KODIAK PLAN + DEVELOPMENT STRATEGY

SUMMARY REPORT

kodiak island borough
regional plan and development strategy

summary report

july 1978

The preliminary findings presented here are part of a technical study being performed by professional consultants under contract with the Kodiak Island Borough and the Division of Community Planning, Department of Community and Regional Affairs of the State of Alaska. The study has been financed in part through an Economic Development Administration Technical Assistance Grant. Statements, findings, conclusions, recommendations, and other data in this report are solely those of the contractor and do not necessarily reflect the view of the Kodiak Island Borough, State of Alaska, or the Economic Development Administration.

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PREFACE

The purpose in preparing the Regional Plan and Development Strategy was two-fold:

- To assist officials of the Kodiak Island Borough to plan for the full range of government, economic, and social impacts expected to occur during the oil exploration and development programs off Kodiak Island.

- To develop or bring up to date all necessary elements of a Borough Comprehensive Plan and to schedule needed capital and governmental services improvements to coincide with anticipated offshore events.

This Summary Report reflects the required dual purpose. To this end, this report: 1) embodies the U.S. Economic Development Administration's requirements for planning and economic adjustment strategy and 2) provides the conceptual basis for a comprehensive plan for the Kodiak Island Borough.

A conclusion of the economic adjustment strategy which should be stated at the outset is that since OCS-related development is several years distant, there will be no occasion for the Kodiak Island local governments to seek Title IX implementation grant funding from the U.S. Economic Development Administration in the immediate future. Key issues and recommendations concerning the economic adjustment strategy are outlined under Section I., Introduction and Summary, of this report.

As a component of the comprehensive plan, this Summary Report along with other planning tools including draft zoning and subdivision regulations and a proposed capital improvements program have been submitted to the Kodiak Island Borough Planning and Zoning Commission and Borough Assembly for review.

Following action by the Borough Assembly, the revised and adopted version of the Regional Plan will be a part of the official comprehensive plan for the Kodiak Island Borough. When adopted, the comprehensive plan may differ from some of the provisions of this report. The preliminary character of this report should therefore be recognized, and it should not be interpreted as official Kodiak Island Borough policy.

The Regional Plan has been developed as a series of working papers on distinct study elements. The study elements dealt with such areas as transportation, the borough economy and population, and community services, all of which were intended to assist local government officials in minimizing any impact that might occur. The Summary Report incorporates the substance of these elements in their final recommended form, except for the text of three ordinances which are necessary to implement the comprehensive plan and which were printed separately in final draft form. As noted above, each of these measures will be reviewed, revised and adopted as individual ordinances by the Borough Assembly.

It is therefore expected that after final adoption the Borough will print and distribute the following ordinances:

1. Zoning Ordinance.
2. Subdivision Regulations.
3. Capital Improvements Programming Manual.

A fourth supporting study for the Regional Plan was printed separately in final draft form. This is the Environmental Impact Analysis (EIA) required under the regulations of the U.S. Economic Development Administration. The EIA will not require adoption by the Borough Assembly.

It will be apparent in reading the Summary Report that the focus of the Regional Plan has been on the Kodiak urban area. The reason is that plans for the Kodiak villages have been developed separately for the individual villages, with the aid of the Borough staff. As adopted by the Borough Assembly, the village plans will also constitute an important portion of the final comprehensive plan.

ABSTRACT

This report summarizes the findings and recommendations of the Kodiak Island Borough Regional Plan and Development Strategy.

In broad outline, the major findings and recommendations that have emerged from the study are:

- The economy of the Kodiak urban area, based upon the fishing industry and the Coast Guard Support Center, is strong and growing. Coast Guard employment is stable for the foreseeable future. The Alaskan fishing industry appears to be on the verge of significant expansion, and Kodiak could attract many of the jobs involved if it can provide the space and services necessary to the industry.

- At present, however, certain Kodiak utilities and community facilities are seriously strained. Housing for workers is expensive and in short supply. Until these constraints are removed, industrial growth will be slowed.

- These shortages in services and housing also have adverse social and environmental effects. Among them are surface water pollution, dust, periodic water and power shortages, high prices, overcrowded housing, and development in hazardous areas.

- Significant effort and expense will be required to correct these environmental effects and their causes. To minimize this effort and expense as well as to slow the rate of housing cost inflation, concentration of services in the existing Kodiak urban area is recommended.

- Consideration of natural hazards should also be incorporated into land-use decisions. A principal example is the potential instability of Pillar Mountain. A detailed geotechnical study of the mountain must be carried out before any expansion of the existing City dock and cargo facilities can be undertaken. The degree of tsunami hazard should also be investigated and integrated into future land-use planning decisions.

- On-shore employment associated with Outer Continental Shelf (OCS) oil exploration and development could seriously aggravate existing socio-economic problems in the urban area. A sudden population boom would require expansion in services that the boom would be too short-lived to finance. The boom would also drive prices and wages up, which could well force the fish-processing industry to move out of Kodiak. The result could easily be a post-boom depression.

- If oil is found, the Kodiak Island Borough will probably have to allow an oil terminal to be built somewhere in the Kodiak Archipelago. Siting of the facility can be crucial in determining impacts. From a socio-economic viewpoint, oil terminal development should be sited well away from both the urban area and the villages. Planning permission for a specific proposal should follow only after a complete environmental review. It should also be conditioned on the developers' assumption of responsibility for all utilities, services and community facilities for temporary and permanent work forces.

- Depending on the outcome of the geotechnical study of Pillar Mountain, it may be in the Kodiak community's interest to encourage development of a marine service base in conjunction with new community docking facilities. To be prepared to evaluate or even to initiate this type of proposal, the community will need to pursue a detailed examination of the economic and operational feasibility of alternative dock facility locations.

KODIAK ISLAND BOROUGH
REGIONAL PLAN AND DEVELOPMENT STRATEGY

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I. INTRODUCTION AND SUMMARY

The direct impetus behind this study has been the need to plan for the social, economic and governmental impacts expected to occur during the Outer Continental Shelf (OCS) oil exploration and development program off Kodiak Island. The OCS program has been mandated by the federal government because of the vital importance of oil to the nation's economy. At the same time, both the federal and state governments have acknowledged the need for community planning to deal with the local effects of OCS activity and have given financial and technical support to this planning effort.

Because the national interest is involved, the Kodiak community is unlikely to persuade the federal government to cancel the OCS lease sale for the Western Gulf of Alaska, now scheduled for 1980. However, the community can play a very significant role in deciding how the OCS program is carried out in Kodiak. In particular, the Kodiak Island Borough can exert a powerful influence over on-shore development by exercising the area-wide planning powers granted to it by the Alaska Statutes.

The Regional Plan and Development Strategy is intended to help the Borough to exercise these area-wide powers by bringing all necessary elements of the Borough comprehensive plan up to date. The core of the comprehensive plan is a set of long-range policies for the physical development of the Kodiak community. In developing these policies, a number of issues have emerged; OCS activity is important among these, but is by no means the only major issue. Other significant issues include the potential for expansion of the bottom fish industry and the stability of Pillar Mountain. These and other issues have all helped to shape this plan.

Kodiak Planning Program

The present study is the third step in a four-step Kodiak Island Borough planning effort dealing with long-range policy issues and OCS development:

1. OCS Impact Study
2. Marine Facilities Study
3. Regional Plan and Development Strategy
4. Management Study

A brief review of the Borough planning program will help to provide the context for this study.

1. OCS Impact Study. The Kodiak Island Borough Outer Continental Shelf Impact Study was completed by Simpson Usher Jones, Inc., in September, 1977. Its purpose was to provide working estimates of the probable levels of oil industry activity, both off-shore and on-shore, and a baseline inventory of community utilities, services and facilities in the Kodiak Island Borough.

As an extension of this study, Simpson Usher & Jones also prepared Village Sketch Plans for Akhiok, Karluk, Larsen Bay, Old Harbor, Ouzinkie and Port Lions, as well as the unincorporated community of Bells Flat. These plans

are in the process of being revised, amended and adopted by the villages, with help from Borough staff. It is recommended that these be incorporated with the plans for the urban area in one publication when all the plans are adopted.

Another separately reported element of the OCS Impact Study was a set of Draft Goals and Objectives for the Kodiak Island Borough based on a community attitude survey. This document is also being reviewed and amended prior to official adoption by the Borough Assembly. Finally, Simpson Usher & Jones also compiled a map of existing land use in the Kodiak urban area and prepared a sketch plan for future land use as a starting point for discussion of land-use alternatives in the urban area. These two maps are reproduced in the present report.

2. Marine Facilities Study. The Borough commissioned Woodward-Clyde Consultants to evaluate and rank possible sites for OCS-related marine facilities. This study was also completed in September, 1977, and its final title is Oil Terminal and Marine Service Base Sites in the Kodiak Island Borough. The four elements covered in the study are 1) potential demand for such facilities, 2) potential site locations, 3) geotechnical and environmental evaluations of these sites, and 4) site rankings and examination of interest group preferences.

As the final title indicates, the study concluded that marine service bases and oil terminals are the only OCS marine facilities likely to be built in the Kodiak Island Borough. Sites for these two types of facilities were ranked for biological impacts, socio-economic impacts and development costs. Various weighted combinations of these rankings were examined to see how sensitive overall site ranking is to the viewpoint of the group doing the ranking. The conclusions of the study indicate that several of the sites with low biological and socio-economic impacts - relative to other Kodiak sites - appear also to be feasible from a cost standpoint. In short, it appears that there is a range of feasible sites for both types of facility and that the Kodiak Island Borough will be able to influence OCS siting decisions. The most feasible sites, combining cost and impact considerations, are indicated on Map 2.

3. Regional Plan and Development Strategy. This is the present study. The degree to which control of any type of development is successful (and even legal) is in large part dependent on the clarity of community policy towards overall physical development. Therefore, the desire to control on-shore OCS development in the best interests of Kodiak has led to the necessity and opportunity of updating the comprehensive plan as the framework for control of all physical development in the Kodiak Island Borough. For this reason, the Regional Plan and Development Strategy has gone beyond OCS activity to examine a broad range of issues that affect the future of Kodiak.

4. Management Study. Following the completion of the Regional Plan and Development Strategy, the Kodiak Island Borough intends to undertake a fourth and final OCS-related planning study in cooperation with other local governments and groups such as Koniag. It will identify interests, roles and responsibilities among these groups, related specifically to OCS development. The intent will be to develop a unified working approach in the Kodiak community toward on-shore OCS facilities and related development.

Summary

The major findings of the Regional Plan and Development Strategy regarding present conditions in the Kodiak urban area are that the economy of the Kodiak urban area, based upon the fishing industry and the Coast Guard Support Center, is strong and growing. At present, however, housing is expensive and in short supply and certain Kodiak utilities and community facilities are seriously strained. These shortages in services and housing have adverse social and environmental effects, including surface water pollution, dust, periodic water and power shortages, high prices, overcrowded housing, and development in hazard areas. This study recommends that the Borough and other local governments work toward reducing these shortages in housing and community services. Significant expense and effort will be required to do this, but both the effort and the expense can be reduced if services are concentrated in the existing Kodiak urban area.

Looking beyond present conditions, there are three major areas of uncertainty that complicate planning for the future of the Kodiak community. These are OCS activity, the bottomfish industry, and the Pillar Mountain landslide.

The OCS lease sale for the Western Gulf of Alaska was to have occurred in 1978. It has been postponed to 1980 or possibly even later. When the lease sale occurs, petroleum exploration activity will commence, but development and production activities will still be uncertain. The findings of this study are that on-shore employment associated with OCS oil exploration and development could seriously aggravate existing socio-economic problems in the urban area, particularly if an oil terminal were constructed near the urban area. Construction of a terminal could cause a short-term influx of construction workers into the community. A sudden population boom would require expansion in services that the boom would be too short-lived to finance. The boom would also drive prices and wages up, which could well force the fish-processing industry to move out of Kodiak. The result could easily be a post-boom depression. Yet if oil is found, the Kodiak Island Borough will probably have to allow an oil terminal to be built somewhere in the Kodiak Archipelago. Siting of the facility can be crucial in determining impacts.

From a socio-economic viewpoint, oil terminal development should be sited well away from both the urban area and the villages. Permission for a specific proposal should be subject to the conditional use procedures developed in the revised draft of the Borough zoning code and development should be directed to sites identified in the Management Study. Permission should also follow only after a complete environmental review and should be conditioned on the developers' assumption of responsibility for all utilities, services and community facilities for temporary and permanent work forces.

As opposed to OCS development, the bottomfish industry holds out the promise of significant development in keeping with Kodiak's present economy and community preferences. Development of this fishery would help to reduce seasonal unemployment in the community and it appears that Kodiak could attract many of the jobs involved--if it can provide the space and services necessary to the industry.

A very recent report to the Alaska Legislature by the Interim Committee on Resource Matters, titled The Potential for Expanding Into an Alaskan Bottomfish Industry (January 1, 1978) notes that the stated purpose of the federal 200 mile limit extension is "to encourage the development of fisheries which are currently underutilized or not utilized by United States fisheries, including bottomfish off Alaska" (p. 3, emphasis added). The potential benefits to communities such as Kodiak would be increased if shore-based processing is generally adopted (NEFCO has installed an experimental processing line at Gibson Cove). The report identifies some of the community "infrastructure" requirements associated with on-shore bottomfish processing plants (pages 85 and 86) also mentioned in this study and observes that Kodiak is a "prime immediate location" for such plants. However, many economic aspects of the prospective American bottomfish industry are still unresolved. The report ends with proposed study legislation designed to provide some of the issuing information. In the meantime, Kodiak would be well advised to try to resolve issues such as water supply, expanded harbor facilities and space for waterfront industry in order to be able to continue to attract fishery development as it occurs.

The third area of uncertainty in the future of the Kodiak urban area is unfortunately also connected with the expansion of waterfront industry in the Inner Harbor area. This is the Pillar Mountain Landslide. The potential instability of this area above the City of Kodiak dock and cargo terminal facilities is described in this study. It is more thoroughly detailed in U.S. Geological Survey open file report number 78-217, Pillar Mountain Landslide, Kodiak, Alaska (1978) by Reuben Kachadoorian and Willard Slater. The open file report makes it clear that the landslide "is a potential hazard to the City of Kodiak and its environs and merits a thorough investigation and evaluation."

According to the report, the degree and extent of the hazard cannot be identified without a more detailed investigation. That investigation is absolutely necessary for informed and responsible decisions on development in the Inner Harbor area. Lives, property, and the future economic well-being of the Kodiak community are at stake. Furthermore, the open file report has been released, federal and state agencies are aware of the problem, and support for projects in the Inner Harbor area is likely to be conditioned on performance of the detailed investigation. Certainly, a detailed geotechnical study of the mountain must be carried out before any expansion of the existing City dock and cargo facilities can be undertaken. Depending on the outcome of the geotechnical study of Pillar Mountain, it may be in the Kodiak community's interest to encourage development of an OCS marine service base in conjunction with new community docking facilities. To be prepared to evaluate or even to initiate this type of proposal, the community will need to pursue a detailed examination of the economic and operational feasibility of alternative dock facility locations.

In conclusion, this study identifies a number of actions which the community can and should take to plan the orderly future development of Kodiak. In addition, the community can also deal with the three major areas

of uncertainty by 1) preparing to control the course of OCS development, if it occurs, 2) preparing to grasp the opportunity of assisting in the development of the bottom fishery, and 3) beginning the resolution of the Pillar Mountain issue by obtaining the geotechnical information which is a precondition to informed action.

II. ECONOMY AND POPULATION

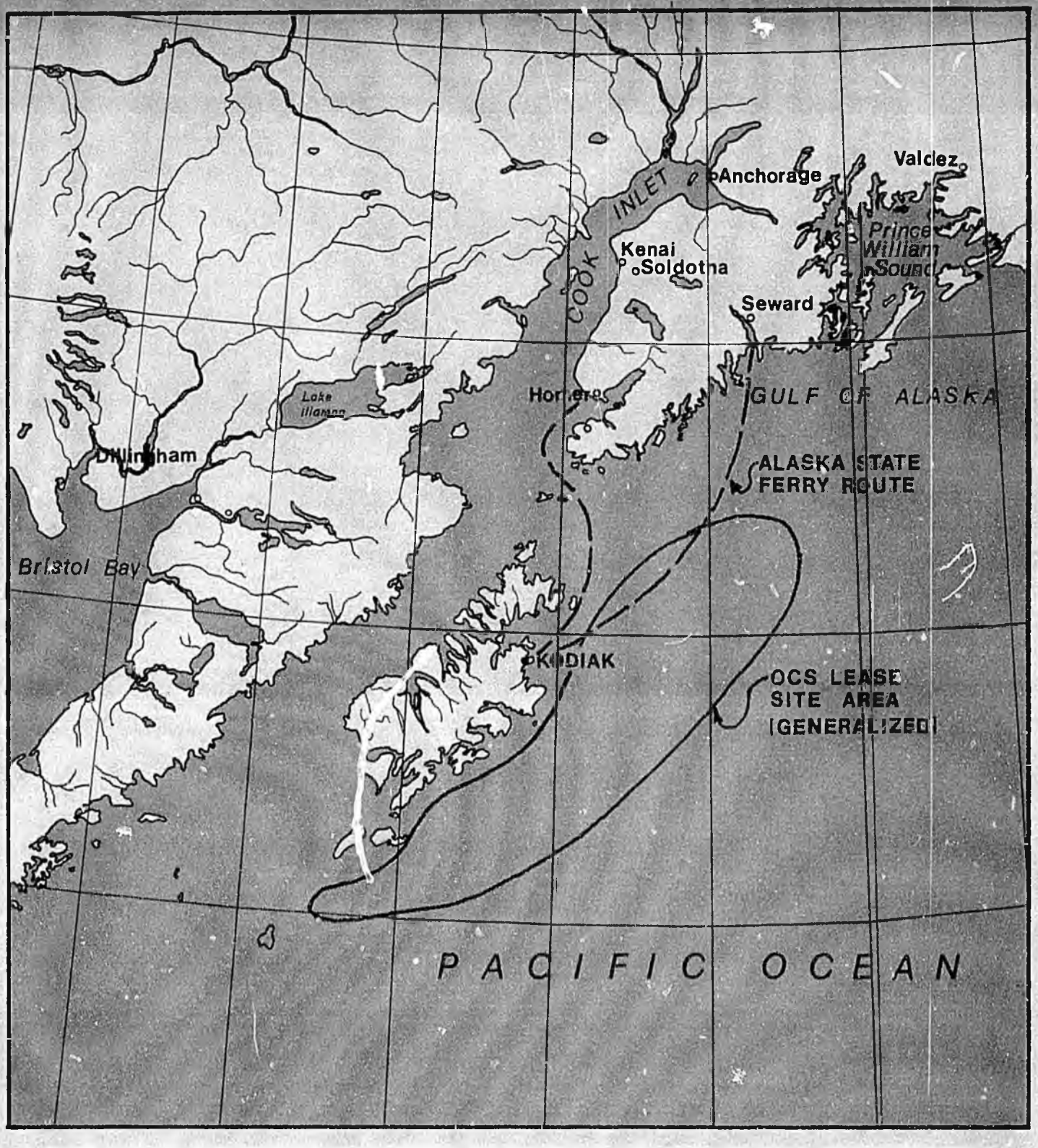
The first step in planning for the future development of the Kodiak Island Borough is to examine existing economic and community patterns in the Borough. This step has been carried out in the Kodiak Island Borough Outer Continental Shelf Impact Study described in the previous chapter. That study, in two volumes, is the inventory upon which the regional planning effort has been based. As such, the OCS Impact Study is a companion document to this report and will not be duplicated here. A brief review of the regional setting and of Kodiak communities will help to put this planning effort into perspective, however.

The Kodiak Island Borough is the overall governmental unit for the Kodiak Archipelago. Map 1 illustrates the regional location of the Archipelago. The Kodiak urban area serves as a subregional center and transshipment point for the western third of Alaska's Southcentral Region, including the Aleutian chain. Kodiak's marine orientation is evident on this map, which also indicates the general area of the proposed Western Gulf OCS lease sale.

Map 2 indicates the established communities present in the Borough. In addition to the City of Kodiak, there are six smaller, incorporated jurisdictions: Akhiok, Karluk, Larsen Bay, Old Harbor, Ouzinkie and Port Lions. These are the "villages." The map also indicates the most feasible sites for OCS on-shore facilities identified in the report, Oil Terminal and Marine Service Base Sites in the Kodiak Island Borough, by Woodward-Clyde Consultants. That report is also a companion volume to this study.

In addition to the villages, two unincorporated rural settlements presently exist on the road system south and east of the urban area: Bells Flat and Chiniak. These are indicated on Map 3, along with the urban area and the Coast Guard Support Center.

A fourth map has been provided to display the spatial relationship between the Support Center, the City of Kodiak, and the balance of the urban area. Several facilities and sites of particular importance to the Kodiak urban area are also indicated, for later discussion.



REGIONAL LOCATION

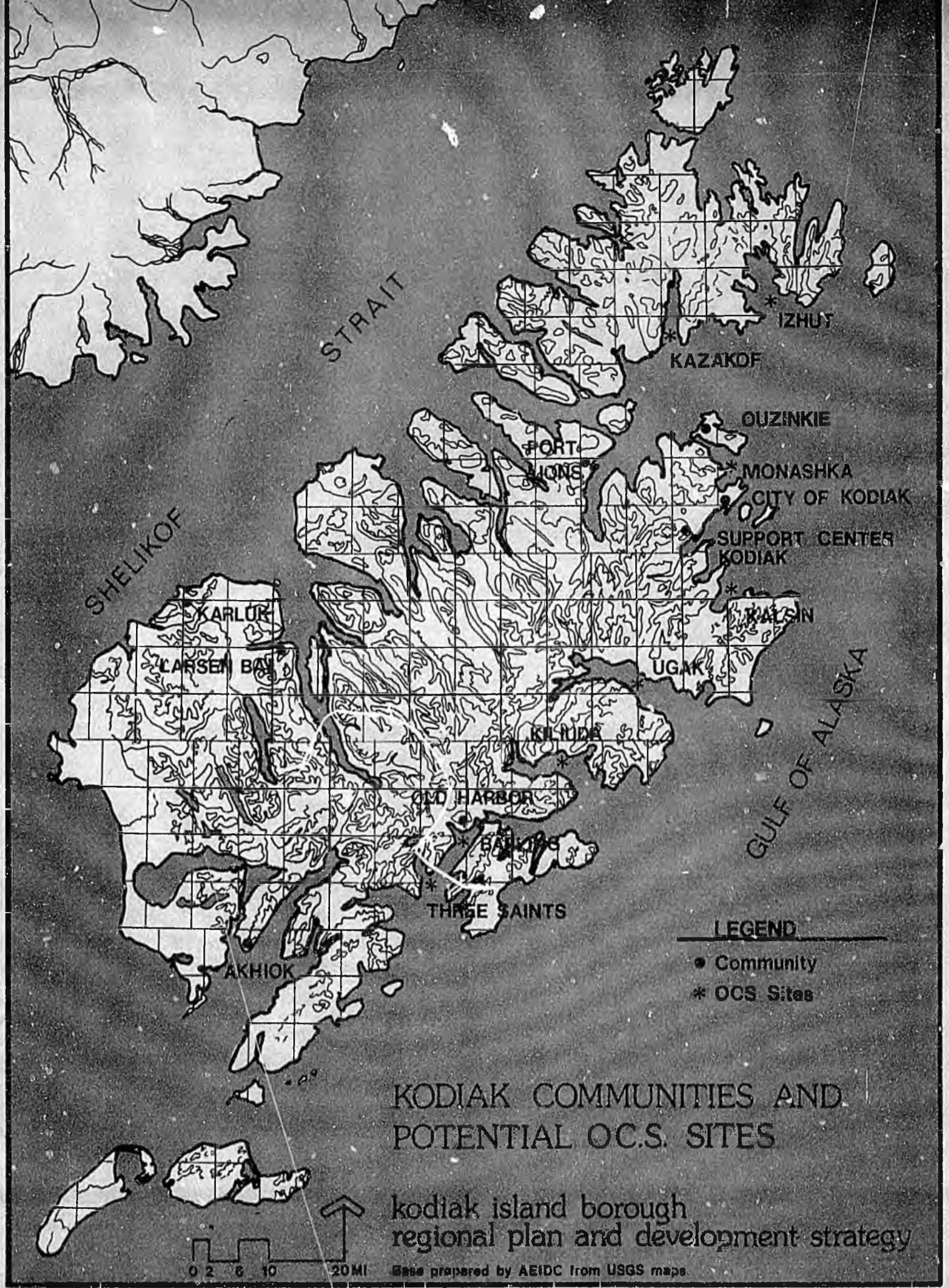
NORTH

0 25 125 225 MI

Base prepared by Simpson, Usher, Jones, Inc.

kodiak island borough
regional plan and development strategy

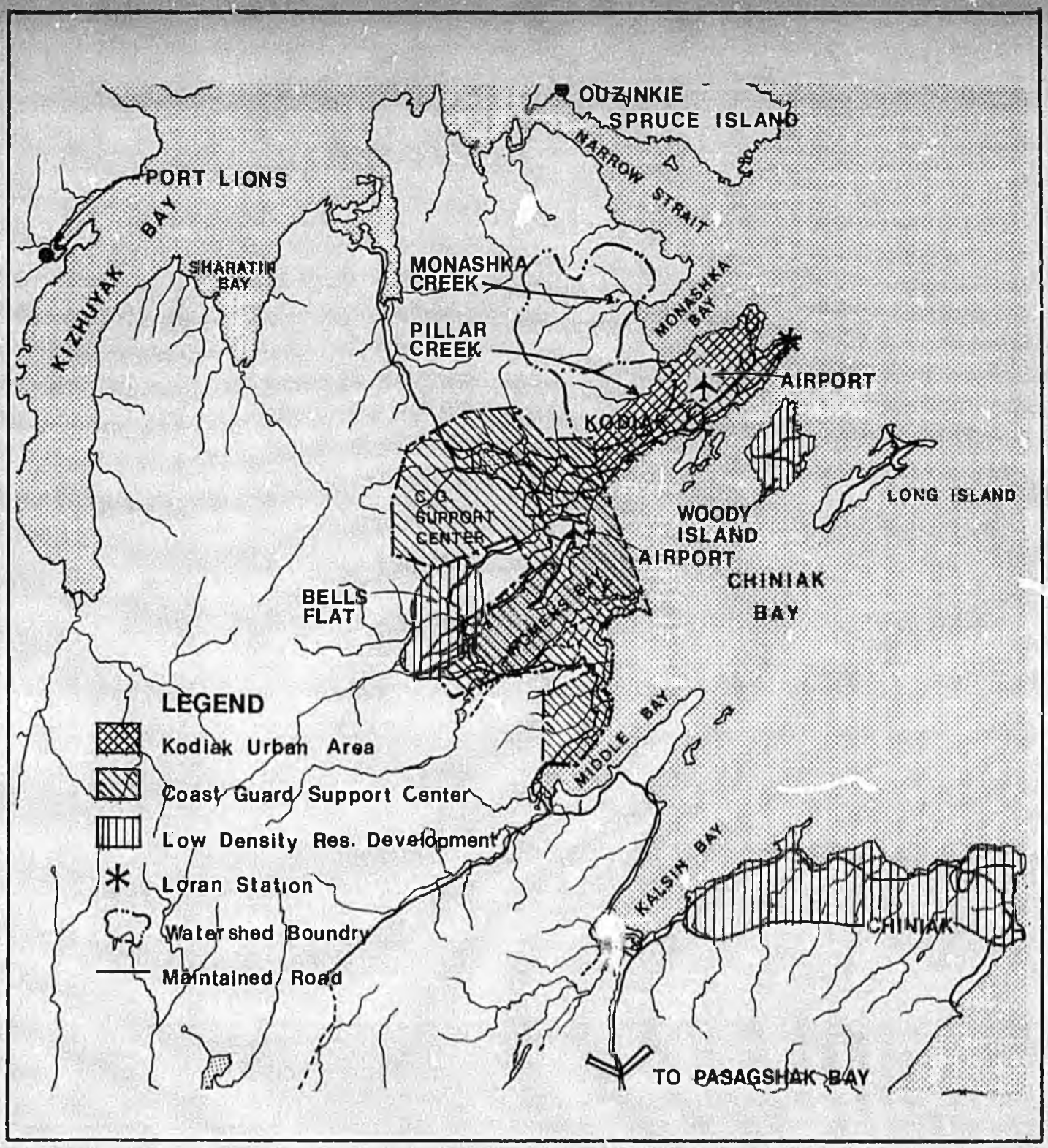
MAP 1



KODIAK COMMUNITIES AND POTENTIAL O.C.S. SITES

kodiak island borough regional plan and development strategy

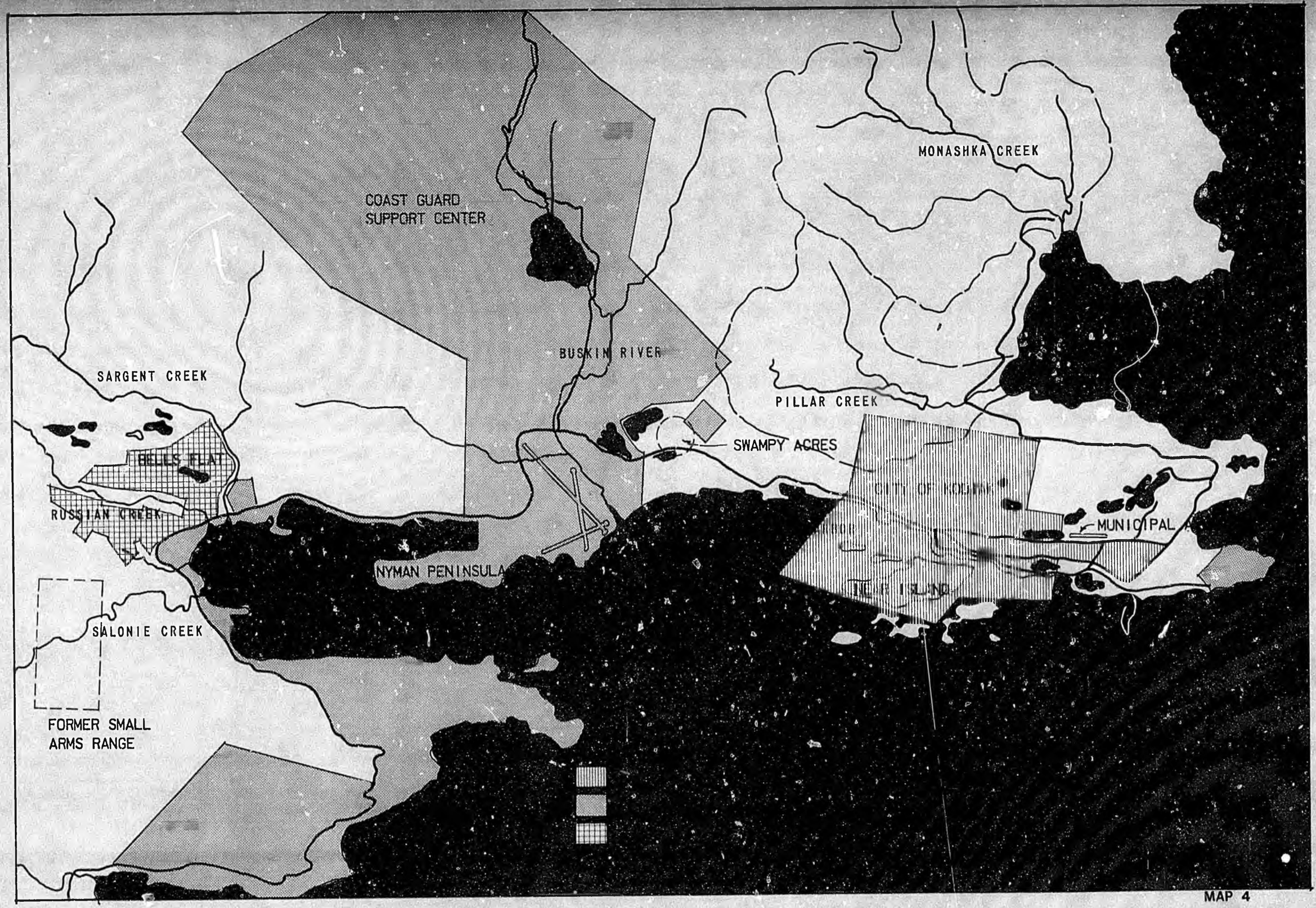
MAP 2



KODIAK ISLAND ROAD NETWORK

kodiak island borough
regional plan and development strategy

MAP 3


COAST GUARD
SUPPORT CENTER
BUSKIN RIVER
MONASHKA CREEK
PILLAR CREEK
SARGENT CREEK
SWAMPY ACRES
BELLS FLAT
RUSSIAN CREEK
NYMAN PENINSULA
SALONIE CREEK
FORMER SMALL
ARMS RANGE
MUNICIPAL

MAP 4

Historical Perspective

After examining existing conditions, the next planning step is to identify the future trends and development patterns that would be likely if no actions were taken to shape them to community desires and needs. Examination of historical trends is a good starting point for doing this.

Between 1960 and 1975, the total population of the Kodiak Island Borough grew from approximately 7,200 to approximately 8,700 persons. That represented an average annual compound growth rate of 1.3% for the 15-year period. When we look at these population figures more closely, however, we find that it is important to distinguish between the military and civilian components of the total population. The official figures are somewhat deceptive because "military population" represents manning levels at the Coast Guard Support Center (formerly the Navy Base). The civilian population figures exclude military personnel, but do include military dependents. Even using these definitions, civilian population increased by an average annual compound growth rate of +2.6% between 1960 and 1975, while military population during the same 15-year period declined at -4.9% (see Table 1).

Over the entire 15-year period, civilian population grew steadily throughout the 1960's and remained relatively stable between 1970 and 1975. Military population, on the other hand, declined steadily throughout the 1960's and on until 1972, as a result of the gradual phase-out of the Kodiak Naval Base. In 1972, the Coast Guard took over the Kodiak base from the Navy, and the military stopped declining and began to show a slow increase. Note that there is some disagreement over the population estimate for 1975.

TABLE 1

Kodiak Island Borough
Population (1960-1975)

Year	Civilian Population (1)	Military Population (2)	Total Population
1960	5,367	1,807	7,174
1967	7,652	1,693	9,345
1968	8,020	1,500	9,520
1969	8,200	1,670	9,870
1970	7,918	1,491	9,409
1971	8,422	1,301	9,723
1972	8,044	659	8,703
1973	8,178	690	8,868
1974	8,499	733	9,232
1975	7,901	847	8,748(3)
Average Annual Compound Rate of Growth			
1960-75	2.6%	-4.9%	1.3%
1960-70	4.0%	-1.9%	2.8%
1970-75	0.1%	-10.0%	-1.6%

Source: Alaska Department of Labor, Current Population Estimates

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(1) Includes military dependents.

(2) Manning levels; dependents not included, Coast Guard personnel replaced Navy personnel in 1972.

(3) Simpson Usher Jones estimate = 9,620, based on actual school enrollment for 1975.

The age distribution of the Kodiak population has been reasonably stable over this period.(1) In a special census taken of the civilian population in 1974 - not including military dependents living on the Support Center - the distribution was this:

TABLE 2

1974 Civilian Age Distribution

Age	Number	Percent
1-5	555	9%
5-17	1805	28%
18-55	3554	55%
55+	490	8%

Note the large percentage of school-age children.

The locational distribution of population has also remained quite stable. That is, village population has remained stable and growth has occurred in the Kodiak urban area. The 1974 special census counts are summarized here, with all residents of the Support Center again excluded. The "remainder" category includes the Mission Road area (outside City limits) and the Chiniak and Uganik census tracts.

TABLE 3

1974 Civilian Population by Location

Census Tract	Number	Percent
Kodiak	3700	57.8%
Ouzinkie	180	2.8%
Port Lions	243	3.8%
Akhiok	102	1.6%
Karluk	94	1.5%
Larsen Bay	98	1.5%
Old Harbor	304	4.7%
Remainder	1683	26.3%

(1) pp. 141-142, Vol. 2, Simpson Usher Jones, Inc., Kodiak Island Borough Outer Continental Shelf Impact Study, 1977.

Future Sources of Economic Growth

Evidence of population growth is ready at hand in the Kodiak urban area: high rents, low vacancy rates, and strained community services. The key factor pushing Borough population up is growth in the existing Kodiak economic base. Before projecting future population levels, with or without OCS development, it is important to briefly examine key sectors of the Kodiak economy to see if future growth in these sectors is likely to occur. The primary and most likely sources of growth fall into the following categories: (1) fisheries development, (2) military, (3) tourism, (4) forestry, and (5) OCS exploration and development.

At the present time, fisheries activity in Kodiak centers around king crab, tanner crab, shrimp and salmon. The traditional basis for fisheries activity in Kodiak has been the salmon harvest. During the early 1970s, the salmon harvest fell off significantly; but, since 1974, it has started to stabilize. In the future, the salmon fishery is expected to be stable or even show some limited growth. The king crab fishery has been relatively depressed for the last several years, partially as a result of over-harvesting during the 1967 through 1969 period. The king crab growing cycle is approximately eight years. Consequently, the stock should begin to show recovery in 1978 and support a stable fishery on a sustained yield basis. Tanner crab harvests are already on a sustained yield basis and should also be relatively stable in the future. The shrimp fishery is relatively new to Kodiak and has been growing steadily. The worldwide market demand for shrimp is strong and is projected to remain so throughout the future. Consequently, this part of the Kodiak fisheries industry will probably continue to show moderate growth, if overfishing is avoided.

A major potential source of growth in the fisheries industry is the harvesting and processing of bottom fish. The bottom fishery requires year-round fisheries activities and could act to deseasonalize employment fluctuations in the industry. As a result of the 200-mile limit extension in both the Soviet Union and the United States, there is little open area left for foreign fishing in the Bering Sea. Although specialized gear is required for this fishery, the shrimp fleet operating out of Kodiak probably can be modified to engage in this activity. Experimental fishing and processing activities are now testing the economic feasibility of American utilization of this fishery.

The expectation of most industry representatives is that the bottom fishery will become a major source of growth in the Kodiak area. Detailed study of the economic prospects of alternative means for developing this fishery are beyond the scope of this study. Nevertheless, it should be noted that one of the major objectives behind the 200-mile limit extension was to provide economic stimulus to the American fishing industry. It is therefore reasonable to expect that implementation of the limit and associated fisheries management measures will be in part carried out to enhance the industry's prospects. It is also assumed that if Kodiak decides to make the effort, it can capture a significant portion of this fishery.

The growth of civilian economic activity in the Kodiak Island Borough has been offset by the decline in military activity resulting from the closure

of the Kodiak Naval Base. Since the Coast Guard took over the base, military employment has increased moderately. On the basis of current plans, future employment at the Kodiak Coast Guard Base will be stable or increase very slightly. Consequently, the military impact on Kodiak's economy should be either neutral or slightly positive - contrasted with the negative impact of Navy withdrawal, which occurred from 1960 to 1972.

It appears that Kodiak has some potential for the growth of tourism. The Kodiak Chamber of Commerce has created a "visitors and convention bureau" (with a budget of approximately $50,000) for the purpose of seeking conventions and the development of pre-convention tours in conjunction with the City of Anchorage. Tour ships have begun to visit the urban area, and by 1980 it is possible that there will be as many as 15 or 20 tour ships visits each year. Over the next ten years, it appears feasible that tourism could grow to the point of generating 1.0-1.5 million dollars in gross revenues annually. If this type of development is pursued successfully, it can be expected that retail trade and services will expand more rapidly than they have in the past. However, tourism tends to be a low-wage, seasonal industry. Extensive development of this industry could exaggerate the undesirable seasonality of the existing Kodiak economy.

In the past, the lumber and wood products industry has not been a significant contributor to either the employment or income base of the Kodiak economy. The Afognak Lumber Company has begun harvesting timber on Afognak Island, and it appears that forestry activity could grow moderately. The Kodiak Native Association is working to establish a Native-owned and operated forest products industry for both harvesting and processing of lumber. The primary intended market would be the local construction industry. Given the current shortage of housing and assuming growth in general employment and population, it seems quite possible that a small scale integrated lumber and wood products industry could develop in the Borough and begin contributing jobs and income to the area's economic base.

Considering all four economic sectors just discussed, the Kodiak Island economy can be expected to show a stronger period of growth during the last half of the 70s than was evident during the first half. This would be true even without the introduction of OCS oil exploration and development activity.

Should OCS oil exploration and development occur, it could produce substantial increases in employment and income. However, Kodiak's economy is different than most other areas of Alaska where OCS impacts are anticipated. In most Alaskan communities, the trade-off is between environmental quality and economic (OCS-related) growth. In Kodiak, the physical limitations of inadequate housing, water supply, power generation, roads and shortages of certain types of land could prevent economic growth which might otherwise be expected to occur. If OCS development occurs, it will put additional strains on all these systems. Consequently, the trade-offs between OCS development involve not only environmental quality but also the continuation of the Borough's civilian, non-OCS-related economic growth.

A major existing sector of the Kodiak economy may be particularly vulnerable to OCS impacts - the food processing industry. The most critical factors for the food processing industry in Kodiak are: (1) the availability of labor, (2) the cost of labor, (3) housing supply available for seasonal

labor, and (4) the availability of electric and water utility services. If major on-shore OCS development occurs in the urban area, all of these factors will be affected. Since the community probably does not have the ability to prevent on-shore development on Kodiak, the challenge is to minimize the adverse impacts of OCS development by careful siting and management.

Future Population Forecasts

Working estimates of future population levels in the Borough are necessary to identify future requirements for community facilities, choose desirable land use patterns, and devise an appropriate strategy for dealing with OCS development. The critical period will be the years immediately ahead. Serious oil exploration efforts are likely to begin in 1980; if oil is found, peak development activity will probably occur around 1985. This is also the most useful period for planning local capital expenditures. Forecasts beyond this period are provided for the long-term view; by 1995, OCS activity is likely to dwindle to relatively small production crew operations.

Several methods are available to forecast future population growth in the Borough. One of these is the "component" method, by which birth rates, death rates, and migration rates are estimated from past records. These are then applied to a base year population and extrapolated into the future. This technique was used in the OCS Impact Study.

An alternative means of forecasting population, used here for comparison, assumes that over time, population adjusts to the availability of employment opportunities and the number of persons in the population who are actively seeking employment. In other words, in a small area such as the Kodiak Island Borough, the primary determinant of population change is the demand for workers. If the demand for workers consistently exceeds the ability of the local population to meet the demand, people will migrate into the area. Conversely, local residents will migrate out of the area rather than tolerate prolonged periods of unemployment. Therefore, the "labor force participation" method projects future population from labor force and employment trends.

The primary difference between the two projections is the assumption in the OCS Impact Study that future migration will continue at a rate approximating that of the past five years. On the other hand, the reasoning of the second method is that economic growth (reflected in employment and labor force) will be more rapid than it was in the past, now that the decline in military population has been arrested. As a consequence, it is believed that the rate of in-migration to the Borough will be significantly greater in the future than it was in the immediate past. Both forecasts represent baseline forecasts of population and do not include potential OCS population impacts.

Both forecasts have been used in this study to define the range of likely future population.[1] The "component" method is used as the low end of this range, and the "labor force participation" method provides a forecast of maximum likely population growth without OCS development (Table 4).

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(1) Detailed descriptions of the two methods used are provided in "Working Paper B, Study Element 1: Economy, Population, Community Services," prepared for this study.

TABLE 4

Projected Total Population of Kodiak Island Borough
Without OCS Development

Year	Low	High
1974(1)	9,232	9,232
1980	11,370	12,920
1985	13,440	17,180
1990	15,880	21,600
1995	18,770	26,100

(1) Actual population, 1974 special census.

It should be noted that this population growth will not simply happen of its own accord. Both analyses predict levels of population likely if the preconditions of population growth are met. These preconditions involve several factors which are currently in short supply in Kodiak, including housing and industrial waterfront land. An active program of economic development will be needed to overcome these shortages if the Kodiak community decides it wants to continue growing. Should it do so, the likely locational distribution of population is indicated in Table 5. Population at the Coast Guard Support Center is now near its likely maximum and will grow very slowly in the future. Village population has been projected simply from present birth and death rates, assuming net migration to be zero. In this table, the Kodiak Urban Area figures also include Bells Flat and Chiniak.

TABLE 5

Locational Distribution of Projected Population
Without OCS Activity

Year	Villages	Support Center	Kodiak Urban Area--Low	Kodiak Urban Area--High
1974(1)	1,021	2,828	5,355	5,355
1980	1,130	3,400	6,840	8,390
1985	1,220	3,550	8,670	12,410
1990	1,330	3,710	10,840	16,560
1995	1,440	3,860	13,470	20,800

(1) Actual population, 1974 special census.

Estimates of direct employment likely to result in the coastal zone from OCS activity were developed in the OCS Impact Study. These estimates were developed around four cases or possible outcomes of OCS activity. Case 1 represents oil discoveries of approximately 250 million barrels. This size of development is uneconomical; consequently, after four years of exploratory drilling, no development takes place. Case 2 assumes that 1,200 million barrels of recoverable oil reserves are found. Two methods of developing this volume are evaluated. The first method involves using pipelines to

an on-shore terminal (Case 2a). The second method involves using off-shore terminals (SBM's) requiring no on-shore storage (Case 2b). Case 3 represents development of maximum likely reserves (2,000 million barrels), involving an off-shore oil pipeline and a land terminal.

These employment estimates were used to predict labor force impacts by estimating the number of OCS workers likely to reside in Kodiak. These workers would have a "multiplier" effect on service industries. Adding this to the direct employment figures resulted in total employment estimates. By including persons seeking employment, labor force impacts were identified. Total population impacts were then predicted by accounting for the families of persons in the labor force.(1) These are presented in Table 6.

TABLE 6

Projected OCS-Related Population

Year	Case 1	Case 2a	Case 2b	Case 3
1980	60	170	170	170
1981	80	320	320	530
1982	100	350	200	640
1983	60	460	170	570
1984		240	100	720
1985		440	80	1,910
1986		1,220	210	3,340
1987		2,180	210	1,920
1988		950	280	1,310
1989		830	360	1,420
1990		830	360	1,350
1991		810	340	1,320
1992-1995		770	300	1,280

The location of these population impacts will largely depend upon where OCS activity is located. Clearly, the Borough wants to have a voice in that locational decision. Case 2b is probably representative of the population impacts on the urban area if a service base alone were built within the urban area. Cases 2a and 3 indicate the level of population impacts possible if a terminal were located near the urban area. The peak population impacts in both these cases are due to the large construction crews necessary to build an on-shore oil terminal. It has already been pointed out that OCS development and attendant population growth could seriously conflict with the existing economic base of Kodiak, because of competition for limited labor, housing, goods, and services. This conflict would be greatly reduced if OCS development were self-sufficient and occurred at a distance from existing Kodiak communities.

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(1) Again, the methods used are discussed in detail in "Working Paper B, Study Element 1: Economy, Population, Community Srvices," prepared for this study.

Recommendations

- Acknowledge that the fishing industry and the Coast Guard are the long-term base of Kodiak's economy and that the economy is growing. Encourage and maintain the community's existing economic base. Attempt to further stabilize year-round employment in the fishing industry by pursuing development of a Kodiak-based bottom fishery.

- Do not actively pursue economic development that would result in increased seasonal employment and corresponding unemployment in the off-season.

- Discourage short-term economic development that would threaten the long-term economic base. Minimize the negative effects of such development when it is necessary to allow it to occur.

- Pursue diversification of the economic base where not in conflict with the above recommendations.

- Job growth causes population growth. If the community wishes to continue economic growth, it should commit to accommodating the population growth that results from economic development, or else it should pace economic development to the community's ability to accommodate population increases.

III. COMMUNITY GOALS AND OBJECTIVES

In the previous chapter we summarized likely future trends in Kodiak's economy and population. We also addressed some basic community service requirements related directly to population size. The next step is to identify desired patterns for the future development of Kodiak. This is done by establishing community goals and objectives. This step is under way; Simpson Usher Jones, Inc. have prepared draft goals and objectives based on the 1977 Borough Community Attitude Survey.

As the draft states, "Without goals planning is aimless; it can accomplish very little other than bring to light problems and needs but cannot arrive at solutions." The draft goes on to note that "It is important for the decision making bodies to be aware of public desires and the degree to which they conflict with factual data so that the finally adopted goals and objectives can accommodate to the greatest extent possible the perceived needs of the public as well as the actual situations as they exist." A number of the draft goals and objectives also appear to conflict within themselves. This is to be expected. For example, Kodiak residents desire housing development to be both inexpensive and on large lots. These two desires are held in common with most Americans. The desires conflict, but this can be translated into looking for the best available buy, with low density as one of the "best buy" criteria.

The draft goals and objectives are now being reviewed and revised by the Borough Assembly, with the help of the Borough commissions. The final adopted goals and objectives will be incorporated into the final Kodiak comprehensive plan. In the meantime, the draft goals and objectives have been used in the development of planning recommendations and are reproduced here for reference. They have been put in the order they are dealt with in this report. Other than this, they have been reproduced exactly as they appear in the Simpson Usher Jones draft.

Primary Goal: To maintain the desirable aspects of the current living environment in Kodiak including the rural atmosphere, the freedom of life styles, and the recreation opportunities. To upgrade and maintain a full range of community facilities, utilities and services that are available in Kodiak. Further, to avoid the adverse effects of rapid population growth including over-taxed utilities, transportation systems and increased costs of living.

Governmental Goal: To provide a full range of governmental services to the residents of the Kodiak Island Borough including utilities, social services, policy direction and administrative services in the most efficient and effective manner possible.

Objective: Upgrade the existing governmental services within the current tax structure.

Objective: Avoid duplication between governmental departments and various levels of governments (borough, city, state and federal) by close cooperation and understanding of the functions and limitations of each.

Objective: Increase the number of services and utilities and facilities provided by the governments on Kodiak Island.

Objective: To use to the maximum extent possible state and federal financial assistance in providing new services and upgrading existing services within the borough.

Overall Village Goals: To establish and improve communication channels between the villages on Kodiak Island and the Kodiak Island Borough in order to allow for better knowledge and understanding of the problems, needs and potentials of those villages. Further, to help provide the services and facilities needed to upgrade the living environment within the villages without destroying the traditional life styles of the residents.

Objectives: To establish the position of village coordinator within the Kodiak Island Borough to assist in liaison between the borough government and the villages and their governments and to help in the administration of the city governments in the outlying villages.

Objectives: To establish a policy of annual visits to all villages by the serior staff of the borough, the borough assembly and the borough planning commission.

Objective: To prepare a detailed study of transportation needs both within as well as to and from the outlying villages and move to resolve the deficiencies at the earliest possible date.

Objective: To improve the level of law enforcement and fire protection within the villages by a realistic education process and assistance in providing and maintaining safety facilities within the villages.

Economic Goal: To encourage the development of a broader economic base for Kodiak that will provide year around employment and economic opportunities to the existing residents without encouraging an economy that induces a rapid increase in the number of permanent or transient residents.

Objective: To foster the development and growth of the fishing industry in and around Kodiak.

Objective: To encourage growth in the tourist industry in Kodiak.

Objective: To encourage the growth and expansion of the construction industry in order to providecompetition in the housing construction industry as well as employment opportunities.

Objective: To avoid the encouragement of growth in the timber and OCS related industries.

Objective: To continually update and implement the overall economic development plan for the Kodiak Island Borough.

Community Services and Facilities Goal: To update the full range of public services in order to provide more consistently efficient utilities, facilities and services to residents of Kodiak Island and further, to plan the expansion of those utilities, facilities and services in order to accommodate future anticipated growth.

Objective: To increase the public water supply in order to provide water services to expanding processing industry as well as to general community growth.

Objective: To upgrade and expand the sewer system to serve a larger area.

Objective: To encourage the development of the Terror Lakes Hydr-Hydroelectric Project in order to meet the growing demands for electrical power without drastic increases in costs that will be incurred if the electrical power is increased through diesel facilities.

Objective: Encourage proper maintenance and adequate upgrading of the telephone system in order to accommodate the existing population as well as future growth.

Objective: Plan for more effective law enforcement services to cope with the increase in criminal activity that is expected as a result of population growth and economic boom conditions.

Objective: To maintain a high level of fire protection services in the urban area and to increase the fire prevention and fire fighting capabilities of th villages.

Objective: To provide a higher level of animal control through increased facilities and code enforcement.

Objective: Increase the amount of public assistance available to resident of Kodiak who are in need

Objective: To encourage and assist in the development of additional public and private radio and television services for the residents of Kodiak.

Educational Goal: To continue to provide and upgrade the quality educational facilities within the Kodiak area and plan for expansion for the educational system in order to accommodate expected population growth levels.

Objective: Establish a boroughwide school site selection policy and move to acquire any needed size, space needed upon estimated population growth figures.

Objective: To establish firm standards for school site size and locational criteria.

Objective: To investigate the possibility of joint recreation/school facilities and sites.

Objective: To standardize the criteria for school facilities both within the Kodiak urban area and the village areas.

Objective: To pay increased attention to the educational needs of students from outlying villages.

Transportation Goal: To provide a more efficient internal island-wide transportation system; to improve the transportation facilities within the Kodiak urban area; and to encourage more effective and wider range of transportation alternatives to and from Kodiak Island.

Objective: Develop road maintenance functions throughout the Kodiak urban area.

Objective: Upgrade existing roads to accommodate the growth of the urban area that has taken place to date and plan for additional upgrading to accommodate anticipated future growth.

Objective: Investigate the feasibility of alternative transportation modes within the urban area including public transportation, bike paths and trail systems.

Objective: Investigate the feasibility of the continued operation of the city airport at Lilly Lake and the need to upgrade that airport, if it is determined that should remain in operation. Upgrading of that airport should consider the need to avoid land use conflicts around the airport and safety hazards that could arise.

Objective: To study alternative modes of island-wide transportation, including the development of a network of outlying dock and mooring facilities that will allow increased reliance by the outlying residents of the island on private boats.

Objective: Encourage the State of Alaska, Division of Aviation to prepare a master plan for the state airport at Kodiak in accordance with FAA guidelines so that facilities in need of improvement can be identified and upgraded and plans can be made for expansion in order to accommodate future demands.

Objective: Increase the efficiency of the city dock by providing additional quay area and storage space.

Objective: Investigate the possibility of expansion of State of Alaska ferry system service to Kodiak including a study of the necessity for improved docking facilities.

Land Use Goal: To work towards eliminating existing conflicts in the land use patterns within the Kodiak Island Borough and to plan for low intensity development that preserves the land use integrity of residential areas and concentrates commercial and industrial development in strategic locations.

Objective: Develop a capability for stronger, more effective zoning enforcement.

Objective: Assure in establishing zoning patterns that land use category separations are located along natural and man made boundaries that effectively buffer potentially conflicting land use districts from each other.

Objective: To assure the provision of adequate residential areas to help increase the housing stock at a relatively low density and cost.

Objective: To concentrate commercial development in the downtown area and other strategic locations without encroachment into residential areas.

Objective: To encourage the development of industrial uses in industrial parks.

Housing Goals: To actively work towards alleviating the current housing shortage in Kodiak by fostering the development of residential land and structures and to help the community maintain the existing housing stock in good condition.

Objective: To provide ample residential land so a broad range of residential locations are available to the home buyer and developer.

Objective: To provide, where possible, a full range of utilities to residential properties in order to simplify the process of residential development.

Objective: Encourage the use of state and federal funds to establish housing programs designed to help upgrade and maintain the existing housing stock.

Objective: To encourage the development of new residential areas, the purpose of providing housing to low and moderate income families.

Objective: To investigate the legal and social ramifications of establishing a rent review process in order to avoid artificially escalating housing costs due to an economic boom.

Objective: To discourage the use of mobile homes in the Kodiak area.

Objective: To avoid the development of new residential uses within the downtown area of Kodiak.

Objective: To encourage the development of new housing in existing residential areas.

Recreational and Cultural Goal: To develop a high level of active recreational facilities utilizing existing parks and open space lands.

Objective: To increase emphasis on development and utilization of recreational lands and decrease the emphasis on recreation land acquisition.

Objective: To attempt to provide a wide range of indoor recreational facilities to allow for leisure activities in winter months and in times of inclement weather.

Objective: To continue to maintain the museums and library within the Kodiak area at a high level of effectiveness in order to offer cultural opportunities to residents of the area.

Objective: To prepare a detailed parks and recreation and open space plan including standards for development of park lands and generalized designation of parks and recreation facility criteria.

OCS Development Goal: To discourage the development of OCS related facilities in and around the population centers on Kodiak Island and, if OCS facilities are located any where on the island, to require that they be concentrated in a limited number of locations as well as be self-sustained at their remote sites.

Objective: To prepare land use regulations that can effectively control the location of OCS related facilities including indirect and ancillary uses.

Objective: To prepare and adopt detailed OCS facility location policies and a physical planning process.

Objective: To encourage the oil industry to participate in funding efforts to mitigate the adverse impacts of their activities on the Kodiak shelf.

Objective: To establish borough-wide environmental impact review and control procedures applicable to OCS related facilities in order to assure that the natural environment is preserved and enhanced throughout any future period of OCS development.

Objective: To investigate the feasibility of local government development and ownership of onshore OCS related facilities to be leased the oil industry.

IV. CAPACITY CONSTRAINTS ON DEVELOPMENT

This chapter will identify some key factors which should constrain planning for development in the urban area. These constraints will affect the types and location of land uses as well as the amount of development that can take place without requiring major public investment in new utility systems or other facilities. In order for growth not to have overwhelmingly adverse effects on Kodiak residents, reasonable and realistic limits on the extent and pattern of future development must be identified.

A major question this planning effort is attempting to answer is whether OCS development should be encouraged or even allowed to take place within the urban area (where it could utilize existing services and utility systems) or whether the Borough should pursue a "remote site" strategy and require the oil industry to develop all necessary services and facilities on a completely separate basis. Information such as the amount of developable land within the urban area will help the Borough to decide which strategy is most appropriate. Three types of constraints will be examined: a) natural constraints, which help determine the land areas most suitable for development; b) man-made systems, which represent existing public investments and which may have capacity limits; and c) financial resources, which may limit local government's ability to provide the services necessary to sustain growth, and which also limit the individual resident's ability to obtain suitable housing in Kodiak, however great the employment opportunities.

Natural Constraints

A number of natural factors affect the suitability of land for development. Three have been selected as being particularly significant in the Kodiak urban area: steep slopes (Map 6), water and wetlands (Map 7) and natural hazards (Map 8). By subtracting lands that are already developed, we can map developable lands (Map 9). The already developed lands are indicated on Map 5, existing land use. This mapped inventory was prepared as part of the OCS Impact Study. It was not printed in that report, however, so it is reproduced here.

The degree of slope affects the suitability of land for development in two ways. First, building cost goes up as excavation and earthwork increases; this is a cost borne by the developer. Second, public costs for roads and utilities increase significantly as slopes steepen. Map 6 indicates four classes of slope. Land less than 5% can be considered "flat" for development purposes; site preparation costs are minimized, as are utility costs. This slope class is particularly well-suited for industry, commerce, institutions and the parking areas associated with these uses. Land between 5 and 10% slope is classed as "accessible". Roads and utilities costs, as well as building costs, are moderate. Kodiak winter icing conditions make 10% a reasonable maximum for road gradients. Slopes between 10% and 25% are classed as "buildable", but not readily accessible. This slope class can furnish dramatic homesites, although foundation costs exact a premium. Utility costs are excessive if any extensive area of this slope class must be traversed. Roads require expensive cut and fill; this also tends to cause erosion problems with Kodiak soils, leading to sedimentation in streams and lakes. Lands over 25% slope are classed as "very steep". Road and utility costs are prohibitive and building suitability is questionable due to potential slope instability.

The pattern of tones on Map 6 indicates that the majority of "flat" and/or "accessible" lands occur on the east side of the Pillar Mountain ridge. Slopes flatten out progressively toward Spruce Cape. The very mixed pattern on Near Island is a result of the hummocky bedrock topography there.

The water bodies and wetlands indicated on Map 7 are also important considerations in locating future development. The watershed boundaries define drainage basins that are important for planning wastewater and stormwater drainage systems. The Island Lake drainage basin is the largest in the urban area. Water quality in Island Lake is below state standards for drinking and even for swimming. In order to improve the water quality, sewers must be provided to the homesites in the drainage basin.

Lakes and ponds are important community assets and enhance property values if water quality is maintained. They can also be water sources, along with streams. Streams are also nature's storm drains. If they can be maintained in natural condition, they will provide amenity and recreation as well as utility. Wetlands are part of the natural storm drainage system. They regulate water flow by retaining peak discharges. They also function as natural settling basins in maintaining water quality. For these reasons any proposals to fill more wetlands in the urban area should be examined very carefully. As a general rule, such proposals should not be approved.

Map 8 indicates potential hazard areas due to flooding, tsunami or landslide. The most likely trigger of these events is a major earthquake. Earthquakes are common in Southcentral Alaska, although it is difficult to predict their frequency of occurrence and magnitude. The indicated floodplain area is the area that the Corps of Engineers has identified as likely to be inundated if the dam for the City's Lower Reservoir were to fail catastrophically. Most probably, this would be due to an earthquake. Future residential development should not be permitted in this floodplain. Several houses have already been built in the floodplain along Larch Street, next to Lilly Lake. The new townhouses near the Lower Reservoir were sited to avoid the floodplain. However, a sewer was installed that crosses it. An extension of Selief Avenue in the same area has been discussed. If and when Selief is extended, the feasibility of designing the roadbed to divert all the flow of potential floodwaters to Beaver Lake should be considered.

The tsunami inundation area indicated on the map is a tentative identification, based on the 1964 tsunami(1). The topographic mapping available for this study was based on the USGS datum before the earthquake. Adding together approximately 5-feet for 1964 subsidence, 9-feet for the highest expected tide (above "mean sea level", not "mean lower low water"), 12-feet for the 1964 tsunami crest and 6-feet for wave runup, we might expect a recurrence of the 1964 tsunami to inundate areas up to 32 feet in elevation, measured against the pre-1964 datum. For convenience, the 30-foot contour was followed

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(1)Kachadoorian and Plafker, Effects of the Earthquake of March 27, 1964 Communities of Kodiak and Nearby Islands, Professional Paper 542-F, U.S. Geological Survey, 1967.

to establish the tsunami hazard areas indicated on the map. The location and elevation of probable tsunami hazard areas should be confirmed with the U.S. Geological Survey, however. Because land use controls are indicated for hazardous areas, it is also important to have the degree of hazard confirmed. In this connection, the Coast Guard has taken the tsunami potential into account in its recent planning and construction at the Support Center. Residential uses are not located in the hazard zone, a tsunami warning system is in operation, and evacuation plans are posted in all buildings.

The third natural hazard area is a possible slide zone on the east face of Pillar Mountain, between the City dock and the City cargo terminal. A surficial slide occurred here during the construction of the City dock in the early 70's, destroying the state highway. The area has been examined by representatives of the U.S. Geological Survey and the Alaska Department of Transportation and Public Facilities and some degree of movement or slippage detected. On this basis, potential instability has been identified, but the degree and extent of instability cannot be determined without further study. This information is necessary to plan for the future of the Inner Harbor area. The nature and extent of corrective actions - if any are necessary - cannot be identified without this information. In particular, it could affect decisions on the City dock and the cargo terminal, which are essential facilities in the urban area.

As noted, precise identification of two of the three hazard areas is hampered by lack of information at this time. A major geotechnical study of Pillar Mountain should be carried out, with assistance from the federal and state governments. One potential cause of a slide would be a major earthquake, so the likelihood and magnitude of future earthquakes will probably be an element of the study. Since this relates directly to possible future tsunamis, the study should also include an identification of the degree of tsunami hazard and the appropriate topographic elevation for a hazard zone within which land use controls would apply.

The types of restrictions that should be considered have been identified in the regional atlas prepared for Kodiak by the Arctic Environmental Information and Data Center: Kadyak, A Background for Living (p. 137). These controls would also be appropriate to a final slide hazard zone, if any, and to the Lower Reservoir floodplain area:

1. Restriction of land uses to those that are essential, such as docks and warehouses, with owners, builders, and occupants being cautioned on the hazard. Prohibition of siting of high-occupancy and critical structures, for example, schools, hospitals, police, and fire stations.

2. Placement of potential inundation areas under floodplain zoning, prohibiting all new construction and designating existing occupancies as nonconforming.

3. Orientation of structures with their long dimension parallel to the anticipated direction of wave movement.

4. Utilization of natural features such as peninsulas, islands, shoals, or large rock protrusions to act as breakwaters in siting communities or structures.

5. Where economically feasible and without encouraging a false sense of security, construction of restraining or diversion structures to minimize potential inundation.

6. Institution of appropriate systems to warn of impending danger. It is important to note here that tsunami warnings and watch bulletins issued by the Alaska Reigonal Tsunami Warning System are usually based upon seismic data, as valuable time would be lost if bulletins were issued only after a tsunami registered on tide gages. Consequently, bulletins will at times be issued in cases where a tsunami does not develop.

7. Adoption and implementation of evacuation plans.

8. Elimination of potentially hazardous dams or reservoirs.

In addition, construction activities or resource extraction activities which would tend to increase the likelihood of slope failure should cease in potential slide areas and not be permitted in the future. Rock quarrying on the side of Pillar Mountain, for example, steepens the slope further and could lead to future slides such as the one that destroyed the state highway.

The pattern of developable lands in the urban area has been displayed on Map 9. The purpose of this map is to identify how much developable land there is in the urban area, and where this land is located. This map was produced by combining the maps of existing land use, steep slopes, and water and wetlands. Natural hazards were not included because of the degree of uncertainty on two of the hazards mentioned above. They would have been included if adequate information were available.

Areas considered generally physically unsuitable for development include steep slopes, lakes, ponds, and wetlands. Already developed areas have been indicated with a gray tone (except for street rights-of-way, which have been left blank to display the street pattern). Undeveloped areas that are dry and in the "flat" or "accessible" slope classes are considered highly suitable for development and were also left blank; these can be differentiated from the street pattern by referring to the plat lines superimposed on the map. These undeveloped areas in the "buildable" slope class were considered to be limited in suitability. Several areas which are presently used at low intensity were classed as "transitional" in order to assess their suitability for redevelopment to higher intensity uses. Initially, these were the municipal airport and adjacent lands, including the concrete plant; the spruce cape loran station; the Cry of the Wild Ram site; the existing City landfill; and the VFW site. Of these,the municipal airport and Spruce Cape areas proved to contain significant amounts of land highly suitable for redevelopment from a physical standpoint.

The overall pattern of developable lands is very significant to decisions about the future pattern of development in the urban area. Large amounts of highly suitable land are present. Two major areas stand out: the municipal airport and adjacent lands; and the Rezanof Extension - Spruce Cape area.

Manmade Systems

The manmade systems which constrain the development pattern include certain utilities which are often called "infrastructure" because they are the framework upon which the community is structured. Four systems should be particularly prominent in current Kodiak planning. These are water supply, wastewater treatment, solid waste disposal and electricity.

The existing water system is presented on Map 10. The system has three primary functions. It supplies water for drinking and other residential uses, water for industrial purposes (the current primary user is the fish-processing industry), and water for fire-fighting. All are critical, but the latter is very important in determining the size and location of lines in residential areas. Fire-fighting equipment draws great volumes of water, stressing water mains to the point that line collapse is a very real possibility. To help prevent this and to assure a continued supply of water, mains should be looped to allow two routes of flow to any point. Possible system extensions to accomplish this in present developed areas are indicated on the map. The City Fire Department currently provides fire protection service to the already developed Island Lake and Mission Road areas, but the water supply is not adequate to serve these areas properly. System extension for these areas could easily serve new development along the Rezanof Extension and at Spruce Cape. Looping is also indicated around the airport area to serve existing development.

In addition to affecting the pattern of development, the water supply system affects the amount of development that can be serviced. Current water usage varies from 3.0 - 3.5 million gallons per day (MGD) when the major seafood processors are not operating, to 10 - 12 MGD when the processing plants are in operation (1). Current system storage capacity is inadequate to guarantee supply to industrial users during periods of low stream flow. Potentially, large fish product losses could occur during peak harvests and this could discourage construction of new processing plants. An OCS service base would also require large amounts of fresh water for supply to drill rigs (2). Further economic development will require increasing storage capacity; the most readily apparent alternative is to go ahead with

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(1) Personal communication with Herman Beukers, Public Works Supervisor, City of Kodiak.

(2) Alaska Consultants, Inc., Marine Service Bases for Offshore Development, State of Alaska, 1976, p. 35.

raising the Monashka Creek Dam. This is a City facility on disputed land; exercise of the Borough planning powers may help to speed negotiations between the parties.

Currently all domestic wastewater in the urban area is either collected and discharged to saltwater without treatment, or is handled by septic tanks or privies. The City is in the process of constructing a secondary treatment plant which is due to be completed in the summer of 1978. The treatment plant was designed and located to eventually serve the entire urban area. However, the initial service area is defined by the existing wastewater collection system. This is entirely within the City limits, except for a small area along Shahafka Cove and Mission Lake.

The treatment plant is based upon a projected service population of 9500 persons for a design year of 1995. The average design flow for the new treatment plant is 2.13 million gallons per day (MGD). This includes 0.85 MGD of infiltration and inflow and approximately 0.25 MGD of wastage.[1] If these two components can be reduced, it is possible that the new treatment plant could serve a population somewhat greater than 9500.

The existing wastewater collection system is presented in Map 11. Since present City population is around 4000, considerable expansion of the service population is possible. The Island Lake drainage basin is experiencing water quality problems and is one of the first areas to which service should be extended. Wastewater trunks would logically follow the drainage pattern (see Map 7) with a lift station at Mill Bay. Provision of the interceptor shown in this area would also make wastewater service possible for the undeveloped Spruce Cape and Rezanof Extension areas. The scheme shown here is very similar to one alternative recently proposed to Island Lake residents.

A second logical area for service extension is the municipal airport area. Because of the natural drainage pattern, it could be partially served by the Island Lake extension. A new sewer (shown as a dashed line) has been started to the townhouse development near the Lower Reservoir. This could be extended to pick up the Beaver Lake portion of the airport area. A collector up the Cutoff Road would pick up the remainder of the airport lands.

Solid waste disposal is another public utility which constrains development. It does not usually affect the overall development pattern, but the site of the sanitary landfill itself is critical and may be hard to locate. This appears to be the case in the urban area; suitable soils and drainage conditions seem to occur in very few places. The present City landfill site, for example, is presently inadequate because the scarcity of soil requires rock to be ripped for cover material. This coarse material allows rainwater to percolate into the buried waste, and to leach out pollutants. Drainage is also uncontrolled, so the polluted leachate works back out to surface water courses. The site will be totally inadequate for the disposal

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[1] Tryck, Nyman and Hayes, Wastewater Treatment Process Selection (undated).

of sludge from the new treatment plant. It is therefore important that a proper site be located in the next six months, before the plant begins operation.

The Coast Guard landfill at the Support Center is in the same situation. To try to resolve the situation, the City of Kodiak and the Coast Guard recently agreed to consider joint utilization of a single landfill operation and cooperated in a study of potential sites. The site recommended was suitability (refer back to Map 4). Perhaps because it was assumed the Coast Guard had jurisdiction over these sites, the study did not develop comparative cost data for alternative sites. It also did not consider solid waste collection and disposal requirements for the urban area beyond the City limits. Swampy Acres, however, had been excessed and claimed by a Native corporation. It also appears that the site has considerable potential for industrial development. The new owners are likely to insist that any landfill operation provide them a financial return equivalent to industrial use.

At this point, an apparent impasse has been reached. One major difficulty in deciding a course of action is that the site study does not provide information for a fallback position. The study needs to be updated — or a new study done -- to fully compare alternative sites, including hauling costs and potential lease rates based on "highest and best use," in order to support decisions and to provide the background for negotiations.

Solid waste disposal is a regional problem in the Kodiak urban area and it is clearly in the interests of all jurisdictions and parties to cooperate. The Borough should take the lead in an immediate study update, involving both the City of Kodiak and the Coast Guard. The Borough is probably also in the best position to negotiate terms of a lease, since it has the zoning and platting powers. If the Swampy Acres site should prove to be the only suitable site, public health considerations would direct that it not be used for another purpose. This must be clearly demonstrated, however. In the interim, planning permission to develop the site for other purposes should not be granted.

Electrical power costs and generation capacity are additional factors that constrain community growth, although they do not have much effect on the spatial pattern of development. Kodiak Electric Association presently relies on expensive diesel generation, to supply the urban area and Bells Flat. It has a "nameplate" capacity of 25,000 KW, compared to a September 1976 peak demand of 9500 KW.[1] However, the nominal capacity is deceptive, because much of KEA's equipment is old and subject to mechanical problems. The fish-processing industry is a major user of power and expansion will require an adequate, reliable, and affordable supply system. KEA will install a new 7000 KW generator in 1979, but the long-range solution appears to be a hydroelectric project at Terror Lake. The Terror Lake project was

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(1) Personal communication with L.H. Johnson, former Manager, Kodiak Electric Association.

delayed because of unfavorable economics when fuel costs were low. With increasing fuel costs, it now appears feasible and KEA is proceeding with planning. Completion could come as early as 1983. The Borough should give KEA any support it can to move the project along.

Financial Resources

By reference to Alaska Taxable, 1976, it is apparent that the City and Borough impose somewhat lower taxes than other Alaskan communities of comparable size. Therefore, if the community desires, it can finance some additional programs and improvements by moderate tax increases. The tax base itself will be increased by economic development, particularly OCS development. Eventually, the tax burden on individual property owners can drop significantly. However, the costs of community facilities for construction workers usually precede the tax base expansion by several years, so there is often an interim period of higher taxes.

The current percentage of indebtedness to valuation in the Borough and City is 6.85%. This is well below the commonly accepted rule-of-thumb maximum of 10%, but is above the state average of 4.42%. It probably reflects a relatively small industrial tax base and relatively high proportion of employment in government. The City's debt service will slightly increase and then remain stable over the next several years. The Borough's bonded indebtedness is primarily for schools and will drop sharply when the state takes over responsibility for school indebtedness in June.

In summation, all these factors appear to indicate that the urban area could probably raise up to five or six million dollars for new capital projects in the immediate future without excessive tax increases. This figure will provide a rough measure of the ability of the community to finance key projects. Most of this sum would probably be available to the Borough rather than the City because of the forgiveness of school debt. If the community were to raise these funds, they would go to projects benefiting the entire tax area, such as parks and schools. Improvement district assessments will have to support much of the cost of needed utility and road improvements, for example.

The financial resources of Kodiak residents should also be considered in planning the pattern of community development. The current shortage of affordable housing emerged as a major concern in the Community Attitude Survey. The reason for concern is apparent when household income distribution figures from the 1970 census are updated for inflation. Approximately 8% of Kodiak households have total incomes of $30,000 or more; 41% receive between $17,000 and $30,000; 51% receive less than $17,000 annually. The break points are significant. Using an income multiplier of 2.5, a family would need at least $30,000 income to be able to purchase a home for $75,000; this is a conservative minimum for new home prices in the urban area. A family would need at least $17,000 income to purchase a $42,500 home. This is a conservative minimum estimated price for an older house in the Aleutian Homes area or for a newer mobile home on a private lot.

The $17,000 household income level is probably also a measure of ability to rent a family-sized apartment unit.

This appears to tell us that only some 10% of Kodiak households can afford large-lot, single-family housing. Another 40% can afford older housing on smaller lots, mobile homes, or apartment rentals. A full 50% of households would appear to have difficulty finding housing on the private market.

How do Kodiak residents cope? Some build their own housing, some have been in their homes for a long time, some are in a limited number of public housing units. But for too many, overcrowding and bad housing conditions appear to be the result. Although statistical evidence of this is hard to produce, it is repeatedly confirmed in discussions with public officials and members of the community. Therefore, while low density residential development may be a desired pattern, sufficient space should be set aside for higher density, affordable housing, such as apartments and mobile homes. An adequate supply of smaller lots with services could also help to bring the cost of homesites down, or at least prevent further speculative inflation.

Priority Development Areas

To more specifically identify portions of the urban area in which higher intensity development can logically take place, 23 neighborhoods were identified in the urban area, plus three more on the road system, using the housing inventory developed in the OCS Impact Study as a starting point. The amounts of developable land in each category were inventoried for each neighborhood. In total, there appear to be some 650 acres of undeveloped, highly suitable lands in the immediate urban area, with an additional 340 acres of transitional, highly suitable lands. There are approximately 320 acres of undeveloped, limited suitability lands and another 180 acres of transitional, limited suitability lands. These areas appear adequate to accommodate even the maximum projected 1995 population entirely within the present urban area, if emphasis is placed on low-rise apartment housing and single-family housing on 7200 square-foot lots.

To provide a graphic illustration of where development might reasonably proceed first, the 23 urban area neighborhoods were prioritized (Map 12) on these criteria:

- Undeveloped land;
  - high = more than 50 acres undeveloped
  - moderate = 20-50 acres undeveloped, or more than 50 acres transitional
  - low = less than 20 acres developed, or less than 50 acres transitional

- Available services;
  - high = existing
  - moderate = near-term future
  - low = long-term future

- Suitable land;
  - high = more than 75% highly suitable
  - moderate = 50-75% highly suitable
  - low = less than 50% highly suitable

The areas that emerge as having the greatest potential for immediate development are Baranof Heights, Beaver Lake, Kadiak Subdivision, Outer Mission Road and Mid-Cape.

To verify that projected population increases could be accommodated in the urban area, the lower population projection was distributed by neighborhood (the higher projection also "fit in", however). This area distribution of population is displayed on Map 13. Existing population was estimated from the OCS IMpact Study housing count. Future estimates were based on the amount of developable land and preliminary assumptions about housing density. It is assumed, for example, that apartment construction will replace some existing structures in the Downtown and Aleutian Homes neighborhoods, though there is relatively little undeveloped land there.

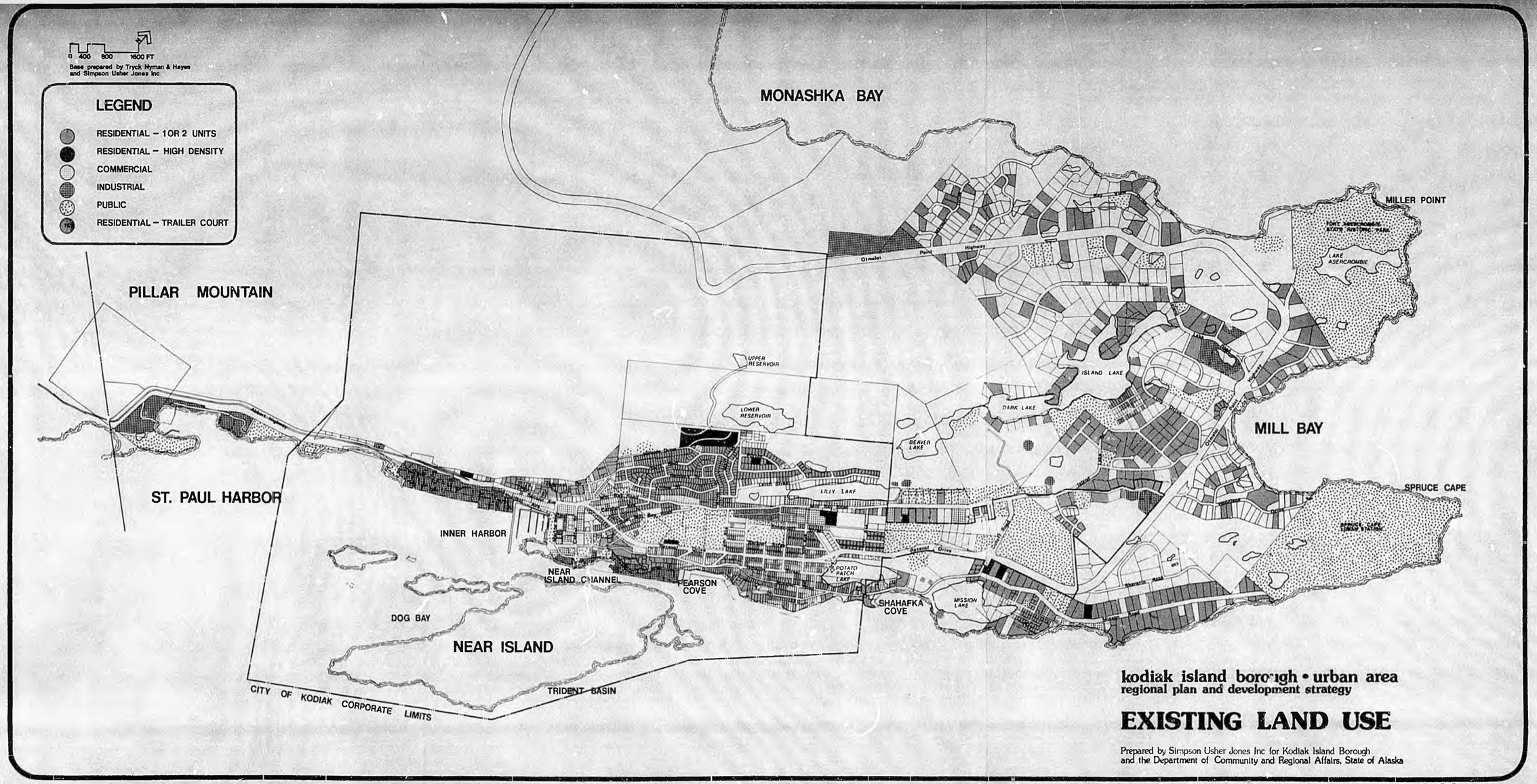
Recommendations

Recommendations bearing upon specific land uses will be found in Chapter VII. Recommendations related to natural constraints are:

- Request that the federal and state governments conduct a full geotechnical investigation of the stability of Pillar Mountain The study should identify the degree of potential hazard and the extent of the hazard area, if any. Preventive and corrective actions should also be identified, if applicable, along with the costs of such actions.

- Request that the geotechnical study also include a determination of the degree of tsunami hazard and the extent of the hazard zone (a maximum elevation may be sufficient).

- Enact land-use controls for designated natural hazard areas.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Base prepared by Tryck Nyman & Hayes and Simpson Usher Jones Inc
LEGEND
RESIDENTIAL – 1 OR 2 UNITS
RESIDENTIAL – HIGH DENSITY
COMMERCIAL
INDUSTRIAL
PUBLIC
RESIDENTIAL – TRAILER COURT
MONASHKA BAY
PILLAR MOUNTAIN
ST. PAUL HARBOR
INNER HARBOR
NEAR ISLAND CHANNEL
PEARSON COVE
DOG BAY
NEAR ISLAND
TRIDENT BASIN
CITY OF KODIAK CORPORATE LIMITS
UPPER RESERVOIR
LOWER RESERVOIR
LILY LAKE
POTATO PATCH LAKE
BEAVER LAKE
DARK LAKE
ISLAND LAKE
SHAHAFKA COVE
MISSION LAKE
MILL BAY
MILLER POINT
LAKE ABERCROMBIE
SPRUCE CAPE
Otmeloi Point Highway
Rezanof Drive
Aleutian Road
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regional plan and development strategy
EXISTING LAND USE
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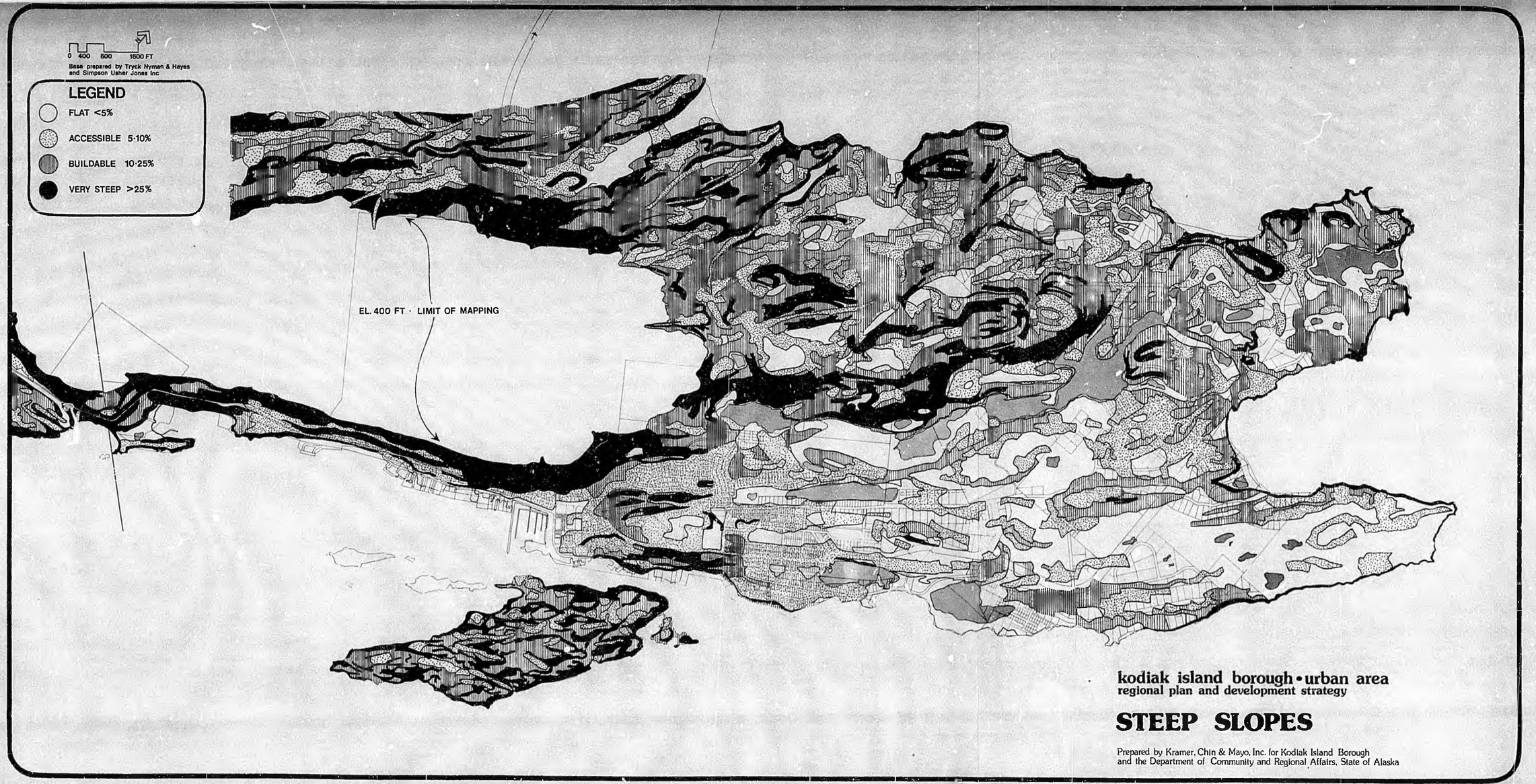
MAP 5



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STEEP SLOPES

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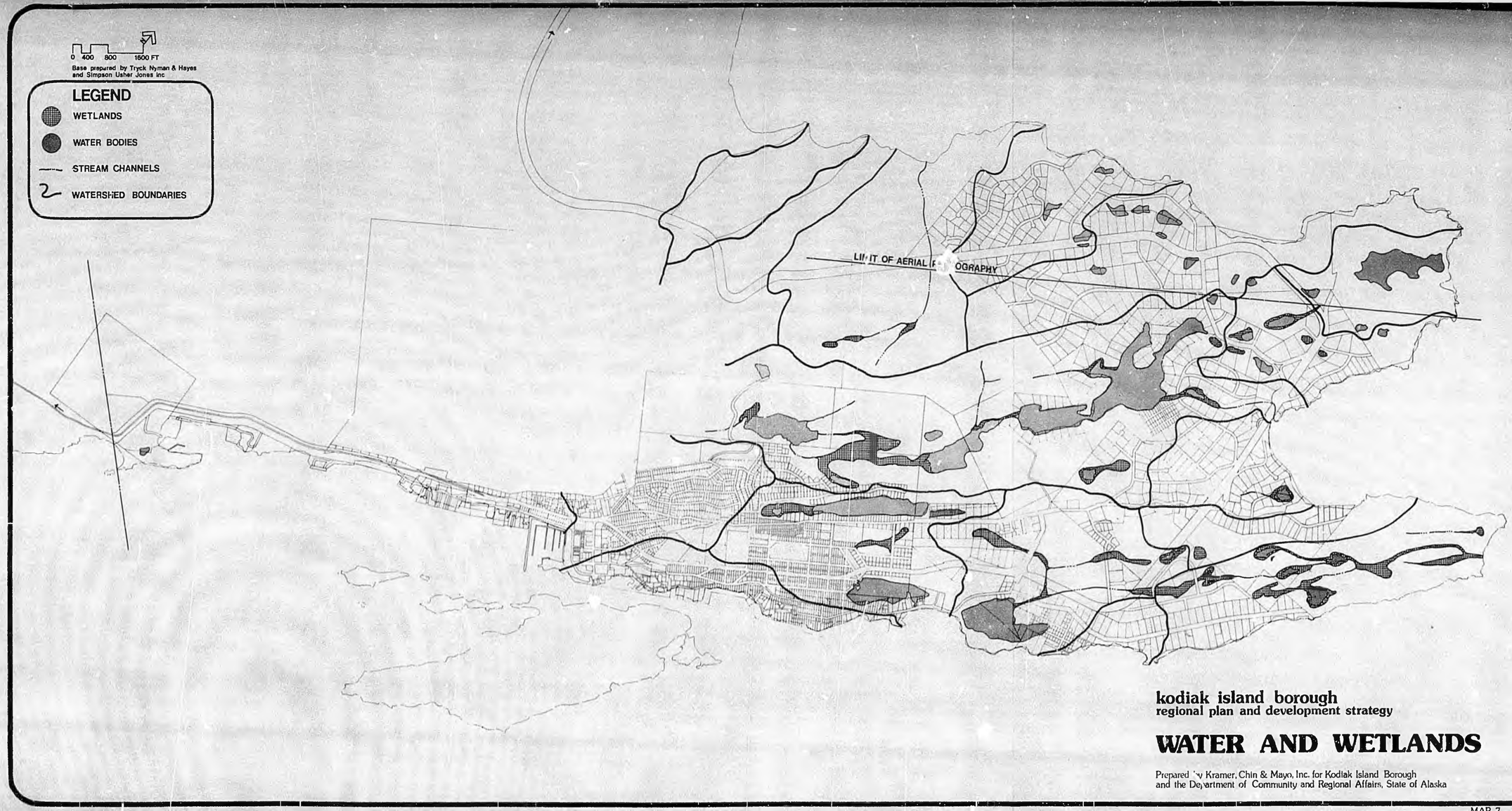

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WATER AND WETLANDS

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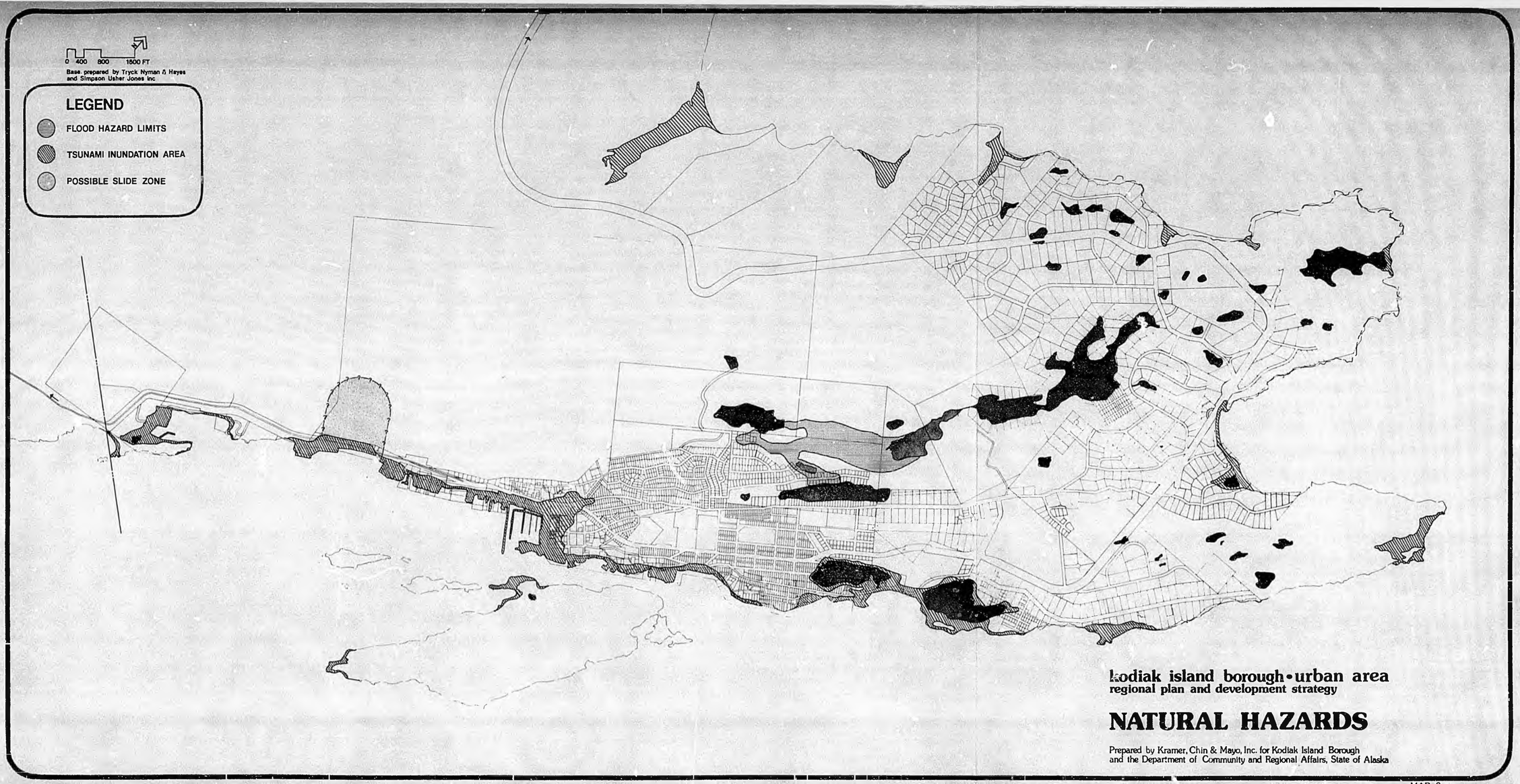

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NATURAL HAZARDS

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DEVELOPABLE LANDS

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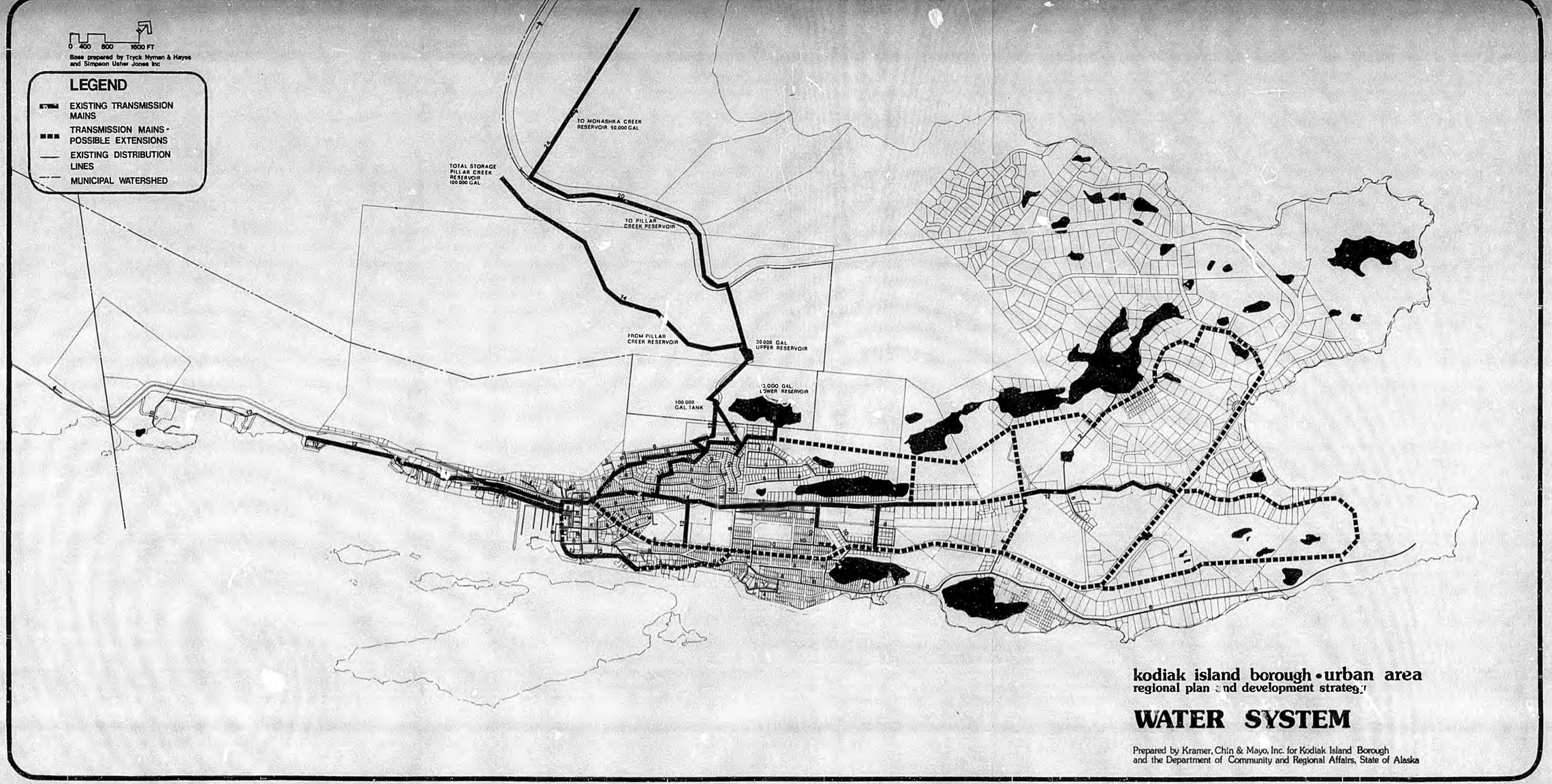

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WATER SYSTEM

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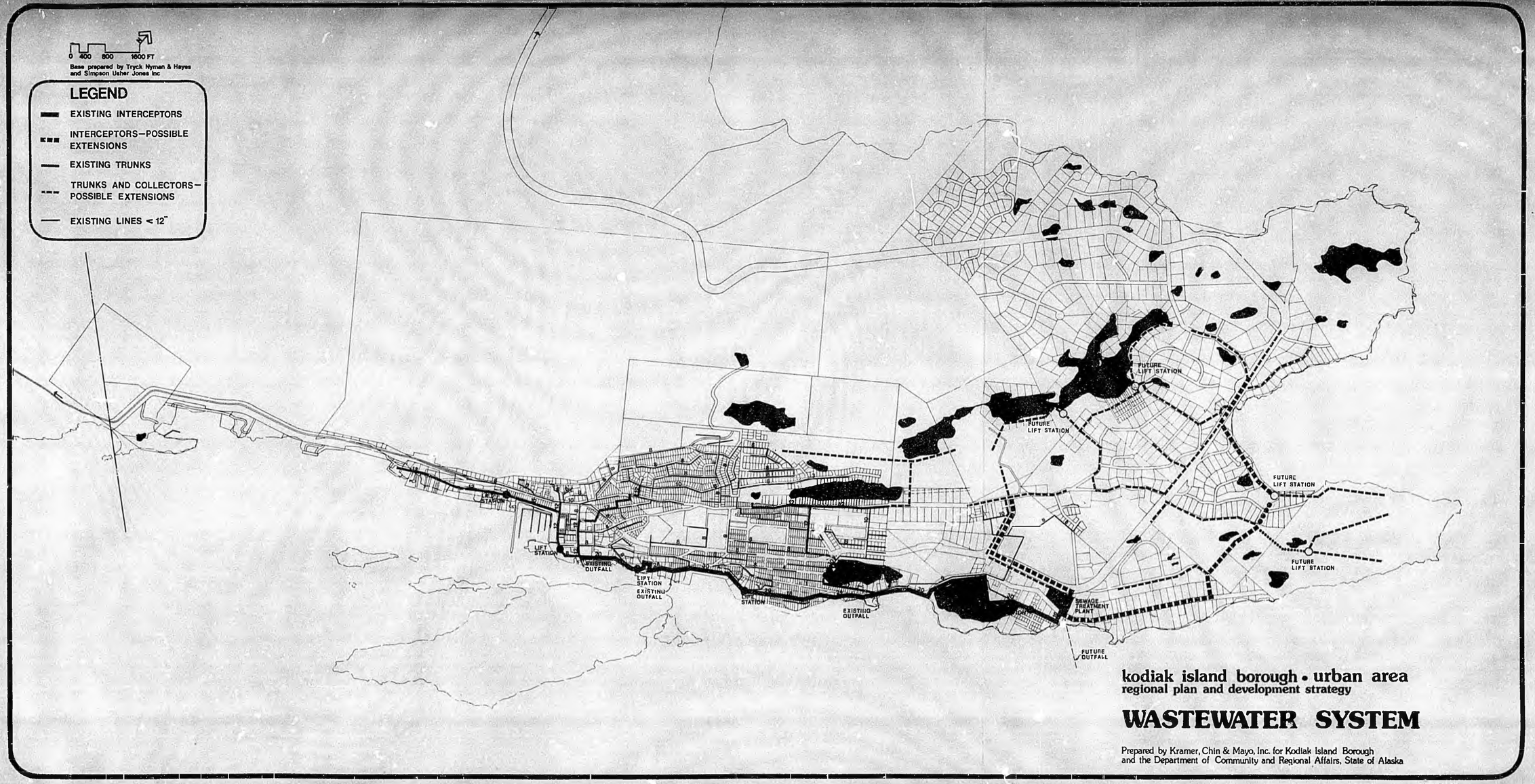
MAP 10



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WASTEWATER SYSTEM

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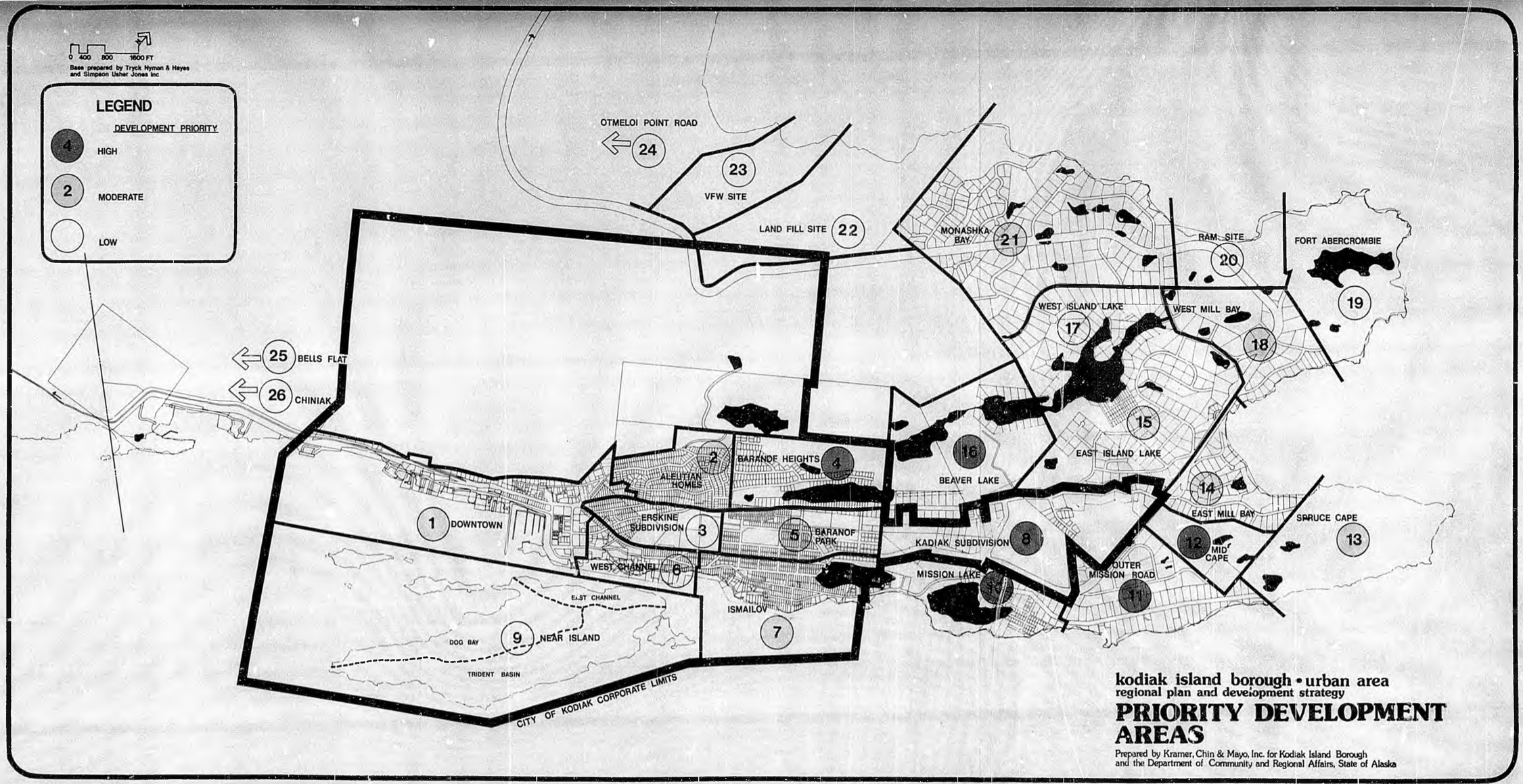

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PRIORITY DEVELOPMENT AREAS

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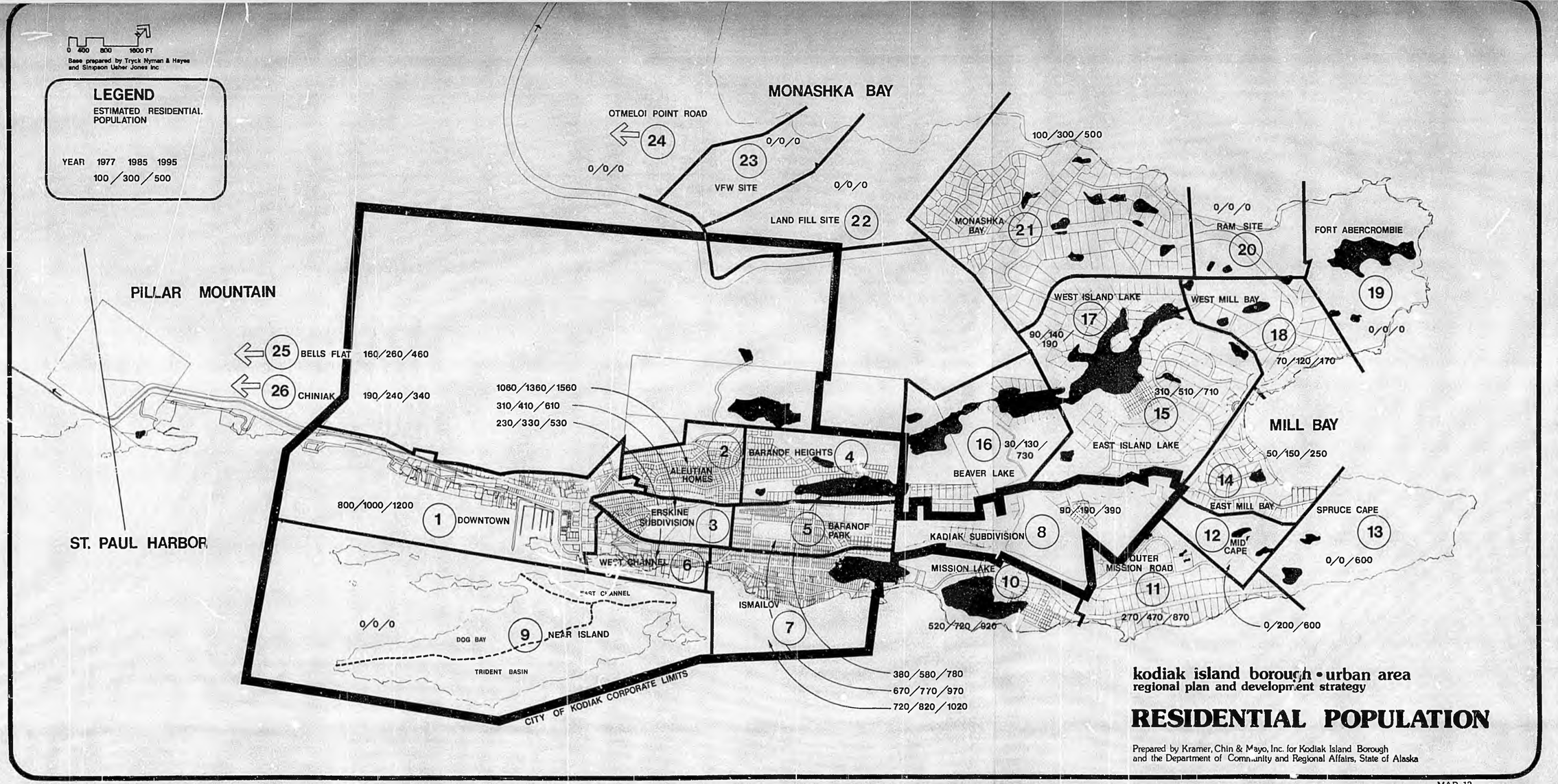
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Base prepared by Tryck Nyman & Hayes and Simpson Usher Jones Inc
LEGEND
ESTIMATED RESIDENTIAL POPULATION
YEAR 1977 1985 1995
100 / 300 / 500
MONASHKA BAY
OTMELOI POINT ROAD
24
23
0/0/0
VFW SITE
LAND FILL SITE
22
PILLAR MOUNTAIN
25 BELLS FLAT 160/260/460
26 CHINIAK 190/240/340
1060/1360/1560
310/410/610
230/330/530
800/1000/1200
1 DOWNTOWN
2 ALEUTIAN HOMES
3 ERSKINE SUBDIVISION
4 BARANOF HEIGHTS
5 BARANOF PARK
6 WEST CHANNEL
7 ISMAILOV
8 KADIAK SUBDIVISION
9 NEAR ISLAND
DOG BAY
TRIDENT BASIN
EAST CHANNEL
ST. PAUL HARBOR
CITY OF KODIAK CORPORATE LIMITS
380/580/780
670/770/970
720/820/1020
MONASHKA BAY
21
100/300/500
RAM SITE
20
FORT ABERCROMBIE
19
WEST ISLAND LAKE
17
90/140/190
WEST MILL BAY
18
70/120/170
15
310/510/710
MILL BAY
16
30/130/730
BEAVER LAKE
EAST ISLAND LAKE
50/150/250
14
EAST MILL BAY
90/190/390
SPRUCE CAPE
13
12
MID CAPE
0/0/600
MISSION LAKE
10
OUTER MISSION ROAD
11
270/470/870
520/720/920
0/200/600
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regional plan and development strategy
RESIDENTIAL POPULATION
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V COMMUNITY FACILITIES

From the material developed in the previous chapters, it is now possible to identify key future community service and facility requirements and make some recommendations about meeting these requirements. Two types of requirements will be examined. The first is what is sometimes called the community infrastructure; this includes the utility systems discussed in the previous chapter, which constrain the future pattern and amount of development. The second type is the community facility: buildings and other physical improvements which are necessary for "people" services such as police, schools, etc. These facilities are generally located in response to development rather than in advance of it. Requirements for these facilities are directly related to population size and will be identified from the population projections developed in Chapter II.

Infrastructure

The water supply system was discussed in Chapter IV and illustrated on Map 10. It was pointed out that the system is already at design capacity as far as storage is concerned. To allow significant industrial expansion, storage would have to be increased. The City's Monashka Creek Dam plans would provide adequate capacity for many years. The distribution system should also be extended to provide safe drinking water; wells in Kodiak are potentially subject to contamination from septic tank wastes due to poor soils, high water table and shallow bedrock. The water distribution system should also be extended to guarantee adequate water supply for fire-fighting equipment. Areas for possible extensions were indicated on Map 10. Immediate priority should go to areas already partly developed. These would include Island Lake and the loop between Lilly Lake and the Lower Reservoir.

The wastewater collection system should also be extended to correct existing water quality problems, with first priority to Island Lake. This would more fully utilize the treatment plant, which is sized for 9500 people. If the low population projection proves correct, the plant itself should be adequate to at least 1990. If the high projected level of growth takes place, the plant may require expansion between 1985 and 1990. Extending the wastewater collection system will also make it possible to service significant amounts of undeveloped land that is highly suited to urban development. Because the cost of laterals will be borne by adjoining property owners, a beneficial side effect should be re-subdivision and sale for home construction of land held for speculation.

In both areas, the limited amount of public bonding capacity available requires that maximum benefit be extracted from each expenditure. Therefore, the pattern of future development should be controlled so that concentrations of population ultimately requiring public services do not emerge beyond the present area. This would cause expensive duplication of facilities, as well as altering the rural character of outlying areas on the road system.

To this end, retention of "conservation" zoning for outlying areas, with a minimum lot area of 5 acres is recommended. Relaxation of this minimum to 1 acre might be considered if the developer will provide approved public water supply and/or waste treatment, as environmental review determines.

The previous chapter also commented on streamways as storm drainage channels. These should be retained in natural condition. A drainage management study should also be undertaken in the next several years to determine what measures are necessary to prevent upland land uses from adversely affecting surface water courses and water bodies in the urban area.

The solid waste problem was also addressed in the previous chapter. The Borough was suggested as the appropriate body to deal with this regional issue in the immediate future.

Finally, the Terror Lake Hydroelectric Project appears desirable from the standpoint of an assured supply of lower-cost power adequate to serve both the urban area and the Support Center. It would save non-renewable fossil fuel and would apparently have few adverse impacts. KEA is actively pursuing the project but whatever assistance can be given should be given.

Projected Community Facility Requirements

The major community service requirements and facilities, other than utilities, associated with additional population are projected here. These include police services, fire protection, education, health services, recreation, and library services. Unlike the utilities discussed earlier, these do not direct the pattern of population growth. They respond to it.

A similar format is used for each facility requirement. First, requirements due to population growth based upon the existing economy are presented as a range, corresponding to the low and high projections of future population in Chapter II. Second, additional requirements likely to result from OCS activity are set out. In planning future facilities, the "low" population forecast will define minimum requirements. Actual growth in the economy, labor force, and population should be watched carefully to see if the higher set of requirements must be provided for. The 1980 census will be a good checkpoint for the population estimates. Additional requirements due to OCS-related population growth must be added in as soon as it is apparent which of the four cases is actually taking place.

Law enforcement in the City of Kodiak is the responsibility of the City Police Department. Outside the City limits, the Alaska State Troopers provide this service. The Borough itself does not provide law enforcement services. Should the City limits change as a result of annexation, the responsibility for law enforcement would shift from the State to the City of Kodiak. Unification would probably also entail additional law enforcement responsibilities for local government.

At the present time, the City of Kodiak's police station and jail (they are in the same building) are operating at full capacity, and the jail will probably have to be expanded within the next year or two. An indication of the degree of expansion is the number of additional officers required for the future (Table 7).

TABLE 7

Projected Police Staff Requirements,
City of Kodiak, Without OCS Activity

Year	Staff Levels	Staff Required
1976	22	
1980	29-30	7-8
1985	35-40	13-18
1990	40-50	18-28
1995	50-65	28-43

The impact of OCS activity on the police force will be strongly influenced by the location of oil company facilities. However, even if these facilities were located in or near the urban area, the impact on the Police Department would be relatively small, assuming that current police protection staff and jail facilities are expanded to maintain per capita protection in the face of normal population growth. The number of additional officers required on the police force as a result of the OCS-induced population growth is given in Table 8.

TABLE 8

Projected OCS-Related Police Staff Requirements

Year	Case 1	Case 2a	Case 2b	Case 3
1980	0	0	0	0
1985	0	1	0	5
1990	0	2	1	3
1995	0	0	0	0
Peak Impact Year[1]	0	5	1	8

(1) See Table 6 for peak impact years.

Fire protection within the Kodiak urban area is also a service provided by the City of Kodiak. Further extension of fire protection services outside the City limits is an issue that requires examination. Services could be extended under contract with the City, or independent fire districts could be formed. The following analysis assumes that the great bulk of future population increases will occur in the present urban area and will be served by the City Fire Department.

At present, the Fire Department is placing high priority on the reduction of the use of volunteer workers. With the use of paid staff, the department would be able to respond to emergency calls in the Island Lake and Spruce Cape areas within approximately four minutes - the maximum period of time allowable without serious loss of life or property. Table 9 shows the staff levels and additional staffing requirements for the Department.

TABLE 9

Projected Fire Department Staff Requirements
City of Kodiak, Without OCS Activity

Year	Staff Levels	Additional Staff Required	Additional Staff Required By Future Growth
1976	6	4	
1980	13-14	7-8	3-4
1985	15-18	9-12	5-8
1990	18-23	12-17	8-13
1995	21-29	15-23	11-19

As in the case of police protection, the impact on the fire-fighting force will be influenced by the location and type of facilities developed by the oil companies. Table 10 sets out the staffing requirements, assuming location in or near the Kodiak urban area. If this occurs, it will probably be necessary to establish a substation to reduce the travel time from the station to any potential fire in the urban area. This would cover residential and secondary industrial areas, but probably exclude oil terminal facilities (the oil companies would provide fire protection for these). At the present time, the department has the equipment to operate a substation but lacks the facility and staff. The substation should probably be located in the

Island Lake or Spruce Cape areas. If OCS development occurs in the Chiniak area, another substation would be needed. Jurisdictional responsibility in this case would have to be assigned. If the primary on-shore facilities under Case 2a and Case 3 are located off the road system in a self-contained site, no additional officers will be required for the fire protection staff over and above those for non-OCS population growth.

TABLE 10

Projected OCS-Related Fire Department Staff Requirements

Year	Case 1	Case 2a	Case 2b	Case 3
1980	0	0	0	0
1985	0	1	0	2
1990	0	1	0	2
1995	0	0	0	0
Peak Impact Year(1)	0	2	0	4

(1) See Table 6 for peak impact years.

The Borough is responsible for the provision of primary and secondary education throughout its boundaries and maintains a complete range of educational facilities. Assuming that the current ratios of students per classroom are maintained, Table 11 presents the numbers of classrooms required in the urban area through 1995.

The high school in Kodiak is new and was built with the potential for enlargement. Additional classroom space could be provided through the movement of partitions and it is estimated that the current high school could double its enrollment without excessive overcrowding. The elementary schools, however, are older and do not have the same flexibility. In addition, they are already operating at or near their capacity. In the near-term, 2 new elementary schools appear required by 1980, at 20 classrooms each. Another elementary school plus a 40-room junior high school may be required by 1985. Due to the lead time required for design and construction - approximately 2 years - planning for one elementary school should begin immediately.

TABLE 11

Projected Urban Area School Requirements
Kodiak Island Borough, Without OCS Activity

Year	Number of Elementary & Jr. High School Classrooms	Number of High School Classrooms	Additional Elementary & Jr. High Classrooms Required	Additional High School Classrooms Required
1976	195	41		
1980	235-248	49-52	40-63	8-11
1985	276-335	58-71	81-140	17-30
1990	326-425	69-90	131-230	90-189
1995	383-517	81-109	188-322	147-241

OCS population impacts - if they occur in the urban area - would generate needs for additional classroom space over and above those shown in Table 11. Table 12 sets these out for elementary and junior high school classrooms;

Table 13 does the same for high school needs. Cases 1 and 2b would have minimal impacts, but Cases 2a and 3 would add significant requirements - approximately one new elementary school for 2a and two new elementary schools plus half a junior high school for 3. In addition to these longer-term requirements, there would be peak impacts of a year or two in duration for Cases 2a and 3 in which the capacity of an entire additional elementary school would be required. This would probably lead to an expedient, such as double-shifting. High school classroom requirements under all four cases could probably be met within the existing facility.

TABLE 12

Projected OCS-Related School Requirements
Elementary and Junior High School Classrooms

Year	Case 1	Case 2a	Case 2b	Case 3
1980	1	4	4	4
1985	0	9	2	40
1990	0	17	8	28
1995	0	0	0	0
Peak Impact Year(1)	1	45	8	69

(1)See Table 3 for peak impact years.

TABLE 13

Projected OCS-Related School Requirements,
High School Classrooms

Year	Case 1	Case 2a	Case 2b	Case 3
1980	0	1	1	1
1985	0	2	0	8
1990	0	4	2	6
1995	0	0	0	0
Peak Impact Year(1)	0	10	2	15

(1) See Table 3 for peak impact years.

The Kodiak Island Borough owns the major health facility in the urban area, the Borough Hospital. With this hospital and privately provided clinics, the Borough currently has ample health facilities and services to provide for the foreseeable future population. The hospital currently has 25 beds for acute care which are averaging only 40% occupancy. A new wing has been added for the provision of long-term care. Rather than facilities, the major potential problem regarding delivery of health services at the hospital is staffing, - particularly professional nursing and laboratory technicians.

At present, the greatest demand for hospital services is OB/GYN care. The second highest demand for services (measured by admissions) is the detoxification treatment of alcoholics. The two major future health needs to be anticipated in Kodiak are (1) alcoholism and alcohol-related care and needs, and (2) family practice physicians, should population growth continue.

The Borough currently has ample health facilities and services to provide for OCS-related population and services to provide for OCS-related population growth. In addition, the oil companies would probably provide temporary medical care at construction camps. Further minimizing the need for additional Borough facilities.

Current staffed recreation programs in the urban area are extensive. These are organized and run by the City of Kodiak and involve use of both City and Borough facilities. Despite (and because of) these extensive recreation programs, recreation facilities are at or over capacity and will require expansion. Current facilities cannot be used to service any further growth of population without a noticeable deterioration of quality. Since existing facilities are inadequate to accommodate the future non-OCS growth of population, OCS-related growth will lead to a further deterioration in the quality of recreation services if recreation facilities are not expanded. The Borough is currently preparing a comprehensive parks and recreation plan to address these issues.

The Kodiak City Library is supported both by the City and the Borough. The building was constructed in 1968 and was expanded in 1977. The library's primary need is additional staff positions. With its new wing, the building should be adequate to provide services to the community for the next decade. After that, it will probably be necessary to expand the library through the provision of additional facilities and the increased acquisition of books and cassettes. This expansion of library services and facilities should also be adequate to provide for additional needs due to OCS-related population growth.

Recommendations

. Utilities ("infrastructure")

- Extend public sewers to the Island Lake area to correct existing water pollution problems. Design these sewers to serve medium density infill development, as well as future development in the Spruce Cape area.

- Extend the City water system to serve the Island Lake area on the same basis, for fire-fighting as well as drinking water supply.

- Derive maximum benefit from utility expenditures; i.e., concentrate on servicing developable areas adjacent to existing and future serviced areas.

- Increase the storage capacity of the City water system by raising the Monashka Creek Dam.

- For storm drainage, retain the existing stream drainage system in as near-natural condition as possible for flood-water storage, water quality and open space. Conduct a drainage management study of the unincorporated portion of the urban area to determine the degree of upland management necessary.

- Minimize the likelihood of future water quality problems in unplatted rural areas by maintaining the minimum lot area for homes serviced by septic tanks in presently unplatted areas to 5 acres with well water and to 1 acre with public water supply.

- Update and extend the City/Coast Guard solid waste study to identify capacities and operating costs of alternative solid waste disposal sites suitable for disposal of sewage sludge.

- Encourage development of the Terror Lake hydroelectric project.

. Facilities

- Construct new schools to keep pace with population growth. In the near-term (by 1980), build two new elementary schools; in the mid-term (by 1985), plan to build one elementary and one junior high school.

- Reserve school sites in developing areas for future population growth.

- Construct a fire station to serve the partially developed Island Lake area, with capability for future expansion.

- Construct additional police and jail facilities to keep pace with population growth to 1985.

VI. TRANSPORTATION

Transportation provides the access that allows lands and resources to be utilized for human purposes. Historically Alaskan development has been hindered by difficult and/or expensive access, despite the presence of many resources of high intrinsic value. Adequate transportation is critical to Kodiak's future development. Indeed, several existing transportation facilities help to anchor the urban area economically: the City dock, the state airport, the state ferry service, the Inner Harbor, crowded as it is. Transportation or development: it is arguable which is the cause and which the effect, but it is clear that the two must keep pace.

Urban Area Transportation

Streets and highways are the primary elements in the urban area transportation system, which is predominently oriented for travel by automobile. Adequate facilities for pedestrian and bicycle travel are virtually non-existent throughout most of the area. As the urban area develops, facilities for all three types of travel will need to be provided and upgraded. It will be important to relate land-use planning closely to existing or planned transportation facilities. In general, the principle to follow is the higher the intensity of use, the greater the transportation need. Just as paths and roads only make sense if they connect destinations, major destinations such as shopping areas, apartment complexes and schools should be located on major paths and roads. This will protect public safety (by providing access for firefighting, police, emergency vehicles) as well as improve traffic flow. In doing this, direct access may have to be controlled, or congested "strip development" may result. But the principle is still important: major uses on major roads.