SUSITNA HYDROELECTRIC PROJECT

ENVIRONMENTAL STUDIES

SUBTASK 7.07: LAND USE ANALYSIS

PHASE I REPORT

APRIL, 1982

ACRES

Terrestrial Environmental Specialists, Inc.

ALASKA POWER AUTHORITY

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PHASE I ENVIRONMENTAL STUDIES FINAL REPORT
SUBTASK 7.07 - LAND USE ANALYSIS

APRIL 1982

by

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Introduction

(a) Overview

This Subtask 7.07 report describes the results of the land use portion of the environmental analysis of the Susitna hydroelectric project proposed by the Alaska Power Authority (APA). The direct and indirect effects of the project on land use were assessed, considering changes in use that would occur with and without the project. The analysis addressed project components, including the dams, reservoirs, and related facilities; access transportation system; transmission facility; construction camps and villages; proposed recreational facilities; and other aspects of the project. The potential effects of the project were assessed in relation to four major land use factors: land developments, dispersed use and activity patterns, land ownership and stewardship, and natural aesthetics.

A summary of these results has been presented previously in Volume 2 of the Susitna Hydroelectric Project Feasibility Report (APA 1982). The results of the land use analysis will be included in a license application to the Federal Energy Regulatory Commission (FERC) if such application is made following state agency and public review of the Feasibility Report. This report provides additional information and details of the land use factors analyzed and presented in the Land Use and Aesthetic Resources sections of the Feasibility Report.

(b) Objectives

The land use analysis involved an evaluation of the changes in land use likely to be caused by the proposed Susitna hydroelectric project and provided the basis for summarizing the overall impact of the project. The analysis was designed to provide baseline

data and an impact assessment that will satisfy FERC license application requirements. The objectives of the Subtask 7.07 land use analysis were to:

(1) describe past, present and future land use trends;
(2) identify potential changes in land use that would result with the development of the project;
(3) evaluate the changes in terms of impacts on land use; and
(4) identify possible mitigative measures to minimize impacts on aesthetic resources.

Methods

(a) Study Areas

Study areas were defined for the analysis according to geographic and land use relationships with the proposed project. These include three zones in the vicinity of the dams and impoundments and additional areas for the study of transmission facilities and downstream effects of dam operation.

(b) Baseline Procedures

Land developments and activity patterns in the Susitna project area are subtle and widely dispersed. To identify past and present land uses, residents in adjacent and other areas were interviewed. Aerial photographs and topographic maps were used to locate indications of use. Subsequent aerial and on-the-ground field observations were made to verify reported or suspected uses noted in the interviews and from the maps and photos and to locate other, unreported uses. Additional information was obtained from published reports and data; personnel with federal, state, and local agencies; Native groups; and other individuals.

Baseline data were compiled and an inventory was established for land developments, activity patterns, land tenure, and natural aesthetics. Data were described, tabulated, and mapped as appropriate.

(c) Project Impact Assessment

Various project facilities were assessed in relation to baseline information to identify changes in land uses likely to occur as a result of the project. Impacts were determined by making qualitative and quantitative estimates of the likely changes in the land use baseline.

(d) Mitigative Measures

Proposals were developed to reduce or eliminate the effects of the project on aesthetic resources.

Baseline Land Use Characteristics

(a) Land Developments

The Susitna project area is characterized by extremely low density land use. Areas where developments have occurred typically include small clusters of cabins. There are approximately 109 structures within 30 km (18 mi) of the Susitna River between Gold Creek and the Tyone River. These include four lodges involving some 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. There are several trails throughout the basin, although air is the primary means of access. Some sections of the transmission corridor, particularly near the Alaska Railroad and Parks Highway, include land developments; other sections have virtually no developed land uses.

(b) General Activity Patterns

Existing use patterns in the project area include hunting, fishing, trapping, mining, research, and some recreation.

Hydroelectric studies probably have contributed more total man-days of use in the past 20 years than all other uses. More intensive land use activity is concentrated along the Parks Highway and in the southern part of Matanuska-Susitna Borough than in the project area of the upper basin.

(c) Land Tenure

Most lands in the vicinity of the proposed dams and impoundments has been selected by Native groups. The State has made some selections on the north side of the river; other lands are federal. There are two large state land disposal areas on the west side of the project area; and there are numerous small, private parcels scattered through the Susitna basin.

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 which serve as the basis for development policies.

(d) Natural Aesthetics

The upper Susitna basin contains a variety of aesthetically distinct landscapes, resulting from a mix of vegetation, water, and topographical features. The landscape is diverse, roadless, and virtually uninhabited. Significant natural features include Devil Canyon, Vee Canyon, Tsusena Falls, Deadman Falls, and Devil Creek Falls.

Land Uses With the Project

The proposed plan for development is a two-dam scheme with a related access transportation system, transmission facilities, construction camps and villages, recreation facilities, and other components. The project will result in major development of a largely wilderness area. It will create developed areas; increase access and activity patterns; effect transfer of land ownership and redirect land management; and change the area's aesthetic character, eliminating important natural features.

(a) Land Developments

The project will result in removal of ten structures in the impoundment areas. Construction and emplacement of facilities will involve conversion of some 26,000 ha (64,000 acres) of land area to project use for all components, including the reservoirs.

(b) General Activity Patterns

The project will result in significant increases in activity patterns in the upper basin, involving hunting, fishing, camping, boating, and dispersed recreation. Whitewater kayaking and rafting between Devil and Vee canyons will be eliminated. Persons who currently use the upper basin will be forced to adjust to the increased use or move to other areas.

(c) Land Tenure

The proposed project will be located in areas involving significant Native-selected lands. Implementation of the project will require purchasing or obtaining rights-of-way to project lands. Increased land and fish and game management may be required to respond to increased use and hunting and fishing patterns.

(d) Natural Aesthetics

The overall effect of the project will be the modification of existing scenic values. Project facilities will contrast with the natural landscape in material, color, and mass. Significant aesthetic impacts involve the outright loss of Devil Canyon and Deadman Falls and considerable surface disturbance and scarring resulting from construction activities. The remote character of many areas will be diminished with the installation of large-scale man-made facilities. As presently proposed, the access road and transmission route will pass within

one kilometer (.6 mi) of a remote wilderness lodge.

Mitigative Measures

Some aesthetic impacts can be reduced or eliminated through careful placement and screening of project facilities; recontouring and revegetating disturbed surface areas; and designing facilities to blend in with natural shapes, patterns, and colors. The report recommends rerouting a portion of the transmission line that would affect a remote lodge. Policies to control the extent and location of uses can be instituted to minimize and confine aesthetic impacts resulting from increased access.

1 - INTRODUCTION

1.1 - Overview

Since the 1940's, the Susitna River has been considered for hydropower development, and several preliminary plans for such development have been prepared. Most of these proposals, which have included one to four reservoirs, have either been overlooked or have simply lain dormant. The present proposal is focused on a two-dam development: one at Devil Canyon and one near Tsusena Creek (Watana dam site). These two structures would create elongated reservoirs typically one to one and one-half kilometers (one-half to one mile) wide, except for a portion of the Watana Reservoir, which would be approximately eight kilometers (five miles) wide.

The land use analysis for the proposed Susitna hydroelectric project involved an assessment of the direct and indirect effects of the project on land use. The analysis was designed to evaluate changes in land use that would occur with and without the project, including the effects of the proposed dams, reservoirs, access transportation system, and transmission line routes.

1.2 - Objectives

The land use analysis evaluates the changes in the present use of the land that the proposed project may cause and provides the basis for summarizing the overall impact of the project, including the dam, reservoir, access transportation system, and transmission corridor. This analysis is designed to provide information (baseline data and impact assessment) that will satisfy FERC (Federal Energy Regulatory Commission) license application requirements. The objectives of Subtask 7.07, Land Use Analysis, are to:

(a) describe past, present, and future land use trends and the aesthetic character of lands and waters to be affected by the project;

(b) identify the potential major changes in land use that would result with the development of the project and describe impacts on the area's aesthetic resources; and

(c) evaluate the changes in terms of impact on present land use and aesthetic resources and identify possible mitigative measures to minimize impacts.

The scope of work is limited temporally from 1940 to present and geographically by study area boundaries established during the first year of the analysis (Section 2.1).

The land use analysis describes and evaluates human use of the land. 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 by other environmental studies specialists on the project team. The analysis addresses dedicated uses of the land, dispersed use activities, land management, and natural aesthetics.

2 - METHODS

Present developed land uses in the Susitna project area are 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. To aid in identifying present dispersed land use activities, an oral history technique was employed: residents in adjacent and other areas were interviewed. Determinations were made as to present patterns of human land use within the project area and the forces which created different types of use. Aerial and ground truthing methods were utilized to verify many of the present land use patterns discernible from the oral history interviews.

The land use analysis is divided into two parts: (1) historic and existing land use and (2) future land use. Land use during these periods is described by summarizing acquisition and settlement, management of land, and the use or alteration of specific resources.

For purposes of discussing changes in land use and associated activity patterns as they relate to major project components, considerations were grouped into four general categories:

- Dispersed and isolated non-site-specific activities:

  This category includes patterns of activities that are generally non-contiguous and do not involve a commitment of resources at any particular site. These include consumptive recreational or subsistence activities, such as hunting and fishing; riverine activities, such as boating or rafting; and dispersed activities, such as camping, hiking, and photography.

- Land uses inherently associated with site-specific activities:

  This category includes land uses that involve some form of long-term development or other commitment of resources (for

example, structures) and the activities associated with them. These include the following: residences, commercial properties (primarily recreational), mining, agriculture, and transportation.

- Resource management activities and related concerns:

  This category involves consideration of present or potential future activities related to conservation or planned use of the land and resources and includes fish and wildlife management, dispersed recreation management, off-road vehicle management, Native claims, land values, and status of land ownership patterns.

- Natural aesthetics:

  This category consists of the natural land cover type itself as opposed to the uses of the land. Considered are the visual character of both land and water resources, ground cover (specifically vegetation), land surface integrity, and general natural character.

  Specific procedures and steps involved in the land use analysis are discussed below.

2.1 - Study Areas

Based upon preliminary project descriptions, three study areas (Zones 1, 2, and 3) were defined for analysis (Figure 1). 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 which 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, which extends

approximately 19 km (12 mi) beyond Zone 2, is distinguished by fewer aggregations of land use; existing structures and land use are sparse.

As mentioned above, 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 and the effects of dam operations on downstream navigation. To investigate these concerns, it was necessary to examine other study areas outside of the three zones defined. Thus, to assess navigational uses of the Susitna, an area downstream and west of the project area was analyzed as were the transmission corridors between Willow and Anchorage and between Healy and Fairbanks.

2.2 - Literature Review

A general literature search was conducted initially 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. A listing of references utilized for the land use analysis is presented later in this report.

2.3 - Aerial Photograph 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. Also, old maps from historical texts and early geological surveys were reviewed for foot and sled trails and for mining sites. Likewise older 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. Finally, 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.

2.4 - 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 a 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 shown in Tables 1 and 2, respectively.

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 are shown in Table 3. The types of questions asked of agency personnel are shown in Table 4. Additional contacts with agencies were made during the course of the study to provide for exchange of information and data.

2.5 - 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 (helicopter) surveys and by ground verification surveys (ground truthing).

Aerial surveys accounted for the macroscopic verification (geographic location) of the reported historical artifacts and other known use information. Once located, these artifacts were recorded, mapped, and photographed. Information from aerial surveys, ultimately used to certify the oral history interviews, was also used as a basis for

establishing priorities for ground truthing. These priorities were based on: (1) sites of historic interest, and (2) sites for which little reported information was available from the transcripts or other data sources.

Field surveys in proposed development locations were employed to locate important natural features and to estimate potential impacts on the area's aesthetic resources. Viewshed areas were also identified through ground truthing. Observations, coupled with findings of other project investigators, resulted in identification of additional aesthetic impacts as well as possible mitigative measures.

2.6 - 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. Thus, while the study intended to encompass the period from 1940 into the 1980's, some land use information was included that preceded the 1940's but overlapped into that decade. 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 activities, land status and ownership patterns, management activities, and natural features was summarized. Some data were mapped, as appropriate, and all data served as the basis for assessment of project impacts.

2.7 - Access Road and Transmission Line Analyses

As noted above, 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. Descriptions of the approaches and techniques used are presented in later sections of this report. A general discussion of the overall approach appears in the introduction to Section 4. For the access road, see the introductions to sections 4.1 and 4.1(a). For the transmission line, refer to the introduction to section 4.2, section 4.2(a), and the introduction to section 5.2(d).

2.8 - Assessment of Project Impacts

As information concerning various possible project plans and components was received, potential impacts were identified and assessed in relation to the the land use baseline data.

Where possible, impacts were quantified in terms of changes in usage patterns or outright loss of man-made or natural features. Where it was not possible to quantify impacts, qualitative assessments were made to describe changes in use patterns. Impacts were summarized and mapped to exhibit the alterations in land use and development patterns and natural features that would likely result from construction and operation of the Susitna hydroelectric project.

2.9 - Mitigative Measures

Possible mitigative measures were identified which could be utilized to minimize or avoid potential project impacts. 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.

3 - BASELINE LAND USE CHARACTERISTICS

Described below are characteristics of past and present land use patterns and developments, land stewardship, and aesthetic resources in the three study zones defined in section 2.1 (Figure 1).

3.1 - Past Land Use

Documentation concerning land use in the upper Susitna River basin for the decades of the 1930's through the 1970's is both scarce and sketchy. Because of this scarcity and the lack of current land use literature and documents available through libraries, agencies, archives, and museums, oral history interviews were used as a baseline source of information. The oral history methodology focused on obtaining eyewitness accounts from participants in the history. In anticipation of future information needs, the scope of the oral history interviews was broader than what would normally be addressed for immediate or specific use. In the development of data on land use patterns within the Susitna project area, oral history information was also used as a supplement to any existing historical information to produce a cohesive land use history.

The lifestyle of the user of the upper Susitna River basin has changed since the decade of World War II, and it continues to change. With these altering lifestyles have evolved changing land uses. The oral history method, as a research tool, enabled information to be drawn from persons who were, and are, an important part in that changing lifestyle and changing land use.

(a) Review of Archival Material and Oral History Memorabilia

Review of archival material provided little useful information pertinent to historical land use of the current project area within the designated time frame. The Talkeetna Collection of the University of Alaska archives consists mainly of minutes and correspondence of the Talkeetna Commercial Club, from the

years 1918-1919 and 1934-1935. The club functioned in a manner similar to that of a present-day chamber of commerce, with additional attention to legislation, road building, education, and mining as these topics related to the town of Talkeetna. Letters to the club from the Alaska Exploration and Mining Company, the Commissioner of Territorial Education, and the state's governor mainly concerned the business of the town of Talkeetna and the mining district west of Talkeetna in the Petersville vicinity. No documents related to the project area were found in the Talkeetna Commercial Club records.

Photographs also represent part of the Talkeetna Collection. Some of the photographs supplement the minutes of Talkeetna Commercial Club meetings in 1934-1935 and represent historical information on mining efforts in the vicinity of Petersville and Gold Creek.

Loose photographs of mining in the Gold Creek area depict the use of tracked vehicles (Cats) in the 1920's for freighting equipment and supplies to the placer mines. One such photograph shows a 1938 incident in which a Cat broke through the ice on the Susitna River before reaching its destination at Gold Creek, the westernmost boundary of the land use analysis study area.

Many photographs from the archives donated by the Alaska Road Commission are unidentified as to their location and are undated. Subjects identified deal primarily with areas beyond the Susitna project area periphery and are dated from 1910 to 1940. These are photographs of early roads, their construction, and their improvement, almost all of which emanated from the city of Anchorage or from areas in southeast Alaska associated with mining.

A few photographs depict trapping during the 1920's and 1930's in the areas of McGrath, Minchumina, and northwest of the

present-day Denali National Park boundaries. Although trapping activities also existed in the Susitna project area during those years, archives photographs are not available to document this fact.

Unfortunately, the available archival material, in general, fails to provide the abundance of historical information on land use in the project area that was hoped for. Personal memorabilia shared by some oral history interviewees are much more plentiful as well as more descriptive. These include diaries, old maps, letters, flight records, hides, and firearms historically used in the project area. The diaries and journals reveal land uses in areas of Stephan, High, and Clarence lakes from the 1930's on.

Much of the descriptive material in the journals centers around trapping activities, weather, and trapping conditions in the project area. Other journals describe the emergence of guided hunting in the late 1930's, government research expeditions, and the establishment of one of the first hunting lodges in the Susitna basin.

Maps produced by the interviewees locate old trails used for mining, trapping, and hunting; old landing strips; trap lines and cabins; hunting and fishing cabins; favorite hunting and fishing areas; and cross-country ski trails, all of which exist in the present-day project area. A review of correspondence shared by one interviewee reveals instances of early federal exploration of the Susitna River basin, weather conditions, and the status of game and hunting quality as well as personal attitudes toward wildlife and the land itself. Flight records of various bush pilots and air-taxi services indicate that the project area has been serviced for purposes of hunting, fishing, trapping, mining, and recreating from the 1930's until the present.

Memorabilia shared by oral history interviewees fill a substantial number of the time-geographic location information gaps that exist in the archival material. The memorabilia also add a personal flavor to the land use information in the history of the project area.

(b) Field Verification of Historical Artifacts

Historical artifacts are of great significance for the overall characterization of activities within a certain time period and geographic location. Their mere existence indicates explicit human activity and, further, provides a clear description of the basic activity carried on by man in that area.

Within the context of the land use portion of the Susitna project study, historical artifacts include man-made objects used in the project area at some specific time during the period 1940-1980. 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 prior land use and activities in the project area. Historical artifacts found within the project area were categorized as: 1) structures, which include cabins, cabin foundations, food caches, lean-to's, storage sheds, small buildings and/or lodges, and tent platforms; 2) roads, trails, airstrips; and 3) other objects, such as old, abandoned vehicles, bridges, etc.

Structures are associated with activities which include 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, whether structures or discrete objects, 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 Cats, 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 proximity to other historical artifacts such as cabins, trails, or lodges. Trails emanate primarily from existing structures and connect them with airstrips, with lakes (on which a ski or float plane could be landed), with fishing streams, or with another structure.

Geographical zones within the project area as designated in Figure 1 provide an approximate siting of artifact locations and types of use in proximity to the Susitna River. A general review of the historical artifacts located reveals that the artifacts, sparsely distributed throughout the project area, were historically used on a predominantly seasonal basis. The majority of the located artifacts have been utilized in hunting, fishing, trapping, boating, mining, or other general recreation purposes, such as cross-country skiing or photography.

Upon closer examination of the historical artifacts with regard to geographical zone, it is interesting to note the greater occurrence of historical artifacts within Zone 2, smaller in area and closer to the Susitna River than Zone 3.

(i) Zone 1

Types of historical artifacts located in Zone 1, the Inundation Zone plus 61 m (200 ft), include existing structures, trails, and airstrips.

Ten isolated structures located in Zone 1, on the shores of the river or on its steep banks, were line cabins for trapping and used by transient fishermen, boaters, hunters, and for research.

(ii) Zone 2

The greatest number of reported historical artifacts were located in Zone 2, a ten-kilometer (six-mile) corridor which flanks Zone 1 on each shore of the Susitna. Types of historical artifacts found in this zone include existing structures, trails, roads, airstrips, and mines. General use associated with these artifacts consists of hunting, trapping, fishing, boating, mining, recreation, and research.

Although the primary distribution of artifacts throughout the project area is of a low density, particularly noteworthy in Zone 2 is the occurrence of aggregations of artifacts and uses. The nuclei of these aggregations are the small lakes and lake systems located throughout Zone 2, with emphasis on their accessibility by air. Like the single, scattered artifacts in Zone 3, the aggregations of artifacts consist of cabins and related structures, lodges, roads, trails and airstrips.

(iii) Zone 3

The existing structures within Zone 3 are located within a nineteen-kilometer (twelve-mile) ribbon of

land which flanks the lower and upper portion of the Zone 2 boundary. The 25 existing structures in Zone 3 were historically associated with land uses such as hunting, fishing, trapping, mining, boating, research, and other types of recreational use. Aggregations of use are much less common in Zone 3 than in Zone 2 and occur primarily in the areas of Chunilna and Prairie Creeks, south of the project area.

(c) Summary of Past Land Use in the Project Area

Combined factors of magnitude, isolation, and location of the Susitna project area in a subarctic environment result in extremely low-density land use.

(i) Zone 1

Within the relatively narrow corridor of Zone 1 occupied by the river and its inundation zone, the river itself provided the transportation for land use activities in the 1930's. The Susitna offered a passageway for early trappers, who depended on the frozen river to travel their network of trap lines, sometimes extending 110 to 130 km (70 to 80 mi) in an east-west direction.

During certain seasons of the year, mining endeavors beyond the Zone 1 boundary (beginning as early as the late 1800's in the Portage Creek area) relied on the Susitna and its shores for the transportation of goods and equipment to the mines. Horse- and dog-team travel on the Susitna facilitated both trapping and mining activities in the early 1930's. At present, three gold claims fall within Zone 1; these were active from 1971 to 1978.

With the increased attention paid to the Susitna River as a source of hydroelectric power in the 1940's, a landing strip was constructed in proximity to Devil Canyon. Ground surveys, aerial reconnaissance, and river research expeditions marked the longstanding history of hydropower-related studies within the area of Zone 1.

Trapping within the area of Zone 1 continued in the 1940's, as did Portage Creek mining endeavors, a few miles beyond the Zone 1 boundary. During the 1950's, with the decline in fur prices, trapping activities within the Zone 1 corridor began to wane. Increasing interest in Alaska as source of trophy game, along with the decreasing pelt prices, were the impetus for transforming the early trappers into trophy and big-game guides. The line cabins along the shores of the river were utilized by these guides and their hunters. Inscriptions in the logs above the doors of the original cabins along the river shore indicate the cabins were used by big-game hunting parties throughout the 1950's. Moose, caribou, and black bear were commonly sought trophies in the Zone 1 river corridor.

Sport hunting continued to evolve as the hunting trend of the 1960's, at which time a new cabin appeared on the south shore of the Susitna, within the boundaries of Zone 1. It accommodated river boaters, hunters, and fishermen as an outreach cabin of a hunting lodge in the project area.

During the 1970's, the Susitna River corridor continued as a means of access for fly-in and float-in hunters. The river corridor also served as a navigational landmark for persons hunting in the dense brush that characterizes much of the Zone 1 landscape.

Trapping and the use of trap line cabins along the Susitna corridor (Zone 1) practically disappeared as a land use activity in the 1970's. Original trapping cabins along the corridor that were not destroyed by weather are currently used by transient hunters and hikers and were visited by researchers involved in the current feasibility study.

Freshwater tributaries of the silt-laden Susitna River provided fishing enthusiasts with excellent fishing spots within the boundaries of Zone 1. One manager of a popular recreational hunting and fishing lodge within the project area describes a typical, present-day guided fishing trip as follows:

> "We fly to a gravel bar near the confluence of the Susitna and Tyone Rivers, putting the boats in about forty miles up river from our riverbank cabin. It's kind of a 'get up and float down' trip, where we stop and fish the tributaries to the Susitna. It's really good fishing."

Continued exploration and research of the Susitna River during the 1950's generated many stories, which longtime trappers, pilots, and guides of the area cherish and relate to families and friends. In 1955, for example, a detachment of the U.S. Army Scouts unloaded a fifteen-meter (fifty-foot) boat at the Talkeetna Rail Station. The eight-man crew intended to navigate the Susitna from Talkeetna to Devil Canyon, 105 river kilometers (65 river miles) northeast. Two days after they commenced their upstream journey, the veteran bush pilot Don Sheldon, while flying over the Susitna enroute to a lake near Devil Canyon, spotted pieces of the wreckage strewn over about 30 km (20 mi) downriver of the Canyon. Upon closer examination,

Sheldon recognized the crew huddled on a narrow rock ledge of the canyon's north wall. His daring rescue of the crew entailed landing his floatplane in the boiling Devil Canyon rapids and floating backward close enough to the ledge for the crew members to jump out onto the float (Greiner, 1974).

(ii) Zone 2 and Zone 3

The belt of land which begins at the Zone 1 boundary and extends in a radius approximately ten kilometers (six miles) beyond the river/inundation corridor makes up Zone 2 of the project area. Although it contains the greatest number of historical artifacts, land use in this zone has generally been of low density throughout the 1930's-1970's. The proximity of this zone to the Susitna River lends itself to low density uses similar in nature to those mentioned in the Zone 1 discussion.

Although there are fewer aggregations of use in Zone 3 than in Zone 2, they share the same basic types of use. In many instances, though the origin of the use may differ by zone, the use itself may extend from one zone to another. For these reasons, the historical summaries of land uses throughout Zones 2 and 3 have been combined.

- Trapping

Trapping within the confines of Zone 2 and Zone 3 typified a lifestyle characteristic of early land and resource use in the Susitna River valley and associated project area. Early trappers of the area, though few, covered extensive areas in their trapping. Distances

of 110 to 130 km (70 to 80 mi) were not uncommon for a trap line.

During the 1930's, trapping provided a seasonal livelihood to the few hardy souls willing to contend with the rugged country and severe weather so characteristic of the Susitna River basin. Fox, mink, otter, beaver, wolverine, and marten were trapped from easternmost portions of the project area in the vicinity of Clarence and Watana lakes, to Stephan, Fog, and High lakes, and as far west as Chulitna.

Gentlemen's agreements were common with the trappers in the 1930's. Trappers knew their areas well and knew who was trapping in other areas. They respected other trappers' territories as their own and were careful not to cross understood boundaries on a trap line.

Early trappers built cabins all along the trap line and usually spaced them according to the distance they could travel in one day. Trapper Oscar Vogel, for example, built his first and main cabin on Stephan Lake and built the second one 29 km (18 mi) from Stephan. One portion of his extensive network of trap lines began at Stephan Lake and continued to the Fog Lakes, where he would stay in his small, one-room cabin, then turn around and return to Stephan on a different route.

As discussed above, the decline in fur prices in the 1940's, with a simultaneous increased interest in the Susitna basin for trophy game, provided the impetus for the early Susitna fur trappers to engage in guiding big-game hunts. With their intimate knowledge of the land and its resources, gained from the many hours spent on miles of trap lines, early trappers proved to be excellent trophy-game guides.

Trapping activities throughout the area dropped to a very low level in the 1950's. Original trappers of the 1930's increasingly concentrated on guiding. In the easternmost portion of the project area, some aerial trapping existed during the 50's and through the 60's and 70's. One air-taxi operator described aerial trapping of wolverine. He would land in an area far from the sign of cabins and set a few traps. A few days later, when flying across the area, he would check the traps and move them if he had caught a wolverine.

The 110- to 130-km (70- to 80-mi) trap lines of the 1930's no longer existed in the 1970's. Present-day trap lines, limited in distance and traversed by snowmobiles, have replaced the style of snowshoe steps of the early trappers in the Susitna basin. Winter season trapping currently takes place in areas near Stephan Lake, with sporadic traps set by aerial trappers in the easternmost portions of the Susitna valley.

- Hunting

Historically, hunting activities within boundaries of the project area began with man's arrival in the area hundreds of years before the time frame of this study. The Susitna River basin provided a relatively unobstructed route for the east-west migration of the thousands of caribou comprising the Nelchina herd of southcentral Alaska. In addition, the basin historically provided the calving grounds for caribou, wintering grounds for moose, and hibernating areas for black bear. Sheep, too, occupied the high-ground periphery of the Susitna basin, on mountains north of the river and on the Talkeetna and neighboring mountains to the south.

During the 1930's, hunting was part of the lifestyle, providing food for trappers, some of whom lived in the basin year round. Toward the end of that decade, however, guided trophy hunting emerged as part of the hunting spectrum of the Susitna River basin. Bush pilots from Anchorage and Talkeetna ferried in guides and hunters.

As related in the historical review of trapping, the impetus for the early Susitna trappers to engage in guiding for trophy game expeditions was a combined decline in fur prices in the 1940's and increased interest in the Susitna basin for trophy game. A guided trophy hunt in the 1940's took place in steps. Since the clientele was of national or international origin rather than Alaskan, the hunters had to be prepared by the guide service to hunt Alaska lands. The elite hunters would travel to Anchorage and usually be met there by the guide or his business partner, who, in many instances, was also his wife. Mrs. Oscar Vogel, in an oral history narration, describes the stages:

> "We had the house in Anchorage, where I stayed during the hunting season. I would meet the people at the airport, bring them to the house, help them get all their gear together, their hunting licenses, and then take them out. We didn't fly ourselves, and we never took more than seven hunters out per season. Oscar didn't believe in pilots for hunting. Once they arrived at Stephan [Lake], Oscar made them walk. This way you . . . earned your trophy."

In a style different from the guided trophy hunts of the 30's and 40's, in which local Alaskan towns provided the "stepping off" bases for hunting

expeditions in the Susitna River basin, hunting activities in the 1950's introduced a variation: the establishment of local field bases. The appearance of hunting lodges within the area of the upper Susitna River basin in the 1950's added another aspect to the hunting activities. As with trapping, gentlemen's agreements on guiding areas typified early territory establishment for lodge-owner guides.

In the 1960's hunting within the present-day Susitna project area became increasingly popular. One hunting lodge located within the Zone 2 boundaries, on a lake a few miles north of the Susitna River catered during these years to an international hunting clientele of royalty, celebrities, and prominent political figures.

Guests at the hunting lodges would be flown or would hike from the lodges to small outreach camps on lakes or streams for a few days at a time. Of the three major hunting lodges in the Susitna River basin in the 1960's, one lodge provided its guests with the option of hunting by horseback.

Lodges typically handled 15 to 25 guests at a time and about 40 guests per season. The increasing popularity of sports hunting in the 1960's brought about an increase in the number of small cabins on the lakes of the present-day project area. Many longtime hunters of the area believe that the increased hunting pressure had a detrimental effect on the game populations. One local air-taxi pilot commented that during the mid-60's, he could look out his airplane and "see the ground moving because of the thousands of caribou. But gun-happy people would see the plentiful numbers and just aim and shoot repeatedly, leaving the dead animal and the meat behind. During the 70's, the herds became a lot smaller."

In the decade of the 1970's, guided and nonguided sport hunting typified hunting activities within the project area. Local, national, and international hunting enthusiasts converged on the areas of Stephan, Fog, High, Clarence, Watana, Tsusena, Deadman, and Big lakes in addition to many of the area's smaller lakes. Both lodges and cabins provided the field bases for many hunters in the 1970's.

During this decade, access to the hunting lodges, cabins, and hunting grounds was primarily realized by means of aircraft (floats or wheels). Ski planes were also used in the late 1960's and 1970's for aerial wolf hunts. At present, the lodges are accessible by all-terrain vehicle (ATV).

- Fishing

Fishing is an activity that, throughout its history in the project area, has occurred in close association with other activities, such as hunting and trapping, or for purely recreational purposes. Local residents of the Susitna River basin and local area users have long known the high quality of fishing in the lakes, rivers, and streams throughout the project area.

Spawning salmon have historically filled the lakes and streams of the westernmost portions of the project area below Devil Canyon. Additional species historically popular with fishing enthusiasts are burbot, grayling, rainbow trout, Dolly Varden, lake trout, whitefish, and sculpin.

During the 1930's, residents of the area peripheral to the present-day project boundaries tapped the fishing resources in the Susitna basin by means of air access. Residents of settlements in the westernmost areas of

the basin would commonly fly to lakes in the far eastern portions of the project area, such as Clarence Lake, for an all-day or a weekend fishing trip. Those with no readily available means of air access to lakes or streams within the basin settled for fishing the lakes and streams closer to home, beyond the project area boundary.

The relatively few people in the 1930's who took part in the fly-in fishing excursions to sites within the present-day project area spread the reputation of the quality fishing there. In the 1940's, resident Alaskans other than local fishermen made efforts to fly into the Susitna area for fishing.

Air-taxi services transported numerous fishing parties to various lakes and streams throughout the project area in the 1950's, and hunting lodge owners in the early 60's began to notice clientele attracted chiefly to fishing. The 1970's brought about a refinement of historical fishing activities within the project area. Pure fishing enthusiasts as well as those who fished as a sideline to hunting or other recreation characterized the fishing use throughout that decade.

- Mining

Mining has played a significant role in the historical and cultural development of the land in the upper Susitna River basin, especially in the area of Valdez Creek. With reference to the three study zones addressed by this land use analysis and to the time frame of 1930 to 1970, the mining activities on the land consisted of relatively low-density mining claims characterized by intermittent activity.

According to U.S.G.S. mining claim files, of the 93 mining claims located on the U.S.G.S. 1:250,000-scale Talkeetna Mountains quadrangle, fewer than half occur in the project zone boundaries. The three areas of greatest mining activity, with a concentration of six or more claims, exist on Chunilna (Clear) Creek, Gold Creek, and Portage Creek. Gold placer claims have been mined at Chunilna Creek since the late 19th century and are still being worked. Claims at Gold Creek represent gold, copper, and silver placer claims active from the early 50's until the late 70's. Unlike the placer claims of Chunilna and Gold creeks, Portage Creek claims are all lode deposits of silver, copper, magnesium, zinc, and molybdenum. Mining has taken place in this area since the late 19th century, but at present, only one claim is active. Aside from these three major concentrations of mining activities, the remainder of the mining claims are sparsely scattered throughout the land use zones.

- Other Recreational Activities

Historically, recreation other than the hunting and fishing described earlier included cross-country skiing, kayaking and boating, photography, and snowmachining. These activities have been associated primarily with the artifacts and the use aggregations throughout the project area.

As early as the 1930's, the natural beauty of the Susitna valley was enjoyed by photography enthusiasts. Some even took movies of the area while making cross-country flights.

Boating within the project area has had a variety of purposes: for early research, for fishing, for running

the Devil Canyon rapids, or for transportation. Pleasure boating on many of the small lakes in the area, such as Clarence, Watana, Fog, Stephan, Tsusena, High, Bear, Otter and Dawn lakes, was amd remains a common summertime activity. Often, pleasure boating was associated with fishing in these lakes.

Another type of boating activity which has increased in popularity within the past decade is that offered by the riverboat services. These services, several of which are based in Talkeetna, offer boating trips up the Susitna and Talkeetna rivers within the project area boundaries. Services include day trips to Devil Canyon; drop camps for hunting, fishing, and photography; and canoe hauls to river locations specified by clientele. One guided river float trip, for instance, began from a lodge on Lake Louise, beyond the southeastern portion of the project area boundary. The float guide and his client proceeded northwest on the Tyone River, entered the Susitna, and floated to an area east of Devil Canyon, where they then portaged the rapids and floated the remainder of the river to Talkeetna.

Cross-country skiing emerged as a popular land use activity with the advent of the hunting lodges. Ski tour packages offered by wilderness outfitters became popular within the project area during the late 1970's. At about the same time, snowshoeing, a regular mode of transportation for early hunters and trappers in the area, moved from the realm of the purely pragmatic to the more recreational.

3.2 - Present Land Use in Project Area

Historically, access has been a determinant of the types and levels of land use in the upper Susitna River basin. As discussed above,

early access to the area for trapping was by dog team and snowshoe. When the price for furs dropped, some trappers turned to the more lucrative occupation of acting as guides to sport hunters. Commercial bush pilots provided access to the area using lakes and tundra airstrips for landing. By the early 1970's, use of the area by private pilots during hunting seasons had somewhat reduced the need for hunting guides.

(a) General Activity Patterns

Present land use patterns in the project area reflect the ties people of the area have with the land as a source of food, shelter, income, and recreation. Although land use developments are dispersed, present use and activity patterns were discerned from analyzing known historical uses in the project area and by locating actual remnants of past activity as described in Section 3.1(b).

The access trails provide indications of past land uses and their influence on present use patterns. Trails provided access into the project area for subsistence hunting, fishing, and trapping, and today these same routes, undoubtedly undergoing some changes, provide access to scattered cabins and to the region in general for recreational purposes.

Existing use patterns in Zones 1, 2, and 3 have been identified for hunting, fishing, trapping, mining, and recreation. Brief descriptions of each land use activity follow. The most intensive activity is concentrated along the major highways and in the southern part of Mat-Su Borough well to the south of the project area. Except for hydroelectric power studies, most activity within the project area is related to recreation or mining and, as mentioned, is subtle and dispersed.

(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, or recreation. Raft float trips are taken from the Denali Highway on the Susitna or Tyone rivers down to just above either Vee or Devil canyons, where rafters portage to below Devil Canyon and float to Talkeetna.

Another Zone 1 activity involves hydroelectric research, that is, study of the feasibility of using the Susitna itself as a source of power. 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

As defined, Zone 2 is the area extending about ten kilometers (six miles) from Zone 1. Thus, Zone 2 encompasses the area, including the river itself, which is downstream of Devil Canyon. 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. In addition to fishing, other forms of recreation such as boating occur downstream of Devil Canyon. Individual and riverboat operations out of Talkeetna travel up the Susitna River, offering services that include day trips to Devil Canyon; drops at camps for hunting, fishing and photography; and canoe hauls to many tributaries. Some canoeing and rafting takes place from just below Devil Canyon to Talkeetna. A further discussion of boating follows later in this section.

- Hunting

  Hunting within the Susitna project area became popular in the 1960's. Two hunting lodges located within the Zone 2 study area, one on High Lake and the other on Stephan Lake, have catered to an international clientele. Guests at the lodges fly or hike from the lodges to small outreach camps on lakes or streams for stays of a few days at a time.

  Lodges typically handle 15 to 25 guests at a time and about 40 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. As mentioned above, salmon migrate up Indian River and up the Susitna as far as Portage Creek. 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

Although trapping activity has declined over the past 30 years, recently there has been a slight increase in 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.

- Mining

Mineral exploration and mining have been limited in the immediate project area. Typical of the mining done in the upper Susitna River basin since 1930 is a low density of claims characterized by intermittent activity. Nevertheless, mining has played a key role in the land development of the upper river region, particularly along Valdez Creek.

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, with some other active claims around Stephan and Fog lakes, Jay Creek, and the Watana Hills east of Jay Creek. Mining at Gold Creek was active from the early 1950's through the late 1970's; most claims were gold, copper and silver placer mines. A concentration of at least six mining claims has existed on Chunilna Creek, where gold placer claims have been worked since the late 19th century. Mining has occurred in the Portage Creek area since the late 19th century, but only one claim remains active.

Coal is the major mineral resource in Mat-Su Borough. Although extensive deposits of varying quality are located in the river valley areas, no coal mining activity occurs in the project area. Most coal is mined to the south and west of the project area, much of it being used for household fuel.

- River Boating/Floating - Upper Basin

There is considerable summer boating on many of the lakes, including Clarence, Watana, Fog, Stephan, Tsusena, High, Otter, Bear, and Dawn. As discussed above, both individuals and riverboat operations offer services out of Talkeetna. They travel up the Talkeetna River, dropping recreators at camps for hunting, fishing, and photography. These guides also offer canoe hauls to may tributaries of the Susitna River. Some canoeing and rafting takes place from just below Devil Canyon to Talkeetna. Boating below Devil Canyon is further discussed below.

(iii) Downstream Navigation

The Susitna River, downstream of Devil Canyon, has long provided a major means of access into the region. The

Susitna is navigable from its mouth in Cook Inlet to the area around Portage Creek. Based upon (1) its prior use by boat for any purpose and (2) its suitability as a highway of commerce since Alaska Statehood in 1959, the Susitna River has been determined by BLM to be navigable as far upstream as 12 km (7.5 mi) above Gold Creek. While the BLM has made no determination of navigability beyond this point, the U.S. Coast Guard considers the Susitna River between Gold Creek and the Tyone River, because of shifting sand and gravel bars and shifting channels, to be non-navigable.

A variety of craft are used on the downstream portion (below Devil Canyon) of the Susitna, including rafts, canoes, airboats, and riverboats. In addition, floatplanes are used throughout the Susitna drainage area. Considerable boating is done along the Susitna, particularly near boat launches at Willow Creek, Talkeetna, Kashwitna Landing, and Sunshine. Boats are used for fishing during the warmer months of the year and as means of access to hunting areas in the fall. Riverboat services, several of which are based in Talkeetna, are increasingly popular and provide trips up the Susitna and Talkeetna rivers for recreators and others wishing to reach inland areas not easily accessible otherwise.

Most boating activity is concentrated on the Susitna and Talkeetna rivers. The Yentna River and its tributaries--the Skwentna and Kahiltna rivers--the Deshka River (Kroto Creek), and Willow and Alexander creeks all receive some use. The Yentna is used for fishing, other recreation, and as access to hunting areas. The Deshka River receives extensive use by sport fishermen during salmon runs. The Talkeetna River receives heavy use for trapping, subsistence, recreation, and mineral development purposes.

Riverboats, many with jet units, utilize portions of the Talkeetna River in the summer. From just below Devil Canyon to north of Talkeetna, the Susitna is highly regarded and utilized by rafters and kayakers. The rapids of Devil Canyon are considered world-class whitewater, but few kayakers have successfully negotiated the gorge.

In the winter, the Susitna River is used as an avenue of transportation for dogsleds and snowmobiles, primarily for trapping, recreation, and travel between Trapper Creek and Talkeetna.

(b) Land Use Developments-Present

Existing land use developments are associated with hunting, fishing, trapping, food or equipment storage, research, recreation, and mining. Categories covering the frequency with which structures are used are 1) no use, 2) seasonal use--present, 3) seasonal use--past and present, 4) year round use--present, 5) year round use--past and present, and 6) no use information.

Most of the developments, whether structures or discrete objects, are associated with some means of access. Unpaved roads and trails were or are presently used for access to certain points in the project area. Horses and vehicles, such as tracked vehicles (Cats), four-wheel drive vehicles, rolligons, and dog sleds, have been used for freighting, for transportation within the area, and for access to the project area. Airstrips on gravel bars or flat ground are commonly located in proximity to other historical artifacts, such as cabins, trails, or lodges. Trails emanate primarily from existing structures and connect them with airstrips, lakes (on which a ski or float plane can be landed), fishing streams, or other structures.

The study zones within the project area (as designated in Figure 1) provide an approximate measure of development locations and types of use in proximity to the Susitna River. 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 developments or artifacts have been utilized for hunting, fishing, trapping, boating, mining, and other general recreation purposes, such as cross-country skiing or photography.

(i) Zone 1

Types of developments located in Zone 1, the inundation zone plus 61 m (200 ft), include structures, trails, and airstrips.

Ten isolated structures are located in Zone 1 on the shores of the river or on its steep banks (Table 5 and Figure 2). 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 used or usable.

(ii) Zone 2

The greatest number of existing land use developments and historical artifacts are located in Zone 2. Zone 2 is a much smaller area than Zone 3 (see below), yet there is more evidence of use within Zone 2 than within Zone 3. Types of developments 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 uses throughout the project area is low in density, particularly noteworthy in Zone 2 is the occurrence of aggregations of existing developments. The nuclei of these aggregations are the small lakes and lake systems located throughout Zone 2, which provide access by air. Like the single, scattered land uses in Zone 3, the aggregations of developments consist of cabins and related structures, lodges, roads, trails, and airstrips. Table 6 and Figure 2 present information on Zone 2.

(iii) Zone 3

Fourteen of the 25 existing structures are currently used during some portion of the year. As described above under Past Land Use, aggregations of use are much less common in Zone 3 than in Zone 2 and occur in the areas of Chunilna and Prairie creeks south of the project area. A summary of existing structures within the area is presented in Table 7 and Figure 2.

(iv) Summary of Present Land Use in the Project Area

The combined factors of the size of the Susitna project area, its isolation, and its location in a subarctic environment result in extremely low-density land use. This use is still tied to the values of the area people, for whom the land is still a source of income, food and related subsistence activities, and recreation. The development of land use has been a slow, evolutionary process involving utilization of the resource base. Many historic uses are relevant in assessing present land use patterns and, indeed, many of the remnants of past uses shape present patterns. Structures verified through aerial truthing are shown by land use zones in Tables 5 through 7 and are summarized in Table 8. The major trails

into the project area, although not structures, represent substantial environmental modifications and reflect general use patterns; they are presented in Table 9. Figure 3 gives the locations and types of uses of developments where these are sufficiently clustered to be identifiable on the ground. Thus, intensity of use might refer to a series of isolated cabins along a shoreline, as at Stephan Lake, or to several small mines clustered together, as at Chunilna Creek.

The greatest concentrations of physical developments are in the Stephan Lake area (13 cabins and one lodge with outbuildings and airstrip) and the Portage Creek mining area and summer cabins (19 cabins and related buildings). Chunilna Creek and Gold Creek also have some mining developments. Three commercial lodge operations are located at High, Tsusena, and Stephan lakes.

3.3 - Land Stewardship

Prior to statehood and the Alaska Native Claims Settlement Act, the entire Susitna drainage area was mostly federally owned. There were no agency resource management plans for the area and, except for minimal mining and timbering, very little resource exploitation. A major limiting factor to development of the area has been access; inaccessibility has rendered it economically impractical to utilize the area's resource base.

(a) Ownership Patterns

The Susitna River proper and the lands immediately adjacent along with the bench country around Stephan and Fog lakes extending eastward to the Kosina Creek drainage have been selected by Cook Inlet Region, Inc. (CIRI) and associated Native village corporations. The State has selected land

entitlements on the north side of the proposed reservoir between the remaining federal lands and the Native lands (Figure 4). In the areas designated for the Cook Inlet land trade, the State will select all those lands that are not selected by the Natives. Matanuska-Susitna Borough owns no lands in the project area.

Two state land disposal sites (Figure 4) exist near the Indian River in the westernmost part of the project area, just north of the Susitna River. The Indian River Subdivision (T33N, R2W, S.M.) lies near mile 168 of the Parks Highway, northwest of Chulitna Butte, and contains approximately 518 ha (1,280 a) of land. The disposal area has been subdivided into roads and also some 139 lots averaging about two hectares (five acres) per lot. South of this subdivision is the Indian River remote parcel, located northeast of the confluence of the Susitna and Indian rivers. This remote parcel (T31-32N, R2W S.M.) is located just east of and, at some places, adjacent to Denali State Park. The Indian River remote parcel is comprised of 2,590 ha (6,400 a). Approximately 607 ha (1,500 a) in 75 parcels is being disposed of.

These land disposals, along with scattered private parcels of land, represent the only real dedication of a given piece of land to a particular use. Table 10 displays various land holdings in the vicinity of the proposed project, and Table 11 summarizes those holdings by status/ownership category.

(b) Land Use Management

Personnel employed by responsible land managing agencies were interviewed initially and throughout the study to gain information about present and future programs. The individuals interviewed are listed with other authorities contacted. The results of the interviews are summarized in Table 12.

One federal agency, one state agency in addition to the Alaska Power Authority, one borough, and one regional Native corporation have various management concerns in the project area. These entities are the Bureau of Land Management (U.S. Department of Interior), the Alaska Department of Natural Resources, Matanuska-Susitna Borough, and the Cook Inlet Region, Inc. and associated village groups.

Federal lands to the north of the project area are managed by the Bureau of Land Management (BLM). These lands are included in the Denali Planning Block, for which a land use plan has been approved.

Management in the Denali Unit and those areas not yet conveyed either to the Natives or the State is essentially passive. Very few management activities are taking place.

BLM's main 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.

BLM is also developing regulations for the management of public easements across Native lands. 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 m (50 ft) 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. Easements were only identified 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 (T11-12 N, R2-9 W, 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 ha (1,500 a) of remote housing parcels and 518 ha (1280 a) in a subdivision. These disposal areas (located north and south of Chulitna) are west of the project area and in the vicinity of the proposed access route.

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. Planning for state lands in this area will be based in part on this assessment.

Matanuska-Susitna Borough is involved in three separate management efforts which affect the project area. These are the Mat-Su Borough Comprehensive Plan (1970), the Talkeetna Mountains Special Use District, and the Mat-Su Borough Coastal Management Program. The current Mat-Su Borough Comprehensive Plan (1970) 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 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 permit 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; the Susitna River through Devil Canyon was designated to be within the biophysical boundaries of the program (Figure 6). Program results to date provide for a preliminary determination of uses subject to the program guidelines including, specifically, hydroelectric development in Devil Canyon. The appropriateness of this use is to be reviewed as resource analysis continues in subsequent phases of 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.

3.4 - Natural Aesthetics and Related Resources

(a) Aesthetic Character of Lands and Water to be Affected

The upper Susitna River basin comprises a diverse landscape, largely roadless and relatively uninhabited. The combination of these factors creates a natural region in which, depending upon a viewer's location in the basin, a variety of visual groupings exists free from the imprints of man. In contrast to other areas in Alaska, the aesthetic resources of the project area are generally not seen as outstanding (with the one exception of Devil Canyon itself). Because the area is a wilderness region positioned between the two major population centers of Fairbanks and Anchorage, however, the aesthetic resources of the upper Susitna basin are an important consideration when evaluating the impact of the proposed hydroelectric project.

The upper Susitna basin contains a variety of aesthetically distinct landscapes. This diversity arises from a mix of vegetation, water, and topographical features, and thus the landscape displays many combinations of form, line, color, and texture. These combinations are enhanced both by sub-elements and ephemeral qualities, including atmospheric conditions; observer distance, angle, and position illumination; the presence of wildlife; and natural scents and sounds.

The landforms of the area are defined by three major elements: the deeply incised Susitna River valley and its tributaries, the northern Talkeetna and Chulitna Mountains, and the northern Talkeetna plateau. The area's features, textures, and relief are dominated by the plateau's northeast trending; rounded, low mountains; and generally rolling highlands. These areas of rolling terrain slope to meet adjacent landforms that are moderately rugged, higher, and more mountainous. Other landforms in the east reflect the influence of the adjoining Copper River basin. These are characterized by lower mountains and hills widely spaced on the plateau and by flat terrain interspersed with numerous ponds.

Vegetation is diverse and varies with elevation. Dense spruce-hardwood forests blanket the lower drainages and slopes, while large meadows of tundra cover higher elevations. A variety of shrub types occur between the forest and tundra types, adding texture and color to the setting. This diversity of vegetation enhances edge effect found in the more scenic visual groupings.

Color also enhances the scenic composite, particularly in autumn, when the leaves of deciduous trees turn gold and orange, creating a vivid contrast to the dominant dark spruce green. Also in the autumn, the tundra bursts into a brief period of color, especially striking when viewed against a high lake and mountainous backdrop.

The V-shaped valleys of the Susitna River and its tributaries are visually prominent as they cut a distinct swath of green through a predominantly tundra landscape. The deeply cut canyon of the Susitna River is particularly striking at Devil and Vee canyons, where turbulent rapids, rock outcroppings and cliffs, and enclosed walls dominate the scene. There are numerous clear, fast-flowing mountain creeks, some of which flow over and through steep, rocky embankments to form

waterfalls and flumes. Lakes in a variety of forms and settings are numerous in the basin. They range from small, irregularly shaped lakes set in woods and against a backdrop of mountain peaks; to lakes which reflect their glacial origin; to a complex of five, finger-shaped lakes (Fog Lakes) set in a black spruce and shrub wetland region.

The higher mountain peaks, including Deadman, Devil, and Watana mountains, as well as the more accessible overlooks of of Tsusena and Chulitna buttes and the ridges above Vee Canyon and at Big and Swimming Bear lakes provide viewpoints that overlook the project and adjacent areas. Many of these sites allow extensive views of the central Talkeetna Mountains and the Alaska Range, often focusing on Mounts McKinley, Deborah, and Hess and on the Eldridge, West Fork, and Susitna glaciers.

Overall, the upper Susitna basin has considerable aesthetic appeal. Furthermore, certain natural features in the area have been identified as having exceptional aesthetic quality. These features, their locations, and their descriptions appear on Table 13 and on Figure 7. Other noteworthy natural features are listed in Table 14 and are also designated on Figure 7.

(b) Wetlands and Floodlands

Within the approximate boundaries of Zone 1, there are 12,579 ha (31,083 a) of wetlands of various types, including riverine. These are summarized in Table 15. In the vicinity of the proposed Watana impoundment, there are 10,913 ha (29,966 a), and in the vicinity of Devil Canyon, there are 1,666 ha (4,117 a). The table indicates the sizes and types of wetlands in relation to the proposed impoundments, dams, and spillways; camps, villages, and airstrip; and borrow areas. A map of wetlands is part of in the 1980 Annual Report on Plant Ecology Studies (APA 1981).

Floodlands have been identified for the Susitna River downstream from Devil Canyon to Talkeetna. A map of vegetation types in this floodplain is part of the 1980 Annual Report on Plant Ecology Studies (APA 1981).

3.5 - Future Land Use

Assessment of the effects of construction and operation of the proposed Susitna hydroelectric project involves comparison of the potential direct and induced changes in land use caused by the project with the land use patterns likely to evolve during the next 20 years and beyond in the absence of any project. Making a definitive forecast of future land use for the upper Susitna basin is affected by many factors, some of which have been discussed previously:

(1) Existing land use patterns are subtle and dispersed.
(2) Little active land management has taken place to date, and as yet there are no comprehensive management plans that would indicate future use. With the exception of the Alaska Power Authority, concerned with the proposed Susitna hydroelectric project itself, no state agency or Native group has expressed definitive plans for development - or non-development - of the area.
(3) The question of ultimate land ownership and tenure remains unresolved. Federal and state agencies and Native groups are involved in this process of selection and transfer of lands at present.
(4) Very little land is privately owned by individuals, and there is no indication that this pattern will change in the near future.
(5) There are no quantitative data or estimates of current or projected use of the area.
(6) Lastly, and most significant, there is no road access into the upper Susitna basin.

The results of discussions with BLM, DNR, Mat-Su Borough, and the Cook Inlet Region, Inc. are meaningful within the context of general resources management in present-day Alaska. Agencies, the 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. Because of uncertain outcomes of the Alaska National Interest Lands Conservation Act (ANILCA) and the proposed Susitna hydroelectric project, little attention has been given to actual land management.

The project area has not been exploited in the past because it was not economically feasible to do so. It is still not economically feasible to mine and process what minerals exist within the project area, although improved access may also improve the economics of exploitation. Discussions with land owners/managers and consideration of present market conditions indicate that without the project, little change is likely to occur soon 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 eventually 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, and the Natives have expressed their preference for the Susitna project access road to be on the south side of the river between the two dam sites.

As proposed by Acres American and the Alaska Power Authority, however, the project access road between the dam sites would be on the north side of the river. One could speculate that, if the road is built as proposed, the Native land owners may eventually build another road on the south side, assuming that it were economically feasible to do so.

4 - ANALYSIS OF PROJECT COMPONENTS AND FACILITIES

For the feasibility analysis of the Susitna hydroelectric project, Acres developed a "generalized plan formulation and selection process" to guide the various planning studies. As alternative development plans, project components and facilities, and operating schemes were identified, they were assessed and screened (according to engineering, economic, and environmental criteria) until the preferred plan was defined. During the course of the study, the land use analysis dealt with alternative general basin development plans, operating schemes, access plans, transmission alignments, and related project facilities. Of the numerous planning decisions made in the selection of a basin development plan, the land use assessment involved considerable analysis of alternate access plans and transmission corridors. Discussion pertaining to these latter analyses is, therefore, presented below. Analysis of construction borrow areas was likewise conducted, and the results are also presented here. Descriptions of analyses pertaining to other project aspects are contained in Section 5.

4.1 - Access Route

After initial engineering screening, three main access corridors were identified: (1) a corridor from the west on the north side of the Susitna to the dam sites; (2) a corridor from the west on the south side to the dam sites; and (3) a corridor from the north to the dam sites. Each was assessed by the Acres team according to engineering and environmental (including land use) criteria. Several different plans for access emerged and after further screening, eight plans were studied in more detail. Figure 8 shows the different access corridor segments which comprised the plans.

Each of the eight access plans considered contains access routes to both dam sites which tie into the existing transportation network at one or two of the following points: The Parks Highway at Hurricane (road intersection), the Alaska Railroad at Gold Creek (railroad or road junction), and the Denali Highway west of Denali (road intersection). The eight plans are shown in Figures 9 through 16.

The eight plans were paired according to shared points of origin, although they vary in mode or alignment from the point of origin to the work sites. For purposes of the land use analysis, the point of origin is the dominant variable, with mode and alignment being important variables. In general, the effects of each pair will be very similar.

Access Plans 1 and 5 - These plans are both road access options originating at Hurricane, passing through the Devil Canyon site, and terminating at the Watana site. In Plan 1, the road is on the south side of the Susitna River between Devil Canyon and Watana; in Plan 5, the road is on the north side between the two dam sites.

Access Plans 8 and 2 - Both originate at a railhead near Gold Creek, pass by the Devil Canyon site, and terminate at Watana. In Plan 2, the connection is accomplished via a rail line on the south side of the river; in Plan 8, a road runs on the south side of the river from the railhead to Devil Canyon and on the north side of the river from Devil Canyon to Watana.

Access Plans 4 and 6 - Both plans include the initial construction of a road from the Denali Highway to the Watana site followed by the construction of a railroad from the railhead at Gold Creek to the Devil Canyon site. Plan 6 includes the construction of a service road on the north side of the river between Devil Canyon and Watana; Plan 4 does not.

Access Plans 3 and 7 - Both plans include the initial construction of a road from the Denali Highway to the Watana site followed by the construction of a road from near Hurricane on the Parks Highway to the Devil Canyon site. Plan 7 includes the construction of a service road on the north side of the river between Devil Canyon and Watana; Plan 3 does not.

(a) Assessment Factors

Each access route would be built for construction and operation of the dam facilities. Many of the effects, however, will be related to long-term consequences after construction is complete. The impact on current land use and related activities resulting from emplacement and use of an access route will vary depending upon the location of the route and the mode.

The land use analysis of each access plan involved assessment of the potential impact of the route on land use developments, activity patterns, land management and tenure, and natural aesthetics. Each route was analyzed for its potential land use impact, and Table 16 was constructed to present the anticipated magnitude of these effects on the various land use concerns for the route under consideration. A subjective numerical scale of 1 to 5 was used, with 5 representing a great impact and 1 a small or negligible impact. The scoring's purpose was to identify only possible impacts and to estimate relative magnitude, thus enabling a rudimentary comparison of the access schemes.

In the upper Susitna basin, the site of all the proposed access plans, there is little extensive land use. Most of what exists occurs along present rail lines and around the major lakes in the area--High, Stephan, and the Fog Lakes. In these locations, most of the land use resources involve recreational concerns, both of a private, individual nature and of a commercial sort.

With the introduction of a highway, a railroad, or a combination of these, land use concerns focusing on transportation will also be involved. Furthermore, the communities that exist at the origins of these routes will feel the impact of any new transportation form introduced.

Access will facilitate an influx of people and will instigate activity within the basin that will affect both small population concentrations and isolated residences, peripheral commercial and transportation systems, resource utilization and level of recreational activity, visual and aesthetic factors, and the overall character of the area. In addition, these effects will have ramifications for management activities in terms of their extent, adequacy, and need (for example, fish and game, land, etc.) and will influence changes in land values and development.

(i) Parks Highway to Gold Creek

Access Plans 1, 5, 3, and 7 all include this route segment. The land use resources in this area to be affected by these access plans include Pass Creek and the Indian and Susitna rivers, all of which will require crossings. These access plans will also have a significant impact on Chulitna, Canyon, and Gold Creek, all of which will acquire road access where none previously existed. Two cabins and an unnamed lake are also included in the land use resources here.

(ii) Gold Creek to Devil Canyon

All of the access plans include this segment, although some pass through here via railroad while others use a vehicular road. The towns of Gold Creek and Canyon would both experience an impact from access plans here, with the effects on Gold Creek substantially greater than those on Canyon. Both would feel the impact on their land values and on commercial and residential land uses. Some minor stream crossings are also planned for this area.

(iii) Devil Canyon to Watana, North Side

In terms of land use concerns, the primary resources to be affected here are waterways and water bodies. Access Plans 5, 8, 7, and 6 will pass within a quarter-mile of both the Susitna River and an unnamed lake. These plans will also come within 0.8 kilometer (a half mile) of High Lake and partly parallel a several-kilometer length of Devil Creek.

Other types of resources along this route include High Lake Lodge, which consists of nine buildings; a private cabin; and Tsusena Creek, which will require a significant crossing via a bridge.

(iv) Devil Canyon to Watana, South Side

Access Plans 1 and 2 incorporate this segment. The waterways to be affected here include two unnamed tributaries of the Susitna itself and, with Plan 1, a significant crossing and bridge over Fog Creek. These access plans will pass within 0.4 kilometer (one quarter mile) of Stephan Lake and will come quite close to the Fog Lakes. All of this area may experience increased off-road vehicle use, especially around the lakes and in the plateau region of the upper Prairie Creek drainage. This use will be limited, however, if Plan 2, using a railroad, is chosen over Plan 1, which calls for a highway.

Finally, access into this area, by whatever means, will affect approximately 12 cabins and the Stephan Lake Lodge, which consists of ten structures. The lodge, in particular, will experience a significant impact.

(v) Denali Highway to Watana

Access Plans 3, 7, 4, and 6--all of which incorporate this segment--will parallel the Deadman Creek drainage and pass close to Deadman Lake. They will also pass within 1.6 kilometers (a mile) or so of a lake adjacent to Tsusena Butte, so both the butte and the lake will experience some impact. This segment could have a possible effect upon approximately four local cabins and will open up a considerable area to new off-road vehicle use.

(b) Impact Assessment

(i) Access Plans 2 and 8

With access to the sites originating at Gold Creek, all materials, equipment, and labor must move by rail to Gold Creek. Once there, it would continue either by rail or road to both dam sites. There would be a significant impact on Gold Creek itself as well as at Hurricane and Talkeetna, which are the last railroad junctures with highway access to the north and south of Gold Creek, respectively.

The effects in the upper basin associated with Access Plans 2 and 8 are probably the most limited, in that the only access to the interior basin is via rail at Gold Creek. To take either the road or railroad to the dam sites requires using the Alaska Railroad to get to Gold Creek. This approach tends to limit access, while a road, on the other hand, permits the public to drive to the site. Furthermore, use of the railroad to ship materials to a point where materials would be transported to the dam sites would cause less of an impact on communities along the Parks Highway corridor.

(ii) Access Plans 1 and 5

The effects associated with Access Plans 1 and 5 would be substantial on communities along the Parks Highway. There would be significant consequences for existing community land uses, particularly residential and commercial uses. Of all access plans under consideration, this pairing would have the greatest impact on community land uses. In addition, either the north connecting road, for Plan 5, or the south, for Plan 1, would affect lodges in the interior of the basin. One could expect these uses and associated activities to be substantially influenced by the additional access afforded the public.

(iii) Access Plans 4 and 6

Initially, since the Watana site is to be developed first, these access plans move the origin of access from the Railbelt corridor west of the Susitna drainage to the Denali Highway in the north. This move would attenuate the effects described for Plans 2 and 8 and Plans 3 and 5 up the Railbelt corridor to Cantwell. Access from the Denali Highway lengthens significantly the road distance between most available housing (Mat-Su Borough) and the work site. Thus, most workers would probably commute to the site in a more organized and routine manner than if they all provided their own transportation to the site or the railhead. The addition of a service road between the Devil Canyon and Watana sites, as included in Plan 6, will create a negligible difference between the two access plans. If it is maintained and opened to the public after completion of the two dams, however, it would increase the usage of the Susitna drainage. This usage would not have any significant consequences outside of the drainage.

Development of the Devil Canyon site during the second half of the proposed Susitna project will be achieved by access similar to that provided in Access Plan 2.

Access Plans 4 and 6 would create effects similar to those of Access Plans 2 and 8. Goods or people would travel by rail to the Devil Canyon site. This requirement reduces the extent of impact on community land uses along the Parks Highway. Access by road from the Denali Highway to Watana, however, would introduce potential for significant off-road vehicle use in areas where it is now minimal. This effect could result in significant alterations to an area with virtually no existing development or surface-disturbing activities.

(iv) Access Plans 3 and 7

Access Plans 3 and 7 provide road access from two directions--the Parks Highway and Denali Highway. The impact on community land uses along the Parks Highway would be somewhat less compared with, as in Plans 1 and 5, a road off the Parks Highway alone. With Plans 3 and 7, there is likely to be greater alteration to interior basin land uses, as access is facilitated for both Anchorage and Fairbanks populations.

(c) Summary of Impact Analysis

With respect to land use concerns, Plans 1 and 5 and Plans 3 and 7 are expected to have a significant impact on both community land uses outside the project area and on land use and activities in the interior basin.

Access Plan 1's south river road from the Devil Canyon site, looping around Stephan Lake to the Watana site, is probably the one proposed study route that would have both strong positive

and negative impacts on land use, particularly at Stephan Lake and Fog Lakes. From the Devil Canyon site to Stephan Lake, a new land use would emerge: off-road vehicles above timberline. At Stephan Lake and Fog Lakes, the road would also pass close enough to the water, even without formal access, to attract the recreational boater. This proximity would affect the existing lifestyles of the present residents and could have economic impacts on the lodges and guiding businesses. Regardless of the formal/informal access, recreational use of the lakes would occur and likely conflict with the present residents of and fly-in visitors to Stephan Lake and Fog Lakes. Present users would likely be displaced by new types of users, willing to tolerate higher densities, noise levels, etc.

This road would also open up CIRI lands for possible resource development. This could be seen as a positive step by those interested in tourism, mining, timber, and land ownership changes. It could be viewed with dismay, however, by those Native groups that have different objectives for the use of their lands.

Plans 4 and 6 would likely cause somewhat less of an effect than those above, since direct access from the Parks Highway is precluded. These access alternatives would reduce the impact on community land use patterns in those areas and could concentrate it, instead, on railroad use. The road from the Denali Highway would permit car travel by the public into the interior of the basin, but Fairbanks' population is considerably smaller than Anchorage's, so the human use would undoubtedly be less with these plans, especially since access would be more difficult for the latter, larger population. In addition, virtually no development exists along the Denali route, so disruptions to existing land uses would be minimal. It is likely however, that additional off-road vehicle use would be introduced along this route.

Land use and socioeconomic disciplines establish a somewhat different problem from that offered either by the strict biological sciences or by cultural resources considerations. In all these areas, the route being sought is that which will have the least impact on the area. Consequences of whatever type are viewed as negative and, therefore, to be avoided. With land use and socioeconomics, additional factors must be addressed in the impact of access road alternatives: 1) the potential impact area is larger, may not be geographically explicit (for socioeconomics), and varies depending upon origin and mode being considered; 2) there are a greater number of variables, which may be mutually exclusive, comprising the land use and socioeconomic disciplines; and 3) interpretations of results of analysis of these factors require consideration of a disparate public's opinion as to whether outcomes are positive or negative; that is, what may be considered negative by one individual may be viewed quite positively by another. The various access plans would have consequences for both the resident population and for those newcomers arriving with the construction activities as well as for those with land or other economic interests who do not live in the project area.

Access Plans 2 and 8 would create the least amount of impact, all things considered, on land uses both in the interior basin and in adjacent communities. For minimizing alterations to land uses, either would be an acceptable plan. For enhancing access, providing the public with more exposure to the resource base, one of the other plans would be a better selection.

All four of the plans incorporating the Denali segment - 3 and 7 and 4 and 6 - will cause much greater effects on the Cantwell area and eastside communities, which have smaller populations and less developed infrastructures than do westside communities.

4.2 - Transmission Line Route

Acres' transmission line route selection followed a pattern similar to that used for choosing access routes. Corridor selection resulted in narrowing the options from 22 possible choices to three, one each for the southern, central, and northern study areas. The 22 possible corridors (three for the southern area, 15 for the central area, and four for the northern area) were comprised of the various segments depicted in Figures 17 through 19 and are defined in Tables 17 through 19.

The alternative corridors were evaluated from an environmental standpoint, as discussed below. When one corridor in each study area had been selected, constraints within that corridor were examined more closely [as discussed in Section 5.2(d)] and a 0.8-kilometer (one-half mile)-wide route within the corridor was selected. This recommended route was the end product of the Phase I analysis. Eventually, a 122 to 213-m (400 to 700 ft) right-of-way will need to be located within the route.

(a) Assessment Factors

The process of environmentally screening the original 22 corridors involved comparison of study area options based on 15 resource inventory categories: length of corridor, number of road crossings, number of stream crossings, topography, soils, land status (ownership), existing/proposed development, existing rights-of-way, scenic quality/recreation, cultural resources, vegetation, fish, birds, furbearers, and big game.

The inventory categories served as a basis for gathering information about the various corridor segments under consideration. Following the development of the inventory tables, constraints imposed on the corridors by each inventory were analyzed and evaluated. Constraint tables were developed to perform this analysis. These tables are very similar to inventory tables but identify only the most important

constraints (rather than considerations) imposed on any potential corridor (rather than segment).

By combining inventory categories, the fifteen categories were reduced to eight constraint categories: length, topography/soils, land use, aesthetics, cultural resources, vegetation, fish, and wildlife. This consolidation facilitated comparison of the corridor alternatives. Tables 17 through 19 display the constraints identified, by corridor alternative, pertinent to the land use analysis: length, topography, land use, and aesthetics. Details concerning the land use inventory and categories and data assembled for each segment are discussed in the TES report on Preliminary Screening of Alternative Transmission Corridors and reiterated in Acres' Transmission Line Corridor Screening Report (Acres 1981).

(b) Corridor Assessment

Several corridor segments and, hence, several associated corridors were identified as having several constraints. These are discussed below.

(i) Southern Study Area

In the southern study area, Corridor Segment AEF and, hence, Corridor Three (AEFC) were determined not to warrant further consideration. This conclusion resulted primarily from the routing of the segment through the relatively well-developed and heavily utilized Nancy Lake State Recreation Area. Adjustments to this route to make it more acceptable were attempted, but no alterations proved successful. Consequently, it was determined that this corridor should be dropped from further consideration.

Corridor ABC' was identified as probably not warranting further consideration. Its great length, its traversing residential and other developed lands, its crossing through lands proposed for potential development if the state capitol is moved, and the extensive forest clearing that would be involved pose considerable constraints.

Corridor ADC was identified as warranting further consideration. This is the only such designated corridor in the southern study area. Based on existing information, minor modifications could reduce the influence of the various constraints identified here.

(ii) Central Study Area

In the central study area, several corridor segments and, hence, their associated corridors were determined not to warrant further consideration. The first of these, Corridor Segment BEC, appears as part of Corridors 1, 5, 7, 9, and 15. The reason for rejecting this segment is primarily that the developed recreation area around Stephan Lake would be harmed needlessly; viable options exist to avoid intruding into this area. Again, modifying this route to something more acceptable failed. Consequently, it was recommended that these five corridors be dropped from further consideration.

Corridor Segment AG was also determined not to warrant further consideration. There are three reasons for this conclusion: (1) this corridor segment is long, approximately 105 km (65 mi) in total length, and for approximately two-thirds of its length, a pioneer access road would possibly be required; (2) extensive areas of clearing would be required, opening the corridor to view in some scenic locations; and (3) the impacts on fish and wildlife habitats are potentially

severe. These preliminary findings, coupled with the fact that more viable options to Segment AG exist, suggest that consideration of this corridor segment and, therefore, Corridors 8 and 10 should be terminated.

Corridors 11 and 12 in this study area were identified as probably not warranting further consideration. This decision arises from the fact that numerous constraints affect this routing. Information exists and field visits have occurred, however, which suggest modifications of these corridors that might make their use possible.

Corridors 3, 4, and 6 were also identified as probably not warranting further consideration. Corridors 3 and 4 were so designated because of the CJ Corridor Segment. This segment, however, is currently under consideration for development. Segment CJ intrudes upon an existing recreation area at High Lake and contravenes existing viewsheds of the Alaska Range.

Corridor segment CJ could be moved such that it avoids land use conflict. By exiting the dam at Devil Canyon to the northwest and then turning to the northeast to parallel the Portage Creek drainage, the route can avoid High Lake. Once northwest of High Lake,it can then turn more easterly, crossing the Devil Creek drainage and rejoining segment JA near Swimming Bear Lake. This proposed routing avoids constraint features identified in the vicinity of High Lake.

Corridor 6 intrudes on valuable wildlife habitat and would cross numerous creeks, none of which are currently crossed by existing access roads. In addition, a high mountain pass and its associated

shallow soils, steep slopes, and surface bedrock constrain this routing.

Corridor 1 (ABCD) as shown on Figure 21 was identified as warranting further consideration. Constraints to this routing do exist (if it were visible from Stephan and Fog lakes), however, and would need to be further evaluated before modifications to this corridor could be suggested.

Corridors 13 and 14 were also determined to merit further consideration, primarily because they incorporate segments from feasible corridors. With the presence of developed residential and recreation areas at Otter Lake, Corridor 13 would require special attention in segment CF, or it would be eliminated. Corridor 14 will face constraints in the vicinity of segment CJA and, thus, is not recommended from an environmental standpoint. With modifications to this segment as suggested, Corridor 14 may improve in its environmental rating.

(iii) Northern Study Area

Corridor Segment ED, part of Corridor 3, was determined not to warrant further consideration because of many constraints. They include the lack of an existing access road; problems in dealing with tower erection in shallow bedrock zones; the need for extensive wetland crossings and forest clearing; the 75 river or creek crossings involved; and the fact that prime habitat for waterfowl, caribou, sheep, golden eagle, and brown bear would be crossed as well as would the active nest site and habitat of a pair of peregrine falcons. No attempt to modify this route was made since an alternative corridor seemed more viable to further evaluation.

Corridors 1 and 4 (ABDC AND AEF, respectively) were identified as probably not warranting further consideration. Certain constraints noted for these two corridors suggest that an alternative to both is preferable. Compared with Corridor 1, Corridor 2 crosses additional wetlands and requires the development of more access roads and the clearing of additional forest lands. The same is true of Corridor 4. Moreover, Corridor 4 crosses high elevation mountain passes and surface bedrock zones. Both cross through or near prime or important habitat for a number of sensitive big game species, raptors, and waterfowl. Finally, corridors 1 and 4 also cross through lands currently being used as an active Air Force bombing range.

Corridor ABC was identified as warranting further consideration, the only such designated corridor in the northern study area. While many constraints were identified under the various categories, it appears possible to modify this route to minimize constraint influences.

Figures 20-22 show corridors that survived the initial TES screening process. Following review of the environmental and engineering analyses, Acres selected one transmission corridor for each of the three study areas. These corridors, and the land use consideration of the routing analysis performed for them, are presented in Section 5.2(d).

4.3 - Borrow Areas

Figure 23 shows the location of borrow areas for construction of the dams and access road. Borrow areas in general, create both unnatural forms and line and color contrast and are, therefore, seen as visually disruptive in a natural setting. Aesthetic impacts are

caused by denuding expansive areas of vegetation, changing the natural topography, perhaps creating erosion, and adding spur access roads, all of which contrast visually with the surrounding landscape. The evidence of borrow area excavation will remain visible for many years. To reduce some of the long-term effects of this excavation, the borrow areas will be recontoured to resemble natural topography, and the sites will be revegetated.

(a) Borrow Areas for Dams

The size of each of the proposed borrow areas is: A=333 ha (823 a); B=50 ha (124 a); D=287 ha (709 a); E=180 ha (445 a); F=280 ha (692 a); H=489 ha (1208 a); I=34 ha (84 a); and K=148 ha (366 a). Total land required will involve 1,801 ha (4,451 a). Areas G, J, and L are within the confines of the inundation zones. Area C is no longer being considered.

Of these sites, the highest impact on the area's aesthetic resources will perhaps be caused by Borrow Area D, since it is located in low-absorption vegetation and is highly visible from both the reservoir and a portion of the access road. A reserve area, Quarry A, is located in a scenic region and will involve the excavation of a tundra knoll. Areas E and F will alter the appearance of the area along Tsusena Creek, and although Tsusena Falls is not within either of these borrow sites, it is likely that the setting of this exceptional natural feature (Table 13, Figure 7) will be disturbed. Borrow Area K has the potential for infringing on the series of falls on Cheechako Creek; a recreational facility has been proposed in this vicinity. Area E in the upper Devil Canyon reservoir will extend above the full-pool elevation, with the result that some surface scarring and modification of topography will occur. Borrow Area I will be developed to 15 m (49 ft) above the existing river elevation, to a maximum elevation of 471 m (1550 ft). Therefore, lower portions of the site will be inundated by the Devil Canyon impoundment,

but at the upper end, it will remain exposed. This area will be particularly visible if a proposed recreational facility is built at Tsusena Creek for boating access to the Devil Canyon reservoir. As with all the other sites, recontouring to resemble natural topography will help reduce the permanent impacts. In some cases, borrow areas will be used as disposal areas for waste material from dam construction, perhaps restoring the original topography.

(b) Borrow Areas for Access Road

Figure 26 shows the locations of the borrow areas (1 through 8) proposed for the access route. Borrow areas for the access road involve a total area of 167 ha (413 a). The highest degree of impact will occur in Area 1. Located in a scenic setting adjacent to the Indian and Susitna rivers, Area 1 will be visible from the road and the river, from the Susitna bridge crossing, and from other key viewpoints. Development of this site will be of particular concern to future residents, who are expected to settle in this vicinity as a result of state land disposal.

Area 7 is on the northern edge of Mermaid Lake, a scenic area, and is set in low-absorption shrub vegetation along the access route. Area 2, which is also set in low-absorption shrub vegetation along the access route and visible from key viewpoints, may adversely affect a waterfall. Area 8 is located in a tundra region and includes a good view of the surrounding landscape. The general discussion of the types of impact caused by excavation of borrow areas, as given in Section 4.3(a), also applies to borrow sites for road construction.

5 - LAND USES WITH THE PROJECT

In accordance with its development selection process, Acres has recommended a plan for the development of hydropower in the Susitna basin. This section describes the major project components as proposed by Acres and discusses anticipated changes in land uses and their associated impacts. The first subsection provides a brief outline of the project; it is followed by the description of likely effects on land use.

5.1 - Project Facilities

Figure 23 shows the locations of proposed project facilities in the upper Susitna basin. Locations of the dams, impoundments, the access road, construction camps and villages, borrow areas, and related facilities are indicated. Brief descriptions of the major facilities are presented below; details may be found in Volume 1 of the Feasibility Report (APA 1982).

(a) Watana Dam and Impoundment

The Watana dam will be a 270-meter (885 ft)-high, gravel-filled structure, with a crest length of 1,250 m (4,100 ft). 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 km (48 mi) of river to 666 m (2,185 ft) elevation and inundate about 16,000 ha (38,000 a).

(b) Devil Canyon Dam and Impoundment

Devil Canyon dam will be a 197-meter (645 ft), 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 m (2,475 ft). The dam will impound 42 km (26 mi) of river to 444 m (1,455 ft) elevation. Approximately 3,157 ha (7,800 a) of land will be inundated.

The underground power plant will have an installed capacity of 600 megawatts. The emergency spillway for the dam on the south side of the river is designed to pass 222,000 cfs of water. A tailrace tunnel will extend more than two kilometers (1.3 mi) downstream on the north side of the river.

(c) Access

Construction of a permanent access road will be facilitated by a pioneer road to be constructed from Gold Creek to the Watana site. For about 70% of the distance (discontinuous) between Gold Creek and Devil Canyon, this pioneer road will follow an existing bulldozer trail (used in earlier studies by the Corps of Engineers). Spurs will be built from the pioneer road to certain points on the permanent access route. A temporary low-level bridge will cross the river, with a series of switchbacks down into the canyon just above the dam site. Between the two dam sites, the pioneer road will mostly follow the route of the permanent access road.

Full access for construction and operation of the dams and access to proposed project recreation facilities will be by way of a gravel road from the Parks Highway. There will also be a railroad yard in the vicinity of Gold Creek, with a short road connection to the main access road. The main access road will connect with the highway near Hurricane and will roughly parallel the alignment of the Alaska Railroad through Chulitna Pass south to the confluence of the Indian and Susitna rivers north of Gold Creek. The road will then parallel the Susitna River on the south side to Devil Canyon. Initially, a bridge will be constructed at this point over the canyon; after construction, the Devil Canyon dam will serve as a bridge. The road will extend northeasterly through the alpine lakes area north of Devil Canyon and will parallel the upper Devil Creek drainage. From this point, the road will follow a generally easterly direction to the Watana dam site.

The total length of the access road from Hurricane to the Watana site will be 110 km (68 mi), aligned within a 60-m (220-ft) corridor. The roadway will be ten meters (34 ft) wide, with two-meter (five-foot) shoulders on either side.

Several pull-outs will be constructed along the access road to permit viewing of natural areas and some of the project facilities. In addition, access to recreation sites from the road will be provided as indicated in the plan for recreation.

(d) Transmission Facilities

Maps of the proposed transmission routes recommended by Acres are included in Appendix A. From Watana to Devil Canyon within the 0.8 km (0.5 mi)-wide route, a 122-m (400 ft)-wide transmission right-of-way will mostly parallel the access road. Two single-circuit 345,000-volt (345 kV) lines will be constructed. From Devil Canyon to the intertie near Gold Creek, a total of five single-circuit, 345 kV lines will require a right-of-way about 213 m (700 ft) wide.

These lines (two to the north, three to the south) will parallel the intertie to Healy and Willow. From Healy to Fairbanks and from Willow to Anchorage, the right-of-way will be approximately 122 m (400 ft) wide. Most of the towers are expected to be X-shaped structures approximately 30 m (100 ft) tall. In some places, such as near the Municipality of Anchorage, double-circuit construction may be used, thus requiring taller towers. Double circuit towers, while approximately 15 m (50 ft) taller than single circuit towers, allow a narrower right-of-way.

(e) Construction Camps and Villages

Construction camps (single worker housing), villages (family housing), and associated facilities will be located within the immediate project area: there will be one camp and village at each dam site. Construction of Watana dam is scheduled to begin in 1985, nine years before the dam at Devil Canyon. Plans call for the building of a construction camp and village first at Watana. When construction phases down at the Watana site, the camp will be relocated to the Devil Canyon dam site. Part of the village at Watana will remain as a permanent town to provide housing and other community facilities for workers who will operate the dams. No such permanent village is currently planned for the Devil Canyon site.

The proposed camp and village at the Watana site will be constructed northeast of the dam site between Deadman and Tsusena creeks on what is now BLM land. Approximately one to 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 construction camp include modules for housing (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 (where a small impoundment will be created) and groundwater wells. The treatment plant, also of modular design, will fulfill primary and secondary Environmental Protection Agency (EPA) requirements. Treated water will be stored in three tanks, two at the camp and one at the village. Sludge, a by-product of the treatment plant, and solid waste from the two sites will be properly treated and disposed of in a landfill.

Permanent facilities required for project operation at Watana include a permanent town or 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 construction camp and village to be built at Devil Canyon will differ only slightly from those at Watana, though fewer workers will need to 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 just 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 just west of the camp.

Additional details on the construction camps and villages may be found in Appendix B of this report and in Volume 5 of the Feasibility Report (APA 1982).

(f) Recreation Facilities

Presently, there are no publicly developed recreation facilities within the vicinity of the project. Three privately-owned lodges exist at Stephan, High and Tsusena lakes. Recreational facilities to be provided in the project area as part of the overall hydroelectric development plan will reflect both the recreation potential which exists in the area and public input from the recreation surveys conducted as part of the recreation study. The primary emphasis will be on day-use with overnight facilities provided near the two dam sites and road-oriented recreation at the alpine lakes in the area.

Figure 27 and Table 20 indicate recreational facilities proposed for development within three years of commencement of project operation. The greatest concentration of use will be near the Devil Canyon and Watana dam sites where there will be access to the reservoirs. Recreation facilities to be provided in the first three years include developed auto campgrounds, designed to accommodate various types of vehicle users and allowing for future expansion; boat-in campgrounds; picnic grounds; boat launches, and parking areas. Emphasis will be on rustic facilities with a minimum level of services and a maximum of natural aesthetic features.

After the first three years of project operation, long-term development will focus on the expansion of the campgrounds at Cheechako Canyon and Tsusena Creek and on the additions of two boat-in campgrounds along the Watana reservoir and a boat-in picnic area at Devil Canyon reservoir (Figure 28). Boaters coming down the Susitna River from the Denali Highway and down the Tyone River from Lake Louise and Lake Susitna will be accommodated at a proposed camping area near the confluence of the two rivers. Delay in the development of these boat-in facilities is necessary until the shoreline effects are

evaluated. A detailed discussion of both short- and long-term proposed recreation facilities is found in Volume II of the Feasibility Report (Acres 1982) and in the TES report on the Recreation Plan (Subtask 7.08, APA 1982).

5.2 - Induced Land Use Changes

Construction and operation of the dams and related facilities will cause impacts on area resources. Prior to determining the extent of alteration or disruption which land use patterns will experience, land uses were assessed in terms either of man's use of the landscape for particular purposes (many of which tend to be site-specific) or of man's dedication of a given geographical area to preserve some specified values. In some cases, these values and their protection are identified in agency management programs that apply to the area.

Based on available information and agency interviews, however, it has been determined that no comprehensive management plans exist at present. 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 only preliminarily addressed land management concerns (see Section 3.3). 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 for the surrounding areas.

With increased access, certain land use activities are expected to become more intense than at present. In terms of displacement of existing land uses, by both the project itself and the induced land uses, the primary effects will be changes in the manner in which individuals (rather than land management agencies) are presently using the area.

Figures 24 and 25 show points and areas in the vicinity of the project which will experience changes in land use and activity patterns. Project facilities will create immediate, direct impacts on the landscape, as shown on Figure 23; some of these impacts will be temporary, such as those of the construction camps and construction activity itself. Other aspects of the project will create or facilitate permanent and often subtle changes in the type, nature, and intensity of use and activity patterns. Chief among these aspects is the provision for automobile access to an area currently lacking such access [Section (c) below].

(a) Dams and Impoundments

(i) Land Use Developments

The emplacement of the dams and impoundments will cause the direct loss of ten structures (six by Watana, four by Devil Canyon). These structures and their uses are described in Table 5. Only three of the ten are actively maintained, being used on a seasonal basis; two others are used sporadically. The remaining five are currently unused or unusable. The primary uses of the structures to be affected are hunting, fishing, boating, and trapping as well as hydroelectric feasibility studies.

(ii) General Activity Patterns

The impoundments will displace relatively low levels of riverine boating and rafting patterns of use between the upstream end of Watana reservoir and Devil Canyon. Kayaking (in which one must employ considerable technical expertise to negotiate the turbulence in Vee Canyon and world-class whitewater of Devil Canyon) will be eliminated. In place of these activities, there will be reservoir boating. As discussed in the following section, some rafting and kayaking downstream of Devil Canyon may continue.

Hunting activity will increase, and current patterns will change as a result of the impoundments. The reservoirs and access to them [see also Section 5.2(c)] will facilitate floatplane landing and boat travel and, thus, permit easier penetration by big game hunters into areas now rarely visited. As shown in Figures 24 and 25, an increase in moose hunting will likely occur immediately adjacent to the proposed impoundments. Increased hunting for caribou (to the extent that the permit system allows) will likely occur a relatively short distance back from the impoundments.

There is likely to be increased fishing for resident species, primarily grayling, in tributaries in the vicinity of the impoundments, as shown in Figures 24 and 25. A limited reservoir fishery may also develop. Because of the proximity of the Devil Canyon facility, salmon fishing in Portage Creek could increase. If necessary, further regulations can be implemented to prevent overfishing in this area.

At present, some trapping takes place in the upper basin. The reservoirs will cause disruption of present trapping patterns.

(iii) Land Stewardship

With the exception of a few scattered parcels, most lands in the vicinity of the dams and impoundments are presently under federal control. Most lands are likely to be transferred to CIRI and associated Native village groups, however, as shown in Figures 4 and 5. Much of the land required for the project has been selected under ANCSA. 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 outright purchase and/or an exchange of other State selections with Native groups.

(iv) Natural Aesthetics

The overall effect of the project will be the modification of existing scenic values. The two proposed dams and their associated facilities will contrast vividly with the natural landscape in material, color, and mass; as a result, the structures will tend to be visually isolated from the surrounding environment. Although the proposed dams will introduce a significant non-natural feature into the landscape, they will also attract visitors interested in viewing them. Because of their size (Watana will be one of the highest dams in North America) and the engineering accomplishment that they will represent, the dams will be impressive structures.

The primary effects on aesthetic resources resulting from inundation by the reservoirs will be the loss of the variety and natural character of the V-shaped valley floor, rock cliffs and outcroppings, river and rapids, and confluences with tributaries. These natural features will be replaced by large lakes with drawdown zones. The created shorelines, in most areas, will lack the characteristic qualities of natural shorelines. Because of their sizes, the reservoirs will be prominent features of the landscape. While these new lakes may visually enhance the landscape by juxtaposing land and water, this advantage may be limited by bank slumping, the appearance of the exposed drawdown zone, and the possible turbidity of the water.

(b) Downstream Effects of Dam Operations

A number of impact issues have been raised concerning the potential effects of project flows on downstream navigation. These concerns include the following: (1) whether present access for fishing, hunting, and other purposes via the Susitna and its tributaries may be affected by reduced summer flows in certain channels; (2) whether a reduction in flow could alter the stream bed morphology of the various tributaries; and (3) whether access to land disposal areas now accomplished by boat and floatplane will be affected by reduced summer flows. In addition, concern has been expressed about the loss of kayaking and rafting opportunities and also about potential impacts on winter use of the river.

Future navigational use is likely to increase along the Susitna River and other water courses in the Railbelt as the population in the region increases. Development and settlement of state land disposal areas below Devil Canyon will also change present navigational use. Therefore, the change in summer flow in the Talkeetna to Devil Canyon reach is a particular concern, although railroad access will continue and road access will be created by the project access road.

Review of limited aerial photographs, river cross-section data, and simulated water surface profiles in the reach between Devil Canyon and Talkeetna indicates that proposed project stream flows are likely to cause periodic navigation problems during the months of August and September. If project flows were increased in August and September, few areas would experience navigation problems.

One area of concern is the reach one to five kilometers (one to three miles) below Sherman, where the main channel crosses

the floodplain. The water depth at 6500 cfs is approximately 0.75 m (2.5 ft) at the cross section here, indicating the channel is navigable. Examination of nearby areas (for which cross-sectional data are unavailable) indicates, however, that they may not be navigable. With the proposed flows, navigation problems may be encountered in this reach in August in about one year out of three and in September in about one year out of two. If water is stored in the spring to augment flows in August and September, navigation problems may be encountered in this reach during June in about one year out of ten.

Cross-sectional data were gathered for the main channel below Talkeetna in sloughs and side channels used for river access near Kashwitna Landing and Willow Creek and at the upper access channel to Alexander Slough. While stage-discharge data at these sites are very limited, initial analysis indicates that operation of the dam will have no significant negative impacts on navigation on the main channel below Talkeetna or on access at Kashwitna Landing. Access channels near Willow Creek should be navigable at the proposed flows. Minor navigation problems could occur in this area during May if water is stored to augment flows in August and September.

Data are insufficient to define completely the flow required at Susitna Station in order to maintain upstream access to the Alexander Slough area, but the decrease in stage will be less than .3 m (1 ft) for the proposed flows.

Even if rafting and kayaking downstream of Devil Canyon are still possible with project flows, the river will not be as appealing as it is at present because the flows will be controlled. The limited daily peaking operations proposed for the Devil Canyon facility may present some boating hazards immediately below this facility. Because these hazards will be unlike the natural hazards posed by a wild river, this vicinity may be unsuitable for river floating.

Ice studies have predicted that during project operation the Susitna River below Devil Canyon dam will have open water in winter at least as far downstream as Talkeetna. This open water will preclude the present use of snowmobiles and dogsleds for transportation on this portion of the river. Additional information and analysis is present in the TES report on Navigational Use (Acres 1982).

(c) Access

As indicated previously, increased access is a critical factor with respect to land uses. Road access will cause both the disruption of present land use and the inducement of future land uses. The most significant aspect of the access road relates not so much to various impacts associated with the road per se but rather to the concept of access itself, in any form, to the interior of the Susitna basin. The provision of a means by which the general public can easily and frequently venture inland to an area which is essentially wilderness will likely cause profound alterations in the character of the Susitna area.

Access, because it will facilitate the influx of people and activity into the basin, will affect the following: small population concentrations and isolated residences; peripheral commercial and transportation systems; resource utilization and level of recreational activity; visual and aesthetic factors; and the overall character of the area. These effects will have ramifications for management: the need for it and its extent and adequacy (for example, fish and game management, land management, etc.). Access will influence changes in land values and development and may expedite exploitation of the area's mineral resources.

(i) Land Use Developments

Road access to the dam sites from the Parks Highway will likely create increased traffic and related activity along the Parks Highway and in adjacent communities. Residential and commercial use and the values of land made more accessible by the new road will probably be affected; there is likely to be increased demand for these parcels (because of an increased population and markets for commercial services), and improved access will make them more attractive to prospective buyers. The proposed route through Chulitna Pass and along Indian River will provide road access to state land disposal sites on Indian River.

(ii) General Activity Patterns

There will likely be increased hunting for moose and bear along the access corridor. The zone around the access road subject to increased hunting will be much larger if off-road vehicles are permitted. In addition to the impacts of increased hunting activity in a larger area as a result of both the road and the impoundments, there will be disruption or displacement of the persons who currently hunt in the upper basin. Those who presently hunt in the area will either have to adjust to larger numbers of hunters or will have to hunt in other areas. Fishing will also increase (for example, for salmon in Indian River) with potential effects on both the resource and those 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 nearer to Devil Canyon. Some recently established trapping territories 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. Figures 24 and 25 indicates locations of future activity patterns likely to be caused by the provision of access.

(iii) Land Stewardship

The provision of access will likely result in a need for increased management and use controls in the upper Susitna basin. Even after titles or legal rights-of-way are obtained for construction and operation of facilities, public access could result in unacceptable levels of use of private lands outside, but immediately adjacent to, project lands.

Furthermore, as the discussion above indicates, an increase in hunting, fishing, and general use of the area is likely. These activities will pressure current levels of fish and game and result in more potentially surface-disturbing activities.

These factors will affect decisions regarding resource management of fish and game and public use of the area. It is likely that specific controls will need to be instituted to protect resource values. These could include establishing levels for hunting and fishing activities, ORV management, and other general land managemer..

(iv) Natural Aesthetics

Access into the present roadless project area represents a major influence on the area's aesthetic resources. The construction of a road is a long-term linear alteration of the landscape, sharply contrasting with the natural background and interrupting the unified sweep of the surroundings. A road will also allow public access into a remote region - a change which has potential consequences for the existing resources but also affords many people the opportunity to view these aesthetic resources.

The strong horizontal line created by right-of-way clearing and by the road itself will appear incongruous with the natural setting of the Susitna basin. Long-lasting visual effects will result, even with revegetation of the right-of-way and road construction borrow areas not within the right-of-way. While views from the road will be, for the most part, attractive, with expansive views from the road segment between the two dam sites, in most areas, the transmission line on one side of the road will detract from the scene.

The road could be perceived as a positive impact on aesthetic resources because it will allow more persons to experience the aesthetic resources of the area. The exceptional and important natural features that will become more accessible because of the proposed access route are: Tsusena Falls and Devil Creek Falls, Swimming Bear Lake, Tsusena Butte and Lake, Chulitna Butte, Cheechako Falls and Devils Club Falls (Tables 13 and 14, Figure 7).

Imposing increased activity on a nearly pristine landscape will drastically reduce the peace and solitude of the area; the reduction of both scenic quality and the potential for wilderness experience will cause some previous users to seek these amenities elsewhere. In addition, the roads and borrow areas seen from the river and reservoir will alter users' visual experience.

Where the topography is suitable for their use, off-road vehicles (ORV), if permitted, would disturb the terrain. Because of its topographical make-up and fragile vegetative cover, the area traversed by the access route between the two dam sites is extremely suseptible both to ORV use and to consequent damage. ORV use on lands of tundra and shrub cover types would lead to long-term vegetative and visual damage, degrading the original character of the land. Documented ORV use off the Denali Highway has led to severe soil disturbances, left areas denuded of vegetation, and formed gullies 6 to 8 m (20 to 26 ft) wide and up to three meters (ten feet) deep (Sparrow et al. 1978). If ORV use is restricted, especially in the area between the dam sites, such degradation of the landscape can be avoided.

Additional impacts on the aesthetic resources of the project area break down into three main categories and are discussed using the six access route segments, as shown in Figure 26. The main aesthetic impact categories are: viewing opportunities and features made accessible, disruption to current residents, and disruption to land users of the area.

Viewing opportunities include those views along the proposed access route that will become more accessible to the road-oriented traveler. Segment A will allow road travelers restricted views of Indian River, a heavy forest cover, numerous wetland regions, and views of the lower portion of the upper Susitna River and its valley. Segment A will pass near Chulitna Butte, an important natural feature. Segment B, following a ridgeline, will open up occasional views to the south of tundra regions and the Central Talkeetna Mountains; views to the north will focus on the Susitna River valley and background views of the Chulitna Mountains. The viewing opportunities along Segment B will be restricted at times by a heavy forest cover, especially those views to the north. Foot access will reveal an important natural feature, Devils Club Falls (Figure 7).

Views along access route Segment C include a heavy forest cover, the Susitna River below the Devil Canyon dam, and the proposed Devil Canyon dam, reservoir, associated facilities and recreational developments. A proposed trail up Cheechako Creek [see Phase I Final Report - Subtask 7.08, Recreational Planning (APA 1982)] will allow visitors the opportunity to view the series of waterfalls on Cheechako Creek; the falls are considered important natural features of the project area. Segment D traverses an area where high lakes are numerous and the vegetation is varied, ranging from forest to tundra. A proposed trail [see Phase I Final Report - Subtask 7.08, Recreation Planning (APA 1982)] to an exceptional natural feature is routed down Devil Creek to the Devil Creek Falls. Viewing opportunities along D are diverse, numerous, and accessible both on and off the road.

Access route Segment E will be constructed through predominantly tundra and shrub vegetation. Segment E lends itself to extensive viewing opportunities of the project area and distant mountains. The proposed access route will pass by Swimming Bear Lake, an alpine lake surrounded by tundra, and an important natural feature. A unique natural feature, Tsusena Falls, will be accessible by foot for viewing; Tsusena Falls is the dominant feature in a very scenic setting (Table 13), Figure 7). Segment F of the access route will allow views of the proposed Watana dam, reservoir, and associated facilities set in a shrubland and woodland spruce region.

Impacts on aesthetic values and views, including amenity values such as solitude, will be felt by the area's current residents who are in proximity to the proposed access route. The proposed access route will have a relatively big impact on Segments A and D. Current residents along Segment A are grouped in the vicinity of the Alaska Railroad and in the Indian River remote parcel disposal area. Current residents along Segment D are found at High Lake Lodge and cabins located on nearby lakes. Seasonal cabin users will likely notice changes in the aesthetic character of the area resulting from increased access.

Topographical conditions occurring along Segments D and E may induce ORV use, degrading the previous roadless experience of current users. The primary users affected along Segment A will include fishermen, trappers, miners, and travelers using the Alaska Railroad and existing project area sled road. Users disrupted along Segment D will include lodge and cabin visitors and fishermen. All of the access route segments will affect, to some degree, the very

dispersed recreation currently enjoyed by hunters, fishermen, winter enthusiasts, and back country hikers.

(d) Transmission Facilities

Analysis of proposed transmission facilities for the Susitna project involved assessment of three study areas: 1) the southern study area, covering Willow to Anchorage; 2) the central study area, containing transmission lines from the power plants at the dams to the intertie; and 3) the northern study area, containing that portion of the line between Healy and Fairbanks. Following review of the environmental screening and assessment of optional transmission corridors (described in Section 4.2) and Acres' engineering analysis, Acres selected a final corridor for each of the three study areas. The corridors recommended by Acres are shown on the maps in Appendix A. The corridors for the areas are essentially: (1) for the southern area, segments ADC; (2) for the central area, segments DCA (after further consideration of a corridor that encompassed both sides of the river); and (3) for the northern area, segments ABC. The original segments are as described in Section 4.2 and shown on Figures 17 through 19.

Following corridor selection, route analysis was performed for each corridor for various land use features. The route analysis involved mapping of the selected land use features within the established five- to ten-kilometer wide (three- to six-mile) corridor. In the central study area, the corridor covered both sides of the river and, thus, was as wide as 23 km (14 mi) in some places. Land use features involved developments and activities, land tenure, and natural aesthetics. These features are shown on the maps in Appendix A as man-made constraints. A discussion of the analysis of corridors for the study areas is presented below.

(i) Effects Common to All Study Areas

The major impact of the transmission line will be the creation of incongruous lines across the landscape, where existing utility corridors are not present, decreasing landscape unity and interfering with scenic views by deflecting attention from natural scenes. The noticeable contrast between man-made structures and the landscape's natural elements is caused by irregular patterns: the visibility of towers as a result of their height above existing vegetation and their color contrast with the surroundings; the reflection of the conductors; sizeable clearings of vegetation; unconcealed substations; and conspicuous access roads and staging areas needed for construction and maintenance purposes.

Negative impacts on aesthetic resources will occur where the transmission line is viewed against the horizon, is routed along a ridge, appears on level terrain with unobstructed views, or crosses rivers and gorges. An effort was made, however, to avoid such areas, both in the initial corridor (five to ten kilometers wide) selection phase and, again, at the route (0.8 km wide) selection phase of the study.

Construction activities cause both short- and long-term impacts on aesthetic resources. The creation of new access where none previously existed will add significantly to the potential for visual disturbance caused by the transmission line. Efforts were made to parallel existing utility corridors and to utilize existing access whenever 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 but can be minimized through careful prescription of maintenance techniques.

(ii) Southern Study Area

- Land Use Developments

The route crosses or parallels numerous trails, including the Iditarod Trail, seismic survey clearings, tractor and pioneering ORV trails, and several recreational trails farther north near Willow.

Residential use occurs in Willow, Red Shirt Lake, and on many of the small lakes mostly to the east of the 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 the Point MacKenzie area, and agricultural clearings occur from a region just northeast of Middle Lake to the Little Susitna River south of Yohn Lake. While land within a transmission right-of-way can still be cultivated, the towers could displace small areas of existing and

potential future agricultural use or disrupt normal patterns of agricultural development or cultivation.

Land use in the area of the existing Chugach Electric Association, Inc. Point McKenzie-University Substation line (which will be paralleled by project lines east of Knik Arm to a new substation to be located south of Muldoon Road) is predominantly military: most of the route here lies within the Fort Richardson Military Reservation. Impacts on these lands will be limited primarily to those associated with the area's visual quality.

- General Activity Patterns

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 and Willow Creek as well as on many of the numerous small lakes. Potential conflicts between the proposed lines and private lands and boating use 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 likely not affect physical use of trails, although visual conflicts may occur where the lines and towers pass near various trails.

- Land Tenure

The study area encompasses land disposal areas and private lands, most of which the proposed route

avoids. Access to these land holdings is via floatplanes, ORVs, and snowmachines.

The corridor and portions of the western boundary of the route include the northeast corner of the Susitna Flats Game Refuge.

Future agricultural land sales are proposed in the Department of Natural Resource's draft land use plan for the Willow sub-basin, along with programs for protecting wildlife habitat and sportsmen's access.

- Natural Aesthetics

The Willow-to-Knik Arm route will cause major visual impacts near Willow. Here, the line will cross the Parks Highway and the Alaska Railroad and will be most evident to travelers on these routes. The transmission line route passing west and north of the community of Willow could affect the visual setting of this community because the line may also be apparent to residents as well as to recreators on Willow Creek. The route will likewise disturb the wilderness quality of the region and will interfere with natural views, most severely near the Iditarod Trail and the Susitna Flats Game Refuge. Between a point southwest of Willow and Knik Arm, the line will intrude upon the landscape, although by following existing trails, new roads will not be required along much of the transmission line right-of-way. In addition, existing recreation areas will be avoided. Because the route is removed from travel corridors, the visibility of the line in this area is low, except for the Little Susitna River crossing, which will be relatively noticeable. The retention of vegetative screens along the river banks could significantly reduce the degree of visual

intrusion at this location. Information on visual quality for this study area is presented graphically on the maps of Appendix A.

For that area east of Knik Arm to the proposed substation south of Muldoon Road, visual impacts will be significant. Because of the presence of and anticipated proximity to existing transmission structures in this area, however, impacts will be incremental rather than totally new. To help mitigate these impacts, tower and conductor materials, spacing, and design could approximate closely that which is already present.

(iii) Central Study Area

- Land Use Developments

Between the Watana and Devil Canyon dam sites, there will be significant conflicts between the proposed route, like the access route which it parallels, and the development at High Lake Lodge; the proposed route will pass just northwest of High Lake and the wilderness lodge and cabins located there. Several other alpine lakes are also located in this area, and the transmission line could potentially interfere with floatplane landings. A right-of-way 122 m (400 ft) wide will be required to accommodate transmission facilities between the dams.

Although slightly more land area would be required, locating the line well to the west of the proposed route within the alternative route alignments (identified on Figure 31 in Appendix A) would reduce the conflict with existing uses at High Lake Lodge. The alternative route would roughly parallel the Portage Creek drainage just below the ridge to the east of the creek and pass well to the west and north of High Lake.

The segment of the proposed route from the Devil Canyon facility to the intertie near Gold Creek will conflict little with existing uses. The lines and towers, however, will probably be visible from areas north of the Susitna River in the Indian River remote parcel disposal, Otter Lakes, and from some places on the river.

- General Activity Patterns

The transmission route will affect some scattered recreational activities in this area. Chief effects will be of an aesthetic nature (discussed below). In addition, as mentioned, flying and floatplane landings could be affected if the transmission line is located within existing flight patterns.

- Land Tenure

At present, most lands are under federal control. Eventual transfer of title of Native-selected lands, however, will require obtaining a right-of-way - or purchasing property outright - to install the transmission lines.

- Natural Aesthetics

The major impact of the upper basin transmission lines will be degradation of the basin's wilderness quality; the line will disrupt otherwise unobstructed views and will decrease the unity of the natural landscape. This impact will be experienced most severely by users of High Lake Lodge and its surrounding lands and waters. The lines will be located within 1.6 km (1 mi) of High Lake and, although in the background, will be incongruous with the otherwise natural setting of the

lodge area. For this reason, an alternative route has been proposed, which would locate the lines beyond the viewshed of the lodge and its environs. Figure 31 in Appendix A graphically presents both route locations.

Another impact will result from clearing vegetation within a strip 122 m (400 ft) wide between the two dams (although tall-growing vegetation exists only on a small portion of this segment) and within a second strip 213 m (700 ft) wide from Devil Canyon dam to the point of intersection with the Intertie near Gold Creek. These impacts are depicted graphically on Figures 25 through 36 in Appendix A. The line, where visible near the access road and reservoirs, will impair the viewer's scenic experience. Background views of the lines will exist from Otter Lake and from the access road. Foreground and middle-ground views will be evident particularly from High Lake (unless the alternative route is selected) and again from points along the access road.

(iv) Northern Study Area

- Land Use Developments

There are several moderate concentrations of land use developments along or adjacent to the proposed route between Healy and Fairbanks. Significant among these are developments at Healy, Nenana, and Ester. In Healy and Ester, existing land uses and the proposed transmission route will be directly juxtaposed.

Impacts in this study area will include the acquisition of a 122-m (400-ft)-wide right-of-way and the elimination of future land development within this

strip. In addition, one dwelling located off the Parks Highway approximately 6 km (4 mi) south of Browne may have to be acquired. Many potential impacts, however, were avoided during the selection of the corridor and route.

- General Activity Patterns

Much of the route in this area traverses undeveloped, inaccessible lands. Effects will be primarily of an aesthetic nature.

- Land Tenure

There are several large land disposal areas (on the west side of the Parks Highway) through which the route will pass. In traversing these disposal areas, the lines will, for the most part, closely parallel an existing transmission line.

- Natural Aesthetics

The Healy-to-Fairbanks route will cause aesthetic impact at the three crossings of the Parks Highway, the three river crossings, the two railroad crossings, and two areas where the line is visible from and parallels the highway or railroad. Careful placement of towers, and whenever possible, retention of vegetative screens, however, will greatly reduce the degree of impact. Furthermore, by closely paralleling the existing transmission facilities where appropriate, incremental rather than totally new impacts will result. Information on aesthetics appears on the maps in Appendix A.

(e) Construction Camps and Villages

(i) Watana

- Land Use Developments

The construction camp and village will not have a direct effect on existing land developments. Their installation will result, however, in dedication of some 150 ha (370 a) to community use during the construction phase. Additional lands will be required for connecting roads, an airstrip, and other facilities related to dam construction. After construction has been completed and the camp and temporary village have been removed, the permanent town for housing operation and maintenance personnel at Watana will occupy some 36 ha (90 a) in addition to that required for roads and other facilities.

- General Activity Patterns

Among the project's effects upon activity patterns are those impacts related to access; many of these have been addressed earlier. The chief effects of the Watana camp will be the associated construction activity during 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.

- Land Tenure

Location for the camp and village (and permanent town site) as presently proposed 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 camp or village.

- Natural Aesthetics

The construction camp and village sites will be incongruous with the existing natural landscape, and the concentrated, constant human use therein will disturb the scene. Permanent and temporary human use will introduce waste disposal sites, litter, and leisure activities potentially damaging to the environment in an area now relatively free of human imprint.

Large numbers of people (as shown in Appendix Table B) will be using the construction camps and villages for considerable amounts of time; as a result of this pressure, the sites and their immediate vicinities will undergo significant changes in character. Site preparation will include clearing of vegetation, which will create long-term alterations to the sites. Human activity will create paths throughout the vicinity and, as a result of anticipated heavy use, will affect nearby streams and lakes. The aesthetic resources in the area of the housing facilities will evidence visual alteration long after the facilities are removed and the property restored. The types of impacts associated with the town site at Watana are similar to those of the camps and villages but of lesser degree because of the fewer people involved; on the other hand, these impacts will be of longer term because of the town's permanence.

The camp and village sites at Watana will be quite visible because of the relatively low absorption capability of the shrub community and because the sites are within the viewsheds of portions of the access road and reservoir. On the other hand, the proximity of the housing facilities to the dam construction site serves to concentrate the impact into a limited area.

(ii) Devil Canyon

- Land Use Developments

The construction camp and village for Devil Canyon will not have a direct effect on existing land use developments. Some 34 ha (85 a) 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 are to be removed from the site.

- General Activity Patterns

As with the Watana camp, the chief effects of the Devil Canyon camp will be the associated construction activity during the eight-year construction period from 1994 to 2002. Extent of the impact of construction workers on general activity patterns will depend on policies established to control activities outside of camp. Generally, however, any change in such patterns could be expected to be lower than that for Watana because of the smaller work force required for Devil Canyon.

- Land Tenure

The proposed locations for the Devil Canyon camp and village are on lands that have been selected by CIRI.

Prior to initiation of construction, a means of acquisition of necessary land areas will have to be established, either through outright purchase or by obtaining a temporary right-of-way.

- Natural Aesthetics

Until their removal upon completion of construction, the camp and village sites will create temporary conflicts with the existing natural landscape. Human use will temporarily disturb the scene, with the introduction of waste, litter, and possible increased activity. Because a forested area will be cleared, a long-term aesthetic impact will result, even with site restoration.

Creation of the Devil Canyon camp and village will require the clearing of trees, giving rise to contrasts of texture, color, and line between the facility and its natural environment. Because of the higher absorption capability of the surrounding spruce-hardwood forests, however, and owing to other micro-relief factors, the Devil Canyon facilities will likely be shielded from most viewsheds. Also, no permanent town site is currently planned for Devil Canyon. Thus, the impact on aesthetic resources, while significant, will be lessened at the Devil Canyon site.

The sites of any temporary camps for road and transmission line construction crews are presently unknown, so specific impacts cannot be discussed. If such camps are located, built, and maintained in an environmentally sensitive manner and if the sites are later restored with the same concern, then the camps' impact will be relatively short-term.

(f) Recreation Facilities

Recreational facilities will be developed in two stages, the first, within three years of commencement of project operation and the second, beginning three years after the operation's start. Additional information on the staging of recreational development is included in the TES Subtask Report on the Recreation Plan (APA 1982). Figures 27 and 28 and Table 20 indicate recreational facilities proposed for development. Potential effects of these developments on land use are discussed below.

(i) Land Use Development

The proposed recreational facilities will result in the conversion of small amounts of what is now open space to developed campgrounds, picnic areas, boat ramps, trails, parking areas, trails, and related facilities. Land area involved totals slightly more than 24 ha (60 a).

(ii) General Activity Patterns

The effect of development and use of recreational facilities on land use activity patterns is largely related to access [discussed in Section 5.2(c)]. The newly available access into the upper Susitna basin that the project creates will result in new patterns of recreational activity. These include camping, hiking, boating, and driving for pleasure. In addition, the combination of ready access, recreation facilities (including boat launches), and the reservoirs themselves, will facilitate hunting and fishing in areas now accessible primarily by air. Areas likely to experience increased hunting and fishing activity are indicated on Figures 24 and 25.

The level of future activity will depend upon the extent to which the public avails itself of recreational facilities and resources to be provided. Such use will also depend on public policies which may be established concerning fish and wildlife management.

(iii) Land Tenure

Recreation facilities proposed at Cheechako Creek (near Devil Canyon) and at an unnamed tributary southwest of Fog Creek are in areas that have been selected by CIRI under the Alaska Native Claims Settlement Act (ANCSA). Facilities near Deadman Creek and on an unnamed tributary west of Watana Creek are on lands that have been selected by the State. The boat-in campground proposed at the unnamed tributary between Watana and Jay creeks is on federal land (where a state selection has been suspended) that is in reserve for possible future Native selections. As with other lands required for the project, outright acquisition or an easement will be necessary on non-state lands.

(iv) Natural Aesthetics

Recreational facilities are proposed to be of rustic, natural design to blend with the natural environment. Their development will, however, require some clearing of ground cover. Effects of construction will result in conversion from a natural state to a man-made condition, which includes structures and facilities.

6 - MITIGATION OF AESTHETIC IMPACTS

In the event that a license application is filed for the Susitna hydroelectric project, FERC requires that mitigation measures be developed to reduce or eliminate impacts on aesthetic resources. Neither the scope of work for the land use analysis (Subtask 7.07) nor FERC regulations for Exhibit E require similar proposals for other aspects of the land use analysis. This section describes proposed approaches to mitigate aesthetic impacts. Proposed methods are discussed in relation to major project components and facilities.

6.1 - Dams, Impoundments, and Associated Facilities

The effects created by the dams may be viewed as generally not mitigable, although various techniques may be used to reduce and de-emphasize impacts on aesthetics. The policy for these techniques includes innovative, simple, and/or suitable architectural design; proper color and texture; and minimized site disturbances to attempt to blend the dam structures with the characteristic landscape.

Associated facilities can be made to blend with the characteristic surroundings by way of innovative and suitable architectural design; natural screening techniques such as plantings, grading, and terrain alterations; placement in sites where vegetation could help to conceal visual impacts; and natural blending of color and texture. Screening techniques need to be used whenever the only viable option is to locate project facilities in the viewshed areas of the access road and reservoirs. All non-utilized or unnecessary developments should be removed and the vacant sites returned to their original conditions.

Overlooks at the dams need to be located where the conflict between the structures and the adjacent landscape is at a minimum. Proper viewing angles at the dam sites could enhance the sites' good points and negate their bad points. A view of the spillways could be included in the viewing opportunity. The Recreation Plan, Subtask 7.08, addresses potential locations for overlooks.

6.2 - Borrow Areas

One way to mitigate the impact of borrow areas on the aesthetic character of the area is to use buffer strips or vegetative screening of some type. If Borrow Area A is utilized, for example, the front and adjacent side sections of the knoll could be left intact in order to reduce the possibility of a view incorporating any scarred terrain that remains after excavation. A reduction in visual impact from Borrow Areas E and F is possible if a forest buffer strip is retained on both sides and ends of the excavations. Such a design would preclude disruption of the natural setting of Tsusena Falls. For borrow areas located or extending above the high water line of the reservoirs, such as Borrow Areas D and E, grading and revegetation will be necessary to insure aesthetic quality.

Vegetative buffer screens could reduce the view from the reservoir of Borrow Area H. Moreover, in creating Borrow Area H, if alterations to the Fog Creek gorge are avoided, then the aesthetic character of the gorge area can be maintained. In the case of Borrow Area I, if it becomes necessary to excavate above high water line, then the contrast created between the forested shoreline and bare slopes can be reduced by revegetating the area, preferably to include native shrubs. Subtask 7.12 provides additional details concerning revegetation recommendations. Finally, a forest buffer screen could be used between Borrow Area K and Cheechako Creek to limit the extent to which it would be visible from Cheechako Creek and Falls.

In a manner similar to that used for construction borrow areas, the view of the access route borrow areas from the river, remote parcels, reservoirs, and access route itself would be limited if existing vegetation is used to screen the areas. Such a design would be effective in Areas 1 through 5, where the forest cover has a high absorption capability. The views of Areas 7 and 8 could be screened by using local changes in relief, landscaping, and vegetation screening techniques.

The aesthetic impact of borrow areas could also be either masked or eliminated by planning a post-construction use for them. Areas D, F, and K, for example, could be designed to coordinate with future use and needs. Scenic and recreational pull-outs could be designed for Borrow Areas F and K. Areas D and E could serve future recreational needs by providing boat access, overlooks, or parking lots.

Proper utilization of Borrow Area 2, one of the access route borrow areas, could preserve the view of the nearby waterfall. In addition, the area could be used in the future as a scenic pull-out. Borrow Area 7, with proper design consideration, could double as a lake-side recreational site. It would need to be so excavated, however, as to preserve the existing aesthetic quality perceived by current visitors. Borrow Area 8 could also be utilized as a future day-use and/or back country recreational pull-off.

6.3 - Access Route

Measures can be taken to eliminate or reduce a majority of the impacts to the areas' aesthetic resources resulting from the access route. The proposed access route needs to be designed and constructed so as to be compatible with and to enhance the surrounding environment. Techniques to achieve this objective include: taking advantage of natural changes in topography and vegetation, repeating the basic elements displayed in the characteristic landscape, planning scenic viewpoints, coordinating future needs with construction needs, and utilizing sound land management practices.

Impacts can be lessened if areas of unstable soil and wetlands are avoided in the construction of the access road and if those areas which are disturbed are restored and revegetated (Subtask 7.12-Plant Ecology). Wherever possible, screening of roadside structures and construction activities would help to reduce their visual impact. As for the road itself, the use of colors and texture of construction

materials that blend naturally with the surroundings (chips, cinder, pea gravel, etc.) would help to reduce the contrast between the road and the surrounding landscape.

If the use of off-road vehicles originating from the access route becomes a problem, measures will need to be taken to inhibit this activity. Such measures would include: a buffer strip adjacent to the access route designated for non-motorized use; natural conditions employed as subtle but absolute deterrents to ORV use; and, if necessary, designated and planned ORV trails in locations that will neither conflict with other land uses nor damage the environment. Similarly, spur roads to private holdings and mining claims will need to be properly designed, located, and constructed.

Recreational use created by the access route will need to be directed to those sites designed to support such use; these will receive regular servicing and patrolling. Discouraging both overnight use and heavy day use of some segments of the access route (particularly segments D and E) would minimize damage to the tundra and high lake region. Properly located and developed viewpoints, while revealing the upper Susitna basin's most vivid and interesting features, could avoid views of the access route, areas scarred by construction activities, and housing sites. Rustic design of recreational developments will help blend such areas in with the sites' natural conditions. A natural buffer strip could also be provided between the development and the viewshed of the road, reservoirs, and river. For further recreational considerations refer to Subtask 7.08 - Recreation Plan.

A fire protection and prevention plan must be formulated to decrease the fire hazard associated with increased access. Impacts on wildlife, leading to their dispersal from the area, can be minimized by following the pertinent mitigation recommendations of Subtask 7.11 - Wildlife Ecology, and by conferring with Alaska Fish and Game personnel.

To reduce aesthetic impacts from the proposed access route several design and management techniques can be followed. The access route should not cross slope contours but, rather, wherever possible, should follow topographic and vegetative cover edges. Variety along the roadside can be created by cutting irregular tree-edge lines; retaining rock outcrops or large boulders (if not a safety hazard); forming an undulating edge at the right-of-way clearing; and retaining safe, special-interest trees and clumps of vegetation.

Additional scars along the roadside could be eliminated if staging areas and parking lots used during road construction are planned, whenever practical, so as to be useful in the future as scenic and recreational pull-outs for the public. As yet however, the locations of the staging areas and parking lots have not been determined.

Disturbed sites will need to be left in a natural and stable condition. The process of restoring disturbed areas includes replacing stockpiled topsoil; fertilizing; seeding or planting; mulching; using slope stabilizers, removing all construction items (oil drums, equipment, litter, etc.); and, if possible, having the final site approved by a landscape specialist. Revegetation is covered in Subtask 7.12 - Plant Ecology.

Areas of existing vegetation will need to be protected from unnecessary blazing, equipment, and blasting damage. Cutting timber must be done in an environmentally acceptable manner by cutting close to the ground and removing all debris.

6.4 - Transmission Facilities

Efforts were made to select transmission line routes that would minimize aesthetic impacts. In some areas, however, impacts were unavoidable; in other areas (such as between the dam sites), minimizing visual impact was in conflict with other project objectives.

Proper alignment of the transmission line right-of-way within the route could reduce line's obtrusiveness in some areas. At a minimum, partial concealment of the line can be accomplished by incorporating local changes in topography and vegetation. The towers, wire, and substations can be designed and constructed to blend with the surrounding environment. Using simple towers, designed to rust naturally, would help to reduce the visual contrast between the towers and the surrounding landscape. Non-specular materials can also be used for the conductors to reduce their reflectivity.

Additional impacts could be avoided if the number of clearings necessary for the right-of-way are limited and if these clearings blended with existing natural openings in the landscape. Vegetation can be used to soften the line's visual impact. Tapering vegetative growth along the right-of-way and topping trees instead of clearing them will reduce the contrast the cleared right-of-way will have with existing vegetated areas.

To reduce the visual impact of the transmission line where it traverses rivers, roads, railroads, and trails, the right-of-way crossings should be at right angles to the features involved, with the towers set as far back from and the line as high above the thoroughfare as possible. Vegetation screens should be left at such crossings. A buffer strip of vegetation or topography may also be necessary to limit visual impact in areas where the transmission line is adjacent to the Parks Highway, Alaska Railroad, the proposed project access road, residential areas, and cabins and lodges in the project area. In the upper basin near High Lake Lodge, rerouting the presently proposed corridor to the west and north of High Lake, that is, beyond the viewshed of the lodge area, would negate the transmission line's impact here. The proposed and alternative routes are shown on Map 31 in Appendix A.

6.5 - Construction Camps and Villages

The camp and village sites could be at least partially screened from the viewshed of the proposed access route and reservoirs and from the Susitna River below Devil Canyon dam if appropriate screening techniques are used and if tree clearing is inconspicuous. Efforts to make clearing for the Devil Canyon camp and village look natural could include cutting trees in a feathered and irregular manner so tha these areas blend with the surrounding landscape. Additional impacts from human use can be reduced if, for example, trails outside the proposed camps are established rather than left random and if specific areas are designated for leisure activity.

Impacts from facilities associated with housing, such as sewage treatment lagoons and landfills, can be reduced if they are located as far away as possible from existing or proposed developments. Consideration of proper water supply techniques for Tsusena Creek could decrease the chances of interfering with the current flow over Tsusena Falls as well as the viewing opportunities at the falls. Monitoring the effluent discharged into Deadman Creek will also mitigate both water quality and aesthetic impacts.

Finally, posting and enforcing construction camp rules will help make project personnel aware of the potential for adverse environmental impacts. Other measures may include the utilization of designated pathways and restricting the use of private vehicles in the project area.

6.6 - Recreation Facilities

It is proposed that recreation facilities be designed to blend with their natural setting. Measures include rustic construction, using natural materials whenever possible. Additional details concerning recreational facilities are described in the TES report on the Recreation Plan (Subtask 7.08, APA 1982).

TABLE 1: THE INTERVIEW PROCESS - ORAL HISTORY

I. Introduction
   - A. Introduction of interviewer
   - B. Explanation of the project
   - C. What information is needed by interviewer
   - D. What interviewer will do with the information
   - E. Does the person think he can help
   - F. Ask for permission to record conversation - avoid use of the word "interview"

II. Background of the informant
   - A. Relationships to and interests in project area
     1. Length of time involved with project (area)
     2. Seasons of year
     3. Means of access

III. Knowledge of land uses in the area (use map)
   - A. How was project area used?
   - B. What resources were utilized; where?
   - C. Major changes that have taken place in the project area; when? why?

IV. Whom else might we contact?
   - A. Name, address, and occupation
   - B. Relationship to the area

TABLE 2: ORAL HISTORY INTERVIEW INFORMATION

Interviewee	Address	Reason for Being Interviewed
Mike Fisher	General Delivery Talkeetna, AK 99676 (907) 733-2356	Air-taxi pilot who has spent many flight hours in the upper Susitna River basin; local Talkeetna resident.
Cliff Hudson	Main Street Talkeetna, AK 99676 (907) 733-2321	Long-time Talkeetna resident; 40-year owner/pilot of Hudson's Air Taxi operation.
Minnie Swanda	General Delivery Talkeetna, AK 99676 (907) 733-2461	Widow of master guide Frank Swanda; 46-year Talkeetna resident.
Ed Wick	Box 1550 Talkeetna, AK 99676	Local Talkeetna resident; assists Mahay's River Boat Service
Dorothy Jones	Box 109 Talkeetna, AK 99676	President Talkeetna Historical Society; Representative-elect of Mat-Su Borough Assembly.
Verna & Carrol Close	P.O. Box 1954/Palmer Apts. Palmer, AK 99645 (907) 745-2260	27-year Talkeetna Roadhouse owners
Roberta Sheldon	Main Street Talkeetna, AK 99676 (907) 733-2414	Partner in Sheldon Air Service; Talkeetna resident
John Ireland	Talkeetna, AK 99676	Alaskan sourdough; year-round resident of Murder Lake, southwest of Stephan Lake.
Mrs. Ken Oldham	327 W. 6th Avenue Anchorage, AK (907) 276-7697	Past co-builder, co-owner of High Lake Lodge; guide; bush pilot; author.
Mrs. Frenchy Lamoureux	2808 W. 32nd Avenue Anchorage, AK (907) 277-7417	Hunter; trapper; wife & mother of big-game guides.
Tom Mercer	Mi. 233.5 Alaska Railroad Talkeetna, AK 99676 c/o Denali Wilderness Treks (907) 733-2384	Bush pilot; dog musher; president of Denali Wilderness Treks (recreation outfitters)

Interviewee	Address	Reason for Being Interviewed
James Moran	1220 Kennicott Ave. Fairbanks, AK 99701 (907) 452-5679.	Pilot; partner in Tsusena Lake Lodge.
Mrs. Oscar Vogel	1002 30th Avenue Anchorage, AK. (907) 2720-5714	Hunter; trapper; 20-year Stephan Lake resident; widow of 40-year trapper, master guide in upper Susitna River.
Jake Tansy	Cantwell St./Denali Hwy. General Delivery Cantwell, AK 99729	Native hunter and long-time trapper in Susitna River.
Cleo McMahon	P.O. Box 7 Gakona, AK 99586 (907) 822-3802	40-year air-taxi owner, pilot/ hunter & aerial trapper in upper Susitna River basin.
Jim & Vonnie Grimes	P.O. Box 89 Cantwell, AK 99729	Pilots; owners of Adventures Unlimited Lodge, Denali Hwy.
Bob Toby/ Warren Ballard	A.D.F.& G. Glennallen, AK 99588 (907) 822-3461	Hunters; research & management game biologists in upper Susitna River basin.
Chuck McMahon	P.O. Box 133 Gakona, AK 99645	Upper Susitna River basin pilot; hunter, trapper & fisherman.
Andy Runyon	Star Route C/Box 8860 Palmer, AK 99645	Long-time air-taxi pilot; hunter; Clarence Lake trapper.
Butch Potterville	A.D.F.& G. Glennallen, AK 99588 (907) 822-3309	Upper Susitna River basin sportfish biologist.
Paul Holland	Star Route C/Box 8867 Palmer, Ak 99645	Owner-manager Evergreen Lodge, Lake Louise; boated from Lake Louise to Talkeetna by way of Susitna River.
Pete Haggland	P.O. Box 60249 Fairbanks, AK 99701 (907) 456-4411/ 45204797	Pilot & president Alaska Central Air; partner in Tsusena Lake Lodge
Dennis Brown	Akland Air Service Talkeetna, AK 99676	President Akland Air Service; helicopter pilot.

Interviewee	Address	Reason for Being Interviewed
Don Lee	P.O. Box 307 Talkeetna, Ak 99676 (907) 733-2307	Manager Stephan Lake Lodge; air-taxi pilot; hunting outfitter.
Les & Helen Tolefson	General Delivery Talkeetna, Ak 99676	Father was an original settler in Talkeetna area; subsistence trappers & hunters; long-time Talkeetna residents.
Kathy Sullivan	General Delivery Talkeetna, Ak 99676	Owner of Genet Expeditions (mountaineering & recreational outfitter, Talkeetna).
Dave Johnson	Denali State Park Mi. 193 Alaska Rail-road	Denali State Park Manager; familiar with recreational use in upper Susitna River basin.
Jeff Weltzin	Fairbanks Environmental Center Fairbanks, AK 99701	Backpacked into the Devil Canyon area on numerous occasions.
Judy Simco	Jewel Lake Road Anchorage, AK 99501	Hunter; trapper; widow of trapper Elmer Simco.

TABLE 3: LIST OF CRITICAL MANAGEMENT AGENCY INTERVIEWEES

Name and Title	Agency	Type of Interview	Date
	FEDERAL		
Stanley H. Bronczyk, Chief Branch of Easement Identification	BLM	Meeting	5 May 1980
Lee Barkow, Planner, Anchorage District Office	BLM	Telephone	25 June 1980
	STATE		
Debbie Robertson Land Management Officer	DNR Division of Forest Land & Water Management, Southcentral District	Telephone	5 May 1980
Bill Beaty Planning Supervisor	Division of Research & Development, Land Resources Planning	Meeting	18 June 1980
Ron Swanson Land Management Officer	Division of Research & Development, Policy Research Land Entitlement	Meeting	18 June 1980
	MUNICIPALITY		
Lee Wyatt Planning Director	Matanuska-Susitna Borough	Meeting	4 May 1980
	NATIVE		
Marge Sagerser Land Manager	Cook Inlet Native Corporation	Personal Telephone	23 April 1980 10 July 1980

TABLE 4: THE INTERVIEW PROCESS - MANAGEMENT AGENCIES

I. Introduction (see Part 1, Table 1)

II. How agency relates to current land use in the area
    A. Status of the resources for which the agency has responsibility
    B. Current monitoring activities
    C. Special use permits, if any
    D. Problem areas

III. Future plans for area
    A. Planning documents
    B. Other indications of present or future planning

IV. Agency long-term goals for the area

V. Agency's perception of the impacts that the proposed Susitna hydroelectric project would have on its own future programs

VI. Background of informant
    A. Position with agency
    B. Time with agency

VII. Agency suggestions on ways in which the Susitna hydroelectric project could be most compatible with agency goals and interests

TABLE 5: 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 Watant/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 5 (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.

TABLE 6: ZONE 2 (a) - EXISTING STRUCTURES

Map #	Structure	Location	Access	Currently Maintained	Use Status
1	Cabin; meat house	Lake E. of Stephan Lake, 564 m (1850 ft) elevation	floatplane, skis	Yes	Built in 1960's and in current use for seasonal hunting, fishing, and boating
3 4	Cabin; shed Cabin	N.W. shore of Stephan Lake	airplane	Yes	Built 1960's and in current use for seasonal hunting, fishing, and boating
5	Cabin foundations	Tsusena Creek: 6 km (3.5 mi) from Tsusena/ Susitna confluence	foot, dog team	No	Built in 1940's as a trap line cabin and used until late 1950's; no longer in use
7	Cabin; shed	S. shore of Fog Lake #2	floatplane	Yes	Built in 1960's and currently being used as a seasonal fishing and hunting cabin
8	Cabin;	On knob of Fog Lake #1	airplane	Yes	Built in 1960's and currently being used as a seasonal hunting and fishing cabin
9	Stephan Lodge (10 structures)	W. central shore of Stephan Lake	airplane, foot	Yes	Built in 1960's and in current use as hunting, fishing, and recreation lodge; can accommodate up to 35 guests; operates year-round
10	Cabin; shed	0.8 km (.5 mi) S.W. of Stephan Lodge on Stephan Lake shore	airplane, foot	Yes	Built in 1960's and in current use seasonally as a hunting and fishing cabin

a. Zone 2 is the ten-kilometer (six mi) perimeter around Zone 1 (impoundment zone plus 61 m [200 ft.]).

(a)

TABLE 6: ZONE 2 - EXISTING STRUCTURES

Map #	Structure	Location	Access	Currently Maintained	Use Status
1	Cabin; meat house	Lake E. of Stephan Lake, 564 m (1850 ft) elevation	floatplane, skis	Yes	Built in 1960's and in current use for seasonal hunting, fishing, and boating
3 4	Cabin; shed Cabin	N.W. shore of Stephan Lake	airplane	Yes	Built 1960's and in current use for seasonal hunting, fishing, and boating
5	Cabin foundations	Tsusena Creek: 6 km (3.5 mi) from Tsusena/ Susitna confluence	foot, dog team	No	Built in 1940's as a trap line cabin and used until late 1950's; no longer in use
7	Cabin; shed	S. shore of Fog Lake #2	floatplane	Yes	Built in 1960's and currently being used as a seasonal fishing and hunting cabin
8	Cabin;	On knob of Fog Lake #1	airplane	Yes	Built in 1960's and currently being used as a seasonal hunting and fishing cabin
9	Stephan Lodge (10 structures)	W. central shore of Stephan Lake	airplane, foot	Yes	Built in 1960's and in current use as hunting, fishing, and recreation lodge; can accommodate up to 35 guests; operates year-round
10	Cabin; shed	0.8 km (.5 mi) S.W. of Stephan Lodge on Stephan Lake shore	airplane, foot	Yes	Built in 1960's and in current use seasonally as a hunting and fishing cabin

a. Zone 2 is the ten-kilometer (six mi) perimeter around Zone 1 (impoundment zone plus 61 m [200 ft.]).

Map #	Structure	Location	Access	Currently Maintained	Use Status
11	Cabin; shed	E. shore of Stephan Lake	airplane, foot	Yes	Hunting, fishing, boating, seasonal use; built in 1960's
12 13 14 15 40	Cabin; shed Cabin; shed Cabin; shed Cabin; shed Cabin; shed	E. shore of Stephan Lake	airplane, foot	Yes	Built in 1960's and in current seasonal use as hunting, fishing, and boating cabins
16	Cabin; shed	Mouth of Prairie Creek at Stephan Lake	airplane, foot, horse	No	Built in 1940's and used until late 1950's as a hunting, fishing, and trapping base and residence; no longer used
17 18	Cabin Cabin	W. shore of Prairie Creek	airplane, foot	Yes	Built in 1960 and 1970 respectively and currently used as a year-round residence from which hunting, fishing, and trapping occur
19	Cabin; meathouse	E. shore of Murder Lake (S. of Stephan Lake)	airplane, foot	Yes	Built in 1960's and used as a year-round residence; hunting and fishing
25	Mining buildings (5)	Portage Creek: 4 km. (2.5 mi) N. of Portage/Susitna confluence	airplane, ATV, foot, dog team, horse	No	Mining records exist as far back as 1890's; mined 1920's and sporadically 1930's, then 1950-70's; currently inactive mining operations; buildings not in use

Map #	Structure	Location	Access	Currently Maintained	Use Status
26	Cabins (2)	1.6 km (1 mi) N. of Portage Creek mining	airplane, ATV foot, dog team	Yes	Mining; built in 1950's; used Creek seasonally
27	Cabins (2)	N.W. shore of Dawn Lake	airplane, ATV horse, dog team	Yes	Built in 1960's by owners of High Lake; used currently as a hunting cabin on a seasonal basis
28	Lodge, High Lake (9 buildings)	S. shore of High Lake	airplane, ATV horse, dog team	Yes	Built in 1960's for use as an international hunting/fishing lodge; currently in use by Acres American Susitna project on a seasonal basis
30	Cabin foundations	S. shore of High Lake	airplane, ATV horse, dog team	Yes	Building under construction as of June 1980
39	Cabin	14 km (9 mi) of Stephan Lake: 11 km (7 mi.) S. of Fog Lake	foot, airplane	Yes	Built in 1970's; current use not known at this time
42	Cabin	Portage Creek 3 km (2 mi) N.W. of Dawn Lake	foot, sled road, airplane, ATV	Yes	Built in 1960's and currently used on a seasonal basis for hunting and fishing
45	Cabin	1.8 km (1 mi) W. of Portage Creek mining	foot, airplane, ATV/4WD	Yes	Currently used on a seasonal basis for recreational purposes
46	Cabin	1.8 km (1 mi) W. of Portage Creek mining, on sled road	foot, airplane, ATV, 4WD	Yes	Currently used on a seasonal basis for recreational purposes
47 48 49	Cabin Cabin Cabin	Unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	Yes	Currently used on a seasonal basis for recreational purposes

Map #	Structure	Location	Access	Currently Maintained	Use Status
50	Trailer	W. end of S. shore of unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	No	Currently not in use; abandoned
51	Cabin	W. end of S. shore of unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	No	Built in late 1960's and currently used for hunting and fishing on a seasonal basis
52 53	Cabin Cabin	S. shore of unnamed lake N. of Otter Lake	foot, airplane, ATV, 4WD	Yes	Built in late 1960's and seasonally used since then for hunting and fishing
55	Cabins (3)	W. end of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970's and currently used on a seasonal basis for hunting and fishing
56	Cabin	N. shore of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970's and currently used on a seasonal basis for hunting and fishing
57 59	Lodge	N. shore of Bear Lake	foot, airplane, ATV, 4WD	Yes	Built in 1970's; lodge and cabin used for fishing, hunting, and skiing on a year-round basis; seasonal boating
58	Cabin foundations	E. end of Bear Lake	foot, airplane, ATV, 4WD	No	Built in 1950's for trapping purposes; no longer in use
64 65	Cabin Cabin	Miami Lake	rail, foot, car, airplane	Yes	Perhaps being used as recreational cabins
69	Cabin	S. shore of Bear Lake	airplane, foot, 4WD	Yes	Built in 1960's and currently used for hunting, fishing, and swimming

Map #	Structure	Location	Access	Currently Maintained	Use Status
75	Cabin	6 km (4 mi) from Watana/Susitna confluence	airplane, ATV	Yes	Built in the 1970's; currently used on a seasonal basis for hunting
76	Cabin	11 km (7 mi) E. of Big Lake	airplane, ATV	Yes	Constructed in 1970's and currently used on a seasonal basis for hunting and mining
77 78	Cabin Cabin	W. end of Watana Lake	airplane, dog team, snow-machine	Yes	Built in 1950's and 1960's respectively and currently used seasonally for hunting and fishing
79 80	Cabin Cabin	E. end of Watana Lake	airplane, dog team, snow-machine	Yes	Built in 1950's and 1960's respectively and currently used seasonally for hunting and fishing
81	Cabin	E. end of Gilbert/ Kosina confluence	foot, dog team	No	Built in 1936 as a trapping line cabin; used until 1955; currently abandoned with everything intact
82	Tent frame structure	S.W. end of Clarence Lake	foot, dog team	No	Built in 1950's and used until 1960's for seasonal hunting
84	Cabins (2)	S.E. end of Clarence Lake	airplane	Yes	Built in 1950's and currently used seasonally as a hunting and fishing cabin
85	Cabin	E. end of Clarence Lake	airplane	Yes	Built in 1970's and currently used on a seasonal basis for hunting, fishing, and trapping

Map #	Structure	Location	Access	Currently Maintained	Use Status
86	Cabin	N. end of Clarence Lake	airplane	Yes	Built in 1960's and currently used on a seasonal basis for hunting, fishing, and trapping
87	Cabin	On tributary 1.6 km (1 mi) E. of Clarence Lake	foot, dog team	No	Built in 1930 and used until 1950 for trapping, hunting, and fishing (Simco's line cabin #4); currently used seasonally as a hunting shelter
88	Cabins (2)	Gaging station: S. bank of Susitna	airplane	No	Built in 1950's for research purposes; currently not used or maintained
93	Cabin	W. of Jay/Susitna confluence	airplane	Yes	Built in 1960's and used currently on a seasonal basis for hunting and fishing
94	Cabin	Laha Lake: 2.4 km (1.5 mi) W. of Jay Creek	floatplane, airplane	Yes	Built in 1960's and used currently on a seasonal basis for fishing
95 96	Cabin Cabin	Unnamed lake: 4 km (2.5 mi) S.E. of Vee Canyon gaging station	airplane	Yes	Built in 1950's and used currently on a seasonal basis for fishing
99	Cabin	Tyone River/Susitna confluence	boat	Yes	Built in 1960's by Stephan Lodge owner as a river cabin for Stephan Lodge boating guests
100	Tent platform	Susitna sandbar: S. of Tyone River/ Susitna confluence	boat, helicopter	No	Built in 1970's and used currently for transient boaters
103	Cabin	Jay Creek: 5 km (3 mi) N. of VABM Brown	ATV	Yes	Built in 1970's for hunting and currently used on a seasonal basis

Map #	Structure	Location	Access	Currently Maintained	Use Status
110	Cabin	N. end of Madman Lake	airplane	Yes	Built in 1960's and currently used on a seasonal basis for hunting and fishing
116	Cabin	1.6 km (1 mi) W. of VABM Oshetna	airplane	Yes	Built in 1970's for hunting purposes and is currently used on a seasonal basis
112	Cabin foundations	W. bank of Portage Creek: 6 km (4 mi) from Portage/Susitna confluence	dog team, foot	No	Built in 1940's as a mining/ prospecting cabin; no longer in use
117	Cabin	Tyone River/Tyone Creek confluence	boat, dog team	Yes	Built in 1960's for hunting and fishing purposes and currently used on a seasonal basis
118	Cabin	11 km (7 mi) due E. of Tyone River/ Susitna confluence	boat, dog team	No	Built in 1960's for hunting and fishing purposes; no longer in use

Summary: Sixty-seven locations with structures exist within Zone 2.

(a)

TABLE 7: ZONE 3 - EXISTING STRUCTURES

Map #	Structure	Location	Access	Currently Maintained	Use Status
20	Cabin; shed	S.E. shore of Daneka Lake	airplane, foot	Yes	Built in 1960's and currently used on a seasonal basis for hunting, fishing, and recreation by guests of Stephan Lodge
21	Cabin; shed				
22	Cabin; shed	Prairie/Talkeetna confluence	foot, dog team, boat	Yes	Built in 1960's and currently used seasonally by Stephan Lodge for purposes of fishing and hunting
23	Cabin; shed	Game Lake	airplane, foot	Yes	Built in 1940's and used since then for trophy game hunting; now a part of Stephan Lodge's series of outreach cabins used on a seasonal basis
34	Chunilna Creek Placer (7 buildings)	Chunilna Creek	airplane, ATV, 4WD, snow-machine	Yes	Large placer mining operation in existence since 1950 and currently actively mined on a seasonal basis
36	Mining buildings	Chunilna Creek: 13 km (8 mi) S.W. of VABM Clear	airplane, ATV, 4WD, snow-machine, dog team, foot	Yes	Four buildings built in the 1920's, 1940's and 1960's and used seasonally for the purpose of mining
37	Cabin	5 km (3 mi) N.E. of VABM curry	foot, dog team	No	Built in 1940's and used seasonally for trapping until early 1960's; no longer in use
38	Cabin	Grizzly Camp: 8 km (5 mi) E. of Daneka Lake	foot, dog team, airplane	Yes	Built by Vogel in the 1940's as a hunting cabin; currently used on a seasonal basis as a Stephan outreach cabin for purposes of hunting

a. Zone 3 is that zone between 10 km (6 mi) and 19 km (12 mi) from the impoundments.

Map #	Structure	Location	Access	Currently Maintained	Use Status
59 60 61 62 63	Cabin Cabin Cabin Cabin Cabin	Chulitna Pass: near railroad	rail, foot, car, airplane	Yes	Exact construction dates not known; currently used as year-round residences
70	Lodge	N. shore of Tsusena Lake	airplane, ATV	Yes	Built in 1958; used for commercially guided hunts until 1976; presently used on a seasonal basis for private hunting, fishing, and skiing trips
72	Cabin	Deadman Lake: W. of Big Lake	airplane, ATV	Yes	Built in 1960's for fishing and hunting purposes and currently used on a seasonal basis
73 74	Cabin Cabin	Big Lake	ATV	Yes	Built in 1960's; currently used on a seasonal basis for hunting and fishing
89	Cabin	Unnamed lake 5 km (3 mi) S.W. of Clarence Lake (island in middle)	floatplane, boat	Yes	Exact construction date not known; currently used on a seasonal basis for fishing
98	Cabin	Oshetna River: 16 km (10 mi) S. of Oshetna/Susitna confluence	dog team, foot, boat	No	Built by Simco in 1930 as a trap line cabin and used on a seasonal basis for hunting and fishing
101	Cabin	0.4 km (0.2 mi) S. of Maclaren/ Susitna confluence	boat	Yes	Built in 1960's and currently used for boating on a seasonal basis
105	Cabin	Coal Creek	ATV, airplane	Yes	Built in 1970's for hunting and currently used on a seasonal basis

TABLE 7: Page 3 of 3

Map #	Structure	Location	Access	Currently Maintained	Use Status
106	Cabin	S. end of Coal Lake	ATV, airplane	Yes	Built in 1960's and currently used on a seasonal basis for mining and fishing
113	Cabin	Unnamed lake: 10 km (6 mi) W. of Murder Lake	airplane	No	Built in 1960's for hunting purposes; no longer in use
114	Cabin	11 km (7 mi) N.E. of VABM Disappointment	airplane	Yes	Built in 1970's for hunting use and currently used for seasonal hunting purposes
115	Cabin	3 km (2 mi) N. of Tsusena Lake	airplane	Yes	Built in 1970's and currently used as a year-round residence by a guiding outfit

Summary: There are 25 locations in Zone 3 with existing structures.

TABLE 8: 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 9: 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 10: 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
		T30&31N,R11E SM	4,792	11,840
	Federal (SSS)[c]	T29-31N,R10&11E SM	11,396	28,160
	State Selection	T29N,R10&11E SM	9,324	23,040
	Regional Selection	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.

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 11: 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 12: 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 13: EXCEPTIONAL NATURAL FEATURES

Feature	Location	Description
Devil Canyon	Susitna River, west end of project area T.32N, R.1W., 1E., and T.31N., R.1E., S.M.	A steep-sided, nearly enclosed gorge, its sides alternating spruce-covered terraces and rock-bound walls, constricts the channel of the Susitna River, producing an 18 km (11 mi.) stretch of turbulent whitewater. Two narrow falls, flowing through deeply incised crevasses, plummet a distance to the river below. Devil Canyon combines unusual geology, hydrology, and aesthetics with uncommon recreational opportunities, such as kayaking, to render it a unique natural feature in both the project area and the state of Alaska.
Vee Canyon	Susitna River, east end of project area T.30N., R.10E., Sec. 11 & 12, S.M.	Vee Canyon occupies a double hairpin bend in the deeply cut channel of the Susitna River, creating a stretch of whitewater. The canyon walls are composed of very steep rock ridges and are unusually colorful, the rock often interlaid with marble and green schist. Vee Canyon, more visible than Devil Canyon and with its walls more open, is exceptional in its scenic beauty.
Clear Valley	Approx. 6 km (4 mi.) south of Fog Lake 2230 T.30N., R.5E., Sec. 5, 8, 17, 20, 29, 34., S.M.	Clear Valley contains unusual flat surfaces raised off the valley floor and surrounded by meandering streams; the valley's dominant feature is its visually apparent geological history. Geologically, the valley is fairly young and contains good examples of lateral moraines. Clear Valley contrasts significantly with the surrounding viewscape; the valley is unusual for its geologic features.
Deadman Falls	Near mouth of Deadman Creek T.32N., R.5E., Sec. 26., S.M.	Deadman Falls with an elevation of 521 m (1710 ft) is one of the largest and most scenic waterfalls in the project area. Deadman Creek surges over loose rocks in its incised channel, plummeting straight down over rocky slopes and outcroppings into a clear boulder-dominated pool, a pool often veiled in vapor.
Tsusena Falls	Above mouth of Tsusena Creek T.32N., R.5E., Sec. 20, S.M.	Clear and turbulent, Tsusena Creek drops nearly 60 m (200 ft.) as it rushes over a steep, rocky cliff, creating a waterfall of considerable volume, which cascades into a large, deep, rock-enclosed pool. The view of the waterfall; creek; rock outcroppings; and dense, green vegetative cover is impressive.

TABLE 13 (Continued)

Feature	Location	Description
Devil Creek Falls	Above mouth of Devil Creek T.32N., R.2E., Sec. 20., S.M.	Devil Creek, constricted by a narrow opening between jagged rock walls, plunges over the steep embankment in a narrow, contained flow before fanning out and cascading to the pool below. The irregular pattern of the waterfall, against bare rock and surrounded by the densely vegetated, incised creek valley walls, creates a scene of high aesthetic appeal. Elevation 579 m (1900 ft).
Big Lake	N.E. of proposed Watana dam site T.22S., R.3W., Sec. 18, 19, 30, T.22S., R.4W, Sec. 25., F.M.	Big Lake, largest lake in the project area, is a prime example of a lake held in by a terminal moraine. Big Lake's proximity to Deadman Lake and, from Big Lake, the panoramic view of the Alaska Range and nearby Deadman Mountain combine with the lake's observable glacial origin to create an area that is noteworthy for both scenic and geologic features.
Mt. Watana Cirque Lake	East of VABM Mt. Watana T.30N., R.7E., Sec. 2., S.M.	A cirque lake high on Mount Watana provides a scenic interpretation of the area's glacial history. The cirque contains a pristine lake, simple in outline and distinguished by the natural amphitheater formed on three sides by towering scree slopes, with a scenic view of the valley from the remaining side.
Tyone River	East end of project area, confluence with Susitna River T.30W, R.12E., Sec. 9., S.M.	The slow-flowing, dark, and clear Tyone River, near its confluence with the Susitna River, is flanked on its south shore by starkly contrasting chalk-colored cliffs. These are composed of lacustrine deposits left behind by an expansive proglacial lake, one of three such lakes of significant size recorded in Alaska. This particular region of the Tyone River is exceptional for its prominent glacial remains, scenic white bluffs, and dark/clear river.

TABLE 14: OTHER IMPORTANT NATURAL FEATURES

Feature	Location	Description
Fog Lakes	Sections 3, 7-11, 13, 18, T31N.,R.5E., and Sections 5, 7, 8, 18, T.31N., R.6E., S.M.	Five lakes in proximity to one another; average surface area is 109 ha (270a), with no lake smaller than 58 ha (147a).
Stephan Lake	Sections 2, 3, 9-11, 16, 17, 20, 21, T.30N., R.3E., S.M. Between Watana and Devil Canyon dam sites on south side	The longest lake immediately adjacent to the project area, it measures 7 km (4.2 mi) in length, and is the nearest lake to the project area with a run of salmon and one of the few with relatively high recreational use.
Watana Lake	Section 6, T.30N., R.8E., S.M. Section 1, T.30N., R.7E., S.M. Section 36, T.31N., R.7E., S.M. Section 31, T.31N., R.8E., S.M. East of Mt. Watana	Mount Watana, rising directly to the west of Watana Lake, provides an aesthetically pleasing setting for the high (914 m [3,000 ft] lake).
Swimming Bear Lake (unnamed lake)	Section 4, T.32N., R.3E., S.M. Sections 32, 33, T.33N., R.3E., S.M. 8-10 km (5-6 mi.) north of VABM Devil near proposed access route	One of the highest lakes in the project area, Swimming Bear Lake (Ms. K. Oldham, pers. comm.) is a large alpine lake set in mat and cushion/sedge-grass tundra.
Deadman Mountain	Sections 6, 7, 17-20, 29-32, T.21S., R.3W., F.M. Sections 1, 2, 11-14, 23-26, 34-36, T.21S., R.4W., F.M.	Isolated Deadman Mountain, reaching a height of 1684 m (5,525 ft), overshadows Deadman Lake and Big Lake.
Tsusena Butte and Tsusena Butte Lake	Sections 16, 20-22, 27-29, T.33N., R.5E., S.M. North of Watana dam site	A prominent butte 1,314 m (4,312 ft) high, Tsusena Butte rises above Tsusena Butte Lake, one of the deepest lakes in the project area (34 m [110 ft]). The lake is comprised of two irregularly shaped segments.

TABLE 14: (Continued)

Feature	Location	Description
Chulitna Butte	Sections 22, 27, T.33N., R.2W., S.M. South of Hurricane	Chulitna Butte overlooks the Alaska Railroad's past and present communities and provides an accessible viewpoint of part of the project area from the Parks Highway.
Cheechako Falls	Sections 4, 8, 9, T.31N., R.1E., S.M. First creek southeast of Devil Canyon dam site. Elevation: 510 m (1,672 ft)	A series of five waterfalls along Cheechako Creek, set in a steep gorge. The two largest falls are approximately 8 m (25 ft) apart, with pools and rocky cliffs, and surrounded by thick mats of moss and other vegetation.
Mount Watana Falls	Section 33, T.31N., R.7E., S.M. On north side of Mount Watana. Elevation 1,372+ m (4,500 ft)	A waterfall flows over a deeply incised rock gorge interlaid with black and white marble; barren tundra surrounds the falls, and a mist hangs above it.
Spearpoint Falls (unnamed falls)	Section 1, T.31N., R.7E., S.M. In an easterly direction, first creek past Watana Creek and Susitna River confluence on the north side. Elevation 625+ m (2,050 ft)	Four waterfalls occur along a relatively small creek. The largest one is below the others in a large, hollowed-out area. (Named for a spearpoint that was discovered in one of two nearby archeological sites.)
Devil's Club Falls (unnamed falls)	Section 11, T.31N., R.2W., S.M. In an easterly direction, first creek past Gold Creek and Susitna River confluence on the south side. Near Borrow Area 2 for access road. Elevation: 297+ m (975 ft)	Devil's Club Falls is a scenic waterfall, easily accessible from the Susitna River below the Devil Canyon rapids. (Temporarily named for the abundance of devil's club that is present all the way up to the falls).

TABLE 15: HECTARES (ACRES) OF DIFFERENT WETLAND TYPES BY PROJECT COMPONENT (a) (b)

Wetland Type	WATANA FACILITY											
	Impoundment, Dam and Spillways		Camp, Village and Airstrip		Borrow Areas							
					A		D		E	F	H	I
Palustrine forested	7,408	(18,306)			252	(623)	16 (40)		133 (329)	80 (198)	345 (853)	15 (37)
Palustrine scrub-shrub	1,126	(2,782)	142	(351)	62	(153)	212 (524)			199 (492)	38 (94)	
Palustrine emergent	139	(343)			8	(20)	8 (20)					
Lacustrine emergent	4	(10)										
Lacustrine	54	(133)	8	(20)								
Riverine	2,182	(5,392)	—		—		—		—	—	—	—
TOTAL	10,913	(26,967)	150	(371)	322	(796)	236 (583)		133 (329)	279 (689)	383 (946)	15 (37)

Wetland Type	DEVIL CANYON FACILITY					
	Impoundment, Dam and Spillways		Camp and Village		Borrow Area K	
Palustrine forested	800	(1,977)			11	(27)
Palustrine shrub-scrub	43	(106)			29	(72)
Palustrine emergent	12	(30)				
Lacustrine emergent						
Lacustrine	1	(2)				
Riverine	810	(2,002)	—		—	
TOTAL	1,666	(4,117)	-0-		40	(99)

a. Wetland types according to Cowardin et al. (1979).
b. Acreages appear in parentheses.

TABLE 16: POTENTIAL IMPACTS AND MAGNITUDE OF IMPACTS OF ACCESS PLANS ON LAND USE VARIABLES[a]

LAND USE ANALYSIS CATEGORIES	ACCESS PLANS			
	Plans 1 & 5	Plans 2 & 8	Plans 4 & 6	Plans 3 & 7
1. Land uses and associated site-specific activities				
- Residential: remote, isolated	4	3	4	4
- Residential: community[b]	3	3	4	4
- Residential lodges (concentrated tourism & recreation)	5	5	2	2
- Commercial: community[b]	3	3	3	4
- Agriculture	1	1	1	1
- Transportation: Highway	4	1	2	3
Rail	1	5	4	4
- Mining	3	3	3	3
2. Dispersed and isolated activities				
- Extractive: hunting & fishing	5	3	4	4
- Riverine: boating	3	3	3	3
- Camping, hiking, photography, etc.	3	2	2	3
3. Land management activities & related concerns				
- Game management; hunting, fishing, trapping	5	3	4	5
- General land management	5	3	4	5
- Off-road vehicle management	5	2	4	5
- Native claims	4	4	2	4
- Land values	4	2	2	4
4. Natural aesthetics				
- Visual characteristics: land	4	3	3	4
- Visual characteristics: water	3	2	2	3
- Ground cover: flora	5	2	2	4
- Land surface integrity	4	2	3	4
- General natural character, extensive	4	2	3	4

a. A subjective numerical scale in which 5 represents a major impact and 1 a negligible impact.
b. The Socioeconomic Analysis deals with more discrete factors relating to communities located near the project area.

TABLE 17: ENVIRONMENTAL CONSTRAINTS WITHIN TRANSMISSION CORRIDORS-SOUTHERN STUDY AREA (Willow to Anchorage/Point MacKenzie)

Corridor	Length	Topography/Soils	Land Use	Aesthetics
1 (ABC)	117 km (73 mi)	Some soils with severe limitations to off-road travel; some good agricultural soils	No existing ROW in AB; residential use uses near Palmer; proposed capital site; much U.S. Military Wdl., private, and Village Selection land	Iditarod Trail; trail paralleling Deception Ck.: Gooding L. bird-watching area; 5 crossings of Glenn Hwy, 1 crossing of Parks Hwy.
2 (ADFC)	61 km (38 mi)	Most of route potentially wet, with severe limitations to off-road travel; some good agricultural soils	Trail in only existing ROW; residential and recreational areas; Susitna Flats Game Refuge; agricultural land sale	Susitna Flats Game Refuge; Iditarod Trail; 1 crossing of Parks Hwy.
3 (AEFC)	63 km (39 mi)	Same as Corridor 2	No known existing ROW; residential and recreational use areas, including Nancy Lakes; lakes used by float planes; agricultural land sale	Lake area south of Willow; Iditarod Trail; 1 crossing of Parks Hwy.

TABLE 18: ENVIRONMENTAL CONSTRAINTS WITHIN TRANSMISSION CORRIDORS-CENTRAL STUDY AREA (Dam Sites to Intertie)

Corridor	Length	Topography/Soils	Land Use	Aesthetics
1 (ABCD)	64 km (40 mi)	Crosses several deep ravines; about 305 m (1000 ft) change in elevation; some wet soils	Little existing ROW except Corps rd.; mostly Village Selection and private lands	Fog Lakes; Stephan Lake; proposed access road
2 (ABECD)	72 km (45 mi)	Crosses several deep ravines; about 610 m (2000 ft) change in elev.; some steep slopes; some wet soils	Little existing ROW except Corps rd. and at D; rec. and resid. areas; float plane areas; mostly Village Selection and private lands	Fog Lakes; Stephan Lake; proposed access road; high country (Prairie & Chulitna Ck. drainages) and viewshed of Alaska Range
3 (AJCF)	66 km (41 mi)	Crosses several deep ravines; about 610 m (2000 ft) change in elevation; some steep slopes; some wet soils.	No existing ROW except at F; rec. areas; float plane areas; mostly Village Selection and private land; resid. & rec. development in area of Otter L. and old sled rd.	Viewshed of Alaska Range & High Lake; proposed access rd.
4 (ABCJHI)	124 km (77 mi)	Crosses several deep ravines; >610 m (2000 ft) change in elevation; routing above 1220 m (4000 ft); steep slopes; some wet soils; shallow bedrock in mts.	No existing ROW; rec. areas and isolated cabins; lakes used by float planes; much Village Selection land	Fog Lakes; Stephan Lake; proposed access rd; viewshed of Alaska Range
5 (ABECJHI)	132 km (82 mi)	Crosses several deep ravines; changes in elevation >610 m (2000 ft); routing above 1220 m (4000 ft); steep slopes; some wet soils; shallow bedrock in mts.	Same as Corridor 4	Fog Lakes; Stephan Lake; High Lake; proposed access rd; viewshed at Alaska Range

Corridor	Length	Topography/Soils	Land Use	Aesthetics
6 (CBAHI)	109 km (68 mi)	Crosses several deep ravines; changes in elevation of about 488 m (1600 ft); routing above 1220 m (4000 ft); steep slopes; some wet soils; shallow bedrock in mts.	No known existing ROW; rec. areas and isolated cabins; float plane area; Susitna area and near I are Village Selection land	Fog Lakes and Stephan Lake; proposed access rd.; Tsusena Butte; viewshed of Alaska Range
7 (CEBAHI)	117 km (73 mi)	Crosses several deep ravines; change in elevation of about 488 m (1600 ft); routing above 914 m (3000 ft); steep slopes; some wet soils; shallow bedrock in mts.	Same as Corridor 6	Fog Lakes and Stephan Lake; proposed access rd.; high country (Prairie-Chunilna Cks.); Tsusena Butte; viewshed of Alaska Range
8 (CBAG)	145 km (90 mi)	Crosses several deep ravines; change in elevation of about 488 m (1600 ft); routing above 914 m (3000 ft); steep slopes; some wet soils; shallow bedrock in mts.	No existing ROW; rec. areas and isolated cabins; float plane areas; air strip and airport; much Village Selection and federal land	Fog Lakes; Stephan Lake; access rd; scenic area of Deadman Ck.; viewshed of Alaska Range
9 (CEBAG)	153 km (95 mi)	Crosses several deep ravines; changes in elevation of about 488 m (1600 ft); routing above 914 m (3000 ft); steep slopes; some wet soils; shallow bedrock in mts.	Same as Corridor 8	Fog Lakes; Stephan Lake; proposed access rd; high country (Prairie and Chunilna Cks.); Deadman Ck.; viewshed of Alaska Range
10 (CJAG)	146 km (91 mi)	Same as Corridor 8	No existing ROW; rec. areas and isolated cabins; float plane areas; air strip and airport; mostly Village Selection and federal land	High Lakes area; proposed access rd.; Deadman Ck. drainage; viewshed at Alaska Range

Corridor	Length	Topography/Soils	Land Use	Aesthetics
11 (CJAHI)	111 km (69 mi)	Crosses several deep ravines; changes in elevation of 305 m (1000 ft); routing above 914 m (3000 ft); steep slopes; some wet soils; shallow bedrock in mts.	No existing ROW; rec. areas and isolated cabins; float plane areas; mostly Village Selection and private land	High Lakes area; proposed access rd.; viewshed of Alaska Range
12 (JA-CJHI)	113 km (70 mi)	Same as Corridor 11	No existing ROW; rec. areas and isolated cabins; float plane area; mostly Village Selection and private land	High Lakes area; proposed access rd.; Tsusena Butte; viewshed of Alaska Range
13 (ABCF)	66 km (41 mi)	Crosses several deep ravines; about 305 m (1000 ft) change in elevation; some wet soils	No known existing ROW except at F; rec. areas; float plane areas; resid. and rec. use near Otter L. and old sled rd.; isolated cabins; mostly Village Selection land; some private land	Fog Lakes, Stephan L.; proposed access rd.
14 (AJCD)	66 km (41 mi)	Crosses deep ravine at Devil Ck.; about 610 m (2000 ft) change in elevation; routing above 914 m (3000 ft) some steep slopes; some wet soils	Little existing ROW except old Corps rd. and at D; rec. areas; isolated cabins; much Village Selection land; some private land	Viewshed of Alaska Range and High Lake; proposed access road
15 (ABECF)	72 km (45 mi)	Crosses several deep ravines; about 610 m (2000 ft) change in elevation; some wet soils	No known existing ROW except at F; rec. areas; float plane areas; resid. and rec. use near Otter L. and old sled rd.; isolated cabins; mostly Village Selection land with some private land	Fog Lakes; Stephan Lake; proposed access road; high country (Prairie and Chunilna Cks. drainages); viewshed of Alaska Range

TABLE 19: ENVIRONMENTAL CONSTRAINTS WITHIN TRANSMISSION CORRIDORS-NORTHERN STUDY AREA (Healy to Fairbanks)

Corridor	Length	Topography/Soils	Land Use	Aesthetics
1 (ABC)	145 km (90 mi)	Some wet soils with severe limitations to off-road traffic	Air strip; residential areas and isolated cabins; some U.S. Military Withdrawal and Native land	3 crossings of Parks Hwy; Nenana R.-scenic area
2 (ABDC)	138 km (86 mi)	Severe limitations to off-road traffic in wet soils of the flats	No existing ROW n. of Browne; scattered residential and isolated cabins; airstrip; Fort Wainwright Military Reservation	3 crossings of Parks Hwy; high visibility in open flats
3 (AEDC)	185 km (115 mi)	Change in elevation of about 762 m (2500 ft); steep slopes; shallow bedrock in mts.; severe limitations to off-road traffic in the flats	No existing ROW beyond Healy/Cody Ck. confluence; isolated cabins; airstrips; Fort Wainwright Military Reservation	1 crossing of Parks Hwy; high visibility in open flats
4 (AEF)	169 km (105 mi)	Same as Corridor 3	Airstrips; isolated cabins; Fort Wainwright Military Reservation	High visibility in open flats

TABLE 20: DESCRIPTION OF PROPOSED RECREATION SITES AND FACILITIES

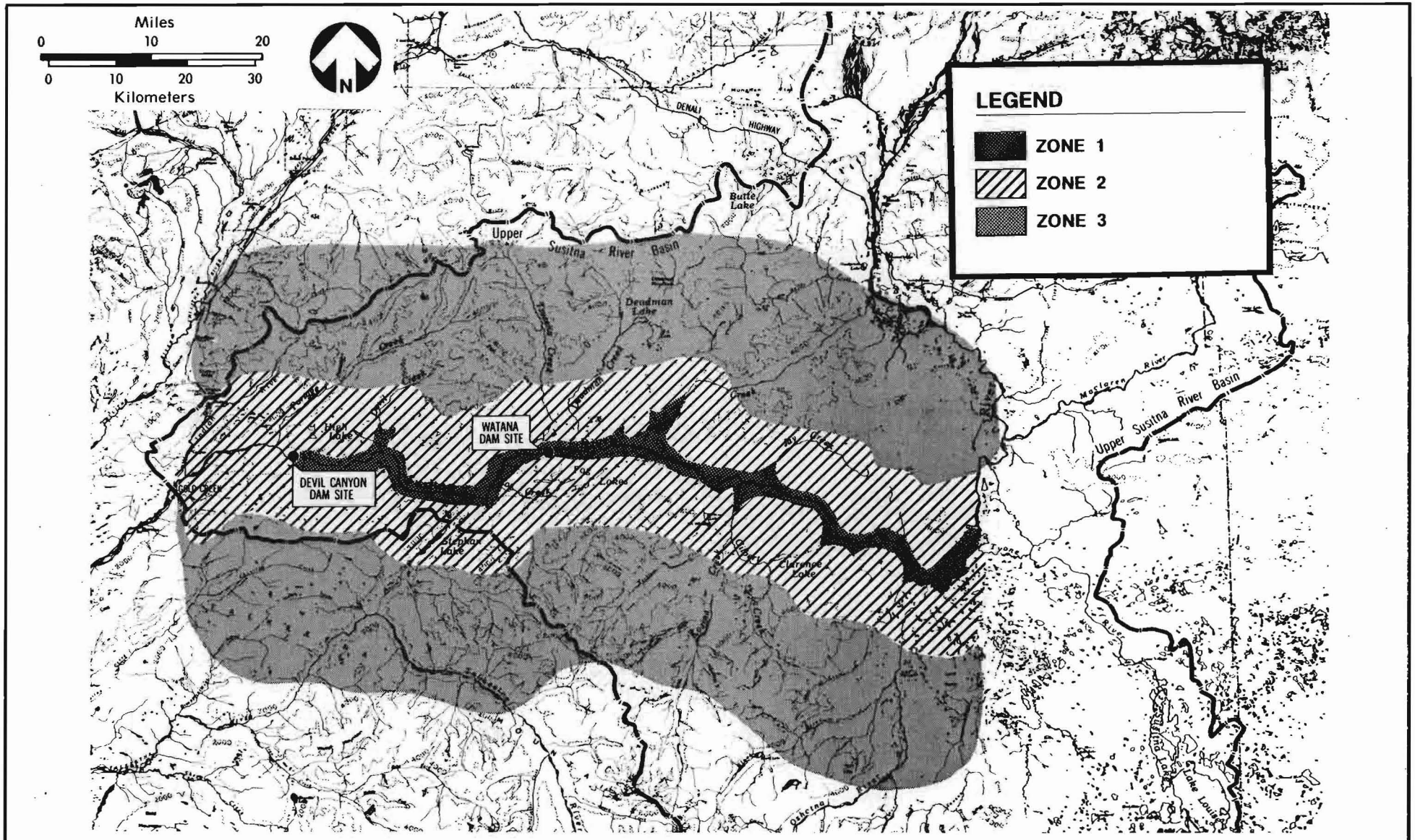
(Keyed to Figures 27 and 28)

Opportunity Setting	Site Number	Site Description
A	1(a)	Pull-out with area information sign
	2(a)	Pull-out and parking area with access to Indian River; parking for five vehicles
	3(a)	Scenic pull-out and viewing point above the Susitna River
	4(a)	Scenic pull-out, with small parking area, for waterfalls near the road; parking for five vehicles
	5(a)	Scenic pull-out and viewing point; large, rustic project entrance sign before reaching site 4
	6(a)	Scenic pull-out and small parking area below the Devil Canyon dam near the bridge over the canyon; parking for five vehicles
B	1(a)	Scenic pull-out with panoramic view of reservoir; trailhead and parking area with developed trail to observation point; parking for five vehicles
	2(a)	Scenic pull-out with trailhead and developed portage to Dawn Lake; primitive portage to other lakes (brushed trails only); parking area limited to seven vehicles
	3(a)	Scenic pull-out with trailhead and developed portage to Mermaid Lake; parking area limited to five vehicles
	4(a)	Scenic pull-out with parking area and trailhead to Devil Creek Falls; parking area limited to five vehicles
	5(a)	Scenic pull-out overlooking Swimming Bear Lake; parking for two vehicles
	6(a)	Scenic pull-out
	7(a)	Scenic pull-out and access to Tsusena Creek; parking area limited to two vehicles
	8(a)	Scenic pull-out and trailhead for short trail to overlook of Tsusena Creek Canyon and Tsusena Creek Falls; parking for seven vehicles

a. Handicapped accessible.

TABLE 20 (Continued)

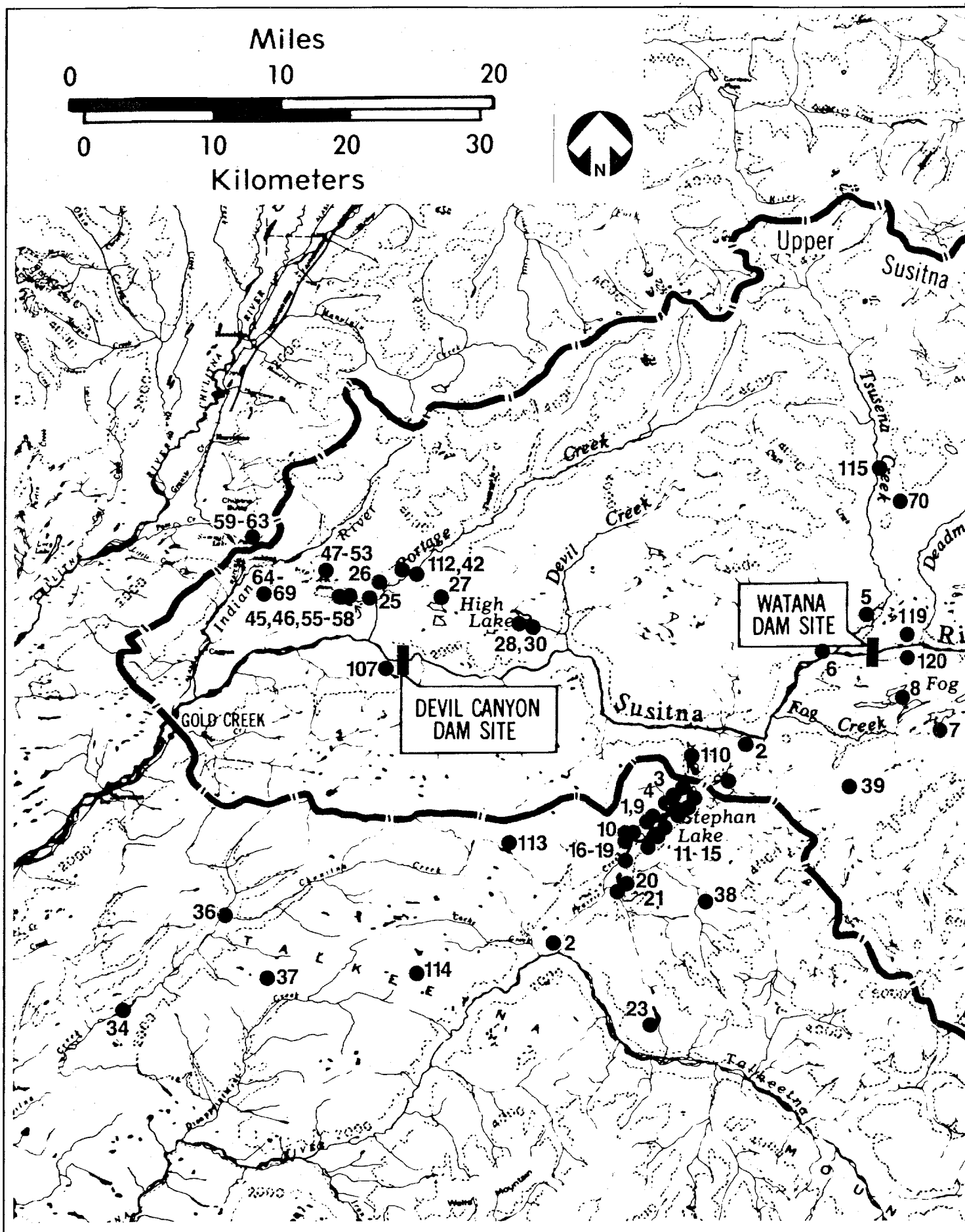
Opportunity Setting	Site Number	Site Description
C	1(a)	Boat launch and parking area with picnic grounds and parking nearby; access to Devil Canyon reservoir; trailhead for Cheechako Canyon Trail with short loop for physically handicapped
	2(a)	Primitive, auto-oriented campground (100 units, 60 units to be developed for first three years) and a secondary trailhead to Cheechako Canyon
	3	Primitive, boat-in picnic ground (ten units, long-term development)
	4(a)	Simple boat launch, and picnic and parking area at Tsusena Creek and gravel access road; access to Devil Canyon reservoir
D	1(a)	Boat launch, and parking area, with primitive auto campground (60 units, 30 units to be developed the first three years) with a gravel road; primary access point for Watana reservoir
	2	Primitive boat-in campground at Watana Cove (ten units long-term development)
	3	Primitive boat-in campground at Jay Creek (ten units long-term development)
	4	Camping area for Susitna and Tyone River floaters (to be developed in agreement with BLM)
E	1	Trail to observation point north of Devil Canyon (see B-1)
	2	Develop portage to alpine lakes and primitive portages to more distant lakes (see B-2)
	3	Develop portage to alpine lakes (see B-3)
	4	Develop trail to Devil Creek Falls (see B-4)
	5	Develop trail to Tsusena Creek Falls (see B-7)
	6(a)	Develop trail to Cheechako Creek Falls (see C-1, C-2)
F		No developed facilities



STUDY AREAS FOR LAND USE ANALYSIS

PREPARED BY TES

FIGURE 1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Devil Creek
Indian River
Portage Creek
59-63
47-53
26
112,42
64-69
27
25
45,46,55-58
High Lake
28,30
107
WATANA DAM SITE
5
119
120
6
8
Fog
Fog Creek
7
DEVIL CANYON DAM SITE
GOLD CREEK
Susitna
110
2
39
3
4
1,9
10
Stephan Lake
11-15
113
16-19
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21
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Talkeetna
MOUNTAINS
PREPARED BY TES
EXISTING

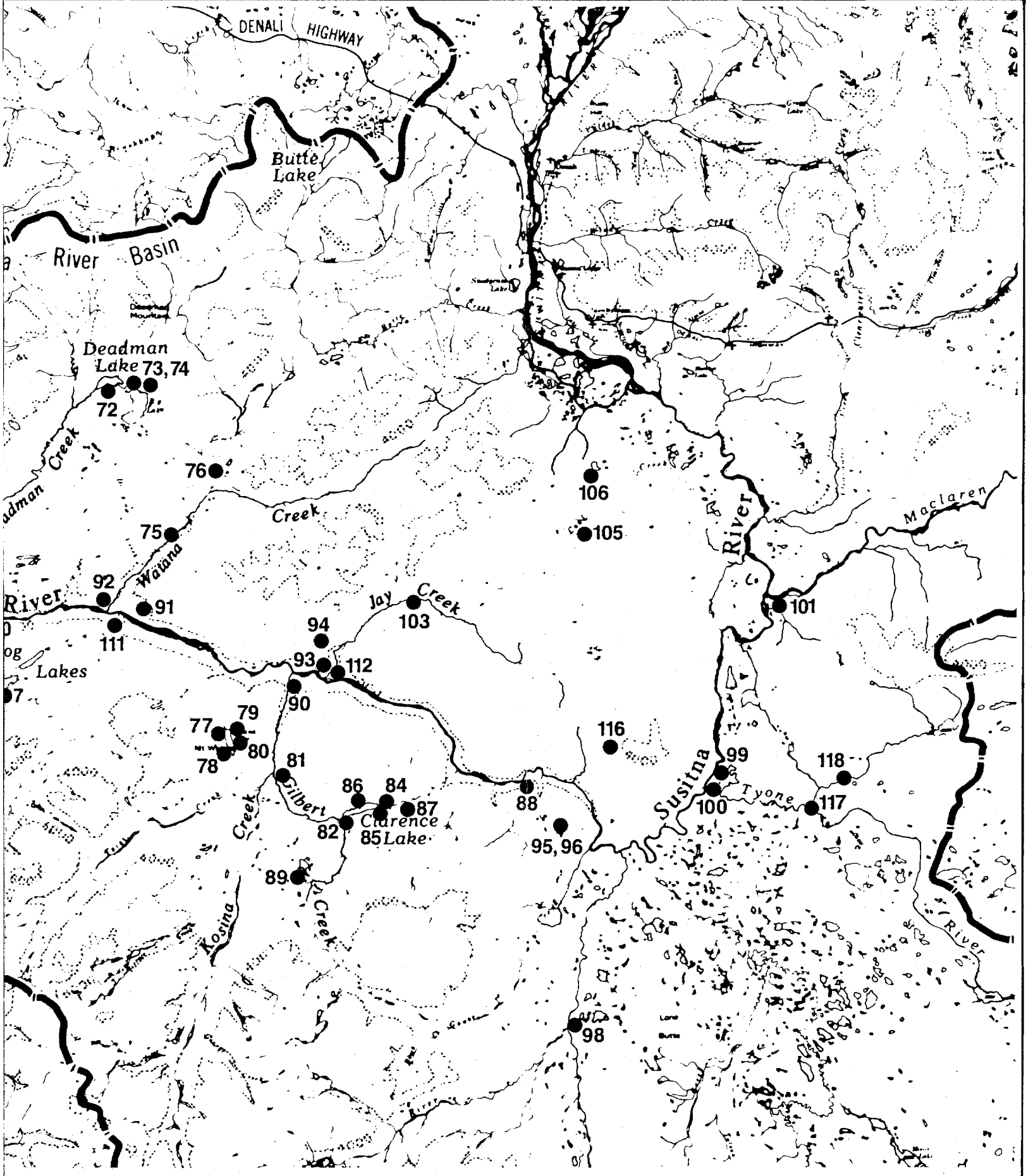

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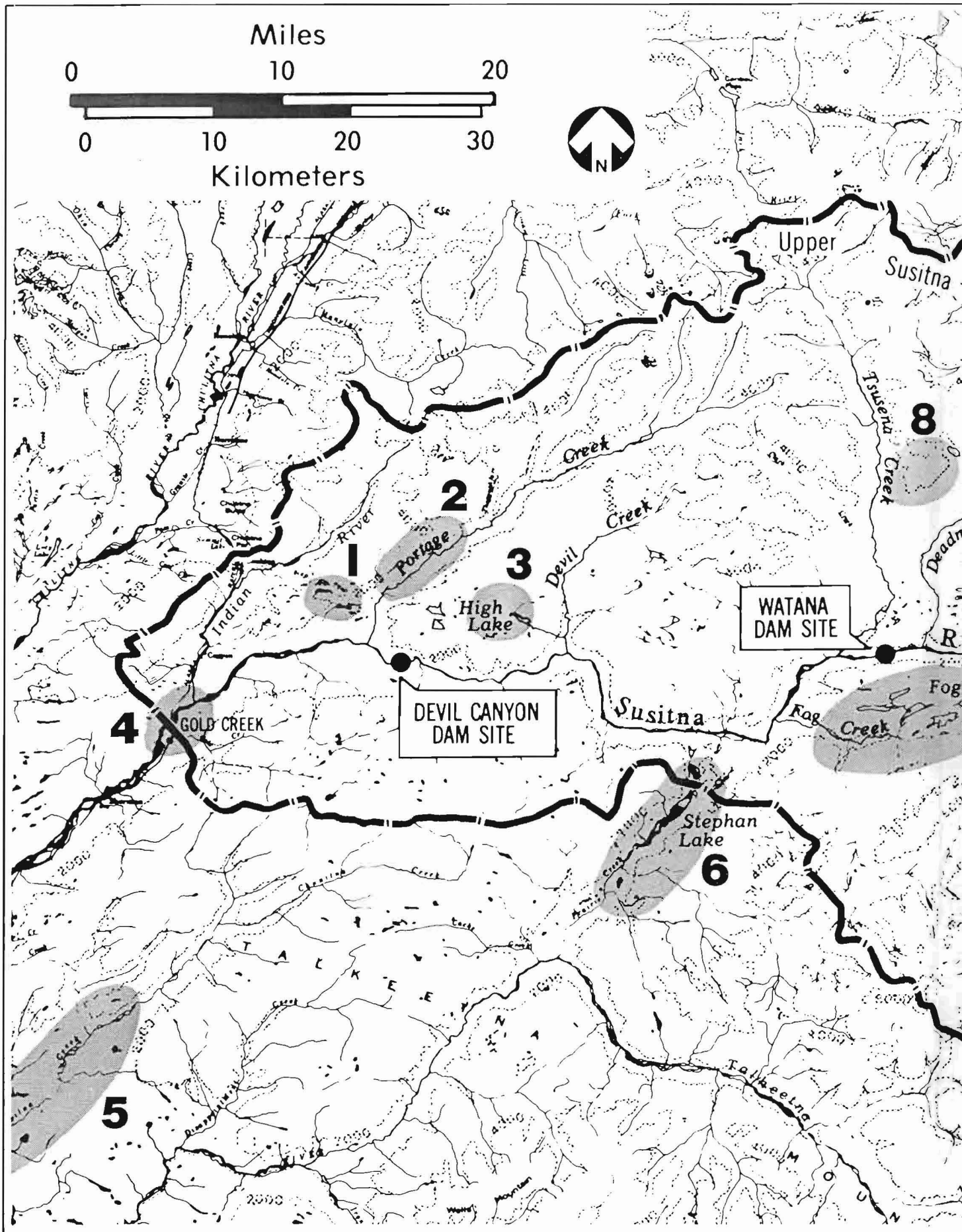
FIGURE 2



LAND
RECREATIC

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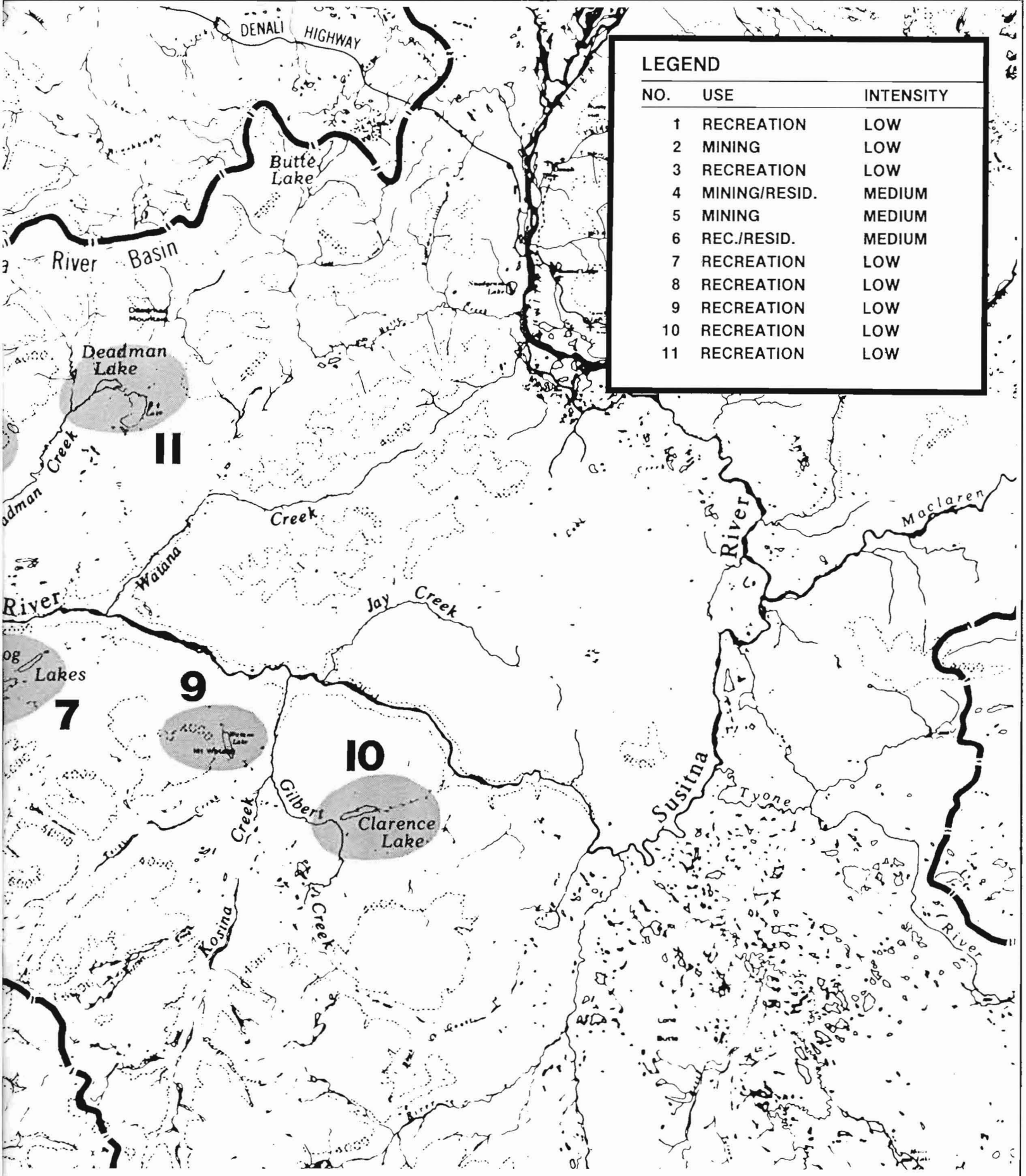
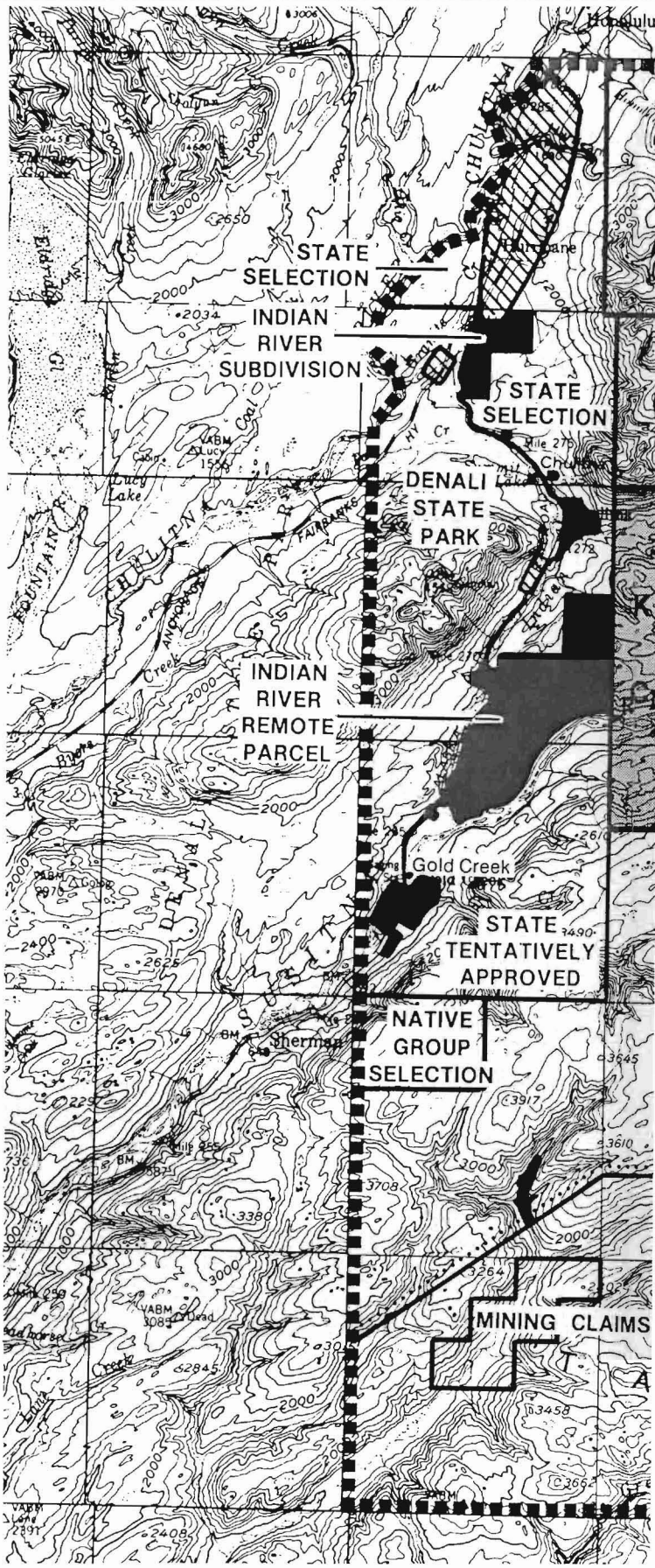


) USE AGGREGATIONS:
ION, MINING, RESIDENTIAL

FIGURE 3



N

0 5 10 Miles

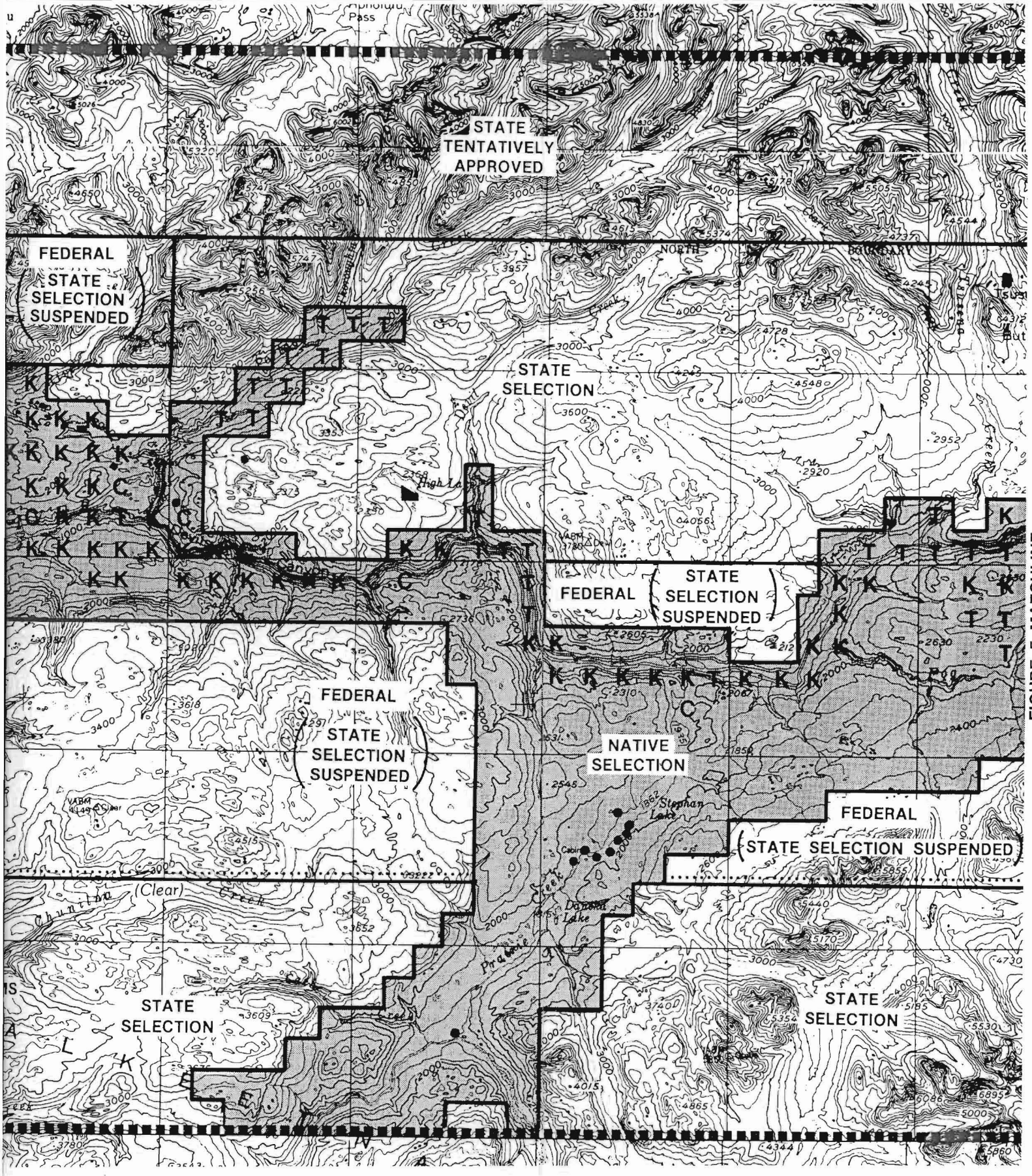
0 5 10 15 Kilometers

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 / STEV

PREPARED BY TES



WARDSHIP, DEVIL CANYON PORTION

FIGURE 4

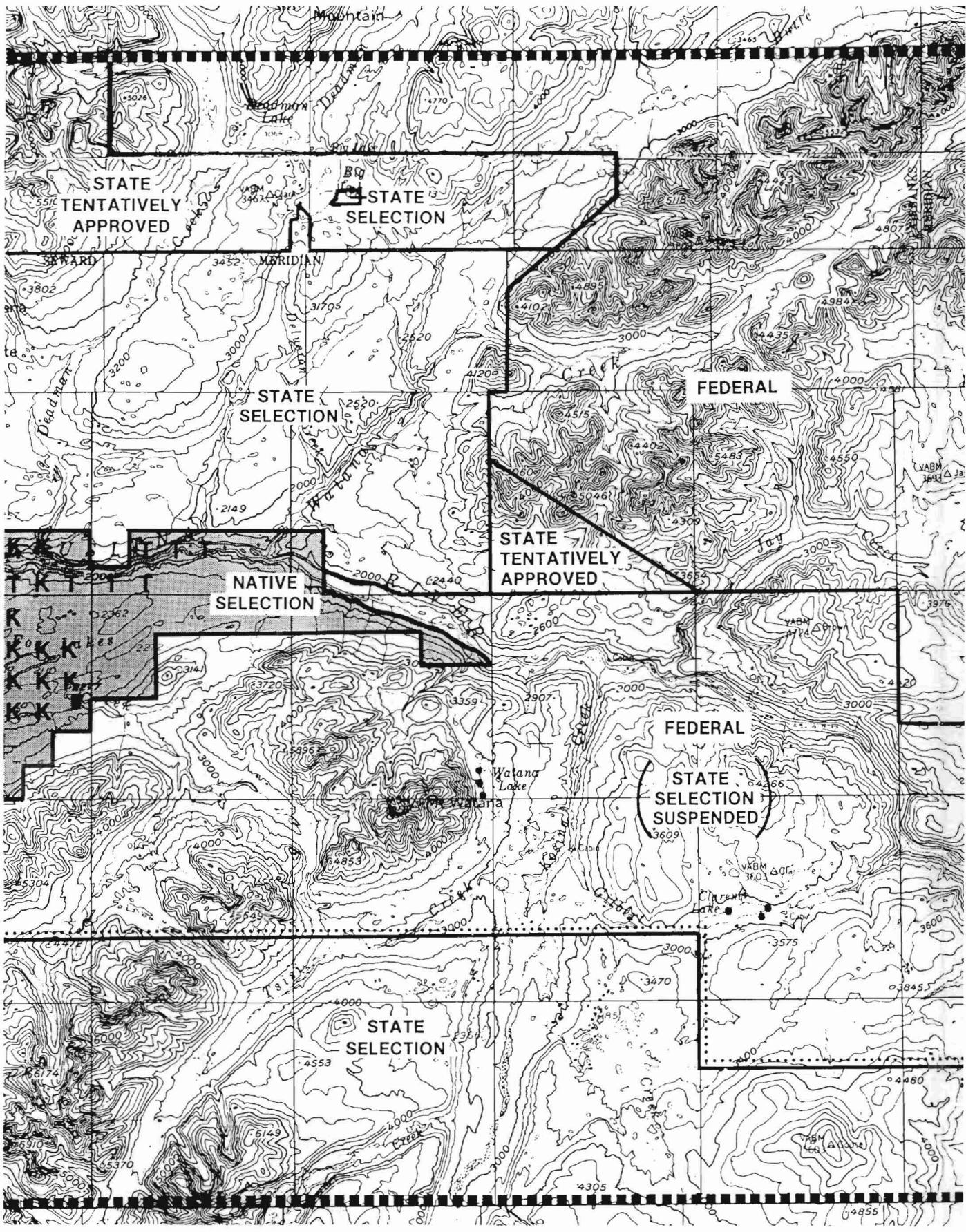
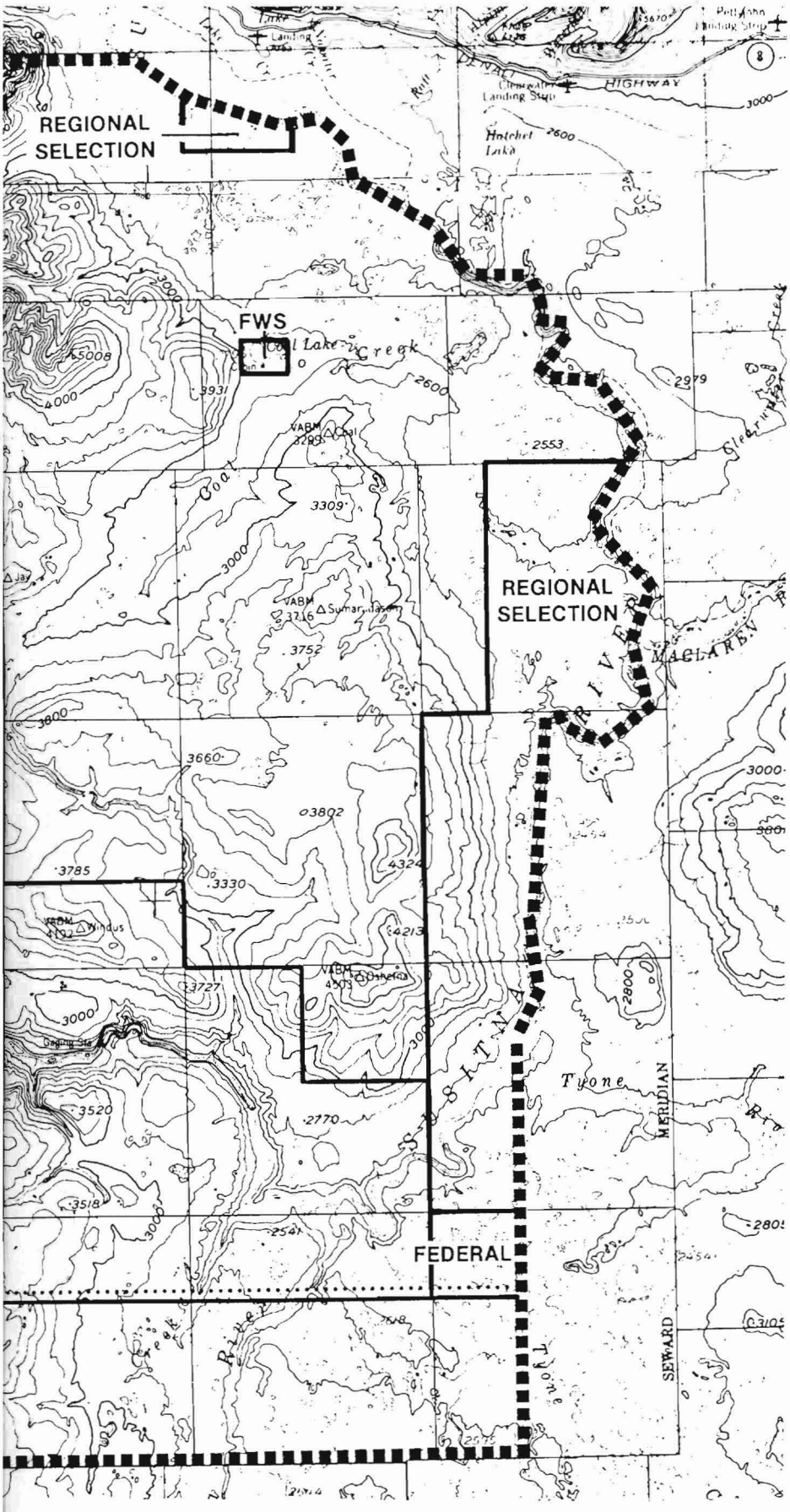


FIGURE 4 MATCHLINE

LAND OWNERSHIP / STI

PREPARED BY TES



N

0 5 10 Miles

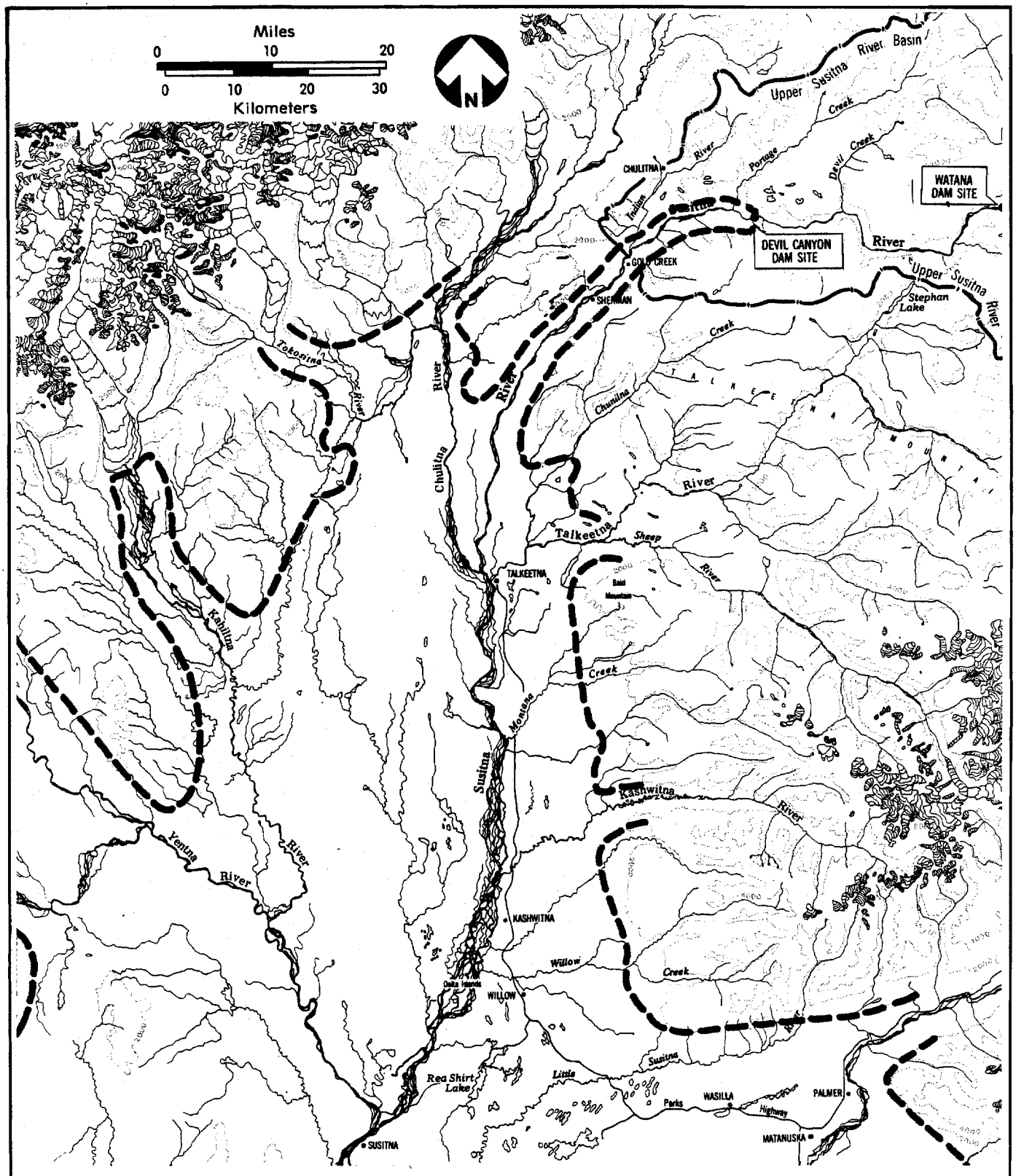
0 5 10 15 Kilometers

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

TEWARDSHIP, WATANA PORTION

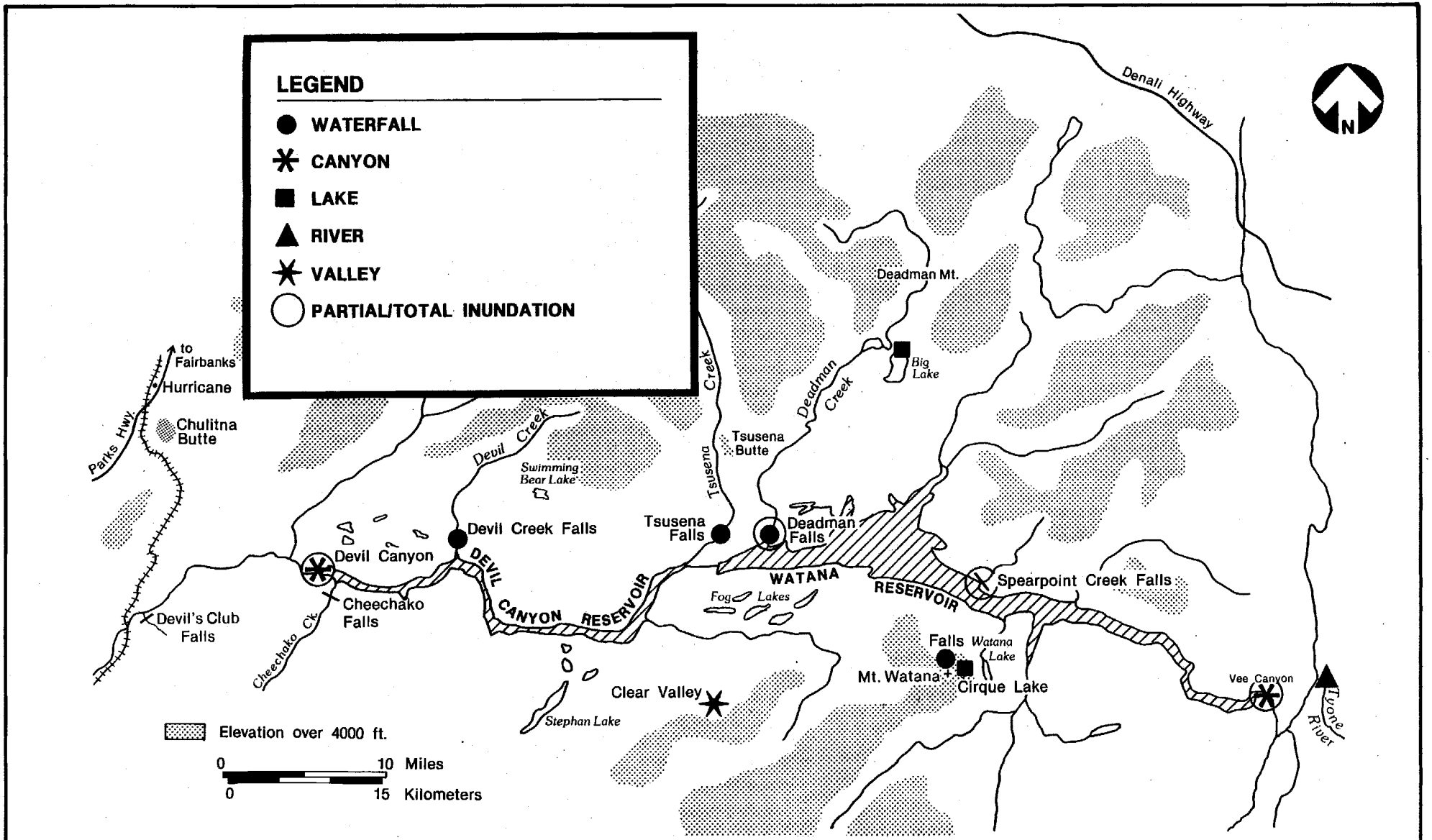
FIGURE 5



BIOPHYSICAL COASTAL BOUNDARY
MATANUSKA - SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM

PREPARED BY TES

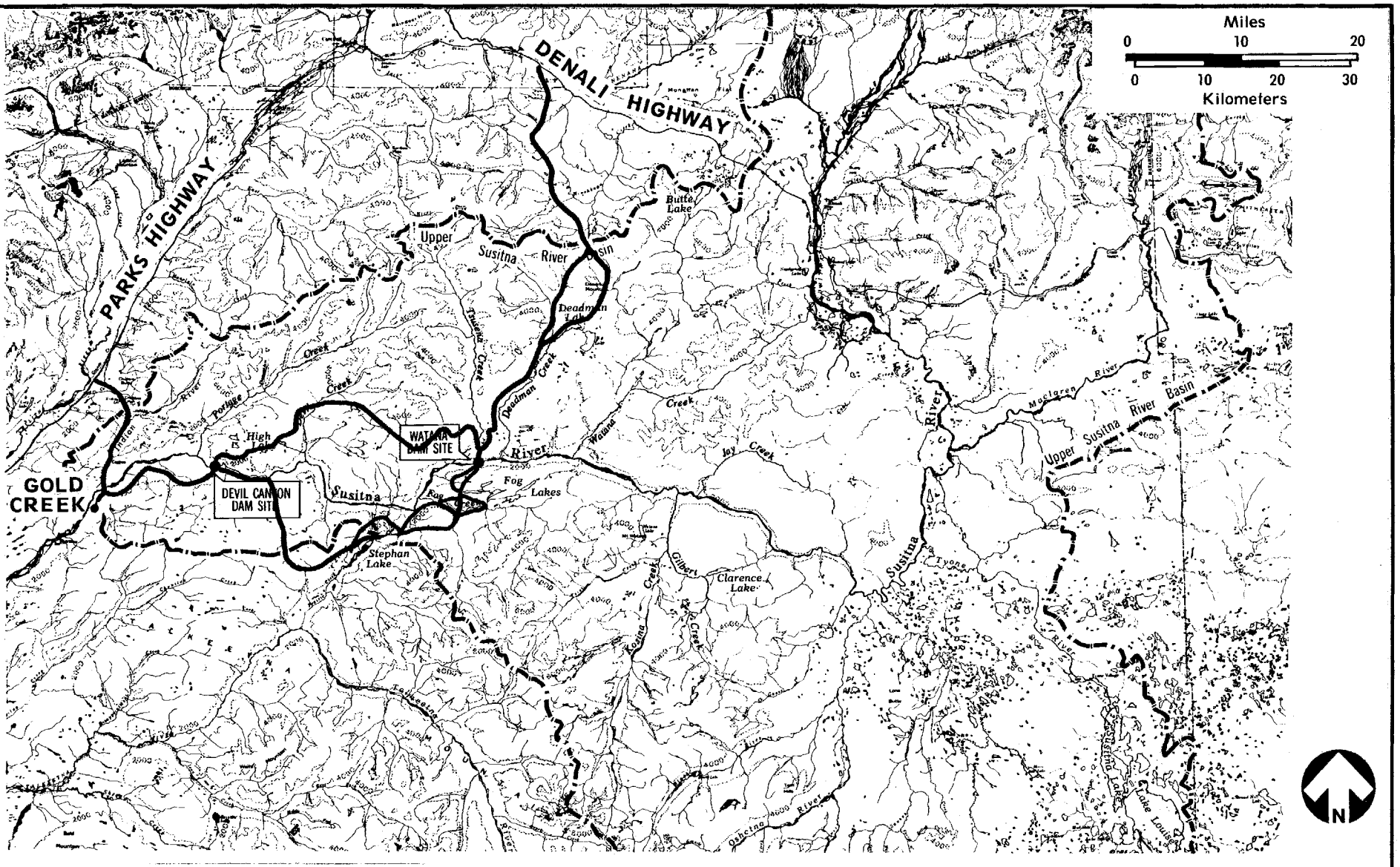
FIGURE 6



EXCEPTIONAL NATURAL FEATURES (SYMBOLS)
AND OTHER IMPORTANT NATURAL FEATURES

PREPARED BY TES / UNIVERSITY OF ALASKA

FIGURE 7

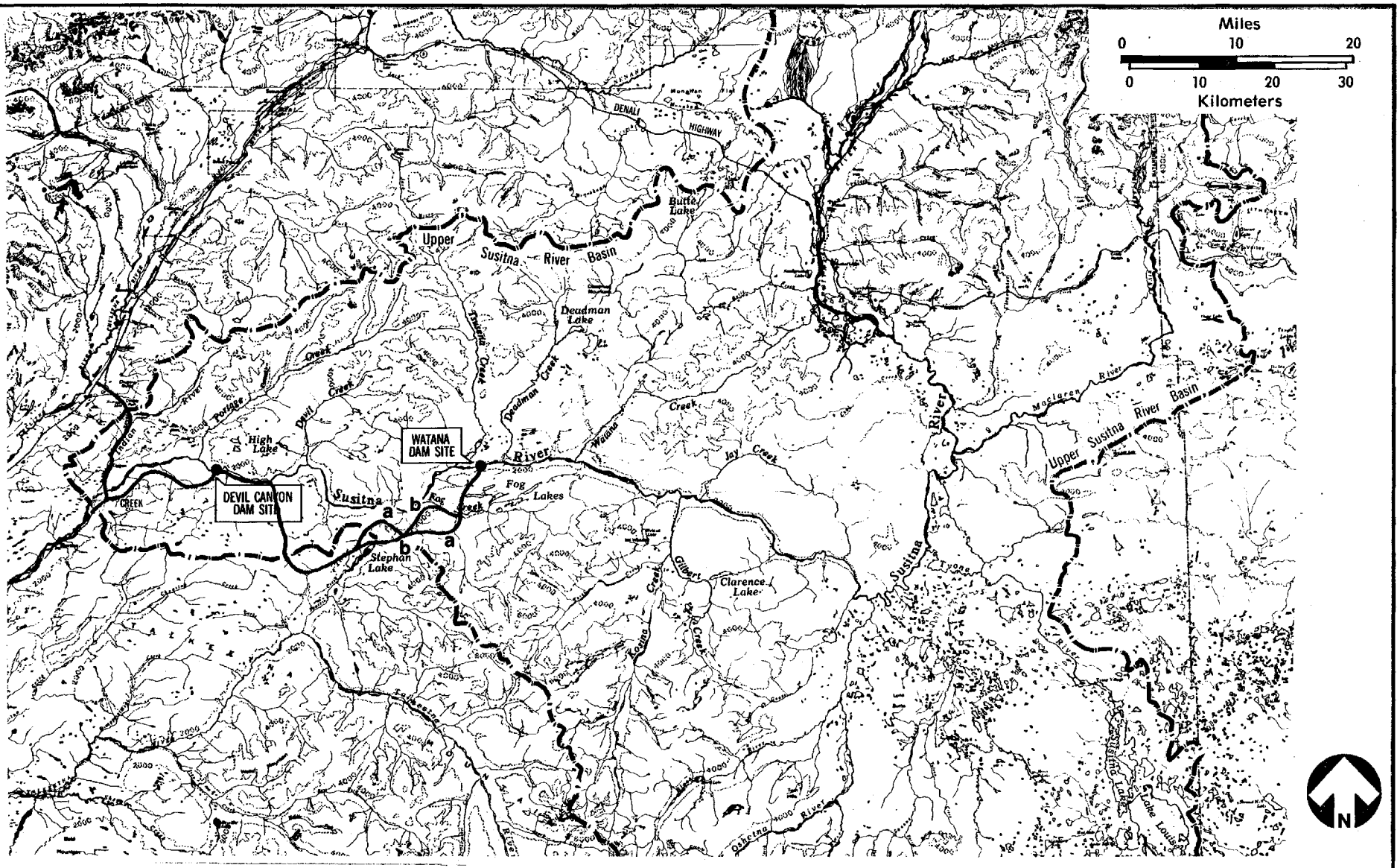


GENERAL ALIGNMENTS

ACCESS CORRIDOR SEGMENTS

PREPARED BY TES

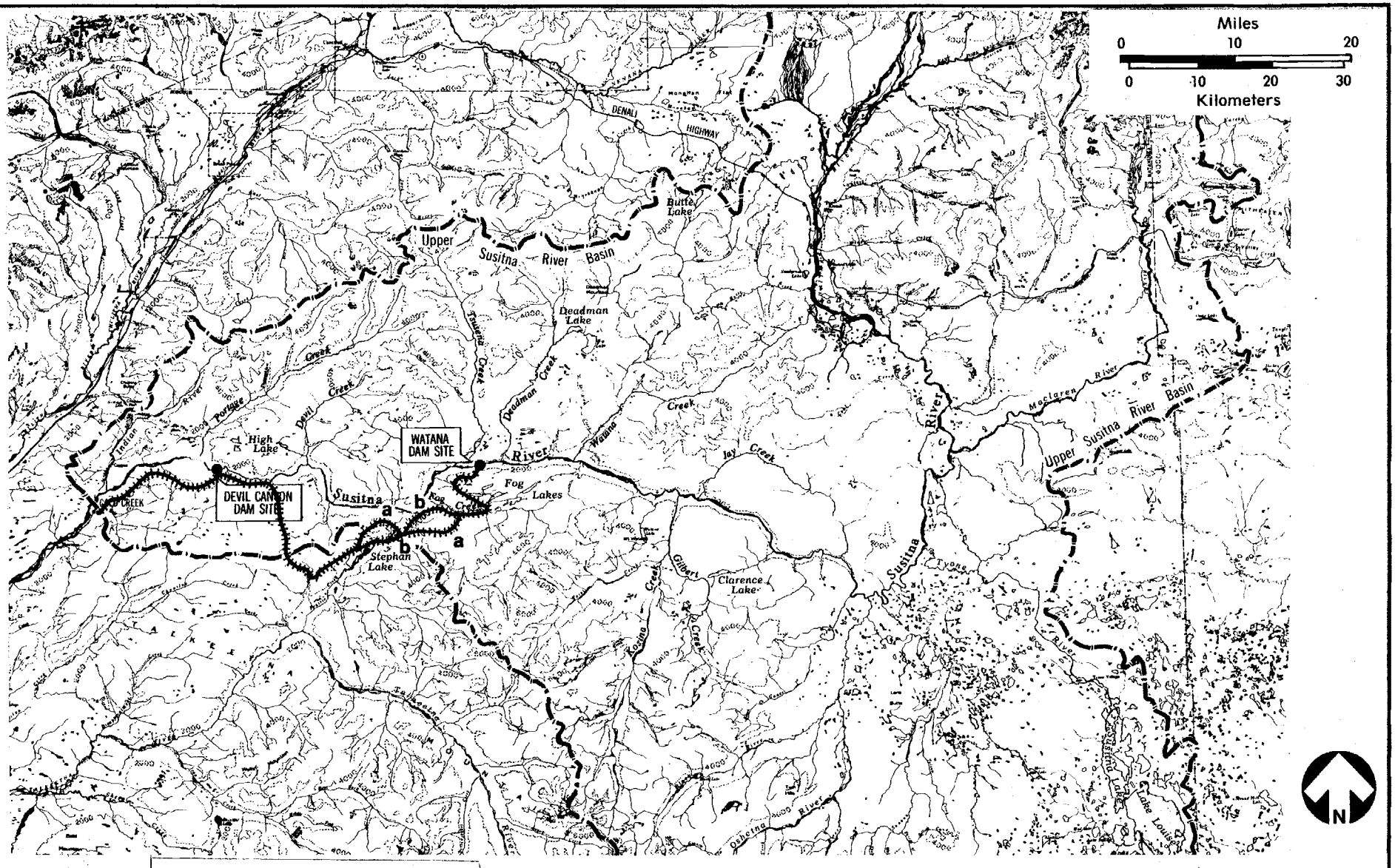
FIGURE 8



ACCESS PLAN 1

PREPARED BY TES

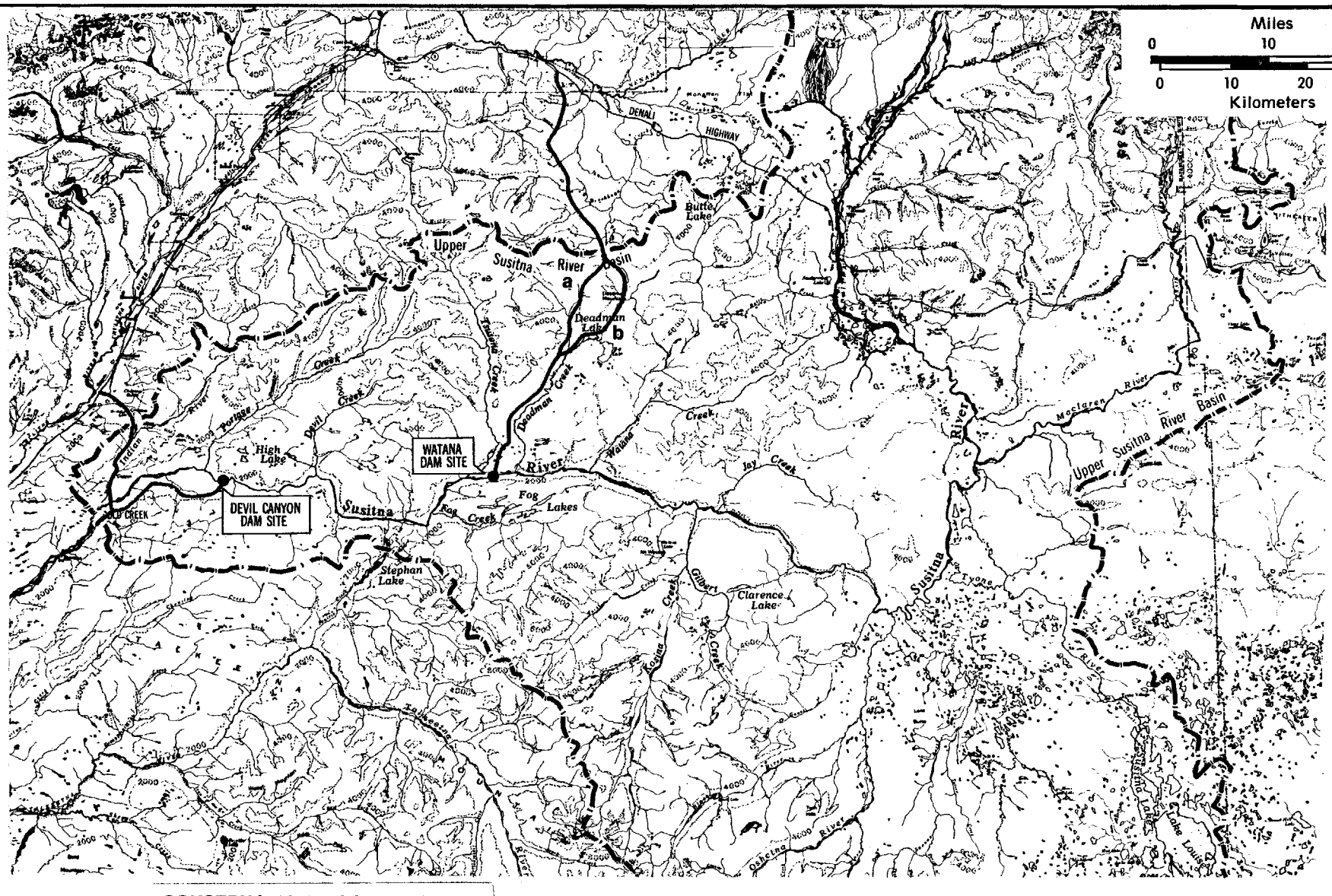
FIGURE 9



ACCESS PLAN 2

PREPARED BY TES

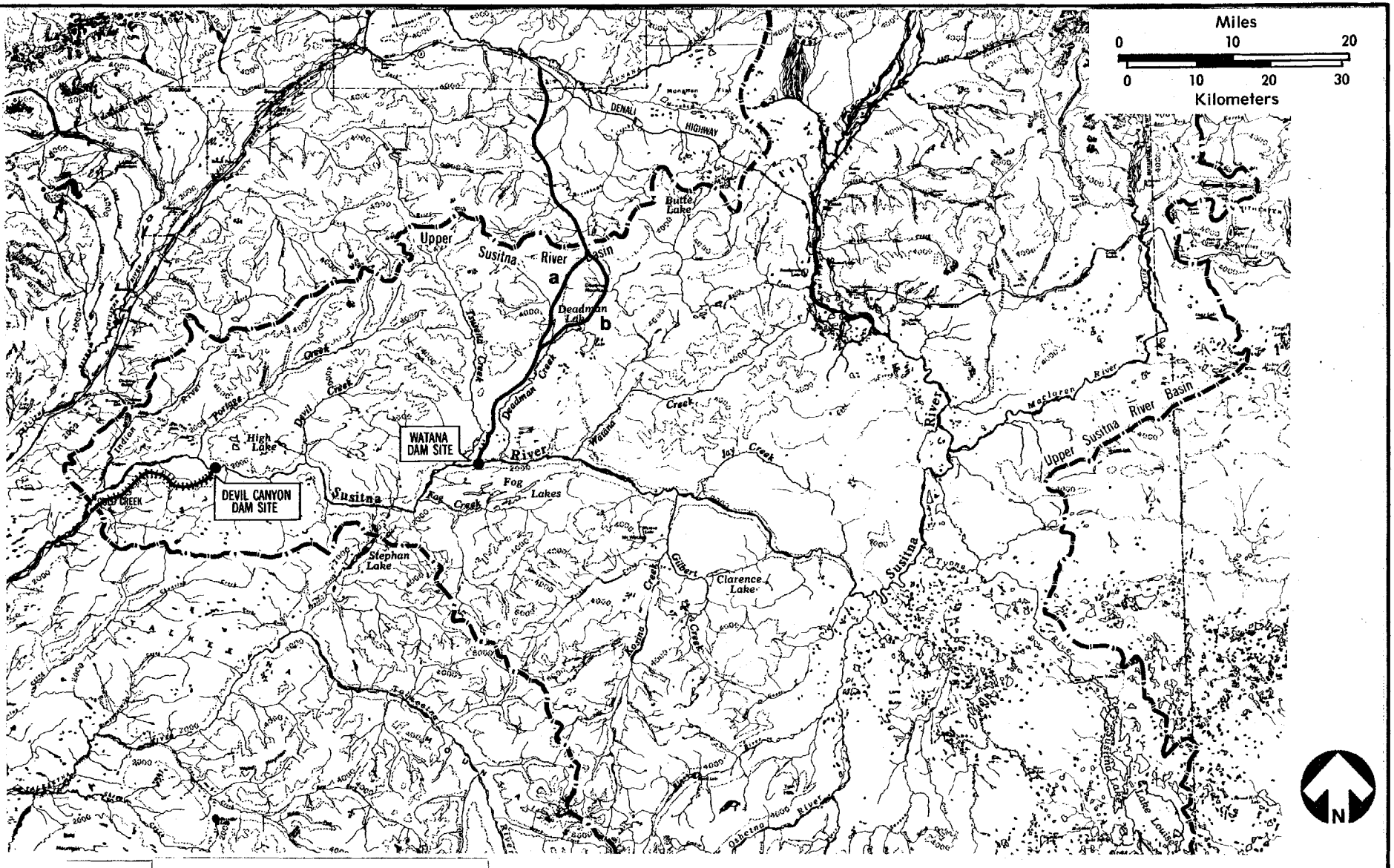
FIGURE 10



ACCESS PLAN 3

PREPARED BY TES

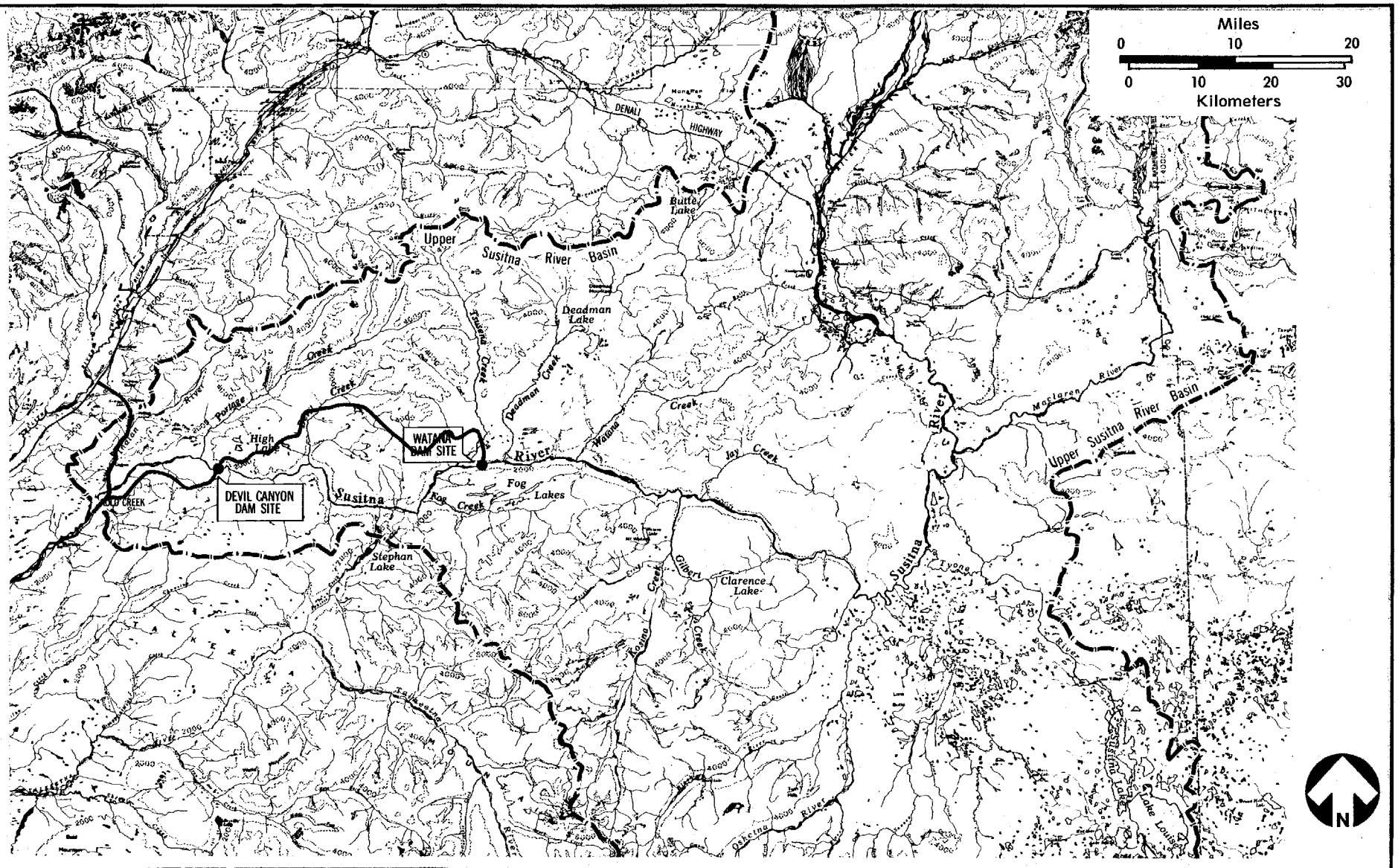
FIGURE 11



ACCESS PLAN 4

PREPARED BY TES

FIGURE 12

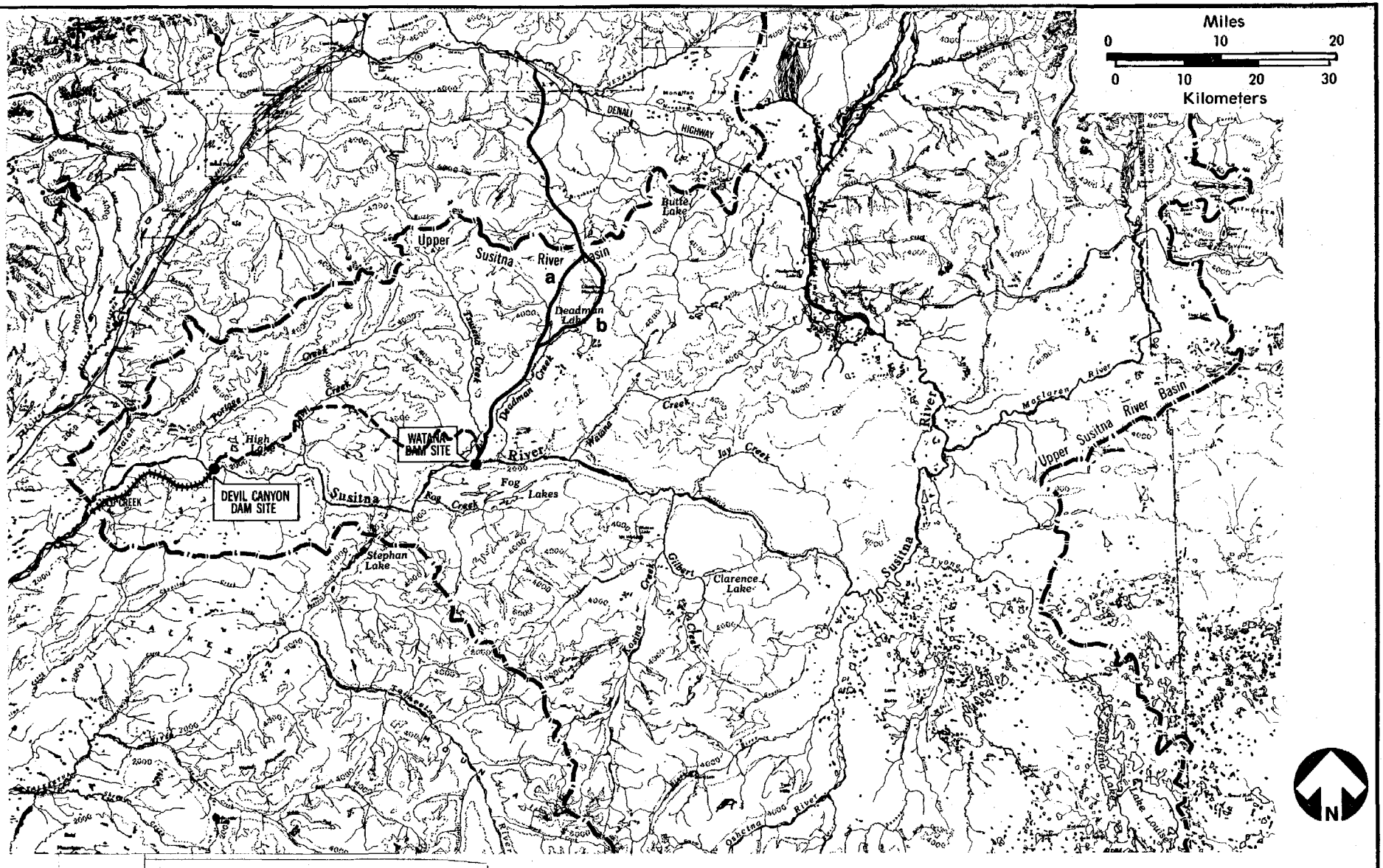


CONSTRUCTION ROAD

ACCESS PLAN 5

PREPARED BY TES

FIGURE 13



CONSTRUCTION ROAD

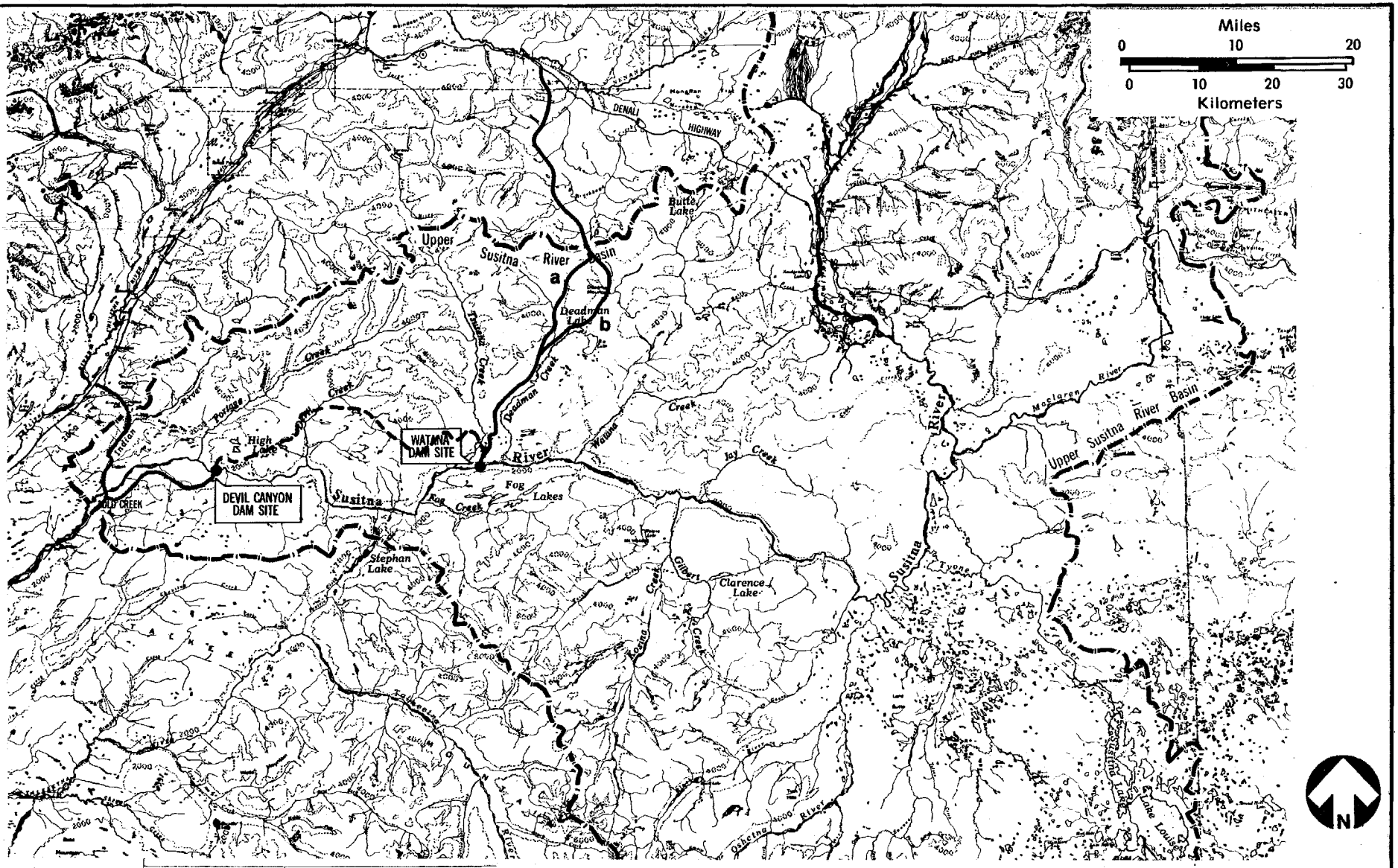
RAILROAD

SERVICE ROAD

ACCESS PLAN 6

PREPARED BY TES

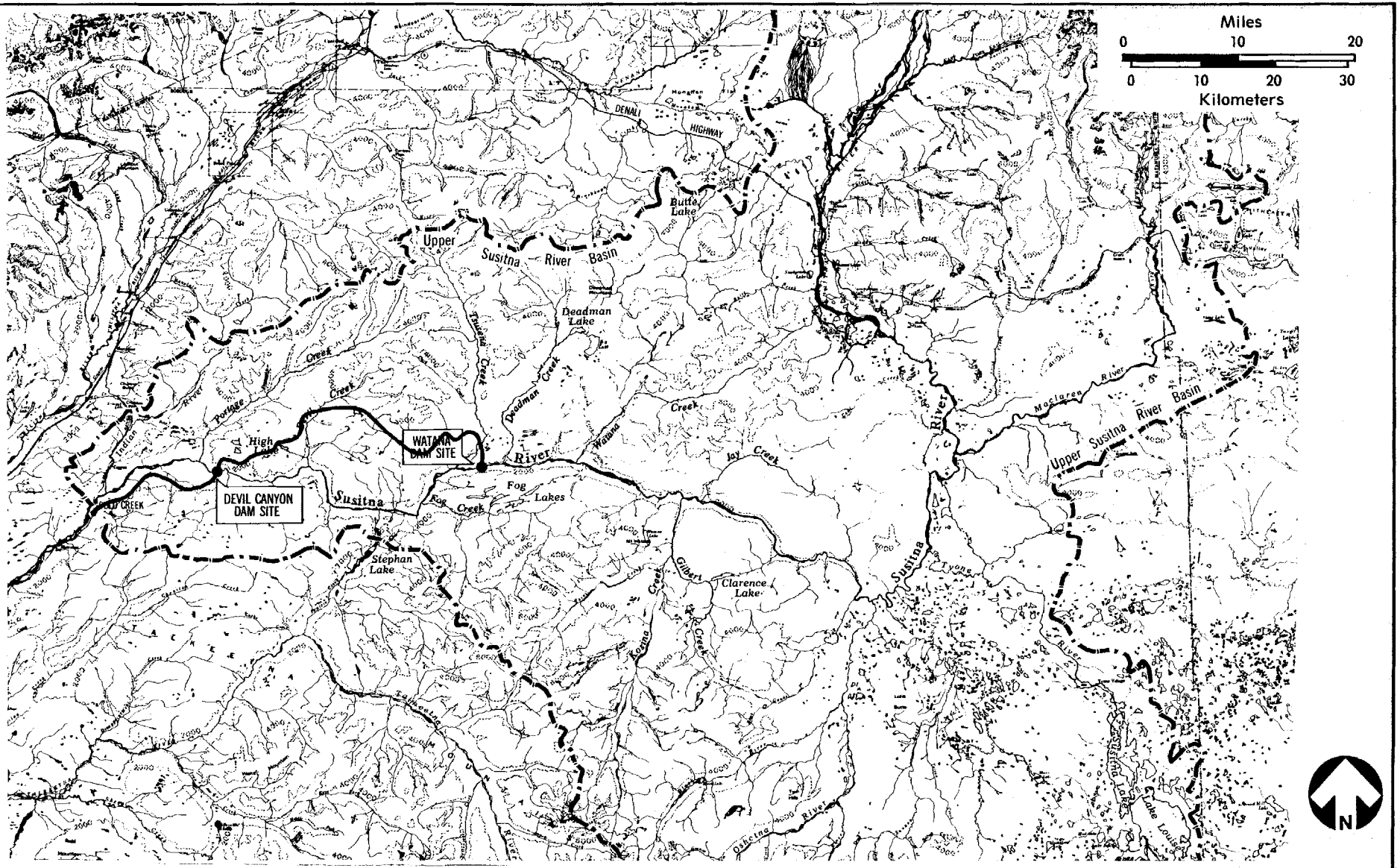
FIGURE 14



ACCESS PLAN 7

PREPARED BY TES

FIGURE 15

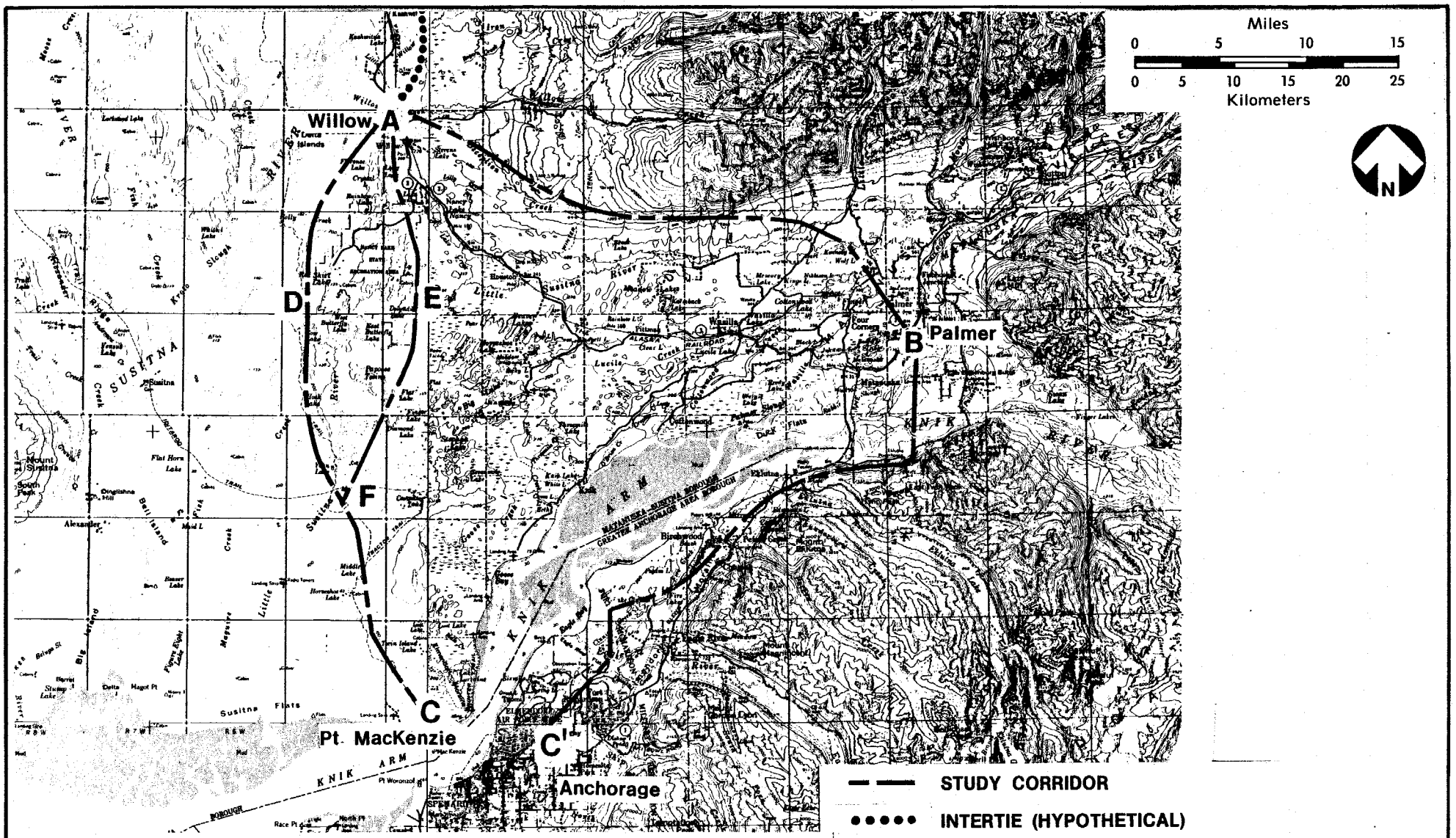


CONSTRUCTION ROAD

ACCESS PLAN 8

PREPARED BY TES

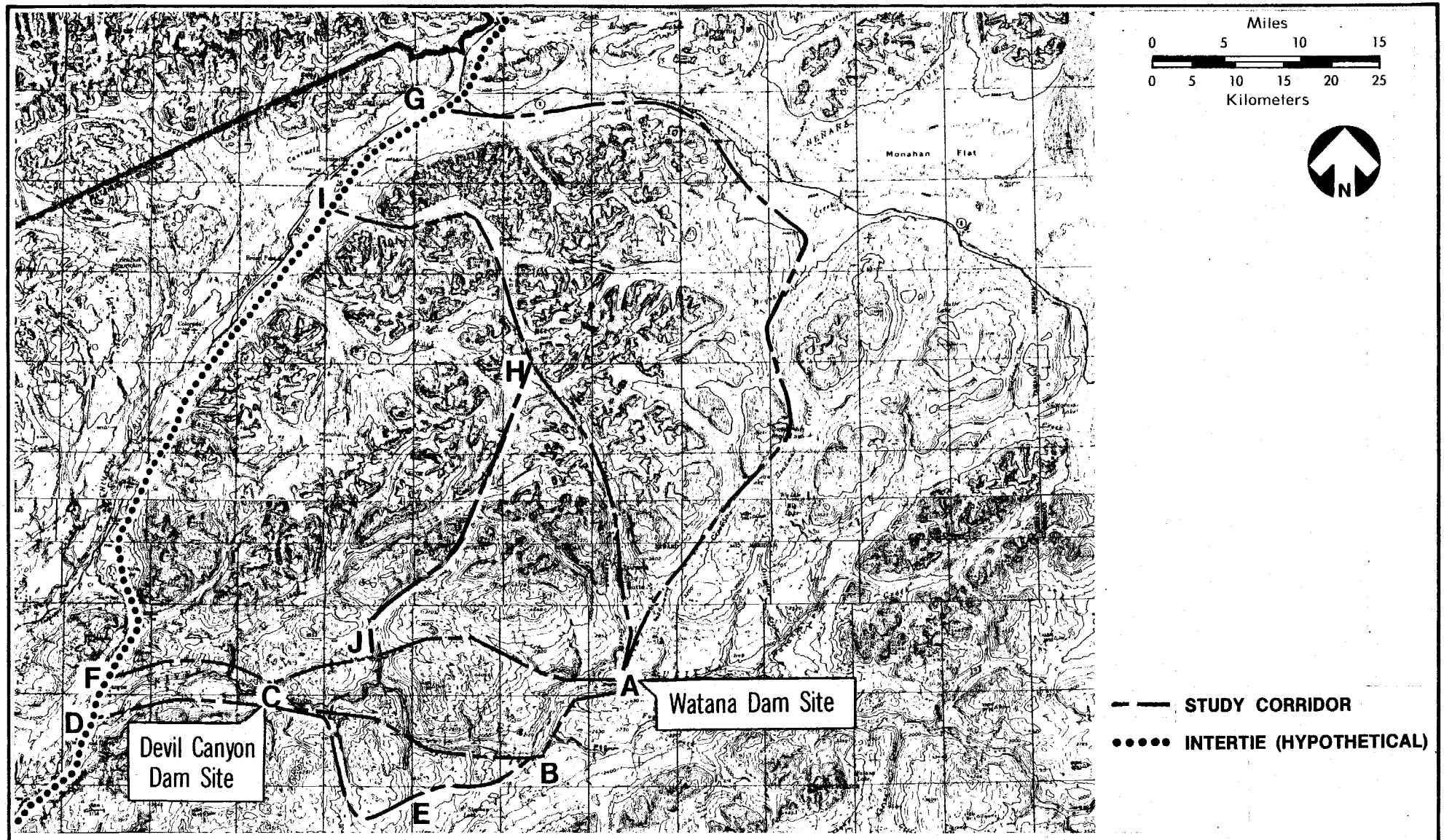
FIGURE 16



TRANSMISSION CORRIDORS EVALUATED
SOUTHERN STUDY AREA

PREPARED BY TES

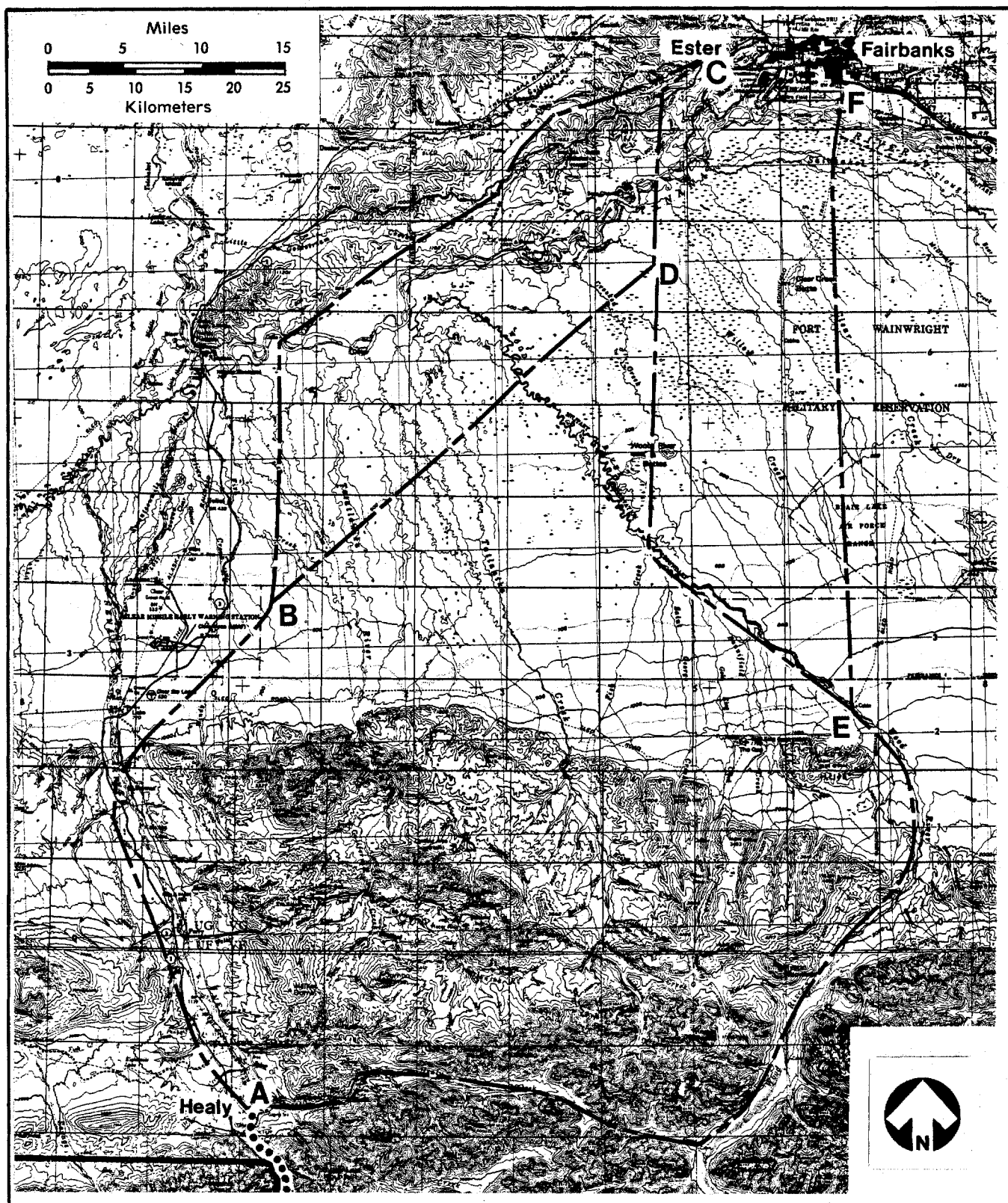
FIGURE 17



TRANSMISSION CORRIDORS EVALUATED
CENTRAL STUDY AREA

PREPARED BY TES

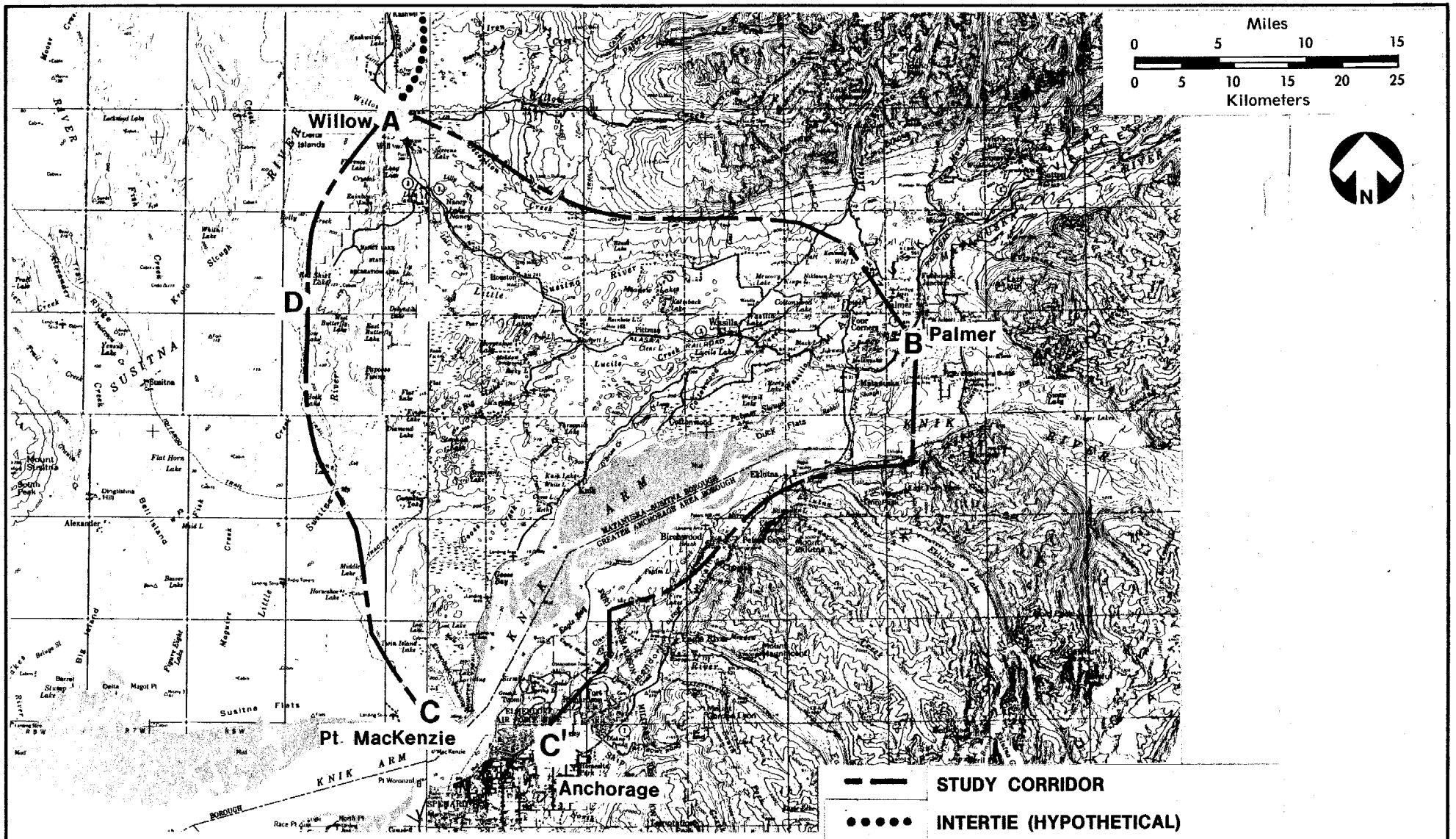
FIGURE 18



TRANSMISSION CORRIDORS EVALUATED
NORTHERN STUDY AREA

PREPARED BY TES

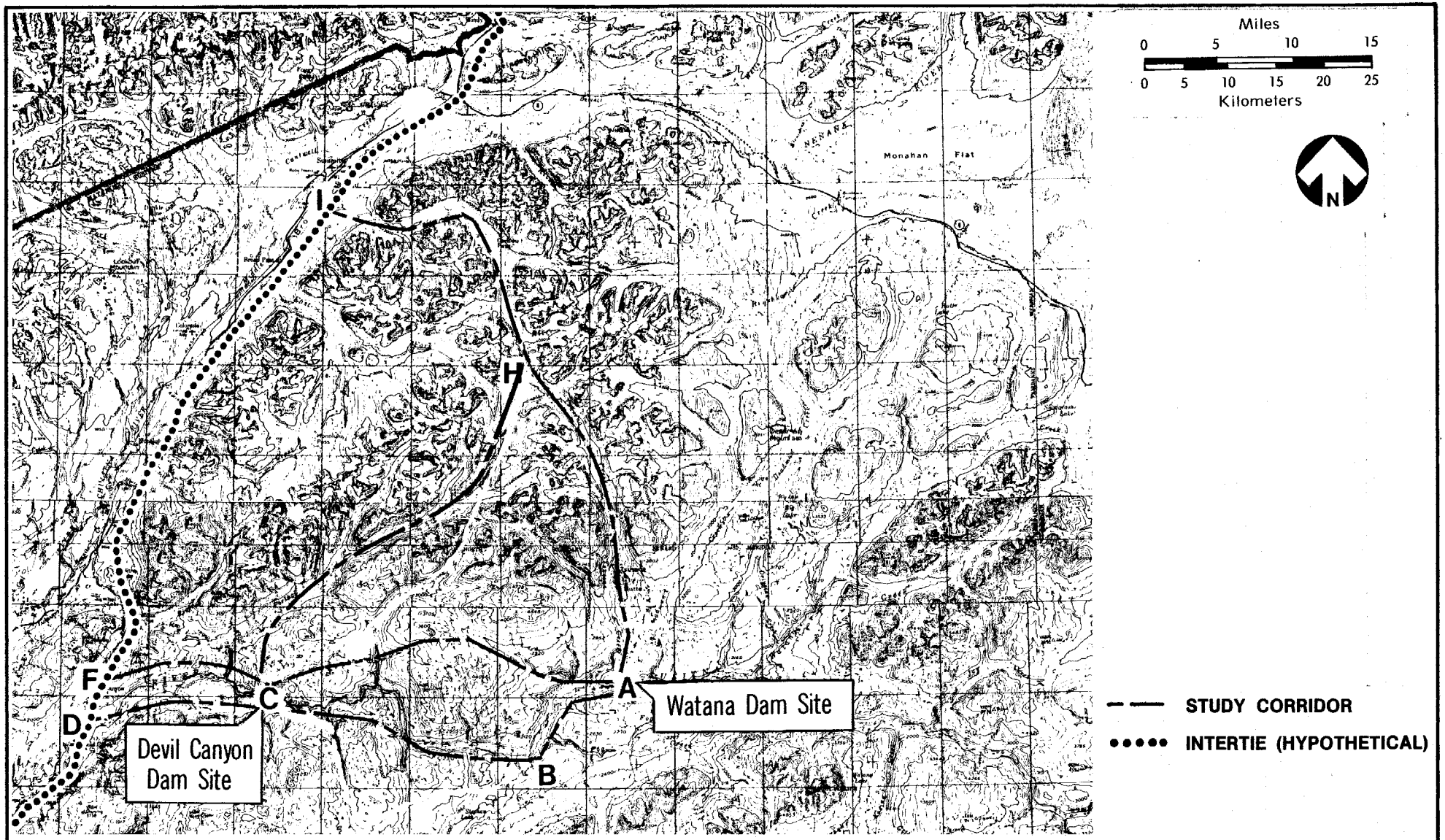
FIGURE 19



TRANSMISSION CORRIDORS
SURVIVING PRELIMINARY SCREENING
SOUTHERN STUDY AREA

PREPARED BY TES

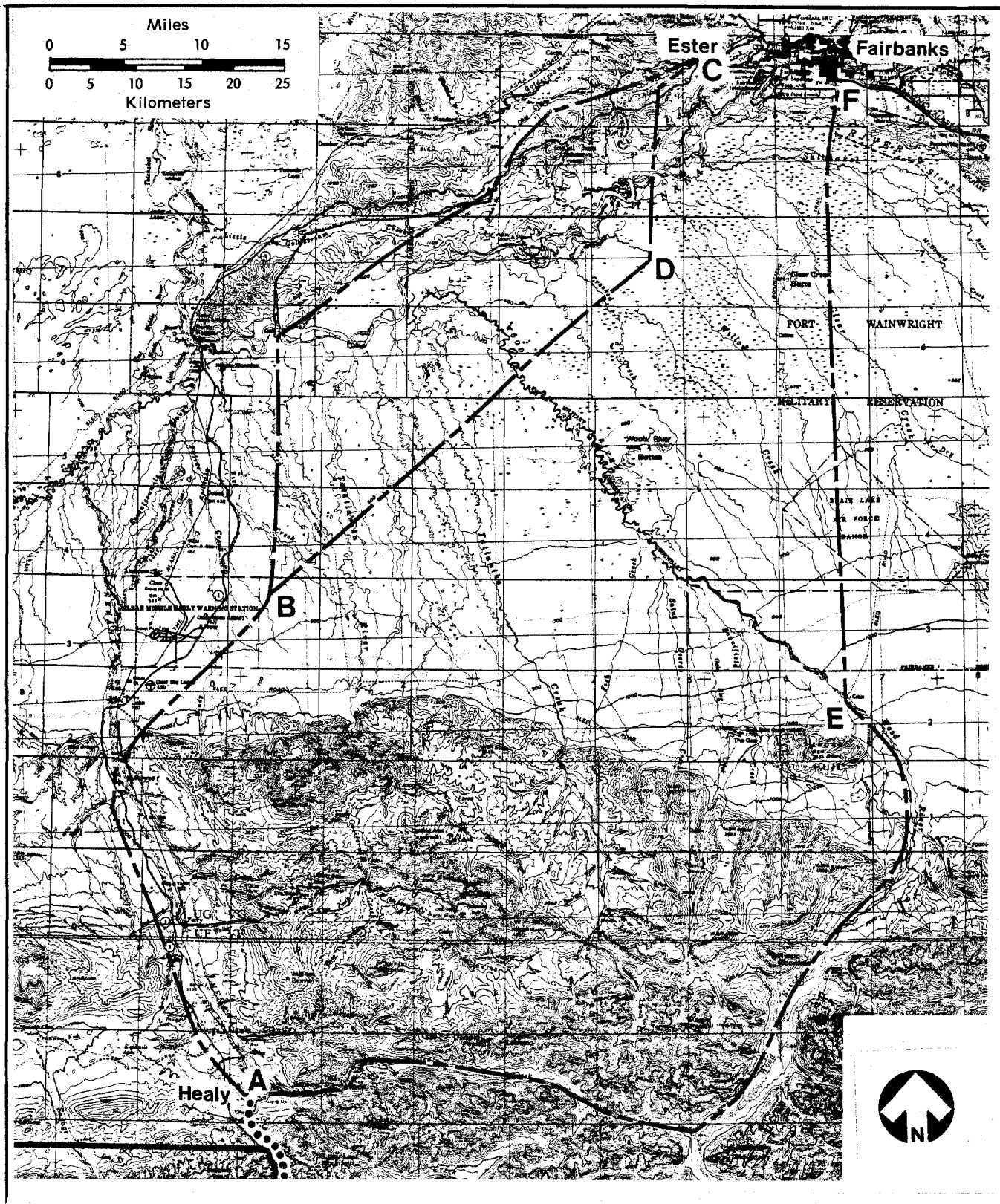
FIGURE 20



TRANSMISSION CORRIDORS
SURVIVING PRELIMINARY SCREENING
CENTRAL STUDY AREA

PREPARED BY TES

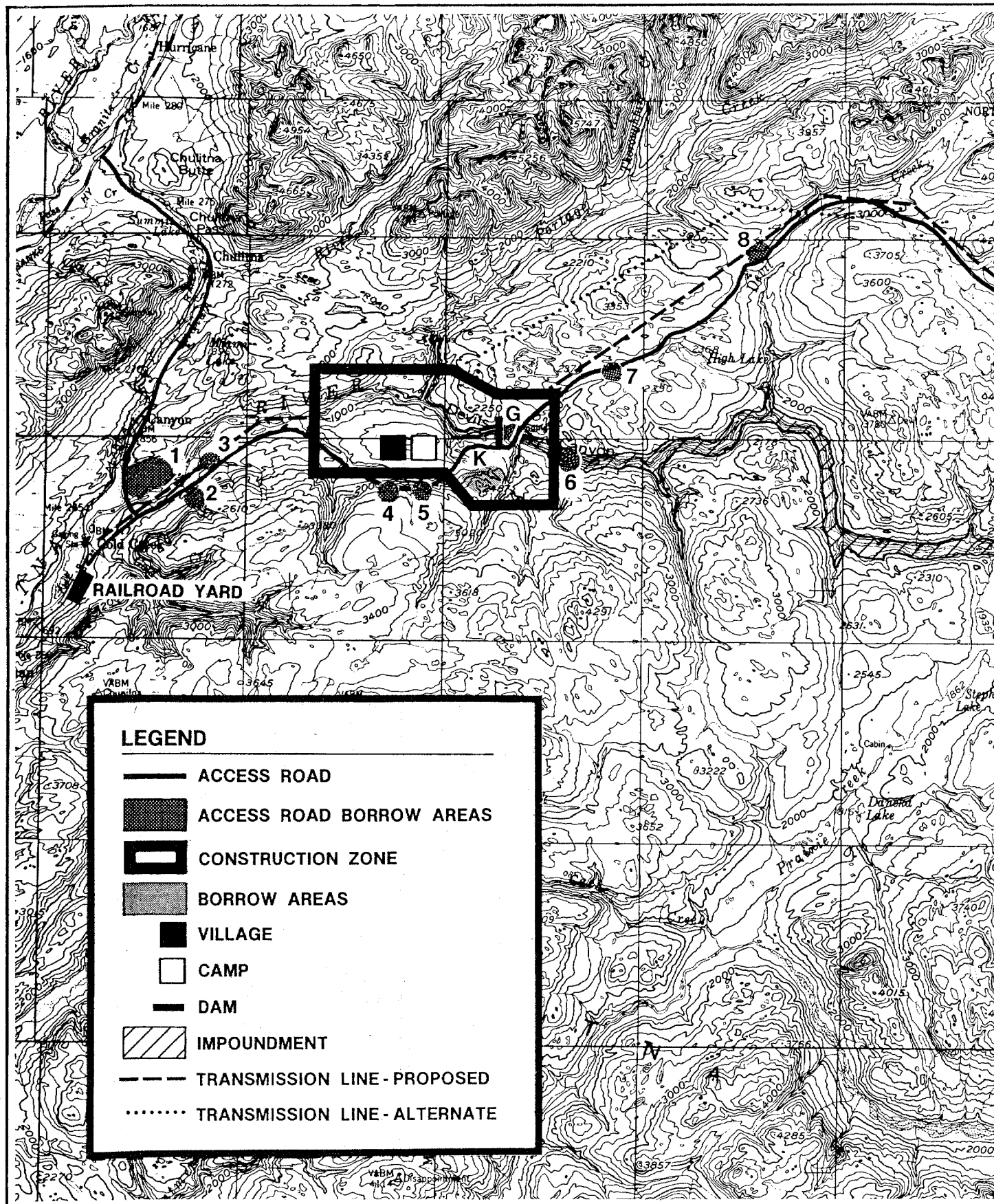
FIGURE 21



TRANSMISSION CORRIDORS
SURVIVING PRELIMINARY SCREENING
NORTHERN STUDY AREA

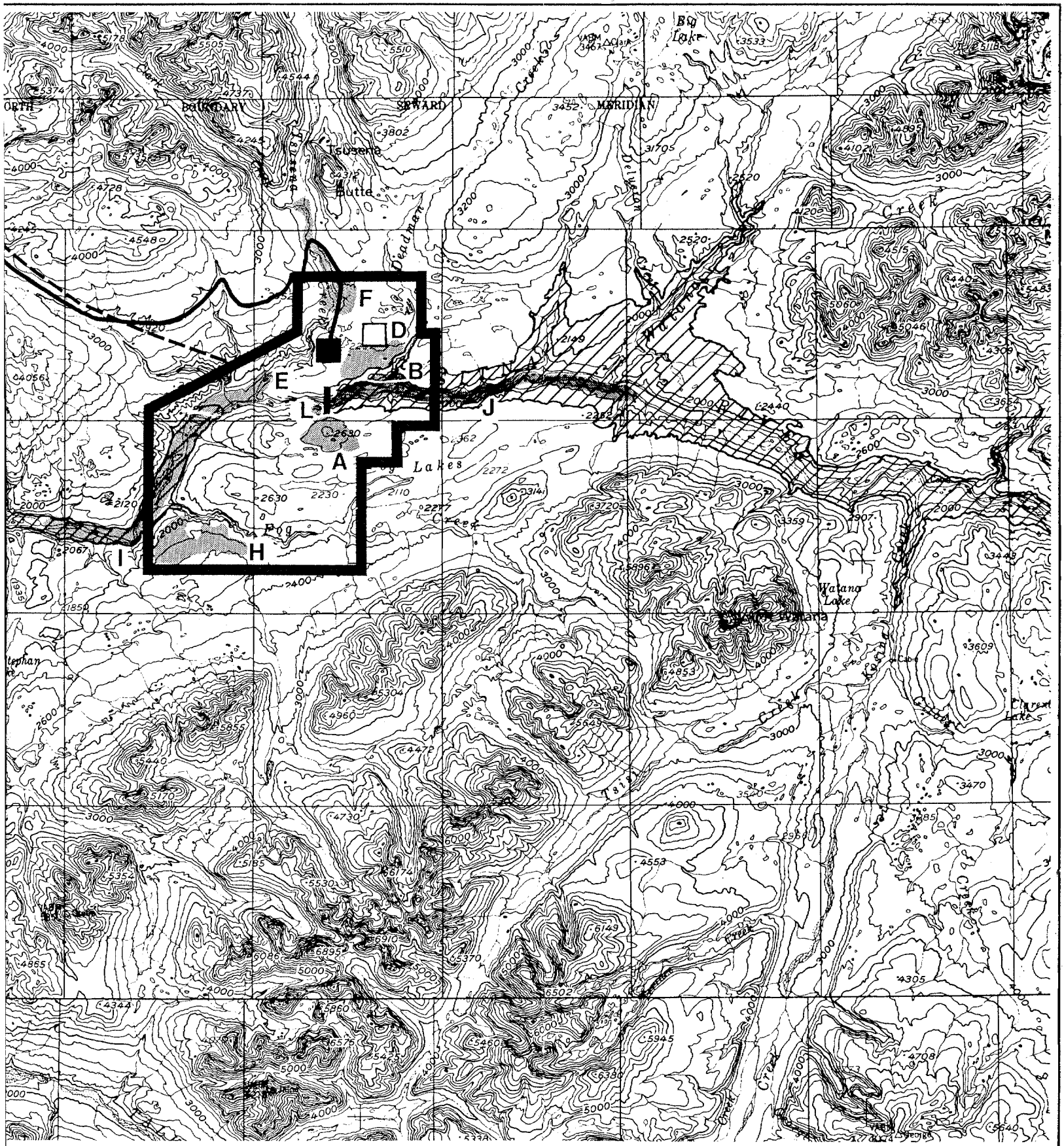
PREPARED BY TES

FIGURE 22



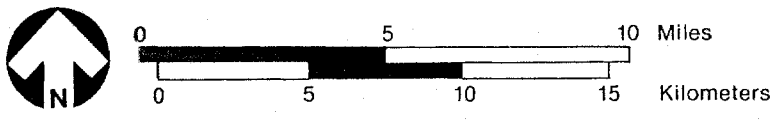
PROJ

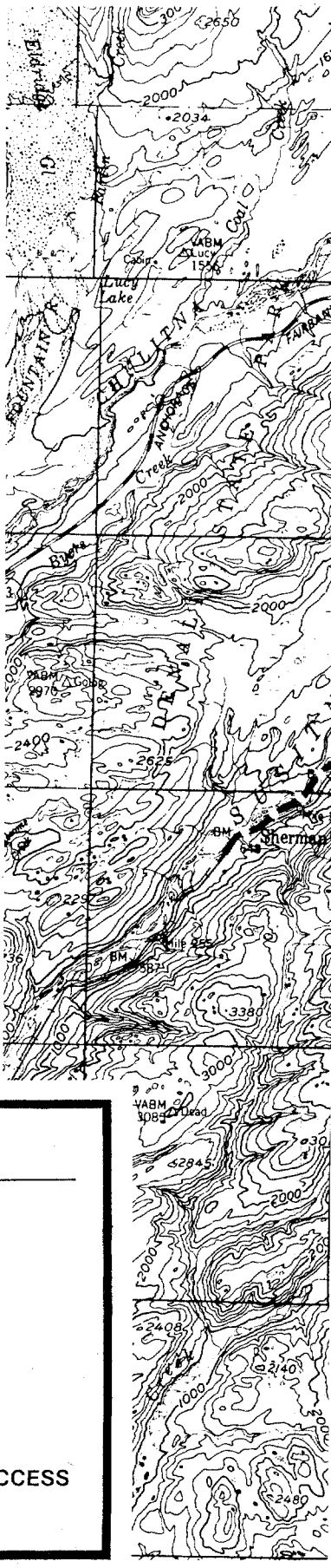
PREPARED BY TES



)JECT FACILITIES

FIGURE 23





LEGEND

- EXISTING STRUCTURES INUNDATED / DISPLACED
- DISPLACEMENT OF RIVERINE BOATING/RAFTING: REPLACEMENT BY RESERVOIR BOATING
- STREAMS LIKELY TO HAVE INCREASED FISHING ACTIVITY
- ZONE OF POTENTIAL INCREASED MOOSE HUNTING
- ZONE OF POTENTIAL INCREASED CARIBOU / BEAR HUNTING
- ACCESS ROAD
- ZONES OF INCREASED USE DUE TO PARTIAL OR COMPLETE ACCESS

INDUCED LAND USE AC

PREPARED BY TES

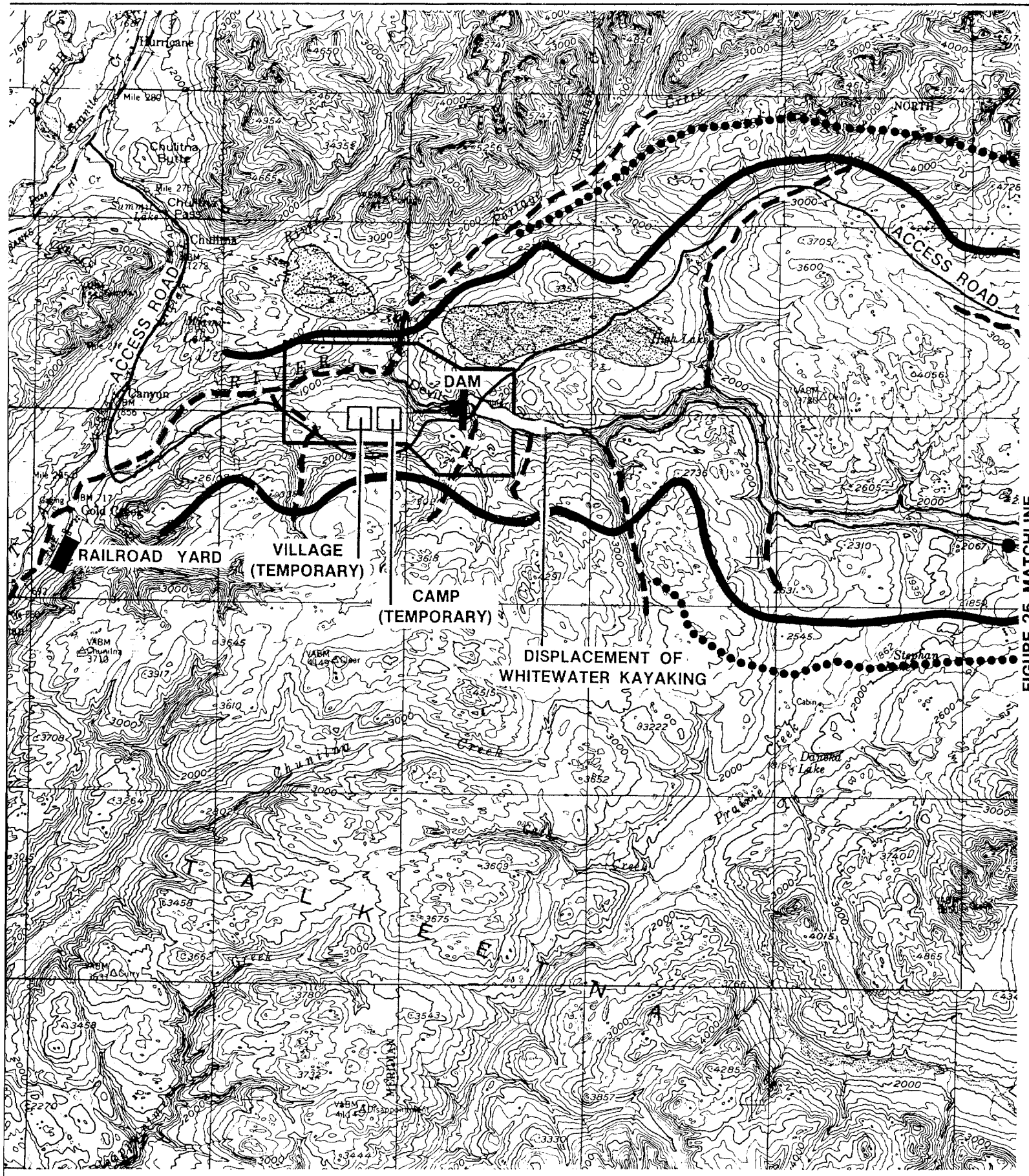


FIGURE 25 MATCHLINE

ACTIVITIES, DEVIL CANYON PORTION

FIGURE 24

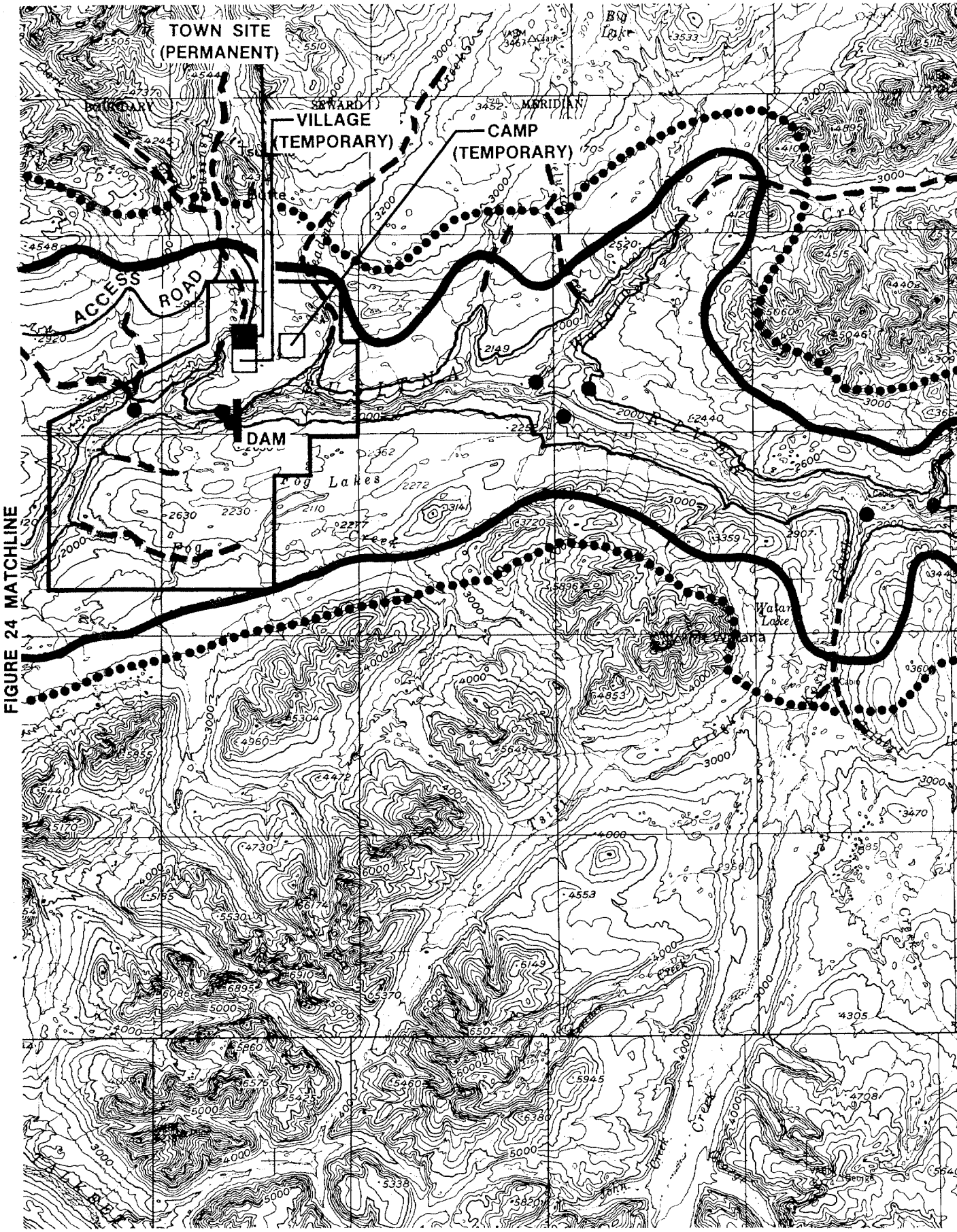
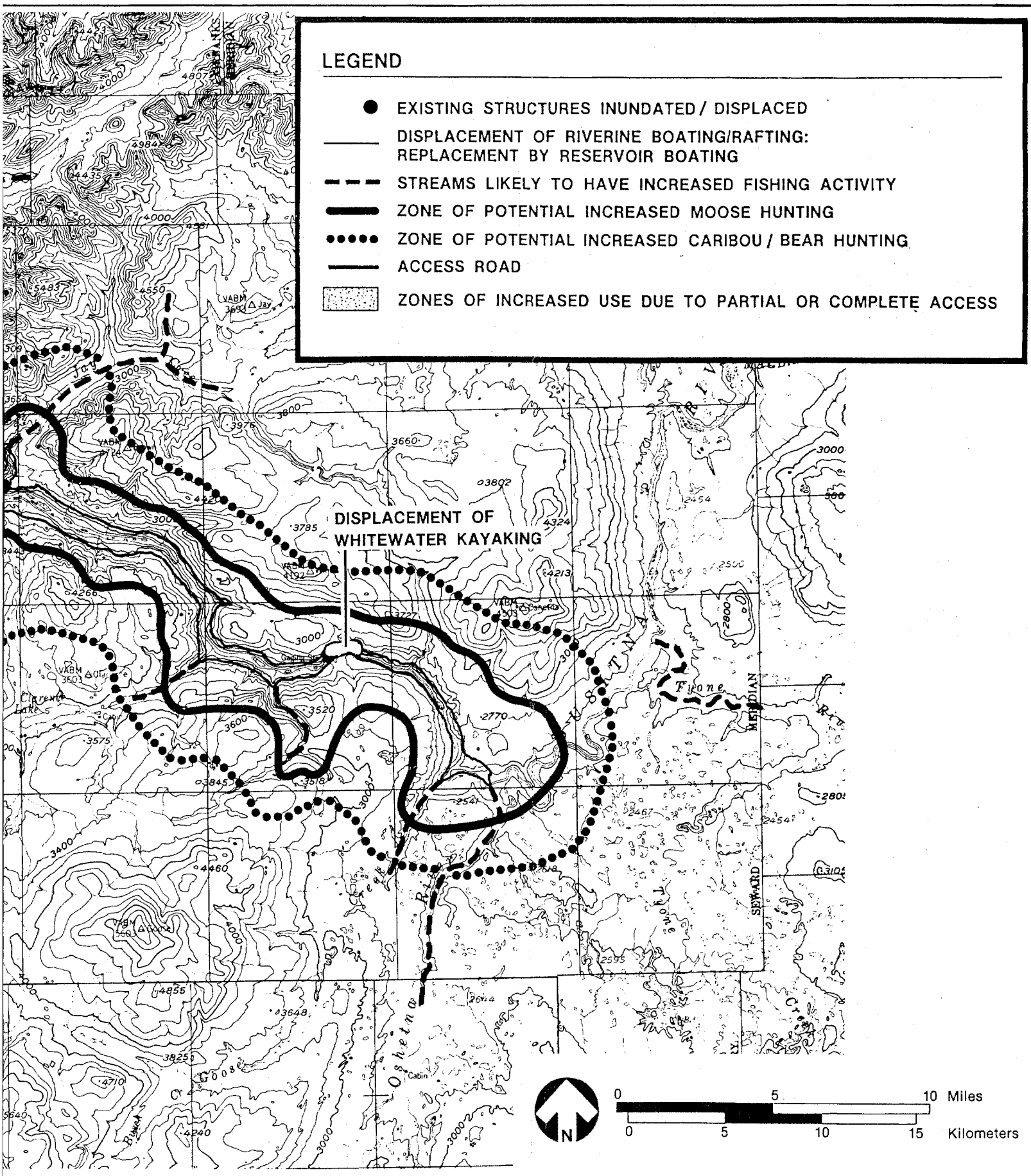


FIGURE 24 MATCHLINE

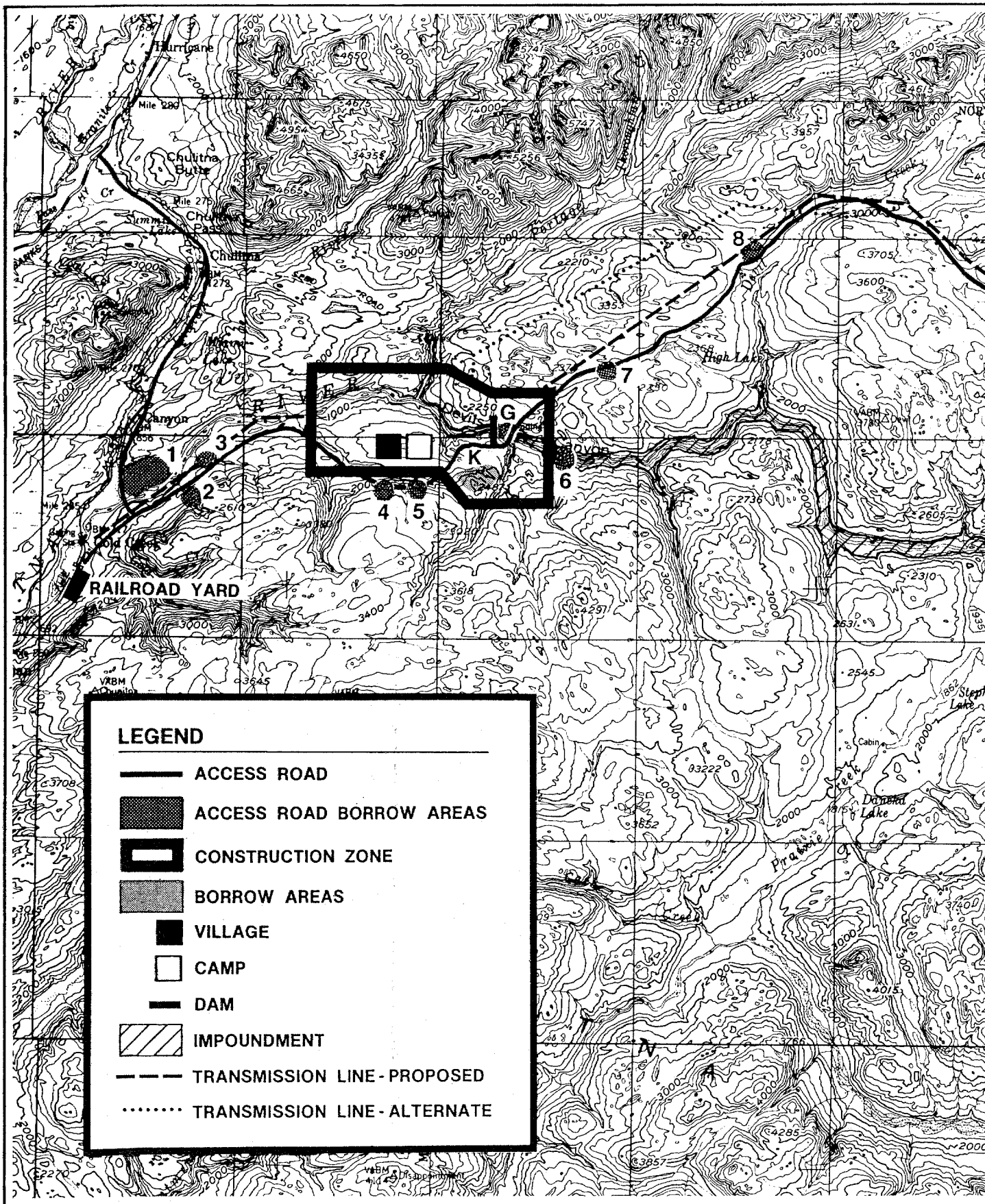
INDUCED LAND USE

PREPARED BY TES



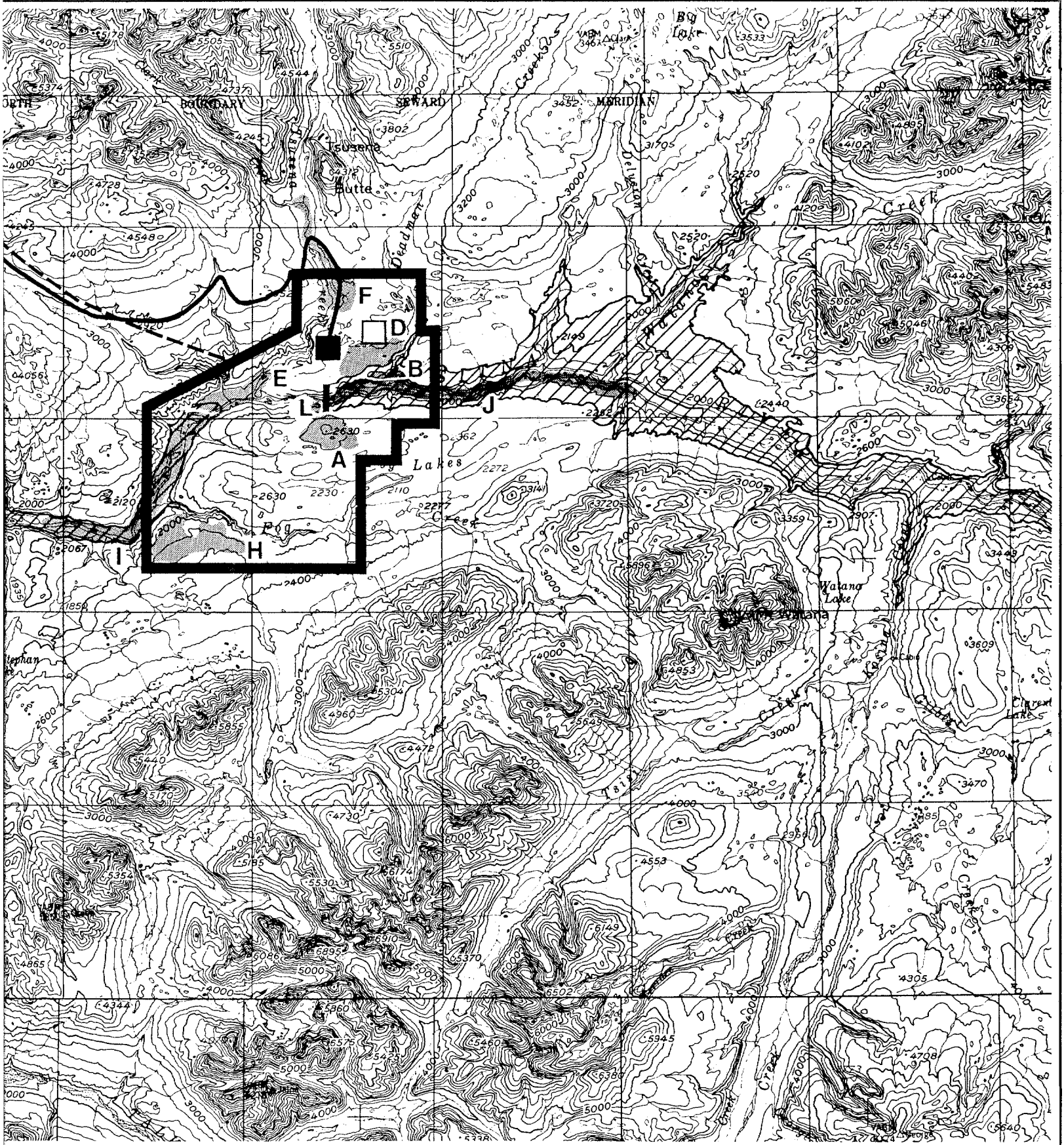
SE ACTIVITIES, WATANA PORTION

FIGURE 25



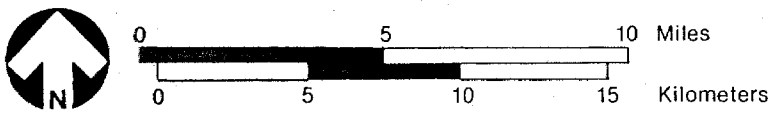
PREPARED BY TES

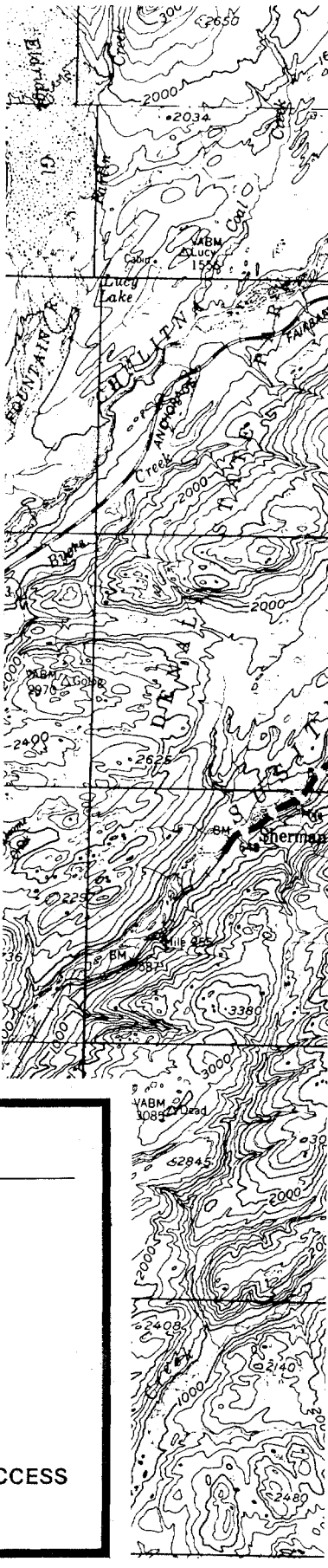
PROJ



OJECT FACILITIES

FIGURE 23





LEGEND

- EXISTING STRUCTURES INUNDATED / DISPLACED
- DISPLACEMENT OF RIVERINE BOATING/RAFTING: REPLACEMENT BY RESERVOIR BOATING
- STREAMS LIKELY TO HAVE INCREASED FISHING ACTIVITY
- ZONE OF POTENTIAL INCREASED MOOSE HUNTING
- ZONE OF POTENTIAL INCREASED CARIBOU / BEAR HUNTING
- ACCESS ROAD
- ZONES OF INCREASED USE DUE TO PARTIAL OR COMPLETE ACCESS

INDUCED LAND USE A

PREPARED BY TES

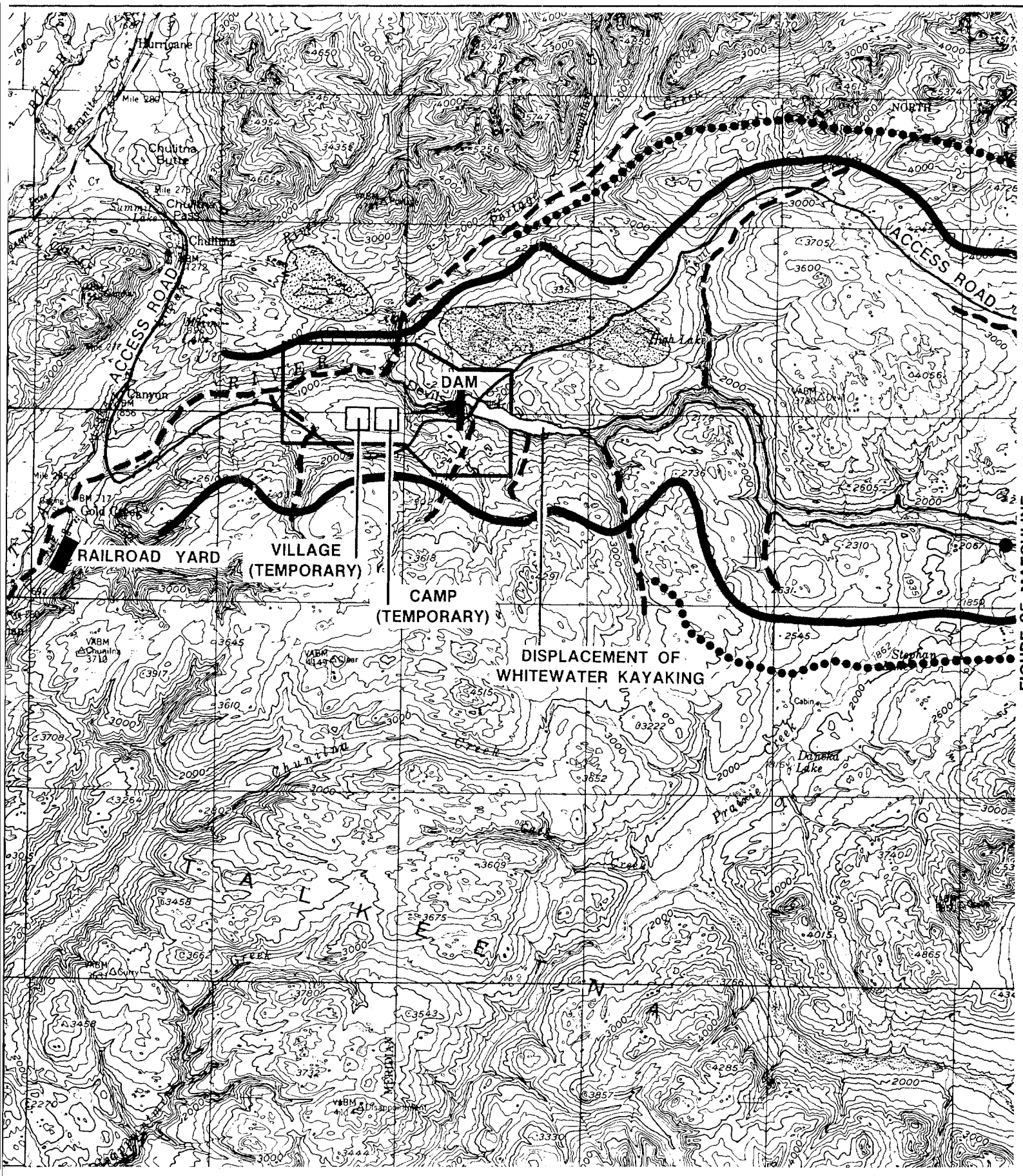


FIGURE 25 MATCHLINE

ACTIVITIES, DEVIL CANYON PORTION

FIGURE 24

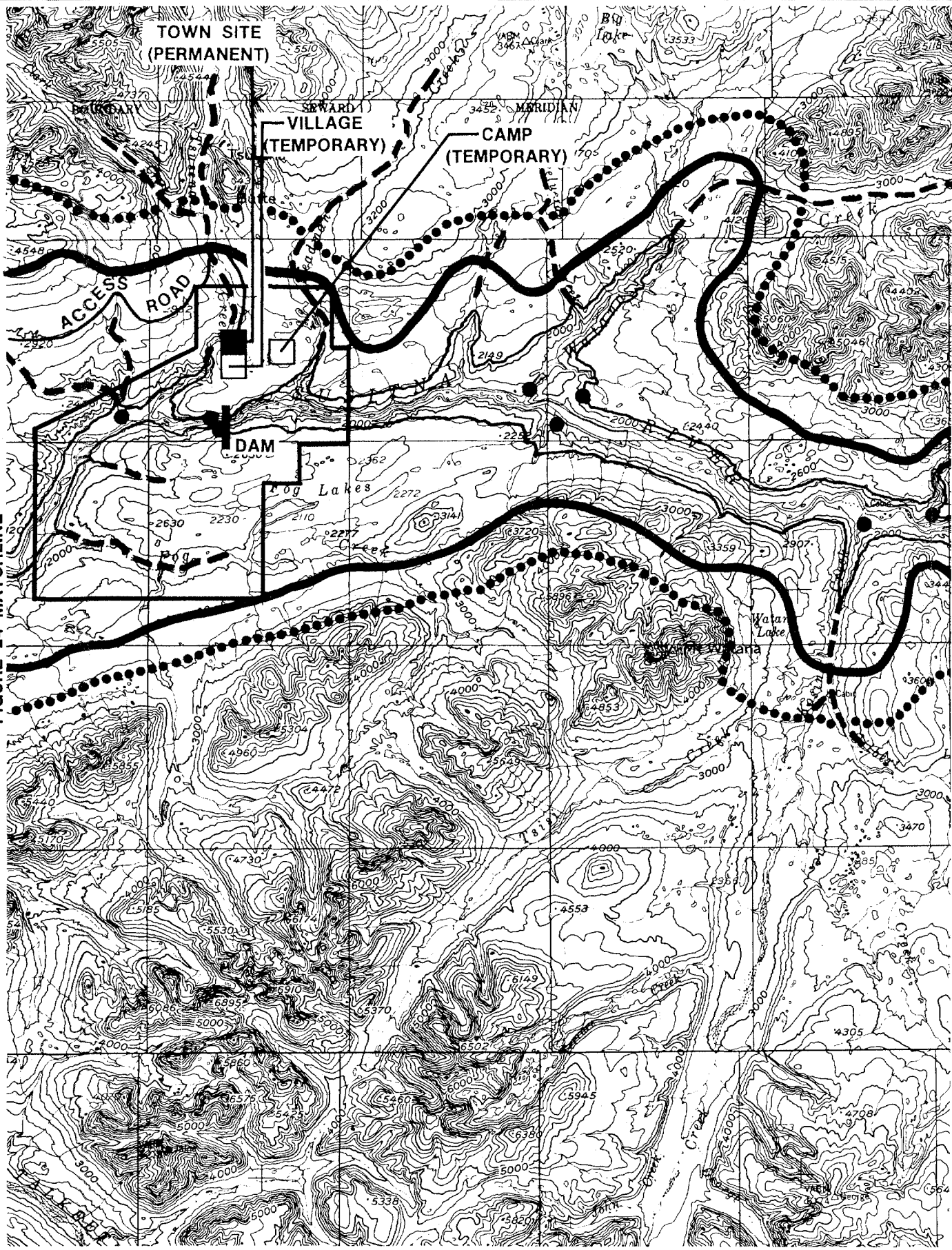
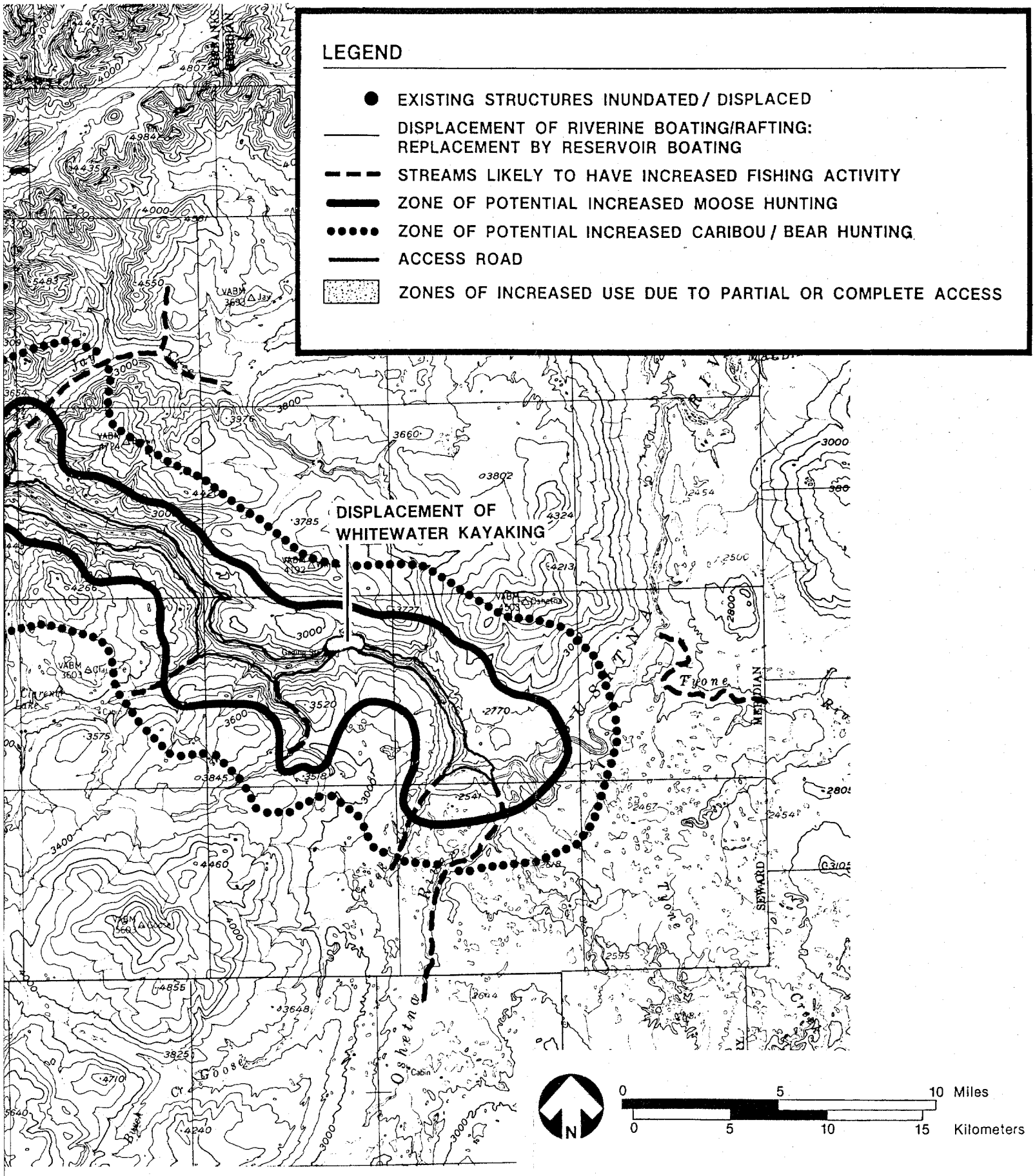


FIGURE 24 MATCHLINE

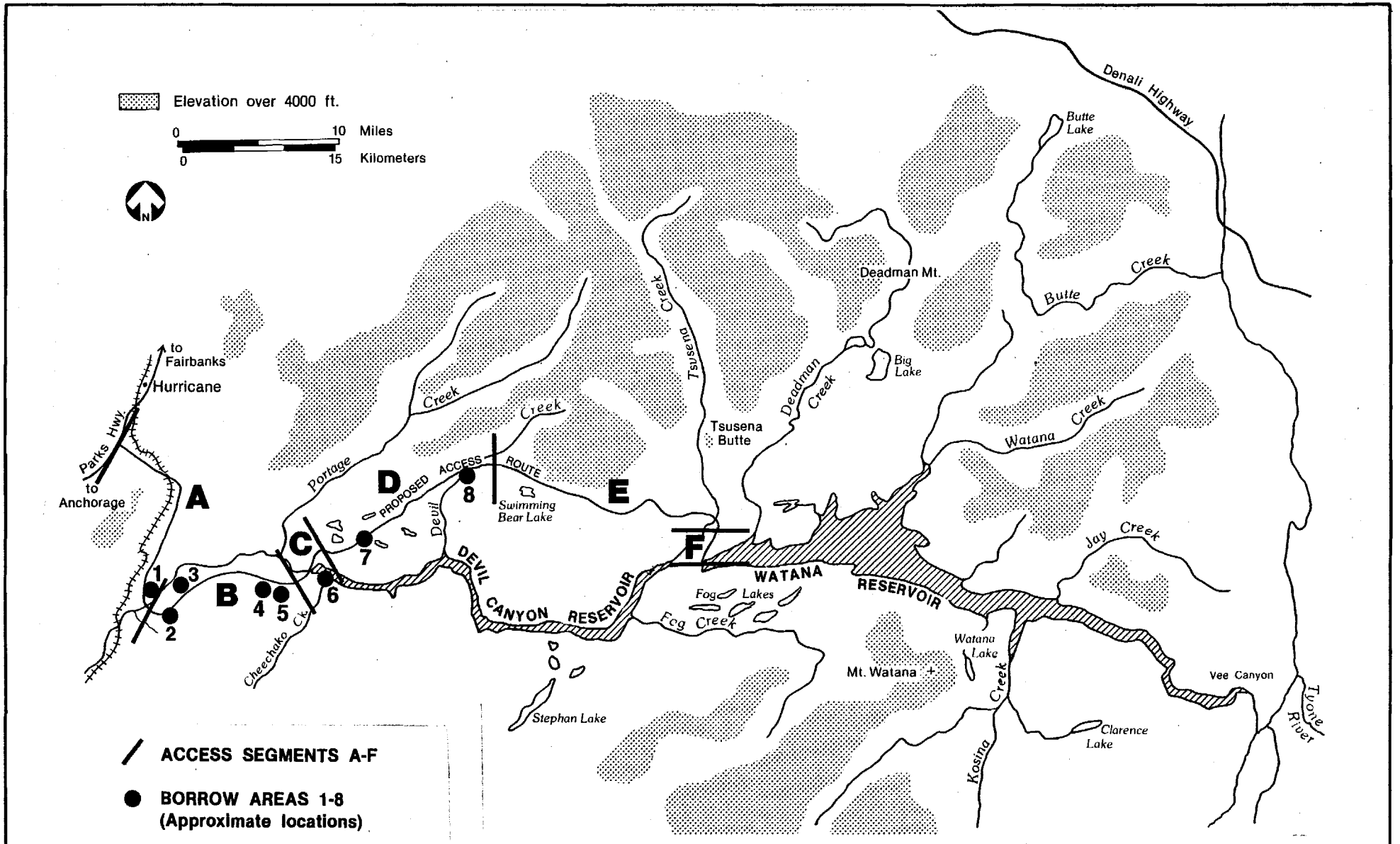
INDUCED LAND USE

PREPARED BY TES



SE ACTIVITIES, WATANA PORTION

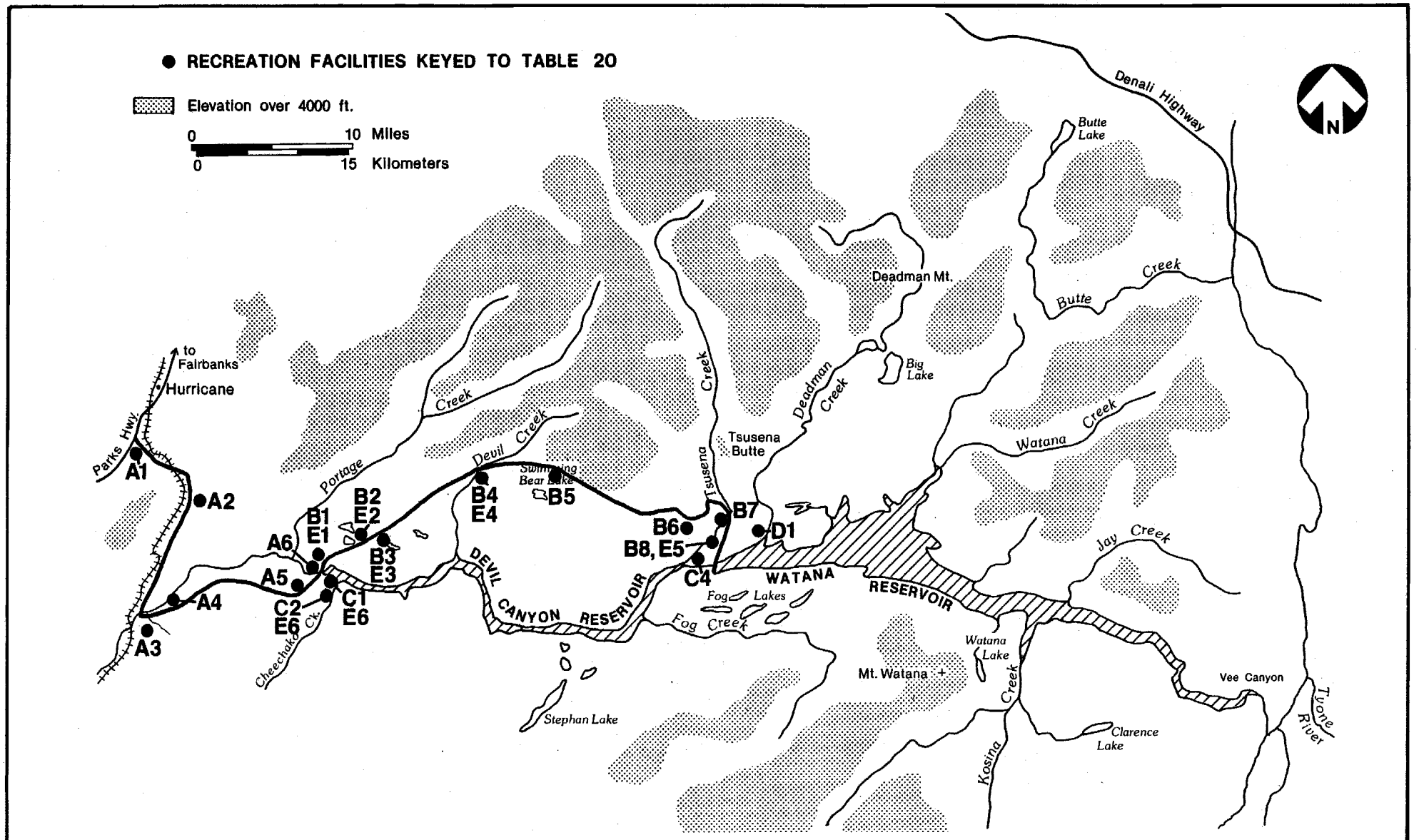
FIGURE 25



PROPOSED ACCESS ROUTE AND ACCESS ROUTE BORROW AREAS

PREPARED BY TES

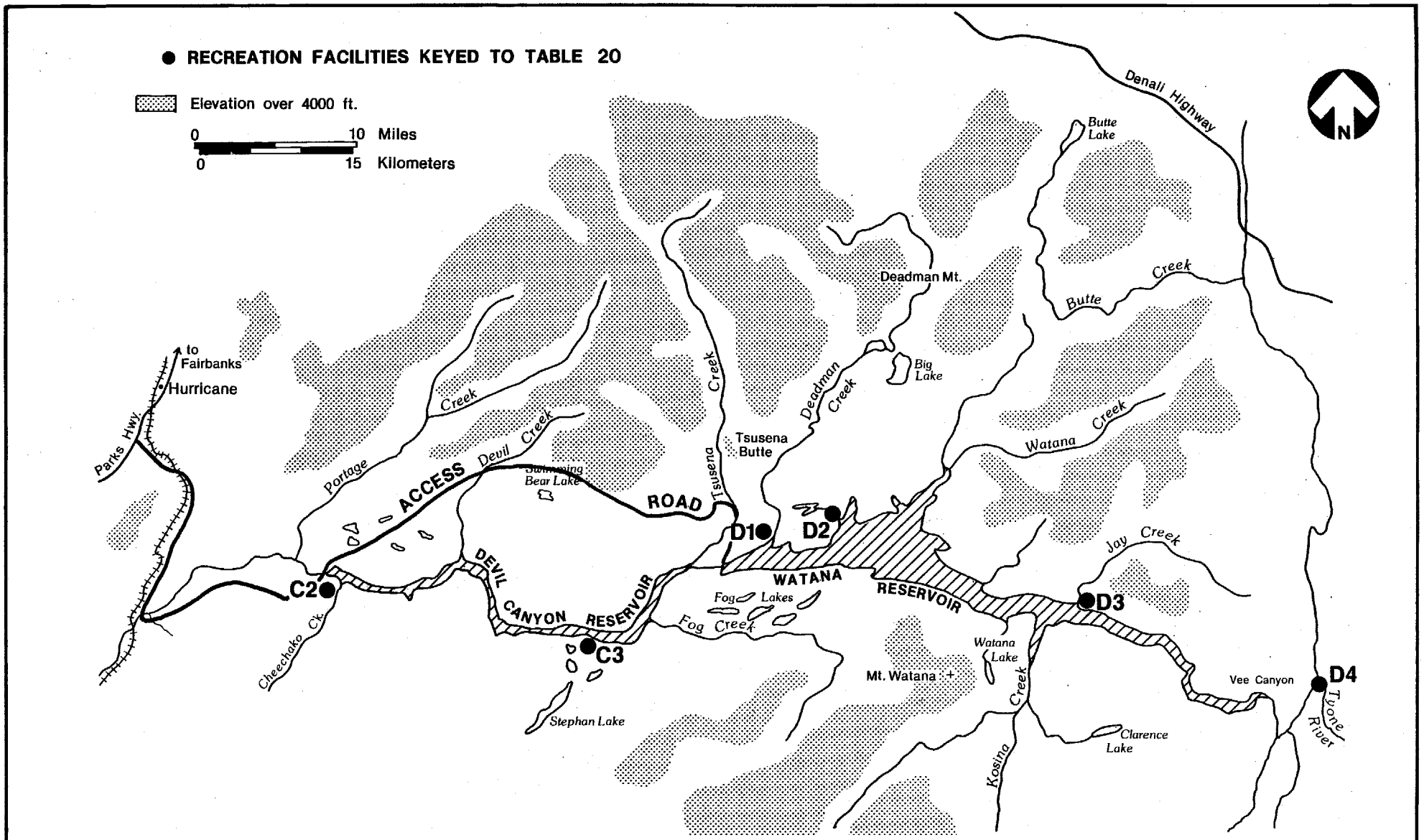
FIGURE 26



RECREATION FACILITIES -- IMMEDIATE DEVELOPMENT

PREPARED BY TES / UNIVERSITY OF ALASKA

FIGURE 27



RECREATION FACILITIES -- LONG-TERM DEVELOPMENT

PREPARED BY TES / UNIVERSITY OF ALASKA

FIGURE 28

REFERENCES

Acres American, Inc. 1981a. Susitna Hydroelectric Project Final Draft Closeout Report Task 8: Transmission - Transmission Line Corridor Screening. Prepared by Acres American, Inc. and Terrestrial Environmental Specialists, Inc. for the Alaska Power Authority, Anchorage, Alaska.

Acres American, Inc. 1981b. Susitna Hydroelectric Project Preliminary Report Subtask 6.20: Access and Camp Facilities - Watana Construction Camp. Alaska Power Authority, Anchorage, Alaska.

Acres American, Inc. 1981c. Susitna Hydroelectric Project Report Subtask 2.10: Access Roads - Access Route Selection Report. Prepared by Acres American, Inc. for the Alaska Power Authority, Anchorage, Alaska.

ADF&G. 1976-1979. Harvest Tickets. Alaska Department of Fish and Game, Anchorage, Alaska.

ADF&G. 1978-1979. Sealing Records. Alaska Department of Fish and Game, Anchorage, Alaska.

ADF&G. 1978. Preliminary Environmental Assessment of Hydroelectric Development on the Susitna River. Alaska Department of Fish and Game, Anchorage, Alaska.

ADF&G. 1981. Susitna Hydroelectric Project Environmental Studies Annual Report Subtask 7.11: Wildlife Ecology Studies - Big Game. Submitted by the Alaska Department of Fish and Game to the Alaska Power Authority, Anchorage, Alaska.

ADNR. 1981. Scenic Resources along the Parks Highway, Inventory and Management Recommendations, Susitna Basin Background Report. Alaska Department of Natural Resources, Division of Research and Development, Anchorage, Alaska.

Alaska Rural Development Council. 1977. A Revegetative Guide for Alaska. Cooperative Extension Service, University of Alaska and the United States Department of Agriculture, Fairbanks, Alaska.

Anchorage Daily News. 1981. Uncle Sam Fulfills River Rat's Fantasy (June 1, 1981). Anchorage, Alaska.

Anchorage Daily Times. 1973. Blackadar Beats Devil's Canyon Rapids (March 29, 1973). Anchorage, Alaska.

APA. 1981a. Susitna Hydroelectric Project Environmental Studies Annual Report Subtask 7.07: Land Use Analysis. Submitted by Terrestrial Environmental Specialists, Inc. and the University of Alaska to Acres American, Inc. for the Alaska Power Authority, Anchorage, Alaska.

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 Report Subtask 7.09: Transmission Corridor Assessment - Environmental Assessment of Proposed Transmission Facilities East of Knik Arm. Submitted by Terrestrial Environmental Specialists, Inc. 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.

Bacon, G. 1975. Heritage Resources Along the Upper Susitna River. United States Army Corps of Engineers, Anchorage, Alaska.

Baum, W. K. 1967. Oral History for the Local Historical Society. Conference of California Historical Societies, Stockton, California.

Binger, W. V. et al. 1978. Papers presented In Environmental Effects of Large Dams. American Society of Civil Engineers, New York, New York.

Bradshaw, A. D. and M. J. Chadwick. 1980. The Restoration of Land, the Ecology and Restoration of Derelict and Degraded Land. University of California Press, Berkeley, California.

Clawson, M. and C. Stewart. 1965. Land Use Information: A Critical Survey of U.S. Statistics Including Possibilities for Greater Uniformity. Resources for the Future, Incorporated, Johns Hopkins Press, Baltimore, Maryland.

Cole, T. 1979. The History and Use of the Upper Susitna River, Indian River to the Headwaters. Alaska Department of Natural Resources, Division of Research and Development, Anchorage, Alaska.

Cook, S. 1981. An Investigation of the Recreational Potential of Water-filled Gravel Pits in Interior Alaska: Preliminary Findings (unpublished). University of Alaska, School of Agriculture and Land Resources, Fairbanks, Alaska.

Cowardin, L. M., V. Carter, F. C. Golet and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/BS-79/31. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C.

Daniel, T. C. and R. S. Boster. 1976. Measuring Landscape Esthetics: The Scenic Beauty Estimation Method. USDA Forest Service Research Paper RM-167. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Davis, C. 1974. From Tape to Tape: An Oral History Manual and Workbook. Prager Publishers, New York, New York.

Dean, K. G. 1980. Surficial Geology of the Susitna-Chilitna River Area, Alaska, Part 1: Susitna Basin Planning Background Report. Alaska Department of Natural Resources, Land and Resource Planning Section, Anchorage, Alaska.

Dietz, E. E. 1950. Speedletter by Dietz concerning the Susitna Float Trip, November 20, 1950. Records of the United States Department of the Interior, Bureau of Reclamation, Seattle, Washington.

Dohrenwend, B. S., D. Klein and S. A. Richardson. 1965. Interviewing - Its Forms and Functions. Basic Books, Incorporated, New York, New York.

Dwight, L. and E. W. Trihey. 1981. A Survey of Questions and Concerns Pertaining to Instream Flow Aspects of the Proposed Susitna Hydroelectric Project. Prepared for Acres American, Inc., Buffalo, New York.

Elmiger, F. J. and B. Howlett. 1969. Power Lines and Scenic Values in the Hudson River Valley. Hudson River Valley Commission, Tarrytown, New York.

Emleton, C. (ed). 1968. Land Use and Resources: Studies in Applied Geography. Institute of British Geographers, London, England.

Evans, M. N. (ed). 1976. Proceedings of the Surface Protection Seminar, Theme: Travel and Transportation Practices to Prevent Surface Destruction in the Northern Environment. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

Fortier, E. (ed). 1960. Alaska Hunting and Fishing Guide. Rhodes and Fortier Publishers, Anchorage, Alaska.

Greiner, J. 1974. Wager with the Wind: The Don Sheldon Story. Rand McNally and Company, Chicago, Illinois.

Goldman, C. R., J. McEvoy III and P. J. Richerson. 1973. Environmental Quality and Water Development. W. H. Freeman & Company, San Francisco, California.

Gordon, R. J. 1978. Alaska National Landscapes, Commission Study 33. Federal - State Land Use Planning Commission for Alaska, Anchorage, Alaska.

Heinzenknecht, G. B. and J. R. Paterson. 1978. Effects of Large Dams and Reservoirs on Wildlife Habitat In Environmental Effects of Large Dams. American Society of Civil Engineers, New York, New York.

Henning, R. A. 1976. Selected Alaska Hunting and Fishing Tales, Volume 4. Alaska Northwest Publishing Company, Anchorage, Alaska.

Irving, W. N. 1957. An Archaeological Survey of the Susitna Valley. University of Alaska, College, Alaska.

IUCN. 1971. Landscape Planning Papers presented at the International Symposium on the Relationship Between Engineering and Biology. IUCN Publication Paper No. 30.

Jones, G. R. 1975. Upper Susitna River, Alaska. United States Army Corps of Engineers, Anchorage, Alaska.

Jones and Jones. 1975. An Inventory and Evaluation of the Environmental, Aesthetic and Recreational Resources of the Upper Susitna River, Alaska. United States Army Corps of Engineers, Anchorage, Alaska.

Kari, J. M. 1975. Linguistic Diffusion Between Tanaina and Ahtna. International Journal of American Linguists, New York, New York.

Litton, R. B., Jr. 1973. Landscape Control Points: A Procedure for Predicting and Monitoring Visual Impacts. United States Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

Litton, R. B. and R. J. Tetlow. 1974. Water and Landscape: An Aesthetic Overview of the Role of Water in the Landscape. Water Information Center, Inc., Port Washington, New York.

Lotspeich, F. B. 1971. Environmental Guidelines for Road Construction in Alaska. EPA Report No. 1610. United States Environmental Protection Agency and the Alaska Water Laboratory, College, Alaska.

Lotspeich, F. B. and A. E. Helmers. 1974. Environmental Guidelines for Development of Roads in the Sub-Arctic. United States Department of Agriculture, Forest Service, Institute of Northern Forestry, Fairbanks, Alaska.

Matanuska-Susitna Borough. 1978. Phase II Comprehensive Development Plan: Goals, Statements. Mat-Su Borough Planning Department, Palmer, Alaska.

McHarg, I. L. 1971 Design with Nature. Doubleday/Natural History Press, Garden City, New York.

Orth, D. J. 1967. Dictionary of Alaska Places and Names. Professional Paper 567. United States Department of the Interior, Geological Survey, Washington, D.C.

Pragnell, R. C. 1969, Scenic Road: A Basis for its Planning, Design and Management. Cooperative Research Agreement PSW-62 with USDI (BLM) and USDA (FS). United States Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

R&M Consultants, Inc. 1981. Susitna Hydroelectric Projectc Project Preliminary Report Subtask 2.10: Access Roads - Access Plan. Submitted to Acres American, Inc. for the Alaska Power Authority, Anchorage, Alaska.

la Societe de developpement de la Baie James and la Societe d'energie de Baie James. 1975. James Bay Hydro-electric Project: A Statement of Environmental Concerns and Recommendations for Protection and Enhancement Measures. Environment Canada, Montreal, Quebec.

Spadley, J. P. The Ethnographic Interview. Holt Rinehart and Winston, New York, New York.

Sparrow, S. D., F. J. Wooding and E. H. Whiting. 1978. Effects of Off-Road Vehicle Traffic on Soils and Vegetation in the Denali Highway Region of Alaska Journal of Soil and Water Conservation, Volume 33, No. 1.

Taylor, K. V. 1978. Erosion Downstream of Dams In Environmental Effects of Large Dams. American Society of Civil Engineers, New York, New York.

Trihey, E. W. 1981. Instream Flow Study Plan for the Proposed Susitna Hydroelectric Project. Prepared for Acres American, Inc. Buffalo, New York.

USACOE. 1975. South Central Railbelt Area, Alaska, Upper Susitna River Basin Interim Feasibility Report. Appendix 1, Parts 1 and 2. United States Army Corps of Engineers, Anchorage, Alaska.

USACOE. 1976. Draft Susitna Hydropower Feasibility Analysis Environmental Assessment. United States Army Corps of Engineers, Anchorage, Alaska.

USACOE. 1977. Upper Susitna River Basin, South Central Railbelt Area, Alaska - Final Environmental Impact Statement, Hydroelectric Power Development. United States Army Corps of Engineers, Anchorage, Alaska.

USACOE. 1978. Draft Susitna Hydropower Feasibility Analysis Environmental Assessment. United States Army Corps of Engineers, Anchorage, Alaska.

USDA (FS). 1960. Fishery Resource Study, Agency Report. United States Department of Agriculture, Forest Service, Anchorage, Alaska.

USDA (FS). 1974. Outdoor Recreation Research: Applying the Results. Papers presented at a workshop at Marquette, Michigan June 19-21, 1973. United States Department of Agriculture, Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota.

USDA (FS). 1979a. Our National Landscape: A Conference on Applied Techniques for Analysis and Management of the Visual Resource. General Technical Report PSW-35. United States Department of Agriculture, Forest Service, Pacific Southwest Forest Experiment Station, Berkeley, California.

USDA (FS). 1979b. Visual Character Types. Series No. R10-63. United States Department of Agriculture, Forest Service, Division of Recreation, Soils and Watersheds, Juneau, Alaska.

USDI (BLM). 1940-1979. Case Card File. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (BLM). 1952. Susitna River Basin: A Report on Potential Development of Water Resources in the Susitna River Basin of Alaska. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (BLM). 1973. Influence of Man-Caused Surface Disturbance in Permafrost Areas of Alaska. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (BLM). 1979. Final Environmental Assessment Record: Susitna Hydropower Feasibility Study. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (BLM). 1980. Navigability Reviews - State Selections for the Anchorage, Tyonek, Talkeetna, and Talkeetna Mountains Quadrangles. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (BLM). 1981. Report of Historical Data in the Susitna Region. United States Department of the Interior, Bureau of Land Management, Anchorage, Alaska.

USDI (NPS). 1976. Final EIS: Proposed Electric Distribution Line Extension to McKinley Park. United States Department of the Interior, National Park Service, Pacific Northwest Region, Portland, Oregon.

USFWS. 1960. Fishery Resource Study, Agency Report. United States Fish and Wildlife Service, Anchorage, Alaska.

USGS. 1900-1979. Mining Claim Card File, Active and Inactive Claims, Talkeetna Quadrangle. United States Geological Survey, Fairbanks, Alaska.

USGS. 1930. Mineral Industry of Alaska in 1929. Bulletn No. 824-A. United States Geological Survey, Washington, D.C.

Viereck, L. A. and C. T. Dyrness. 1980. A Preliminary Classification System for Vegetation of Alaska. General Technical Report PNW-106. United States Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Wahrhaftig, C. 1965. Physiographic Divisions of Alaska. Professional Paper 482. United States Geological Survey, Washington, D.C.

Williamson, D. N. and S. W. Calder. 1979. Visual Resource Management of Victoria's Forests: A New Concept for Australia. Landscape Planning 6: 313-341.

Woodward-Clyde Consultants. 1980. Gravel Removal Studies in Arctic and Sub-Arctic Floodplains in Alaska. United States Department of the Interior, Fish and Wildlife Service and the United States Environmental Protection Agency, Anchorage, Alaska.

Zube, E. H. 1979. Assessing Amenity Resource Values. General Technical Report RM-68. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

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  - Lynda Hays: Shareholder and Community Relations Coordinator
  - Robert Rude: Senior Vice-President
  - Marge Sargerser: Land Manager
  - Roland Shanks: Manager of Land Administration
  - John Youngblood: Executive Director
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Keual Village
  - James Shoalwolfer: President
Knikatnu Incorporated
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Land Field Services, Incorporated
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Mahay's Riverboat Service
  - William Correra: Guide
  - Steve Mahay: Owner and Guide
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- James Segura: Chief

Susitna Power Now
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Tyonek Native Corporation
- Agnes Brown: President

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- Dennis Brown: President of Akland Air Service
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- Jim and Vonnie Grimes: Pilots, Owners of Adventures Unlimited Lodge
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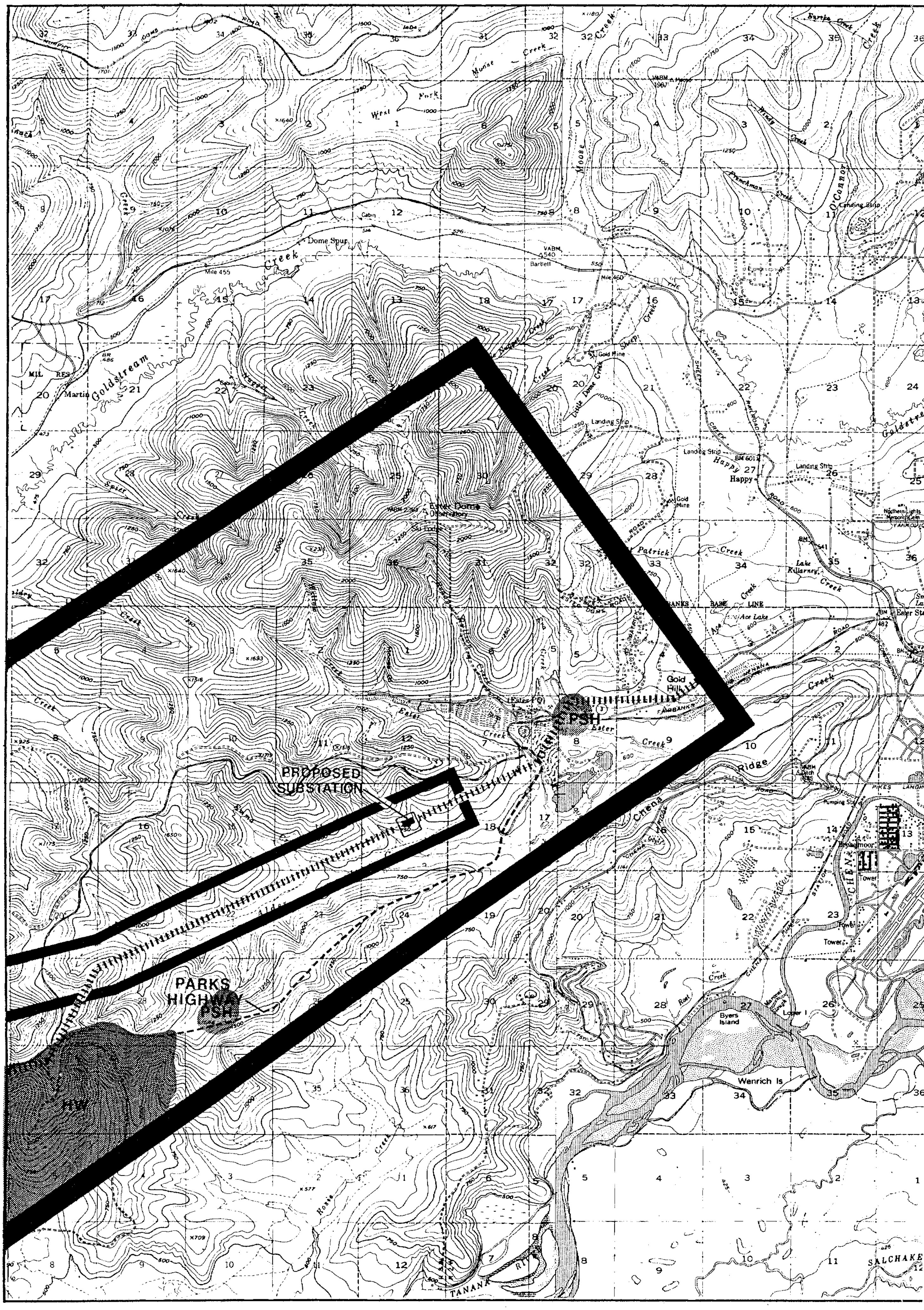
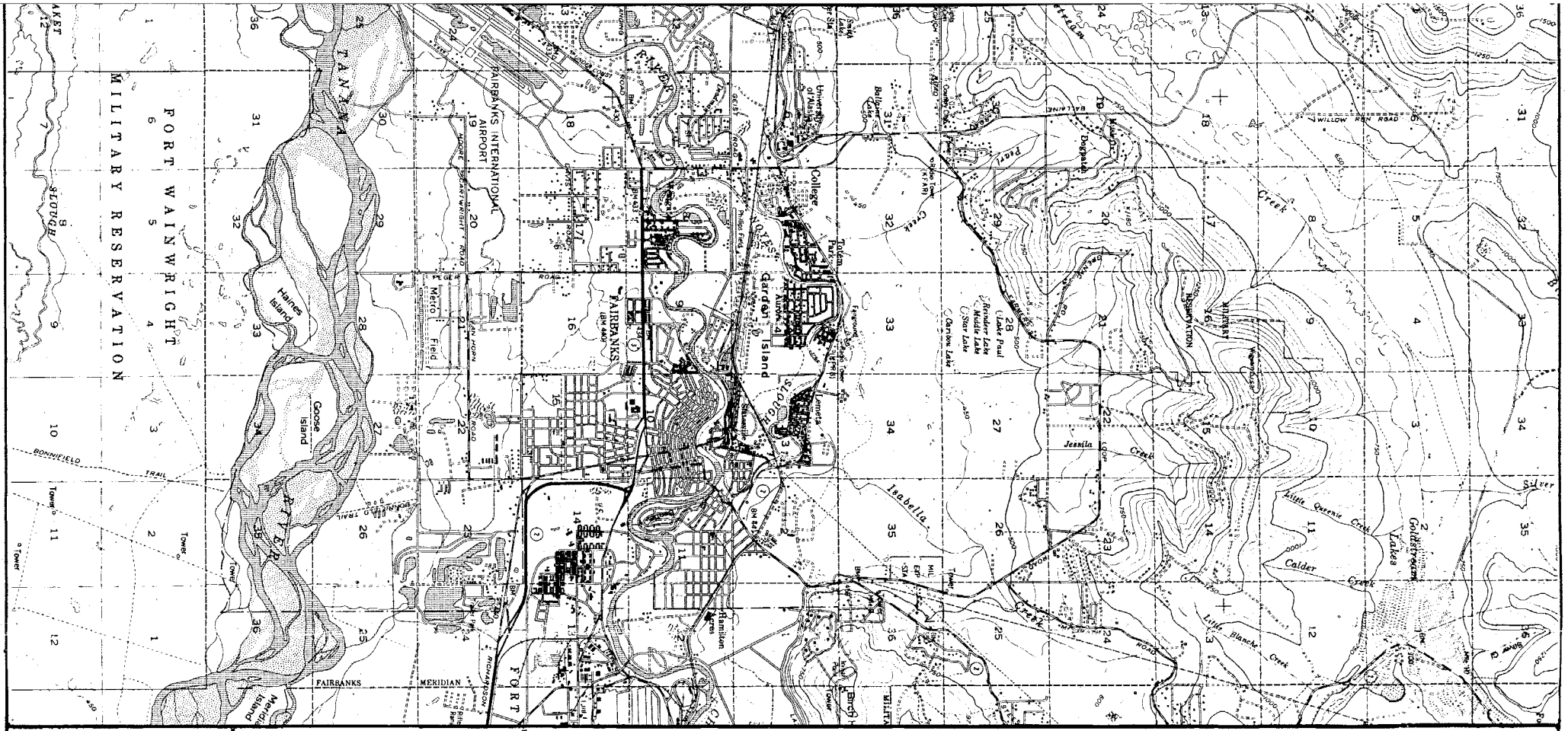
APPENDIX A

TRANSMISSION LINE MAPS


PROPOSED
SUBSTATION
PARKS
HIGHWAY
PSH
PSH
HW
Goldstream
Dome Spur
Gold Hill
Ester Dome Observatory
Happy
Lake Killarney
Ace Lake
Byers Island
Wenrich Is
Chena Ridge
Landing Strip
Gold Mine
Mile 455
Mile 460
Bartlett
Martin
Tower
Pumping Sta
TANANA
SALCHAKET
Creek
Moose
Frenchman
O'Connor
Ester
Alder
Sheep
Patrick
Happy



VISUAL CONSTRAINTS MAP M1

PREPARED BY TES FIGURE 1 of 48

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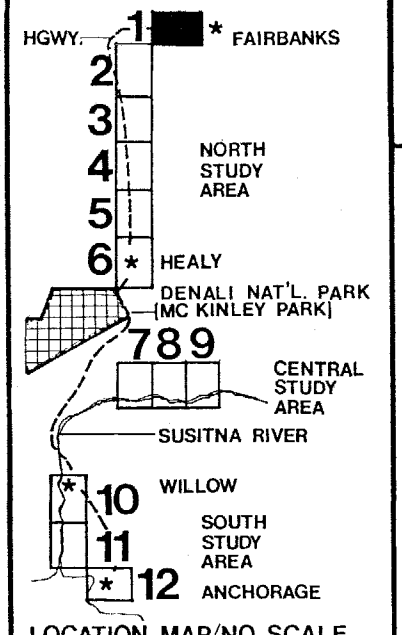


LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

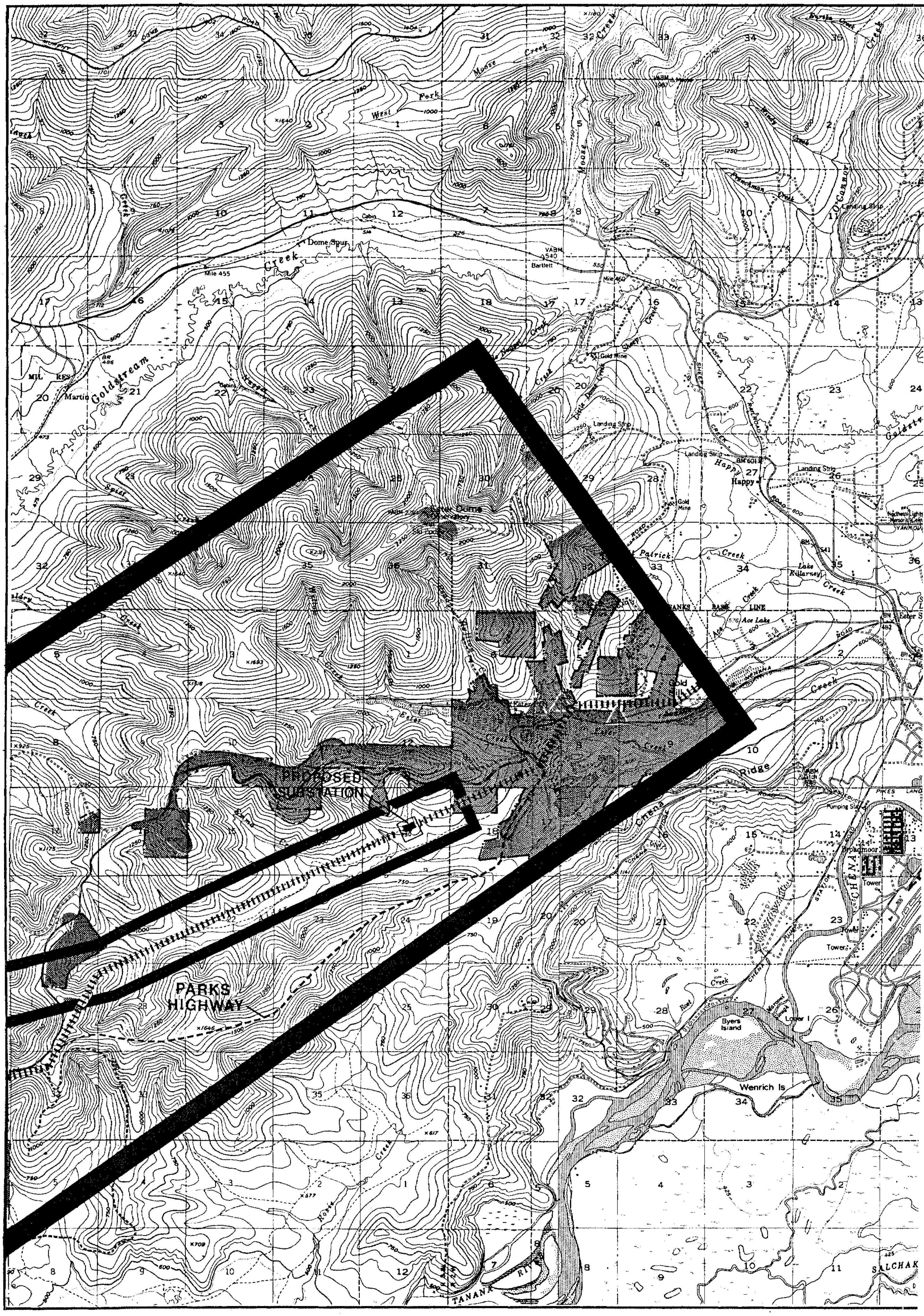
LEGEND

- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

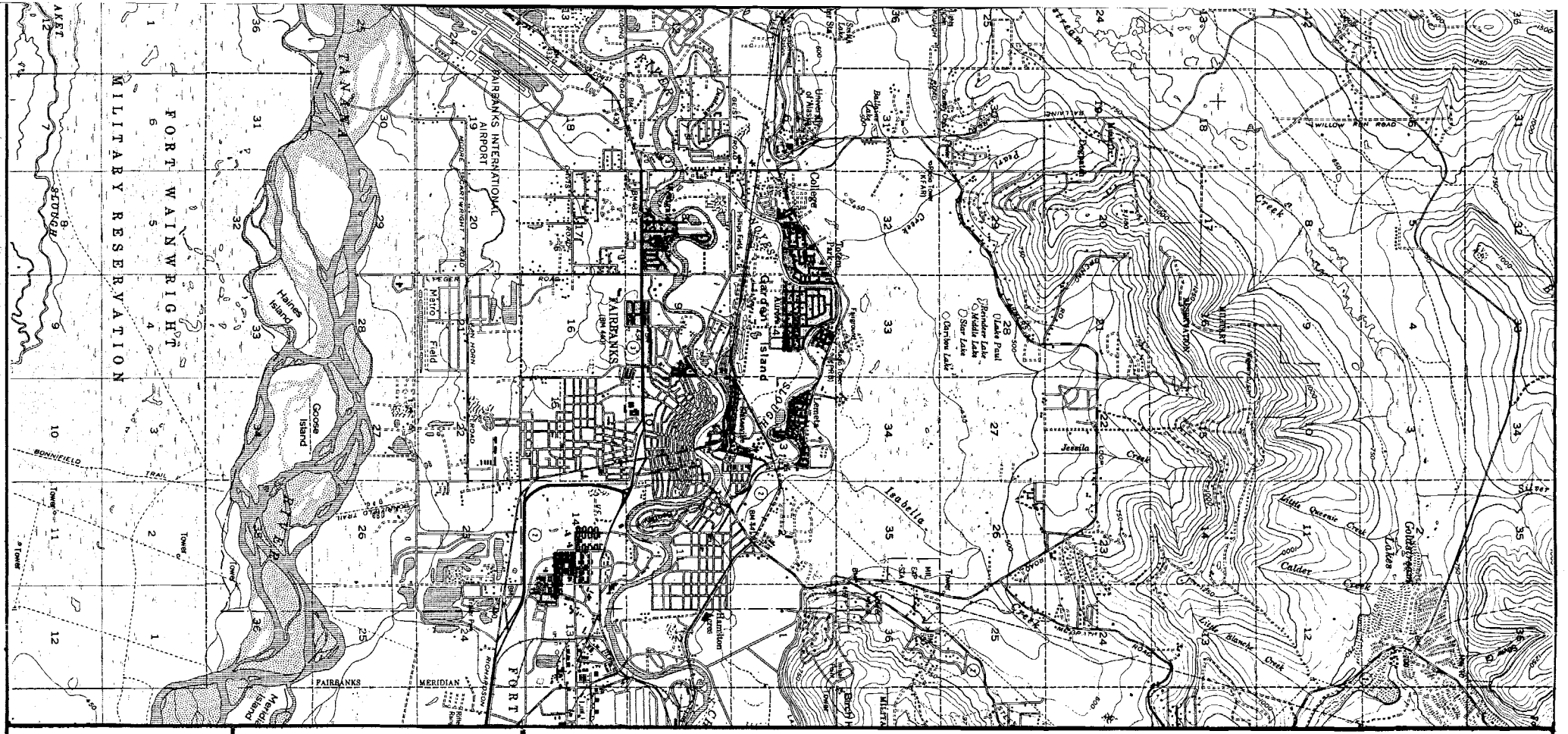
1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT



PROPOSED SUBSTATION
PARKS HIGHWAY
Ester Dome
Goldstream
Dome Spur
Bartlett
Happy
Landing Strip
Lake Killarney
Ace Lake
Chena Ridge
Byers Island
Wenrich Is
Broadmoor
Tower
SALCHAK
TANANA

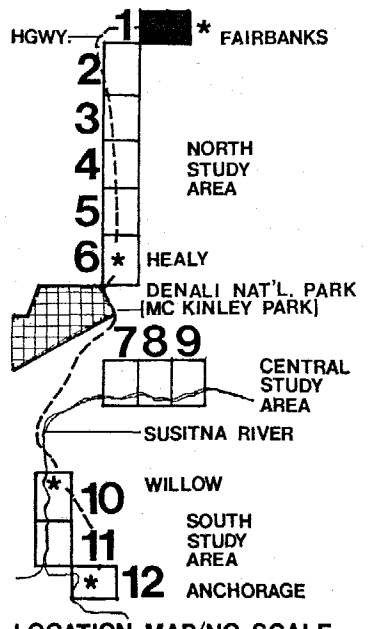


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS
MAP M1

PREPARED BY TES FIGURE 3 of 48

ACRES



MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·—·— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —··—·— DISPOSAL AREA
- — — — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

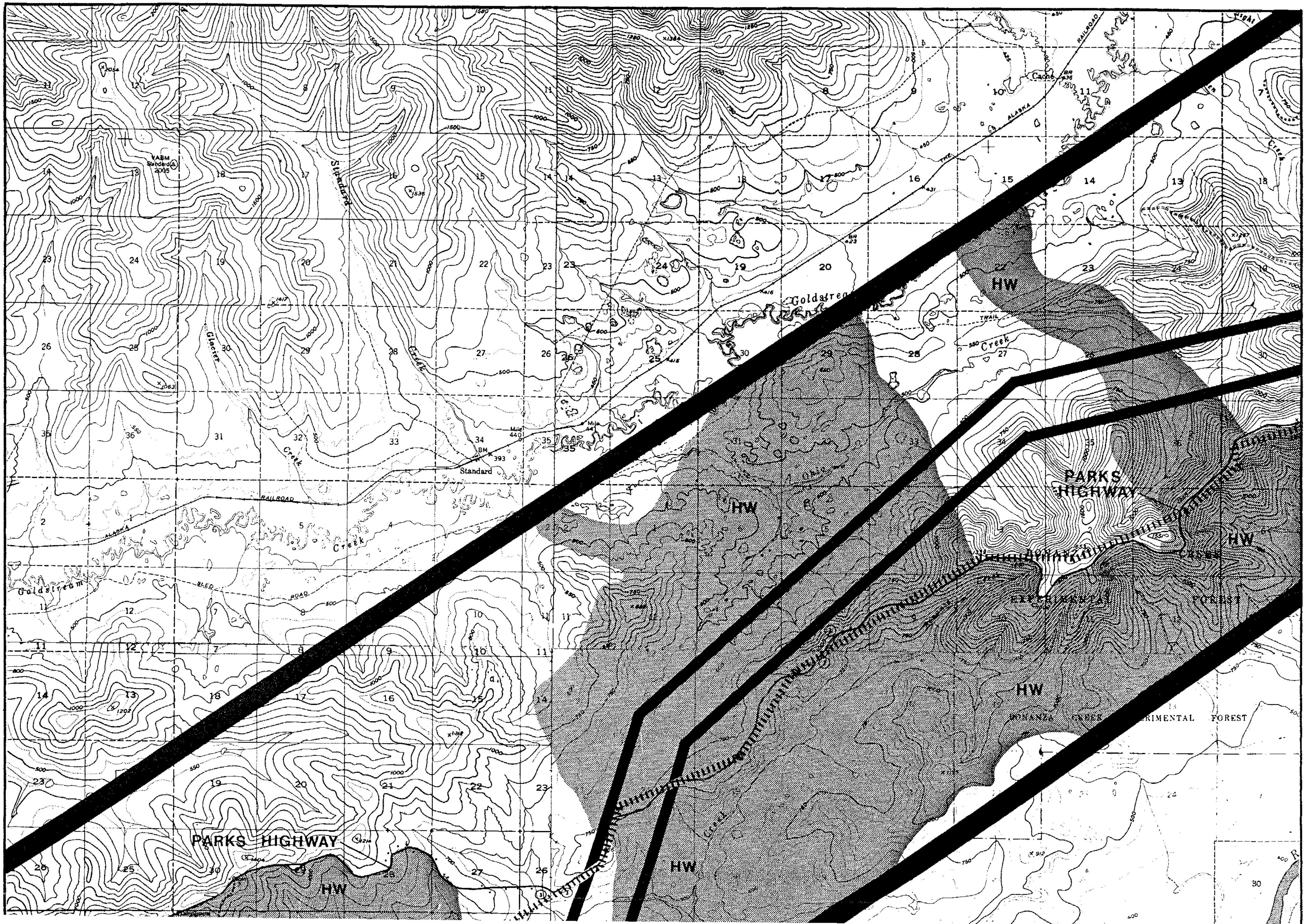
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

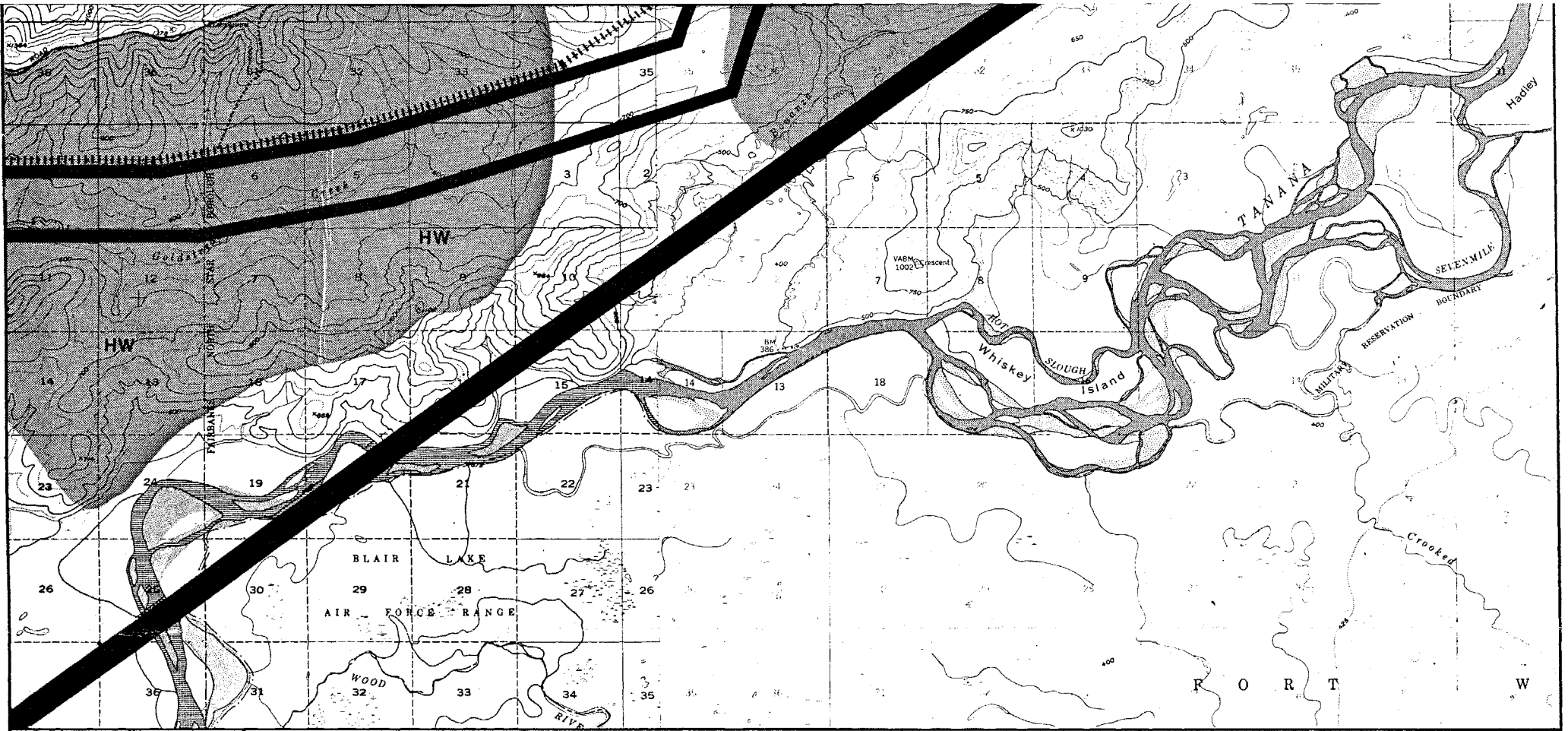
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS HIGHWAY
PARKS HIGHWAY
HW
HW
HW
HW
HW
HW
HW
Standard
Goldstream
Creek
ALASKA RAILROAD
Cache
EXPERIMENTAL
FOREST
BONANZA CREEK
RIMENTAL FOREST



VISUAL CONSTRAINTS
MAP M2

PREPARED BY TES FIGURE 5 of 48

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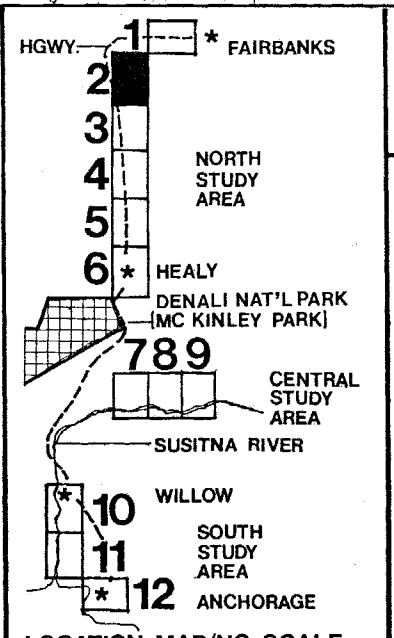


LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

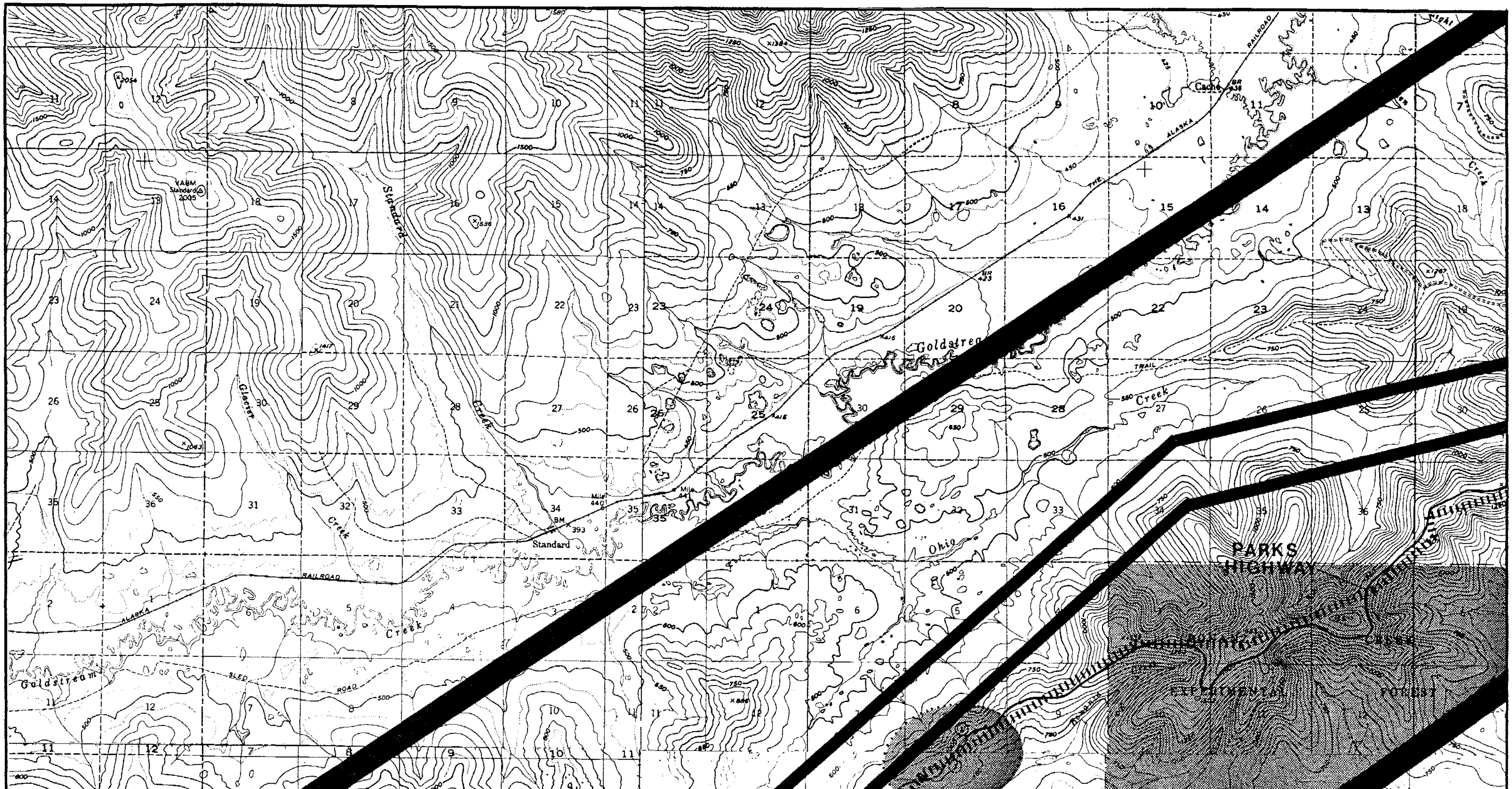
LEGEND

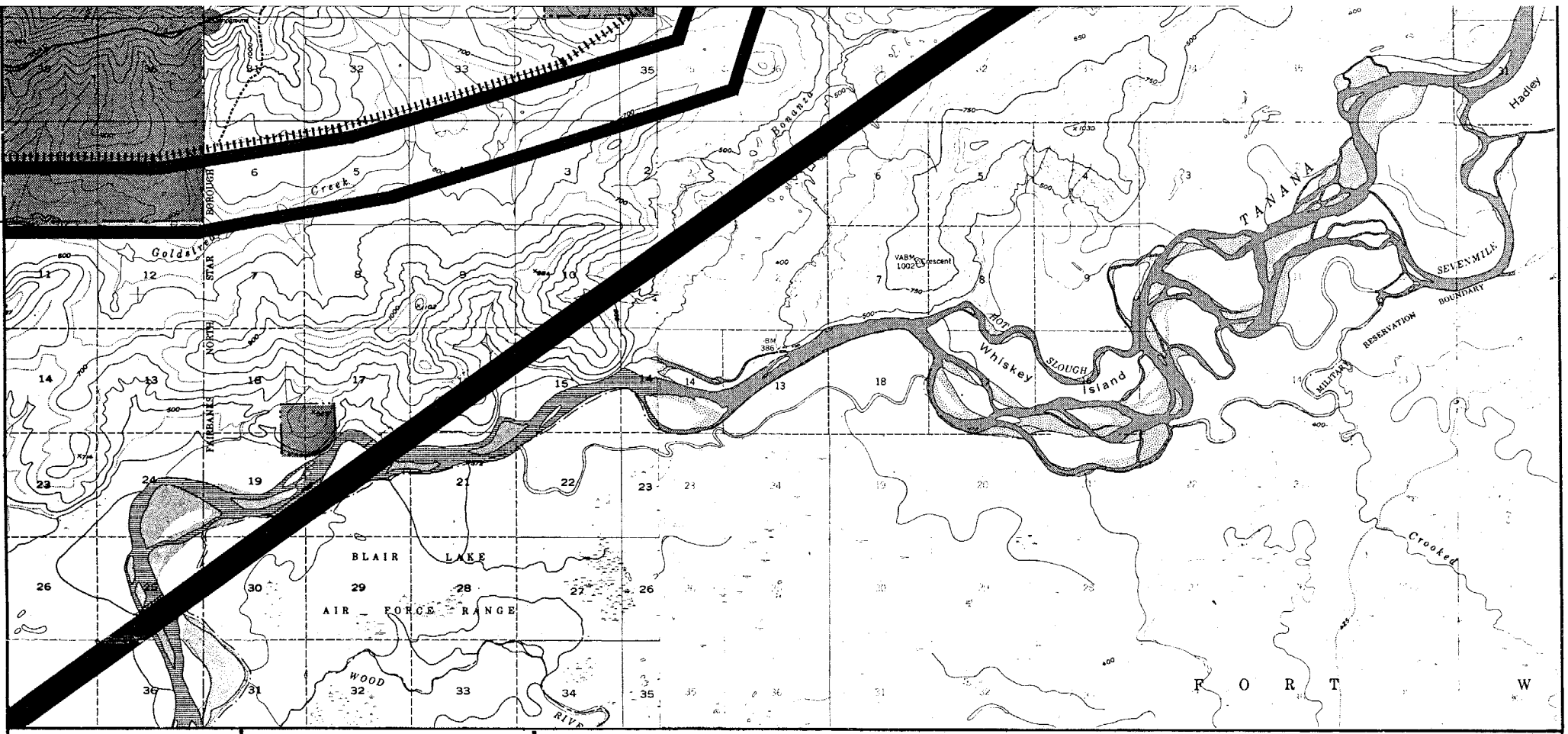
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

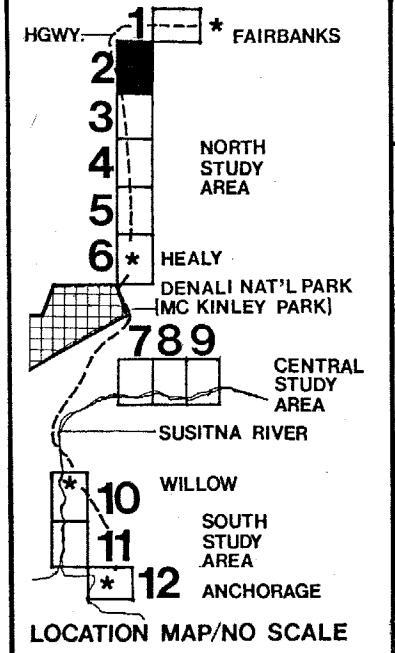

PARKS HIGHWAY
PARKS HIGHWAY
Standard
Goldstream
Creek
ALASKA
RAILROAD
SLED
ROAD
Cache
Ohio
EXPERIMENTAL
FOREST



MANMADE CONSTRAINTS MAP M2

PREPARED BY TES FIGURE 7 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- EXISTING PRIVATE LAND
- DEVELOPMENT AREA
- DISPOSAL AREA
- AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ..... AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

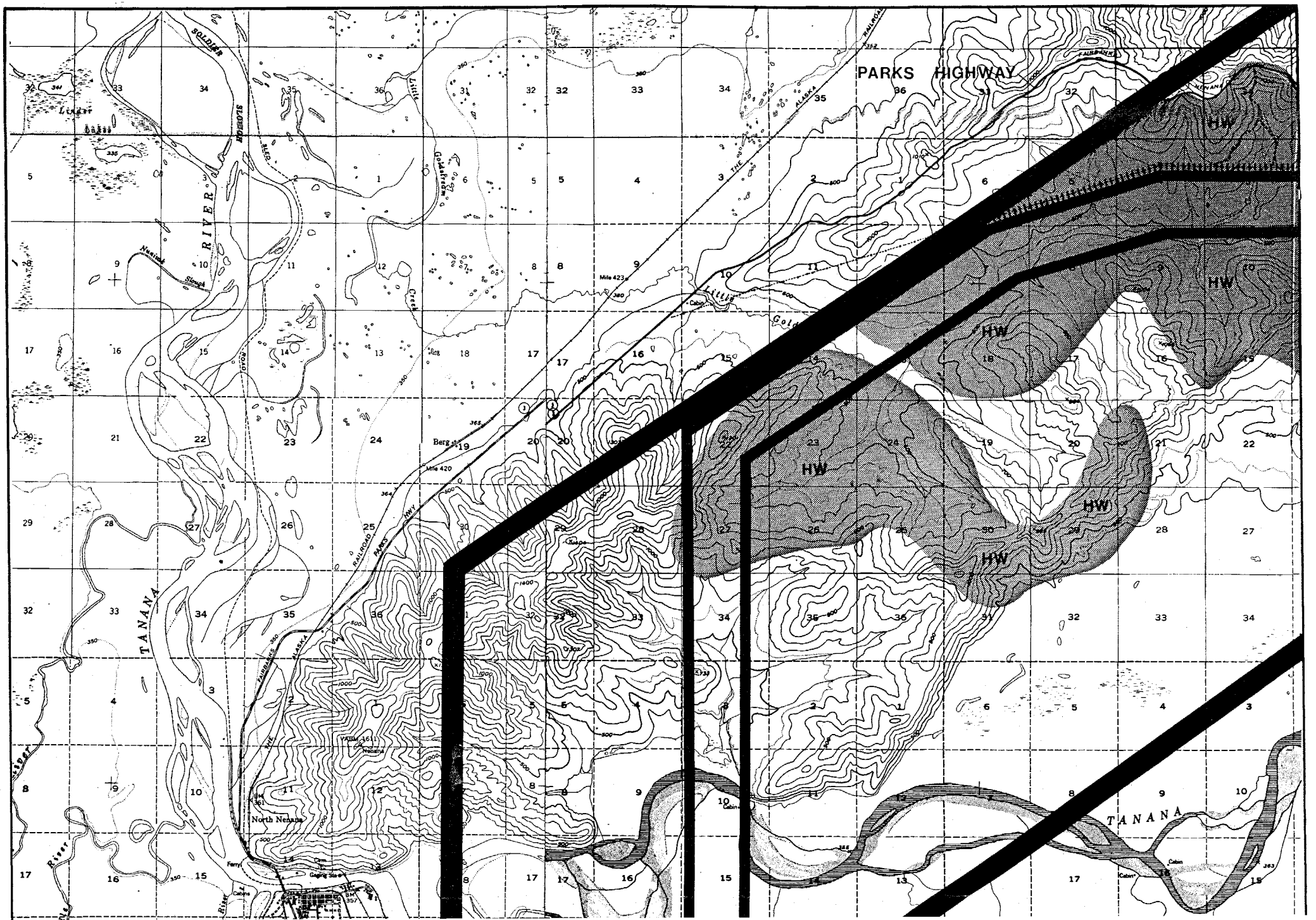
LEGEND

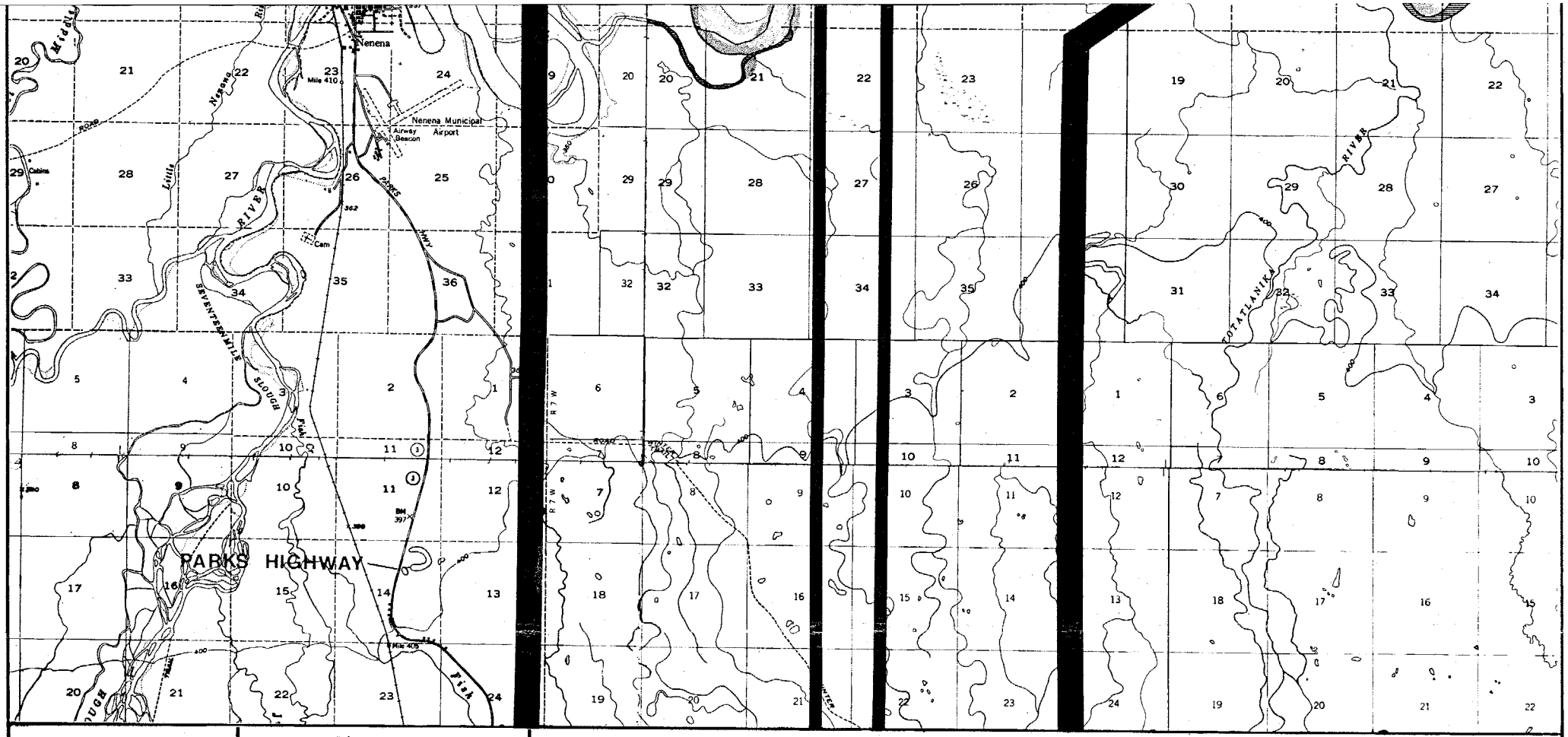
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS HIGHWAY
SOLDIER SLOUGH
SLEE
Little Goldstream
Goldstream
Nenana
Slough
RIVER
Creek
Mile 423
Mile 420
Berg
RAILROAD
ALASKA
TANANA
Ferry
Gaging Station
Cabins
North Nenana
Nenana
HW

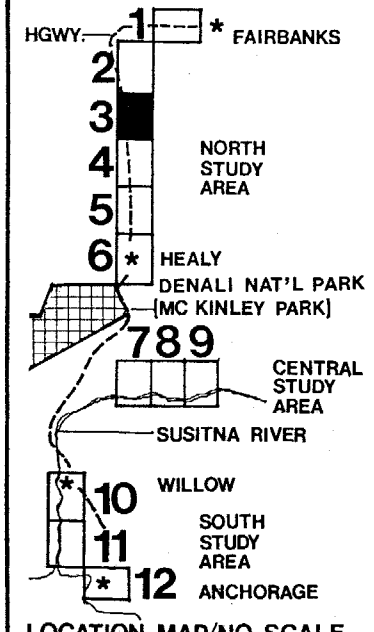


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M3

PREPARED BY TES FIGURE 9 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

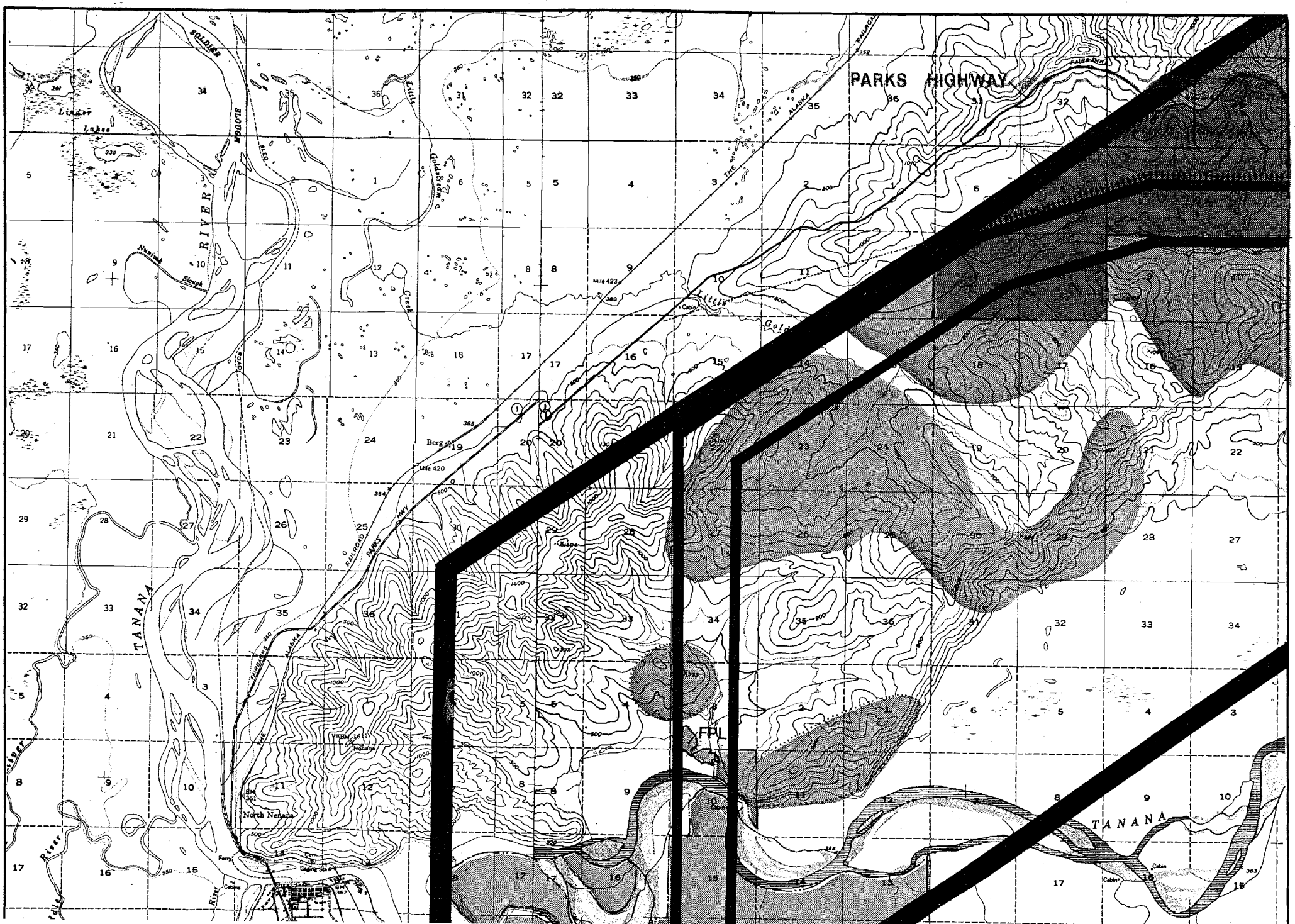
LEGEND

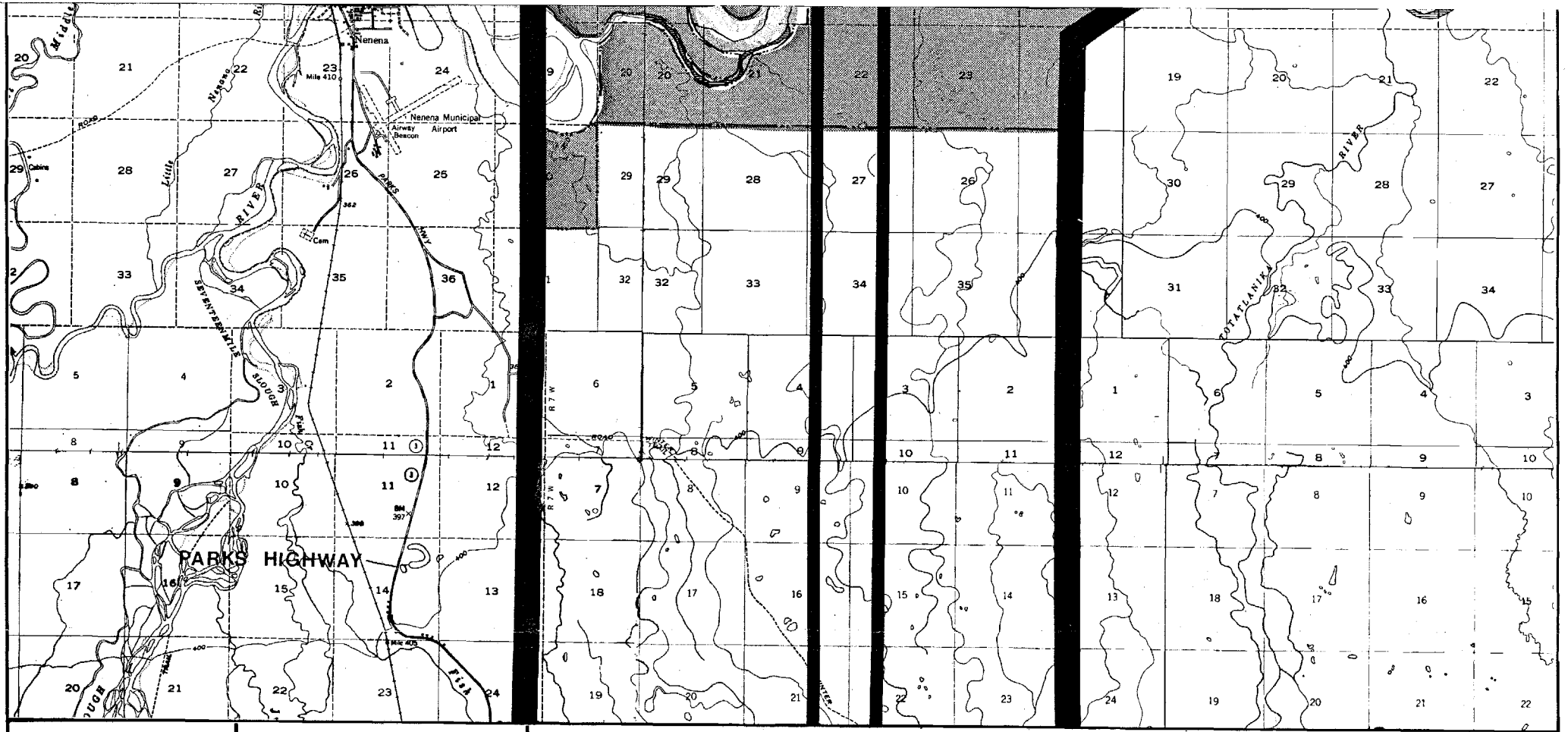
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

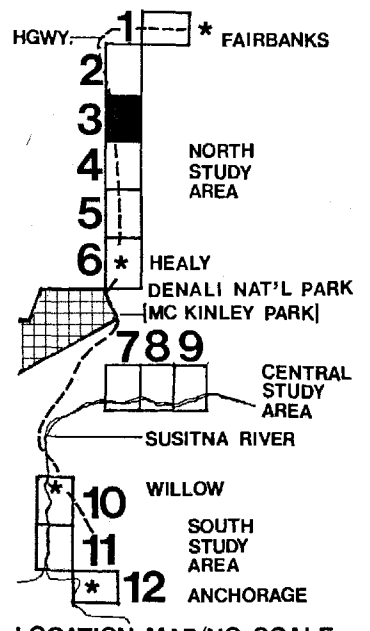

PARKS HIGHWAY
RIVER
TANANA
Lakes
Slough
Creek
Mile 423
Mile 420
Berg
FPL
North Nenana
TANANA



MANMADE CONSTRAINTS MAP M3

PREPARED BY TES FIGURE 11 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —··— EXISTING PRIVATE LAND
- — - — DEVELOPMENT AREA
- —·—·— DISPOSAL AREA
- — - — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

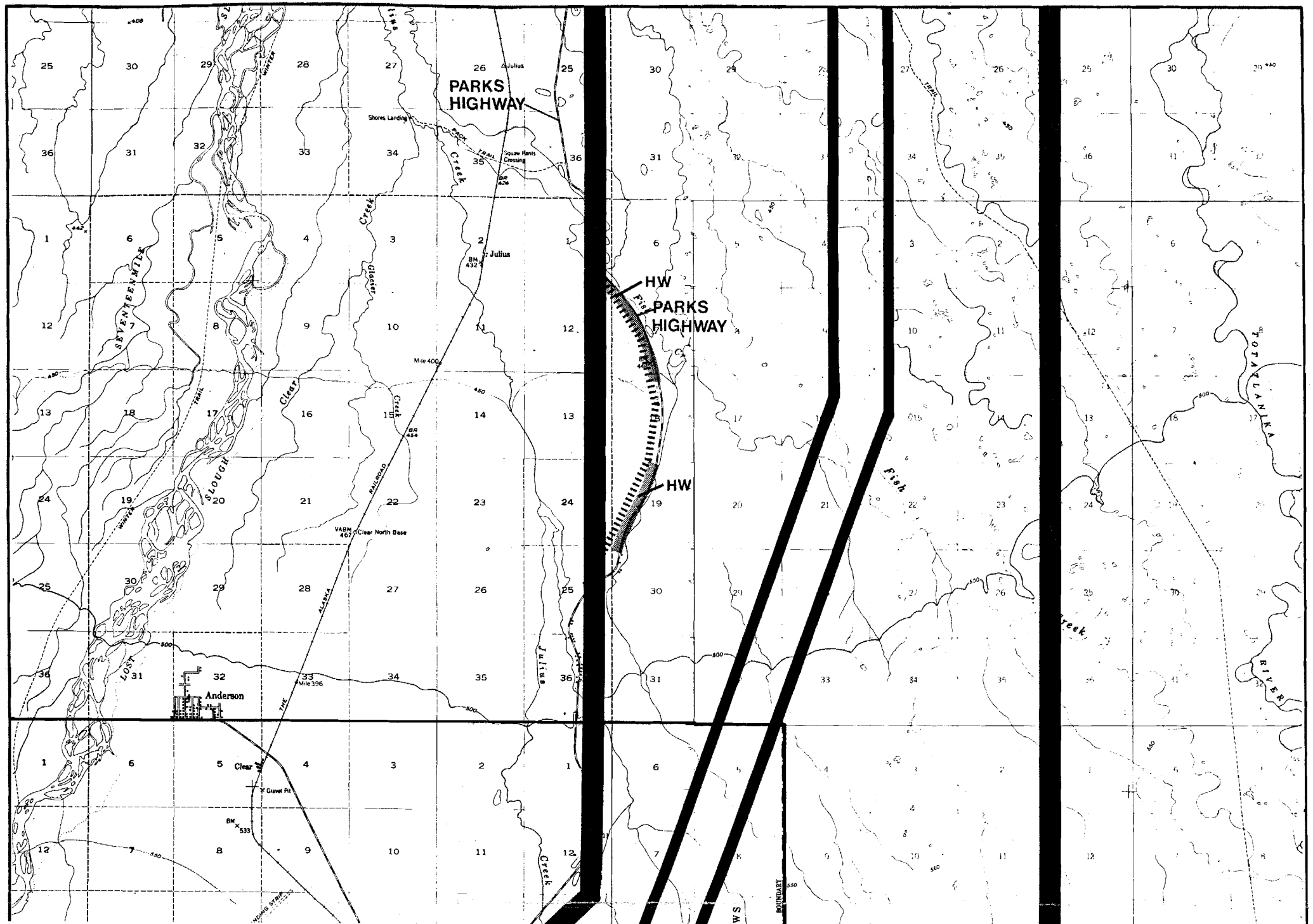
LEGEND

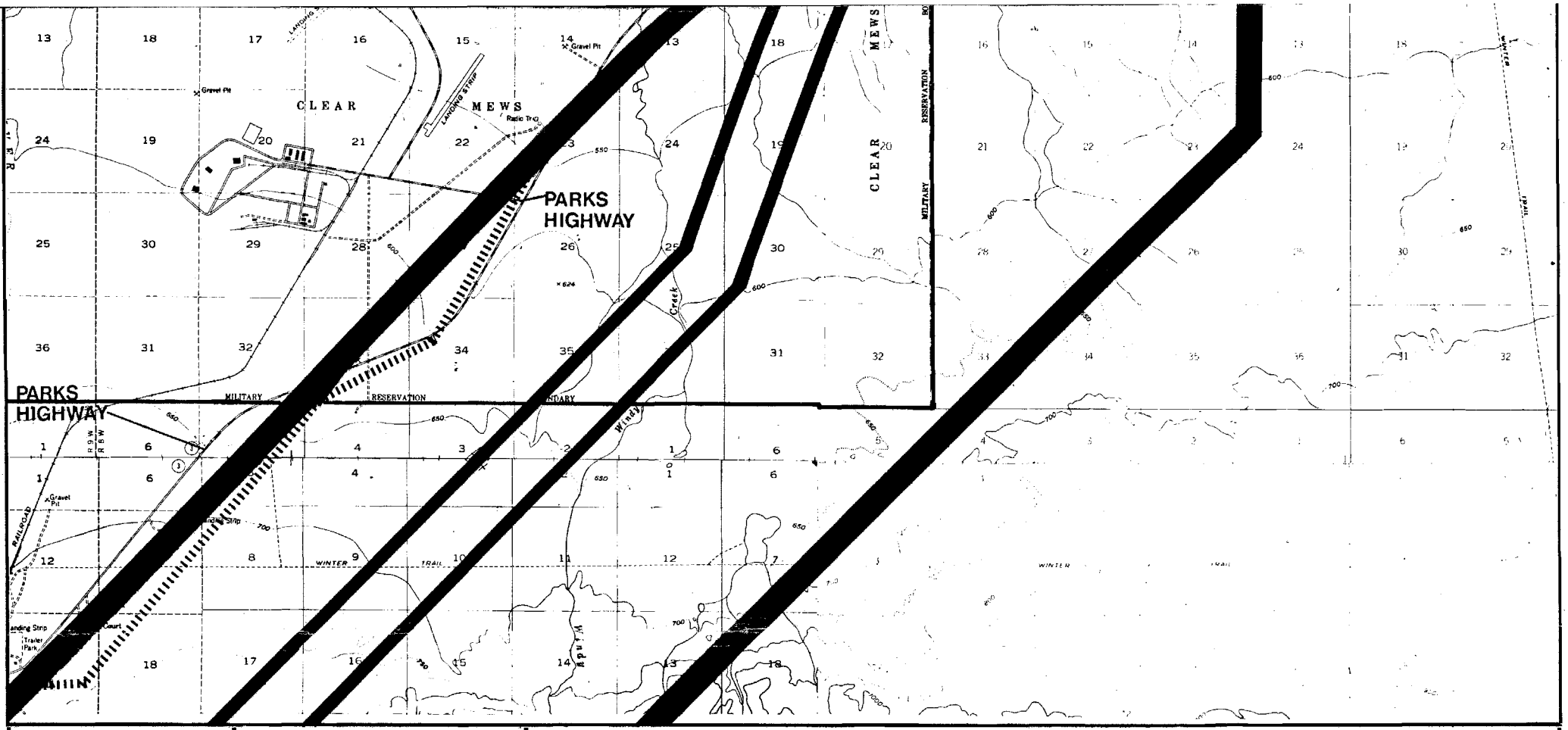
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS
HIGHWAY
Shores Landing
Ferry Trail
Square Rants Crossing
Julius
BM 432
HW
PARKS
HIGHWAY
HW
SEVENTEEN MILE
SLOUGH
Clear
Creek
Glacier
Creek
Mile 400
Railroad
Alaska
VABM 467 Clear North Base
Julius
Creek
Fish
Creek
TOTATLANIKA
RIVER
LOST
Anderson
Mile 396
Clear
Gravel Pit
BM 533
Creek
BOUNDARY

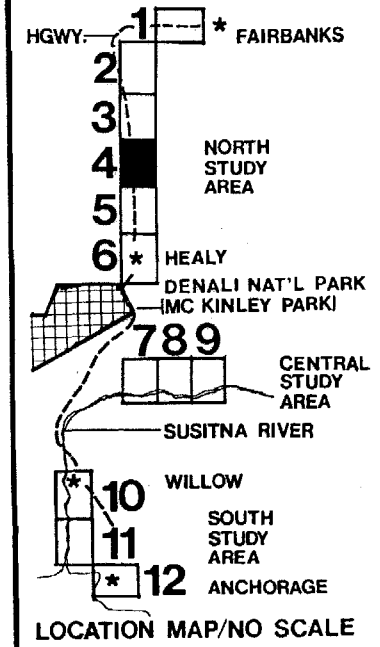


VISUAL CONSTRAINTS

MAP M4

PREPARED BY TES FIGURE 13 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

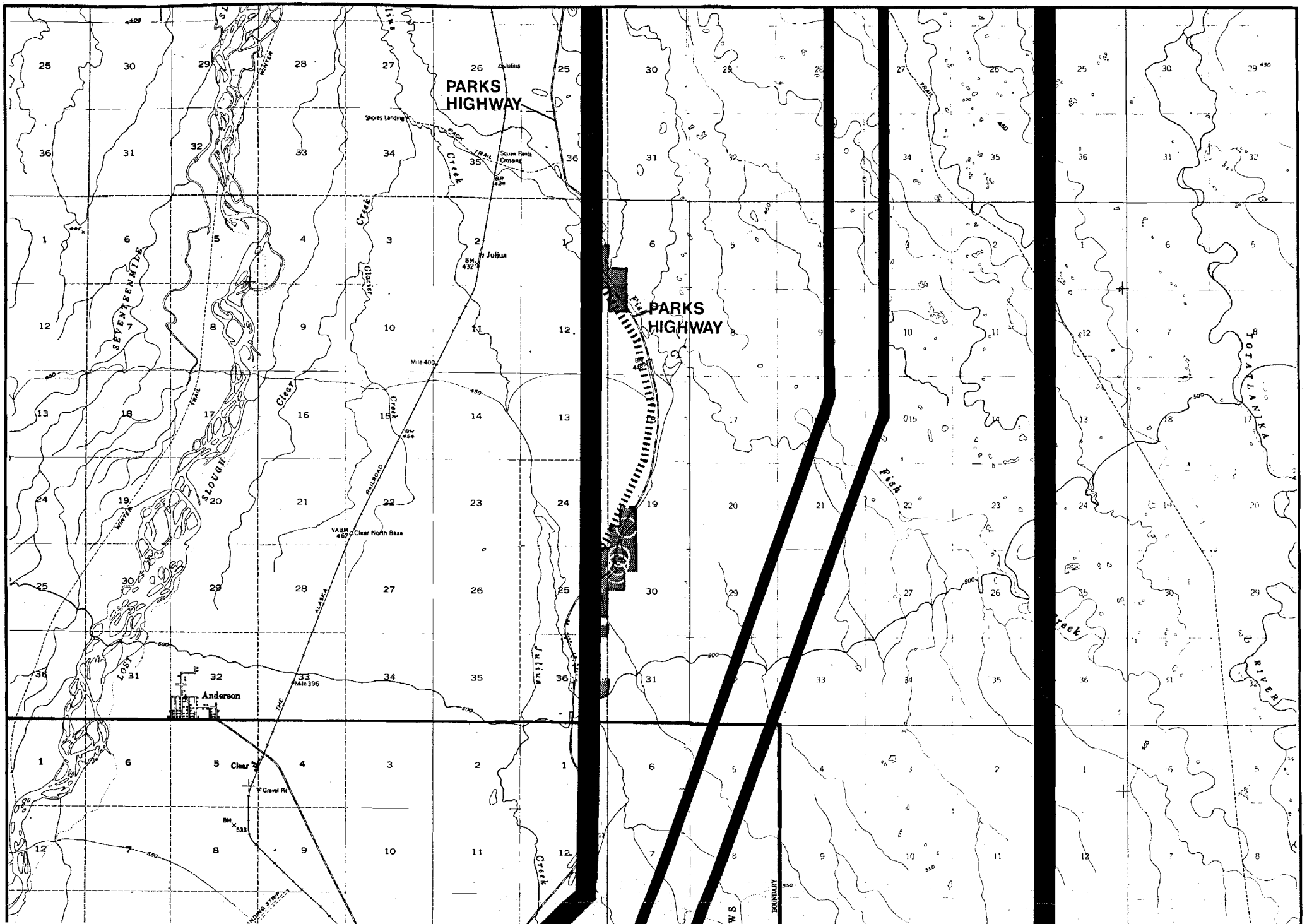
LEGEND

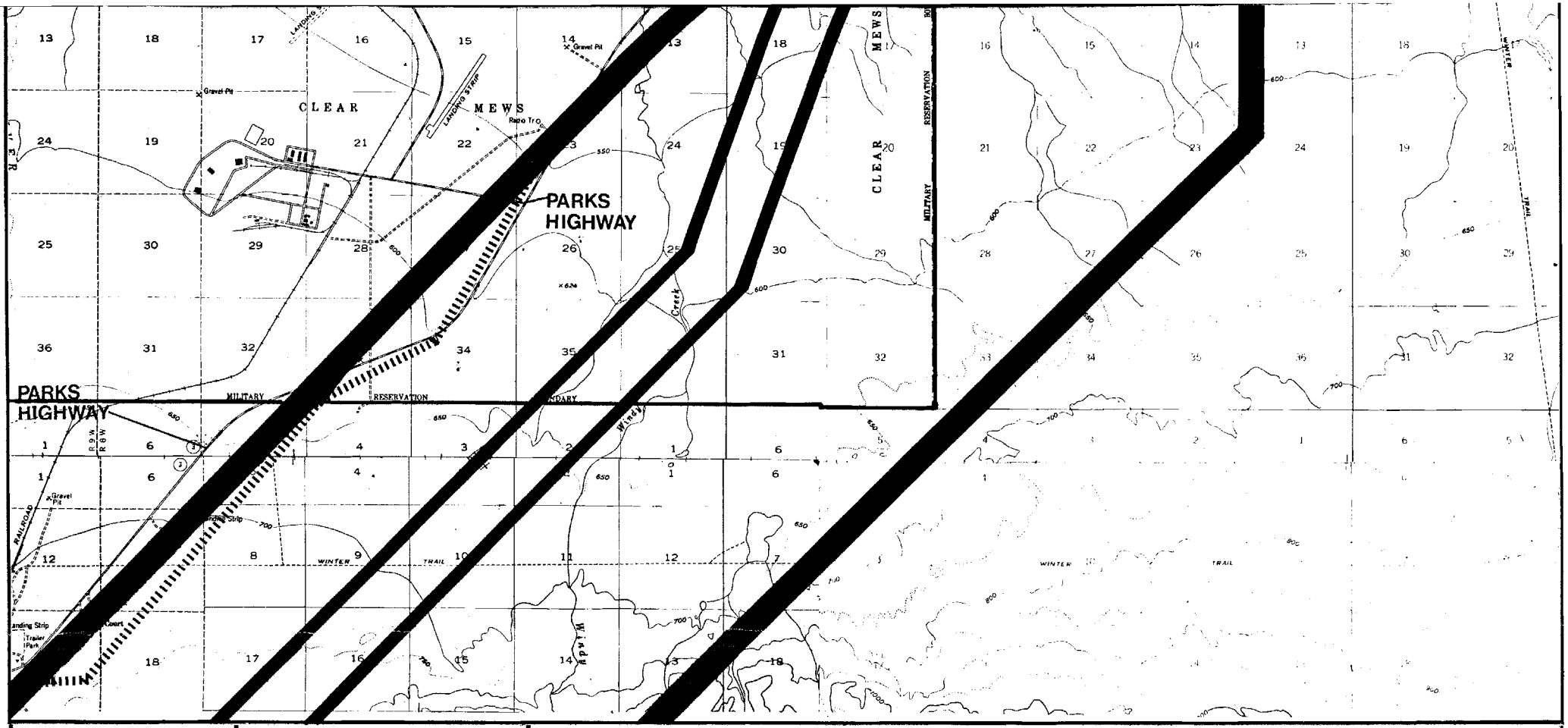
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS HIGHWAY
PARKS HIGHWAY
Julius
Shores Landing
Squaw Pants Crossing
Julius Creek
Glacier Creek
Clear Creek
SEVENTEENMILE SLOUGH
LOST SLOUGH
Mile 400
Mile 396
Clear North Base
YABM 467
Anderson
Clear
Gravel Pit
BM 533
RAILROAD
ALASKA
THE
Fish Creek
POTAYLANKA RIVER
BOUNDARY

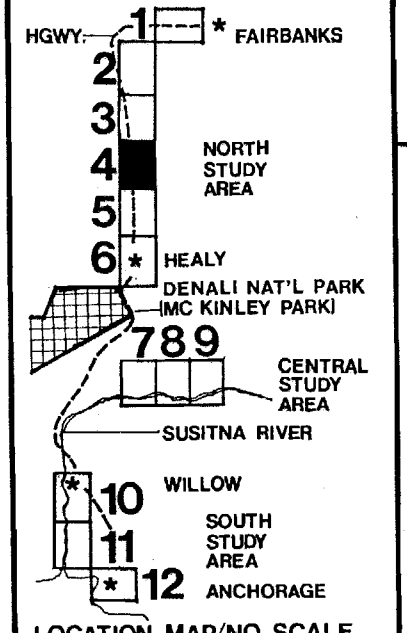


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS MAP M4

PREPARED BY TES FIGURE 15 of 48

ACRES



LOCATION MAP/NO SCALE

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- —RT— RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·—·— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —··—··— DISPOSAL AREA
- — - — - AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

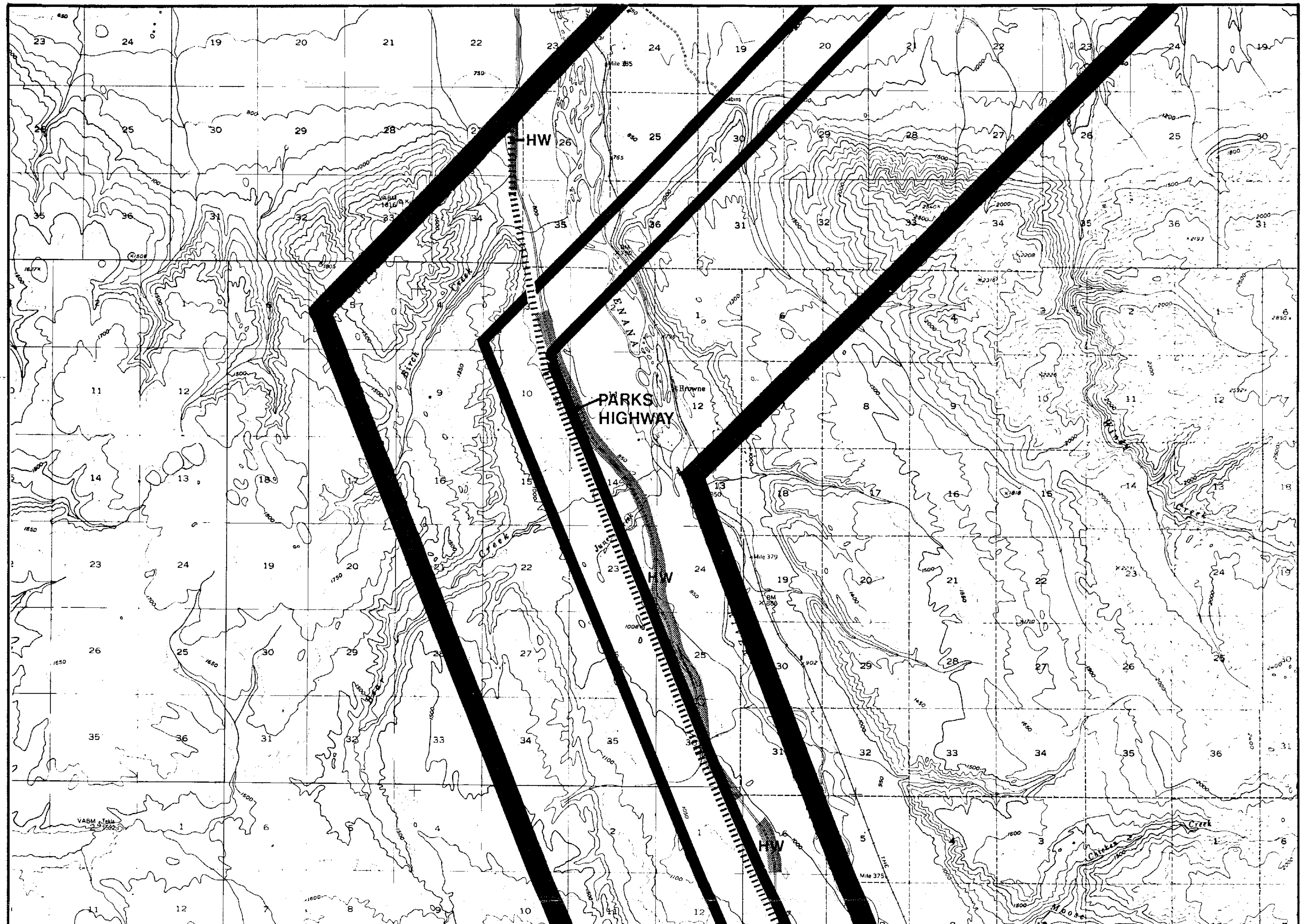
LEGEND

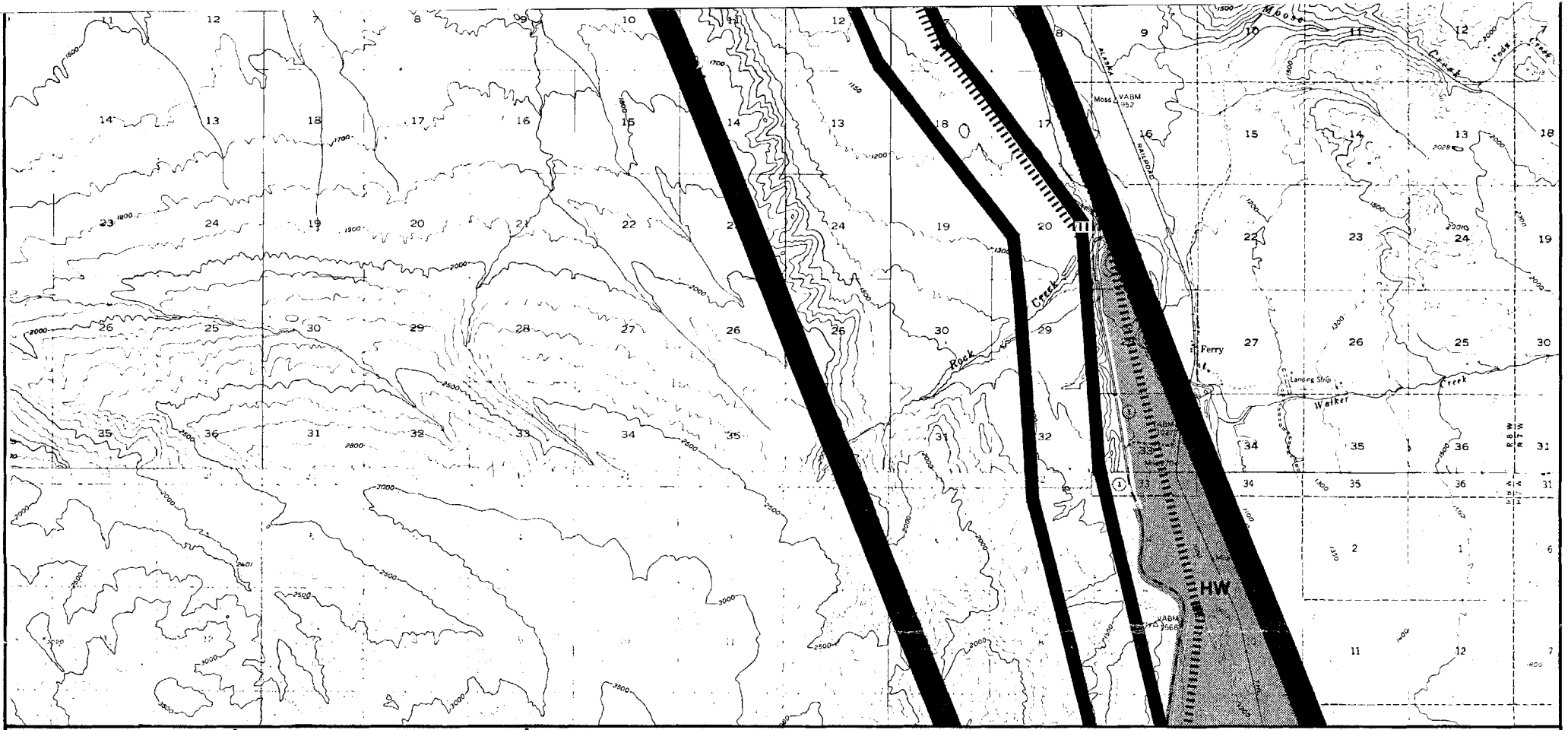
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS
HIGHWAY
HW
Birch Creek
NENANA
Browne
Mile 379
Mile 375
Chicken Creek
Moose

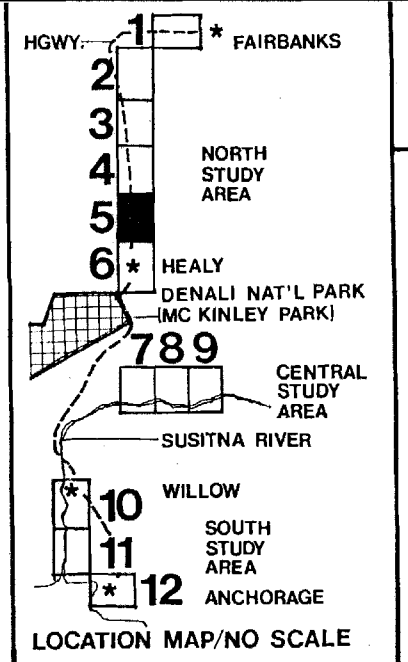


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M5

PREPARED BY TES FIGURE 17 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

LEGEND

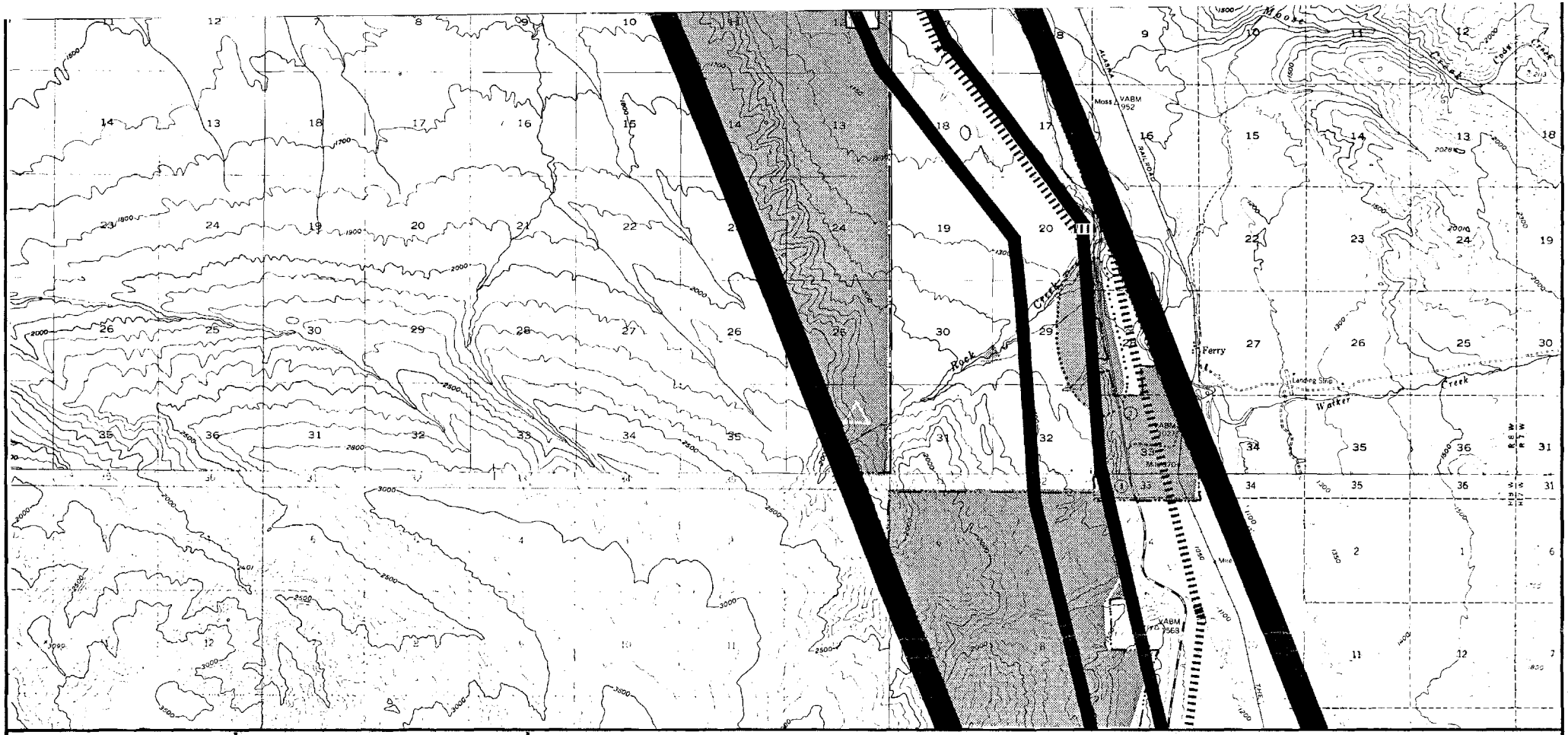
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PARKS
HIGHWAY
Mile 379
Mile 375
Moose
Creek

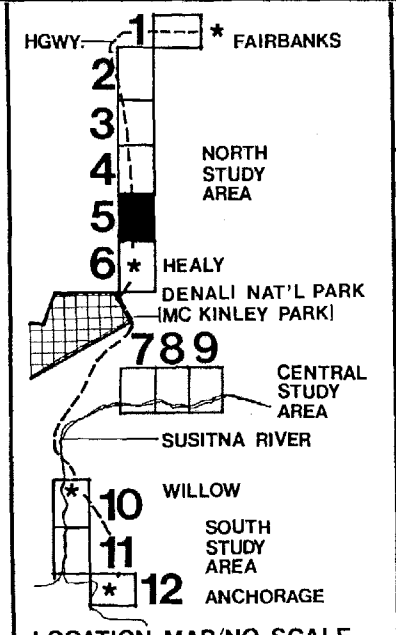


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS
MAP M5

PREPARED BY TES FIGURE 19 of 48

ACRES



LOCATION MAP/NO SCALE

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —··— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —·—·— DISPOSAL AREA
- — — — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

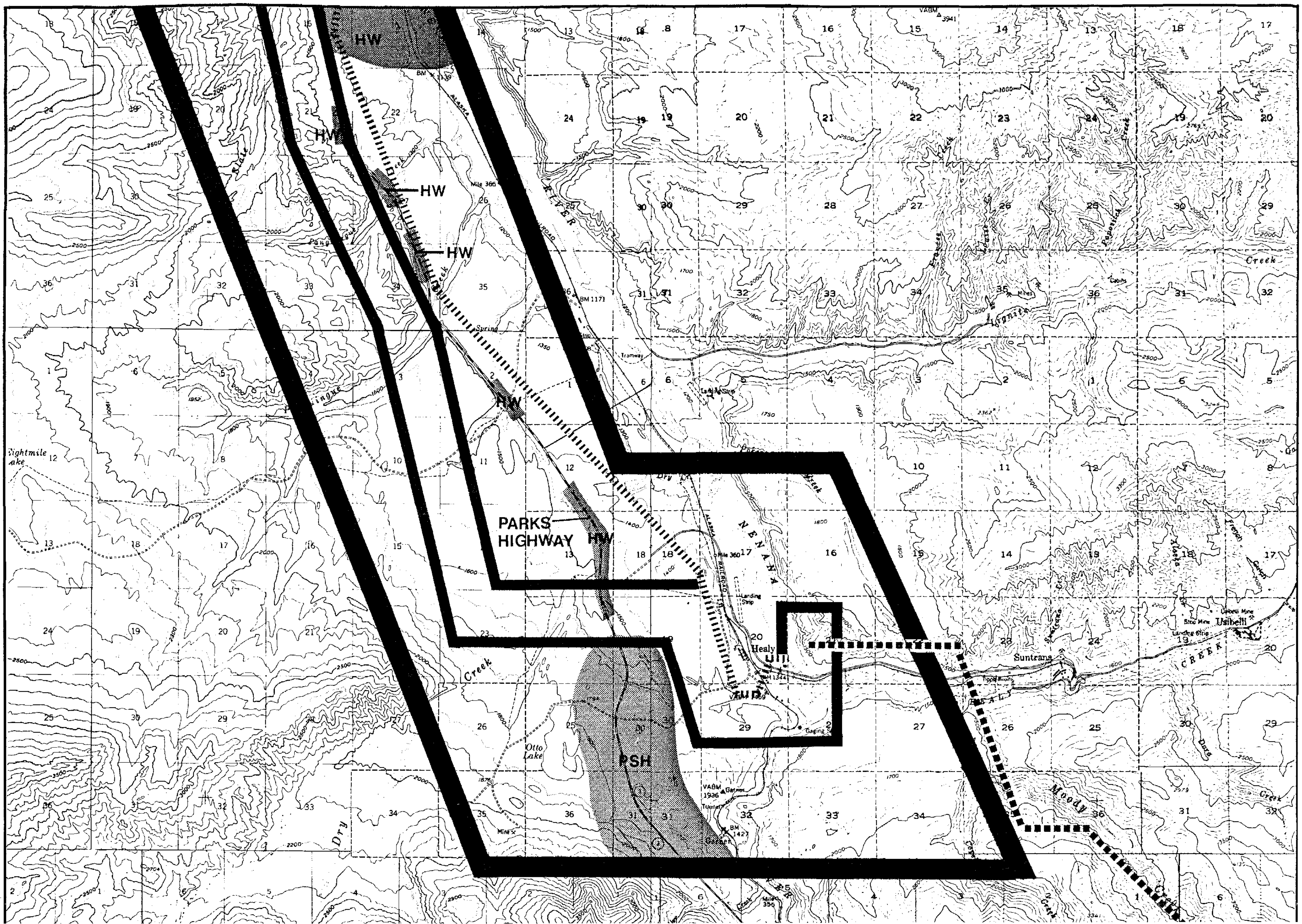
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

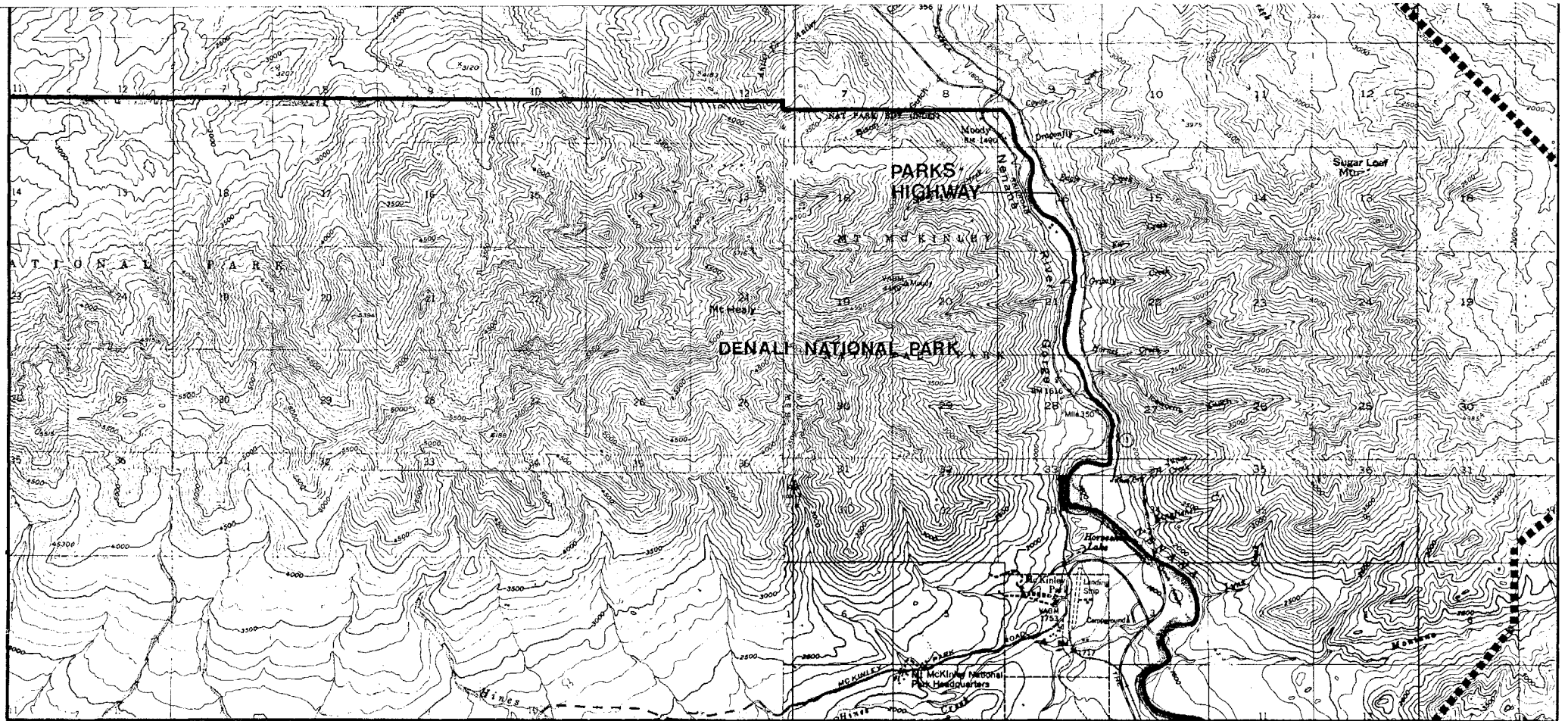
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


HW
HW
HW
HW
HW
PARKS HIGHWAY
HW
PSH
NENANA
RIVER
Healy
Suntrana
Usibelli
Otto Lake
Mile 365
Mile 360
Lignite
Moody
Garner
Tramway
Landing Strip

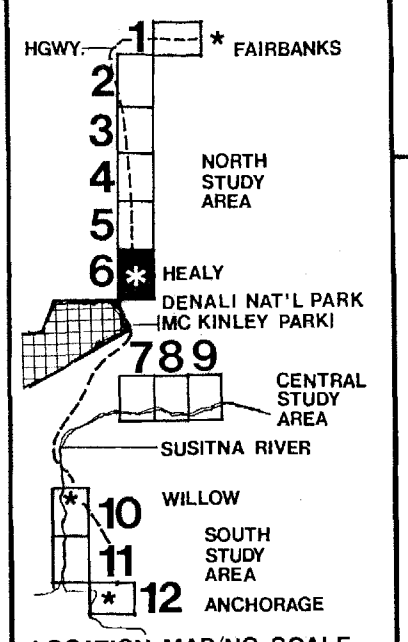


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M6

PREPARED BY TES FIGURE 21 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

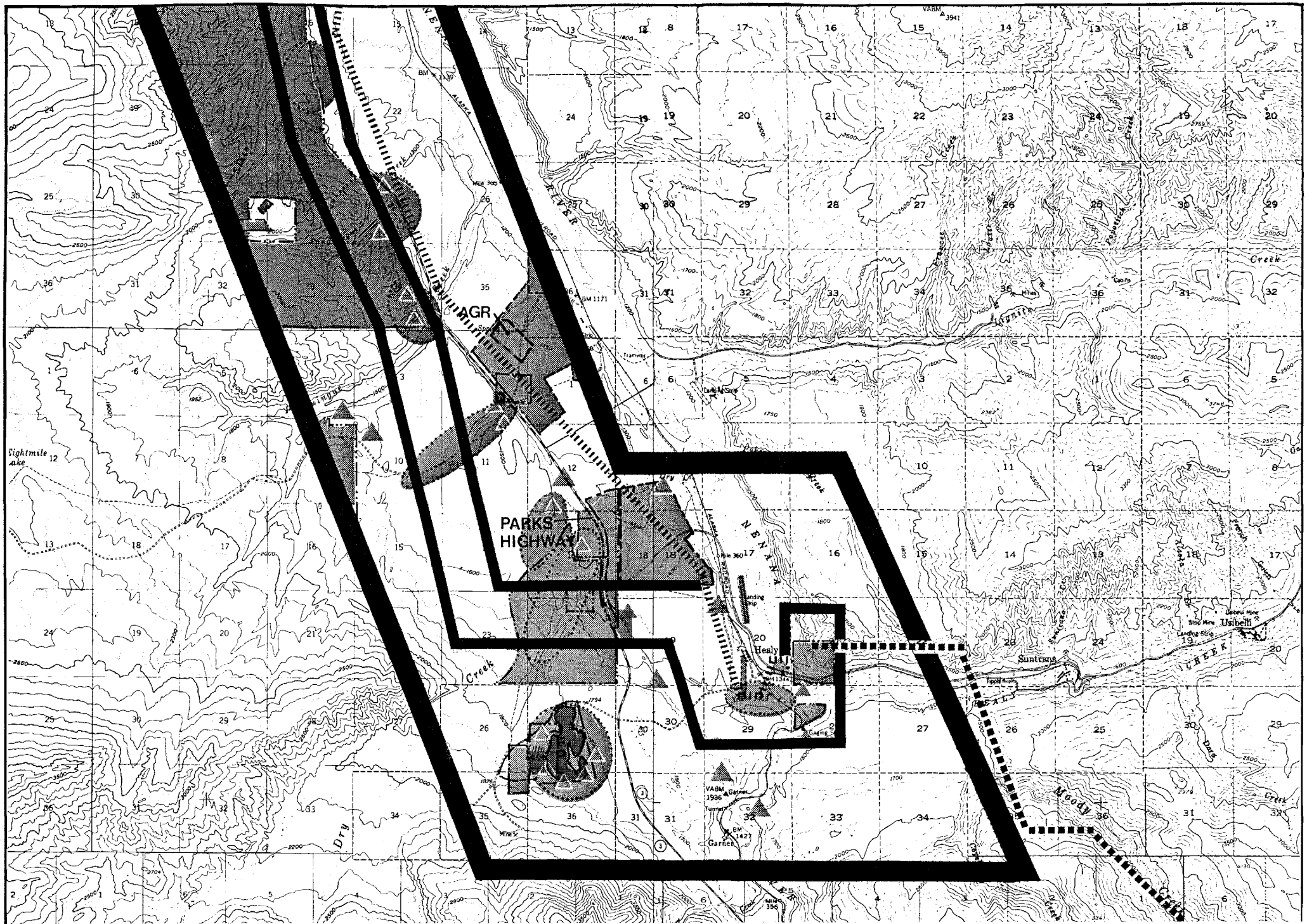
LEGEND

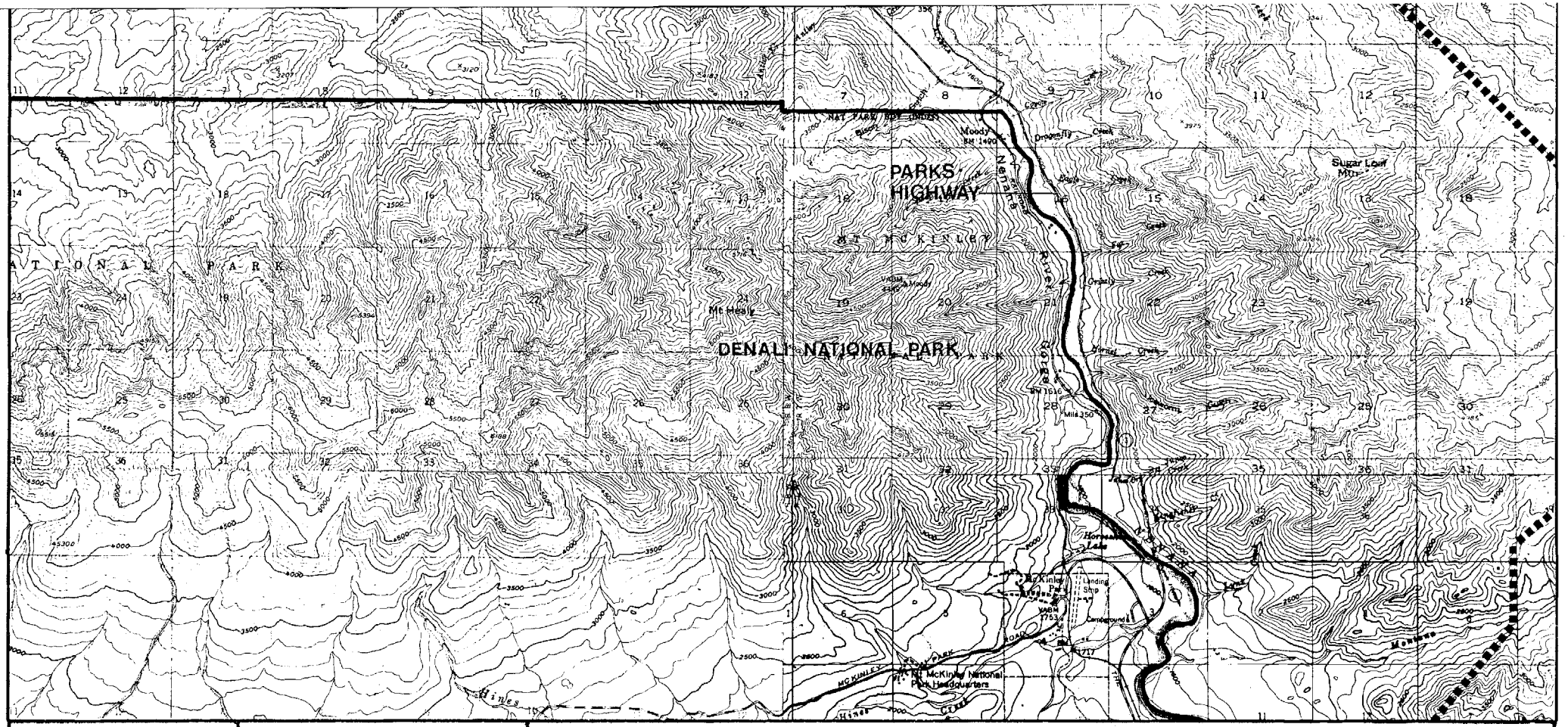
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


AGR
PARKS HIGHWAY
NENANA
Healy
Suntrana
Usibelli
Garner
Dry Creek
Moody
Lignite
Eightmile Lake

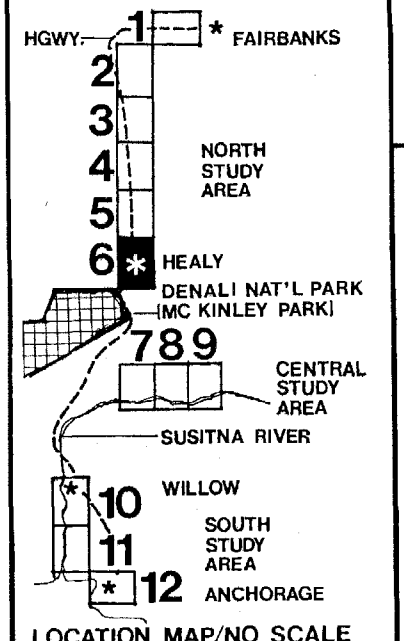


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS
MAP M6

PREPARED BY TES FIGURE 23 of 48

ACRES



LOCATION MAP/NO SCALE

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·—·— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —··—·· DISPOSAL AREA
- — — — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ..... AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

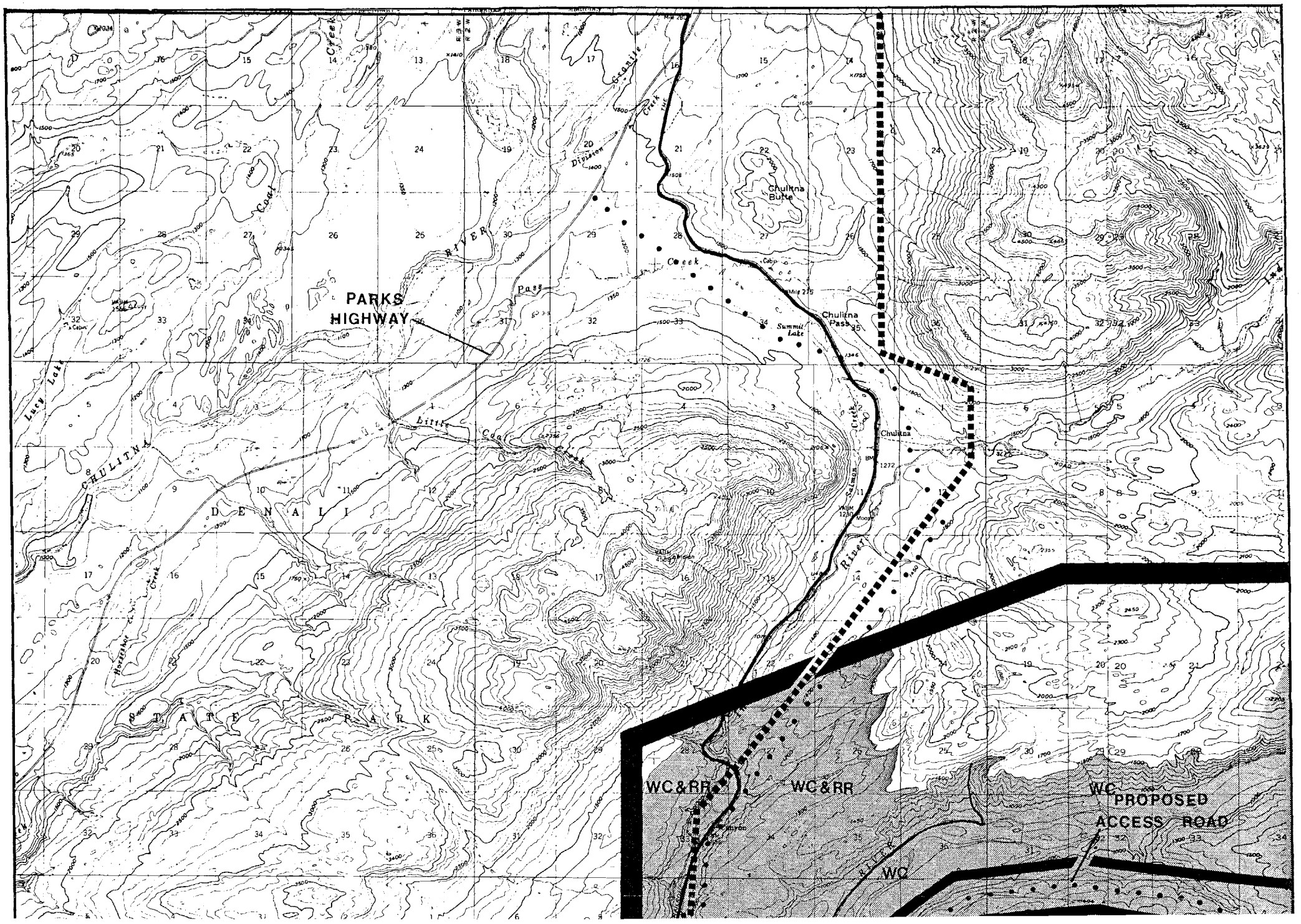
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

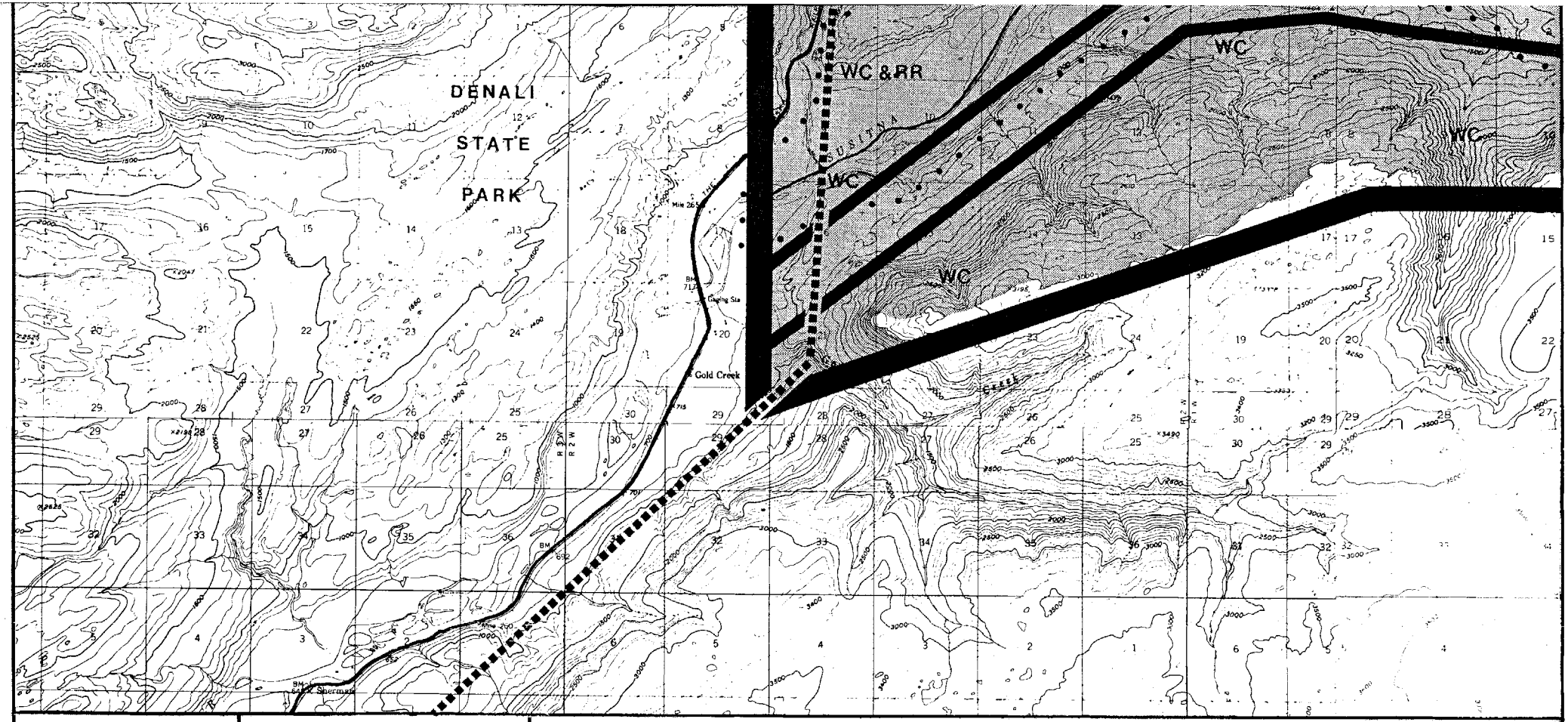
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

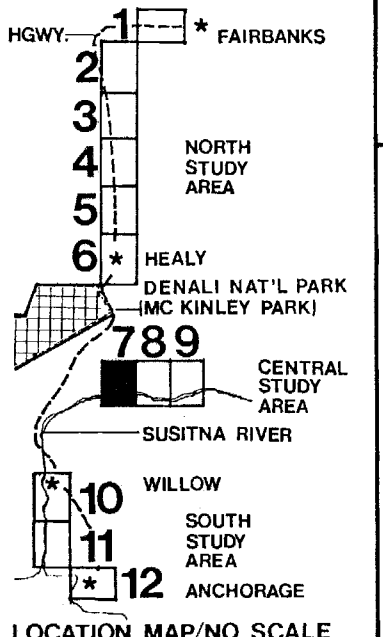

PARKS
HIGHWAY
Chulitna
Butte
Chulitna
Pass
Summit
Lake
Chulitna
DENALI
STATE PARK
WC&RR
WC&RR
WC
PROPOSED
ACCESS ROAD
WC



VISUAL CONSTRAINTS
MAP M7

PREPARED BY TES FIGURE 25 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

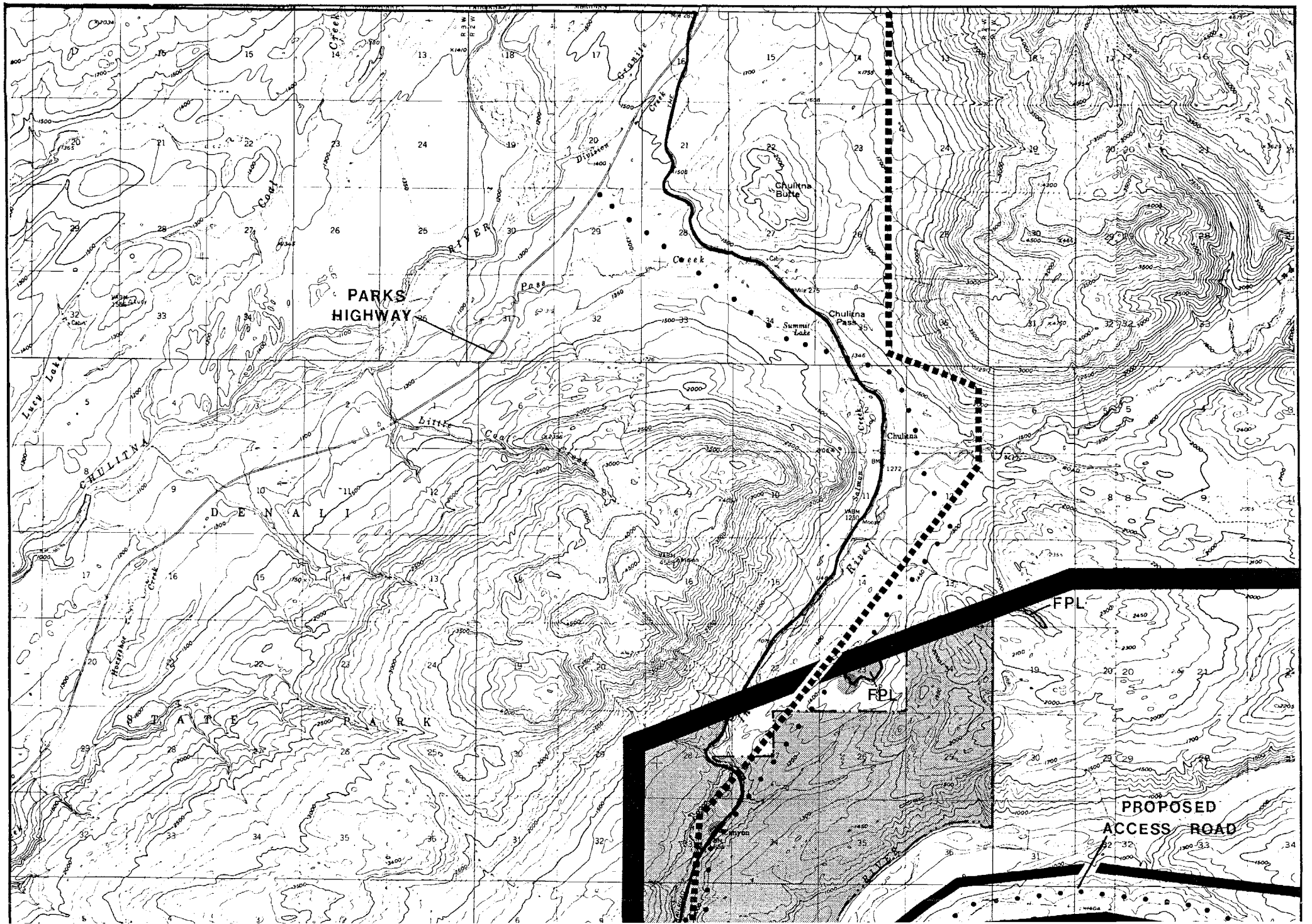
LEGEND

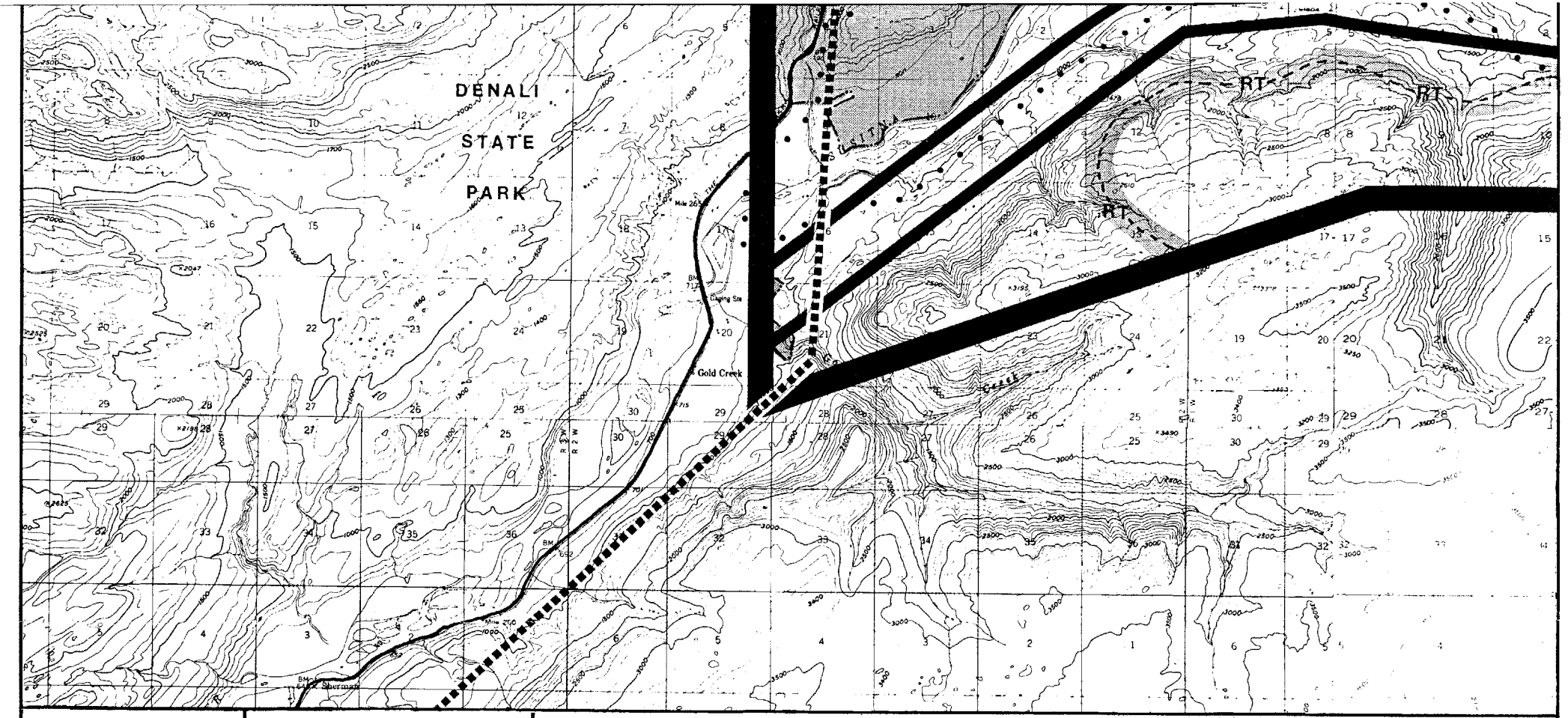
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

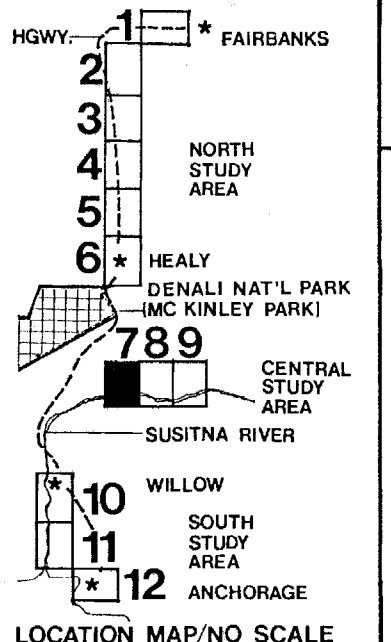

PARKS HIGHWAY
Chulitna Butte
Chulitna Pass
Summit Lake
Chulitna
Lucy Lake
Little Coal Creek
Coal Creek
Gravine Creek
Diversion Creek
Hazelnut Creek
Salmon River
Lake
CHULITNA
D E N A L I
S T A T E P A R K
FPL
FPL
PROPOSED
ACCESS ROAD



MANMADE CONSTRAINTS
MAP M7

PREPARED BY TES FIGURE 27 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·—·— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —··—··— DISPOSAL AREA
- — — — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ..... AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

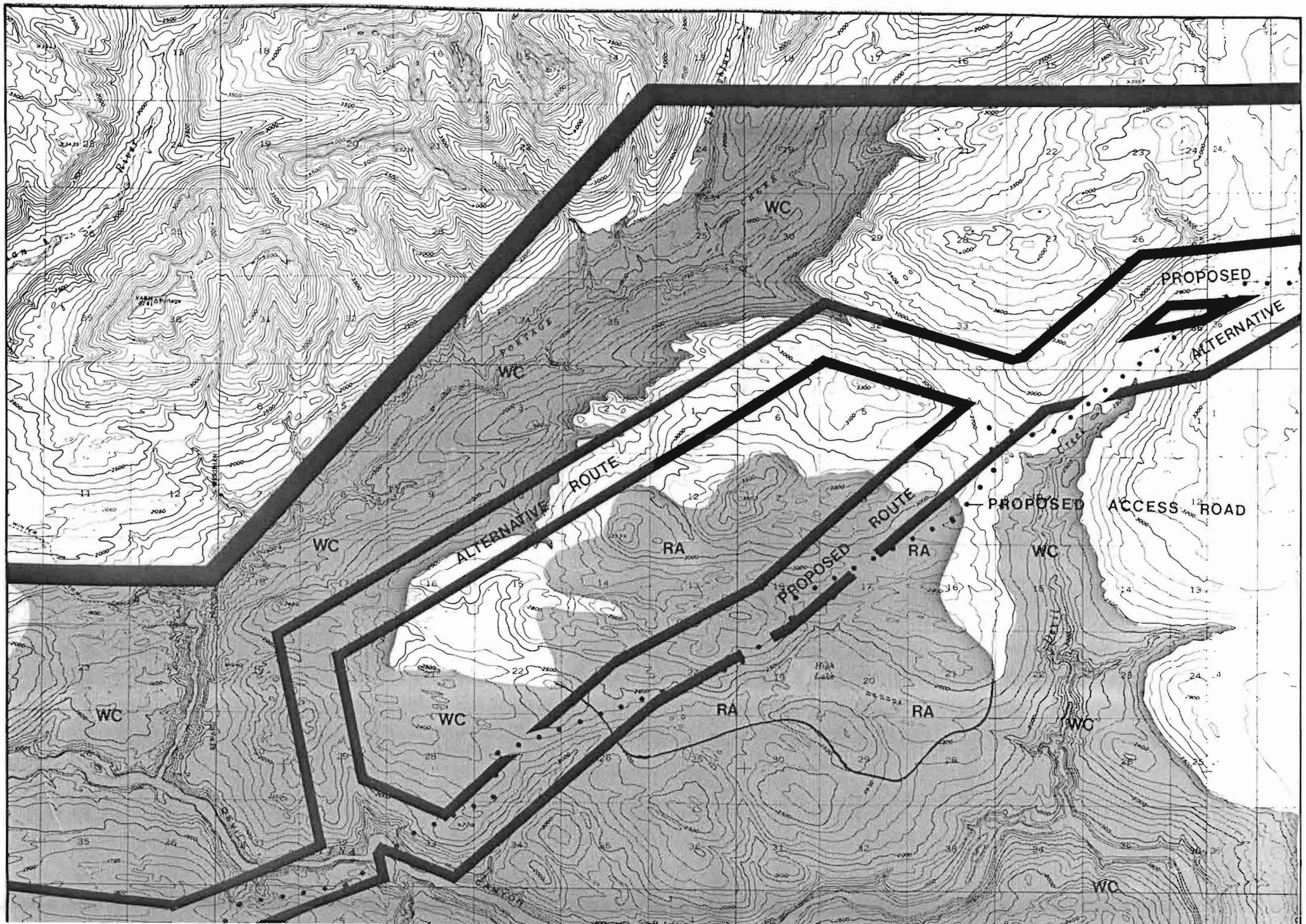
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

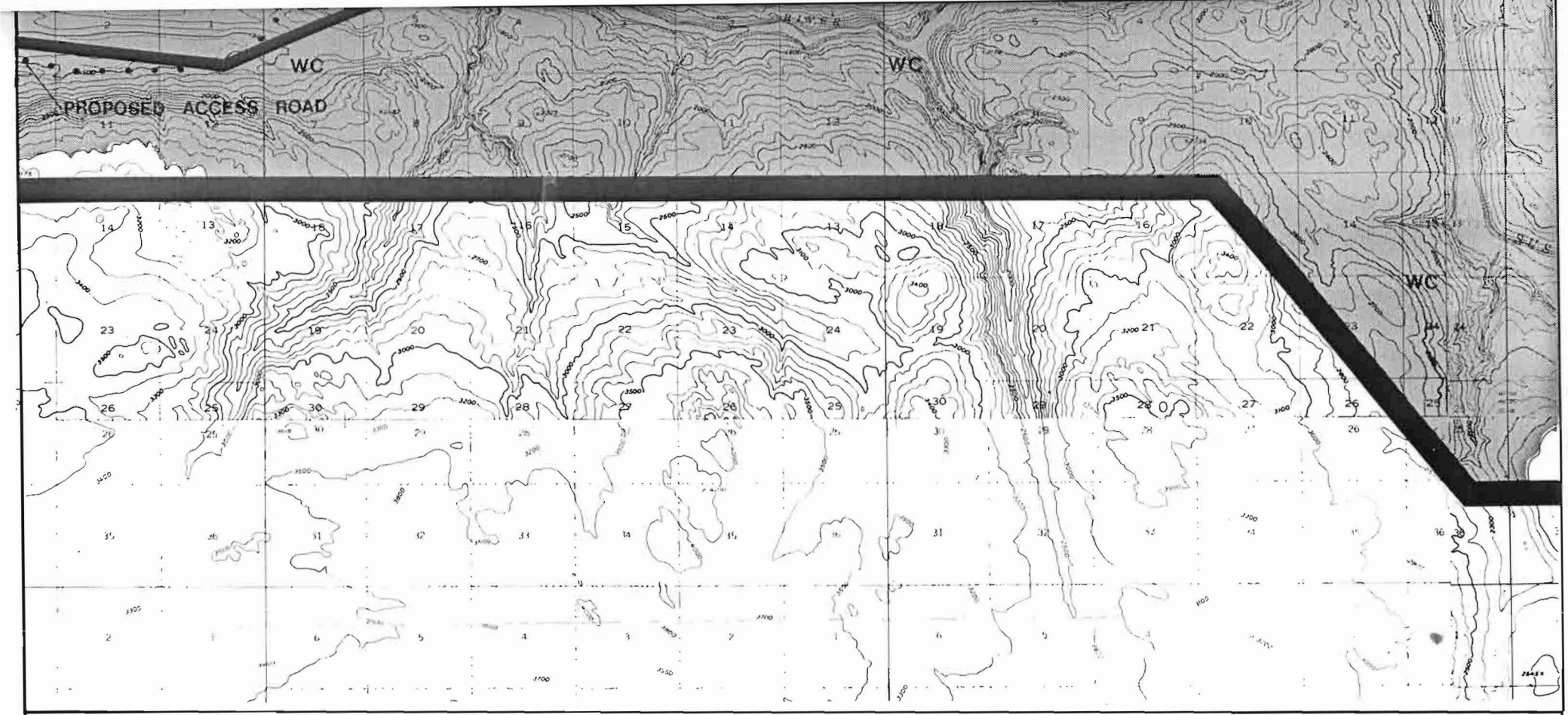
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PROPOSED
ALTERNATIVE
ROUTE
ALTERNATIVE
ROUTE
PROPOSED
PROPOSED ACCESS ROAD
WC
RA
WC
RA
WC
RA
WC
RA
WC
WC
WC
WC

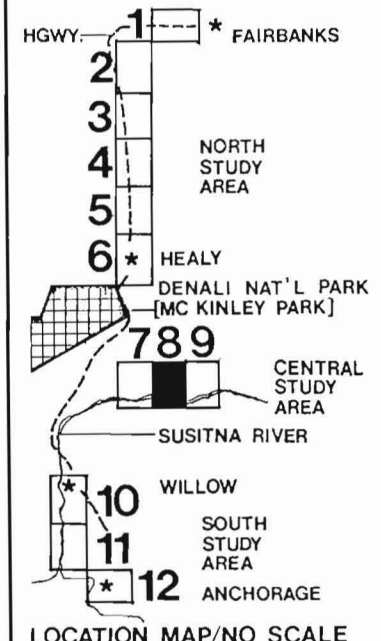


VISUAL CONSTRAINTS

MAP M8

PREPARED BY TES FIGURE 29 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

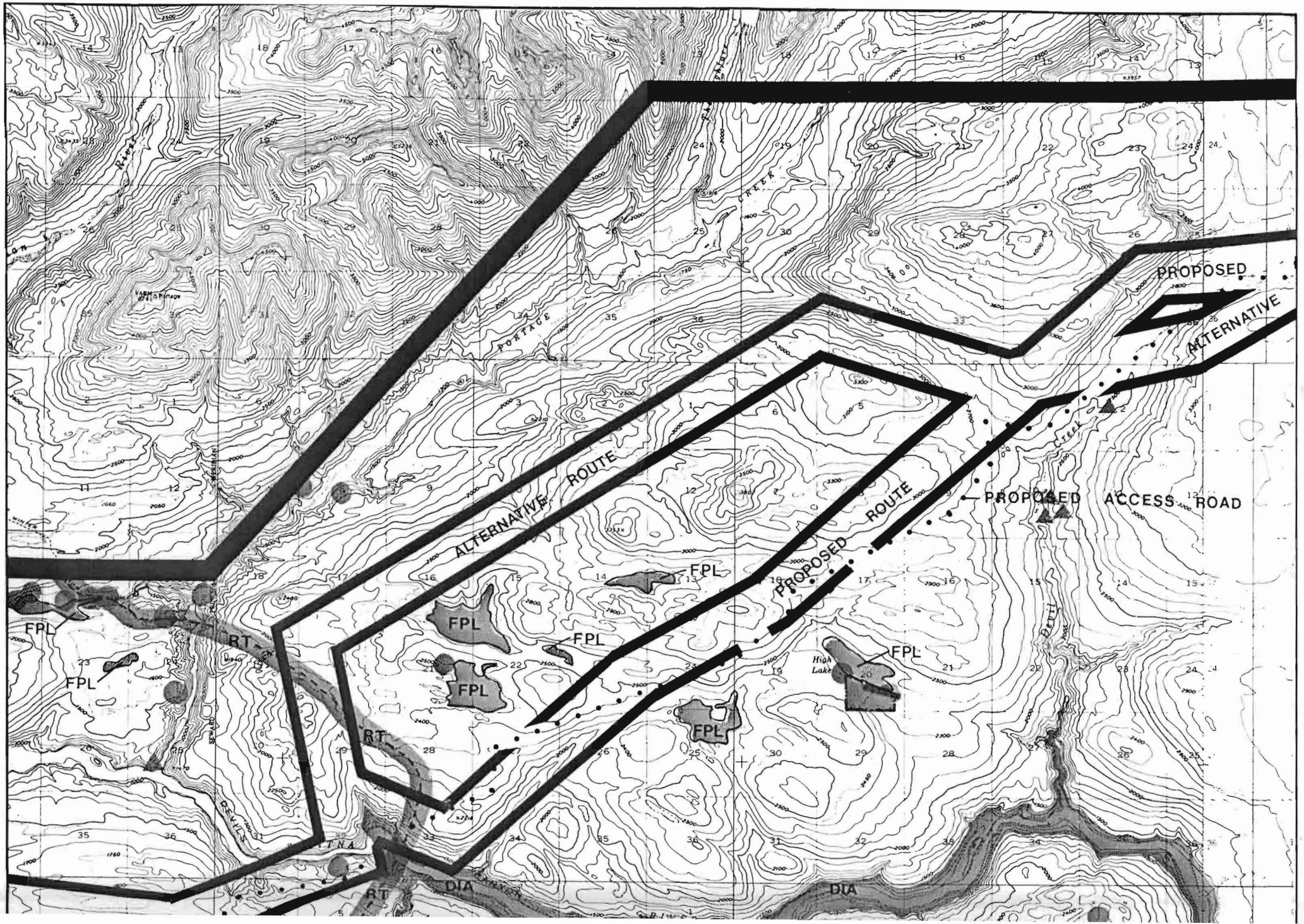
LEGEND

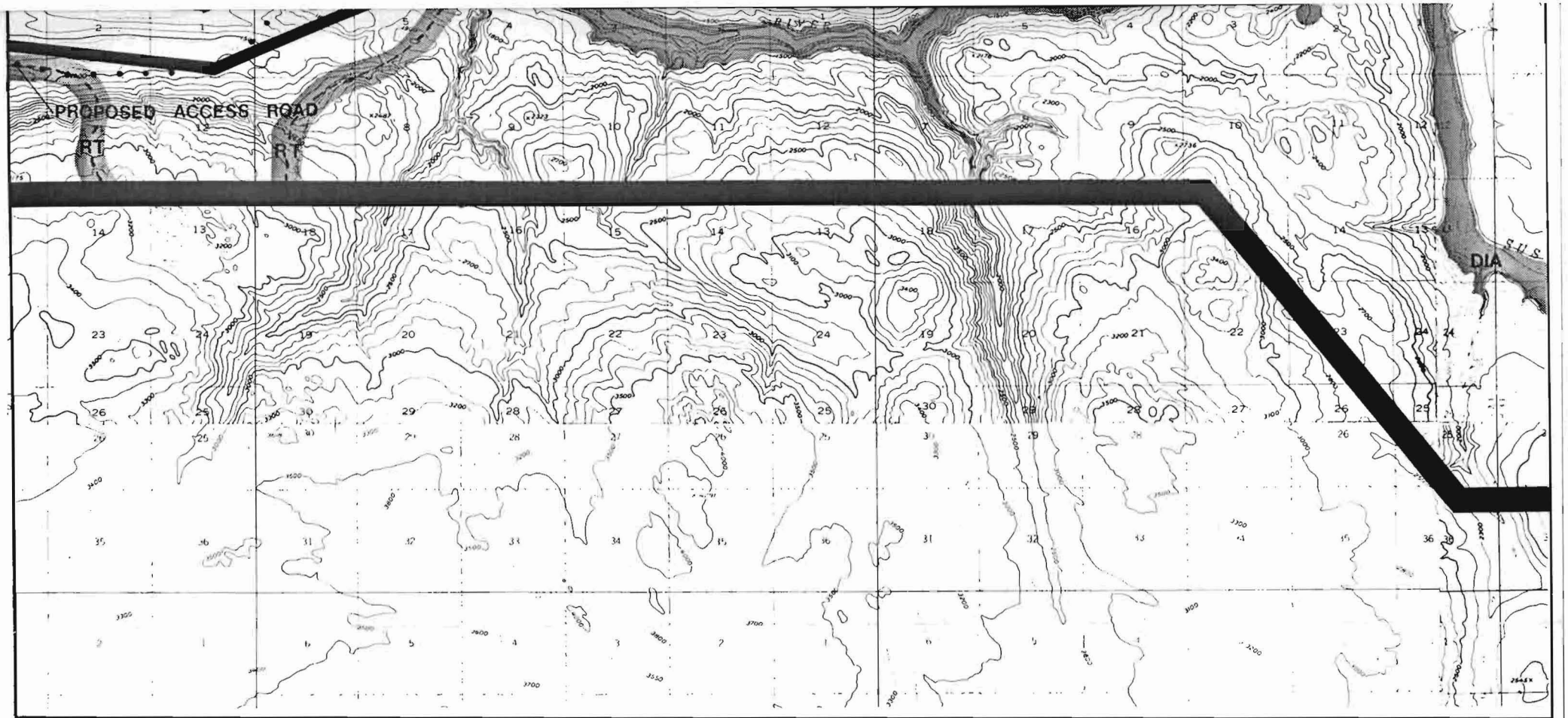
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PROPOSED
ALTERNATIVE
ALTERNATIVE ROUTE
PROPOSED ROUTE
PROPOSED ACCESS ROAD
FPL
FPL
FPL
FPL
FPL
FPL
RT
RT
RT
DIA
DIA
PORTAGE
CREEK
Devil
High Lake

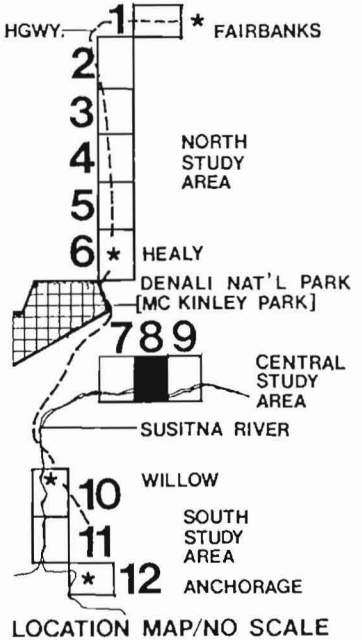


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS
MAP M8

PREPARED BY TES FIGURE 31 of 48

ACRES



LOCATION MAP/NO SCALE

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- CAMPSITE
- RT — RECREATION TRAIL
- NAME — GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- EXISTING PRIVATE LAND
- DEVELOPMENT AREA
- DISPOSAL AREA
- AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA — DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

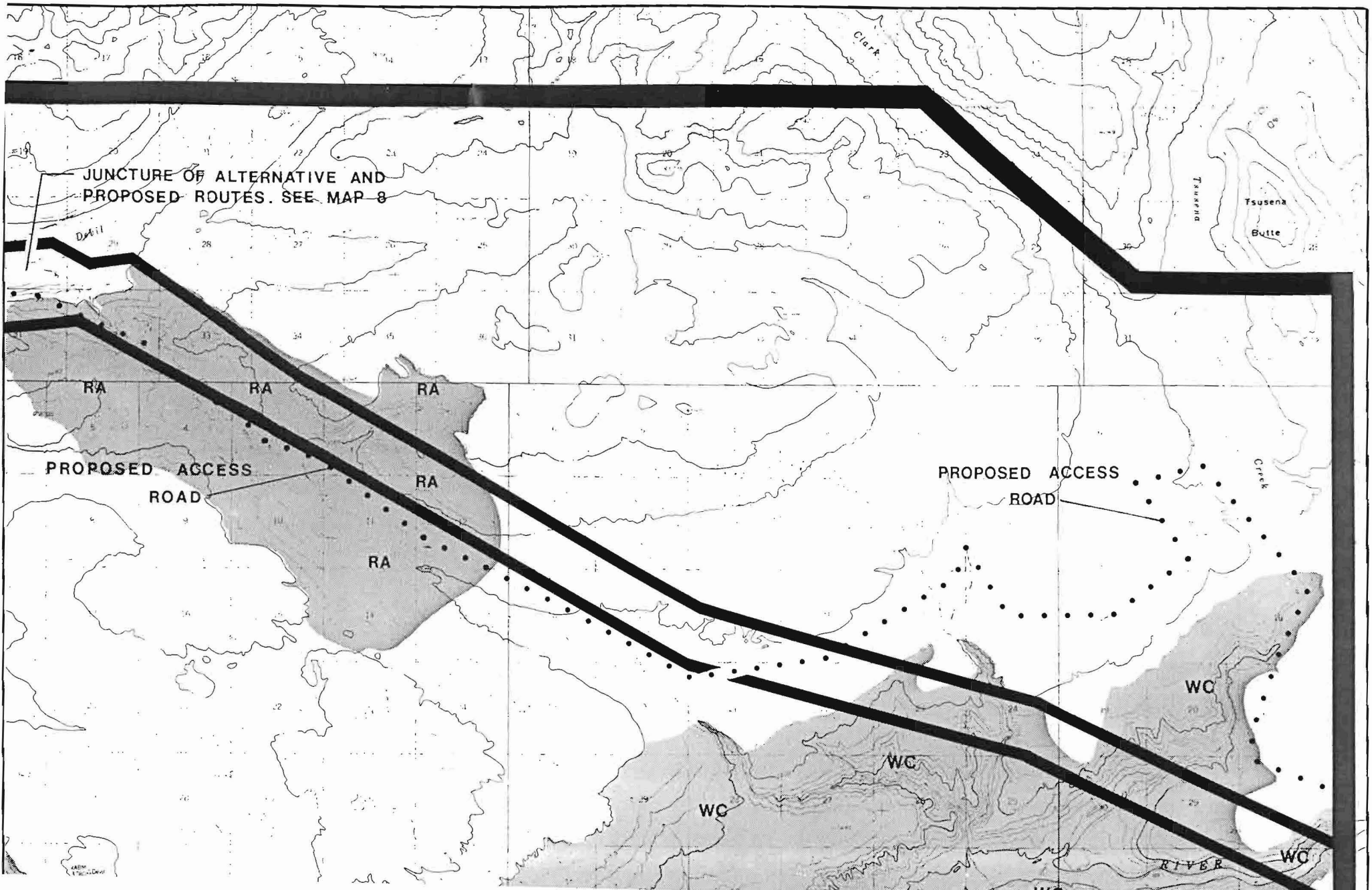
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL — FLOAT PLANE LANDING SITE

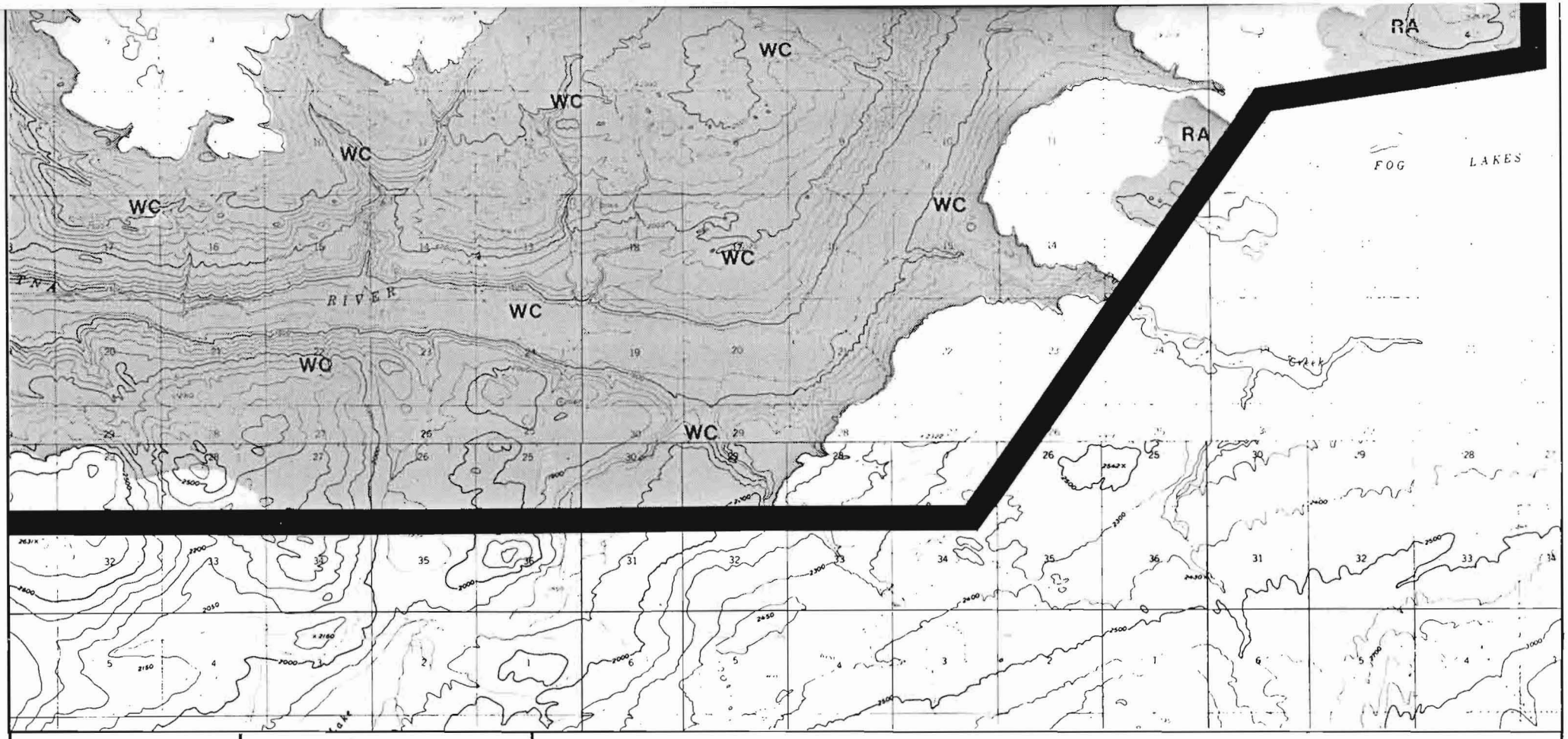
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


JUNCTURE OF ALTERNATIVE AND PROPOSED ROUTES. SEE MAP 8
RA
RA
RA
RA
RA
PROPOSED ACCESS ROAD
PROPOSED ACCESS ROAD
WC
WC
WC
WC
RIVER
Clark
Tsusena Butte
Creek

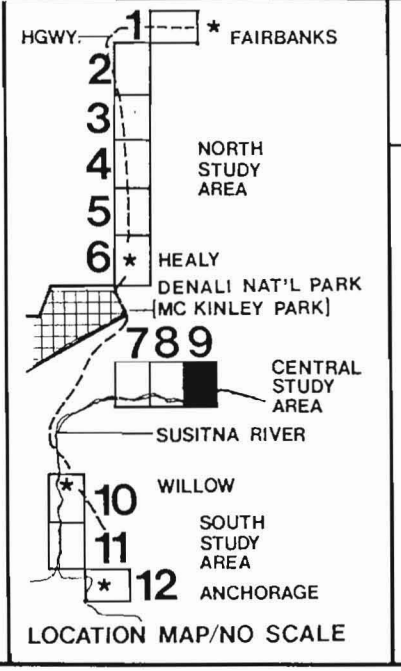


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M9

PREPARED BY TES FIGURE 33 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

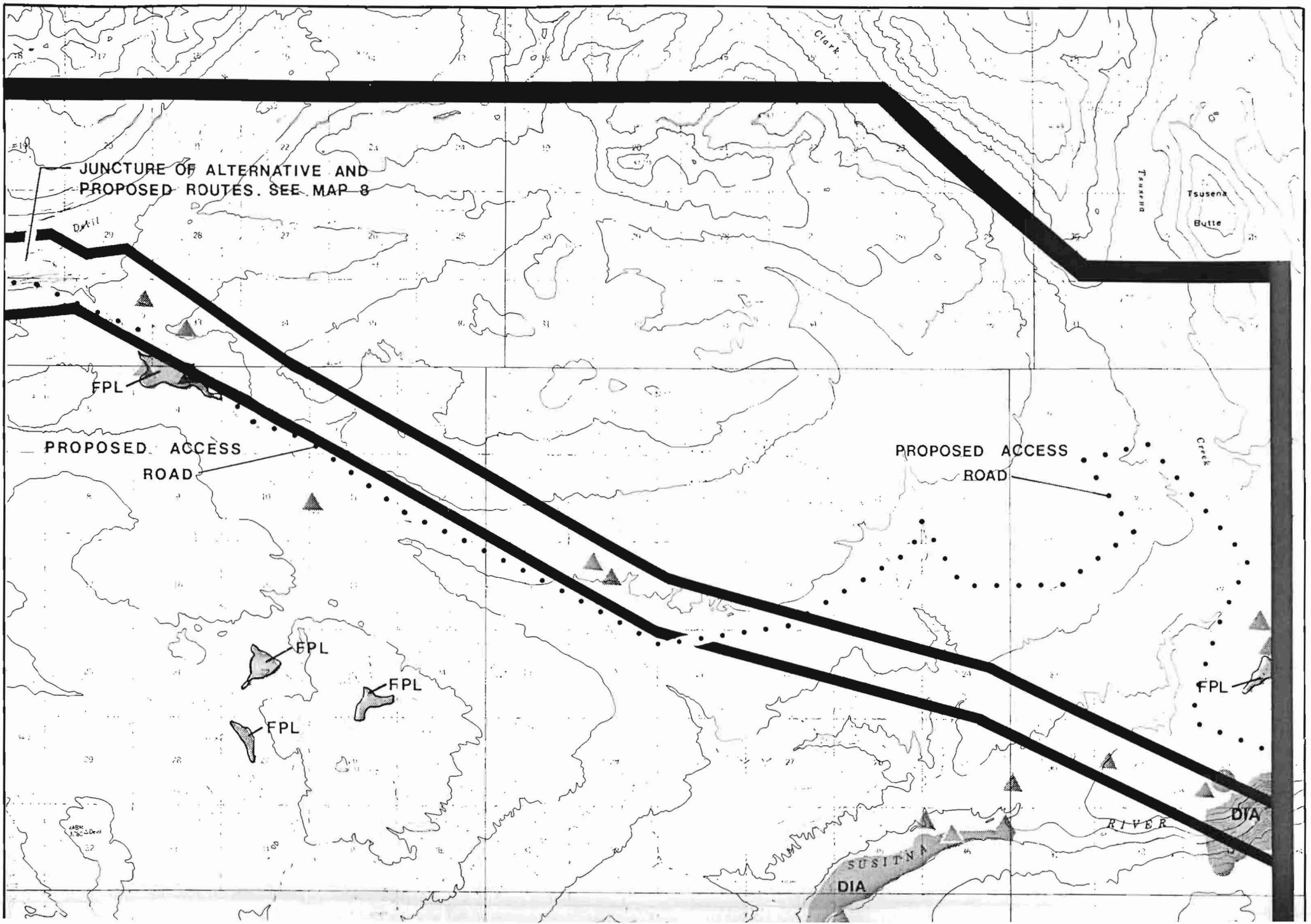
LEGEND

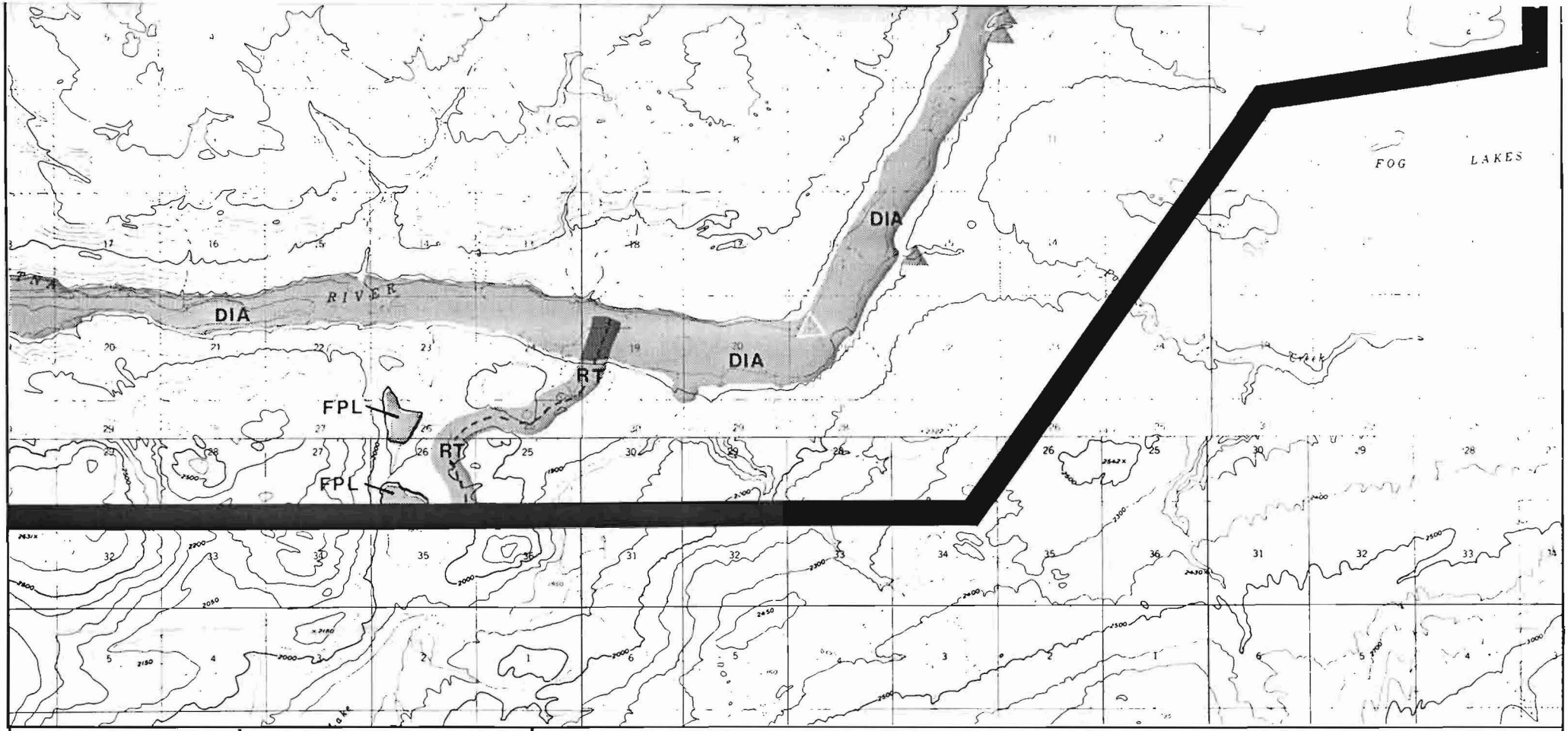
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

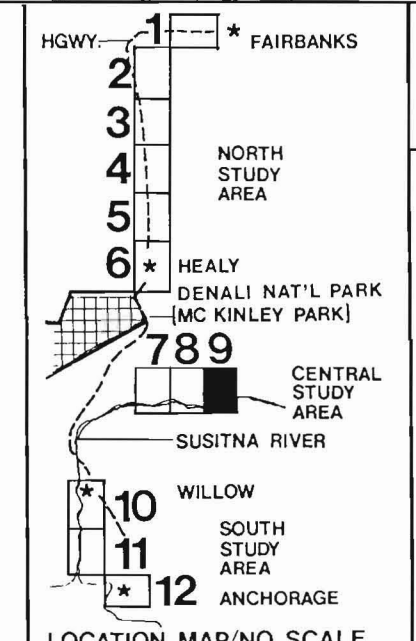

JUNCTURE OF ALTERNATIVE AND PROPOSED ROUTES. SEE MAP 8
FPL
PROPOSED ACCESS ROAD
PROPOSED ACCESS ROAD
FPL
FPL
FPL
FPL
DIA
DIA
RIVER
SUSITNA
Clark
Tsusena
Butte
Creek



MANMADE CONSTRAINTS
MAP M9

PREPARED BY TES FIGURE 35 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —··— EXISTING PRIVATE LAND
- — - — DEVELOPMENT AREA
- —··— DISPOSAL AREA
- — - — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

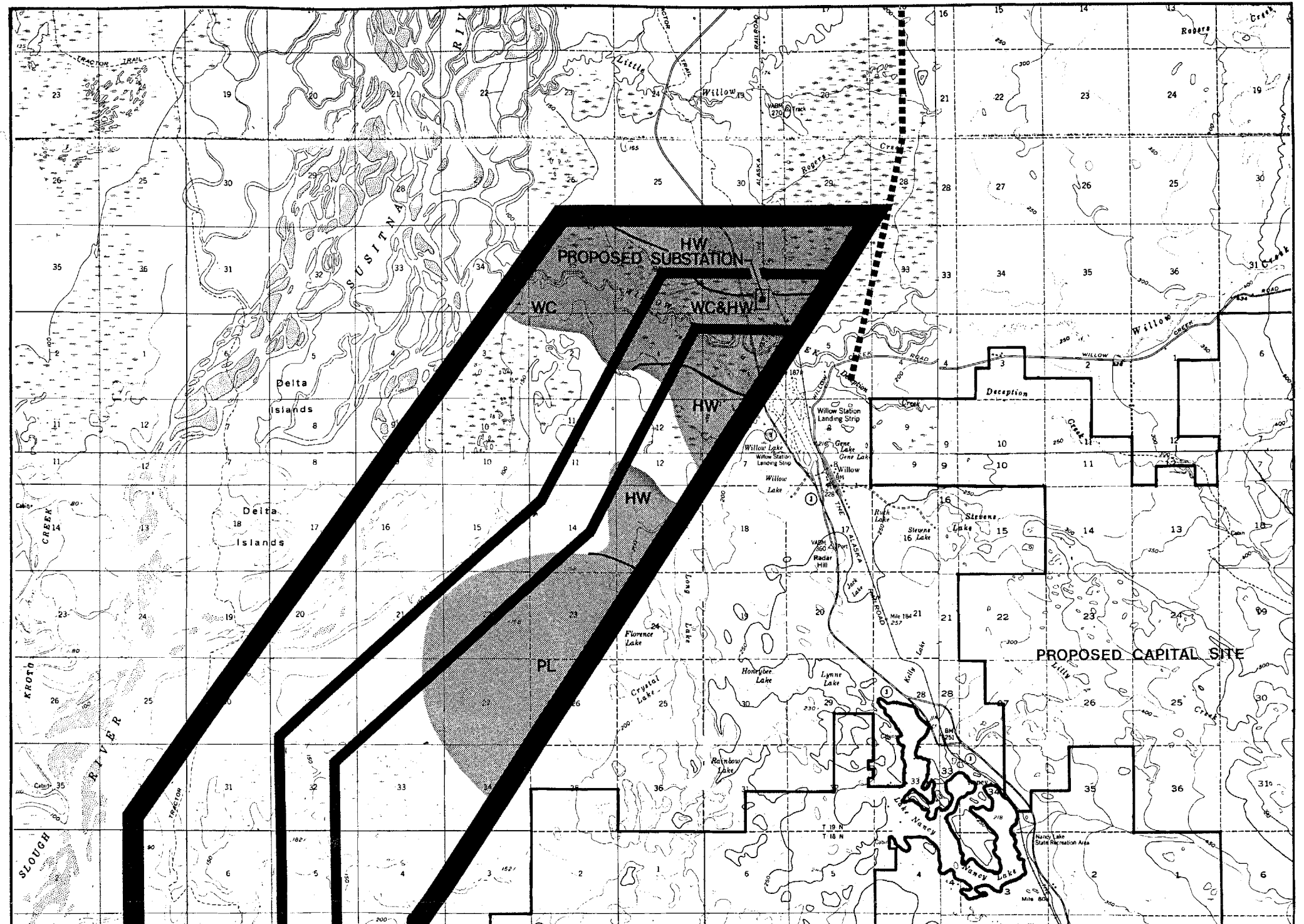
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

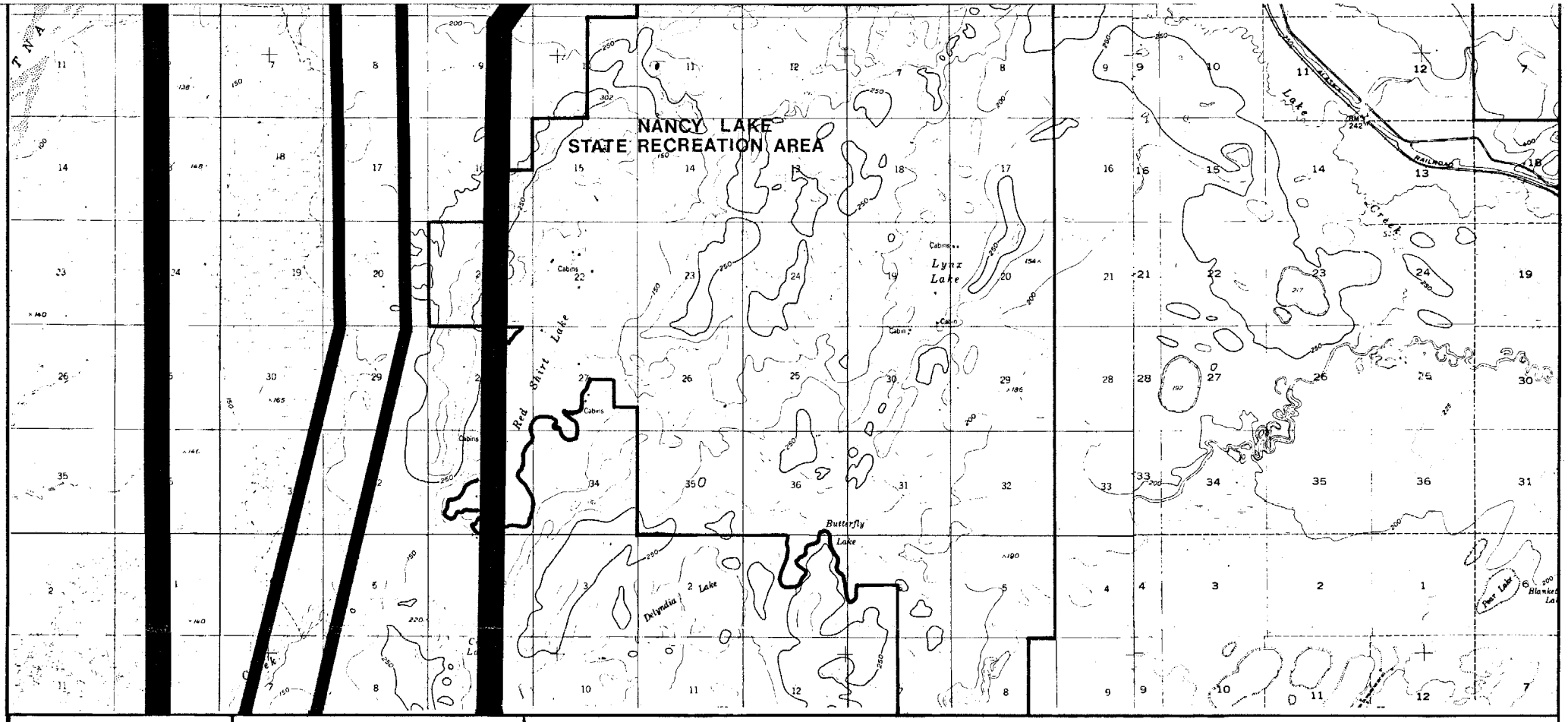
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


PROPOSED SUBSTATION
HW
WC
WC&HW
HW
HW
PL
PROPOSED CAPITAL SITE
SUSITNA RIVER
KROTO SLOUGH
Delta Islands
Delta Islands
Willow
Deception Creek
Willow Creek
Willow Lake
Gene Lake
Stevens Lake
Rabbit Lake
Jack Lake
Florence Lake
Crystal Lake
Honeybee Lake
Lynne Lake
Rainbow Lake
Long Lake
Kelly Lake
Lake Nancy
Nancy Lake State Recreation Area
Radar Hill
Willow Station Landing Strip
Rogers Creek
Little Willow Creek
Kelly Creek
Cabin Creek
ALASKA RAILROAD
TRACTOR TRAIL
E-K ROAD
T 19 N
T 18 N

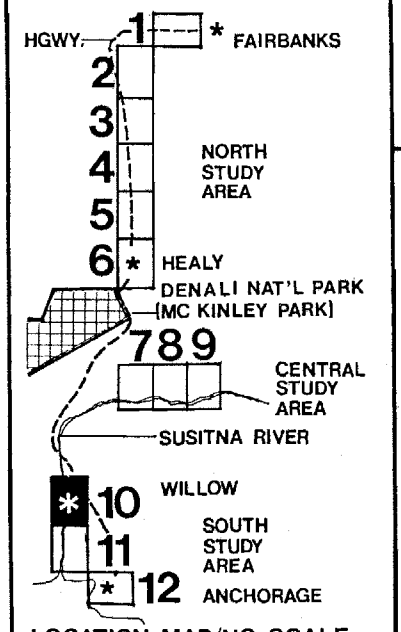


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M10

PREPARED BY TES FIGURE 37 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

LEGEND

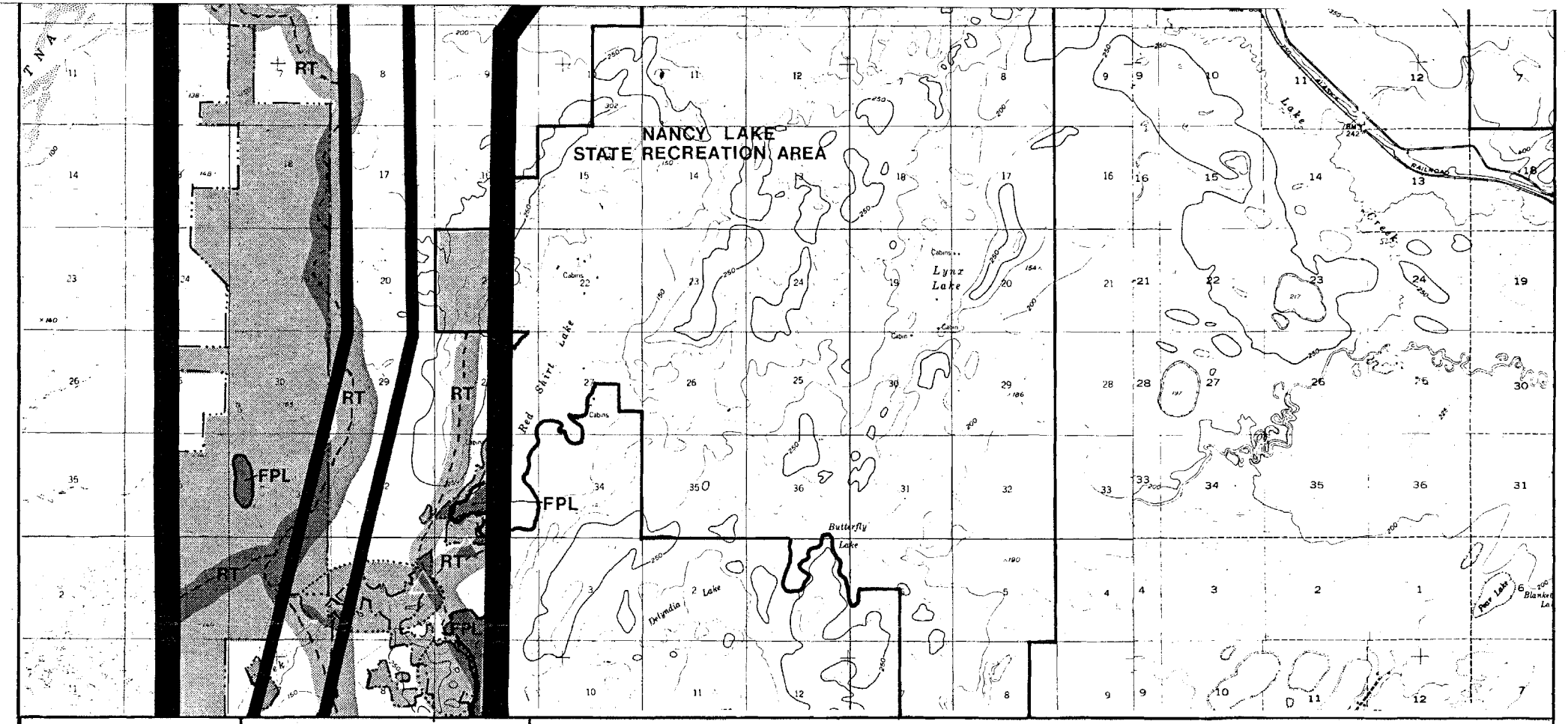
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

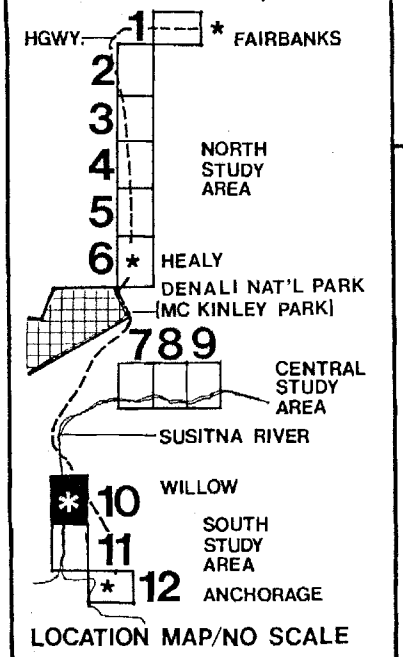

PROPOSED SUBSTATION
PROPOSED CAPITAL SITE
RT
FPL
Delta Islands
Willow Station Landing Strip
Willow Lake
Gene Lake
Florence Lake
Crystal Lake
Honeybee Lake
Lyane Lake
Rainbow Lake
Nancy Lake
Stevens Lake
Radar Hill
Deception Creek
Willow Creek
Rogers Creek
Little Willow Creek
Susitna River
Kroto Slough
Kroto Creek
Alaska Railroad
Nancy Lake State Recreation Area
T 19 N
T 18 N



MANMADE CONSTRAINTS
MAP M10

PREPARED BY TES FIGURE 39 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —··— DISPOSAL AREA
- — - — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

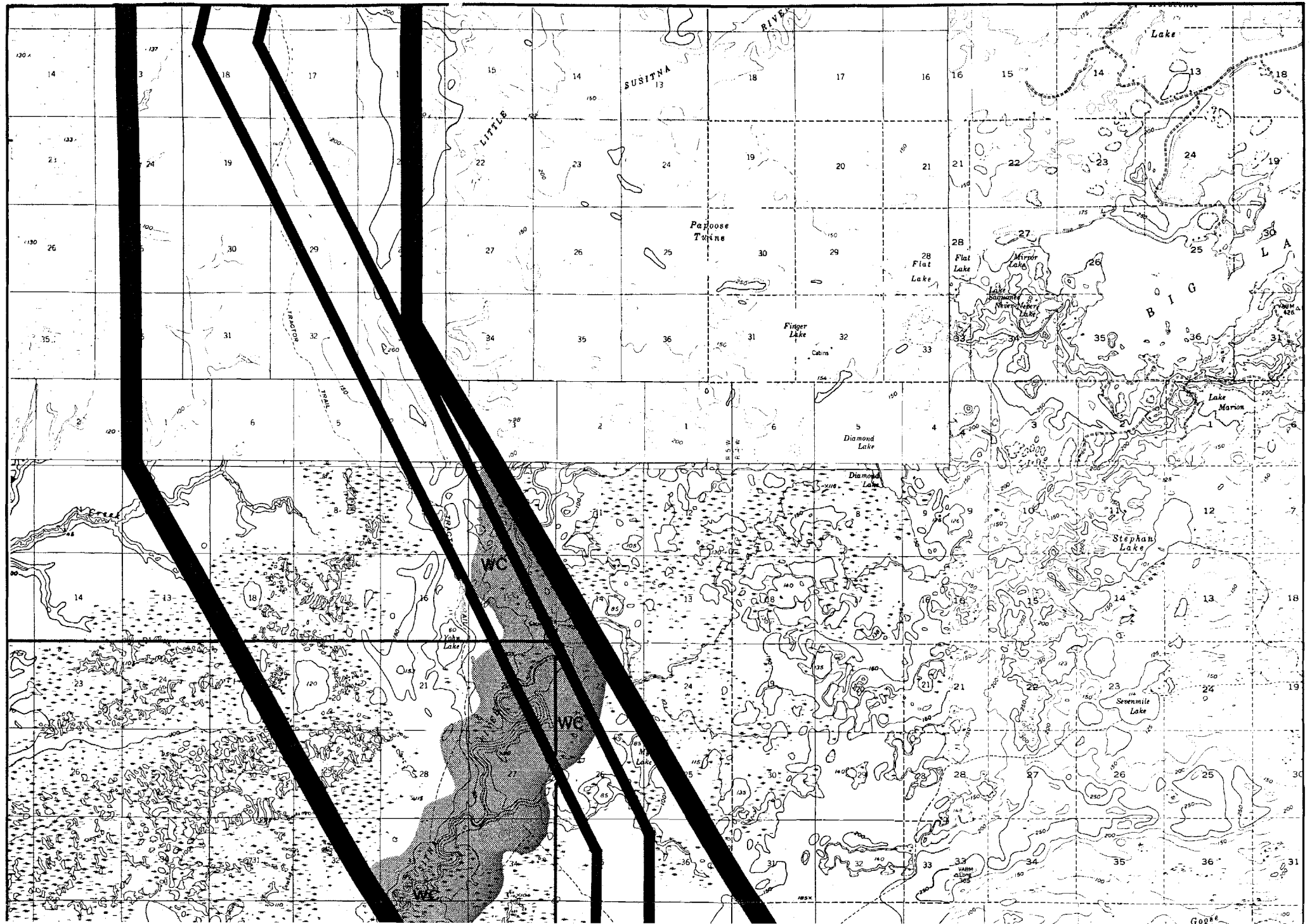
TRANSPORTATION BOUNDARIES
- AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

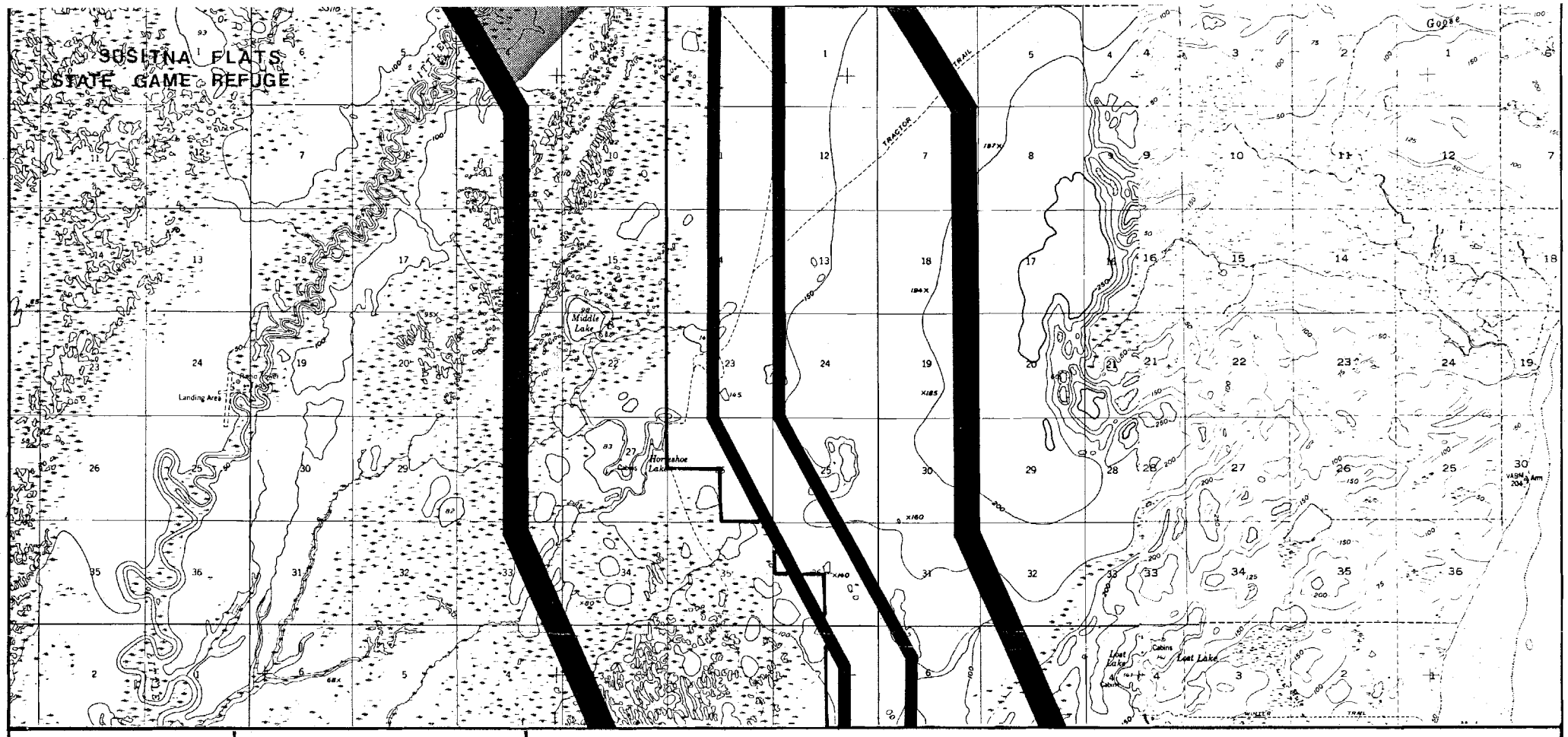
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


SUSITNA RIVER
LITTLE
Papoose Tajne
Flat Lake
Mirror Lake
Lake Lorraine
Lake Nevers
Finger Lake
Cabins
TRACTOR TRAIL
Diamond Lake
Lake Marion
Stephan Lake
Sevenmile Lake
Yohn Lake
WC
WC
WC
BIG LA

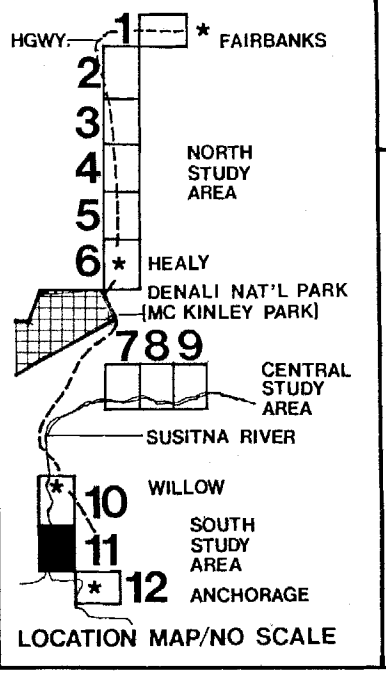


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS MAP M11

PREPARED BY TES FIGURE 41 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

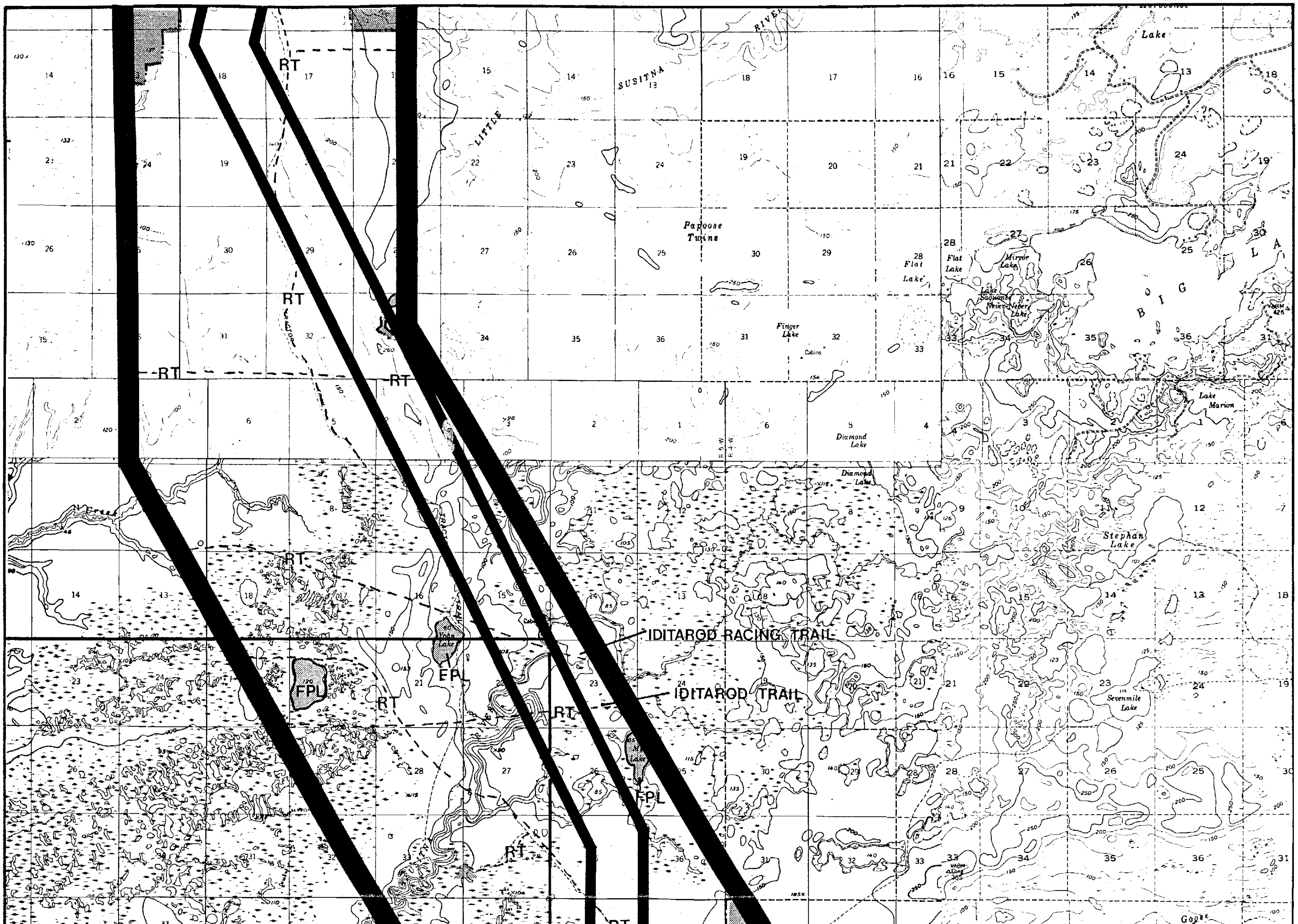
LEGEND

- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

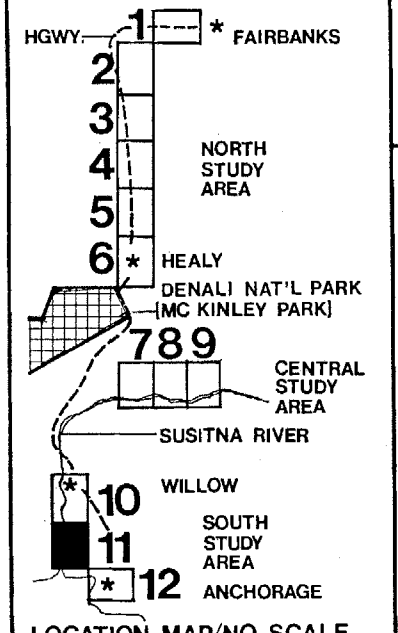
CONTOUR INTERVAL 100FT


IDITAROD RACING TRAIL
IDITAROD TRAIL
RT
FPL
LITTLE SUSITNA RIVER
Papoose Twins
Flat Lake
Mirror Lake
Finger Lake
Cabins
Diamond Lake
Lake Marion
Stephan Lake
Sevenmile Lake
BIG LA
Lake

MANMADE CONSTRAINTS
MAP M11

PREPARED BY TES FIGURE 43 of 48

ACRES



LOCATION MAP/NO SCALE

SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —··— EXISTING PRIVATE LAND
- — — — DEVELOPMENT AREA
- —···— DISPOSAL AREA
- — - — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

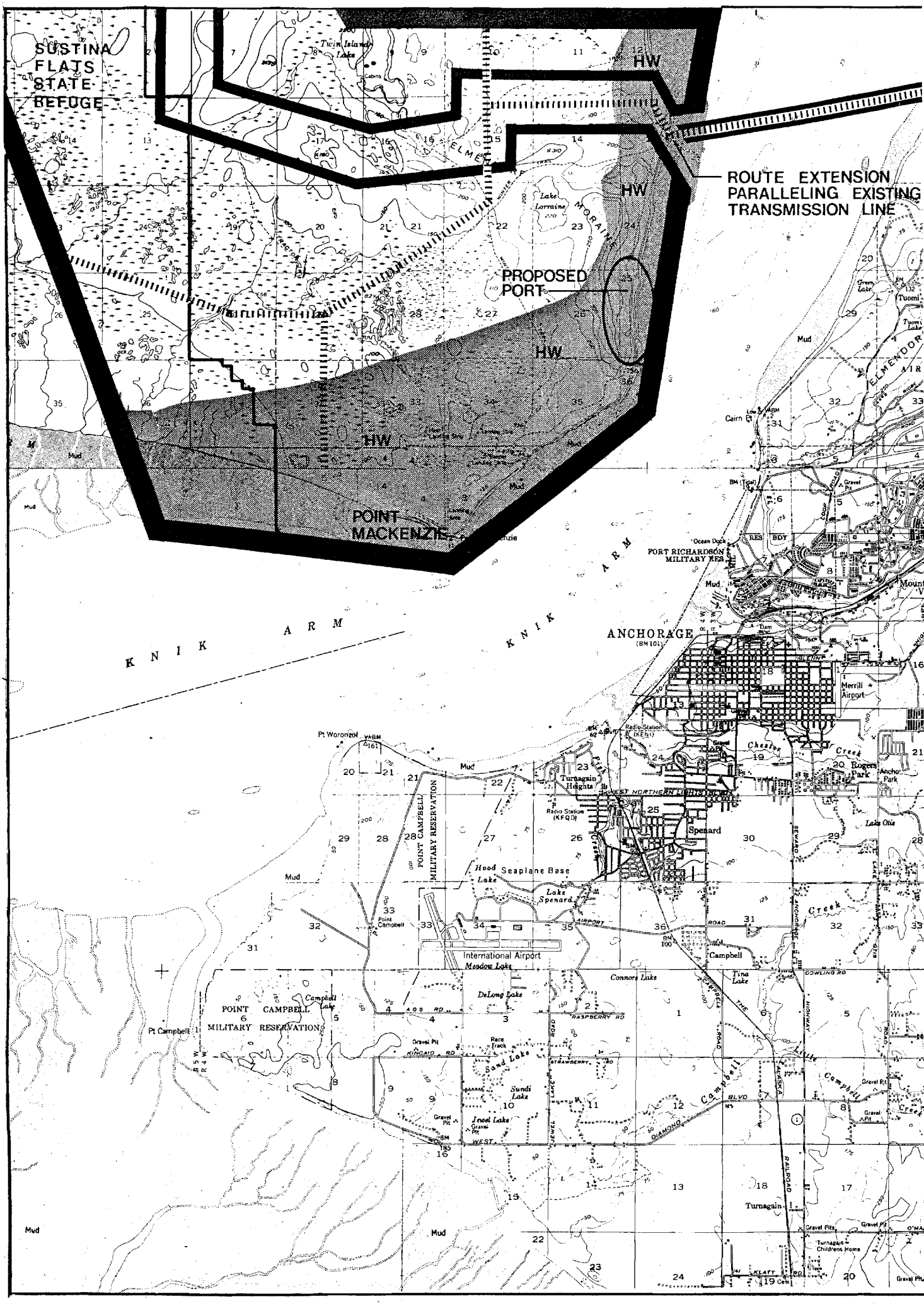
TRANSPORTATION BOUNDARIES
- ▭▭▭ AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

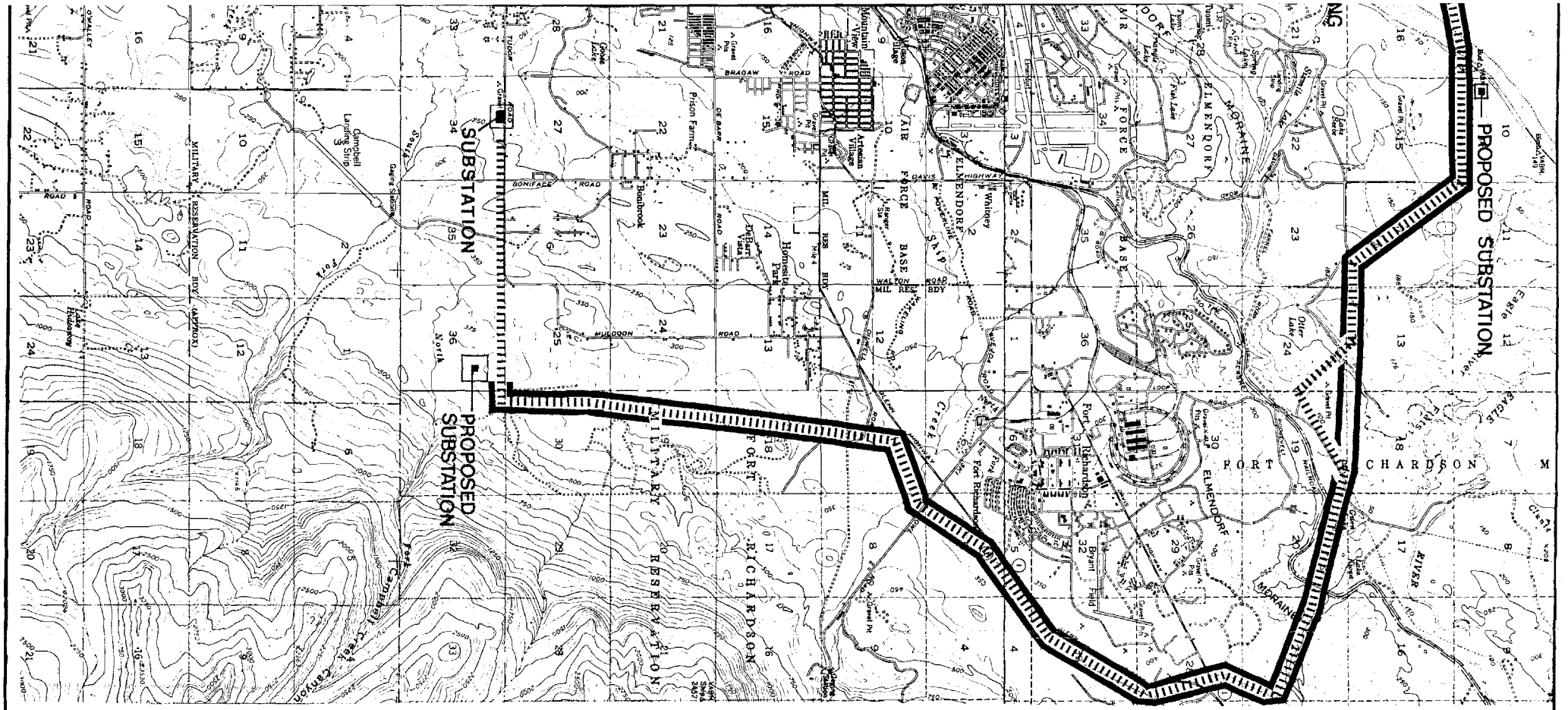
LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


SUSTINA FLATS STATE REFUGE
HW
ROUTE EXTENSION PARALLELING EXISTING TRANSMISSION LINE
PROPOSED PORT
POINT MACKENZIE
FORT RICHARDSON MILITARY RES
ANCHORAGE
KNIK ARM
POINT CAMPBELL MILITARY RESERVATION
International Airport
Spenard
Turnagain Heights
Merrill Airport
Lake Otis
Campbell
Turnagain
Mud

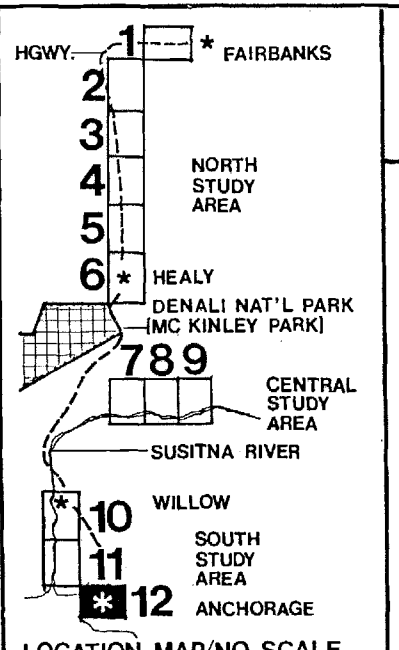


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

VISUAL CONSTRAINTS
MAP M12

PREPARED BY TES FIGURE 45 of 48

ACRES



LOCATION MAP/NO SCALE

VISUAL CONSTRAINTS

SENSITIVE VIEWSHEDS AND PROPOSED SCENIC HIGHWAY AREA

PSH PROPOSED SCENIC HIGHWAY AREA

SENSITIVE VIEWSHEDS

HW	HIGHWAY
RR	RAILROAD
PL	PRIVATE LANDS
WC	WATER COURSE
RA	RECREATION AREA

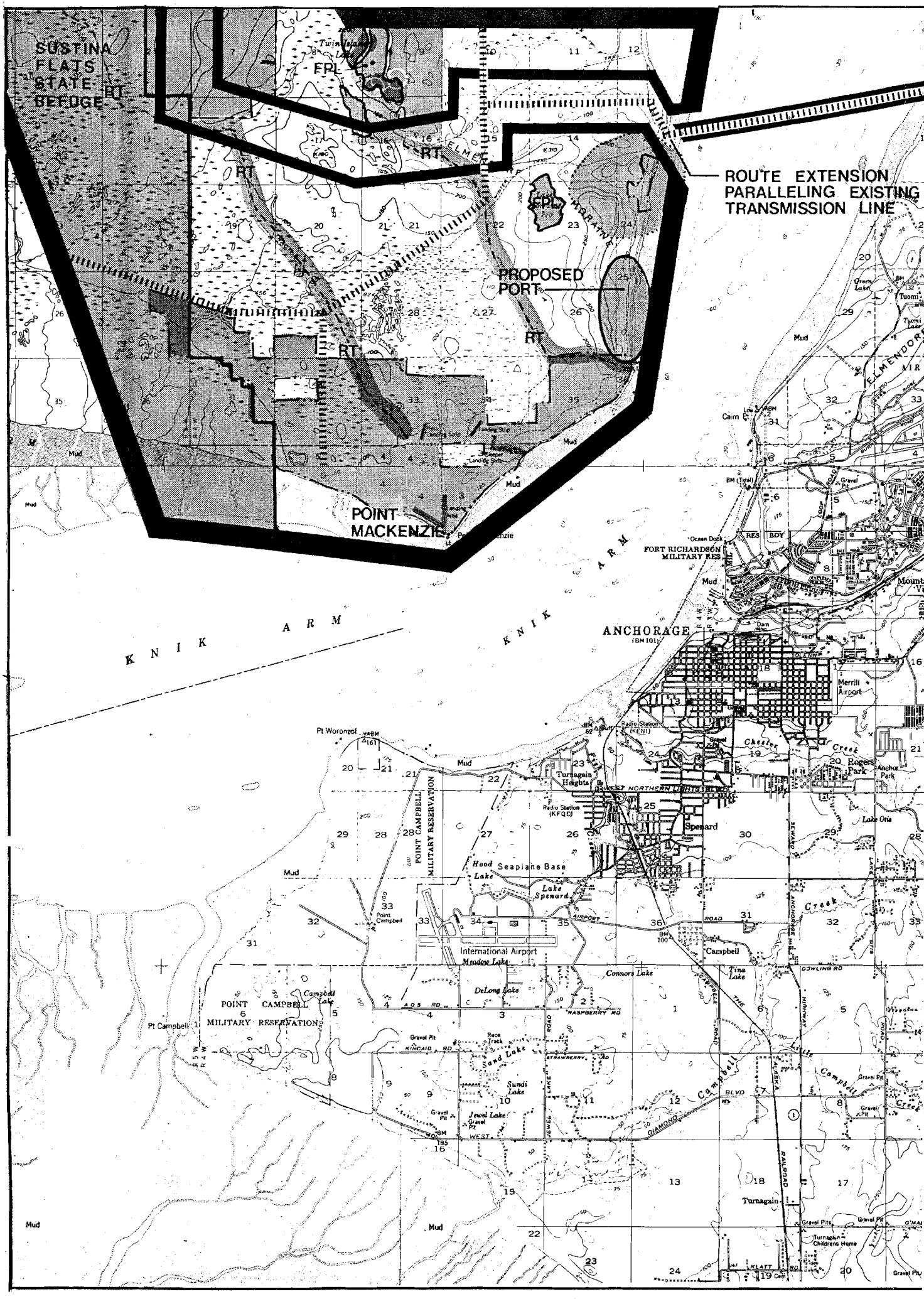
LEGEND

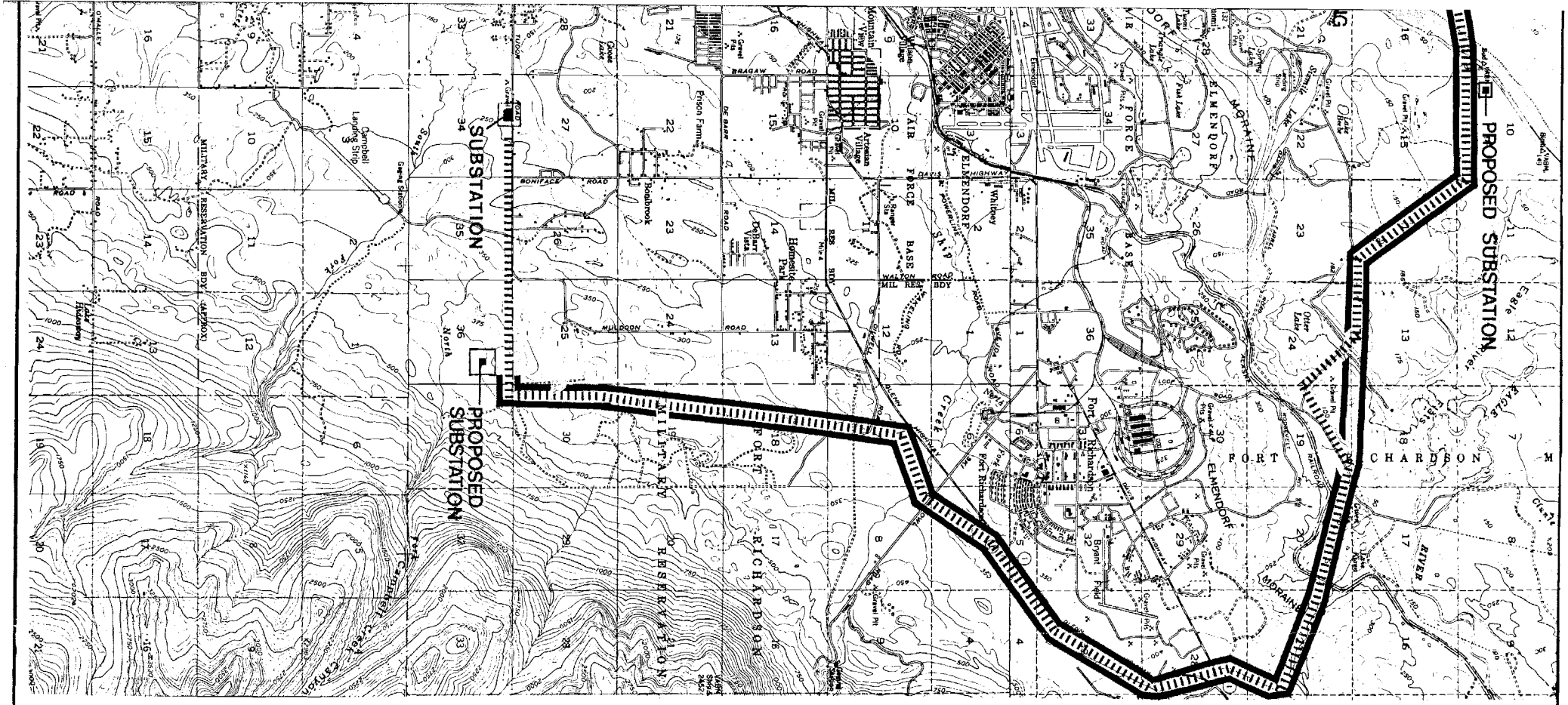
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT


SUSITNA FLATS STATE REFUGE
FPL
RT
ROUTE EXTENSION PARALLELING EXISTING TRANSMISSION LINE
PROPOSED PORT
POINT MACKENZIE
KNIK ARM
ANCHORAGE
FORT RICHARDSON MILITARY RES.
POINT CAMPBELL MILITARY RESERVATION
Pt Woronzof
Pt Campbell
Turnagain Heights
Spenard
Hood Seaplane Base
Lake Spenard
Lake Otis
International Airport
Meadow Lake
Connors Lake
DeLong Lake
Campbell Lake
Sand Lake
Sundi Lake
Jewel Lake
Tina Lake
Merrill Airport
Turnagain
Mud

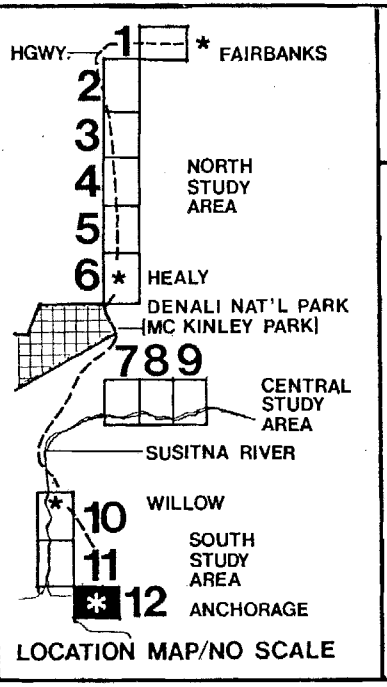


SUSITNA HYDROELECTRIC PROJECT
ALASKA POWER AUTHORITY

MANMADE CONSTRAINTS
MAP M12

PREPARED BY TES FIGURE 47 of 48

ACRES



LOCATION MAP/NO SCALE

MANMADE CONSTRAINTS

RECREATION BOUNDARIES
- □ CAMPSITE
- --RT-- RECREATION TRAIL
- NAME GAME REFUGE AREA

LAND USE AND LAND OWNERSHIP BOUNDARIES
- —·—·— EXISTING PRIVATE LAND
- – – – – DEVELOPMENT AREA
- —·····— DISPOSAL AREA
- — — — AGRICULTURAL LAND
- △ KNOWN ARCHEOLOGICAL SITE
- ····· AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- DIA DAM IMPOUNDMENT AREA
- ○ CABINS, STRUCTURE

TRANSPORTATION BOUNDARIES
- ⊏⊐⊏⊐⊏⊐ AIRPORT AND LANDING STRIP
- FPL FLOAT PLANE LANDING SITE

LEGEND
- EXISTING MAJOR TRANSMISSION LINE
- PROPOSED INTERTIE
- RECOMMENDED ROUTE BOUNDARY
- CORRIDOR BOUNDARY

1/2 0 1KM

1/2 0 1MI NORTH

CONTOUR INTERVAL 100FT

APPENDIX B

DESCRIPTION OF CONSTRUCTION CAMPS AND VILLAGES

The following design criteria and description of the proposed construction camps and villages is adapted from Volume 5 (Design Development Studies) of the Feasibility Report (APA 1982), which was prepared by Acres American.

The concept adopted by Acres for project planning and feasibility and for cost assessment purposes is based on completely self-contained and comprehensive community facilities. Variations in this concept are possible, whereby families would be located elsewhere and appropriate transportation and other facilities provided.

The largest item among the proposed site facilities is the camp and village that will be constructed at each project site. The proposed location of the Watana camp and village is on the north bank of the Susitna River between Deadman and Tsusena Creek, approximately 2.5 miles northeast of Watana. The proposed location of the Devil Canyon camp and village is on the south bank of the Susitna River downstream from Cheechako Creek, approximately 2.5 miles southwest of Devil Canyon. The locations of camps and villages are presented on Figure 23.

The camp and village will constitute an entire community, complete within itself and designed to house and maintain a work force and supporting population of up to 4,000 people during peak construction at Watana and up to 1,900 people during the peak construction period at Devil Canyon. Appendix B-1 indicates the projected work force for construction of Watana and Devil Canyon.

The camp and village will include buildings, roads, utilities, and recreation facilities. On completion of construction at each site, the construction camps and villages will be dismantled, and the area in which they were located will be reclaimed. It is also planned to reuse at Devil Canyon, to the extent possible, dismantled building and other items from the Watana camp and village.

In addition to the temporary camps and villages planned for the construction periods, permanent facilities will be required for project operation. These include a permanent town or small community (at Watana) for approximately 130 staff members and their families. The permanent town has been conceptualized; however, Acres has recommended that preliminary design and final design be delayed until the late 1980's, when more information as to the physical parameters of design are better known and the human requirements and preferences are better defined.

(i) Schedule

The overall schedule for the power developments is for the Watana development to be constructed during 1985 to 1994 and Devil Canyon during 1994 to 2002.

The construction camps and villages will be constructed in stages during the initial three years of the construction schedule for each site. Each camp and village consists of two principal areas. The camp is designed for single workers, who will make up about 90 percent of the force. Structures will include prefabricated wood frame dorms with modular mess halls, recreational buildings, a bank, a post office, a fire station, warehouses, a hospital, offices, etc.

The village is planned for that 10 percent of the work force accompanied by their families. The village is grouped around a service core, containing a school, gymnasium, stores, and a recreation area. It is assumed that community religious activities will take place in appropriate recreational buildings.

The construction concept for the two power facilities calls for completing and commissioning the Watana project before beginning work at Devil Canyon. Thus, facilities used at Watana will be dismantled, moved to Devil Canyon, refurbished, and erected in time for the beginning of construction there. Where possible, complete buildings will be moved to Devil Canyon and re-erected in their original size and shape. When this is not possible, buildings will be dismantled at Watana, scaled down, then rebuilt at Devil Canyon.

Based on the work force planning levels (Appendix Table B-1), a building schedule has been prepared for the construction camp and village at both the Watana and Devil Canyon sites. Site preparation and utilities installation will be accomplished in 1984 at Watana and in 1994 at Devil Canyon. The proposed erection schedule for single-status dormitory units, family housing units, and the service buildings associated with each group is shown in Appendix B-Table 2.

Upon near completion of construction activities at the Watana site, a permanent town will be constructed for the plant's operation and maintenance (O&M) force. Present plans call for construction of the town core (school, shopping and recreation center, medical clinic) and of housing for an estimated 105 O&M personnel and their families for occupancy in 1993. One year prior to completion of the Devil Canyon plant, since no permanent town will be built there, housing units for an additional 25 O&M personnel will be added at the Watana site.

(ii) Alternative Camp Concepts

In planning the design of the camps, two alternatives emerged and were evaluated: single-status, army-type barracks and family-status village. Historically, major Alaskan

construction camps have been the single-status type, so this was an obvious choice to investigate. It was determined that this style is the most economical to build and maintain; thus, it became the first camp construction plan.

In addition, however, investigation of previous large hydroelectic projects in North America showed that, where construction camps were a necessary part of the project, a percentage of the workers' families lived in a portion of the camp or in what evolved into a family status village. Family facilities are usually required on large hydroelectric projects because of the length of the construction schedule. Furthermore, because construction on a hydro project, unlike that of a pipeline, for example, is primarily limited to a single area, such development lends itself more readily to a family village.

The family facilities are planned to serve management and supervisory staff of the owner, its agents, and the contractors. The length of time some of these employees would be working at the project site (five years or more) indicated that to attract and retain such personnel, family facilities would be necessary. On the other hand, family facilities for the entire work force would be impractical and prohibitively expensive. An assessment of previous projects of a similar nature showed that to plan family facilities for approximately 10 percent of the work force is appropriate.

(iii) Camp Policies

Before beginning construction at the Watana and Devil Canyon sites, policies will have to be set regarding operating rules and regulations at the camp. The focus of these policies includes transportation, alcohol, firearms, and work

schedules. To arrive at a conceptual design and to estimate costs associated with the camps, planners have made some assumptions, described below, regarding policy.

- Transportation

The project owner will provide round-trip bus transportation from Anchorage or Fairbanks for 90 percent of the work force. The other 10 percent will drive their personal vehicles or secure their own transportation to the job site. Once at the general project area, all workers will be bussed from the construction camps to work areas.

Private vehicles will not be allowed at Watana until construction is completed, at which time the access road will be given continuous access status. This designation is presently scheduled for mid-1986. Devil Canyon will be accessible by privately owned vehicles from the start of its development; however, private vehicles will not be allowed inside the construction camp. To accommodate these vehicles, a parking area will be provided outside the camp. The residents of the family village, however, will be allowed private vehicles within the village area.

- Alcohol

The construction camp layout is based on a semi-dry camp concept. Alcohol will be allowed in private rooms; it will not be allowed in public areas (that is, dining halls, recreation buildings, offices, etc.). Furthermore, the camp and village layout makes no provision for taverns or beer halls. The assumption is that beer will be available, in accordance with state law, at the retail stores in camp and village. Drunken behavior will constitute grounds for termination.

- Firearms

No firearms will be permitted inside the construction camp. Workers who bring personal firearms with them will be able to check them in a secured storage facility. Hunting and fishing will be regulated by state personnel stationed at the camp.

- Work Schedules

It was also necessary, in designing the construction camps, to assume a likely work schedule; construction will be accomplished with two shifts working six nine-hour days each. Workers will be permitted two weeks' leave every 12 weeks.

(iv) Construction Camp and Village - Watana

- Site Preparation

o Clearing

The construction camp area will be cleared to 50 ft beyond the perimeter fence line shown on Plate 37. The construction village area will be similarly cleared, except that selected areas within the site will be left with natural vegetation intact. In addition, large brush, trees, and other unsuitable material shall be transported to a suitable disposal area.

o Granular Pad

Upon completion of the clearing operation, a layer of filter fabric will be placed on the ground. A four-foot-thick layer of non-frost susceptible (NFS) granular material will be placed over the filter cloth and graded

to provide a uniform surface for construction of buldings, utilities, and roads. In the village area, too, the filter cloth and four-foot granular pad will be installed, except in those green areas left uncleared.

o Roads and Parking Areas

All roads in camps and villages will have a gravel surface for two-way traffic. Main roads will provide a 34- and secondary roads a 24-foot travel surface. Parking areas within the camp and village will also be gravel. The parking area provided outside the camp for private automobiles, however, will consist of layer of NFS subbase material the thinnest that can still support the vehicles.

o Drainage

In general, drainage at the camp and village sites will be accomplished by a network of ditches. Peripheral ditches will intercept overland flows from adjacent uncleared land and route around the sites, while ditches flanking roadways within the camp and village will collect on-site runoff and convey it to existing water courses. Corrugated metal pipe culverts will be installed, as required, where drainage must cross roadways and driveways.

o Rehabilitation

As described above, upon completion of construction activities at Watana, the camp and village buildings will be dismantled and removed from the site. Using topsoil stripped from the adjacent Borrow Area D, a 12-inch layer of soil will be spread over the pad, which will then be graded and seeded.

- Buildings

As discussed, construction camp and village buildings will be of two types. All housing units and all other buildings where practical will be prefabricated, wood frame, factory-built, modular units. These will be transported to the site, then assembled to provide the size and shape necessary. The modules will be complete with heating, lighting, and plumbing; interior finishes; furnishing; and equipment. Additional details concerning buildings are included in the Feasibility Report.

(v) Construction Camp and Village

- Site Preparation

o Clearing and Grubbing

The sites chosen for the construction camp and village are in a non-permafrost area where the bedrock lies an average of three to four feet below the surface. The site has a low-density tree cover, with well-drained land sloping between three and five percent to the south. Both the camp and village sites will be cleared and grubbed to a distance of 15 ft beyond the perimeter fence line. Brush, trees, roots, and other unsuitable materials will be transported to an appropriate disposal area.

o Stripping

The cleared organic material shall be stripped and stockpiled outside the camp and village for use in rehabilitation activities. In areas which will underlay concrete slab foundations, additional excavation either to bedrock, to a material not susceptible to frost, or to a

depth of eight feet (whichever comes first) will be done. These areas will be backfilled to original grade using material not frost susceptible. After stripping, the sites shall be rough graded preparatory to installing the pad.

o Granular Pad

Both the camp and village sites will be covered using a one-foot layer of non-frost susceptible material from the saddle dam excavation followed by a one-foot layer of gravel from Borrow Area G.

o Road and Parking Areas

Roads in the camp and village will carry two-way traffic on gravel surfaces 34 ft wide for primary streets and 24 ft wide for secondary streets. Parking areas inside the camp and village will be gravel. The four-acre area for private vehicles outside the camp will be cleared and provided a one-foot layer of NFS material.

o Drainage

A system of ditches will intercept surface runoff and channel it to existing watercourses off the sites. Roadway and driveway crossings will be accomplished through installation of CMP (corrugated metal pipe) culverts. Drainage water from adjacent land will be intercepted by peripheral ditches and routed around the site.

- Buildings

The construction camp and village at Devil Canyon will be built using components from the Watana construction camp. Prefabricated wood frame buildings will be broken down into their original elements, transported to Devil Canyon,

reassembled, then rehabilitated as necessary. Pre-engineered, steel-frame buildings will be dismantled, moved to Devil Canyon, and reconstructed on new concrete slab foundations. The reconstructed buildings will be refurbished before occupancy.

Most of the buildings will be re-erected to their original shape and dimension; however, a few will be smaller than they were at Watana. The goal of rehabilitating structures will be to resolve them to "new" condition. The only design changes necessary will be the modification of furnaces and building wiring to provide for electrical heating. Details concerning buildings are included in the Feasibility Report.

APPENDIX TABLE B-1: WORK FORCE PLANNING LEVEL

WATANA

YEAR	SITE	TOTAL
1983	100	200
1984	200	400
1985	800	1100
1986	1500	1700
1987	2100	2300
1988	2600	2600
1989	2800	3000
1990	3100	3400
1991	3000	3300
1992	2300	2600
1993	800	900
1994	200	200

DEVIL CANYON

YEAR	SITE	TOTAL
1994	100	100
1995	420	420
1996	940	940
1997	1330	1330
1998	1550	1550
1999	1550	1600
2000	1350	1450
2001	920	1110
2002	50	50

Note: Site facilities to accommodate up to 4,000 people at Watana and 1,900 people at Devil Canyon are conservative allowances. Cost differences for demand adjustment of these numbers are not significant.

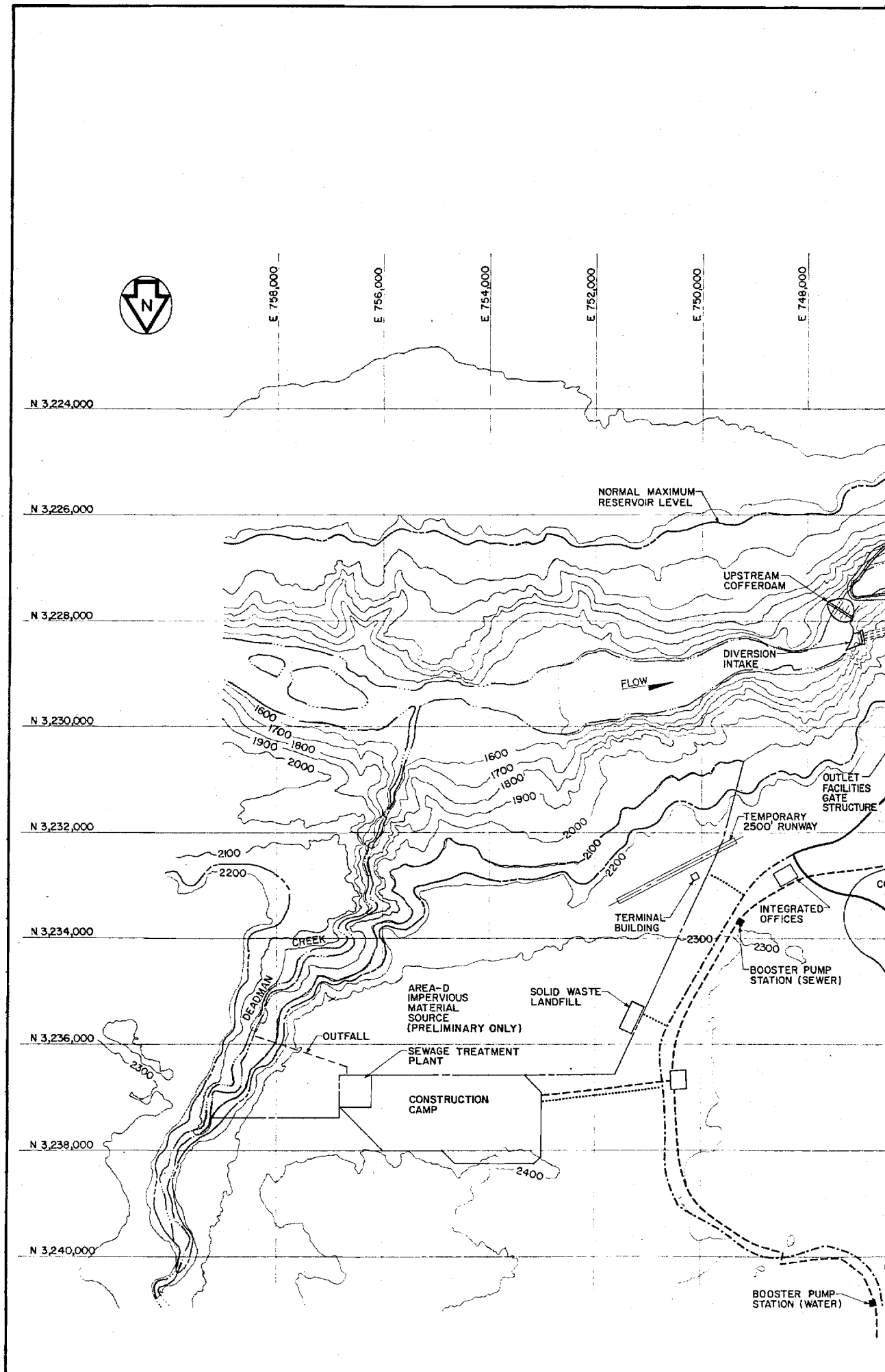
Source: Acres American, Incorporated. Susitna Hydroelectric Project Feasibility Repo t, Appendix B. 1982.

APPENDIX TABLE B-2: CONSTRUCTION CAMP - PROPOSED BUILDING ERECTION SCHEDULE

Buildings	(a) Size in Feet	(b) Type	Watana			Devil Canyon	
			1985	1986	1987	1995	1996
CAMP							
108-man dormitory	26 x 224, 2 story	P	7	10	7	4	9
Dormitory, Type A, 20 man	28 x 120	P	3	5	-	2	2
Dormitory, Type B, 20 man	24 x 120	P	2	5	2	2	3
Guest house	28 x 120	P	-	3	-	1	1
Camp manager's offices	30 x 40	P	3	-	-	2	-
Staff clubhouse	50 x 80/50 x 50	S	-	1	-	-	1
Dining/kitchen	120 x 125	P	1	-	-	-	-
Dining/kitchen	120 x 125	P	-	1	-	1	-
Recreation building	120 x 120	P	1	-	-	-	-
Recreation building	120 x 120	P	-	1	-	1	-
Gymnasium	200 x 140/120 x 120	S	-	-	1	-	1
Security office	60 x 60	P	1	-	-	1	-
Soils & materials lab.	50 x 100	S	1	-	-	1	-
Maintenance building	80 x 100/80 x 50	S	-	1	-	-	1
Warehouse, manager's	100 x 120	S	1	-	-	-	1
Warehouse, food service	100 x 120/100 x 60	S	-	1	-	1	-
Communication building	20 x 30	P	1	-	-	1	-
Hospital	90 x 170/90 x 90	P	-	1	-	-	1
Ice rink	140 x 300	S	-	-	1	-	1
Bank	50 x 60/50 x 40	P	-	1	-	-	1
Store	30 x 60	P	-	1	-	1	-
Laundry	20 x 80/20 x 40	P	-	1	-	1	-
Solid waste garage	20 x 30	S	1	-	-	1	-
Generating station	20 x 30	S	1	-	-	1	-
Water treatment building	60 x 80/60 x 50	S	1	-	-	1	-
Sewage treatment building	80 x 170/80 x 100	S	1	-	-	1	-
Fire station	40 x 80	S	1	-	-	1	-
POL garage	40 x 50	S	1	-	-	1	-
Relocate 160-man camp	N/A	P	-	1	-	-	-
VILLAGE							
Family unit, 2 bedroom	14 x 60	P	-	36	38	16	20
Family unit, 3 bedroom	14 x 60	P	-	90	98	42	50
Family unit, 2 bedroom	24 x 50	P	-	8	8	4	5
Family unit, 3 bedroom	24 x 50	P	-	8	8	4	5
Family unit, 4 bedroom	28 x 50	P	-	8	8	4	5
School	24,000 sq ft/14,000 sq ft	P	-	1	-	-	1
Gymnasium	100 x 100	S	-	1	-	-	1
Swimming pool	120 x 120	S	-	1	-	-	1
Recreation center	100 x 160/80 x 100	S	-	1	-	-	1
Shopping center	100 x 160/100 x 80	S	-	1	-	-	1
Gas station	30 x 40	S	-	1	-	-	1
Generating station	20 x 30	S	1	-	-	1	-
Sewage pump station	20 x 20	-	1	-	-	1	-
Owner/manager's office	120 x 160	P	-	1	-	-	1

a. Where two sizes are shown, the first is for Watana, the second for Devil Canyon.
b. P=prefabricated, wood frame, factory-built modular units.
S=pre-engineered steel frame structures supported by concrete slab foundations.

Source: Acres American, Incorporated. Susitna Hydroelectric Project Feasilibity Report, Appendix B. 1982.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NORMAL MAXIMUM RESERVOIR LEVEL
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DIVERSION INTAKE
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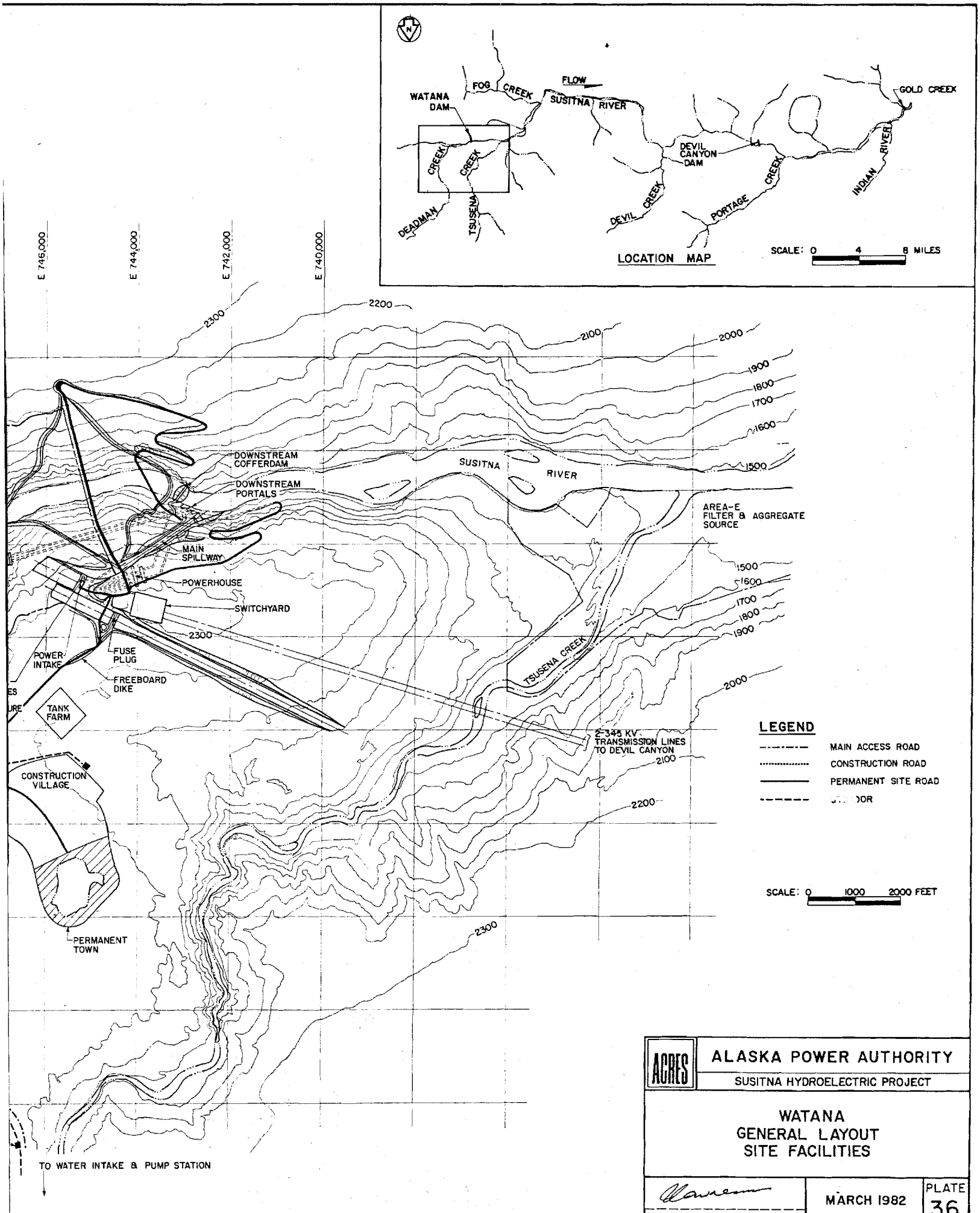
2100
2200
2300
2400
OUTLET FACILITIES GATE STRUCTURE
TEMPORARY 2500' RUNWAY
TERMINAL BUILDING
INTEGRATED OFFICES
BOOSTER PUMP STATION (SEWER)
CREEK
DEADMAN
AREA-D IMPERVIOUS MATERIAL SOURCE (PRELIMINARY ONLY)
SOLID WASTE LANDFILL
OUTFALL
SEWAGE TREATMENT PLANT
CONSTRUCTION CAMP
BOOSTER PUMP STATION (WATER)



ACRES

ALASKA POWER AUTHORITY

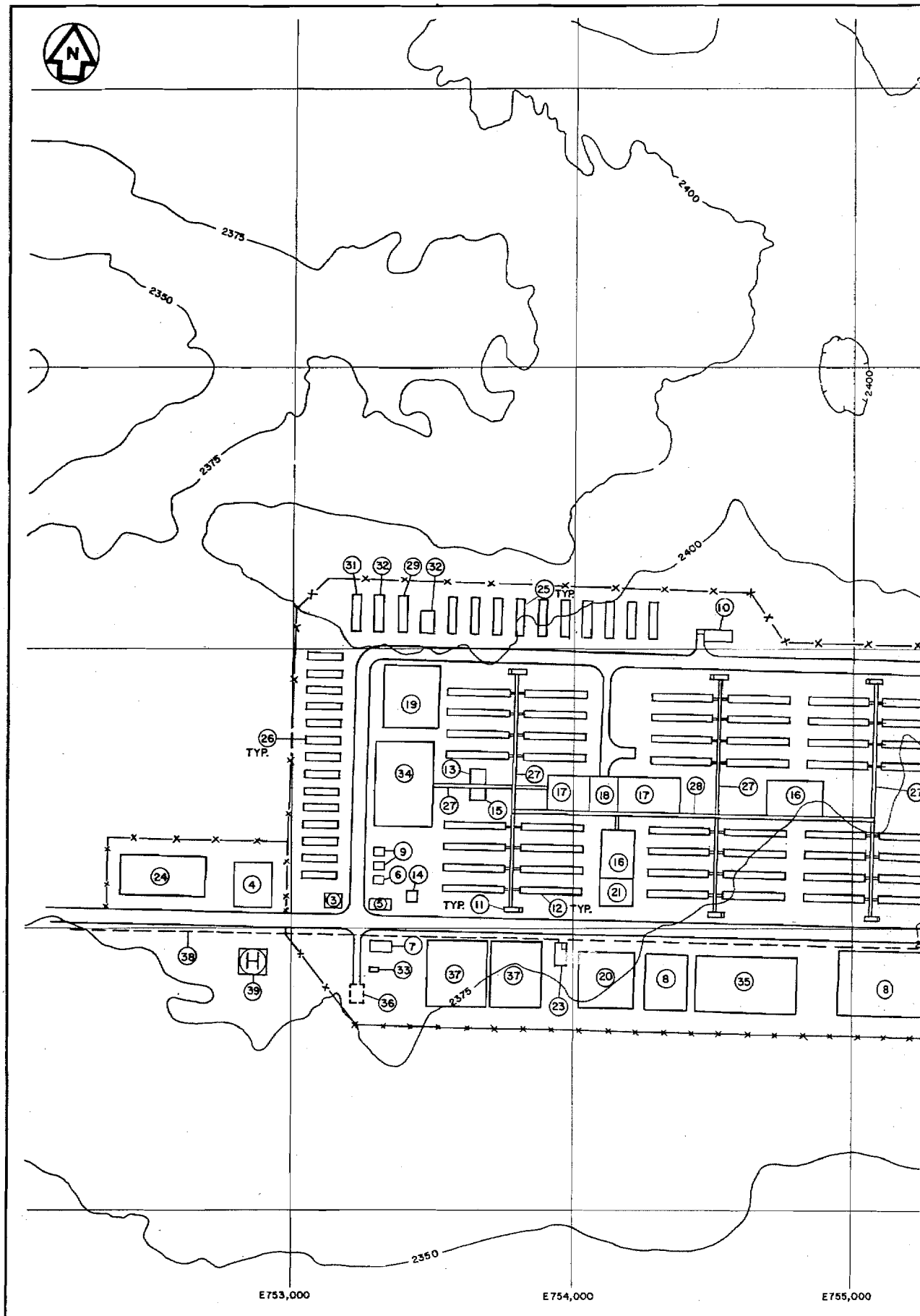
SUSITNA HYDROELECTRIC PROJECT

WATANA GENERAL LAYOUT SITE FACILITIES

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 36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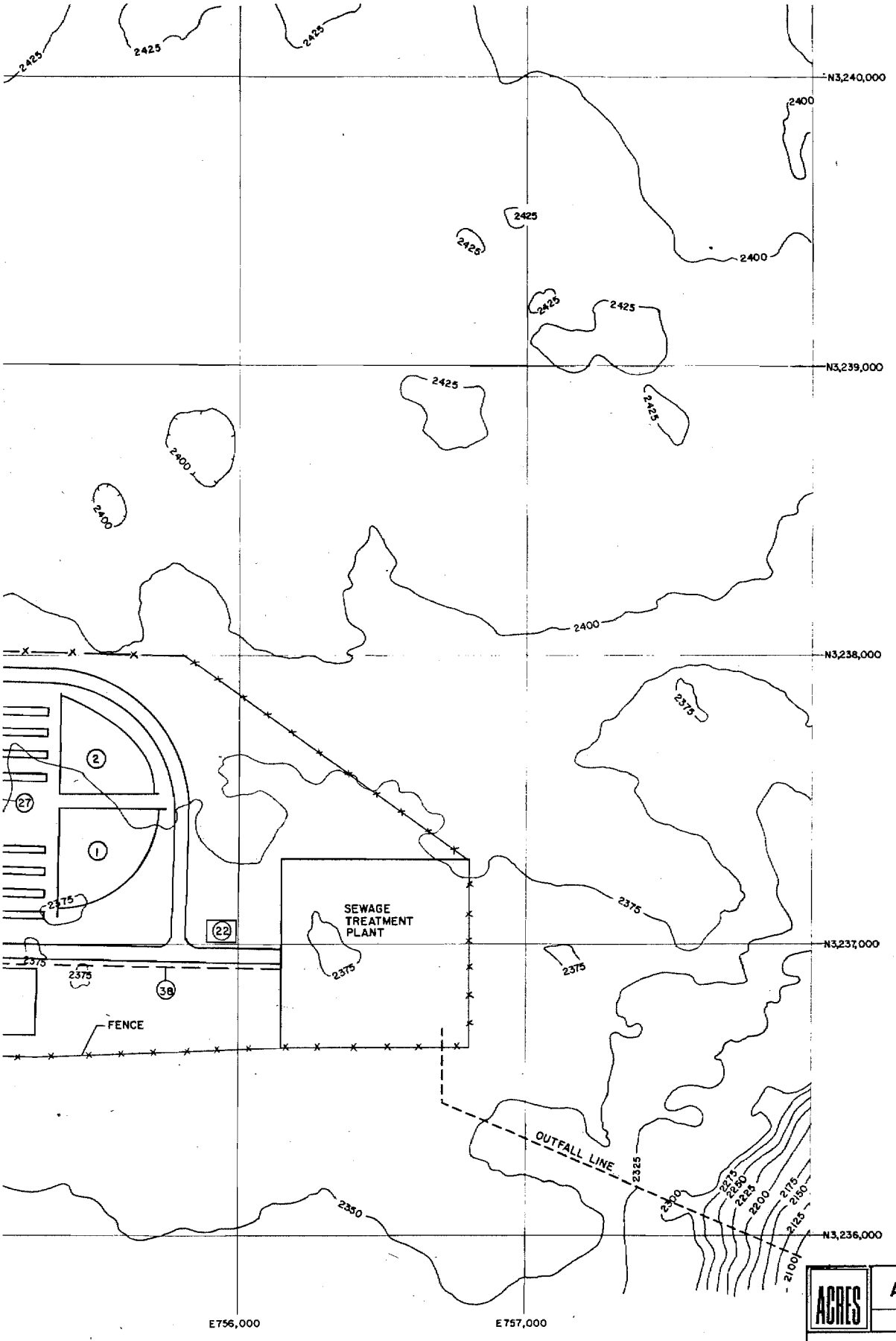


LEGEND

1. BASEBALL
2. SOFTBALL
3. SECURITY
4. HOSPITAL
5. FIRE & OIL SPILL
6. CAMP MANAGER'S OFFICE
7. SOILS LAB
8. PARKING AREAS
9. ADMINISTRATION OFFICES
10. STORE
11. BUS SHELTERS
12. DORMITORIES
13. LAUNDRY
14. COMMUNICATIONS CTR.
15. BANK
16. RECREATION HALL
17. KITCHEN & DINING
18. FOOD SERVICE WAREHOUSE
19. WAREHOUSE
20. GYMNASIUM
21. SWIMMING POOL
22. MAINTENANCE GARAGE
23. PUMP HOUSE (WATER)
24. HOCKEY RINK
25. BACHELOR DORMS MGMT. TYPE A
26. BACHELOR DORMS MGMT. TYPE B
27. 10' PERMAWALK
28. 16' PERMAWALK
29. MANAGER'S GUEST HOUSE
30. OWNER'S GUEST HOUSE
31. CONTRACTOR'S GUEST HOUSE
32. STAFF CLUBHOUSE
33. GENERATING STATION
34. RELOCATED CAMP HOUSING (160 SPACES)
35. FOOTBALL FIELD
36. FUEL STORAGE TANK
37. WATER RESERVOIR
38. UTILIDOR
39. HELIPAD

SCALE 0 200 400 FEET

ACRES

ALASKA POWER AUTHORITY

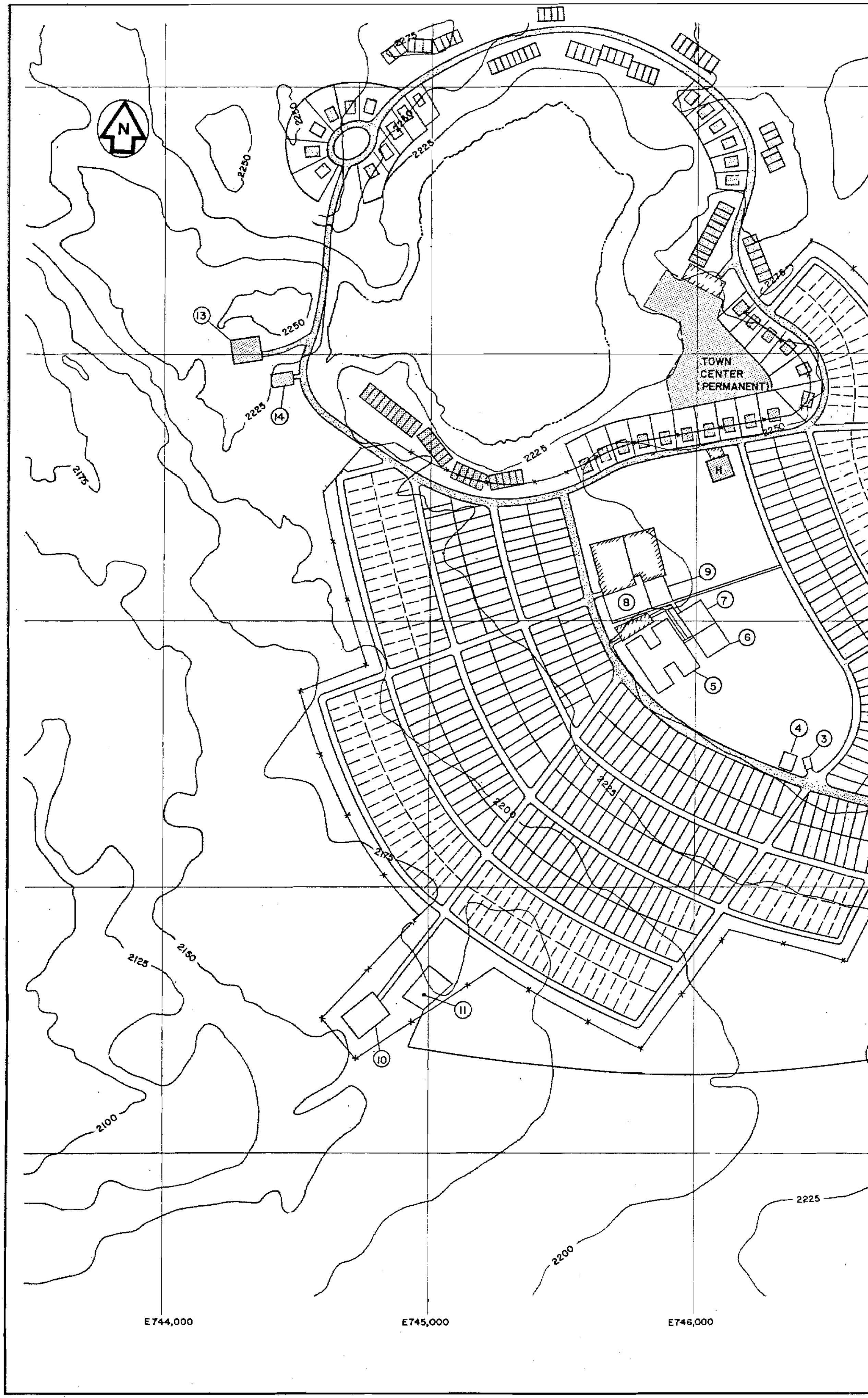
SUSITNA HYDROELECTRIC PROJECT

WATANA
MAIN CONSTRUCTION CAMP SITE

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 37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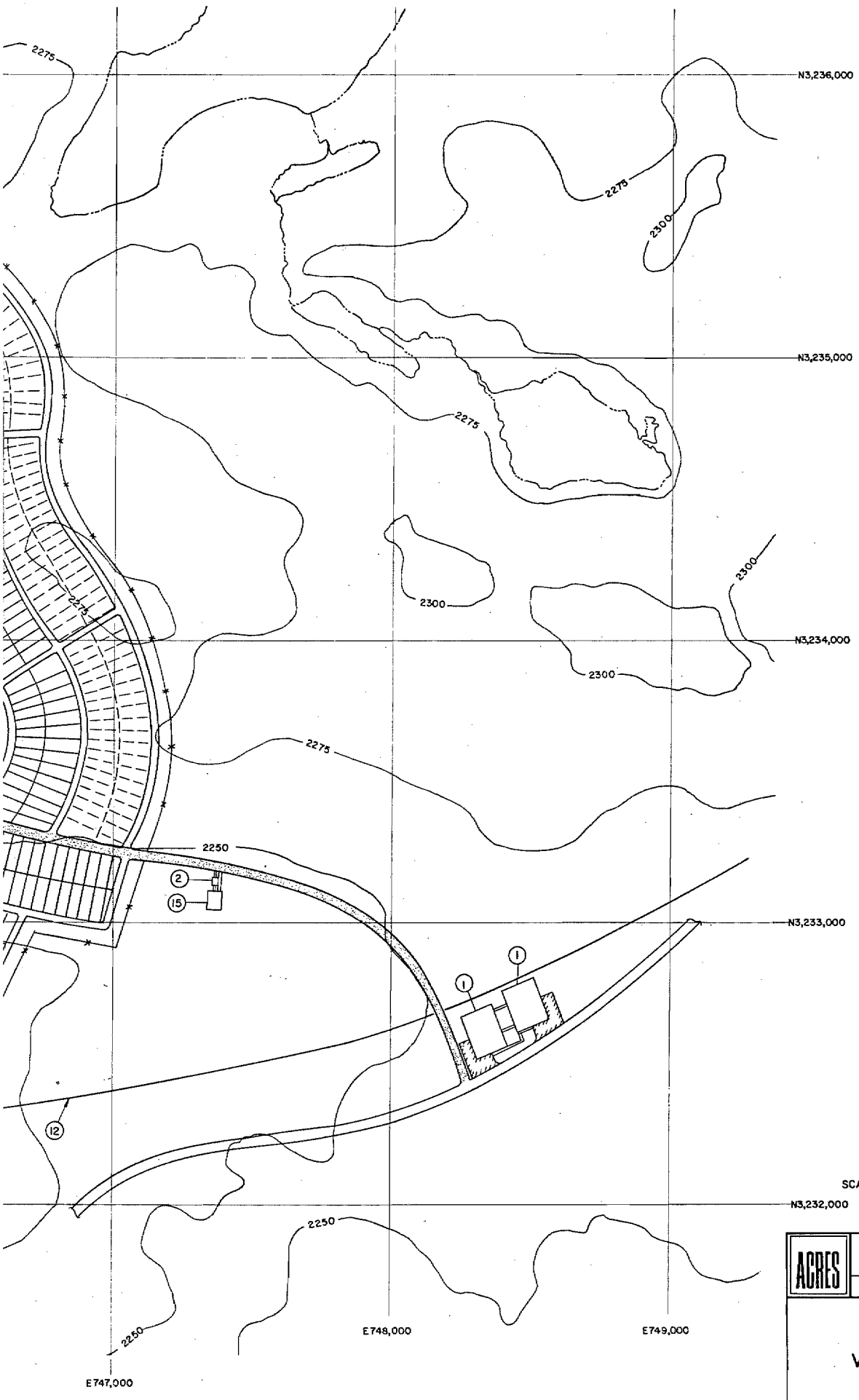


LEGEND

- PERMANENT NON-RESIDENTIAL BLDG.
- PERMANENT ROAD
- PERMANENT MULTIFAMILY DWELLINGS
  - 72 UNITS FURNISHED BY YEAR 1992
  - 16 UNITS " " " 2001
- PERMANENT SINGLE FAMILY DWELLINGS
  - 21 UNITS FURNISHED BY YEAR 1992
  - 6 UNITS " " " 2001
- H PERMANENT HOSPITAL
- TEMPORARY HOUSING/UTILITIES FURNISHED BY OWNER
  - 16 EA.-4 BEDROOMS UNITS 28'x 50'
  - 16 EA.-2 " " 24'x 50'
  - 16 EA.-3 " " "
  - 72 EA.-2 " " 14' x 60'
  - 200 EA.-3 " " 14' x 60'
- TEMPORARY LOTS/ UTILITIES FURNISHED BY OWNER
  - 240 EA.-LOT SPACES
- PARKING AREAS
- (1) MANAGER'S OFFICES
- (2) GENERATING STATION
- (3) FIRE STATION
- (4) GAS STATION
- (5) SCHOOL
- (6) SWIMMING POOL
- (7) GYMNASIUM
- (8) STORE
- (9) RECREATION CENTER
- (10) SEWAGE COLLECTION PUMP STATION
- (11) WATER PUMP STATION
- (12) UTILIDOR
- (13) SEWAGE TREATMENT PLANT
- (14) WATER TREATMENT PLANT
- (15) FUEL STORAGE TANK (50,000 g)

SCALE 0 200 400 FEET

ACRES

ALASKA POWER AUTHORITY

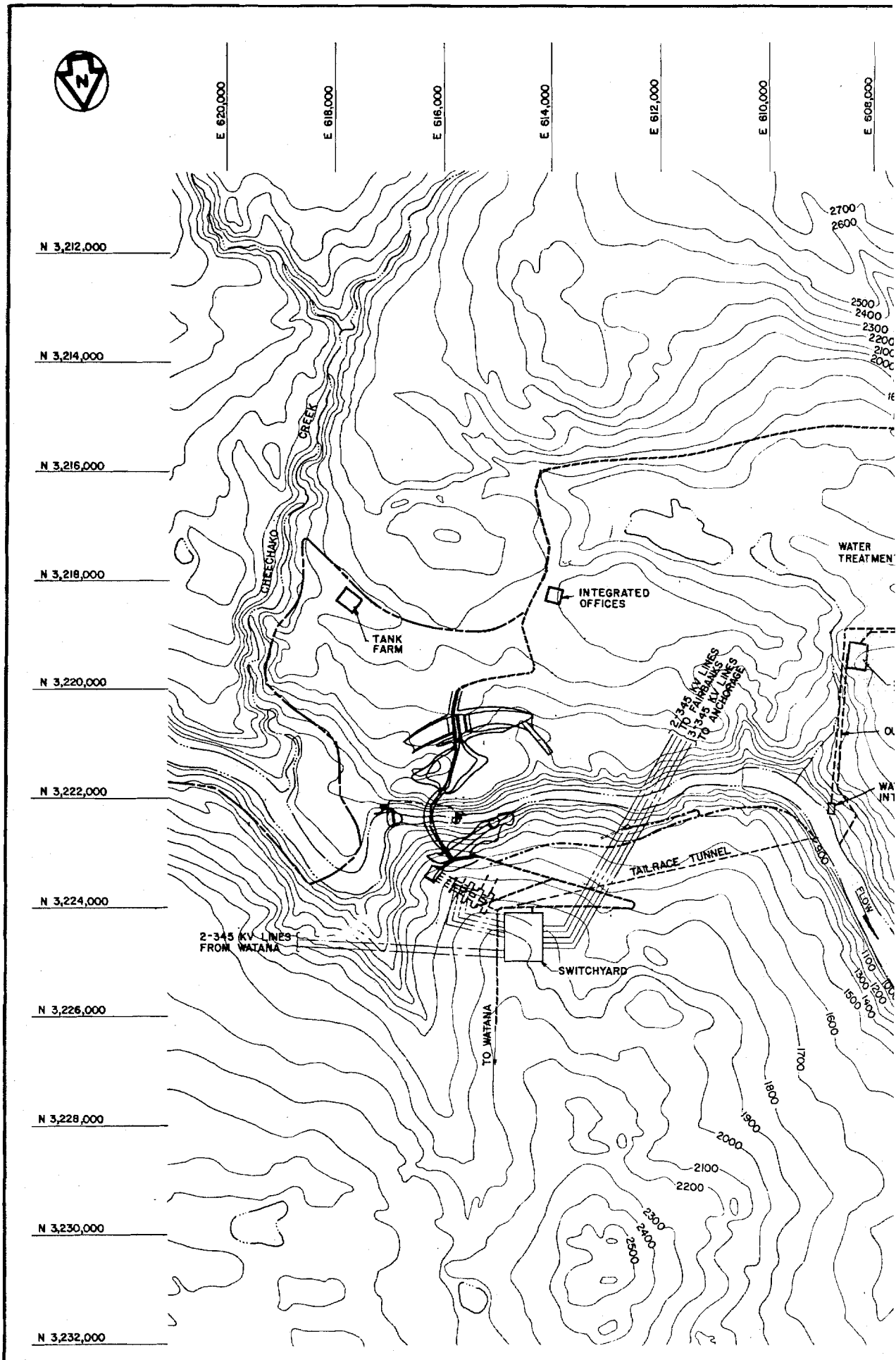
SUSITNA HYDROELECTRIC PROJECT

WATANA
VILLAGE AND TOWN SITE

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 38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WATER TREATMEN
2-345 KV LINES TO FAIRBANKS
3-345 KV LINES TO ANCHORAGE
TAIL RACE TUNNEL
2-345 KV LINES FROM WATANA
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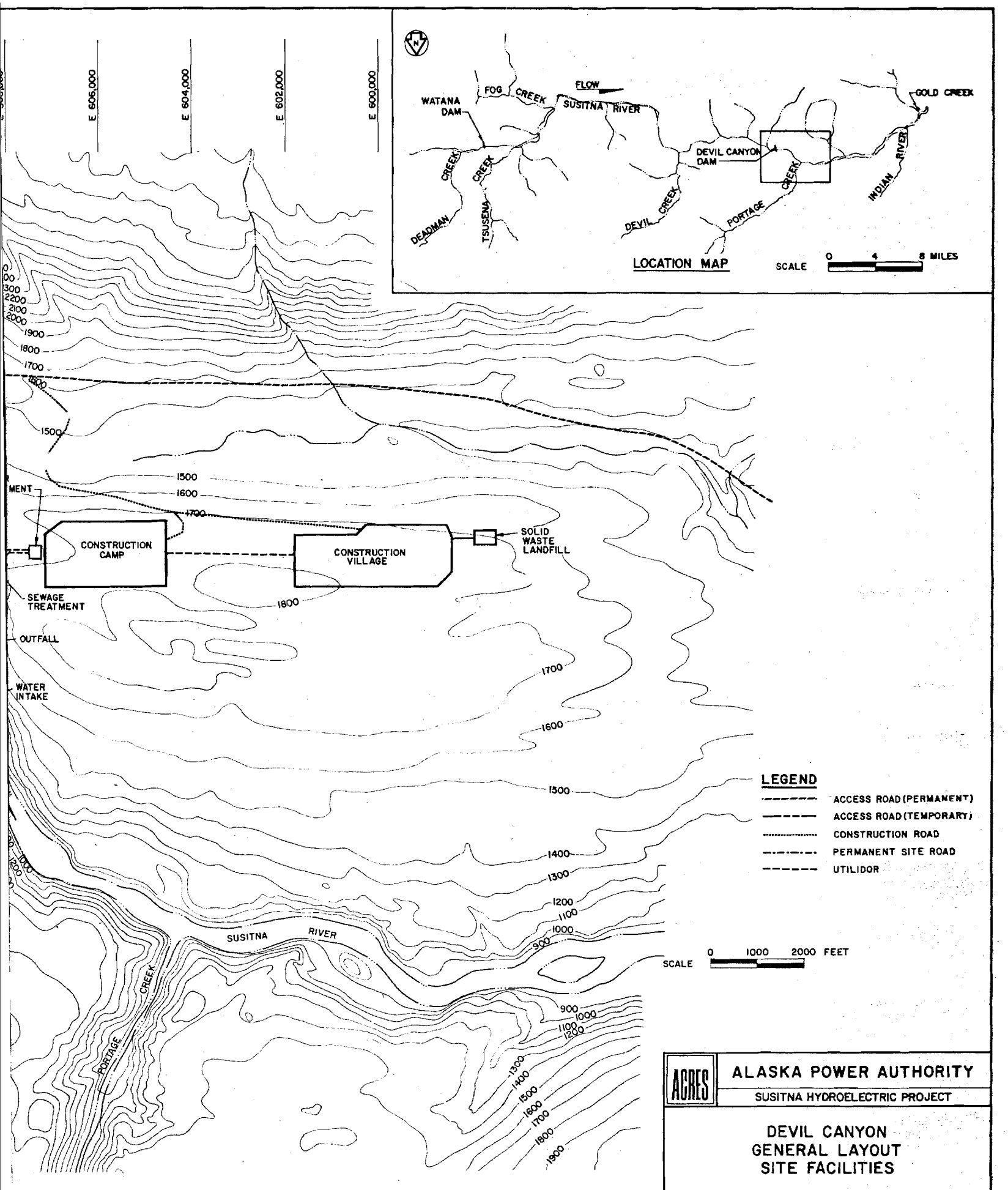


ALASKA POWER AUTHORITY

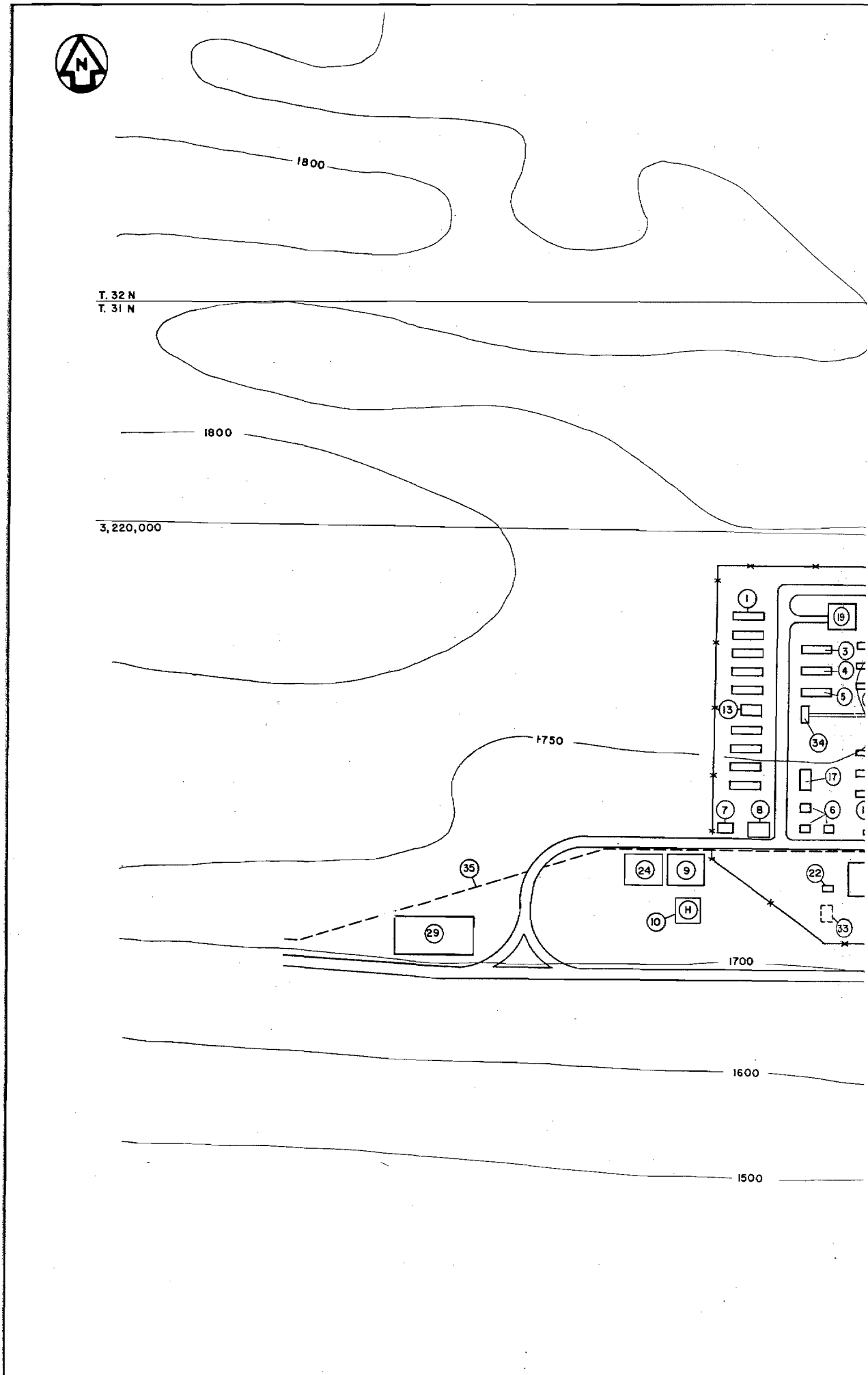
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON GENERAL LAYOUT SITE FACILITIES

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 72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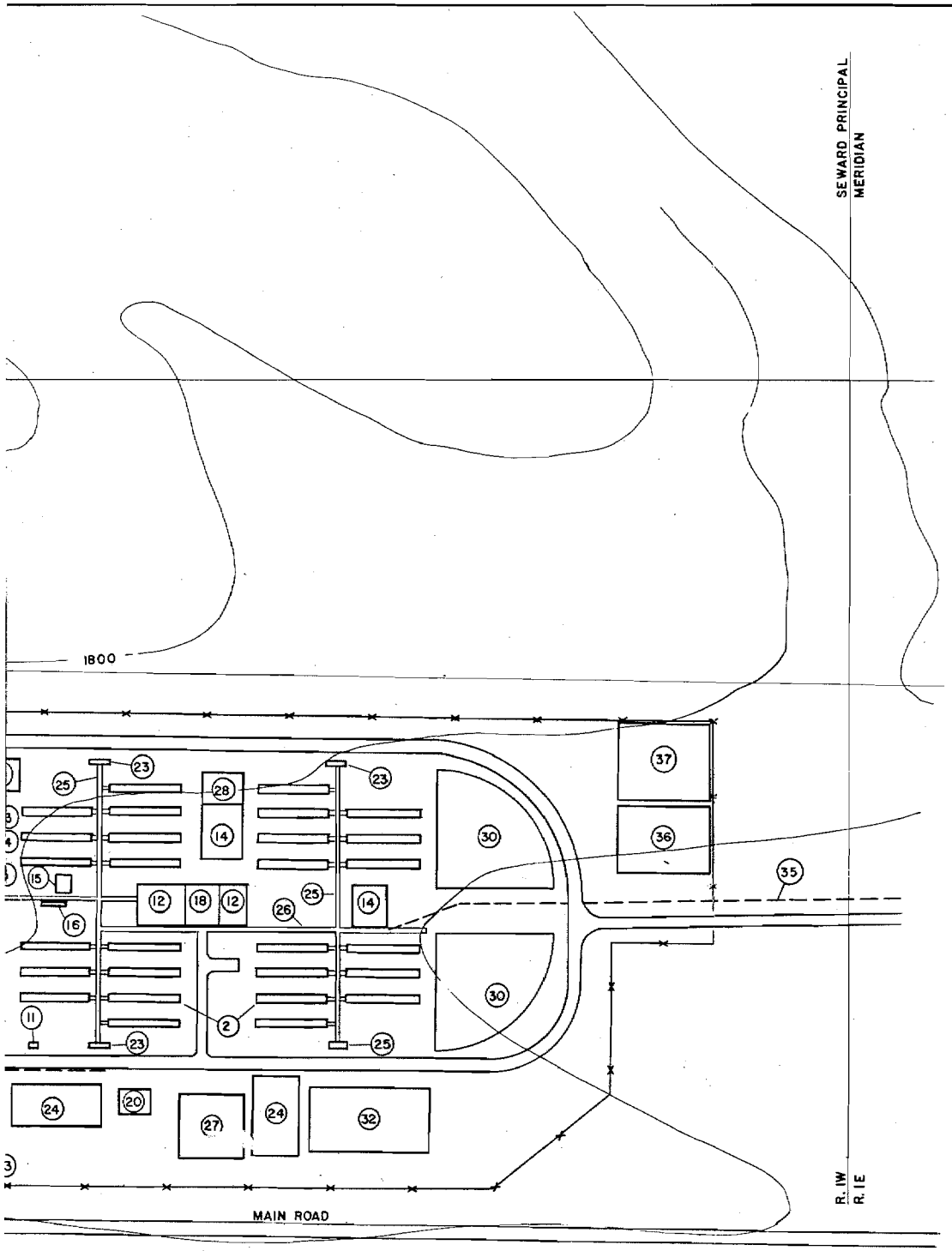


LEGEND

1. STAFF AND FOREMAN HOUSING
2. DORMITORIES
3. MANAGER'S GUEST HOUSE
4. OWNER'S GUEST HOUSE
5. CONTRACTOR'S GUEST HOUSE
6. CAMP MANAGER'S OFFICES
7. SECURITY
8. FIRE AND OIL SPILL
9. HOSPITAL
10. HELIPAD (MEDICAL EMERGENCY)
11. COMMUNICATIONS CENTER
12. KITCHEN AND DINING
13. STAFF CLUBHOUSE
14. RECREATION HALL
15. BANK
16. LAUNDRIES
17. SOILS LAB
18. FOOD SERVICE WAREHOUSE
19. WAREHOUSE
20. MAINTENANCE GARAGE
21. PUMP HOUSE
22. GENERATING STATION
23. BUS STATION
24. PARKING AND LAYDOWN AREAS
25. 10' PERMAWALK
26. 16' PERMAWALK
27. GYMNASIUM
28. SWIMMING POOL
29. HOCKEY RINK
30. BASEBALL FIELD
31. SOFTBALL FIELD
32. FOOTBALL FIELD
33. FUEL STORAGE (50,000 GAL.)
34. STORE
35. UTILIDOR
36. WATER TREATMENT PLANT
37. WATER RESERVOIR

SCALE 0 200 400 FEET

ACRES

ALASKA POWER AUTHORITY

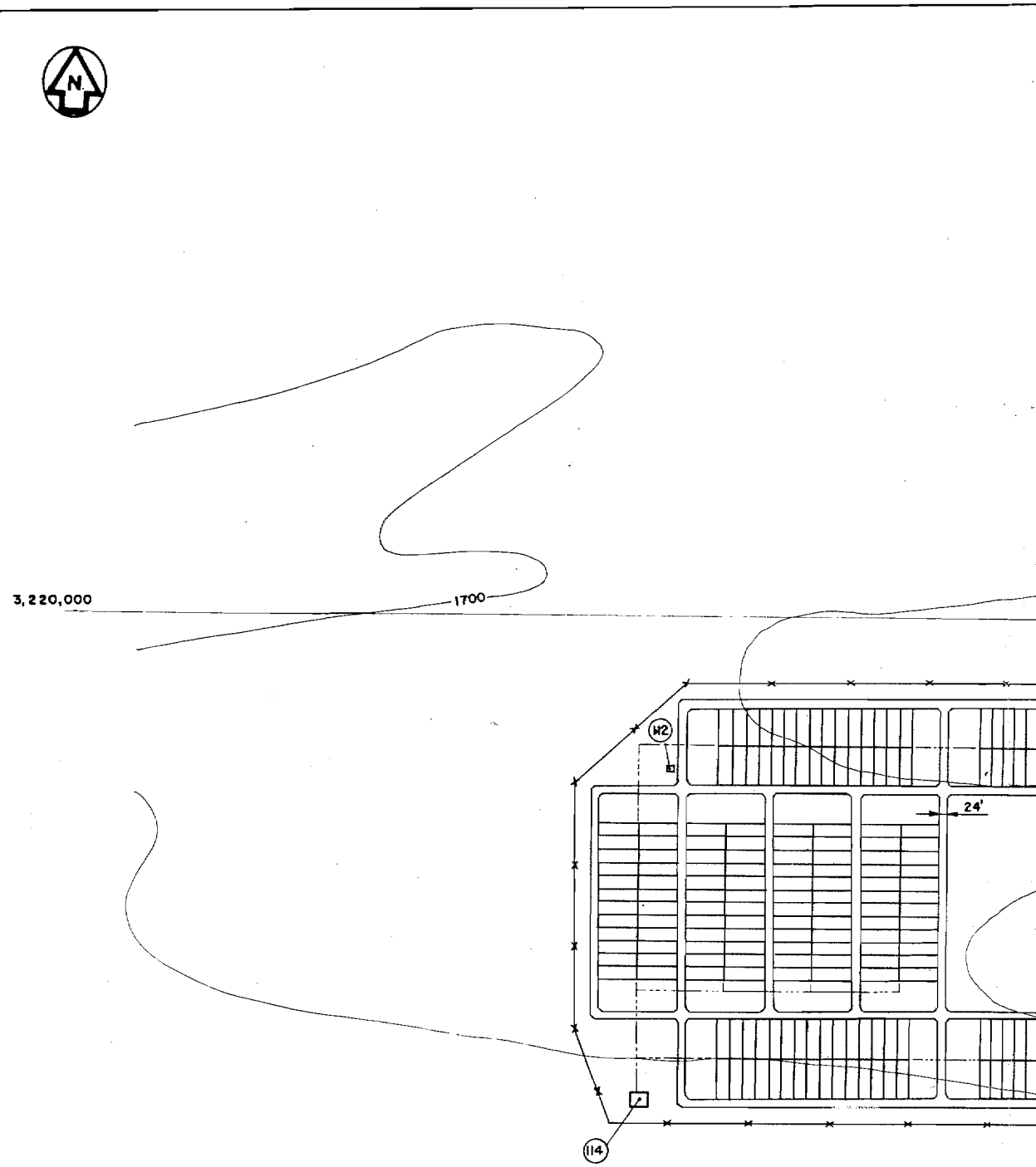
SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON CONSTRUCTION CAMP PLAN

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 73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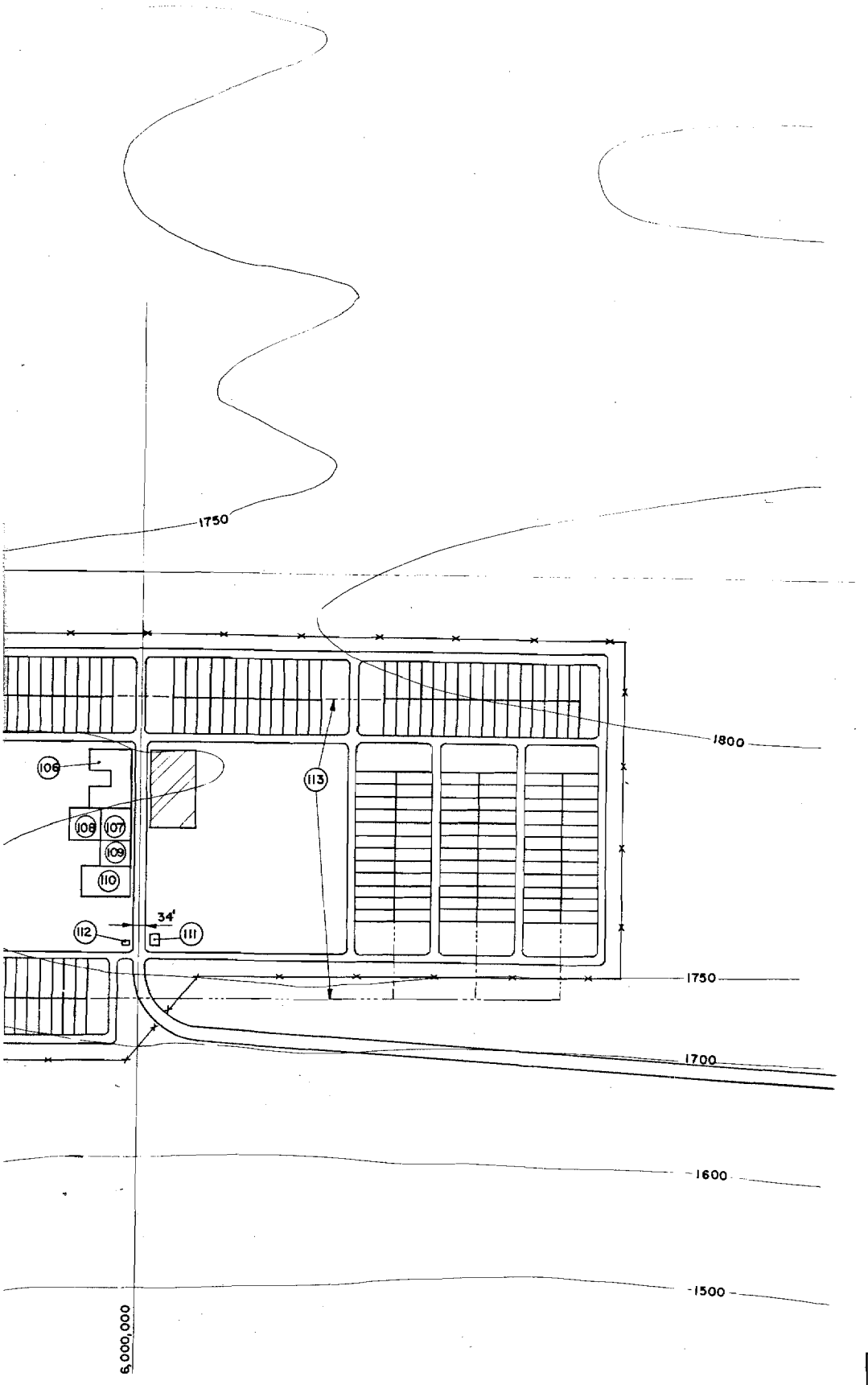

SCALE 0 200 400 FEET

LEGEND

TEMPORARY HOUSING / UTILITIES FURNISHED BY OWNER.

PARKING AREAS

VILLAGE HOUSING - 320 UNITS

FAMILY HOUSING - 2 B.R. - 16 UNITS (24'x50')
FAMILY HOUSING - 3 B.R. - 16 UNITS (24'x50')
FAMILY HOUSING - 4 B.R. - 16 UNITS (28'x50')
FAMILY HOUSING - 3 B.R. - 72 UNITS (14'x60')
FAMILY HOUSING - 3 B.R. - 200 UNITS (14'x60')

(106) SCHOOL - 30'x35' (12 UNITS)
(107) GYM - 100'x 100'
(108) SWIMMING POOL - 100'x 100'
(109) RECREATION CENTER 80'x 100'
(110) STORE - 100'x 160'
(111) FIRE STATION - 30'x 40'
(112) GENERATING STATION - 20'x30' (2 UNITS)
(113) UTILIDOR
(114) SEWER PUMPING STATION - 50'x 60'

ACRES

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

DEVIL CANYON TEMPORARY VILLAGE

ACRES AMERICAN INCORPORATED

MARCH 1982

PLATE 74