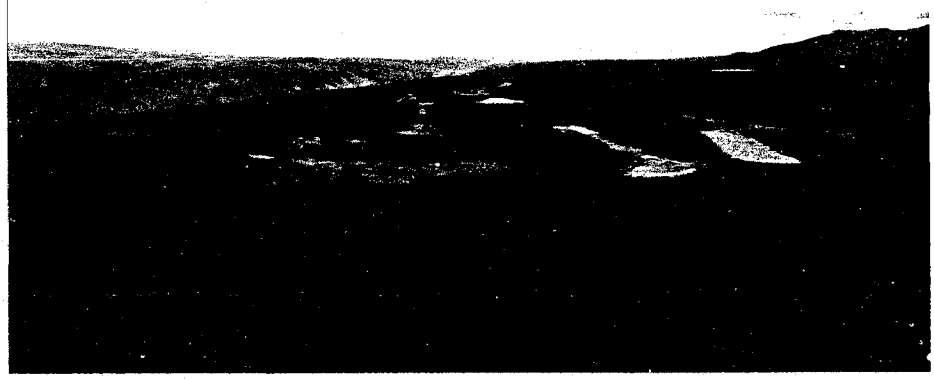
- Primarily tundra and shrub species throughout the mountains below the steeper rocky slopes and peaks.
- Except for the drainages on the northeast area of the range, dense spruce-deciduous forests cover the river valleys.

VIEWS

- Views are scenic and limitless.
- Views are panoramic to semi-enclosed depending on viewer position.

LANDSCAPE CHARACTER TYPE

SUSITNA UPLAND TERRACE



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.

VEGETATION

- Densely forested with spruce and some deciduous trees, except for an area of approximately 10 square miles 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

LANDFORMS

- Terraced, flat and rolling terrain.
- Elevation range is approximately 3,000 - 5,600 ft.
- 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.

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

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, are all seen.

LANDSCAPE CHARACTER TYPE

SUSITNA RIVER LOWLANDS

LANDFORMS

- Very flat to gently rolling lowlands.
- Larger lake areas are enclosed by small hills.
- Mount Susitna, a flat topped remnant volcano, rises over 3,000 feet 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 wide; many islands.
- Numerous meandering tributaries to Susitna.

VEGETATION

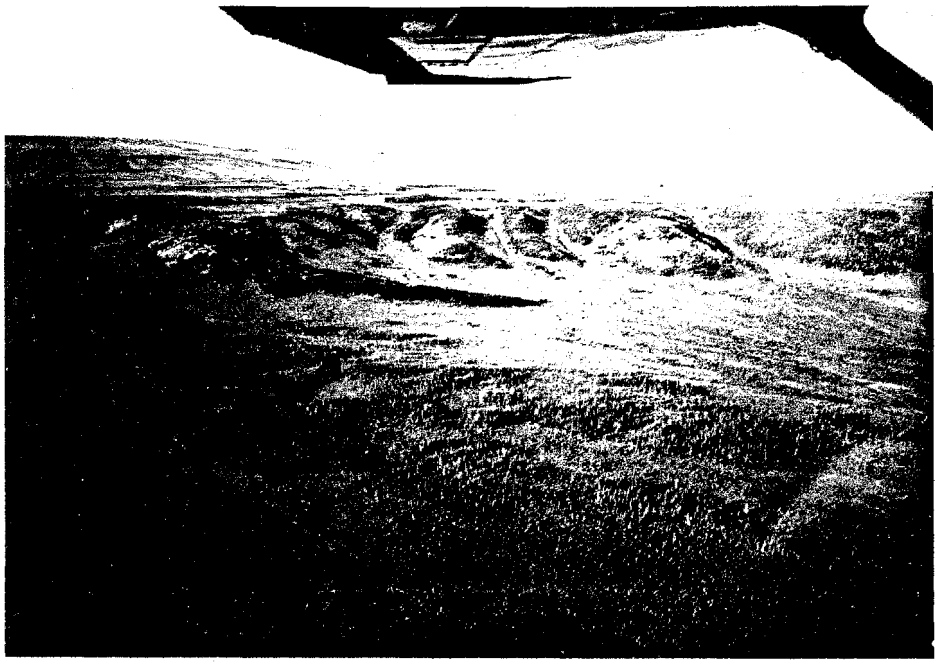
- Thin stands of black spruce cover many bog areas.
- Marsh grasses.
- Moderately dense to dense cover of spruce-deciduous trees around higher reliefed and larger lake areas - good fall color - also along Susitna River and tributaries.
- The dark green color of the spruce is most dominant.

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



LANDFORMS

- Relatively flat meandering river valley terraces several miles 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

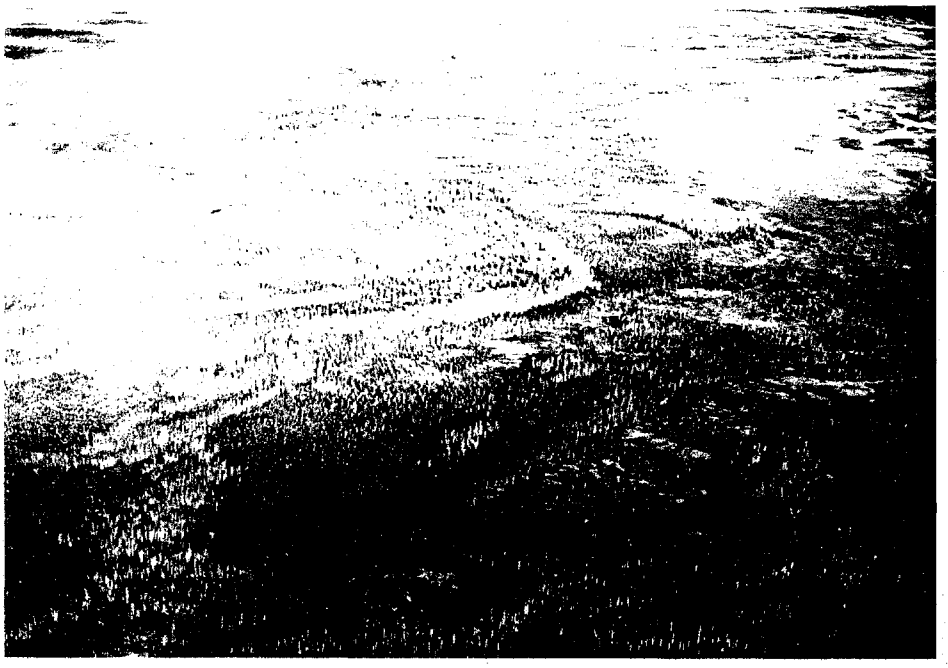
- Variable patterns of sparse to dense spruce and mixed forest over most of the area.
- Scattered open spaces of tundra and bare ground. Soil colors are light.

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



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

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.

3.2 - Viewer Sensitivity (Step 4)

Viewer Sensitivity Categories are indicators of people's concern for aesthetic quality and their level of expectation of aesthetic quality. Sensitivity levels are estimated for six different types of viewers who will see project features. Each viewer type is characterized, and the estimated duration and expectation of views noted. Finally, for each viewer type, an assumption is made regarding the viewer's concern for the aesthetic quality of the visual environment. These indicators are difficult to establish and necessarily somewhat subjective. The range of aesthetic value ratings includes high, moderate and low expectations, or a variation among them. The following chart (Step 4) presents this step.

VIEWER SENSITIVITY

STE 4

TYPES OF VIEWERS

(A) HUNTERS AND FISHERMEN	(B) OUTDOOR RECREATION ENTHUSIASTS (Alaska Residents)	(C) AUTOMOBILE ORIENTED USERS
Alaska residents who hunt and fish with the primary purpose of providing food for themselves and families.	Residents of the state and local areas who will use or currently use the area for many forms of outdoor recreation (i.e., hiking, cross-country skiing, rock climbing, wildlife observation, hunting anf fishing).	Residents and nonresidents who will not venture far fr m from their vehicles.

DURATION OF VIEWS

(A)	(B)	(C)
Due to the nature of hunting and fishing, view times are from a few minutes to several hours daily. Outings range from 1 day to several weeks.	Participation in most outdoor activities of this nature requires an hour to several hours of time. Viewing the landscape will be a high percentage of that time. Outings may range from several hours to a week or more. Views may be from air as well as ground.	Viewing times will be relatively short--few minutes to an hour or so. Weather conditions are of importanc

EXPECTATION OF VIEWS

(A)	(B)	(C)
Not particularly high. Though some hunters and fishermen may prefer more scenic areas. Prime concern is bagging their game or catching their limits.	Moderately high to high expectations for scenic views. Strongly associated with type of outdoor activity and where it takes place. Project features will also attract viewers.	Desire to view scenic natur setting as well as dams and reservoirs.

CONCERN FOR AESTHETIC QUALITY

(A)	(B)	(C)
Wide range. High to low.	High.	High.

VIEWER SENSITIVITY

STEP 4

TYPES OF VIEWERS

(D) NONRESIDENT OUTDOOR RECREATION ENTHUSIASTS	(E) PROJECT CONSTRUCTION WORKERS AND FAMILIES	(F) RESIDENT OPERATORS OF PROJECT FACILITIES
Out of state or country visitors who will use the area for a variety of outdoor activities including hunting and fishing.	People working on various project facilities and operations.	Workers and their families who will live at the permanent townsite, operate and maintain the project facilities.

DURATION OF VIEWS

(D)	(E)	(F)
Up to several hours daily. Outings may be 1 day to a week or more. Related to weather conditions. Views may be from air as well as ground.	Several minutes to hours—longer periods for non-workers. People will be in the project areas on and off for weeks at a time for several years.	Several minutes to hours. Depends on type of work. Potential for long viewing periods as workers will live and recreate in project area indefinitely. Related to weather conditions.

EXPECTATION OF VIEWS

(D)	(E)	(F)
Scenic views of natural setting will be expected due to overall expectations of Alaska. Desire to see as little man-made impacts as possible.	Views of all project facilities and overall large-scale construction operation features will be expected. Due to the remoteness of the site, scenic views will be expected.	Views of man-made features, associated project elements, and scenic landscapes will be expected.

CONCERN FOR AESTHETIC QUALITY

(D)	(E)	(F)
High.	Wide range. High to Low.	Generally high.

3.3 - Aesthetic Value Rating (Step 5)
and Absorption Capability Rating (Step 6)

Each Landscape Character type identified in Step 3 is evaluated and rated for its Intrinsic Aesthetic Value

High	(A)
Moderate	(B)
Low	(C)

It should be noted that these ratings are relative and not absolute in nature, and must be considered in view of the relatively high level of Alaskan landscapes.

Each Character Type is concurrently rated for its Absorption Capability; that is, its relative ability to absorb visual change. Absorption Capability is rated as:

High	(H)
Medium	(M)
Low	(L)

The following charts present the ratings determined during Steps 5 and 6.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

STEPS 5,6

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
MID SUSITNA RIVER VALLEY	B	M	. 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	A	L	. Unique and 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	A	M	. 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	A	L	. Unique and 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	B	M	. 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	A	L	• 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	A	M	• 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	A	L	• 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	B	L	• The variety of water forms and their distinct edges with land and vegetation, along with highly scenic views, gives this landscape an aesthetic value rating of moderate to high. • 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	B	L	• The overall aesthetic value of this area is high due primarily to variety of landforms. 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,J

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
TALKEETNA UPLANDS (contd)	B	L	. 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	A	L	. 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 and even to a greater extent. . 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	B	L	. This setting of large lakes, dense forest and scenic views to the mountains is basically of high aesthetic value. . Unique and 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	B	L	. 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	C	H	• 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 LOWLANDS	C	H	• Low in aesthetic value because of the lack of aesthetically attractive features. • Scale is large and common. • Flat terrain and diverse vegetation patterns should be able to effectively absorb most man-made features. Aesthetic impacts will not be significant.
NENANA UPLANDS	B	M	• 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	C	H	• 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	B	L	• Distinctive and unique landscape to general geographical area.

AESTHETIC VALUE AND ABSORPTION CAPABILITY RATINGS

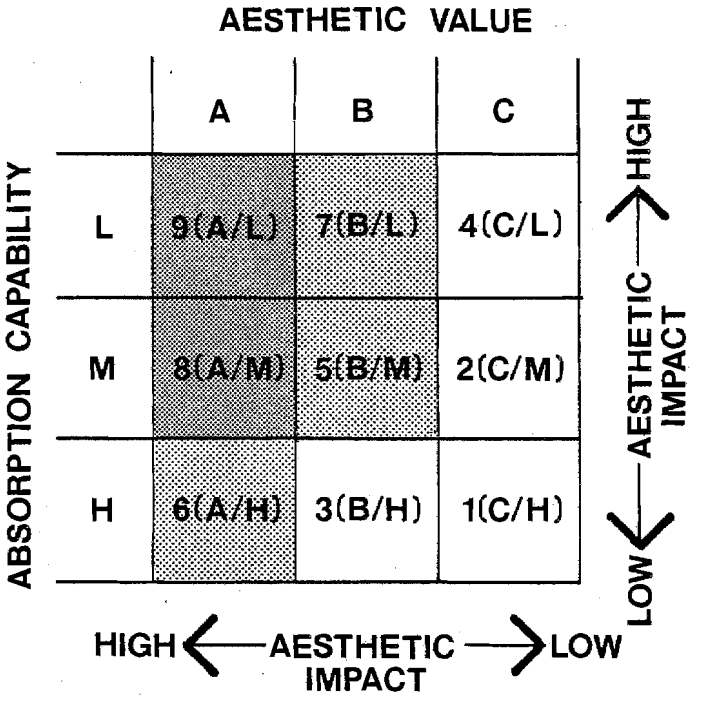
STEPS 5,6

LANDSCAPE CHARACTER TYPE	AESTHETIC VALUE	ABSORPTION CAPABILITY	COMMENTS
TANANA RIDGE (contd)	B	L	• 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.

3.4 - Composite Ratings (Step 7)

In order to determine the potential impacts of development on each Landscape Character Type, composite ratings are determined taking into consideration both the aesthetic value of the type and its absorption capability. Nine different combinations are possible, as shown on the accompanying chart.

COMPOSITE RATINGS



These composite ratings can be grouped and further 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. Therefore, facility design solutions should be equal in strength and compatible in character to the landscape.	Facility design solutions should be similar in character and equal in boldness with the landscape in order to be compatible.

Composite Rating	Description	Design Criteria
7-6-5	Landscape has moderate to high ability to absorb man-made features.	Facility designs should be in harmony with the surrounding landscapes.
4-3-2-1	Landscape has low to moderate aesthetic value with low to high ability to absorb man-made features. Landscape will accept a new variety of harmonious design solutions.	New elements may add to the aesthetic quality beyond existing conditions by introducing visual interest and/or complementing the landscape.

4 - AESTHETIC IMPACT RATING (STEP 8)

4.1 - Relationship Between Proposed Facilities and the Inherent Quality of the Landscape

Impacts are the result of the visual intrusion of various project structures or man-made landscape elements such as transmission right-of-way swaths into the existing environment which is seen and valued by people. Impact may also result from the loss or inundation of scenically valuable natural features and their replacement with a feature of different value.

The following charts describe each project feature (Step 2), identifies the Landscape Character Type within which it occurs (Step 3) and lists the Landscape's Composite Rating (Step 7) Aesthetic Impact ratings are determined by comparison of the features to the ratings of their setting (Step 8). Refer to Appendix 8A for Project Facilities design features. Appendix 8B shows site photos and simulations of major project facilities.

Two aesthetic impact ratings are possible:

(a) Compatible (C)

- The facility is subordinate to the landscape and compatable in characater; and

- Design solution is equal or greater in strength and compatible in character to the landscape.

(b) Incompatible (I)

There is negative contrast between the feature and landscape creating visual discord.

4.2 - Mitigation Planning

Except for a few project features, it is possible to reduce the aesthetic impact of features by employing appropriate mitigation measures. In the last column (W/Mitigation), the generic type of mitigation measure that could be applied is indicated there.

Each feature was first rated in the impacts column "as proposed" - that is, as currently sited and designed utilizing available information. If the rating is (C), no mitigation is necessary and the mitigation column may remain blank. If the rating is (I) and no mitigation is possible without significant design changes, the mitigation column remains blank. If mitigation is possible, the feature's adjusted rating is shown taking into consideration the mitigation measure, which may change the rating to (C) in some cases. In other cases, impacts may continue to be (I), but may be lessened.

If mitigation could be accomplished through redesign, the feature is assigned a new rating in the last column, listed in brackets on second line, to indicate the potential for decreasing aesthetic impact of the feature through new design.

To achieve the proposed level of mitigation, one or more of the following four generic types of mitigation can be employed:

(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; and

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

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

4.3 - Project Impacts Summary

(a) Watana Project Area

- The Watana Dam has been rated incompatable (no mitigation possible) to the Susitna River Landscape Character Type (LCT). The area is incapable of absorbing such a massive element which contrasts in texture and color. The dam form itself is in character to the river banks, however, its orientation in the valley causes it to be visually dissimilar.

- The Main Spillway is also rated incompatable (I). The proposed 100-foot deep cuts will leave large scars on the river valley side and the concrete channel is in sharp contrast to the dark colors of the Susitna River LCT. With proper mitigation, the spillway could become compatable.

- The emergency spillway which is rated I will have impacts similar to the main spillway. In addition, the channel will have a significant impact on dam visitors who will view the its entire length as they cross the spillway bridge. Mitigation is possible which would improve the situation.

- Watana's Powerhouse Access Road also in the Susitna River LCT will cause significant impacts to the area of the dam as viewed by visitors and workers. The road will require large steep cuts in the valley wall which will be difficult to recover with native vegetation. The road is rated I but could become a C with proper mitigation.

- Watana Reservoir will essentially eliminate the Susitna River and River Canyon LCTs in the areas of impoundment and are therefore rated Incompatible in this setting (no mitigation possible). Although reservoirs are not necessarily a negative element aesthetically, the large drawdown areas of Watana will be a negative impact to visitors and workers at the dam area as well as to recreationists on the reservoir itself.

- The Watana switchyard will be located in the Wet Upland Tundra LCT and has been rated as I. This is because the form and texture of switchyard equipment is in sharp contrast to the landscape, and the area is not capable of absorbing the feature. Mitigation could improve these impacts but not eliminate them.

- The Watana Borrow Areas may potentially be a very significant impact on the areas around Watana if their ultimate form is in contrast to existing character, and natural vegetation does not hide the scar. The Borrow areas are rated I, with mitigation a C is possible.

- The tailrace tunnel access road will have similar impacts as the powerhouse access road on the south side of the dam and it has been rated I.

- The Watana Airstrip is rated compatable. It will not be in contrast to the wet upland tundra (LCT) and the area is capable of absorbing this visual change.

- Watana Permanent Town is rated I but could receive a C if redesign studies were done. The town is very disruptive visually.

(b) Devil Canyon Dam Area

- The Devil Canyon Dam area will be a very strong element in the Devil Canyon LCT. The dramatic size and form will be a positive element and is in character to the setting.

- Devil Canyon Saddle Dam is not a visually existing element, therefore, the contrast of form, color and texture it introduces into the sensitive Devil Canyon LCT will be incompatable. No mitigation is possible to make it compatable although some improvements are possible.

- Devil Canyon spillway is incompatable to the area. The form of its deep cut and the color of the concrete and denuded slopes will be a significant visual impact to visitors at the Dam and Visitors Center as well as to workers in the area.

- The Devil Canyon Emergency Spillway has very similar impacts as the main spillway and is also rated I. This spillway, however, is not as prominent from the main vantage points of the Canyon bridge, Dam and Visitors Center.

- Devil Canyon Reservoir, like Watana, will eliminate the existing LCT. It has been rated I. The visual impacts of this reservoir will not be as severe as Watana because a lower fluctuation differential and steeper banks will result in less area during drawdown becoming exposed. However, the areas will be visible during the times at heaviest visitation to the dam and reservoir. No mitigation is possible.

- Devil Canyon Powerhouse Tunnel Access road has been rated I as a result of the major cuts and areas of vegetation removal required to construct the road down the steep slopes.

- The Devil Canyon Switchyard will be in sharp contrast to the existing landscape character as is the switchyard at Watana. The yard is rated I because the setting cannot absorb this feature, however, mitigation is possible to lessen the impacts.

- Devil Canyon Transmission Lines will be visible from the access road, the bridge and the dam. They have been rated I in the Devil Canyon LCT because they are difficult to hide here and the points of viewing are important within the Mid-Susitna River Valley LCT. The lines have been given a C rating because they will be more easily hidden by scattered trees and proper alignment in the topography.

(c) Access Roads and Rail

- The Watana Access Road runs through the wet upland tundra LCT which has a high composite rating and the Chulitna Mountains LCT which is also rated high. In both of these areas, the road has been rated incompatable because of the LCTs low capability to absorb visual change such as the significant cuts and fills required for construction as the road is proposed. A C rating is possible within these LCT settings with the proper mitigation and careful road design.

- The Borrow Areas for Watana Road are located in the same LCTs as the road and have been rated as incompatable. These areas are very sensitive to disruption and excavation activities will be very difficult to hide.

- The Watana to Devil Canyon Access Road traverses three distinct LCTs: Wet Upland Tundra, Chulitna Moist Tundra Uplands and Devil Canyon. The road has been rated I in all of these settings for the same reasons as the Watana road. However, in the first two LCTs the road could become compatable if carefully mitigated because these areas can more easily absorb the change and their character is more compatable with road forms. Within the Devil Canyon LCT, however, there are no methods to make the road compatable due to the constraints of topography and the areas high visual sensitivity.

- Borrow Areas for the Devil Canyon Access Road occur in the same LCTs as the road and are incompatable for the same reasons.

- The high level bridge below Devil Canyon Dam has also been rated as incompatable as it is currently proposed. The bridge will offer visitors an opportunity to view the dam and canyon. This bridge when viewed from other points will be a very prominent element in the Devil Canyon LCT, and unlike the dam has not been engineered to be a visually exciting and positive visual element in the area.

- The railroad spur from Gold Creek to Devil Canyon runs through the Mid-Susitna River Valley and has been rated incompatable to this LCT as a result of the extensive disruption and scars which will result from construction.

(d) Construction Worker Accommodations

- The Watana Village and Camp are located in the Wet Upland Tundra LCT and have been rated as incompatable because of the large areas which will be disturbed, and the introduction of large numbers of structures into an area which cannot absorb the change. Proper design will mitigate this impact but cannot make the towns compatable to the setting because of their great contrast to the existing landscape setting.

- The Devil Canyon Camp and Village are located within the mid-Susitna River Valley LCT and are rated incompatable for the same reasons as the Watana Camps. However, mitigations will need to be modified to respond to the unique character of this setting.

(e) Transmission Lines

- Temporary 138 kV transmission line. This line from Watana to the Denali Highway is rated incompatable to its setting. The Chulitna Mountains and Wet Upland Tundra cannot absorb this feature, however, with proper siting, the views of it can be limited.

- The two 345 kV transmission lines from Watana to Gold Creek pass through five district LCTs. Within the Devil Canyon and Susitna River environments, it has been rated as incompatable because of its high visibility and this areas inability to screen the lines from view. Within the mid-Susitna River Valley and the Talkeetna Uplands, the lines are rated compatable because they are not in conflict and the settings are capable of absorbing the drainage. The Chulitna Moist Upland Tundra could absorb the lines if proper mitigation is followed, however, at present the lines are incompatable.

- The Gold Creek Switchyard is rated compatable to the mid-Susitna River Valley because the area is capable of absorbing the feature as designed.

- The Anchorage to Willow Transmission stub line passes through the Anchorage and Susitna River lowlands and have been rated compatable because these settings are capable of absorbing the new features without causing degradation of the existing visual character.

- Healy to Fairbanks Transmission stub line is rated as compatable in the Nenana River lowlands for the same reasons discussed above. Within the Nenana Uplands and the Tanana Ridge LCTs, the line has been rated I because of its high visibility and the area's low absorption capability.

- Recreation Features have been all rated compatable to their LCT settings because they do not, for the most part, constitute a significant visual modification to the environment. The exception to this is the visitors center, one on the south side of Devil Canyon Dam and other on the north side of Watana Dam. With proper design, these will also be visually compatable to their settings.

- The Construction Practices have also been evaluated for their aesthetic impacts which will last after activity has ceased. This includes rock crushing which could potentially create large amounts of blowing dust and visual degradation. Vegetation clearing for construction activity areas, and spoil sites will leave lasting scars on the landscape. All of these are considered for the proposed aesthetic evaluation to be inherently incompatable to their environments and careful mitigations will be needed.

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA PROJECT AREA

WATANA DAM

FEATURE DESCRIPTION

- Earth-fill dam.
- 885 ft high.
- 4,100-ft crest length.
- Rough (consistent) textured rock surface.
- Will be one of the highest dams in the world.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA MAIN SPILLWAY

FEATURE DESCRIPTION

. Concrete sloping channel 2,000 ft long and 100-ft wide varies.
. 30 ft deep.
. As engineered will require cuts up to and over 100 ft deep on river valley slope. Cut side slopes are 4 ft vertical to 1 ft horizontal.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	(Ca,c)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA EMERGENCY SPILLWAY

FEATURE DESCRIPTION

- Rock cut channel, over 5,000 ft long, 200 ft wide and 30 - 50 ft deep.
- Concrete spillway.
- As engineered will require cuts up to and over 100 ft deep on the river's upper north terrace. The entire length will require cuts of this magnitude. Cut side slopes are 4 ft vertical to 1 ft horizontal.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	(Ic,d) (Ca)
Wet Upland Tundra	7(B/L)	I	(Ic,d) (Ca)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA POWERHOUSE ACCESS ROAD

FEATURE DESCRIPTION

- Gravel road of ±24 ft wide and over 1.5 miles long. Several hairpin turns as it traverses down 400 ft 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	(Ca)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA RESERVOIR

FEATURE DESCRIPTION

- Approximately 54 miles in length and over 5 miles wide at the confluence of Watana Creek.
- Surface area of 38,000 acres.
- Maximum depth at normal operating level of 680 ft.
- Normal maximum operating elevation is 2,185 feet and a low of 2,065 ft in April or May--drawdown of 120 ft.
- All timber will be cleared in the reservoir area and will probably be burned.
- Drawdown will create extensive mud flat areas up to and over 1 mi 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 portins of 7 major tributaries, 2 waterfalls, and a large amount of Vee Canyon.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	B(A/M)	I	
River Canyon	9(A/L)		

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA SWITCHYARD

FEATURE DESCRIPTION

- Will occupy an area of approximately 650 ft x 750 ft above the dam on the north terrace.
- Miscellaneous electrical equipment.
- Area will be paved with gravel and fenced.
- Origin point of two 345-kV transmission lines.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ic,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA BORROW AREAS

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 dam site are designated as borrow areas.
- A borrow area of approximately 640 acres is located on the high north terrace adjacent to Deadman Creek.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	(Ic) (Ca)
Wet Upland Tundra	7(B/L)	I	Cd
Susitna Upland Terrace	7(B/L)	I	I

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

WATANA TAILRACE TUNNEL ACCESS ROAD

FEATURE DESCRIPTION

- Gravel road of +24 feet in width and over 1 mile in length.
- Traverses down the south river slope some 500 ft in elevation. Several hairpin turns.
- Significant cuts will be required to build the road on these steep slopes.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	I	(Ca)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA TEMPORARY AIRSTRIP

FEATURE DESCRIPTION

- Gravel airstrip of approximately 2,500 ft in length.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	C	Cb

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA PERMANENT TOWN

FEATURE DESCRIPTION

- Town Center - approximately 20 buildings.
- Road - perimeter.
- Surrounds a small lake approximately 35 acres in size.
- Supports 400 people of which 125 will operate both dams and facilities.
- Dwelling Units (125).
- Hospital.
- Water and Sewage Treatment Plants.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	(Ic,d) (Ca)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA PERMANENT TOWN

FEATURE DESCRIPTION

- Town Center - approximately 20 buildings.
- Road - perimeter.
- Surrounds a small lake approximately 35 acres in size.
- Supports 400 people of which 125 will operate both dams and facilities.
- Dwelling Units (125).
- Hospital.
- Water and Sewage Treatment Plants.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	(Ic,d (Ca

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, J

PROJECT FEATURE

TWO 345-kV TRANSMISSION LINES
(See Plate 8.5)

FEATURE DESCRIPTION

- Parallel and adjacent lines for 33.6 miles.
- Towers are guyed steel pole "x" structures (CORTEN)
  - + 100 ft high
  - + 85 ft to top of main structure
  - + 3 - single circuit conductors per transmission line for a total of 6 conductors.
  - + Base width of 45 ft.
- Right-of-way width of 300 ft.
- Complete clearing of right-of-way is not necessary - top trees to a 30-ft radius distance of the conductors including maximum sag.
- Additional towers
  - + single steel pole angle structure, also 100 ft 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 high.
- Typical distance between towers is 1,300 ft
- Adjacent towers or poles are 115 ft apart.
- Foundations for all structures, except hill side single poles, will consist of steel piling or rock anchored concrete pedestals
- Single pole structure will have a foundation pedestal anchored to rock or a concrete cylinder approximately 6 ft in diameter and 25 ft deep in other soils.
- Nonspecular conductors.
- Winter construction in roadless areas along with helicopter construction in sensitive or steep terrain. A good portion of west end can be done from an existing road.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	C	Cb,d
Devil's Canyon	9(A/L)	I	Ib,c
Susitna River	8(A/M)	I	Ib
Chulitna Moist Tundra Uplands	8(A/M)	I	Cb,d
Talkeetna Uplands	7(B/L)	C	Cb,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON PROJECT AREA
DEVIL CANYON CONCRETE ARCH DAM

FEATURE DESCRIPTION

. Arch dam will be double curved with a maximum height of 645-ft, spans approximately 1,300 ft across lower Devil Canyon

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	C	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

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 1,000 ft long. Rough (consistent) textured rock surface.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Ib,c

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON MAIN SPILLWAY

FEATURE DESCRIPTION

- Steeply sloping concrete channel over 1,000 ft long with a tapered width no less than 75 ft. Channel depth of approximately 25 ft.
- As engineered, will require cuts up to and over 100 ft deep on the north river slope. Cut side slopes are 4 ft vertical to 1 ft horizontal.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	(Ca,c)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

DEVIL CANYON EMERGENCY SPILLWAY

FEATURE DESCRIPTION

- Sloping rock cut channel over 1,400 ft long with an extending pilot channel - concrete - approximately 800 ft in length. Main channel width is approximately 250 ft. Pilot channel is approximately 50 ft wide.
- As engineered, will require cuts up to 100 ft deep on the river's high south terrace.
- Cut side slopes vary from 1.4 ft vertical to 1 ft horizontal and 10 ft vertical to 1 ft horizontal.
- Pilot channel terminates in a ravine which empties into the river.
- Concrete spillway - fuse plug.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Ic Ca

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON RESERVOIR

FEATURE DESCRIPTION

- Approximately 32 miles 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 7,800 acres.
- Maximum depth at normal operating level of 550 ft.
- Normal maximum operating elevation of 1,455 ft for most of the year. Low of 1,405 ft in August or September (drawdown of 50 ft).
- 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil's Canyon	9(A/L)	I	
Susitna River	8(A/M)	I	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON POWERHOUSE TUNNEL
ACCESS ROAD

FEATURE DESCRIPTION

- Gravel road ±24 ft in width and over 2.5 miles long from the switchyard to tunnel entrance.
- Makes 3 hairpin turns as it traverses down the north slope some 800 ft in elevation.
- Significant cuts will be required to build the road on these steep slopes.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Ic Ca

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON SWITCHYARD

FEATURE DESCRIPTION

- Occupies a space of approximately 800 ft x 1,000 ft 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Ic,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

DEVIL CANYON TWO 345-kV TRANSMISSION LINES -
Adjacent to and parallel to the two 345-kV lines from the Watana phase
(see Plate E8.5)

FEATURE DESCRIPTION

. See Watana Project Area description of transmission lines.
. Increases right-of-way width to 500 ft.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Ib,c
Mid Susitna River Valley	5(B/M)	C	Cb,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

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 above the Susitna River on the south bank terrace north of Gold Creek.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	C	Cc,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

RAILROAD SPUR FROM GOLD CREEK TO DEVIL CANYON

FEATURE DESCRIPTION

- Approximately 14 miles in length.
- Minimum disturbed section width of 31 ft.
- 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 x 3,000 ft. 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	I	Cb,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA ACCESS ROAD - DENALI HIGHWAY TO WATANA DAM

FEATURE DESCRIPTION

- Gravel road of approximately 40 miles in length.
- 24 ft wide, 44 ft minimum disturbed section.
- Design speed is 40 - 60 mph.
- 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 first serve as a temporary 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.
- Will have pulloff - small parking areas for 3 - 5 cars
  - + vista points
  - + trailhead
  - + campground
- Culverts

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ca,b,c,d
Chulitna Mountains	9(A/L)	I	Ca,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

BORROW AREAS - 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ca,b,d
Chulitna Mountains	9(A/L)	I	Ca,b,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

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 in length.
. 24 ft wide - 44-ft minimum disturbed section.
. Design speed is 40 - 60 mph.
. 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.
. Major purpose is for operators of Devil Canyon Dam who live at Watana Permanent Town. Also has long-term recreation purposes.
. Will have pulloff - small parking areas for 3 - 5 cars
  + vista points
  + trailhead
  + campground.
. Culverts and bridges

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ca,b,c,d
Chulitna Moist Tundra Uplands	8(A/M)	I	Ca,b,c,d
Devil Canyon	9(A/L)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7 &

PROJECT FEATURE

BORROW AREAS - 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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ca,b,c,d
Chulitna Moist Tundra Uplands	8(A/M)	I	Ca,b,c,d
Devil Canyon	9(A/L)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,8

PROJECT FEATURE

HIGH LEVEL BRIDGE OVER DEVIL CANYON BELOW DAM

FEATURE DESCRIPTION

- Steel suspension bridge approximately 2,600 ft in length and 600 ft above the river bottom.
- The bridge, as engineered, is not horizontal. The south end is nearly 100 ft higher in elevation than the north end.
- Primary purpose is to aid in construction of Devil Canyon dam.
- Shallow curved suspension.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Devil Canyon	9(A/L)	I	Cc

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

ANCHORAGE TO WILLOW TRANSMISSION STUB LINE
(see Plate E8.5)

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 in length.
- See feature description of transmission lines for Watana Project Area for detail.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Anchorage, Alaska	1(C/H)	C	Ca,b,d
Susitna River Lowlands	1(C/H)	C	Ca,b,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,8

PROJECT FEATURE

HEALY TO FAIRBANKS TRANSMISSION STUB LINE
(see Plate E8.5)

FEATURE DESCRIPTION

. Two 345-kV transmission lines after completion of Watana Dam.
. 98 miles in length.
. See feature description of transmission lines for Watana Project Area for detail.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Nenana Uplands	5(B/M)	I	(Ib,d) (a,b,d)
Nenana River Lowlands	1(C/H)	C	Ca,b,d
Tanana Ridge	7(B/L)	I	(Ib,d) (Ca,b,d)

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

RECREATION FACILITIES AND FEATURES
WATANA DAM VISITOR CENTER
(To be designed)

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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Susitna River	8(A/M)	Ca,c,d	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON DAM VISITOR CENTER
(To be designed)

FEATURE DESCRIPTION

- Located above the dam on the south side of the river.
- See Watana visitor center description above. No botanical garden.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Moist Tundra Uplands	8(A/M)	Ca,c,d	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,

PROJECT FEATURE

SHELTERS

FEATURE DESCRIPTION

. Rustic log cabin type structures of 200 - 300 square feet in size.
. Used as a warming shelter and place to get in from the weather.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Moist Tundra Uplands (Mermaid Lake)	8(A/M)	Cc,d	
Chulitna Mountains (Tsusena Creek-Caribou Pass)	9(A/L)	Cc,d	
Susitna Upland Wet Tundra Basin (Tyone River confluence W/Susitna)	7(B/L)	Cc,d	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

SEMIDEVELOPED CAMPGROUND

FEATURE DESCRIPTION

- Walk-in designated campground area with hardened tent pad and fire pit for each unit.
- Rest rooms (pit toilet)

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)	Cb,c	
Chulitna Moist Tundra Uplands (Mermaid Lake)	8(A/M)	Cb,c	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

PRIMITIVE CAMPING

FEATURE DESCRIPTION

- General area designated but no development.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Mountains	9(A/L)	C	
Wet Upland Tundra	7(B/L)	C	
Susitna Uplands	7(B/L)	C	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVELOPED TRAILS

FEATURE DESCRIPTION

. Cleared and hardened (compacted) trail 2 - 3 ft wide. Portions of established game trails may be utilized.
. Trail destination and mileage markers.
. Explanatory signage-landscape-environment-views.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Mountains	9(A/L)	Cb	
Wet Upland Tundra	7(B/L)	Cb	
Chulitna Moist Tundra Uplands	8(A/M)	Cb	
Devil Canyon	9(A/L)	Cb	
Susitna Upland Terrace	7(B/L)	Cb	
Susitna Uplands	7(B/L)	Cb	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

PRIMITIVE TRAILS

FEATURE DESCRIPTION

• Suggested trail corridors. No physical trail development.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Chulitna Mountains	9(A/L)	C	
Talkeetna Mountains	9(A/L)	C	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

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 have anchored boat tie-ups.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	Cb	
Chulitna Mountains	9(A/L)	Cb	
Chulitna Moist Tundra Uplands	8(A/M)	Cb	
Devil Canyon	9(A/L)	Cb	
Susitna River	8(A/M)	Cb	
Susitna Uplands	7(B/L)	Cb	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

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.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	Cb	
Chulitna Mountains	9(A/L)	Cb	
Chulitna Moist Tundra Uplands	8(A/M)	Cb	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,8

PROJECT FEATURE

FACILITIES CONSTRUCTION - DAMS AND RESERVOIRS

FEATURE DESCRIPTION

. Dam construction sites.
. Miscellaneous dam building equipment.
. Rock crushing plant.
. Storage buildings.
. Cofferdams.
. Diversion tunnels
. Exterior material storage and lay-down areas.
. Borrow areas.
. Clearing and burning of timber in reservoir impoundment areas.
. Spoil sites.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Watana			
Susitna River	8(A/M)	Ib	
River Canyon	9(A/L)	Ib	
Susitna Upland Wet Tundra Basin	7(B/L)	Ib	
Wet Upland Tundra	7(B/L)	Ib	
Susitna Upland Terrace	7(B/L)	Ib	
Devil Canyon			
Devil Canyon	9(A/L)	Ib	
Susitna River	8(A/M)	Ib	
Chulitna Moist Tundra Uplands	8(A/M)	Ib	
Talkeetna Uplands	7(B/L)	Ib	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,8

PROJECT FEATURE

FACILITIES CONSTRUCTION - ROADS

FEATURE DESCRIPTION

- Road construction site.
- Miscellaneous road building equipment.
- Rock crushing plant.
- Storage buildings.
- Exterior material storage and lay-down areas.
- Borrow areas.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	Ib	
Chulitna Mountains	9(A/L)	Ib	
Chulitna Moist Tundra Uplands	8(A/M)	Ib	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

TEMPORARY 138-kV TRANSMISSION LINE (8 YEARS)

FEATURE DESCRIPTION

- Power source for construction of Watana Dam.
- Parallel to the north-south access road.
- Origin at Cantwell, Alaska—follows Denali Highway.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	Ib	
Chulitna Mountains	9(A/L)	Ib	

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

WATANA CONSTRUCTION CAMP

FEATURE DESCRIPTION

- Covers an area of approximately 150 acres.
- Over 100 structures
  - + dormatories
  - + recreation facilities
  - + hospital
  - + service buildings
  - + administration buildings, etc.
- Ball fields (3)
- Sewage treatment plant and landfill.
- Will support 3,480 people for approximately 8 years.
- Roads
- Fenced

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7,8

PROJECT FEATURE

WATANA CONSTRUCTION VILLAGE
(Adjacent to Permanent Town)

FEATURE DESCRIPTION

- Covers an area of approximately 150 acres.
- Multi-family and single family status.
- Supports 1,120 people for approximately 8 years.
- Variety of structures including
  - + dwelling units
  - + school
  - + service
  - + recreation center
  - + gymnasium
  - + managing offices
  - + general store, etc.
- Roads
- Fenced

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Wet Upland Tundra	7(B/L)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON CONSTRUCTION CAMP

FEATURE DESCRIPTION

- Covers an area of approximately 100 acres.
- Approximately 75 structures including
  - + dormitories
  - + staff housing
  - + hospital
  - + gymnasium
  - + warehouse
  - + recreation hall
  - + staff clubhouse
  - + ball fields (3)
  - + water treatment plant and reservoir.
- Roads and covered walkways.
- Will support 1,780 workers for approximately 10 years (after the completion of Watana Dam).
- Sewage treatment plant.
- Located on an existing wet flat terrace with good surrounding forest cover.
- Fenced

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

DEVIL CANYON CONSTRUCTION VILLAGE

FEATURE DESCRIPTION

- Covers an area of approximately 100 acres.
- 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

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	I	Ia,b,c,d

RELATIONSHIP BETWEEN PROPOSED FEATURES AND LANDSCAPE RATINGS

STEPS 7, 8

PROJECT FEATURE

RAILROAD

FEATURE DESCRIPTION

- Construction site.
- Miscellaneous railroad building equipment.
- Storage buildings.
- Exterior material storage and lay-down areas.
- Rock crushing plant.
- Borrow areas.

WITHIN LANDSCAPE CHARACTER TYPE...	LANDSCAPE COMPOSITE RATING	AESTHETIC IMPACT RATING	
		Feature as Proposed	W/ Mitigation
Mid Susitna River Valley	5(B/M)	I	Cb

5 - PROPOSED MITIGATION MEASURES (STEP 9)

Mitigation measures are the crux of the plan for preservation and enhancement of scenic and natural values, and resources within the Susitna Basin. Step 9 describes the proposed measures for mitigating aesthetic impacts in each of the following categories for each of the project features:

(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 in facility design.

Appendix 8D shows illustration of these mitigations for the major project facilities.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP

PROJECT FEATURE	MITIGATION MEASURES
WATANA PROJECT AREA WATANA DAM	. The scale of Watana Dam will be impressive but its size and form are incompatible with the highly rated character type. . No mitigation possible.
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, further 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 compatibe 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).

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP 9

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 AREAS	. 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 areas 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 area on the north high terrace area north of the dam site 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 Lake 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

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 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 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 walls. . 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-deg angles.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP 9

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 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 meausures for Watana Dam/Powerhouse Access 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'S CANYON TO GOLD CREEK SWITCHYARD)	. See mitigation measures for Watana to Gold Creek Transmission Lines.

PROPOSED MITIGATION MEASURES

STEP

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 mi/h 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 dam, 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 AREAS 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 areas 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 areas and then scarified and fertilized. The site should then be left alone for invasion of natural tundra species. . Where possible, borrow areas should be filled to natural grades with spoil material. Again, organic topsoil should be distributed and the previous procedure followed.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP 9

PROJECT FEATURE	MITIGATION MEASURES
DEVIL CANYON ACCESS ROAD	. See mitigation measures for Watana Access Road.
BORROW AREAS FOR DEVIL CANYON ACCESS ROAD	. See mitigation measures for Borrow Areas/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 (see Plate E8.5) can be compatible with some mitigation. . Underground routing of the transmission line is recommended for the last 3 - 4 mi 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.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP

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.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP 9

PROJECT FEATURE	MITIGATION MEASURES
SCENIC VISTA/ROAD PULLOFFS	. See mitigation measures for Trailheads.
FACILITIES CONSTRUCTION COMMON MITIGATION MEASURES/PROJECT AREA CONSTRUCTION	. Because the constant on-going heavy construction activity within the project area and its temporary nature, the construction process and related visual impacts are viewed as incompatible. . Educate project personnel in construction methods which result in minimal environmental impacts. This is directly related to aesthetic impacts. Identify environmentally sensitive areas and features, and explain why they are vulnerable to disturbance and therefore why protective measures are needed. . Interdisciplinary teams should be utilized for assessment and recommendations for the proper siting, design and construction procedure of any major operation with potential of adverse aesthetic and environmental impacts. . Proper siting should minimize requirements for clearing or removal of vegetation. . Dust control measures should be developed. Water application is recommendd. . Site rehabilitation methods should be studied and applied to abandoned sites and depleted material areas by the end of the next growing season following last use.
DAMS/RESERVOIRS	. See mitigation measures for Watana Dam/Borrow Areas. . See Common Mitigation Measures.
ROADS	. See Common Mitigation Measures/Project Area Construction. . See mitigation measures for Denali Access Road.
TEMPORARY 138-kV TRANSMISSION LINE	. See Common Mitigation Measures/Project Area Construction. . See mitigation measures for Watana Project Area/Transmission Lines.
WATANA CONSTRUCTION CAMP WATANA CONSTRUCTION VILLAGE DEVIL CANYON CONSTRUCTION CAMP DEVIL CANYON CONSTRUCTION VILLAGE	. See Common Mitigation Measures/Project Area Construction. . See mitigation measures for Permanent Town.

AESTHETIC RESOURCES

PROPOSED MITIGATION MEASURES

STEP)

PROJECT FEATURE	MITIGATION MEASURES
RAILROAD	. See Common Mitigation Measures/Project Area Construction. . See mitigation measures for Railroad Spur from Gold Creek to Devil Canyon.

6 - AESTHETIC IMPACT EVALUATION OF THE INTERTIE

(a) 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.

As this new facility will carry power generated by the Susitna Project over a system expanded to serve the project as shown in Figure E.8.5, it is briefly discussed herein.

(b) 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.8.5 illustrates the inertie as it is planned to be constructed in 1983 along with subsequent additions for the Susitna Project includng the stubs and dam interconnections. The intertie will be a 170-mile 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 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's 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.

(c) 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

- 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

- Nenana Gorge - Nenana River Crossing to Healy.

However, inspection of the route shows that the landscape unit types which will actually be traversed are as follows:

- Susitna River Lowlands
- Talkeetna Mountains
- Chulitna River
- Broad Pass
- Alaska Range
- Yanert River Valley
- Nenana Uplands

Therefore, these were units analyzed for the purposes of this report.

These landscape unit types and the approximate point of inclination (P.I.) of the transmission line are as follows.

(i) Susitna River Lowlands

Willow Substation to P.I. 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-hardwood 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 heaviest 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.

Many of the larger and more scenic lake areas are popular summer and permanent home sites for hundreds of Southcentral Alaskans. Some are accessed by road while others are only reached by float plane.

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.

(ii) Talkeetna Mountains

(P.I. 14 to P.I. 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
- Talkeetna Uplands.

The proposed alignment passes through these latter two character types which are described below.

(iii) Lowlands Portion

After steeply rising several thousand feet from the Susitna River Valley, the landscape in the lower Talkeetnas becomes a rolling terraced/plateau. With a few knobs rising above 4,000 feet the average elevation is around 3,000 feet.

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 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 float plane, snowmobile and use of a few existing mining and/or settlement trails.

(iv) 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-hardwood 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 four miles 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, float plane, boat and a limited number of jeep ATV or horse trails.

(v) Chulitna River

P.I. 41 to P.I. 48 on the Chulitna River.

Dividing the Alaska Range and Chulitna Mountains, this flat to rolling river valley is predominately an open tundra-covered landscape. Sparse to moderately dense spruce-hardwood 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.

(vi) Broad Pass

P.I. 48 to P.I. 65 north of the Nenana River.

Over 10 miles wide near the town of Broad Pass and narrowing to 4 miles 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.

(vii) Alaska Range

P.I. 65 to midway between P.I. 70 and P.I. 71 on the southern edge of the Yanert River Valley, and P.I. 74 to P.I. 83 near Moody Creek southeast of Healy.

Featuring North America's highest mountain, the U-shaped Alaska Range extends nearly 600 miles 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 Southcentral region of Alaska. Elevations range from approximately 2,000 feet in adjacent valley to over 20,000 feet at Mount McKinley.

(viii) Nenana Uplands

P.I. 83 to P.I. 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-hardwood 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 reliefed 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.

(ix) Yanert River Valley

P.I. 71 to P.I. 74

A 35-miles swath through the Alaska Range east from the Nenana River, the Yanert River Valley ranges from 2 miles in width at the Yanert Glacier to over 5 miles 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. 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.

(d) Description of the Preferred Route

The preferred transmission line route extends 170.1 miles 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 1-1/2 miles east of the Parks Highway. Thence the alignment follows the Matanuska Electric Association right-of-way approximately 19 miles north. It continues in the Susitna Lowlands until Chunilna Creek, northeast of Talkeetna, whence it proceeds east and up into the Talkeetna Mountains, before dropping back to the Susitna River near Gold Creek. The alignment then proceeds due north east 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.

(e) Alternatives

Many minor route adjustments and subalternatives were considered by Commonwealth. In addition, 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.

- An alignment along the Nenana Gorge rather than east of Sugar Loaf Mountain.

In addition, alternative pole configurations, voltage levels, selective undergrounding, and alternative systems to the Intertie were considered and rejected.

(f) Impacts

A cursory examination of visual impacts based on aerial and limited ground inspection of the preferred and alternative alignments, study of U.S.G.S. topographic maps, and analysis of the Commonwealth report is as follows.

(i) 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.

(ii) 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.

(iii) 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 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.

(iv) 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.

(v) 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 of the Parks Highway. The alignment ranges from a few hundred feet to approximately 2 miles from the highway as it passes through this unit. Visual impacts will be high. The crossing of the Denali Highway, currently under study by BLM, for scenic highway designation, will also be in full view.

(vi) Yanert River Valley - Crossing this valley, the alignment is approximately 2 miles east of the highway and will not have major impacts.

(vii) Nenana Uplands

The location of the Healy substation near the Alaska Railroad and Nenana Railroad will be highly visible and has negative visual impacts.

7 - 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
F.E.R.C.	Mark Robinson	09.29.82	Phone
F.E.R.C.	Frank Karwoski	09.30.82 10.13.82	Phone
U.S.B.L.M.	John Rego	10.15.82	Meeting
U.S.B.L.M.	Mike Wrabetz Bob Ward	09.17.82	Meeting
U.S.F. & W.S.	Dave Patterson	09.21.82	Meeting
U.S.N.P.S.	Larry Wright	09.15.82	Meeting
DNR Div Parks	Sandy Rabinowitch	09.14.82 09.15.82	Phone Meeting
		10.28.82	Meeting
DNR Div Parks	Jack Wiles Pete Marks	09.15.82 10.20.82	Meeting Meeting
DNR	Dave Stephens	09.22.82	Phone
DNR	Bill Beatty	10.04.82	Meeting
DOT	Mike Tooley	09.14.82	Meeting
DOT	Dan Kelly	09.29.82	Meeting
DOT	Andy Zahare	09.24.82	Phone
MAT-SU Borough Planning Dept	Claudio Arenas	09.21.82 10.18.82	Meeting Phone
CIRI	Roland Shanks	09.15.82 10.14.82	Meeting Meeting
Tyonek Village Corp	Carl Ehelebe	09.22.82 09.28.82 10.14.82	Phone Meeting Meeting

Agencies	Person	Date	Communication
Tyonek Village Corp	Agnes Brown	09.28.82 10.14.82	Meeting Meeting
AHTNA Development Corp & KNIK Village Corp	N. Roy Goodman	09.22.82 09.28.82 10.14.82	Phone Meeting Meeting
Museum	E. J. Dixon	09.20.82	Meeting
AG. Experiment Station	Alan Jubenville Jo Feyl	09.09.82 09.24.82	Phone Phone

REFERENCES

1. Acres American Incorporated, Susitna Hydroelectric Project, Transmission Line Selection Route, prepared for the Alaska Power Authority, Final Draft, March 1982.

2. _____, Susitna Hydroelectric Project, Transmission Line Corridor Screening Closeout Report, Task 8 Transmission Final Report, prepared for the Alaska Power Authority, March 1982.

3. _____, Susitna Hydroelectric Project, Access Plan Recommendation Report, prepared for the Alaska Power Authority, August 1982.

4. _____, Susitna Hydroelectric Project, Feasibility Report, Volumes 1-7, Final Draft, prepared for the Alaska Power Authority, undated.

5. Alaska Department of Natural Resources, Division of Research and Development, Scenic Resources along the Parks Highway, 1981.

6. Alaska Department of Transportation and Public Facilities, Denali Highway Environmental Assessment, Fall 1981.

7. _____, Denali Highway Location Study Report, RS-0750 (I), Fall 1981.

8. Alaska Geographic, A Photographic Geography of Alaska, Volume 7, No. 2, 1980.

9. Alaska Magazine, The Alaska Almanac, 1982 Edition, September 1981.

10. Alyeska Pipeline Service Company, Visual Impact Engineering, Visual Assessment Principles, Procedures, and Application, V.I.E. Technical Notes 00.1, August 1975.

11. American Association of State Highway Officials, Geometric Design Guide for Local Roads and Streets, Washington, D.C., 1971.

12. Carter, M. Floating Alaskan Rivers, Aladdin Publishing, 1982.

13. Childers Associates, Roadside Recreational Facilities Study, Richardson Highway, M 82.6-185.5, prepared for the Alaska Department of Natural Resources, Division of Parks, July 1, 1982.

14. Colorado Department of Highways, I-70 in a Mountain Environment, Vail Pass, Colorado, 1978.

15. Commonwealth Associates, Inc., Anchorage-Fairbanks-Transmission Intertie Route Selection Report, prepared for Alaska Power Authority, January 1982.

16. _____, Environmental Assessment Report, Anchorage-Fairbanks Transmission Intertie, prepared for the Alaska Power Authority, March 1982.

17. Jones and Jones, Upper Susitna River - An Inventory and Evaluation of the Environmental, Aesthetic and Recreational Resources, prepared for D.O.A., Alaska District, Corps of Engineers, March 14, 1975.

18. U. S. Department of Agriculture, Forest Service, Hells Canyon--Enterprise Powerline Construction Report, June 1968.

19. _____, National Forest Landscape Management, Volume 1, 1973 and Volume 2, 1975-1977.

20. _____, The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research, GTR PNW-98, December 1979.

21. _____, Northern Region, Recreation Opportunity Inventory and Evaluation, June 1974.

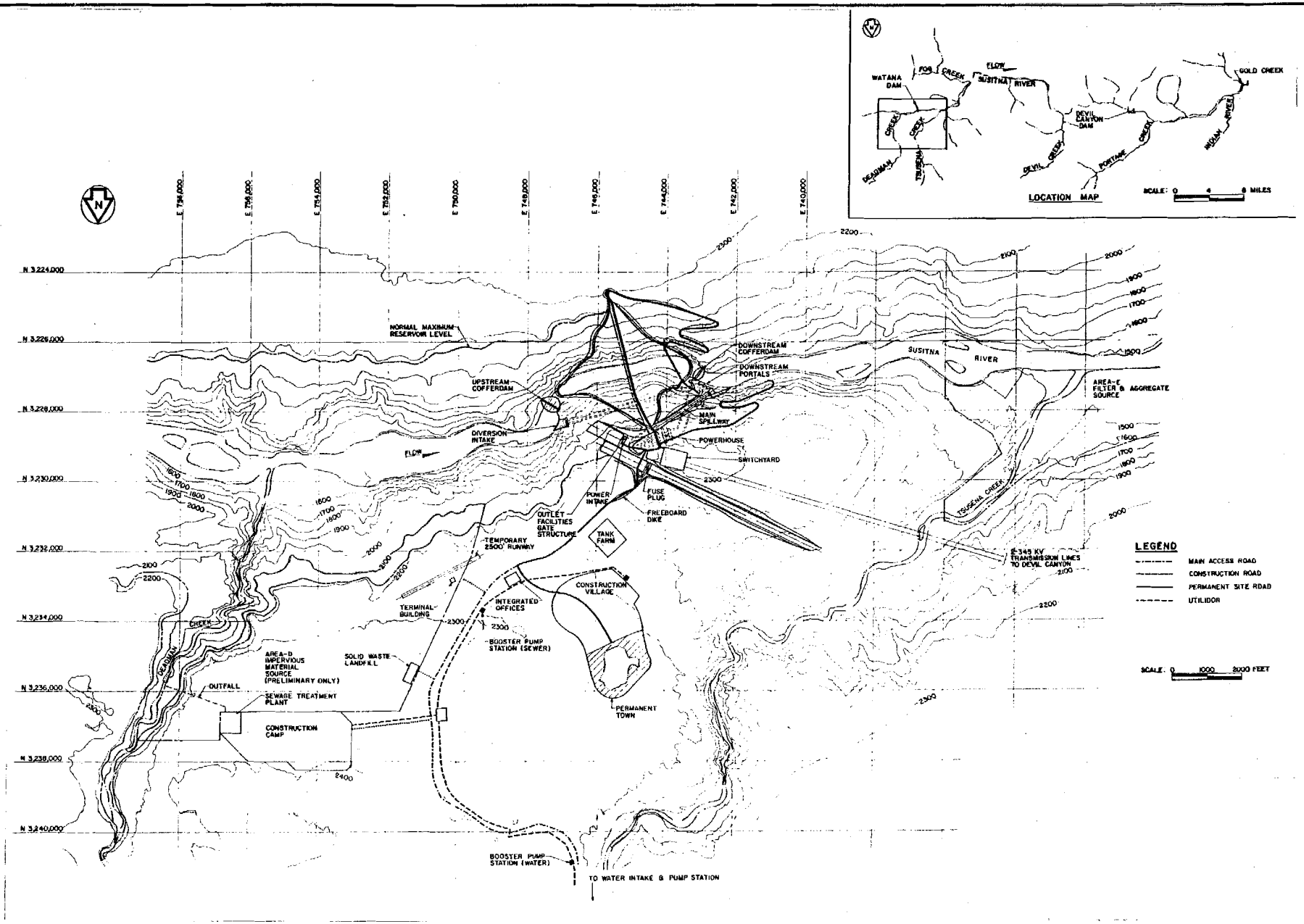
22. _____, Pacific Southwest Forest and Range Experiment Station, Our National Landscape, September 1979.

23. U. S. Department of the Interior, Fish and Wildlife Service, Gravel Removal Guidelines Manual for Arctic and Subarctic Floodplains, FWS/OBS-80/09, June 1980.

24. U. S. Department of the Interior, Heritage Conservation and Recreation Service, A Proposal for Protection of Eleven Alaskan Rivers, undated.

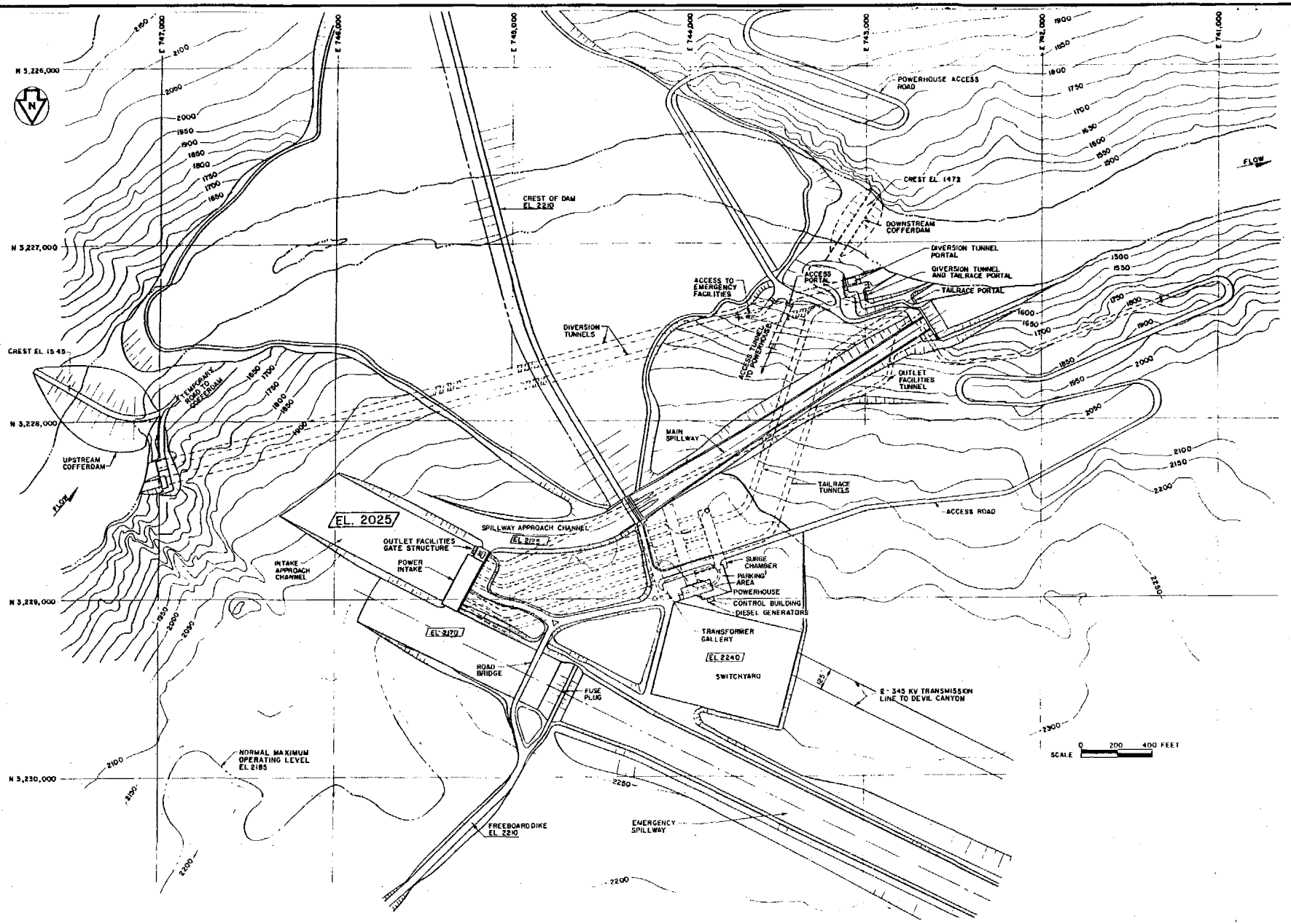
APPENDIX 8.A

Proposed Facilities



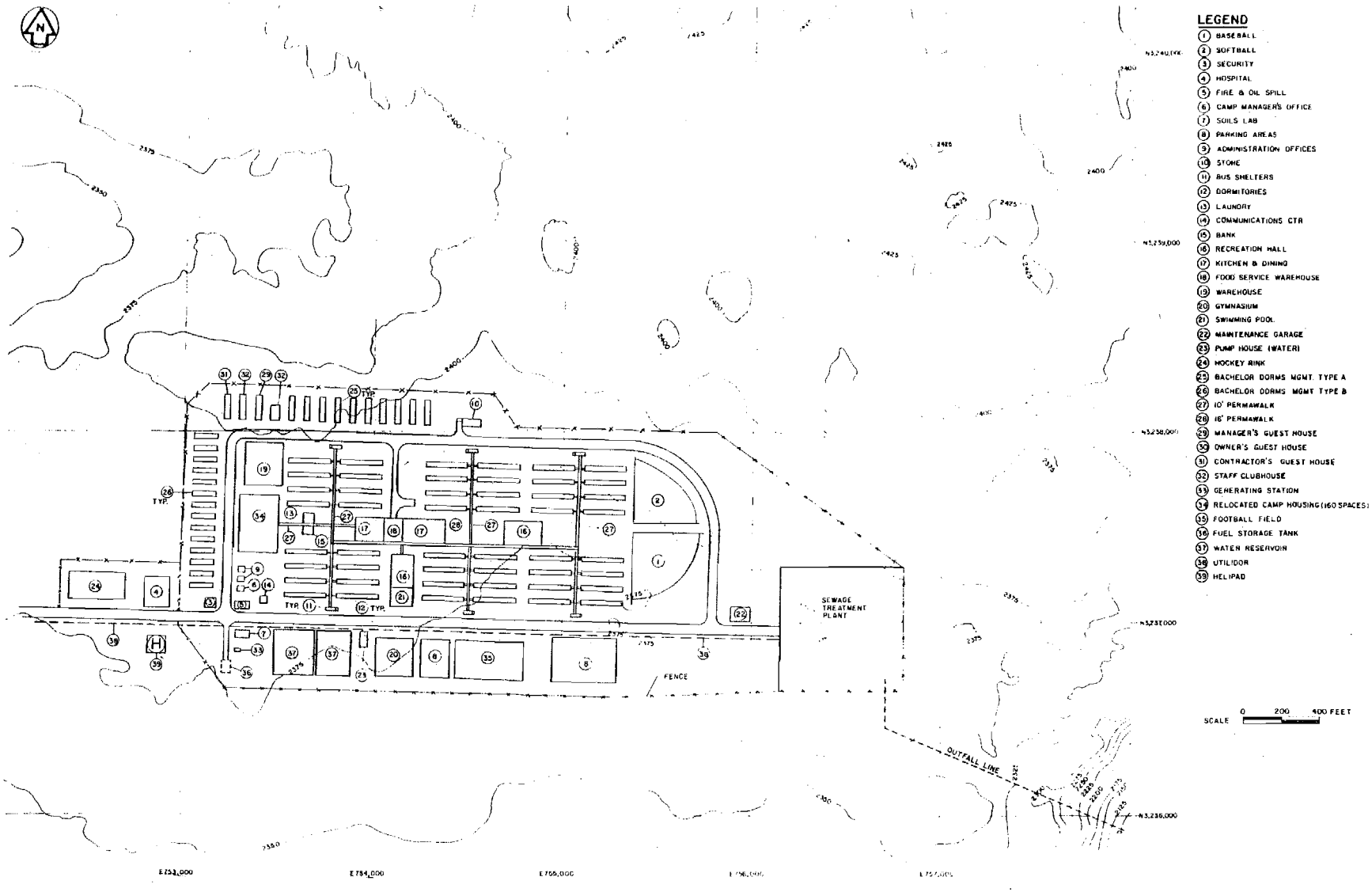
WATANA GENERAL LAYOUT SITE FACILITIES

FIGURE E.8.1



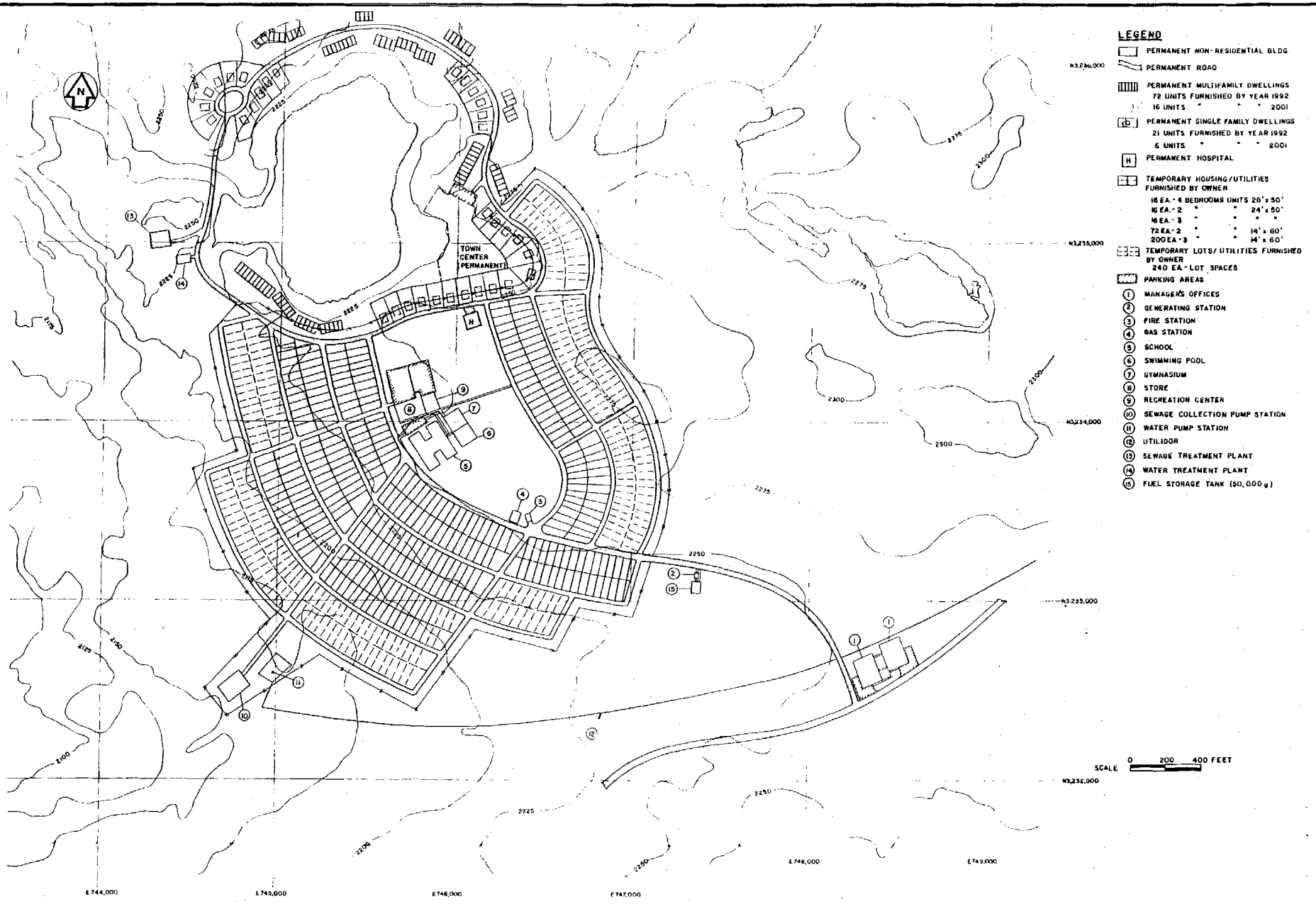
WATANA GENERAL ARRANGEMENT

FIGURE E.8.2



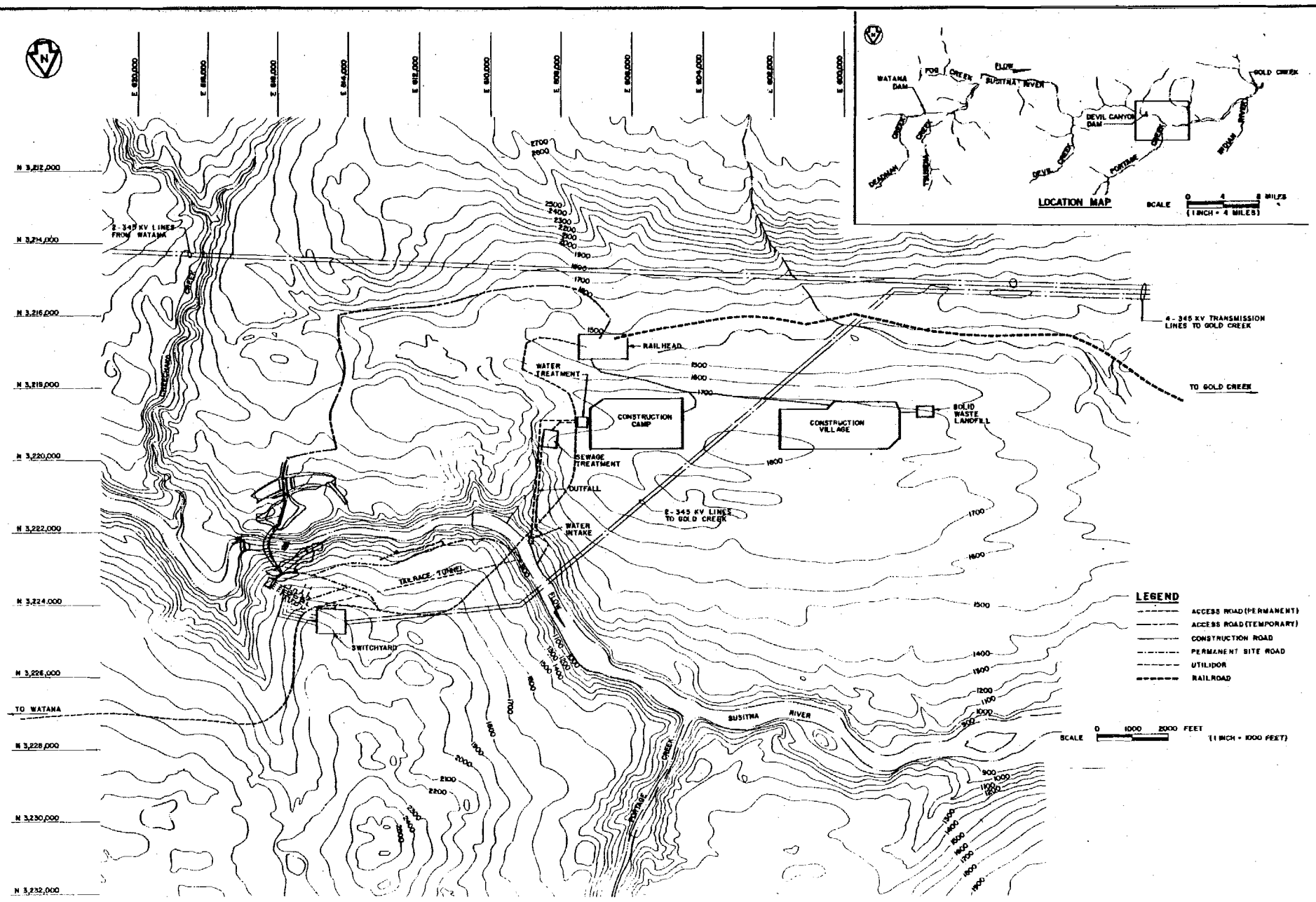
WATANA MAIN CONSTRUCTION CAMP SITE

FIGURE E.8.3



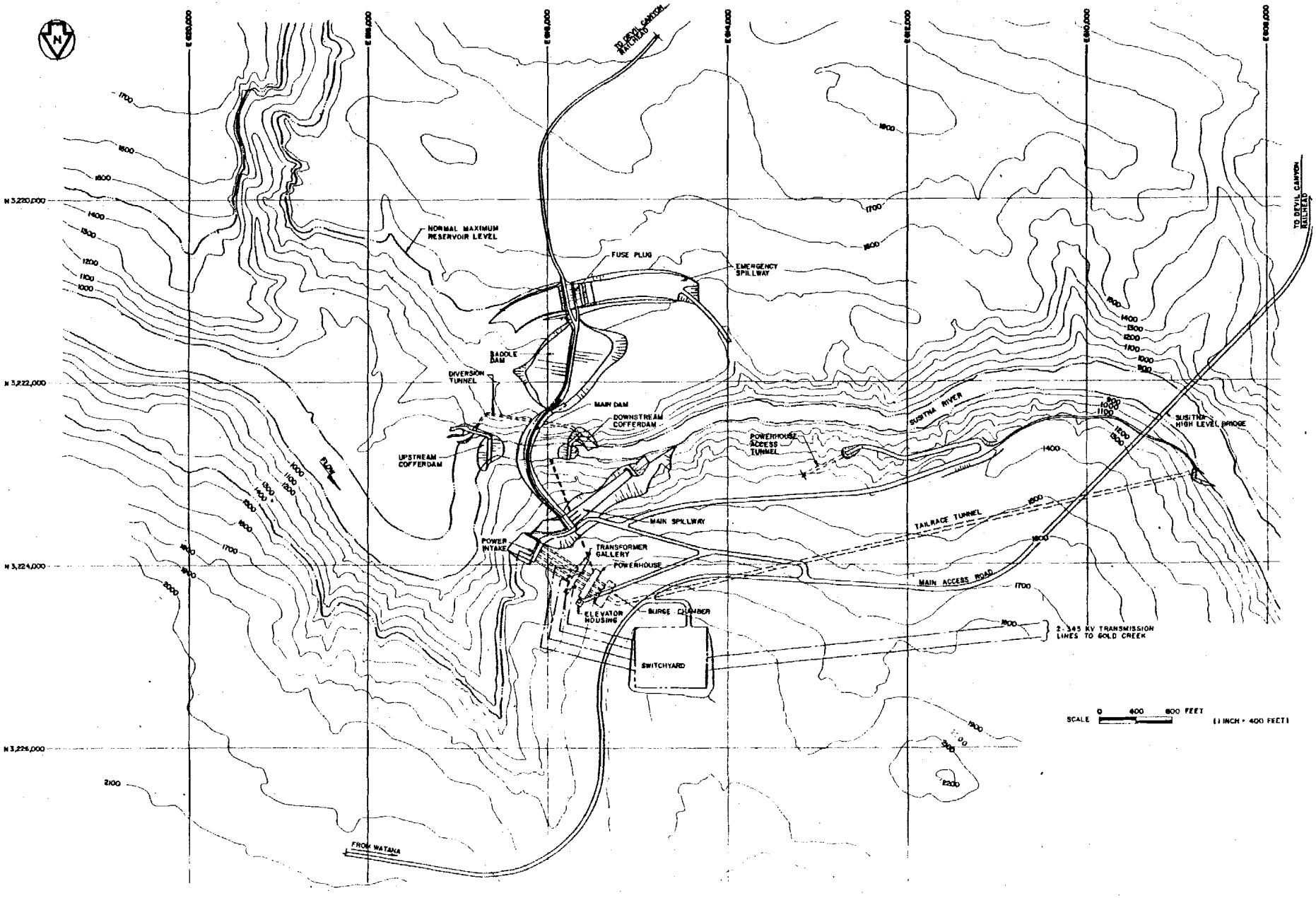
WATANA VILLAGE AND TOWN SITE

FIGURE E.8.4



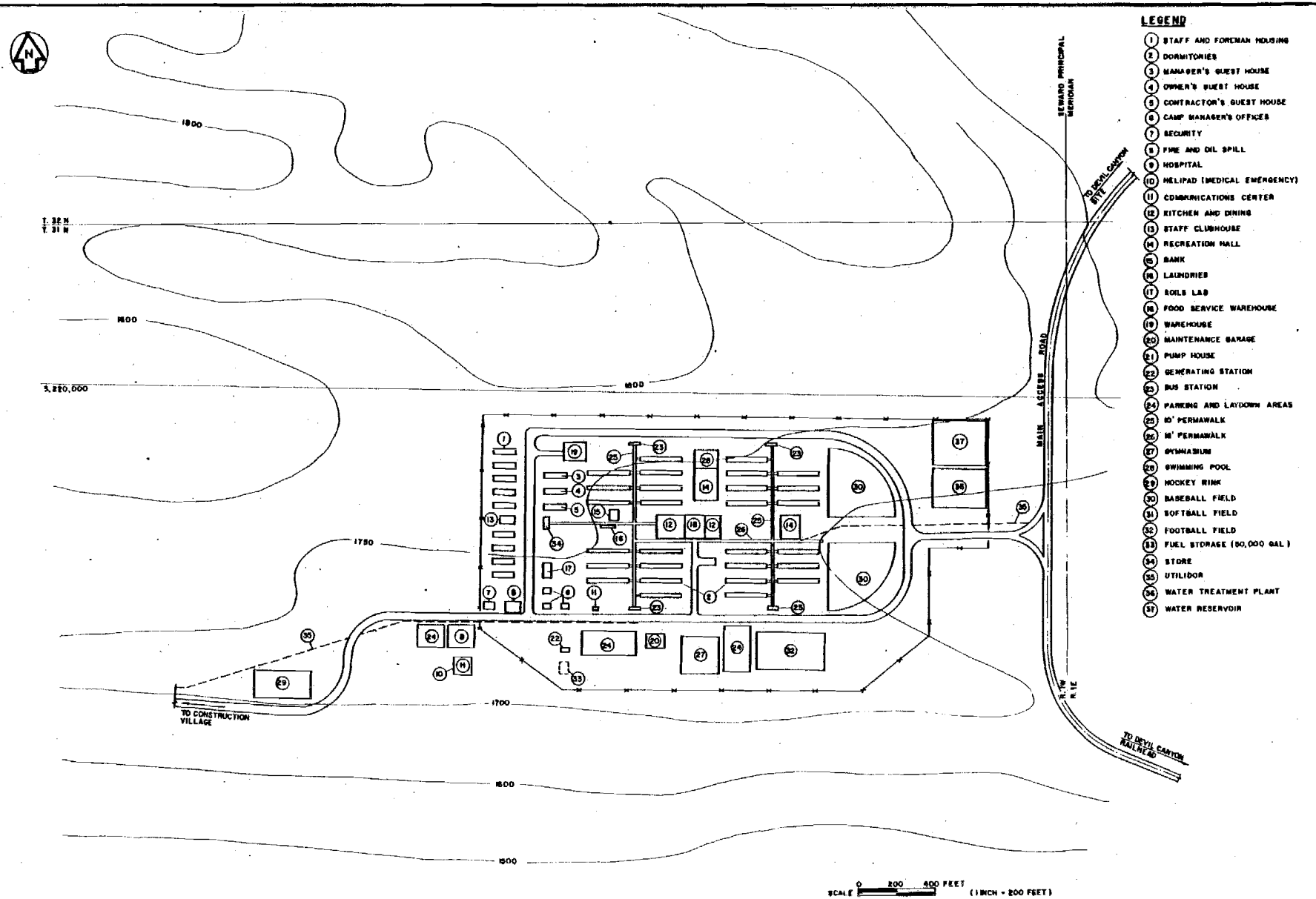
DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

FIGURE E.8.5



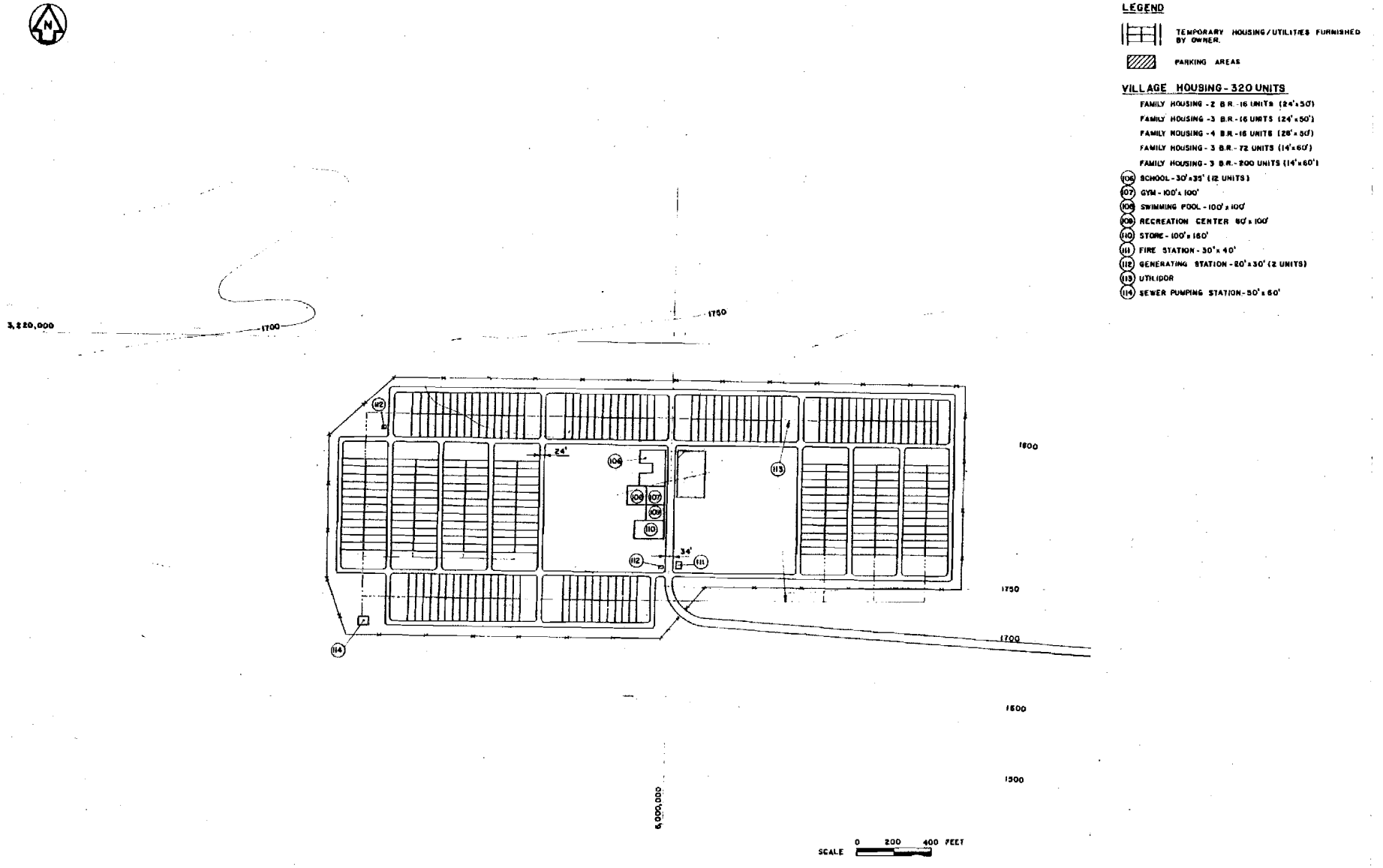
DEVIL CANYON SITE LAYOUT

FIGURE E.8.6



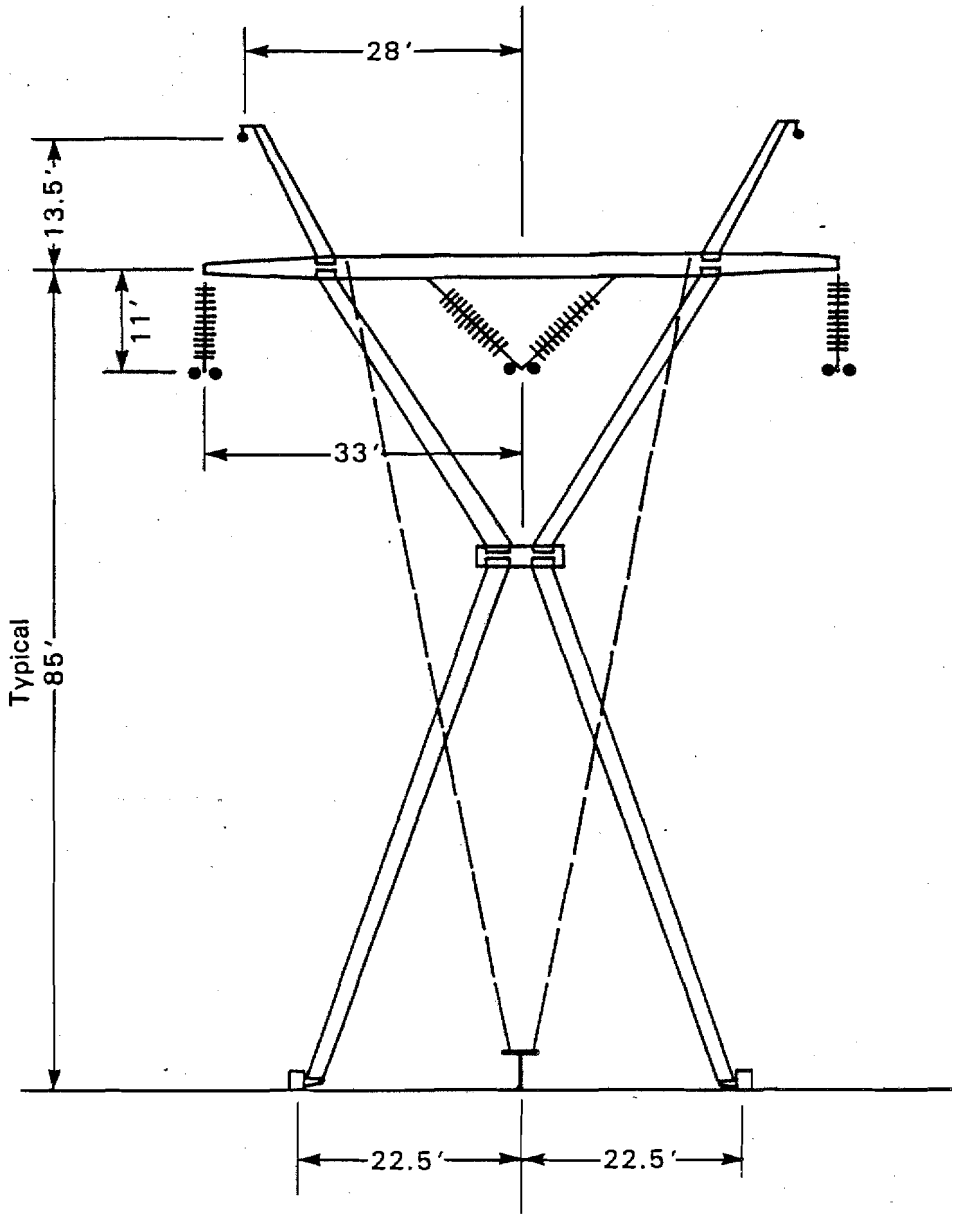
DEVIL CANYON CONSTRUCTION CAMP PLAN

FIGURE E.8.7



DEVIL CANYON TEMPORARY VILLAGE

FIGURE E.8.8



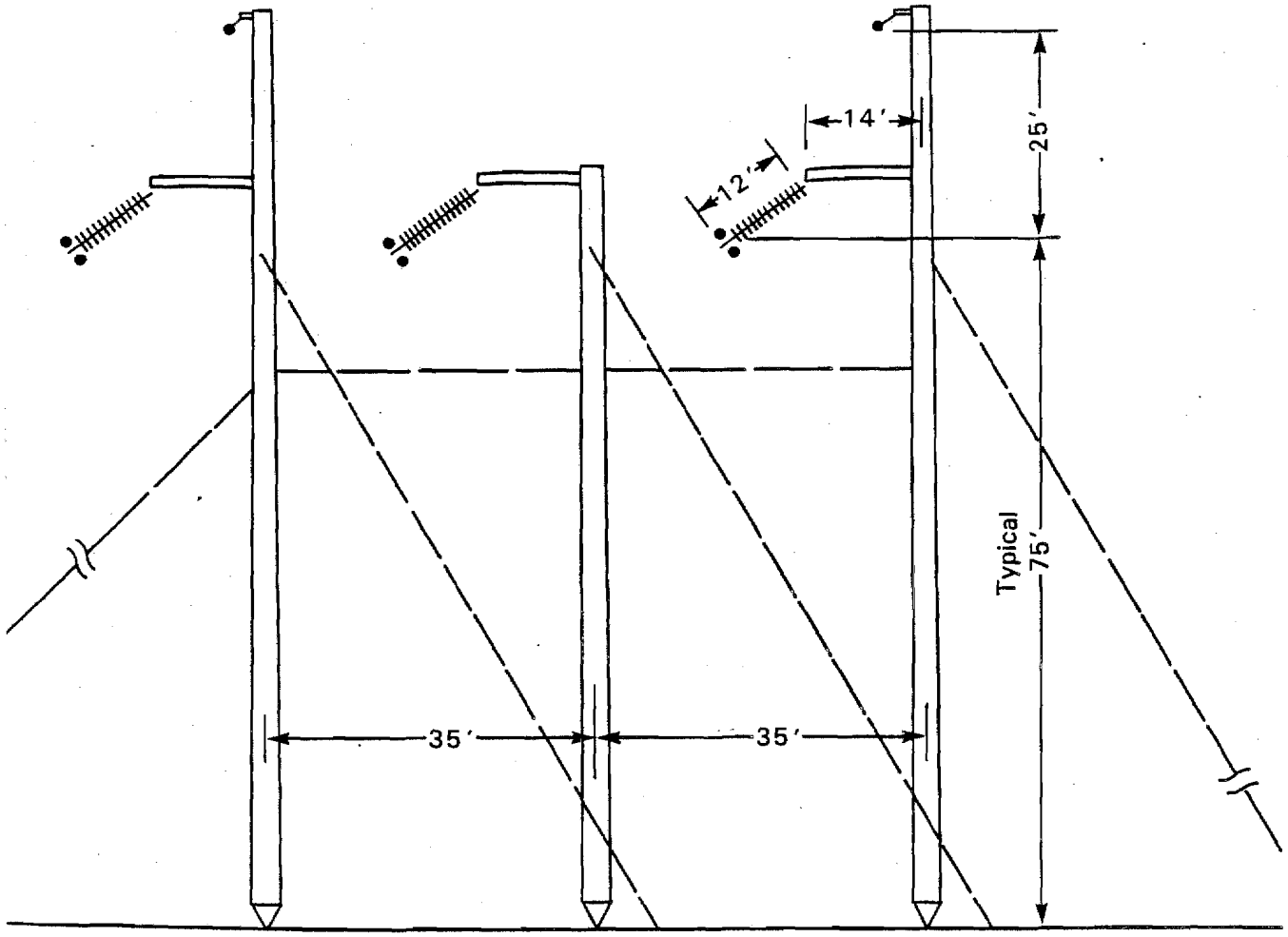
Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV Tangent or Light Angle Structure

Gilbert/Commonwealth

FIGURE E.8.9



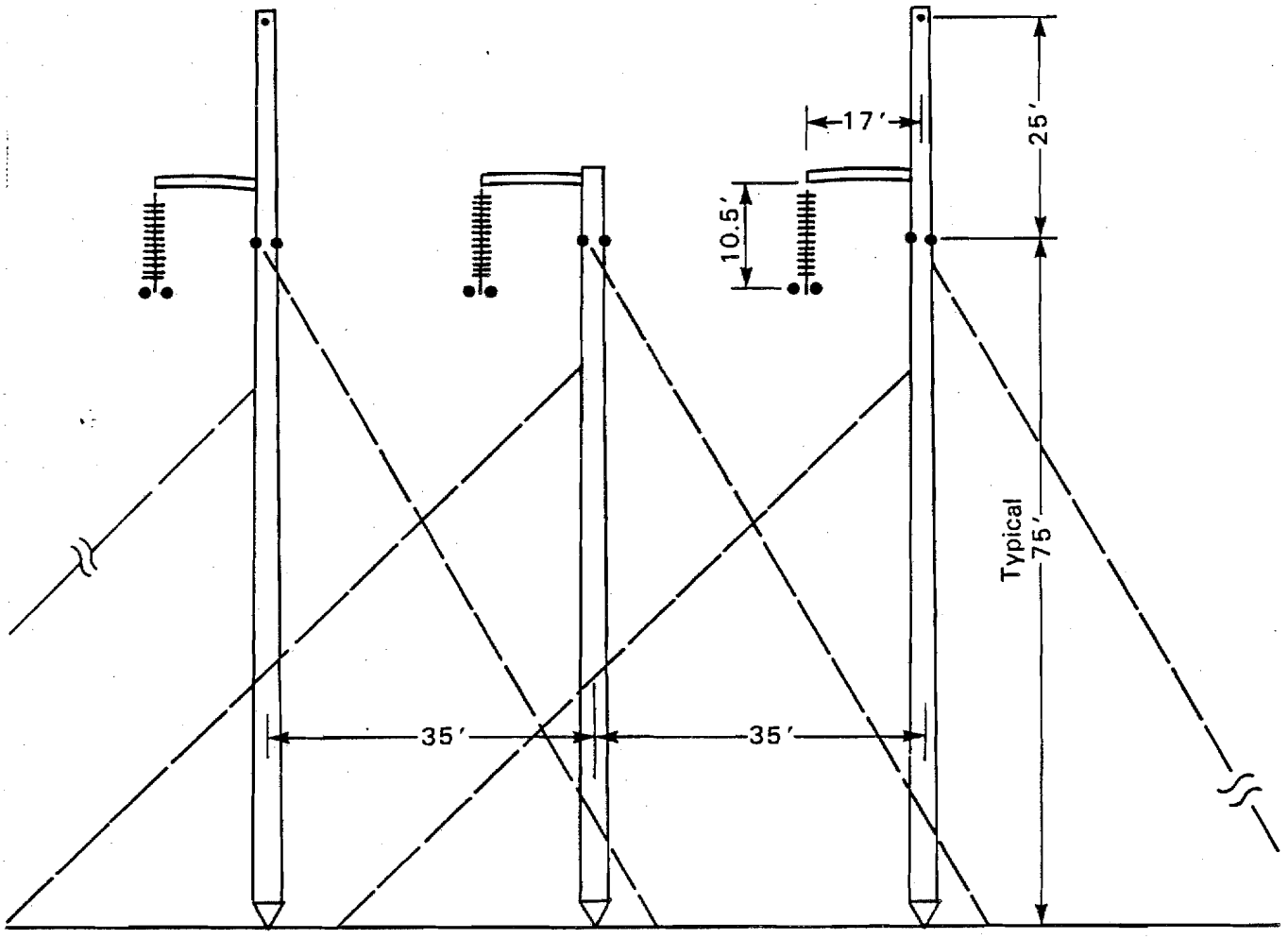
Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV Medium Angle (8°-30°) Structure

Gilbert/Commonwealth

FIGURE E.8.10



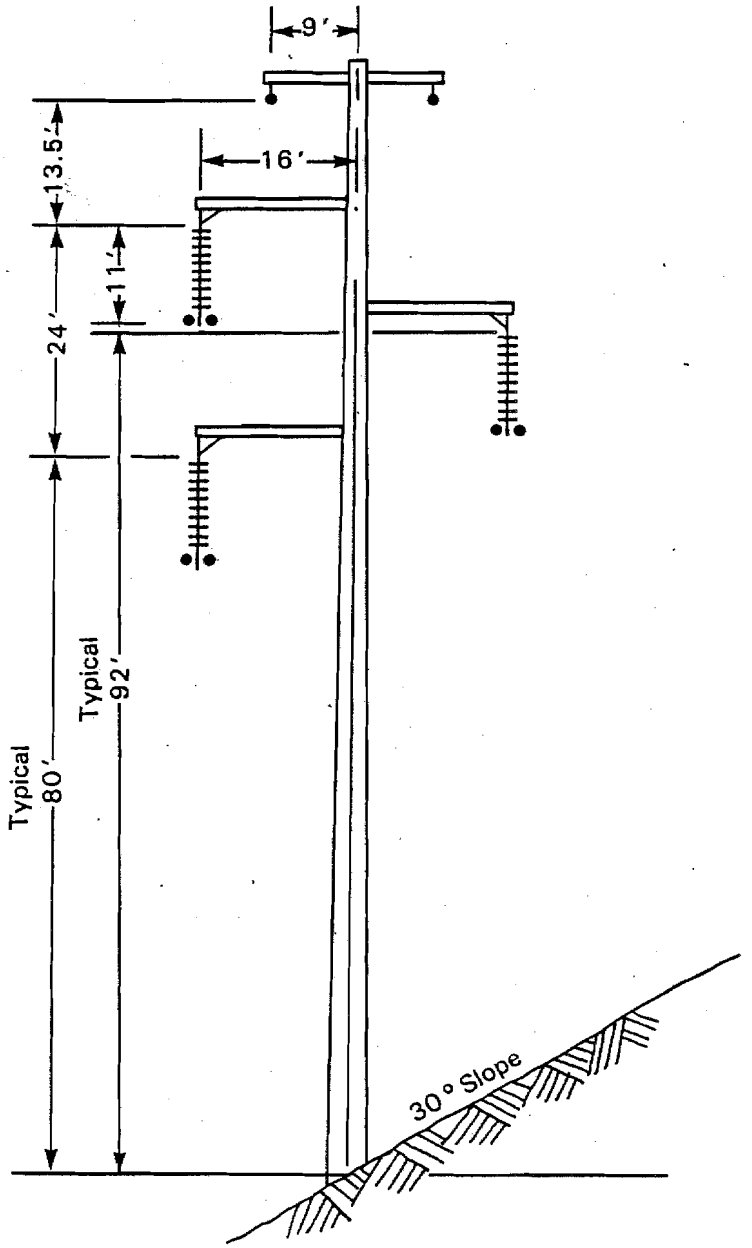
Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV Heavy Angle (8°-50°) Dead End Structure

Gilbert/Commonwealth

FIGURE E.8.11



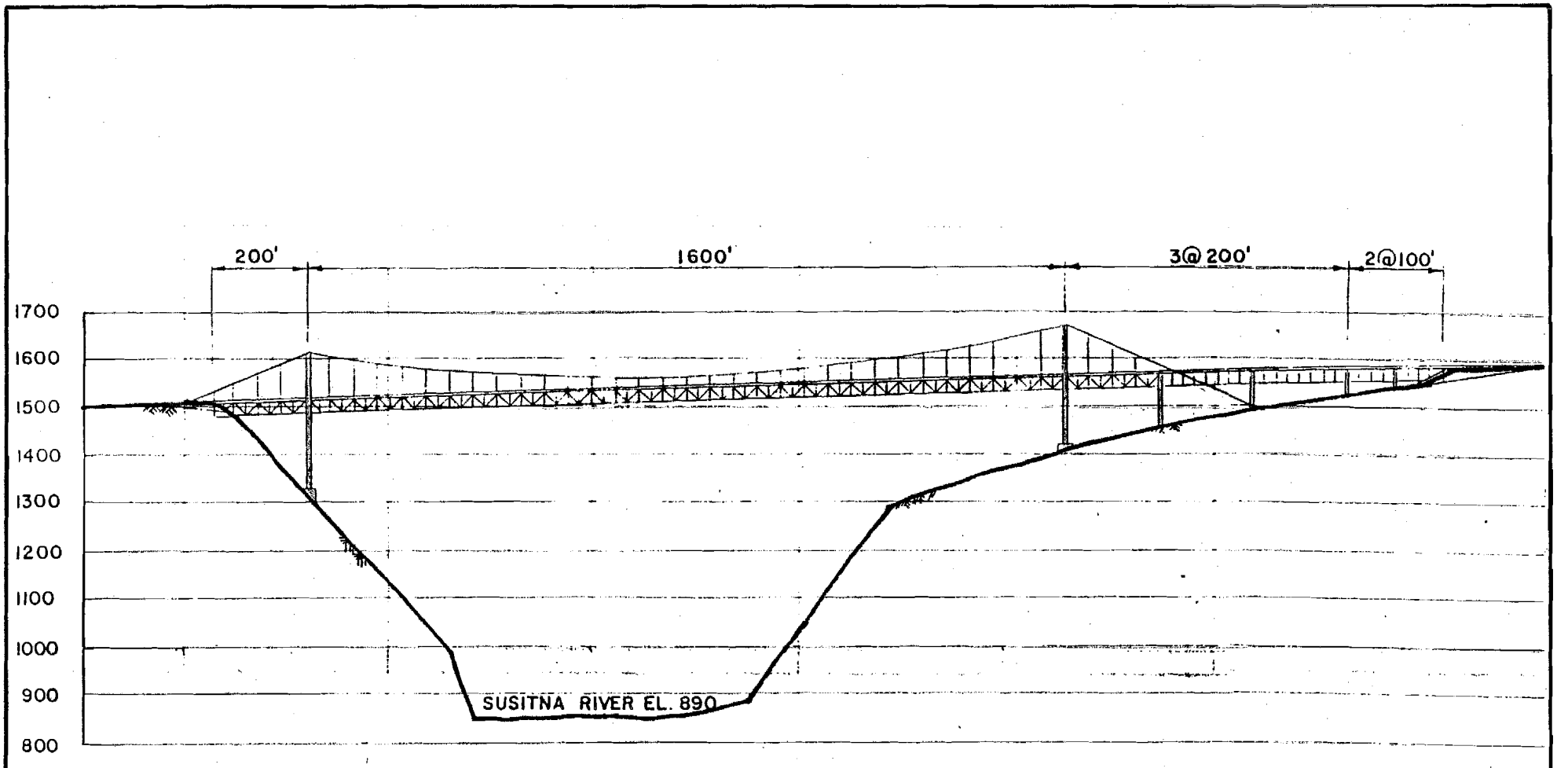
Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV Single Circuit Tangent Pole

Gilbert Commonwealth

FIGURE E.8.12



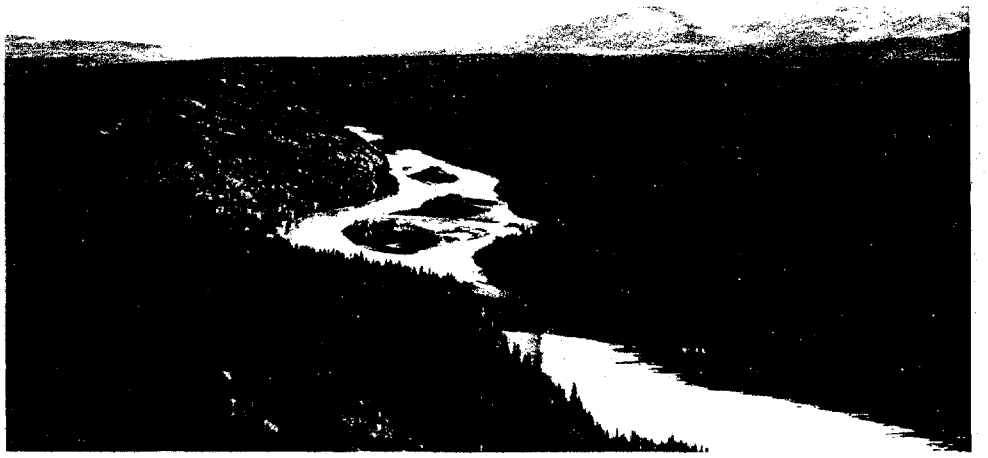
HIGH LEVEL SUSITNA RIVER BRIDGE

FIGURE E.8.13

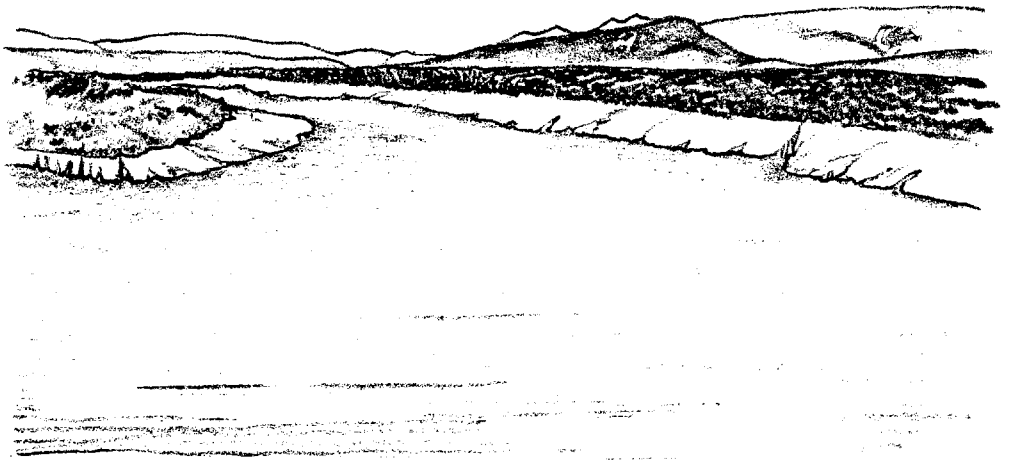
APPENDIX 8.B

Site Photos and Simulations

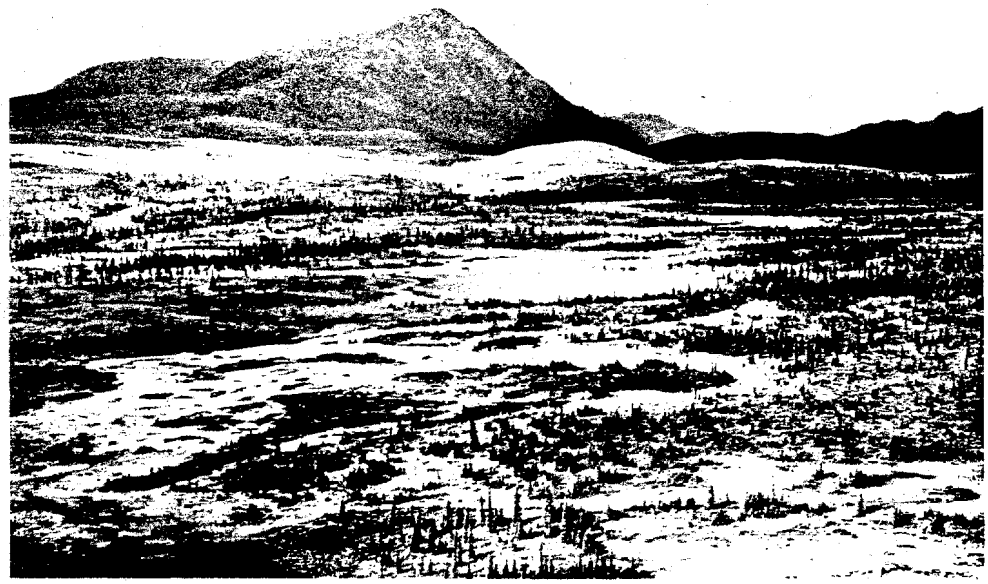
of Project Facilities



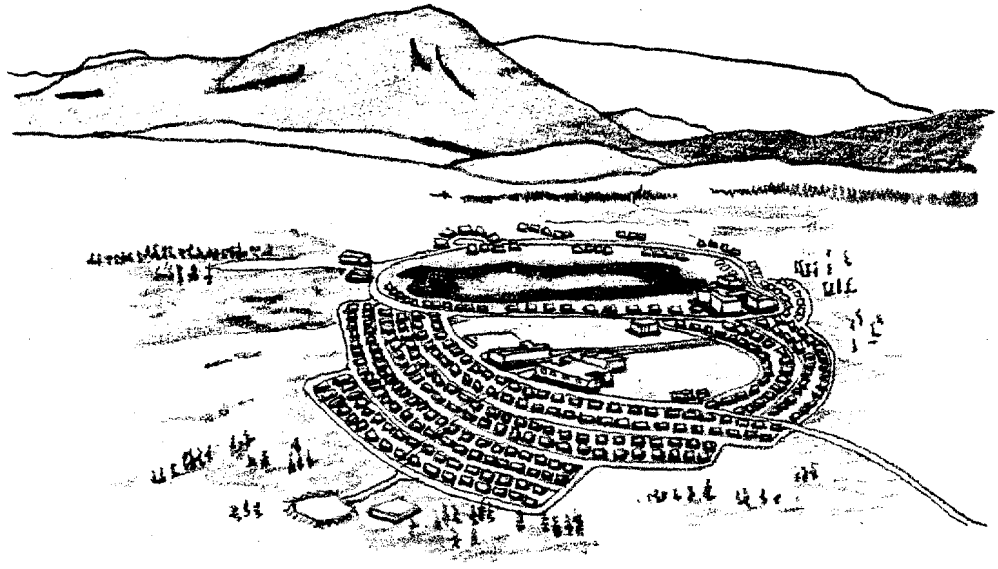
EXISTING SUSITNA RIVER - SITE OF PROPOSED WATANA RESERVOIR (LOOKING EAST)



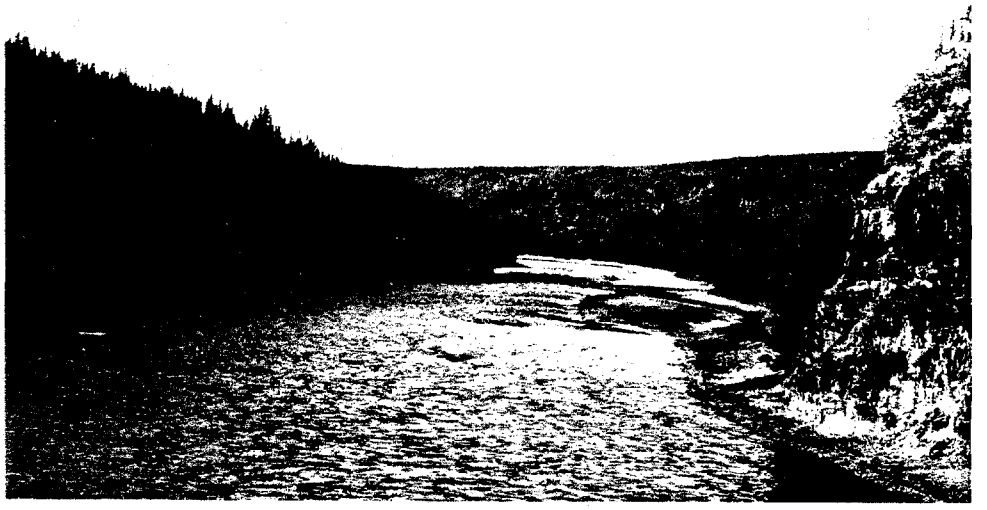
PROPOSED WATANA RESERVOIR AT DRAWDOWN



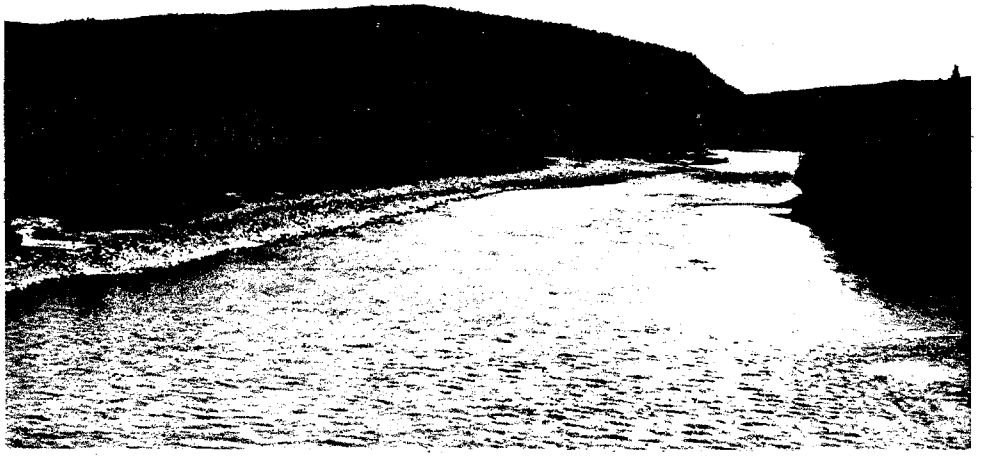
PROPOSED PERMANENT TOWNSITE/CONSTRUCTION VILLAGE - WATANA (LOOKING NORTH)



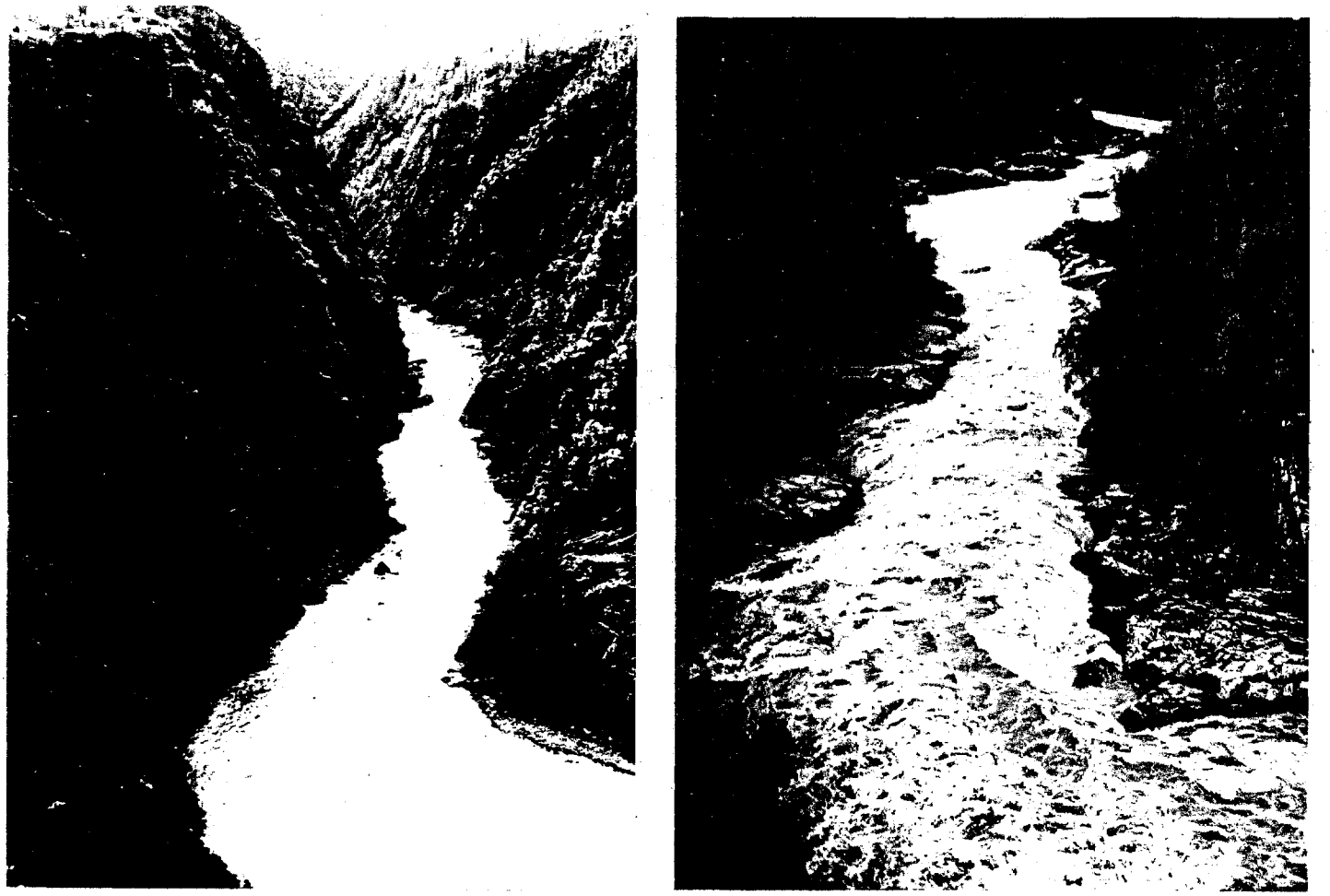
PROPOSED PERMANENT TOWNSITE - WATANA



PROPOSED MAJOR BORROW AREA FOR WATANA DAM ON NORTH (RIGHT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)



PROPOSED MAJOR BORROW AREA (SAME AS ABOVE) FOR WATANA DAM ON NORTH (LEFT) LOWER SUSITNA RIVER TERRACE (NEAR CONFLUENCE OF TSUSENA CREEK)

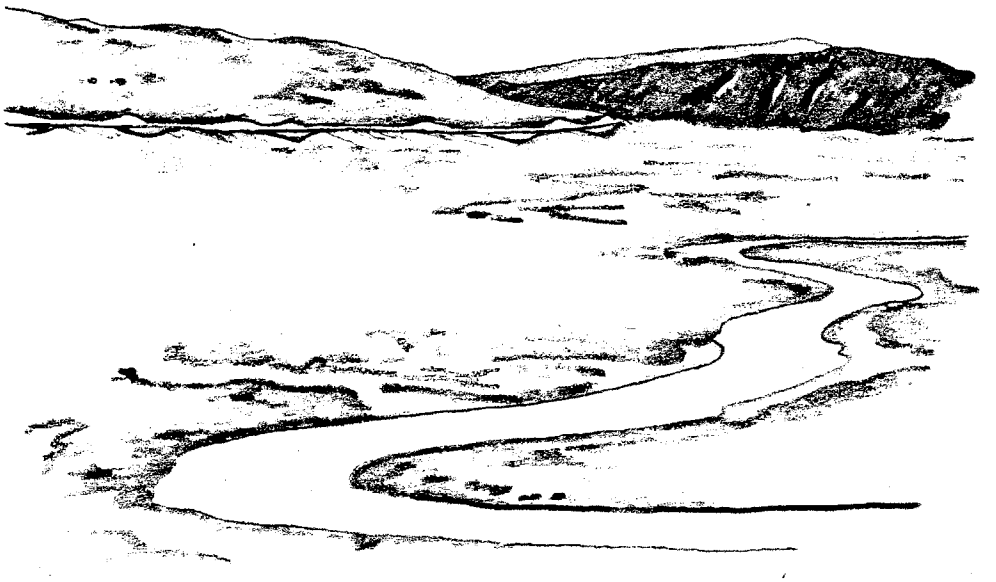


DEVIL CANYON AREA TO BE INUNDATED BY
– PROPOSED DEVIL CANYON RESERVOIR –

PROPOSED DEVIL CANYON CONSTRUCTION
VILLAGE/CAMP SITE (LOOKING EAST)

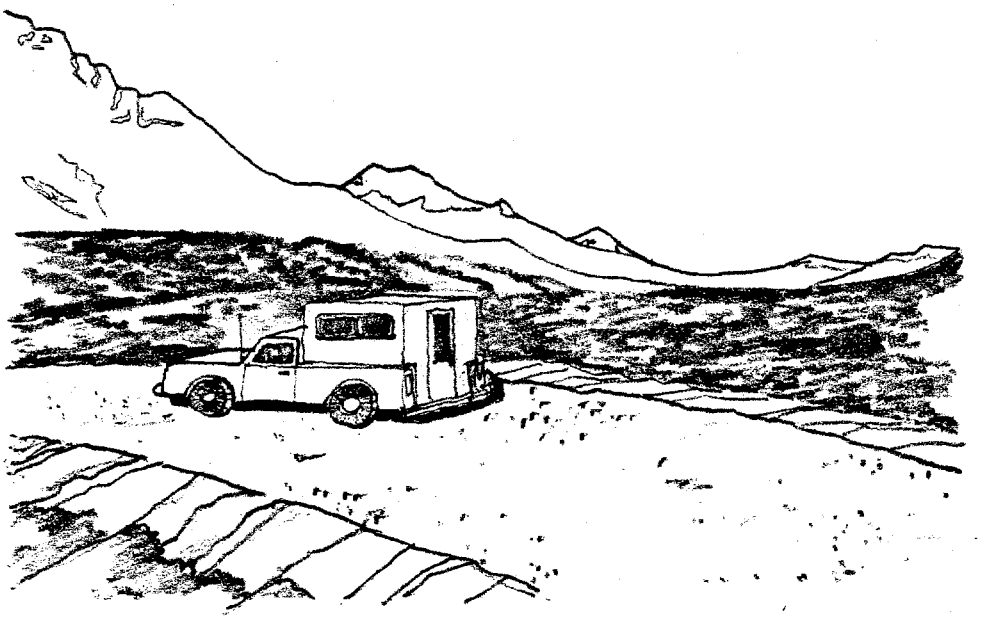
PROPOSED DEVIL CANYON CONSTRUCTION
CAMP SITE (LOOKING EAST)

PROPOSED DENALI ACCESS ROAD LOCATION
ON WEST (LEFT) SLOPE (DEADMAN CREEK)

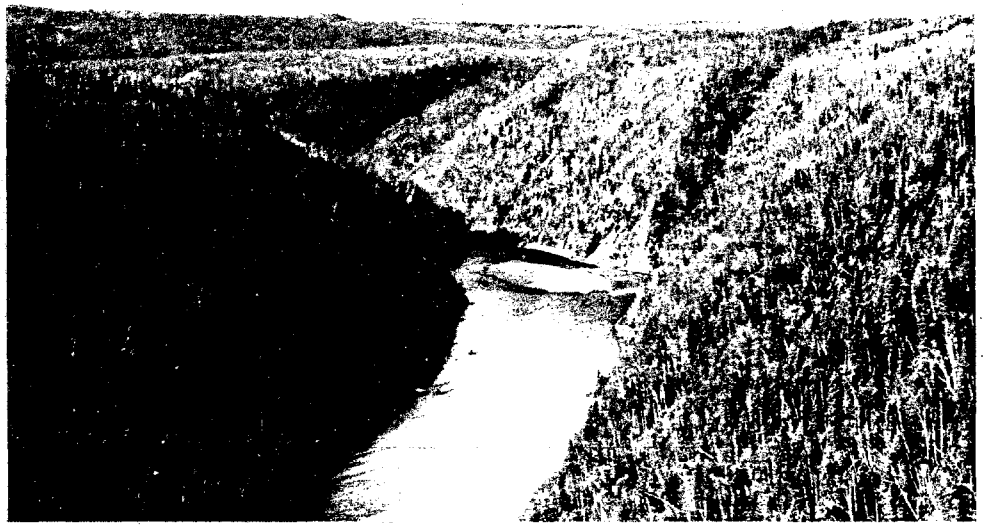


PROPOSED DENALI ACCESS ROAD NEAR
DEADMAN CREEK

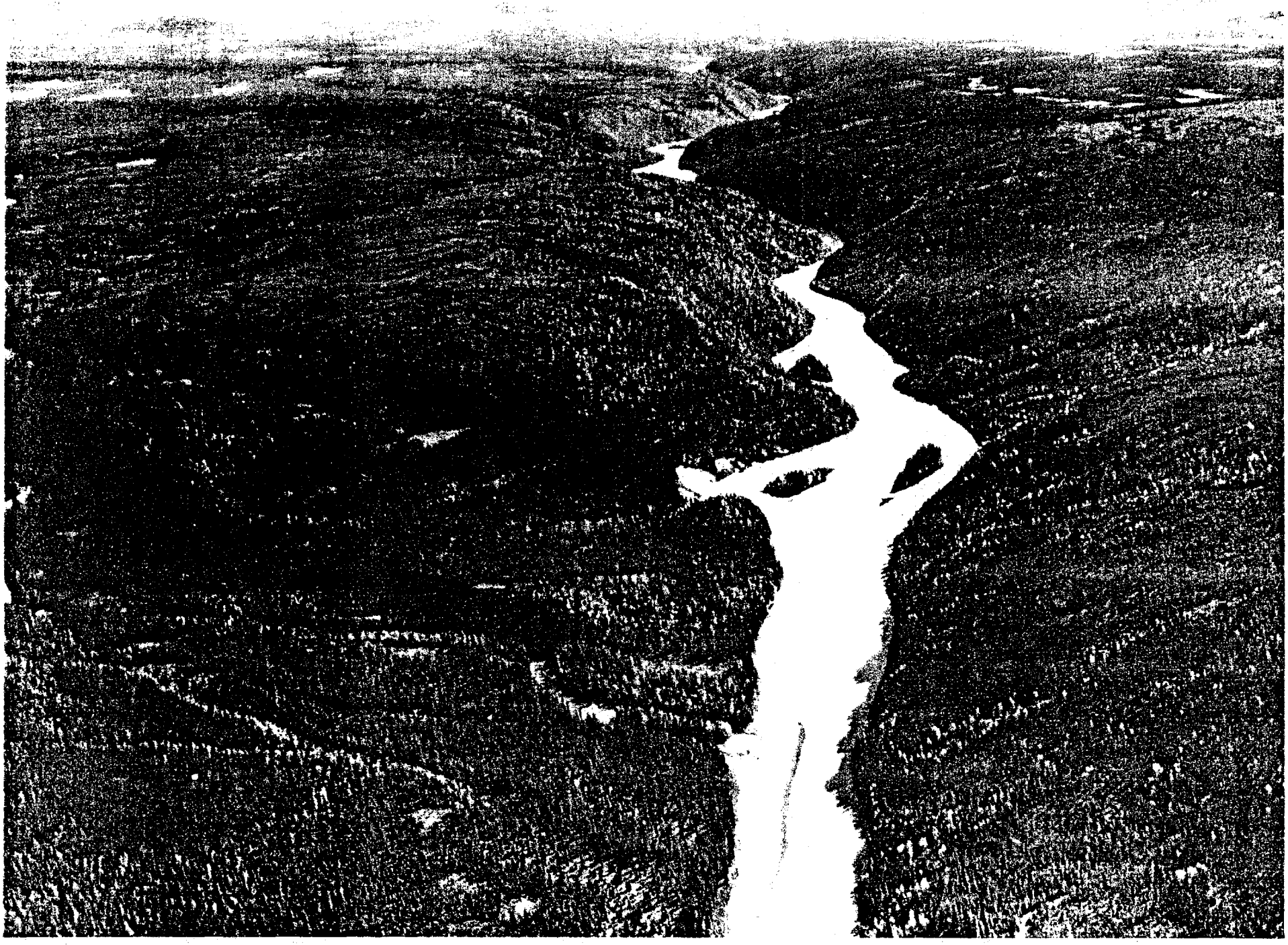
PROPOSED DENALI ACCESS ROAD (HAIRPIN TURN) LOCATION IN CHULITNA MOUNTAINS (LOOKING NORTHWEST)



PROPOSED DENALI ACCESS ROAD (HAIRPIN TURN) IN CHULITNA MOUNTAINS



PROPOSED HIGH LEVEL BRIDGE SITE
(FOREGROUND) OVER DEVIL CANYON
(LOOKING WEST)



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.

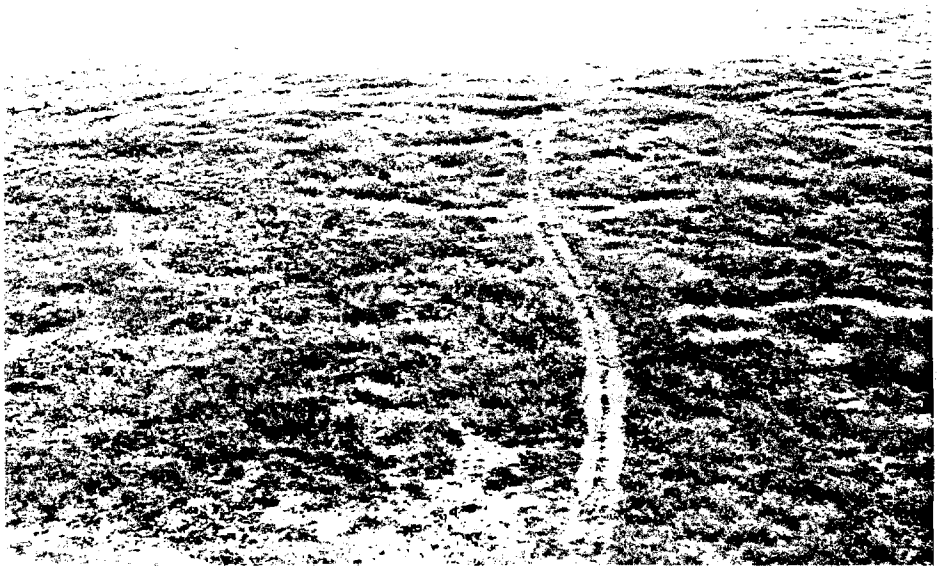
APPENDIX 8.C

Examples of Existing

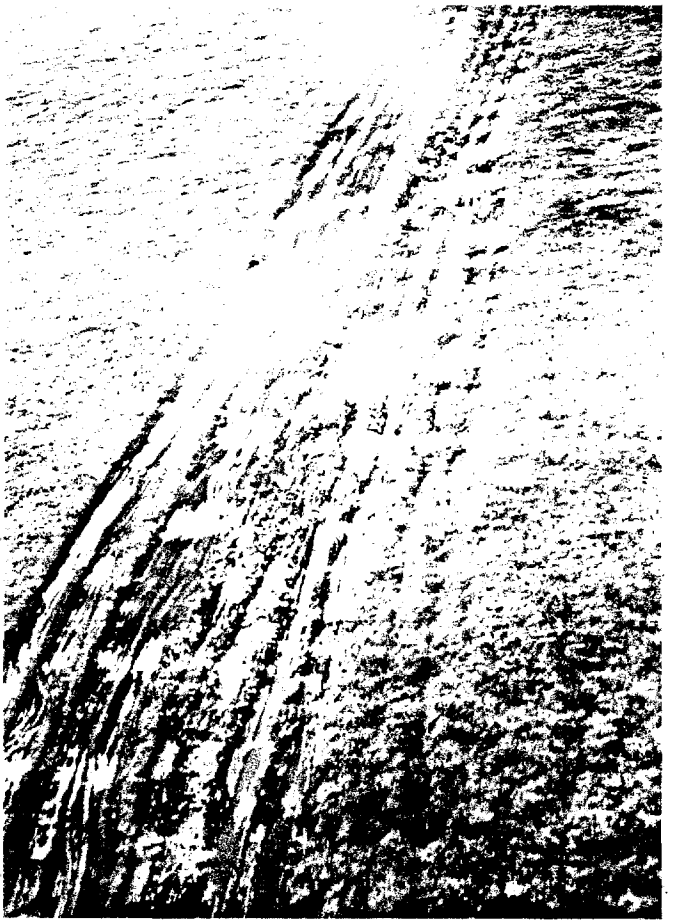
Aesthetic Impacts

DENALI HIGHWAY (LOOKING SOUTHEAST)
NEAR PROPOSED ACCESS ROAD JUNCTION

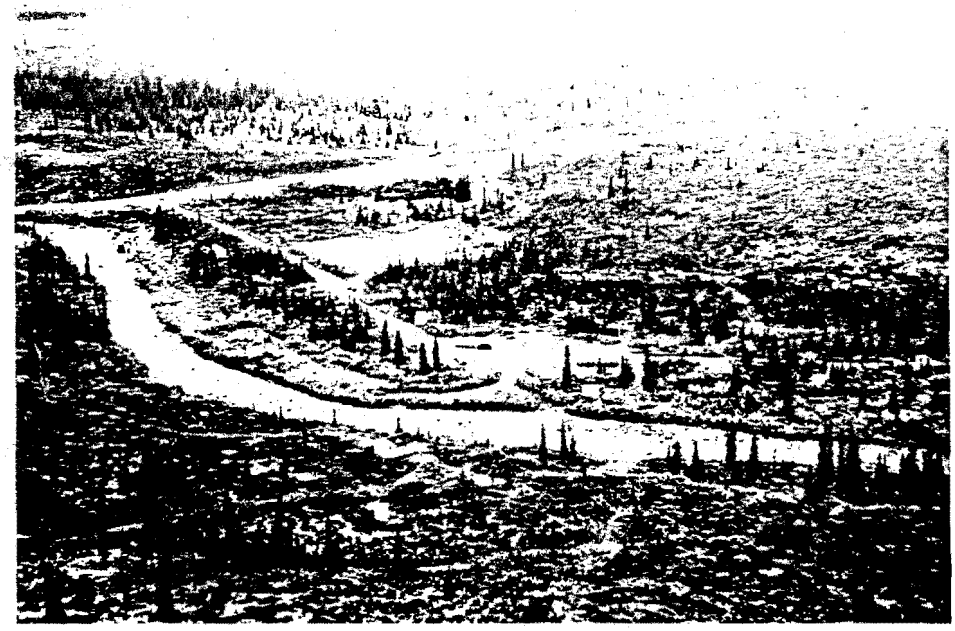
DENALI HIGHWAY



JEEP ROAD/TRAIL OFF DENALI HIGHWAY



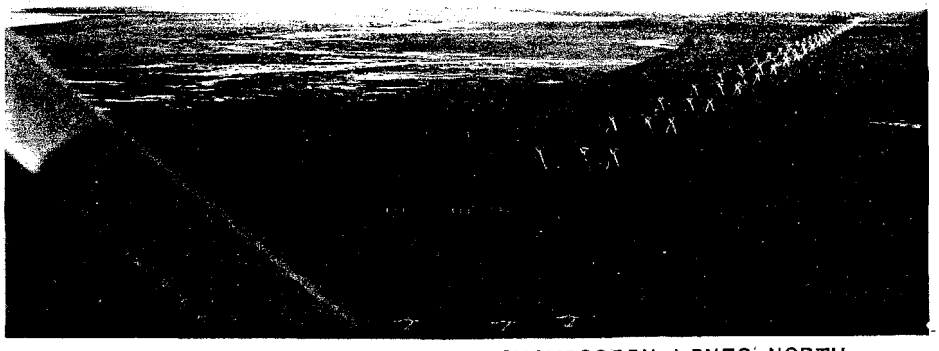
ALL-TERRAIN-VEHICLE (ATV) TRAIL TO BUTTE LAKE



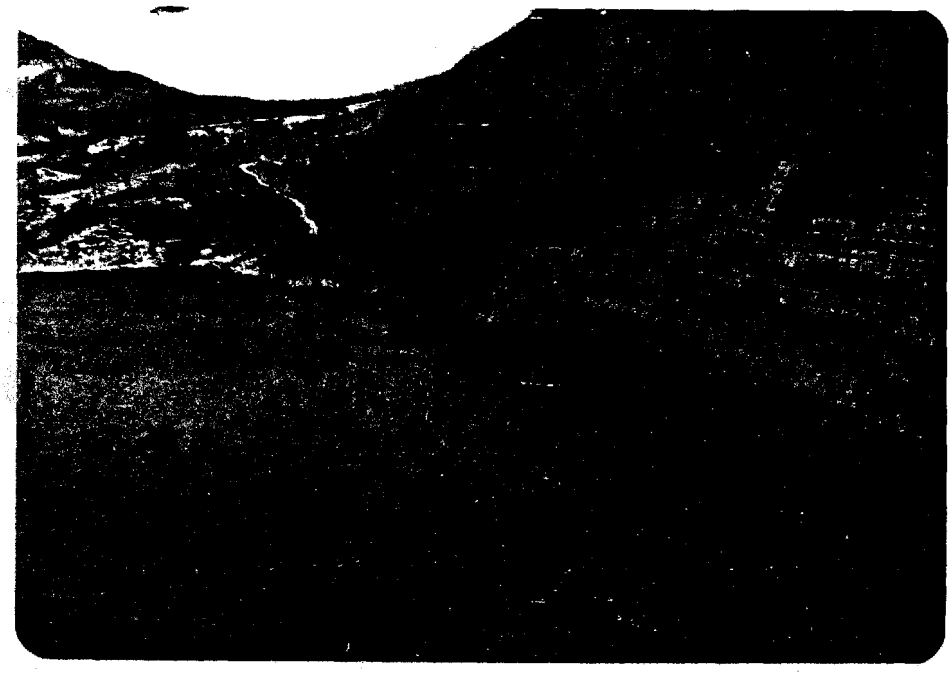
EXISTING BRUSHKANA CAMPGROUND (BLM)
OFF DENALI HIGHWAY-PROPOSED EXPANSION

EXISTING BORROW PIT ALONG DENALI HIGHWAY - TYPICAL ROAD PULLOFF AND CAMPING AREA FOR HUNTERS/FISHERMAN

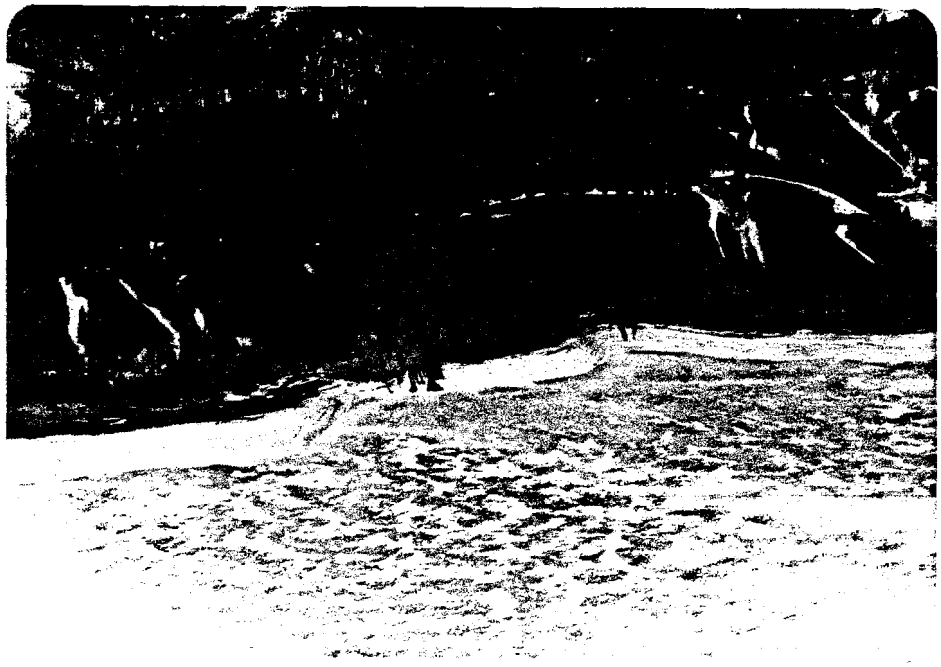
EXISTING TRANSMISSION LINES NORTH SIDE OF COOK INLET - SUSITNA RIVER LOWLANDS



EXISTING TRANSMISSION LINES NORTH SITE OF COOK INLET - SUSITNA RIVER LOWLANDS



POTENTIAL RESERVOIR SLOPE/EDGE CONDITION (WILLISTON RESERVOIR - BRITISH COLUMBIA)



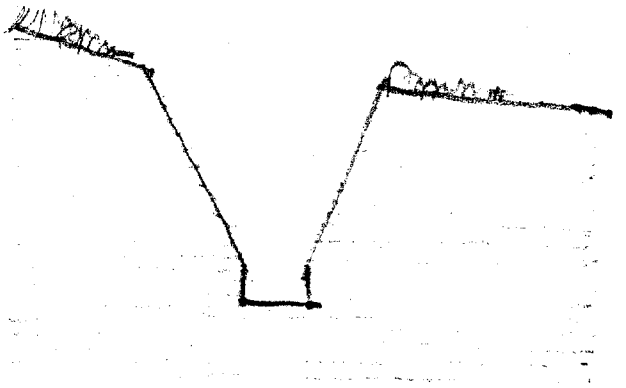
POTENTIAL RESERVOIR SLOPE/EDGE CONDITION (WILLISTON RESERVOIR - BRITISH COLUMBIA)

APPENDIX 8.D

Mitigation Measures

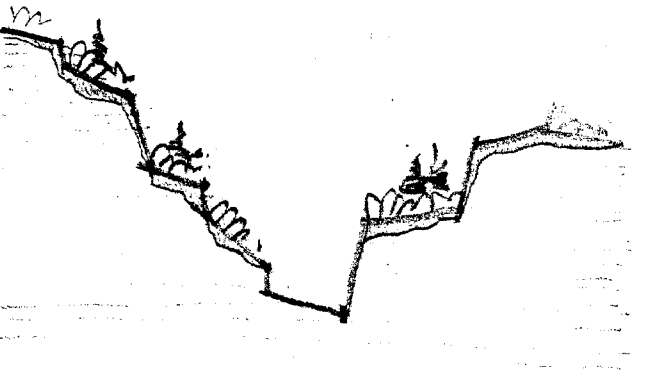
Illustrations

PROPOSED (both dams)
EMERGENCY SPILLWAY



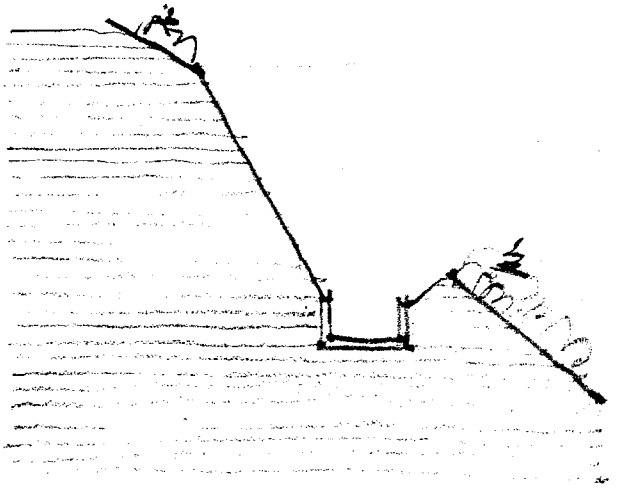
AS PROPOSED, THE EMERGENCY SPILLWAYS FOR BOTH DAMS WILL RESULT IN SIGNIFICANT VISUAL IMPACTS.

MITIGATION



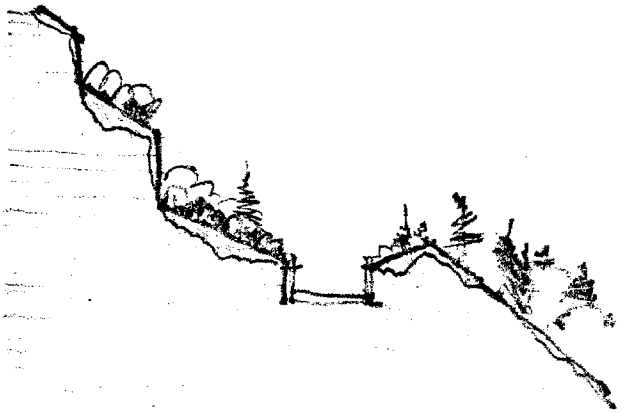
TERRACED SIDE SLOPES WOULD LESSEN ADVERSE VISUAL IMPACTS AND BE MORE IN CHARACTER W/ THE EXISTING LANDSCAPE.

PROPOSED (both dams)
MAIN SPILLWAY



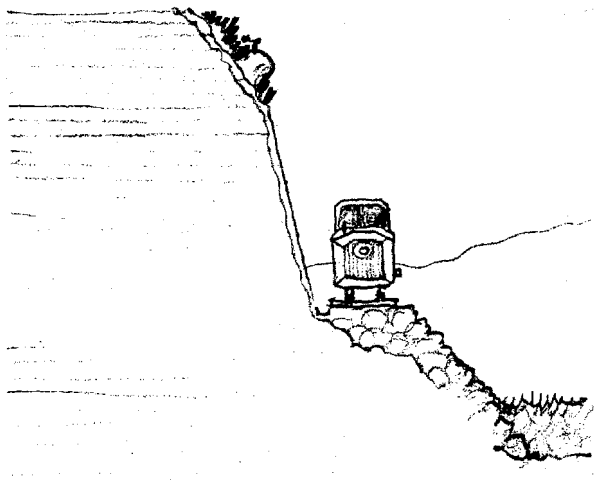
STEEP CUT SIDE SLOPES DEVOID OF VEGETATION WILL BE VISUALLY UNATTRACTIVE.

MITIGATION



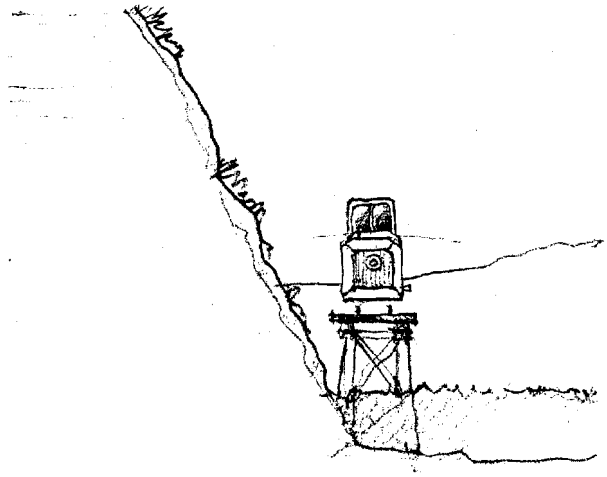
TERRACED SIDE SLOPES WITH SOIL POCKETS FOR INVASION OF NATIVE PLANT SPECIES WILL LESSEN ADVERSE VISUAL IMPACTS.

PROPOSED RAILROAD SECTION

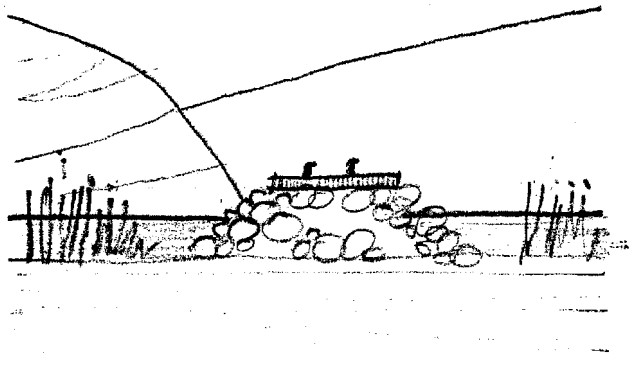


CUTTING OF STEEP RIVER SIDE SLOPES SHOULD BE AVOIDED TO AVOID NEGATIVE VISUAL IMPACTS (maximum condition).

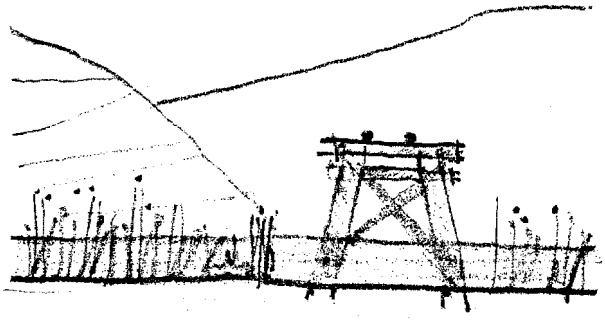
MITIGATION



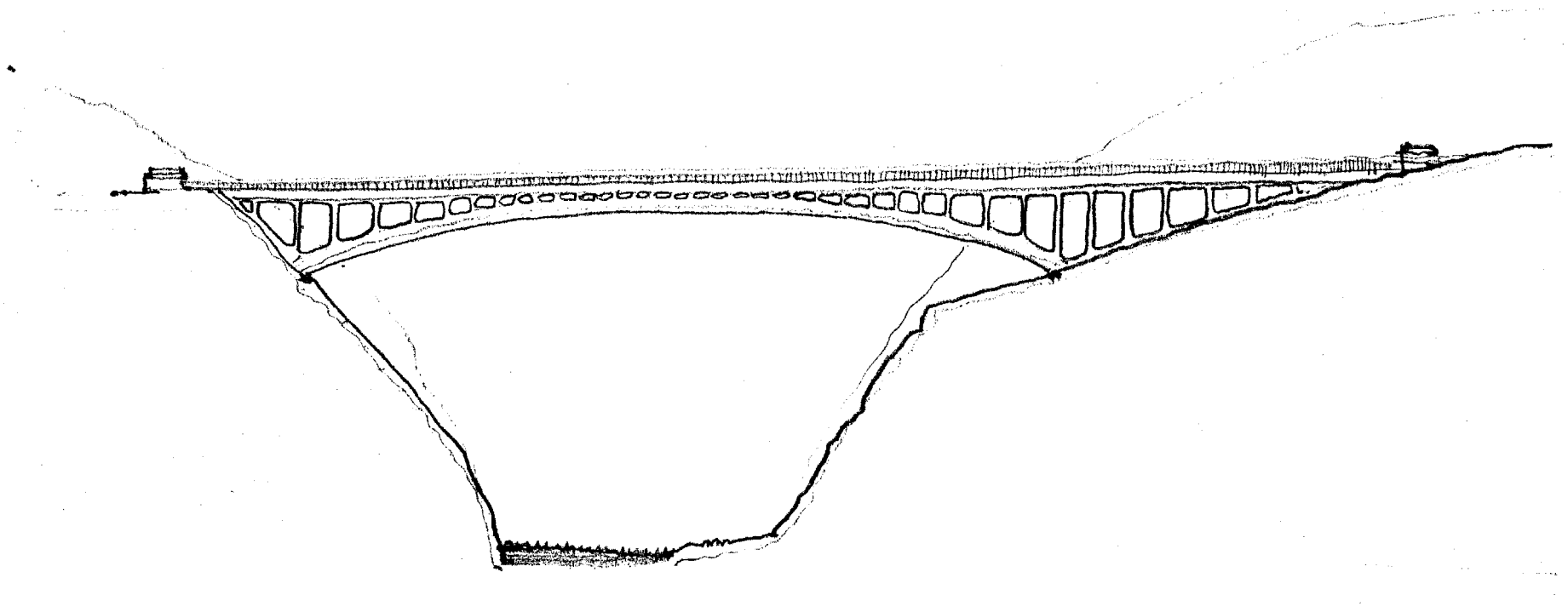
TRESTLE STRUCTURES WOULD MINIMIZE SLOPE DISTURBANCE AND BE AN ATTRACTIVE FEATURE.



RAILROAD BEDS CONSTRUCTED W/ SUCH A FILL SECTION OVER WETLAND AREAS WILL RESTRICT NATURAL WATER FLOW RESULTING IN POTENTIAL BIOTIC & AQUATIC IMPACTS.



TRESTLE STRUCTURES OVER WETLAND AREAS WILL ALLOW NATURAL DRAINAGE AND LESSEN ENVIRONMENTAL AND AESTHETIC IMPACTS.



DRAMATIC ENGINEERING FORM SHOULD REFLECT DRAMATIC RIVER CANYON FORM AND CREATE A POSITIVE VISUAL CONTRAST. THE BRIDGE SHOULD HAVE PEDESTRIAN WALKS W/ GUARDRAIL FOR VIEWING OPPORTUNITIES.

9 - LAND USE

SUSITNA HYDROELECTRIC PROJECT

EXHIBIT E

VOLUME 4 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. 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 1940's, the Susitna River has been considered for hydropower development and several preliminary plans for such development have been prepared. Proposals prior to 1980, which included one to four reservoirs did not proceed beyond the pre-feasibility analysis stage. The present project focuses on a two-dam development: one at Devil Canyon and one near Tsusena Creek (Watana dam site). These two structures would create elongated reservoirs one-half to one mile, except for a portion of the Watana Reservoir, which would be five miles 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

(a) Objectives

The land use analysis involved 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:

- 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 Chapter 3 and 6 of Exhibit E.

(b) 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 truthing 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 BLM. There are two state land disposal areas west of the project, and Native conveyed land in the project area. The Alaska Statehood Act of 1958 and ANCSA of 1971 withdrew the land in the project vicinity from development and acquisition. Most of the lands in the dam and impoundment vicinity have been withdrawn for Native and State selection.

The Cook Inlet Regional Corporation and associated village corporations have selected lands along the river. Some lands along the river have been conveyed from the BLM to these Native groups. Part of these lands however, have been filed as valuable lands to the United States for water- power sites. Therefore, the lands conveyed under ANCSA 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 licensee under Section 24 of the Federal Power Act.

The State also selected lands along the Susitna River. State selection was suspended until the Native groups completed their selection. Upon conveyence 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

(a) 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, recreating (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) seasonal use - past; 3) seasonal use - past and present; 4) year-round use - past; 5) year-round use - past and present; 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 float planes 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 707, Land Use Analysis, Phase I Report,April 1982.

(b) Existing Land Use

As in the past, access continues to determine the types and levels of land use in the upper Susitna River basin.

(i) 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.

(ii) Land Use Development

Developments typically include small clusters of cabins. There are approximately 109 structures within 30 kilometers (18 miles) of the Susitna River between Gold Creek and the Tyone River. These include four lodges involving 21 structures. Concentrations of residences, cabins, or other structures are near Otter Lakes, 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.

(a) Land Status

The proposed project will be located in areas involving significant Native and state selected and interim conveyed lands. Implementation of the project will require purchasing or obtaining rights-of-way to project lands. Increased land management may be required to respond to increased use.

(b) Land Use Activity

The project will result in significant increases in activity patterns in the upper Susitna basin, involving hunting, fishing, camping, boating, and dispersed recreation. Persons who currently use the Upper Susitna Basin will adjust to the increased use or move to other areas.

(c) 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, 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 2.5 kilometers (1.5 miles) 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;

- minimal land use activity; due to the remoteness of the area.

The results of discussions with the Bureau of Land Management (BLM), Alaska Department of Natural Resources (DNR), Matanuska-Susitna Borough (Mat-Su Borough) and the Cook Inlet Region, Inc. (CIRI) are meaningful within the context of general

resource management in present-day Alaska. 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 management is tenuous because of uncertain outcomes of the Alaska National Interest Lands Conservation Act (ANILCA) and the Susitna Hydroelectric Project.

The project area has not been exploited in the past because of limited economically feasiblility. 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, regardless of changing land ownership. 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 until access into the area is improved.

Although Native land owners have expressed their intentions to exploit the mineral potential of lands south of the project area, no specific plans have been identified. Access appears to be the key to such development.

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.9.1. The following definitions of land classifications pertain to the lands within the vicinity of the Susitna project. Figures E.9.2 and E.9.3 illustrate the land status in the impoundment area.

Federal: Lands under jurisdiction of the Bureau of Land Management (BLM), the Alaska Railroad, the National Park Service, or the U.S. Department of Army or Air Force.

Unpatented Mining Claims: Mining claims operated by an individual(s) on federal lands. The federal government has the claim patent. Patent mining claims are privately owned.

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 is classified as State Selections Applications or Federal State Selected.

State Selections Tentatively Approved or State T.A.: State selected lands approved by the federal government for transference to the state.

State Selections Patented: Federal lands conveyed to the state.

Native Allotments: In 1906 Native individuals were allowed by the Native Allotment Act to file for allotments of up to 160 acres on unoccupied federal lands.

Regional Corporation Selections: Lands selected by the Regional Corporations under provisions of ANCSA are selected similarly to those by the state. The project area lies within the boundaries of Cook Inlet Region, Inc. (CIRI) and Ahtna, Inc.

Regional Corporation Selection Tentatively Approved: Corporation selected lands approved by the federal government for transference to the corporation.

Region Corporation Selection Patented: Federal lands conveyed to the corporation. Interim conveyence 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 Alaska Native Claims Settlement Act. The lands have traditionally been used for their commercial resource value, and subsistence hunting and fishing. These lands are located near villages or along rivers. The village receives the surface rights, the regional corporation receives the subsurface rights.

Village Selection Patented: Village Selection conveyed to the Village Corporation by the BLM. Interim conveyence is allocated to the corporation if the selected lands had not been surveyed.

Village corporations in the Cook Inlet Region receive village selected lands by reconveyence from the regional corporation, not the BLM. The procedure for conveyence and reconveyence in the Cook Inlet Region is exceptional to ANCSA. Normal procedures are that the Region and Village corporations select preferred lands and the BLM conveys lands directly to the corporation.

By 1971, lands in the Cook Inlet region had been patented to such an extent that the Native groups could not select their allocation of usable lands within a BLM requirement of contiquity. The BLM classifies these lands the Talkeetna Mountain Deficiency Lands.

Public law 94-456 allows the Village Corporations to select lands 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 deficiency lands, those that are not prime use lands, such as glaciers, are kept by the regional corporation after the land reconveyence to the village.

State Selection Suspended: ANCSA resulted in the suspension of State selected lands until Native selection had been conveyed. The Cook Inlet Land Exchange, Public Law 94-204, has an extensive Terms and Conditions document, which allows the State to acquire land after the conveyence of corporation selected lands to CIRI.

Borough Approved or Patented: If state patented land is not reserved for a particular use a borough can select the land until it fulfills its entilement through a process similar to that used by the state in selecting federal lands.

State classified lands are in addition to the basic land ownership classifications. Within the project area the State has classified various aliquot parts of townships as follows:

Residential Land: Land classified residential because its physical features lie adjacent to development; it is near an existing road, proposed road or navigable waterway; it is suitable for single or multifamily dwellings at medium to high density; it provides adequate on or off-site services and facilities that can be developed for solid waste disposal, wastewater disposal and potable water delivery.

State Planned Disposals: Those State lands plotted for subdivision development. Disposal categories include Remote Parcels, Agricultural Parcels, and Private Recreation Lands.

> Remote Parcels: There are two remote subdivisions located within the project area near Indian River. Lots are sold for private holding.

Agricultural Land: Land classified agricultural because their location, physical features and climate may be suitable for agricultural use. The State either owns these lands or has sold them to private ownership.

Private Recreation Land: Land classified 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 first.

Public Recreation Land: Land classified public recreation because of its location, physical features or adjacent development are most appropriately used by the public as natural or developed recreation areas, scenic overlooks, waysides, parks, campsites, historic sites or hunting, fishing or boating access sites.

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.

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.

Wildlife Habitat Land: Land classified wildlife habitat is a primary resource value as habitat for wild mammals, birds, fish or other animals.

Historically the Bureau of Land Management (BLM) owned all the land in the project area except for some private parcels described below. The BLM has interimly conveyed lands adjacent to the Susitna River to the Cook Inlet Region, Inc. (CIRI) and associated Native villages. Other lands from the Stephan Lake area eastward to the Kosina Creek drainage have been selected by CIRI. The State has selected entitlements on the north and south sides of the proposed reservoir between the remaining federal lands and the Native selected lands. In the areas designated for the Cook Inlet land trade, the State will select all those lands that are not selected by the Natives.

Federally owned lands occur north and south of the Native Selected lands adjacent to the Susitna River. The National Park Service administers Denali National Park and Preserve. Remaining federal holdings are administered by the Bureau of Land Management, the Alaska Railroad, and the U.S. Departments of Army or Air Force within the Anchorage to Willow transmission corridor. Railroad holdings exist along the Railbelt corridor east of Denali State Park north end of Healy.

The majority of state lands north of the impoundment are in various stages of the state selection process, either classified as selected, selection suspended, or as tentatively approved or patented. Lands within the Fairbanks to Healy transmission corridor are predominantly state-patented mixed with private, borough and a few regional holdings. Nearly all of the Anchorage-Willow transmission line is on State land.

The Point MacKenzie Agricultural lands, in the Willow-Anchorage transmission line corridor, are the only agricultural lands within the project area.

Two state land disposal sites (Figure E.9.2) exist near the Indian River in the western-most part of the project 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, and contains approximately 518 hectares (1,280 acres) of land. The disposal area has been subdivided into roads and 139 lots averaging two hectares (five acres) 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 is 2,590 hectares (6,400 acres) of which 607 hectares (1,500 acres) will be divided into 75 parcels.

These land disposals, along with scattered private parcels of land, represent the only actual dedication of a given piece of land to a particular use. Table E.9.1 displays various land holdings in the vicinity of the proposed project, and Table E.9.2 summarizes those holdings by status/ownership category.

Placer mining occurs primarily on federal and state selected and patented lands near Ester.

The majority of State Classified lands within the project area are either resource management or public recreation lands. The majority of resource management lands are located on state holdings west of the Susitna River. The remote parcel (southern portion) of the Indian River State Lands Disposal is under private recreation status.

Private parcels occur along Ester Creek in a mining district at the north end of the Healy-Fairbanks transmission corridor, near Healy at the south end of the corridor.

Matanuska-Susitna Borough owns no lands in the project impoundment area. Mat-Su Borough does own patented land in the Anchorage-Willow transmission corridor east of Knik Arm. The Municipality of Anchorage has patents to land at the south end of the Anchorage-Willow corridor.

The Willow-Anchorage transmission corridor extends across Ft. Richardson Military Reserves for 29 kilometers (18 miles) thence across

Matanuska-Susitna Borough property located approximately 16 kilometers (10 miles) north of Anchorage. Approximately 6.5 kilometers (4 miles) of the line will traverse across the Point MacKenzie Agricultural Sale property that belongs to the state for sale of agricultural rights to private individuals for agricultural use. The remainder of the transmission line extends across state lands until the vicinity of Willow. At Willow the study area encompasses state land disposal areas and private land interspersed within Mat-Su Borough Patented land. The selection of the proposed route avoided private lands to minimize the impact of the line to residents.

The Healy-Fairbanks transmission corridor extends across state-selected lands, much of which has been patented or tentatively approved. The line traverses the U.S. Air Force Clear Mews Military Reserve lands for approximately 16 kilometers (10 miles) in the vicinity of Anderson.

The transmission route between Healy and Fairbanks will pass several land disposal areas on the west side of the Parks Highway. The proposed lines will parallel an existing transmission line when traversing the disposal areas.

2.2 - Description of Existing Land Use in the Project Area

(a) Description of Land Use Evaluation Procedures

Specific procedures and steps involved in the land use analysis are discussed below.

(i) Study Areas

Based upon preliminary project descriptions, three study areas (Zones 1, 2, and 3) were defined for existing land use analysis (Figure E.9.4). 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 Gold Creek and the mouth of the Tyone River.

Zone 1 includes those structures and land uses that would be affected by inundation. Zone 2, extending about 10 kilometers (six miles) from Zone 1, is based upon the locations of lakes which characterize aggregations of land use. Zone 3, that extends approximately 19 kilometers (12 miles) 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 Willow and Anchorage and between Healy and Fairbanks were analyzed.

(ii) 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.

(iii) 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 vehicles (ATV) access, tractor trails, roads, landing strips, and guide camp locations.

(iv) Interviews

Two types of interviewing were used. Oral history interviewing was undertaken to reconstruct a land and resource use history of the upper Susitna basin. This history focuses primarily on the area surrounding the Susitna River between Gold Creek and the Denali Highway, the area in which 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.

(v) 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.

(vi) 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, management activity, and natural features was summarized.

(vii) Access Road and Transmission Line Analyses

Land use and aesthetics were considerations 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.

(viii) 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.

(xi) 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.

(b) Existing Land Use Activity

Land use aggregations for recreation, mining, and residential activities are shown in Figure E.9.5.

(i) 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. Some portage between the lakes in the Stephan Lake vicinity and Prairie Creek to Talkeetna via the Talkeetna River.

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 have probably contributed more total man-days of use in the area in the past twenty years than all other uses.

(ii) Zone 2 and Zone 3

Zone 2 is the area extending about ten kilometers (six miles) from Zone 1. Thus, Zone 2 encompasses the area downstream of 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 Portage Creek. 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.

- 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 1960's 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.

- 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 (Clear) Creeks and Indian River. Fishing in Fog, Clarence, Watana, Tsusena, Deadman, Big, and High Lakes appears to be associated with other activities, such as hunting, summer cabin use, and mining. There is little stream fishing elsewhere in the project area.

- Trapping

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.

- Mining

Mineral exploration and mining have been limited in the immediate project area. Mining in the Upper Susitna River basin has been low in claims density and characterized by intermittent activity since the 1930's.

Placer mines working alluvial deposits for minerals are found in sites throughout Mat-Su Borough. Active mining has been more concentrated in Gold, Chunilna (Clear), and Portage Creeks than in other 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.

(c) Existing Land Use Development

Both historically and currently, 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 have been utilized for hunting, fishing, trapping, boating, mining, and other geneneral recreation purposes, such as cross-country skiing or photography. Existing structures in the project area are shown in Figure E.9.6.

(i) Zone 1

Types of developments located in Zone 1, the inundation zone plus 61 meters (200 feet), 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.

(ii) Zone 2

The greatest number of existing land use development and historical artifacts are located in Zone 2. Zone 2 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 is 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.

(iii) 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.

Figure E.9.5 identifies the location of land use activities and quantifies the intensity of use.

Land use between Montana and Willow is sparse with a Matanuska Electric Association right-of-way located several miles east of the Parks Highway. Some vacant and low density residential lands are present along Fishook Willow Road (Hatcher Pass Road). Homesteads occur along Montana Creek. Four private landing strips and a registered public airport are in the Montana 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. The Larson Lake residents could develop the lake for residential recreation. There are five landing strips in the Talkeetna area. The two within the village of Talkeetna are registered public landing strips.

Residential and commercial land development is 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 principle concentration are where residents desire to keep the land in a natural, pristine conditions. Within the Curry area is Byers Lake State Campground. Hiking trails lead from Byers Lake State Campground 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 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 2 and 16 hectares (5 and 40 acres). 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.

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.

(d) Special Lands

(i) Wetlands

Proposed land use development is contingent on wetland and floodland locations. Wetlands are biologically important because they tend to be more productive and generally 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.

Wetlands cover large portions of the upper 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.

Wetlands of the project area are described in Exhibit E, Chapter 3, Subsection 3.3.

(ii) Floodlands

Floodlands are areas known to be frequently inundated by high water run-off, glacial outbursts, high tide or by water from high winds.

Floodplains are composed of sediments transported and deposited above the riverbanks by flooding rivers or streams. Land use development is not compatible within floodplains.

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). 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 upper Susitna basin due to the area remoteness.

The Chulitna, Talkeetna, and Nenana Rivers are the major rivers in the project area for which floodlands have been identified. Floodlands have been identified for the Susitna River downstream from Devil Canyon to Talkeetna.

(iii) Prime Lands

The U.S. Soil Conservation Service has determined that there are no prime farmlands, rangelands or forests within the Upper Susitna Basin.

2.3 - Description of Existing Land Use Management Plans for the Project Area

The Bureau of Land Management (BLM), the Alaska Department of Natural Resources, Matanuska-Susitna Borough (Mat-Su Borough), and the Cook Inlet Region, Inc. (CIRI) and associated village corporations have various mangement concerns in the project area. Table E.9.5 summarizes the existing and proposed land use management activities of these agencies.

Federal lands to the north of the project area are managed by the BLM. These lands are included in the Denali/Tiekel Planning Blocks (Figure E.9.7). A Decision Record; dated July 1982, authorized the Denali/Tiekel Amendment to the Southcentral Management Framework Plan

to be a Finding Of No Significant Impact (FONSI). The attachment of the 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.

Lands in the project area that have been identified for conveyance to the Natives have a total of six easements across them. These include: an access trail 15 meters (50 feet) wide from the Chulitna wayside on the Alaska Railroad to public lands immediately east of Portage Creek; a state site easement and easements on Stephan Lake; and an access trail running east from Gold Creek. Easements were only reserved when it was shown that access to public lands was not possible from any other public land area. There are no easements immediately adjacent to the Susitna River above Gold Creek.

Finally, BLM is also developing a wildlife habitat management plan in cooperation with Alaska Department of Fish and Game (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.

Most state lands fall under the jurisdiction of the Alaska Department of Natural Resources (DNR). As indicated, the State is disposing of 607 hectares (1,500 acres) of remote housing parcels and 518 hectares (1280 acres) in a subdivision. These disposal areas (located north and south of Chulitna) are west of the project area. They are included in Mat-Su Borough's Talkeetna Mountain Special Use District.

In the project area, the State had, until recently, done only a resource assessment for those lands it is proposing to select. Currently, DNR's Division of Research and Development is undertaking a comprehensive assessment of the resource base in general. The Susitna Area Plan for state lands in this area is being developed in cooperation with Mat-Su Borough. The State has requested coordination between the Susitna Hydroelectric Project and the regional land use plan.

Matanuska-Susitna 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 selections 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 zoning authority over all lands within the district's boundaries. The Special Use District includes the project area. The Indian River Subdivision and Remote parcel are within the special use district. The Mat-Su plan will allow recreation cabins at these sites but no 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. The project area is considered a mixed-use zone, which would premit hydro development. Management objectives for the project area will probably not be refined until the current hydro 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.9.8). At present the dam is not included within the program.

The Cook Inlet Region, Inc. 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 Alaska Power Authority's FERC license application for the Susitna Hydroelectric Project.

Construction and operation of the dams and related facilities will cause impacts on area resources. Prior to determining the extent of the land use changes, land use priorities were assessed in terms of land use activity and development or conservation and preservation of specific ecosystems. In few cases, these values are identified in agency management programs that apply to the area. Section 9.2.3 of Exhibit E described the Existing Land Use Management Plans. Section 4.0 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. Further discussion of access related land use change is presented in Section 3.5 below.

3.1 - Dams and Impoundment Areas

(a) Proposed Facilities

(i) Watana

The Watana Dam will be a 720 meter (885 foot) high, gravel-filled structure, with a crest length of 1,250 meter (4,100 feet). The dam will be located at Susitna River kilometer 266 (mile 165), approximately three kilometers (two miles) upstream from the mouth of Tsusena Creek. It will impound approximately 80 kilometers (48 miles) of river to 666 meters (2,185 feet) elevation and inundate about 16,000 hectares (38,000 acres). A general layout of site facilities is shown on Plate F34.

(ii) Devil Canyon

Devil Canyon dam will be a 197-meter (645 foot), concrete thin-arch dam and a rock-filled saddle dam constructed at river kilometer 216 (mile 134) in Devil Canyon. Its crest length will be 754 meters (2,475 feet). The dam will impound 42 kilometers (26 miles) of river to 444 meters (1,445 feet) elevation. Approximately 3,157 hectares (7,800 acres) of land will be inundated. A general layout of site facilities is shown on Plate F70.

(b) Induced Land Use Changes

(i) Land Use Development

The emplacement of the Watana Dam and impoundment will inundate seven structures. These structures are numbered 90, 91, 92, 111, 112 and 120 on Figure E.9.6. Two structures are actively maintained as indicated in Table E.9.6. Number 90 is a lean-to for hunting and fishing purposes. Number 119 is a trailer situated by the U.S. Corps of Engineers for Susitna Hydroelectric feasibility study.

The emplacement of Devil Canyon Dam and impoundment will inundate three structures, as illustrated in Figure E.9.6. These are 2, 6 and 107. As indicated on Table E.9.6, only Number 2, a boat cabin, is currently maintained for boating and hunting.

(ii) 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 floatplant landing and boat travel, and thus, permit easier penetration by big game hunters into rarely visited areas. An increase in moose hunting will occur immediately adjacent to the proposed impoundments. Hunting for caribou may increase 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.

Access to the proposed facilities will be limited to project personnel during construction of the facilities. Land use activities will be confined to project construction to discourage increased hunting, fishing and trapping in the project area. 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 fur bearers resulting from increased land use activity.

3.2 - Construction Camps and Villages

(a) 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. Construction of Watana Dam is proposed to begin in 1985, nine years before the dam at Devil Canyon. Plans are to build a construction camp and village at Watana for use until the dam construction phases down. The camp will then be relocated to the Devil Canyon dam site. Part of the village at Watana will remain as a permanent town to provide housing and community facilities for workers who will operate the dams. No permanent village is planned for the Devil Canyon site.

The proposed camp and village at Watana will be constructed northeast of the dam site between Deadman and Tsusena Creeks (Plate F34). Approximately two kilometers (one mile) 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. Permanent buildings are planned for the village facilities at Watana, since the village community will remain after the dams are built.

Facilities at the village will include family housing (to accommodate about 1000 people), a school, gymnasium, recreation center, shopping center (food supermarket, department and specialty stores), fire station, generating station, and structures for other support activities. Facilities and services to be provided at the costruction camp include housing modules (dormitories) for about 3,000 workers, camp offices, food services, warehousing, fire and security protection, banking and postal services, hospital care, recreation, communications, and power generation.

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 4,030 (3,070 in the camp and 960 in the village) including workers, families, and visitors. The water source will be from Tsusena Creek and groundwater 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 (Plate F70).

Additional details on the construction camps and villages may be found in Exhibit A and in Section 5 of Exhibit E.

(b) Induced Land Use Changes

(i) Watana

- Land Use Development

The construction camp and village will result in the dedication of 150 hectares (370 acres) 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 36 hectares (90 acres). Additional lands will be required for connecting roads, an airstrip, and other facilities related to dam construction.

- 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 Upper 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.

(ii) Devil Canyon

- Land Use Development

Some 34 hectares (85 acres) 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.

- 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.

(c) Mitigation

Impacts from human use can be reduced if trails outside the proposed camps are established and if specific areas are designed for leisure 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.

Posting and enforcing construction camp rules will help make project personnel aware of adverse environmental impacts. Other mitigations measures may include restricting the use of private vehicles in the project area.

3.3 - Access

(a) Proposed Facilities

The access plan proposed route is shown on Plate F32. Transport to the Watana damsite will commence in part at the existing Alaska Railroad at Cantwell. A road will extend 3.2 kilometers (2 miles) from a proposed rail marshalling yard and storaage facility, and will follow an existing route to the junction of the George Parks and Denali Highways. Transport will proceed east 34 kilometers (21 miles) on the Denali Highway. A new access road will extend south from the Denali Highway from a point south of Pyramid Peak. The road will be constructed for 69 kilometers (43 miles) across Brushkana Creek, paralleling a drainage west of Deadman Mountain and Big Lake to the Watana damsite. The road will provide access to some Native lands on the north side of the river and access to Native lands on the south side of the river when access is provided across the top of the dam.

Access to the Devil Canyon development will consist primarily of an 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 22.5 kilometers (14 miles) from Gold Creek to the marshalling yard near the Devil Canyon camp, except for a 3.2 kilometer (2 mile) section where the route traverses steep terrain alongside the Susitna River. Several streams are crossed requiring the construction of large culverts, however, no bridges are needed.

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.

A road will connect the Devil Canyon and Watana damsite. This road connection is also required for travel between Watana and Devil Canyon by the post-construction operation and maintenance personnel who will be stationed at Watana.

From the marshalling yard at Devil Canyon the connecting road will be built to a high level suspension bridge approximately 1.6 kilometers (one mile) downstream of the dam site. The route extends northeast, across Devil Creek and past Swimming Bear Lake at an elevation of 1,400 meters (3,500 feet), thence southeast through a wide pass. The road continues south crossing Tsusena Creek and connects to the Watana Dam. The overall length of the road is 57.5 kilometers (36 miles) between Devil Canyon and Watana.

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%
Maximum Curvature	5°

The 33.5 kilometers (21 miles) of the Denali Highway will be upgraded to these design standards. The connecting road between Watana and Devil Canyon will be built to these standards.

Grades and curvatures consistent with current highway design standards for a 90 km/h (55 mph) design speed were chosen for the efficient and economical movement of supplies. As extensive grades and curvatures could result at some locations, the design speed will be reduced in certain areas to 65 km/h (40 mph) to allow steeper grades and shorter turn radii. Flexibility of design speed allows the road to follow the topographical contour more closely.

Typically the crown of the road will be approximately 1.2 meters (4 feet) above natural elevations. Side slopes will be smoothed. Several pull-outs will be constructed along the access road to permit viewing of natural areas and some of the project facilities.

Required right-of-way width will generally be 60 meters (200 feet) 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 road will be paved in the community of Cantwell from the 16 hectare (40 acre) marshalling yard to 6.5 kilometers (4 miles) east of the George Park and Denali Highway intersection. This will eliminate dust and flying stones in the residential district. Allowable speeds will be lowered along this segment for safety measures.

(b) Induced Land Use Changes

The access route will be built for construction and operation of the dam facilites. Many of the effects will be related to long-term consequences after construction is complete. 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 Chapter 9.3.3 (b)(i). 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 access into the area will cause profound alterations to the Susitna basin's character.

Rail access to Devil Canyon originating at Gold Creek, will allow the transportation of materials, equipment, and labor through Gold Creek. There would 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.

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 aggrevate 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 as a positive step by the corporations. Recreation, mining, and timber harvesting have been suggested as possible activities.

(i) 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.

The access road that extends from the Denali Highway to Watana and Devil Canyon, and the railhead at Cantwell will not directly create significant impacts on land use development. Their construction will create jobs during 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.

The termination of the rail system at Cantwell, the closest community to the dam sites via road, will create a significant change to Cantwell. 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, housing, business activity, improved transportation and schools will require development and construction within the community.

The population may increase over 100 percent at Cantwell and up to 100 percent at Trapper Creek. Talkeetna will experience a 10-50 percent increase in population with the Denali-North access plan. 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 railroad will traverse through Gold Creek to a railhead at Devil Canyon. This rail spur will signifiantly impact population, and the development of support sector employment, business activity, housing and transportation in Gold Creek and, to a lesser extent, Talkeetna. Talkeetna will experience a significant impact on its schools and other public facilities services.

The extent of land use development in surrounding communities will depend on the transportation program employed which could include combinations of airplane, bus, personal vehicle with associated park and ride lots, travel schedules, and/or travel allowances.

Information on socioeconomic impacts is described in Section 5, Exhibit E of Alaska Power Authority's FERC license application for the Susitna Hydroelectric Project.

(ii) Land Use Activity

There will be increased hunting for moose 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.

Fishing will increase with potential effects on reduced resources and on people who currently fish in the area.

The access road between the two dams on the north side of the Susitna 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.

(c) Mitigation

Access will be limited to project personnel during construction. Land use activity will be confined to project construction until the facilities are built. This will reduce in impact of land use activity until the implementation of the land use management plans are in effect.

If the use of off-road vehicles 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 uses nor damage the environment; and if necessary, ORV restriction such as between the proposed dam sites. 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.

3.4 - Transmission

(a) Proposed Facilities

Maps of the transmission route are included in Exhibit G. From Watana to Devil Canyon, two single-circuit lines will be constructed in a 122 meter (400 foot) wide right-of-way specified within the proposed 0.8 Kilometers (0.5 miles) wide corridor. Five single-circuit 345 Kv lines will extend from Devil Canyon to the intertie near Gold Creek. A 213 meter (700 foot) wide right-of-way will be selected from the proposed Devil Canyon-Gold Creek Corridor. Watana to Gold Creek was considered the central study area.

From Gold Creek, two lines will extend north and three lines will extend south and will parallel the intertie to Healy and Willow, respectively. From Healy to Fairbanks and from Willow to Anchorage, the northern and southern study areas, respectively, the right-of-way will be approximately 122 meters (400 feet) wide.

Most of the towers will be X-shaped structures approximately 30 meters (100 feet) tall. 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 except 15 meters (50 feet) taller.

The corridor width studied was 5 to 10 kilometers (3 to 6 miles). It included both sides of the river so therefore was 23 kilometers (14 miles) wide in some central corridor segments. The transmission route analysis involved mapping within the corridor the following land use features: development and activity, land tenure, and aesthetics.

The process of environmentally screening the original 22 corridors involved comparison of study area options based on the following 8 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 0.8 kilometers (0.5 miles) wide route within the corridor was selected.

The transmission line right-of-way for two 345 KV lines will extend west from the substation north of Watana Dam, in the Southwest Quarter of Section 28, Township 28 North, Range 5 West of the Fairbanks Meridian, for 8 kilometers (5 miles). The corridor is proposed to be north of the Susitna River and to cross Tsusena Creek. The corridor extends southwest for 9.5 kilometers (6 miles) thence west for 16 kilometers (10 miles) crossing the Susitna River. The corridor continues west by northwest for 21 kilometers (13 miles). The proposed Gold Creek Substation is in the Southeast Quarter of Section 36, Township 32 North, Range 11 West of the Fairbanks Meridian.

The transmission line will be built during winter to reduce the impact of the construction vehicles on the terrain. Access to the transmission line will be over snow and ice bridges across the Susitna River, Tsusena Creek and the other drainages traversed, to the greatest extent practical. Access from the proposed Gold Creek Substation to the drainage that extends south from the proposed Devil Canyon dam will be along the alternative Access Plan 16. A description of the Access route is presented in Section 2.6 of Exhibit B.

Crossing the steep walls of the drainage south of the proposed Devil Canyon dam will be difficult and may require following the contours of the drainage south to a location offering safe and economical crossing of the drainage. A similar detour from the transmission corridor may extend north at the Tsusena Creek drainage. Vehicles may need to extend upstream along other drainages and around peaks before returning to the transmission line corridor for construction. It is possible that the transmission line extending for 8 kilometers (5 miles) west of the Susitna River will require helicopter construction during the summer. Upon worst case, summer helicopter construction could be required for approximately 32 kilometers (20 miles) between Tsusena Creek and the drainage south of the proposed Devil Canyon dam.

(b) 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 clearing or of chemical treatment of the right-of-way. Impacts will vary depending upon the timing and method of right-of-way maintenance and can be minimized through careful prescription of maintenance techniques.

(i) Land Use Development

The Willow-Anchorage route crosses or parallels numerous trails, including the Iditarod Trail, seismic survey lines, tractor and pioneering ORV trails, and several recreational trails near Willow.

Residential use occurs in Willow, Red Shirt Lake, and on many of the small lakes east of the Willow-Anchorage 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.

Agricultural use occurs north of Point MacKenzie, and agricultural clearings exist from a region northeast of Middle Lake east to the Little Susitna River south of Yohn Lake. Land within a transmission right-of-way can still be cultivated, 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 Willow-Anchorage 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.

The proposed lines extending south from Willow will parallel the existing Chugach Electric Association, Inc.'s Point MacKenzie-University Substation line on the east side of Knik Arm to a new substation proposed south of Muldoon

Road. The visual impacts of this section of line will not be insignificant since it is located on the Fort Richardson Military Reservation. The impacts of the proposed route will be reduced because it is adjacent to an existing line. Additional mitigation measures include imitating the tower and conductor materials, tower spacing, and design of Chugach EA's existing line.

The impact of the transmission line routes from Gold Creek to Healy and Willow will be minimal because the routes will be within the same corridor as Alaska Power Authority's Healy-Willow intertie transmission line. The construction of Alaska Power Authority's Healy-Willow intertie will be complete upon commencement of the proposed 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.

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.

(ii) 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.

(c) 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. The techniques employed by the U.S. Fish and Wildlife right-of-way management plans will be used when selecting the transmission lines right-of-way.

4 - DESCRIPTION OF CHANGES IN LAND USE MANAGEMENT RESULTING FROM THE PROJECT

4.1 - Land Acquisition

With the exception of a few scattered parcels, most lands in the project area are presently under federal control. Much of the land required for the dams and impoundments has been selected by the Natives under Alaska Native Claims Settlement Act. Many lands such as the proposed locations for the Devil Canyon camp and village, as shown in Figures 4 and 5, have been selected by Cook Inlet Region, Inc. (CIRI) and could be transferred to CIRI and associated Native village groups.

Approximately 16 kilometers (10 miles) of the access route crosses Native Selected lands. The remainder of the access route is on federal or state selected lands. The relocation of the preferred access route could cause the reevaluation of village selection lands by the Natives.

The transmission line routes are primarily on State land with the exception of the central route. Twenty-nine kilometers (18 miles) of the selected transmission line from Watana to Gold Creek traverses Native Selections. The remainder of the central transmission route is on State selected lands.

Sections of the northern transmission corridor crosses Doyon Regional Corporation lands that have been designated for village selection by the Alaska Natives. Sections of the southern corridor are owned by CIRI.

Before the initiation of construction, 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.

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 groups.

The proposed locations for the Watana camp and village are on federal lands that have been selected by the State. Ultimate transfer of title to these lands will not be affected by the project.

For more discussions on land stewardship, see Chapters 9.1.2 and 9.2.1 of Exhibit E.

4.2 - Land Management

Based on available information and agency interviews, it has been determined that little comprehensive management exists at present. Section 9.2.4 of Exhibit E describes existing land use management plans. Table E.9.5 summarizes the existing and proposed land use management activities in the project areas.

The BLM has no proposals for management planning, other than the existing Denali/Tiekel Planning Blocks.

The Alaska Department of Natural Resources (DNR) has prepared a planning background report in cooperation with Matanuska-Susitna Borough (Mat-Su Borough), Kenai Peninsula Borough and the Alaska Department of Fish and Game, and Transportation and Public Facilities. The DNR is preparing a land use report that describes and categorizes potential land use in the southcentral region of Alaska. This document will be completed approximately May, 1983. A land use plan will be completed by the DNR in 1986.

Future agricultural land sales are proposed in the DNR Draft Land Use Plan for Public Lands in the Willow Sub-basin, 1981, along with programs for protecting wildlife habitat and sportmen's access.

The Alaska Department of Fish and Game (ADF&G) has developed species-specific objectives for the region, but it has no land management authority. Other agencies have preliminary 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 important factor when agencies eventually develop comprehensive land management plans.

The Matanuska-Susitna Borough has prepared a planning background report. The Mat-Su Borough will complete a draft comprehensive land use plan in November, 1982.

The Fairbanks Northstar 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 be 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 upper 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 adjacent to project lands. Furthermore, an increase in hunting, fishing, and general use of the project area is probable. These activities may require increased fish and wildlife management and may result in surface-disturbing activities.

Specific controls may be required to protect resource value. Controls could include establishng acquisition limits for hunting and fishing, permitting a limited public entry, ORV management, and other land management.

Finalizing specific management plans and mitigation measures for transmission line right-of-way, access, recreational use, and residential accommodations, will proceed during the Phase II of the Susitna Hydroelectric Project. The Alaska Power Authority will work closely with the aforementioned development of land use plans.

REFERENCES

Acres American Inc. 1981f. Susitna Hydroelectric Project Environmental Studies Subtask 7.05: Socioeconomic Analysis, Sociocultural Report. Prepared by Stephen R. Braund and Associates and Acres American Inc. for the Alaska Power Authority Anchorage, Alaska.

Acres American, Inc. 1981g. Susitna Hydroelectric Project Environmental Studies Subtask 7.07: Land Use Analysis. Prepared by Acres American Inc. and Terrestrial Environmental Specialists, Inc. for the Alaska Power Authority, Anchorage, Alaska.

ADNR. 1981. Draft Land Use Plan for Public Lands in the Willow Sub-basin. Alaska Department of Natural Resources Matanuska-Susitna Borough, Alaska Department of Fish and Game.

ADNR. 1982. Land Use Issues and Preliminary Resource Inventory. Volume 1, Planning Background Report. Matanuska-Susitna-Beluga Cooperative Planning Program. Prepared by the Alaska Department of Natural Resources in cooperation with Matanuska-Susitna Borough Alaska Department of Game and Fish, Transportation and Public Facilities and the Kenai Peninsula Borough.

APA. 1981b. Susitna Hydroelectric Project Environmental Studies Annual Report Subtask 7.12: Plant Ecology Studies. Submitted by Terrestrial Environmental Specialists, Inc. and the University of Alaska to Acres American, Inc. for the Alaska Power Authority, Anchorage, Alaska.

APA. 1981c. Susitna Hydroelectric Project Environmental Studies Report Subtask 7.14: Access Road Environmental Analysis - Environmental, Socioeconomic and Land Use Analysis of Alternative Access Plans. Submitted by Terrestrial Environmental Specialists, Inc., Frank Orth & Associates and the University of Alaska to Acres American Inc., for the Alaska Power Authority, Anchorage, Alaska.

APA. 1982. Susitna Hydroelectric Project Environmental Studies Phase I Final Report Subtask 7.08: Recreation Planning. Submitted by Terrestrial Environmental Specialists, Inc. for the Alaska Power Authority, Anchorage, Alaska.

APA. 1982. Environmental Assessment Reprot, Anchorage - Fairbanks Transmission Intertie. Prepared by Commonwealth Associates, Inc. for the Alaska Power Authority, Anchorage, Alaska.

Arnold, R.D. 1978. Alaska Native Land Claims. Alaska Native Foundation, Anchorage, Alaska.

BLM. 1982. Draft An Amendment to the Southcentral Alaska Land Use Plan for the Denali/Tiekel Planning Blocks. The Bureau of Land Management. Prepared by the Staff of the BLM, Anchorage District Office, Alaska.

Matanuska-Susitna Borough. 1981. Coastal Management Program Phase II Progress Report. Prepared by Maynard and Partch, Woodward-Clyde Consultants for Alaska Coastal Management Program and the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, administered by the Division of Community Planning, Department of Community and Regional Affairs, and the Matanuska-Susitna Borough Assembly.

Matanuska-Susitna Borough. 1982. Draft Growth Potential, Development Issues, Settlement Patterns, Volume 2. Matanuska-Susitna-Beluga Coopertive Planning Program. Prepared by Dowl Engineers for the Matanuska-Susitna Borough.

Price, R.E. 1982. Legal Status of the Alaska Natives. A Report to the Alaska Statehood Commission. Prepared by Department of Law. State of Alaska for the Alaska Statehood Commission, Fairbanks, Alaska.

USOTA 1977. Analysis of Laws Governing Access Across Federal Lands, Options for Access in Alaska. U.S. Office of Technology Assessment, Washington, D.C.

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Land Field Services, Incorporated
- P.J. Sullivan: Representative

Tyonek Native Corporation
- Agnes Brown: President

TABLE E.9.1: PARCELS BY LAND STATUS/OWNERSHIP CATEGORY[a]

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location[b]	Areas Hectares	Areas Acres
C-1	Federal	T29N,R12E SM	1,295	3,200
	Federal (SSS)[c]	T30&31N,R11E SM	4,792	11,840
	State Selection	T29-31N,R10&11E SM	11,396	28,160
	Regional Selection	T29N,R10&11E SM	9,324	23,040
		T30&31N,R12E SM	5,180	12,800
C-2	Federal (SSS)	T29-31N,R8-10E SM	34,966	86,400
	State Selection	T29&30N,R8-10E SM	20,980	51,840
	Private (Clarence Lake)	T30N,R9E SM Sections 19,20,21	5	12
C-3	Federal (SSS)	T30&31N,R5-8E SM	22,921	56,639
	State Selection	T29&30N,R5-8E SM	33,152	81,920
	Native Selection	T31N,R5E SM	404	998
	Private (Watana Lake)	T31N,R7E SM Sections 25&36	6	15
C-4	Federal (SSS)	T30N,R3-5E SM	7,408	18,304
	State Selection	T29&30N,R3-5E SM	29,579	73,088
	Native Selection	T29-31N,R2-5E SM	19,374	47,872
	Private (Stephan Lake)	T30N,R3E SM Sections 9,16,17,20,21	17	42
C-5	Federal (SSS)	T30&31N,R1W,1&2E SM	21,047	52,006
	State Selection	T29&30N,R1W,1&2E SM	21,239	52,480
	Native Selection	T29-31N,R1&2E SM	13,220	32,665
	Private	T29N,R2E SM Section 15	2	5
C-6	Federal (SSS)	T29-31N,R1&2W SM	9,712	23,999
	State Selection	T29&30N,R1&2W SM	12,302	30,399
	State Patented(TA'd)[d]	T31N,R2W SM	2,331	5,760
	Native Group Selection	T30N,R2W SM	1,554	3,840
	Private(north of Chunilna Creek)	T30N,R2W SM Sections 23,26	163	403
	(south of Gold Creek)	T31N,R2W SM Sections 29,30	34	84
	Mining Claims	T29N,R2W SM Sections 2,3,10,11,15,16		Unknown

a. Status and ownership are subject to change through administrative and court proceedings.
b. Seward Meridian
c. SSS - state selection suspended
d. TA'd - 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 Natural 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 of 3

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location (e)	Areas Hectares	Areas Acres
D-6	Federal (Railroad Withdrawal)	T22S,R11W FM Sections 22,23,26, 27,33,34	803	1,984
		T33N,R2W SM Sections 15-17	104	257
	(near Chulitna)	T32N,R2W SM Sections 1,2&11	73	180
	Federal (SSS)	T31N,R1W SM	932	2,303
		T33N,R1W SM	1,554	3,840
	Denali State Park	T31-33N,R2W SM	10,360	25,600
	State Selection	T32&33N,R2W SM	4,144	10,240
		T32&33N,R2W SM Sections 6&31	194	479
		T22S,R11W FM	2,072	5,120
	State Selection TA'd	T31N,R2W SM	3,885	9,600
		T22S,R10W FM	1,295	3,200
	Native Selection	T31&32N,R1W SM	3,108	7,680
	Private (Indian River Remote)	T31&32N,R2W SM Sections 2-4,9,10, 13,24,25-27,33-36	2,590	6,400
	(Indian River S.D.)	T33N,R2W SM	518	1,280
	(near Chulitna)	T32N,R2W SM Sections 1,2,11,12	150	371
	(near Gold Creek)	T31N,R2W SM Sections 17,19-21, 29,30	388	959
	(Pass Creek)	T33N,R2W SM (sec.27)	1	2
	(Summit Lake)	T33N,R2W SM (sec. 34)	2	5
	(Chulitna Pass)	T33N,R2W SM (sec. 35)	1	2
	(near Alaska RR)	T31N,R2W SM (sec. 9)	1	2
D-5	Federal (SSS)	T31N,R1W,1&2E SM	7,228	17,860
		T33N,R1W SM	4,662	11,520
	State Selection	T32&33N,R1W,1&2E SM	24,863	61,438
	State Selection TA'd	T22S,R8-10W FM	11,784	29,119
	Native Selection	T31-33N,R1W,1&2E SM	21,125	52,198
	Private (High Lake)	T32N,R2E SM (sec.20)	45	111
	(north of Devil Canyon)	T32N,R1E SM (sec. 16)	5	12
		T32N,R1E SM (sec. 30)	3	7
		T32N,R1W SM (sec. 9)	2	5
		T32N,R1W SM (sec.10)	5	12
		T32N,R1W SM (sec. 23)	3	7
D-4	Federal (SSS)	T31N,R3E SM	4,921	12,160
	State Selection	T32&33N,R3-5E SM	38,461	95,039
	State Selection TA'd	T22S,R5-8W FM	11,914	29,440
	Native Selection	T31&32N,R3-5E SM	15,344	37,914
	Private (Tsusena Butte area)	T33N,R5E SM Sections 16,21	20	49

USGS Talkeetna Mountains Quad	Land Status/ Ownership Category	Location	Areas Hectares	Areas Acres
D-3	Federal	T32&33N,R8E SM	1,036	2,560
	Federal (SSS)	T31&32N,R5-7E SM	10,878	26,880
	State Selection	T32&33N,R5-7E SM	33,411	82,560
	State Selection TA'd	T32N,R8E SM	842	2,081
		T22S,R2-4W FM	8,806	21,760
		T22S,R5W FM	2,331	5,760
	Native Selection	T31&32N,R5-7E SM	11,396	28,160
	Private (Fog Lakes Area)	T31N,R5E SM Sections 13&24	21	52
D-2	Federal	T31-33N,R8-10E SM	44,549	110,080
		T22S,R1&2W,1E FM	10,619	26,240
	Federal (SSS)	T31N,R8-10E SM	12,432	30,720
	State Selection TA'd	T32N,R8E SM	1,813	4,480
		T22S,R2W FM	1,424	3,519
D-1	Federal	T31-33N,R10-12E SM	31,599	78,080
		T22S,R1-3E FM	5,180	12,800
	Federal (SSS)	T31N,R10E SM	62	154
	Regional Selection	T31&32N,R12E SM	6,993	17,280
	Fish & Wildlife Service	T33N, R11E SM (sec.20)	Unknown	
USGS Healy Quad				
A-1	Federal	T22S,R1&2E FM	1,554	3,840
	Regional Selection	T22S,R1&2E FM	389	960
A-2	Federal	T22S,R1E,1&2W FM	12,432	30,720
	Private	T22S,R2W FM (sec.3)	2	5
A-3	Federal	T22S,R2-5W FM	9,842	24,320
	State Selection TA'd	T22S,R5W FM	2,331	5,760
A-4	State Selection TA'd	T22S,R5-7W FM	11,914	29,440
A-5	State Selection TA'd	T22S,R8-10W FM	8,547	21,120
A-6	Federal (Railroad Withdrawal)	T22S,R11W FM	932	2,303
	State Selection	T22S,R11W FM	906	2,240
	State Selection TA'd	T22S,R10W FM	1,295	3,200
	Private	T22S,R11W FM (sec. 1)	13	32

TABLE E.9.2: SUMMARY OF LAND STATUS/OWNERSHIP IN PROJECT AREA [a]

Land Status/Ownership Category	Total Area Hectares	Acres
Federal	122,899	303,680
Federal (State Selection Suspended)	150,121	370,945
Federal (Railroad Withdrawal)	1,912	4,724
State Selection	230,632	569,883
State Selection Patented or TA'd	70,515	174,239
Denali State Park (within study area)	10,360	25,500
Regional Selection	12,562	31,040
Native Group Selection	1,554	3,840
Native Selection	83,970	207,487
Village Selections (included in Native selection total)		
Chickaloon	2,072	5,120
Tyonek	8,288	20,480
Knik	16,058	39,680
Private	3,996	9,874

a. Summarized from Table 10.

TABLE E.9.3 USE INFORMATION FOR EXISTING STRUCTURES IN THE UPPER 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 & present	2	2	2
- no current seasonal use	2	7	1
Structure intact; maintained, with seasonal use - past & 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 UPPER SUSITNA RIVER BASIN

Type	Beginning	Middle	End	Years Used
Cat, ORV	Gold Creek		Devil Canyon	1950's-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 3 km (2 mi.) east of VABM Dead	1926
Packhorse, foot	Talkeetna	North of Disappointment Creek	Stephan Lake	1948
Packhorse, old sled road	Chunilna	Portage Creek	Lake west of High Lake	1920's-present
ATV	Denali Highway	Butte Lake	Tsusena Lake	1950's-present

TABLE E.9.5: SUMMARY OF PRESENT AND FUTURE LAND MANAGEMENT ACTIVITIES IN THE PROPOSED SUSITNA HYDROELECTRIC PROJECT AREA

Land Management Agency	Current Management	Future Management Direction
U.S. Department of Interior Bureau of Land Management	Protection of natural environment; no activities other than fire control and the issuing of some special use permits. Land use planning being undertaken.	Future management will be guided by Southcentral Planning Area Management Framework Plan and an easement management plan.
Alaska Department of Natural Resources	Planning for the disposal of state lands that are immediately adjacent to the west side of the project area (north and south of Chulitna).	State will select lands in project area not selected by the Natives. Management planning on these lands will not begin before 1983.
Alaska Power Authority	Performing hydroelectric development feasibility studies.	Dependent upon outcome of feasibility studies.
Matanuska-Susitna Borough	Borough has no lands in the project area. Project area does fall within the borough's boundaries and is part of the borough's Talkeetna Mountain Special Use District. Project area is a "mixed use" zone.	By Ordinance No. 79-35 creating the Talkeetna Mountains Special Use District, the borough can exercise planning and zoning authority over private lands within its boundaries; will commence further activities when hydro studies are completed.
Matanuska-Susitna Borough (in affiliation with the Federal Office of Coastal Zone Management and the Alaska Coastal Management Program)	Currently has designated the Susitna River to and including Devil Canyon as part of a biophysical area for the Coastal Zone Management Program.	Continuing CZM studies will determine any additional management direction.
Cook Inlet Region, Inc. and several villages	None; lands currently being transferred to individual villages.	Management planning not yet underway.

TABLE E.9.6: ZONE 1 - EXISTING STRUCTURES (a)

Map # (b)	Structure	Location	Access (c)	Currently Maintained	Use Status
2	Boat cabin	S. bank Susitna: on tributary 4.8 km (3 mi) S.W. of Fog Creek/Susitna confluence	boat, foot	Yes	Built in 1960's for Stephan Lake Lodge; currently used seasonally by Stephan boating/ hunting guests
90	Hunting lean-to	S.E. bank of Kosina/ Susitna confluence	boat, foot, floatplane	Yes	Built in late 1970's for hunting/ fishing purposes; fresh supplies indicate current use
91	Cabin	3 km (2 mi) N.E. of Watana/Susitna confluence	floatplane	No	Built in 1950's; used as seasonal hunting and fishing cabin; supplies indicate current use
112	Line cabin	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
119	Trailer; work shack	N. bank of Susitna: 1.6 km (1 mi) W. of Deadman/Susitna confluence	helicopter	Yes	Built in 1970's by Army Corps for Susitna study
107	Cabin	S. bank of Susitna at Devil Canyon	4WD	No	Built and used in 1950's for Bureau of Rec. study; currently not in use
6	Cabin foundations	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 1950's, now collapsed; no longer used

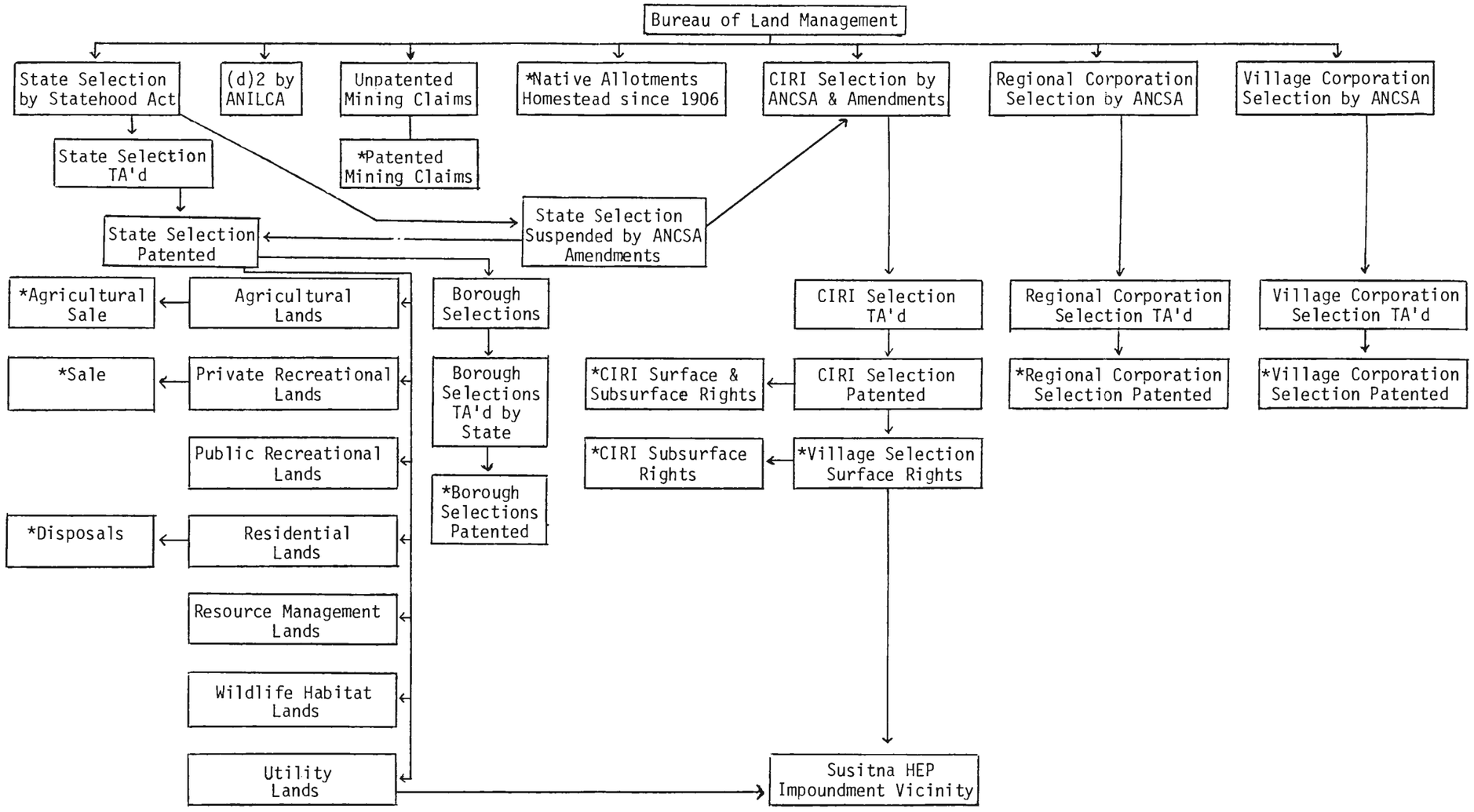
a. Zone 1 is the impoundment zone plus a 61-m (200 ft) perimeter.
b. See Figure 2.
c. Almost all sites are accessible by helicopter.

TABLE E.9.6 (Continued)

Map # (b)	Structure	Location	Access (c)	Currently Maintained	Use Status
120	Shack	S. bank of Susitna: 1.6 km (1 mi) W. of Deadman/Susitna confluence	helicopter	No	Used and built in 1970's as a research site; since Army Corps study, has collapsed; no longer used
92	Cabin/ cache	N.W. bank of Watana/Susitna confluence	dog team, foot	No	Built in 1960's for hunting purposes; cabin collapsed; no longer in use
111	Cabin	S. bank of Susitna: 1.6 km (1 mi) E. of Watana/Susitna confluence	dog team, foot	No	Built in 1945 as a trapping line/hunting cabin; used for trapping until mid 1950's, presently covered with brush; no longer used

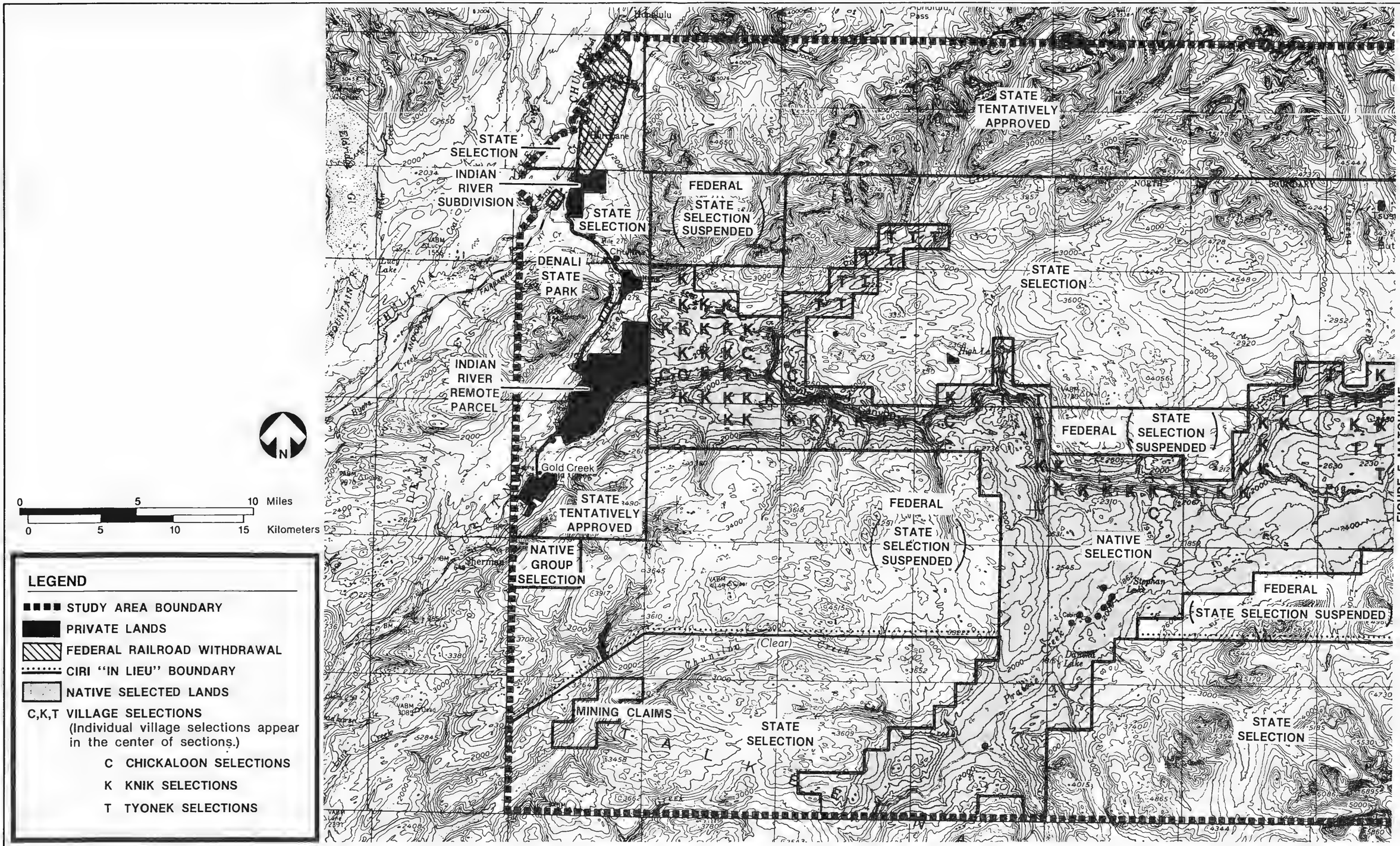
Summary: Ten structures exist within this zone. Of these, five are currently used on a seasonal basis in connection with fishing, boating, hunting, and research.

*Private Lands



PROCEDURES FOR ALASKA LANDS ACQUISITION
(NOT REVIEWED BY AFFECTED AGENCIES 11/82)

FIGURE E.9.1



LAND OWNERSHIP/STEWARDSHIP, DEVIL CANYON PORTION

PREPARED BY TES

FIGURE E.9.2

STATE TENTATIVELY APPROVED

STATE SELECTION

REGIONAL SELECTION

FWS

FEDERAL

STATE SELECTION

REGIONAL SELECTION

STATE TENTATIVELY APPROVED

NATIVE SELECTION

FEDERAL

STATE SELECTION SUSPENDED

FEDERAL

STATE SELECTION

FIGURE 4 MATCHLINE

N

0 5 10 Miles

0 5 10 15 Kilometers

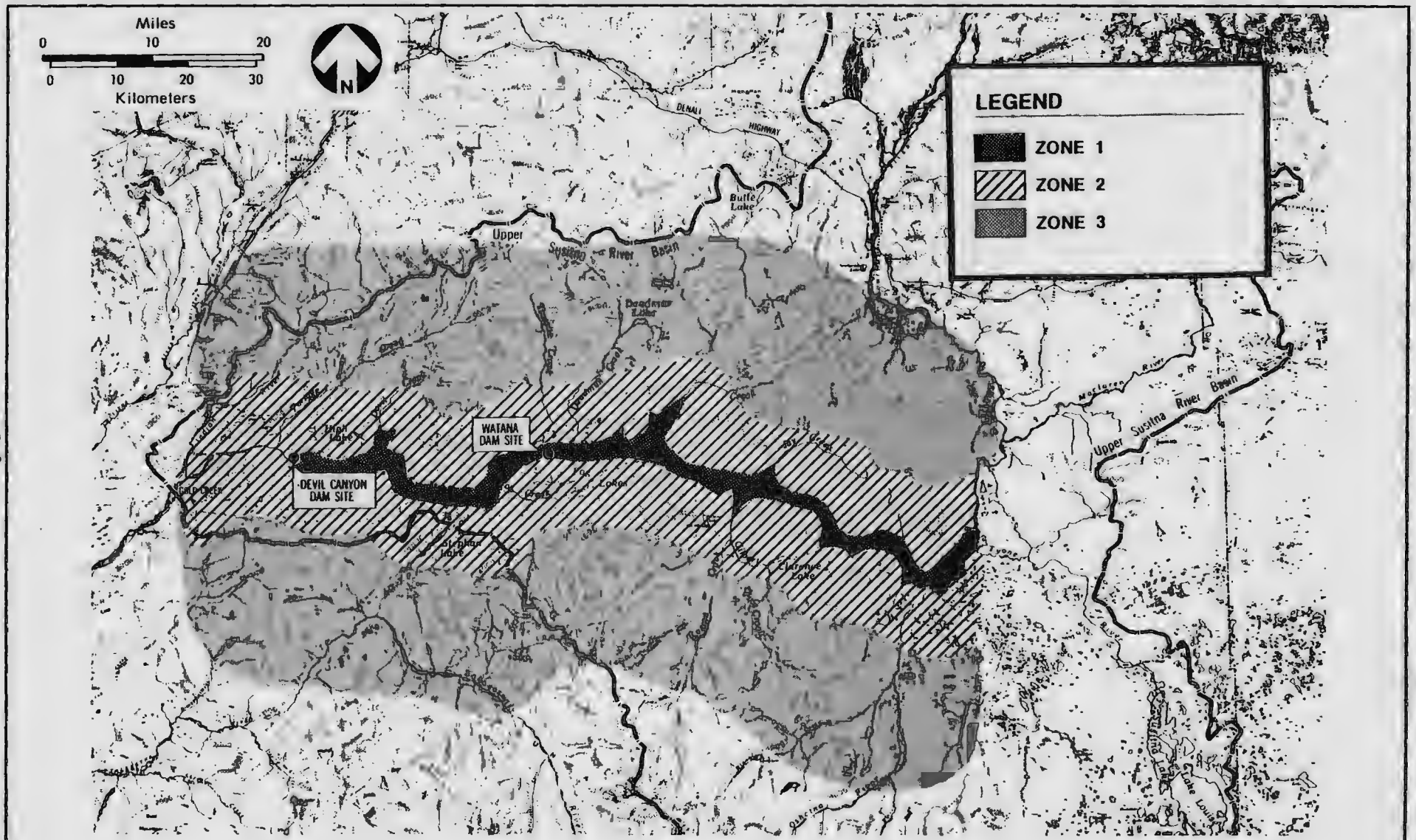
LEGEND

- STUDY AREA BOUNDARY
- PRIVATE LANDS
- FEDERAL RAILROAD WITHDRAWAL
- CIRI "IN LIEU" BOUNDARY
- NATIVE SELECTED LANDS
- C,K,T VILLAGE SELECTIONS (Individual village selections appear in the center of sections.)
  - C CHICKALOON SELECTIONS
  - K KNIK SELECTIONS
  - T TYONEK SELECTIONS

LAND OWNERSHIP/STEWARDSHIP, WATANA PORTION

PREPARED BY TES

FIGURE E.9.3



STUDY AREAS FOR LAND USE ANALYSIS

PREPARED BY TES

FIGURE E.9.4

Miles
0 10 20
0 10 20 30
Kilometers

N

LEGEND		
NO.	USE	INTENSITY
1	RECREATION	LOW
2	MINING	LOW
3	RECREATION	LOW
4	MINING/RESID.	MEDIUM
5	MINING	MEDIUM
6	REC./RESID.	MEDIUM
7	RECREATION	LOW
8	RECREATION	LOW
9	RECREATION	LOW
10	RECREATION	LOW
11	RECREATION	LOW

DENALI HIGHWAY
Butte Lake
Upper Susitna River Basin
Deadman Lake
Tsusena Creek
Deadman Creek
Watana Creek
Jay Creek
Maclaren River
Devil Creek
High Lake
Portage Creek
Indian River
WATANA DAM SITE
DEVIL CANYON DAM SITE
GOLD CREEK
Susitna River
Fog Lakes
Fog Creek
Stephan Lake
Gilbert Creek
Clarence Lake
Tyone River
Kosina Creek
Talkeetna Mountains
TALKEETNA

1 2 3 4 5 6 7 8 9 10 11

LAND USE AGGREGATIONS:
RECREATION, MINING, RESIDENTIAL

PREPARED BY TES

FIGURE E.9.5

Miles
0 10 20
0 10 20 30
Kilometers

N

DENALI HIGHWAY

Upper Susitna River Basin

Butte Lake

Deadman Lake 73,74

72

115

70

Tsusena Creek

Deadman Creek

76

106

105

75

Watana Creek

River

Maclaren

Jay Creek

103

101

WATANA DAM SITE

5

119

92

91

94

6

120

111

93

112

8 Fog Lakes

Fog Creek

7

90

Susitna

110

2

39

77

79

78

80

116

99

118

100

Tyone

117

81

Gilbert Creek

86

84

87

82

Clarence Lake

85

88

95, 96

98

Kosina Creek

Talkeetna Mountains

59-63

47-53

26

112,42

27

64-69

25

45,46,55-58

Indian River

Portage Creek

Devil Creek

High Lake

28,30

107

DEVIL CANYON DAM SITE

GOLD CREEK

3

4

1,9

10

16-19

Stephan Lake

11-15

20

21

38

113

36

2

37

114

34

23

Chunilna Creek

Talkeetna River

Susitna River

EXISTING STRUCTURES

PREPARED BY TES

FIGURE E.9.6

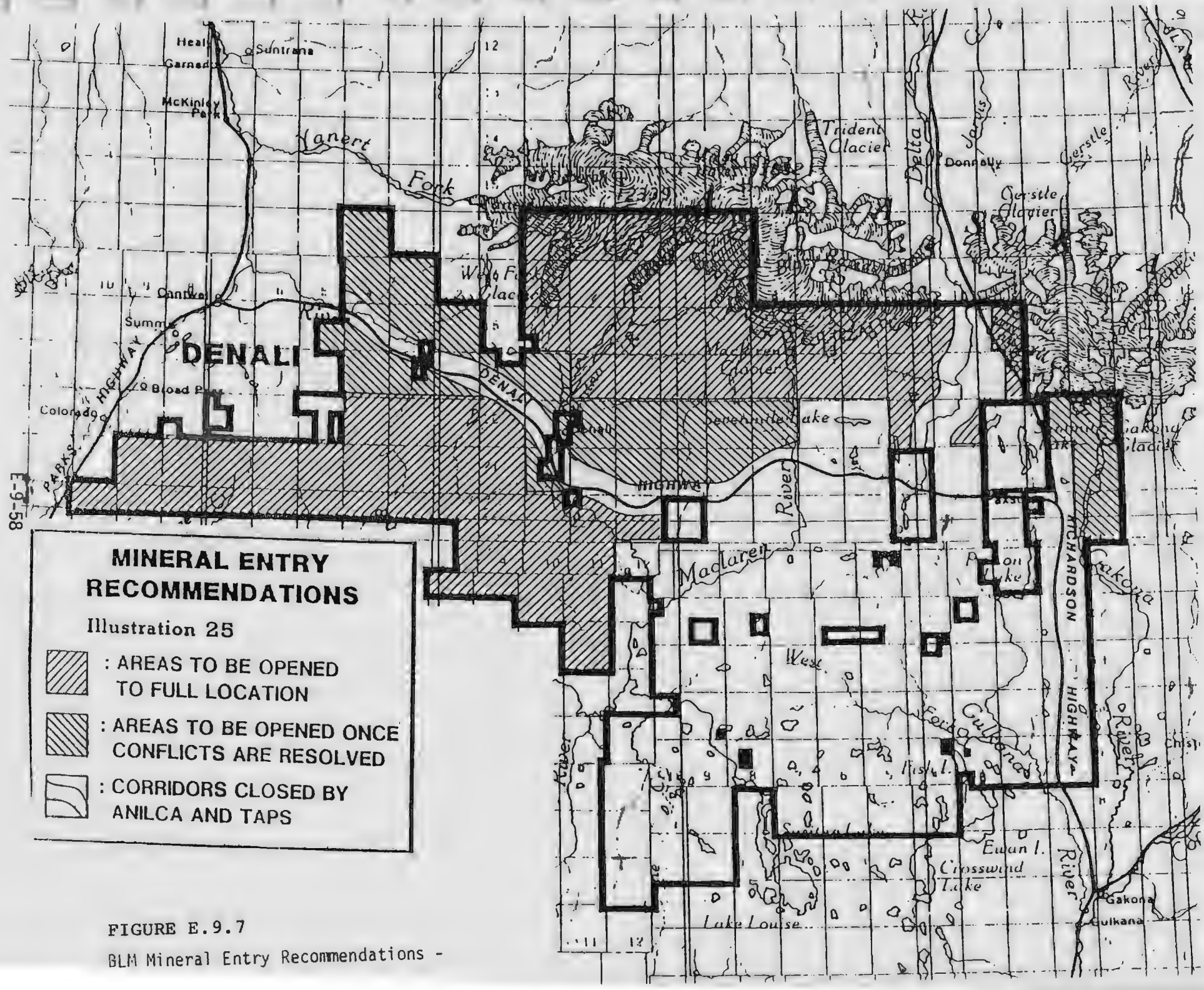
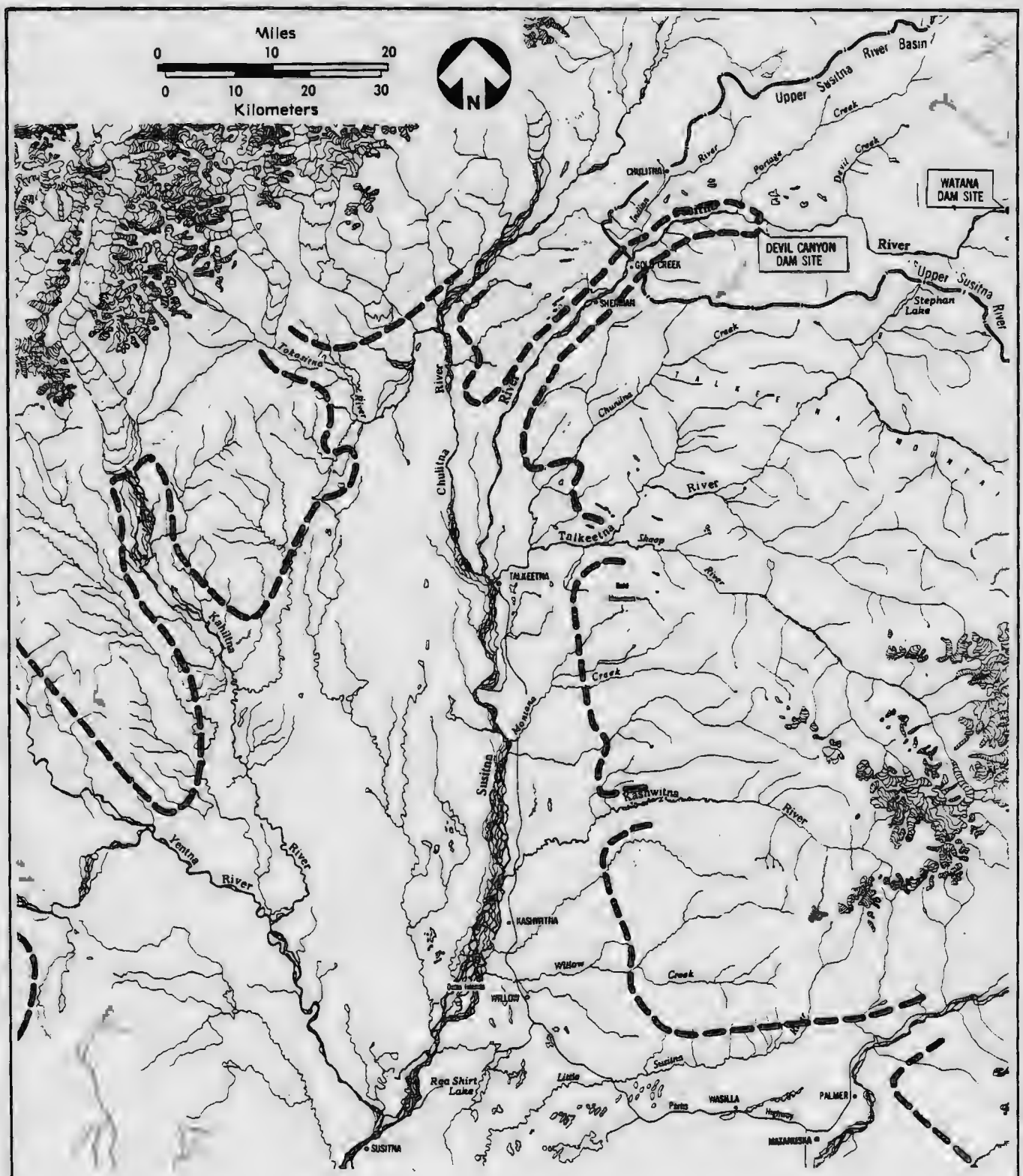


FIGURE E.9.7

BLM Mineral Entry Recommendations -



BIOPHYSICAL COASTAL BOUNDARY
MATANUSKA - SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM

PREPARED BY TES

FIGURE E.9.8

N

CANTWELL

RAILHEAD FACILITY

NENANA RIVER

DENALI HIGHWAY

RAILROAD

ALASKA

PARKS HIGHWAY

CHULITNA RIVER

HURRICANE

CHULITNA

INDIAN RIVER

PORTAGE CREEK

DEVIL CREEK

HIGH LEVEL SUSITNA RIVER BRIDGE

DEVIL CANYON DAM

GOLD CREEK

DEVIL CANYON CAMP SITE

RAILHEAD FACILITY

SUSITNA RIVER

FOG CREEK

SUSENA CREEK

DEADMAN CREEK

WATANA CREEK

PERMANENT TOWN & CONSTRUCTION VILLAGE

WATANA CAMP SITE

WATANA DAM

2000

3000

4000

5000

LEGEND

- PROPOSED ROAD
- PROPOSED RAILROAD
- EXISTING RAILROAD
- EXISTING ROAD

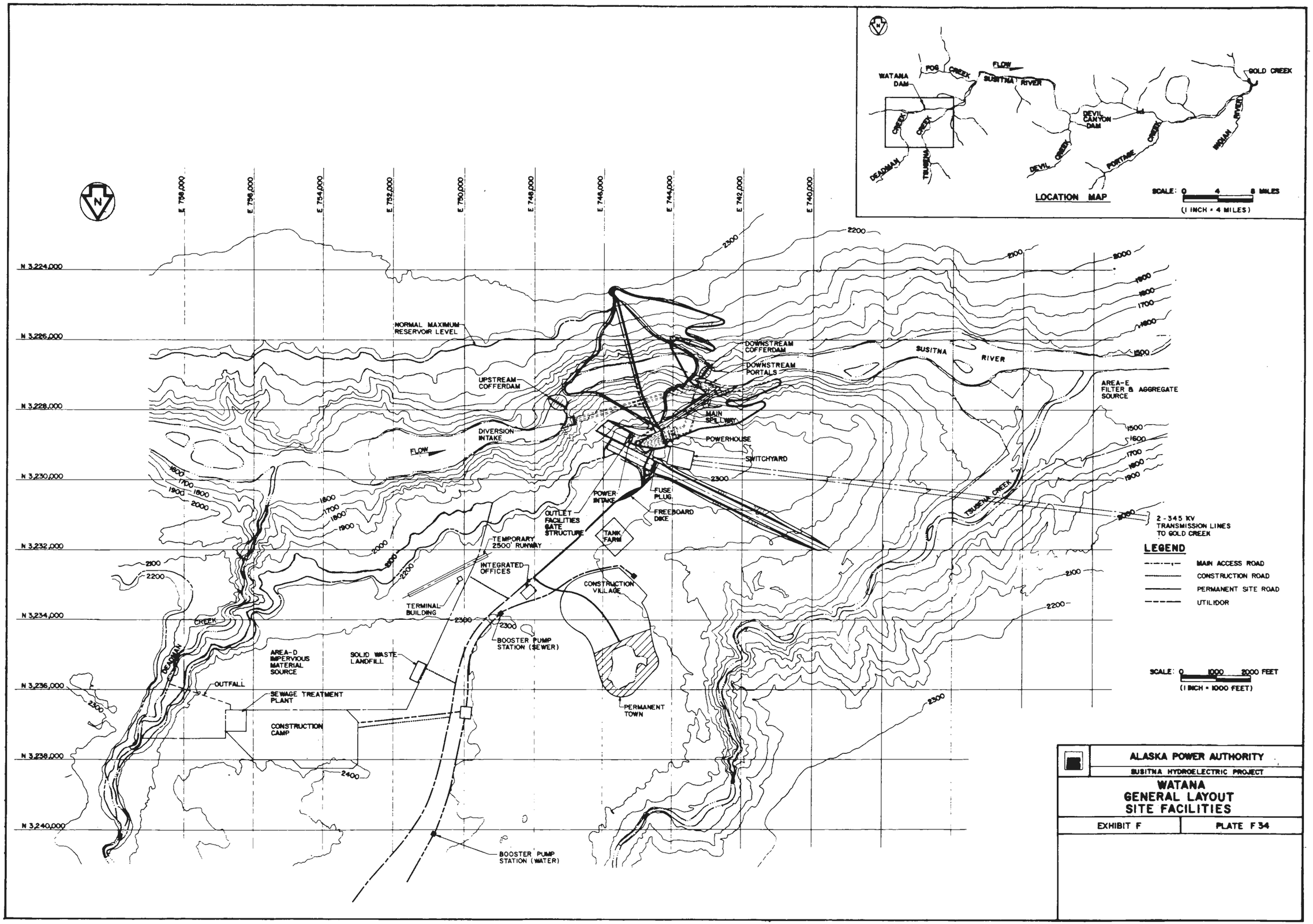
SCALE 0 2 4 MILES (1 INCH = 2 MILES)

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

ACCESS PLAN
PROPOSED ROUTE

EXHIBIT F	PLATE F 32



ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

WATANA GENERAL LAYOUT SITE FACILITIES

EXHIBIT F | PLATE F 34

E 620,000 E 618,000 E 616,000 E 614,000 E 612,000 E 610,000 E 608,000 E 606,000 E 604,000 E 602,000 E 600,000

N 3,212,000
N 3,214,000
N 3,216,000
N 3,218,000
N 3,220,000
N 3,222,000
N 3,224,000
N 3,226,000
N 3,228,000
N 3,230,000
N 3,232,000

2-345 KV LINES FROM WATANA

DEVIL CREEK

CHEECHAKO CREEK

2700 2600 2500 2400 2300 2200 2100 2000 1900 1800 1700 1600 1500

4-345 KV TRANSMISSION LINES TO GOLD CREEK

RAILHEAD

WATER TREATMENT

CONSTRUCTION CAMP

CONSTRUCTION VILLAGE

SOLID WASTE LANDFILL

SEWAGE TREATMENT

OUTFALL

2-345 KV LINES TO GOLD CREEK

TO GOLD CREEK

WATER INTAKE

TAILRACE TUNNEL

TAILRACE

SWITCHYARD

FLOW

TO WATANA

SUSITNA RIVER

PORTAGE CREEK

1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500

1500 1600 1700 1800

1700 1600 1500 1400 1300 1200 1100 1000 900

900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900

LOCATION MAP

WATANA DAM
DEVIL CANYON DAM
DEADMAN CREEK
TSUSENA CREEK
DEVIL CREEK
PORTAGE CREEK
FOG CREEK
FLOW
SUSITNA RIVER
GOLD CREEK
MACKENZIE RIVER

SCALE 0 4 8 MILES (1 INCH = 4 MILES)

LEGEND

- ACCESS ROAD (PERMANENT)
- ACCESS ROAD (TEMPORARY)
- CONSTRUCTION ROAD
- PERMANENT SITE ROAD
- UTILIDOR
- RAILROAD

SCALE 0 1000 2000 FEET (1 INCH = 1000 FEET)

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

EXHIBIT F | PLATE F70