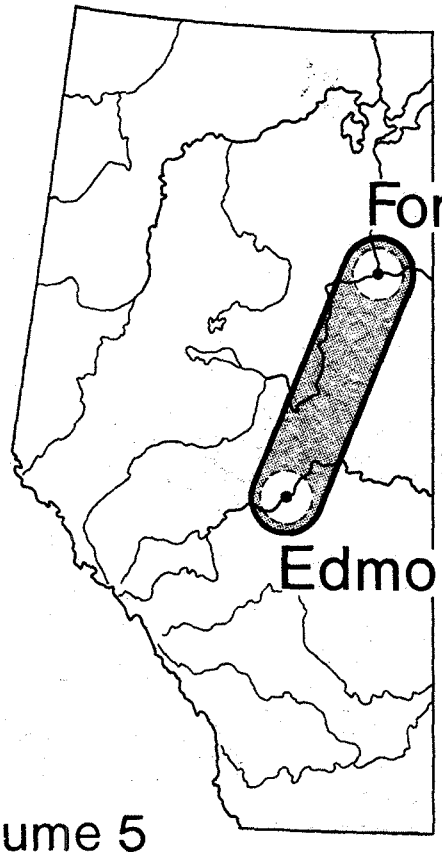
Transportation Corridor Study



Volume 5 Appendix

Effect Upon Human Settlement Patterns

prepared for

Alberta
ENVIRONMENT

october, 1973

by
k.c. mackenzie
associates limited

commissioned by
stewart weir stewart
watson & heinrichs
edmonton, alberta

TRANSPORTATION CORRIDOR STUDY
FORT McMURRAY TO EDMONTON

VOLUME 5 - APPENDIX

"EFFECT UPON HUMAN SETTLEMENT PATTERNS"

Prepared For:

Alberta
Environment

The Honourable
William Yurko

By:

K.C. Mackenzie
Associates Limited,
Edmonton, Alberta
October, 1973

Commissioned By:

Stewart, Weir, Stewart,
Watson & Heinrichs

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SECTION ONE

THE PURPOSE AND APPROACH OF THE REPORT

I. INTRODUCTION

The following report represents the preliminary input of K.C. Mackenzie Associates Limited to the Athabasca Tar Sands Corridor Study being prepared by Stewart, Weir, Stewart Watson & Heinrichs for the Honourable W.J. Yurko, Minister of the Environment of the Government of the Province of Alberta. The objective of the Corridor Study is to determine the most desirable corridor route for a series of pipelines carrying synthetic crude oil from the Athabasca Tar Sands to the Edmonton area. The study is also required to examine the possibility of multiple use of the future corridor and the fundamental purpose of the study is to minimize the environmental impact of pipelines in particular and, where feasible, other transportation and communications facilities.

The general responsibility of K.C. Mackenzie Associates Limited is to examine various aspects of the corridor from the standpoint of human settlement patterns within the study area. This report therefore consists of the gathering and analysis of relevant information that will contribute to the understanding, by the Study Group, of the inter-relationship between the proposed corridor and the human settlement pattern.

This report has been prepared by Mr. K.C. Mackenzie, M.T.P.I.C., and Mr. John Andrew, Research Assistant. The information and opinions contained herein are intended primarily for the use of various members of the multi-disciplinary Study Group, including representatives of various governmental agencies and departments, representatives of firms and agencies who have contributed personnel to the Corridor Study, and other consultants retained to contribute specialized input to the Corridor Study. The authors gratefully acknowledge the assistance provided by innumerable officials of public agencies and departments of the Provincial Government, representatives of municipal authorities and personnel working with private firms from whom input and advice was obtained.

II. PURPOSE OF THE REPORT

The general purpose of this report is to examine various constraints, resulting from human settlement patterns, which will affect the selection of a route for the proposed pipeline corridor. In addition to the definition of constraints, the report will also identify factors which, unlike constraints which are primarily negative in nature, would attract or encourage a proposed corridor route.

The report will ultimately become an appendix to the first volume of the Corridor Study which will contain the recommended route for the pipeline corridor. The report contains, therefore, not only information and opinions relating to human settlement patterns, but recommendations regarding locational factors which the Study Group should consider in selecting the recommended corridor routes or alternative routes.

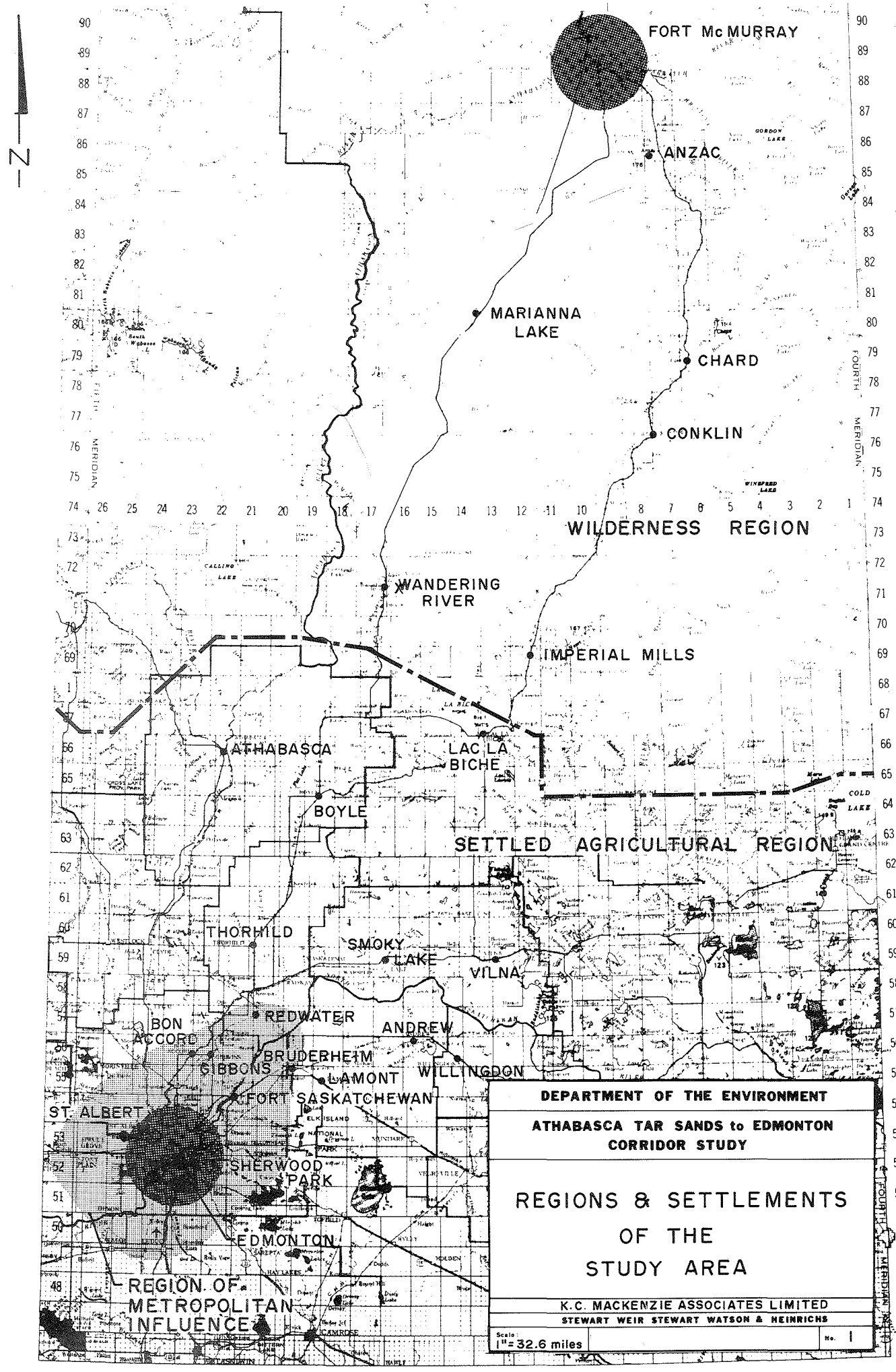
III. THE APPROACH

The selection of a recommended route for the proposed pipeline corridor is, in its broad context, an exercise in applied geography. The sophistication of the exercise is indicated by the diverse talents represented within the multi-disciplinary consulting group and the various public agencies upon which the consultants depend for much of their resource material. On the basis of the fact, however, that the exercise is primarily geographic in nature, this report approaches the analysis of probable corridor location constraints on the basis of the various geographic regions which constitute the study area.

The study area, which consists of that general area covered on Drawing 1., features five relatively distinct sub-areas or regions from the standpoint of their human settlement patterns. The rationale for the dilineation of these regions will become obvious in Section Three where the human settlement patterns are analyzed and discussed. It is sufficient to appreciate at this point that the settlement pattern of each region is based upon a complex of physical, economic and social factors which differ significantly enough from those of other regions to justify the regional approach adopted by this report.

The regions within the study area include:

1. THE FORT McMURRAY REGION
2. THE WILDERNESS REGION
3. THE SETTLED AGRICULTURAL REGION
4. THE REGION OF METROPOLITAN INFLUENCE
5. THE EDMONTON METROPOLITAN REGION


N
FORT McMURRAY
ANZAC
MARIANNA LAKE
CHARD
CONKLIN
WILDERNESS REGION
WANDERING RIVER
IMPERIAL MILLS
ATHABASCA
LAC LA BICHE
BOYLE
SETTLED AGRICULTURAL REGION
THORHILD
SMOKY LAKE
VILNA
REDWATER
BON ACCORD
ANDREW
BRUDERHEIM
GIBBONS
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WILLINGDON
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ST. ALBERT
SHERWOOD PARK
EDMONTON
REGION OF METROPOLITAN INFLUENCE
CAMROSE
FOURTH MERIDIAN
FIFTH MERIDIAN
DEPARTMENT OF THE ENVIRONMENT
ATHABASCA TAR SANDS to EDMONTON CORRIDOR STUDY
REGIONS & SETTLEMENTS OF THE STUDY AREA
K.C. MACKENZIE ASSOCIATES LIMITED
STEWART WEIR STEWART WATSON & HEINRICHS
Scale: 1" = 32.6 miles
No. 1

SECTION TWO

THE CORRIDOR AS A USE OF LAND

I. THE NATURE OF THE CORRIDOR

The proposed pipeline corridor is, in its most basic form, a transportation facility intended to accommodate a variety of pipelines which will convey synthetic crude oil from their point of production near Fort McMurray to their initial destination in or near Edmonton. As a pipeline corridor, it manifests itself in spatial terms as a strip of land which must be kept free of permanent structures and which, to a certain extent,will have to be cleared of its natural vegetation. As a transportation facility with essentially one origin and one destination, its most economical alignment, subject to the constraints to be defined by the Study Group, will be as direct a line between origin and destination as is possible.

The Study Group is, by its terms of reference,required to examine in addition to recommending a route for the proposed pipeline corridor, the possibilities of multiple use of the corridor concept wherever feasible. The relatively simple primary objective of the corridor study is therefore broadened and complicated by the necessity of examining potential multiple use. This requirement presents the Study Group with a significant challenge and, from the standpoint of the human settlement pattern,necessitates the adoption of a particular philosophy in isolating

corridor location constraints.

II. THE PHILOSOPHY OF CORRIDOR LOCATION

Faced with the responsibility of recommending a corridor route, the Study Group will assess alternative routes within the context of minimizing corridor implementation and pipeline construction costs while, at the same time, minimizing the environmental impact of the corridor. The environment in this case includes both the physical and the cultural or man-made environments as they now exist, and it is within the context of the cultural environment that human settlement patterns must be examined.

At first glance, the task of locating a pipeline corridor with regard to the human settlement pattern would appear to involve only the avoidance of areas which are already intensively developed and, in cases where the human settlement pattern is less intensively developed, avoiding such obvious obstacles as economically viable farmsteads and building complexes. The requirement, however, of examining potential multiple uses adds to the responsibilities of the Study Group a new dimension and, from the standpoint of human settlements, demands a significant redefinition of traditional planning procedures.

The added dimension of potential multiple use requires that in addition to the rather fundamental definition

of constraints (those negative factors which confine and restrain corridor location), positive factors or features of corridor location will also have to be considered. This report will therefore attempt to isolate, in instances where multiple corridor use appears feasible, positive factors which will attract the corridor route to a particular location. This added dimension creates the potential for using the pipeline corridor as a planning tool - a positive force in shaping the land use pattern, rather than regarding it as a mere utility that must be accommodated within the pattern of land use.

III. THE APPLICATION OF THE MULTI-USE CONCEPT

This report does not examine in detail the functional inter-relationships between potential multi-use corridor components. This responsibility lies with the Study Group as a whole and will be examined at an appropriate point in the corridor study. This report will consider the concept of multiple use only from the standpoint of the land use pattern in a particular area, and will do so on the basis of apparent compatibility within the context of the overall patterns of land use and human activity.

Multiple use of the proposed pipeline corridor will therefore be considered in general terms and the specific application of multiple use concepts to various portions of the corridor will not be relevant until a final recommended route is being selected by the Study Group.

Exceptions to this principle may include the suggested application of multiple use as an example or, in certain instances where the corridor location alternatives are already significantly limited, multiple use may be recommended.

IV. BASIC FEATURES OF THE PIPELINE CORRIDOR

The pipeline corridor as a use of land generates remarkably few demands upon other elements of the human settlement pattern. Discussions conducted to date with representatives of the pipeline industry indicate that pipelines located within the corridor require no particular location with respect to urban settlements for the provision of services to the pipeline. The personnel needed to provide the minimal maintenance services required by pipelines can be accommodated in existing urban settlements and will probably be located in the urban centers of Fort McMurray or Edmonton. No demand of any significance for housing space or the provision of technical services is anticipated for the maintenance requirements of the pipeline within the area through which the corridor will pass.

Even the construction phases of pipeline development are expected to have a minimal impact upon the small communities located near the corridor. The rate at which the pipelines are constructed, often reaching several miles per day, means that construction crews would be within the market area of existing settlements for periods of a few days only. The impact of these migratory crews

upon existing communities and their services, would be of a very temporary nature and would occur very infrequently. Although the provision of housing accommodation for construction crews does present a significant, if short term, problem, the solution may involve the recommendation of several semi-permanent construction campsites along the corridor route which could be used by various construction crews as required. Should subsequent discussion with pipeline contractors reveal that this approach is realistic, the final recommendation of the Study Group will include some suggested locations for such campsites. It would be desirable to locate these campsites near a community which is capable of rendering a certain level of commercial service, is reasonably accessable to the transportation system, and is capable of providing basic municipal utilities to service the campsite. In the event that specific campsite locations are recommended, the possible additional use of these facilities for tourist and recreational purposes will be examined.

Another basic feature of the pipeline corridor which has yet to be determined is the actual width of the corridor right-of-way which will be required. Although its width will depend upon the number of pipelines installed within the corridor and the multiple uses envisioned for the corridor at various points, one principle which should be considered strongly by the Study Group is that the width of corridor selected should not only accommodate all forseeable requirements, but should also include a generous allowance for

unforseen requirements. Since one of the fundamental advantages of, and justifications for, the acquisition of a single corridor is the fact that the acquisition procedure is necessary on one occasion only, it would be prudent to over-compensate for foreseeable width requirements. Results of the Farm Resident Survey conducted by Stewart, Weir, Stewart Watson & Heinrichs appear to indicate that the advantages of a single acquisition are favoured not only by the pipeline users upon whom the responsibility of acquisition lies, but also the land owners from whom the rights-of-way are acquired. The establishment of a corridor of substantial width provides a degree of certainty to all parties affected thereby. The corridor user benefits from the certainty of knowing the right-of-way is available and acquired, and the owner of land adjacent to the corridor benefits from the certainty that he may use the balance of his land for his own purposes without the fear of further infringement of his rights to use his land by the expansion of the corridor.

SECTION THREE
THE REGIONS OF THE STUDY AREA

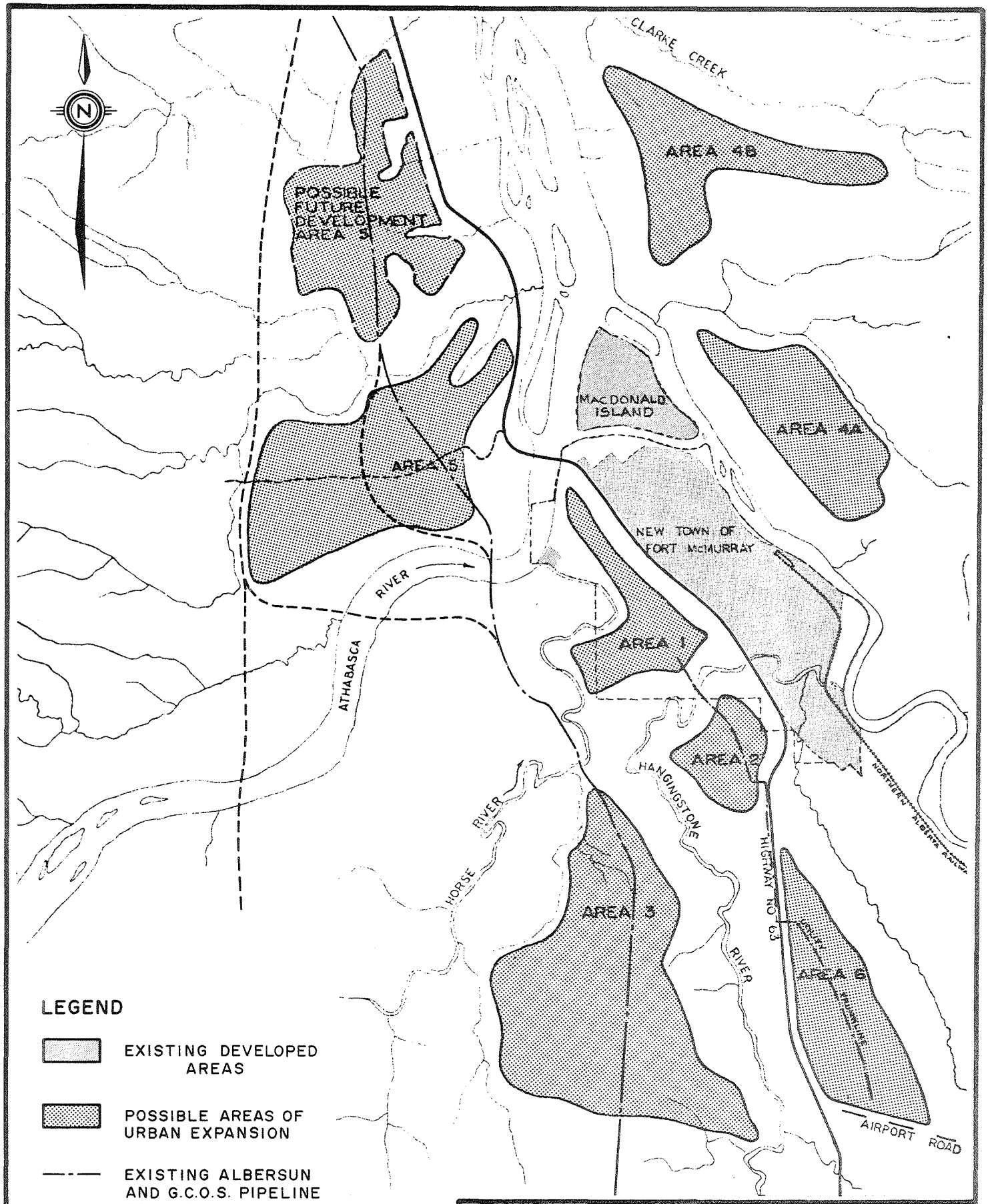
I. THE FORT McMURRAY REGION

A. The Settlement Pattern

1. The Geographic Setting:

Reference to Drawing 2. will reveal that the existing developed area of Fort McMurray lies in the floodplain at the confluence of the Athabasca and Clearwater Rivers. The developable portions of this floodplain are virtually completely developed and any expansion of the Town will therefore take place outside the well defined valleys of the two major rivers on the highland areas which are so indicated on Drawing 2..

The region surrounding Fort McMurray is geographically characterized by a well defined system of tributary waterways which drain into the Athabasca and Clearwater Rivers. These watercourses tend to fragment the highland areas surrounding the Town in terms of the creation of large areas for urban expansion and give rise to the rather scattered pattern of areas which are available for future urban expansion. These watercourses also represent a significant constraint from the standpoint of locating a major pipeline corridor. The areas outlined on Drawing 2. as possible areas of urban expansion were provided by the Provincial Planning Branch responsible for development in the Fort McMurray area. It is significant that development is already taking place in area 5 as outlined on Drawing 2. where subdivisions for single family housing have been



K.E. Mackenzie Associates Limited

SUBJECT: FORT McMURRAY REGION

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registered and are in the process of being provided with municipal services. Plans are also in the process of formulation in areas of potential expansion to the south of the existing Town. Information received to date indicates that Areas 1, 2 and 6 on Drawing 2. are the subject of planning studies by the firm Cohos Delesalle and Evamy which were commissioned by the Department of Municipal Affairs.

It is noteworthy that three potential expansion areas are already bisected by the existing Great Canadian Oil Sands and Albersun Pipelines and that, in the case of Area 5, development is already taking place on both sides of the existing pipeline rights-of-way.

2. The Economic Base and Future Growth:

The economic base of Fort McMurray as it now exists may be characterized as being dependent entirely upon the oil sands extraction process being operated by Great Canadian Oil Sands Limited. The economic function of the Town is to provide living areas for the personnel and families directly employed by G.C.O.S., and the derivitive public and commercial services generated by this basic industry. A small proportion of the population may be regarded as dependent upon the original transportation and trading functions of the Fort McMurray settlement and, more recently, a small proportion of the population depends upon welfare for its economic sustenance, however the over-riding economic life-blood of the community depends upon the oil extraction industry. The future physical growth of Fort McMurray will depend entirely upon the

extent to which additional extraction operations are developed in the Athabasca Tar Sands. Although the following section will attempt to outline the implications of growth from the population's standpoint and illustrate the magnitude of potential growth, it is assumed within the context of this study that growth will occur, and it will occur in some or all of those areas outlined as possible areas of urban expansion on Drawing 2.. The task of this study is to ensure that this growth is coordinated with, and made compatible with, the requirements of pipeline transmission facilities.

3. Population Analysis:

The population of Fort McMurray is characterized by a predominance of young people, a high birth rate, a low death rate, and high rates of in-and-out-migration. Natural increase therefore plays a surprisingly large role in population growth and may be explained by the fact that a large proportion of the in-migrating population falls within the age range in which the formation of families is predominant.

Population statistics reveal a marked increase in the rate of growth during the construction, and early operation, of the G.C.O.S. extraction plant. The rate of population increase declined between 1968 and 1970 to a low of approximately 180 persons per year in 1969 indicating a stablization of population which was related to the completion of the G.C.O.S. plant. Preliminary indications of a second period of rapid

increase are apparent by reference to the graph included in Table I. which shows annual population increases for Fort McMurray. The increase indicated for 1970-71 may be attributed, at least partially, to activity and speculation surrounding the experimental phases of the proposed Syncrude development near the Town.

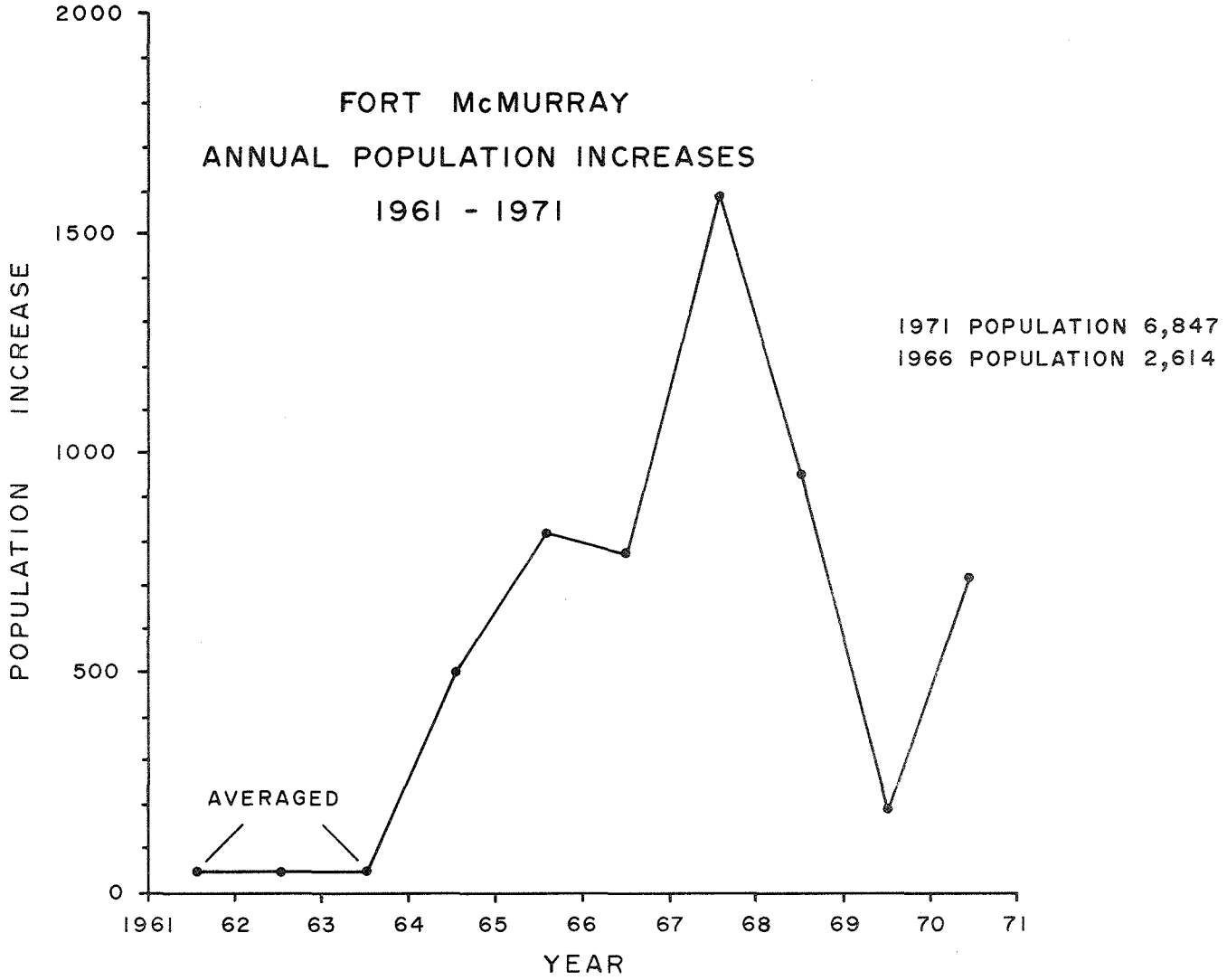
It can be expected that any growth experienced by Fort McMurray will be of a cyclical nature with rapid periods of expansion during the construction and initial operation of each new extraction plant, with periods of stablization or partial decline in population in periods between construction. Despite the widespread knowledge of this future growth trend, a number of population forecasts have been made which warrant consideration in this study. The significance of the probable future growth rate of Fort McMurray relates to the time period during which the relevant authorities may act in establishing a pipeline corridor prior to development occurring which might impede or obstruct such a corridor.

Population projections for Fort McMurray were made by Reid Crowther Consultants Ltd. on behalf of Syncrude Canada Ltd. in 1973. This population projection yields a curve projected to 1986 which suggests periods of rapid growth alternating with periods of relative stability. In the latter part of the curve, these cycles overlap and a more stable rate of increase results. The Reid Crowther projections assume the construction of three new extraction plants other than

FORT McMURRAY AGE-SEX STRUCTURE

% of Total Population

Age Range	Male		Female	
	1966	1971	1966	1971
0-4	8.76%	8.18%	7.42%	7.96%
5-9	6.35	7.38	6.20	8.03
10-14	5.74	6.21	4.48	5.40
15-19	4.02	4.53	3.44	4.01
20-24	4.44	4.75	5.59	5.11
25-34	9.69	9.93	6.16	9.05
35-44	7.04	5.84	4.78	4.60
45-54	4.86	3.14	3.21	2.34
55-64	3.40	1.60	1.49	0.88
65-69	0.88	0.23	0.61	0.37
70+	1.11	0.44	0.34	0.29



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SUBJECT: FORT McMURRAY POPULATION CHARACTERISTICS				
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the Syncrude plant. The last of these would begin construction before 1986. This prediction corresponds with one made by Mr. Harold Page of Hydrocarb Consultants Ltd., who suggests a new plant development interval of three years, beginning in 1978. The prevailing opinion is that by 1986 there will be five extraction plants in the Fort McMurray area, either operating or under construction. Reid Crowther has projected, assuming that the employees of the extraction plants live in Fort McMurray, that population will be between 23,000 and 24,000 by 1981 and will reach 33,000 or 34,000 by 1986.

By way of comparison, the Fort McMurray General Plan which was prepared by the Provincial Planning Branch in 1972, indicates a population of over 15,000 for Fort McMurray by 1980, although planning staff with the P.P.B. have suggested this may be slightly conservative. The General Plan makes no population projection beyond 1980.

For further comparison, an additonal population projection was prepared by the staff of K.C. Mackenzie Associates Limited. This projection was developed using a modified cohort/component method and the factors employed include yearly natural increase, net migration, and an allowance for the addition of local men to the work force each year. The projection also assumes the following:

a. That each plant will employ approximately 1,000 persons on a permanent basis. (Syncrude's plant, it is assumed,will employ 1,100)

b. That each plant will be constructed over a period of five years.

c. That each plant will generate approximately the same in-migration pattern.

d. That no large new industries will locate in the area such as secondary processing plants.

e. That all permanent employees will live in Fort McMurray.

Birth rates were determined using vital statistics provided by the Alberta Department of Health and Social Welfare. It is assumed that the birth rate will decline (approaching the Alberta average of 24.4 births per thousand total population in 1969) as the predominance of young people becomes less pronounced. It should also be noted that Alberta is experiencing a general decline in birth rates.

The mortality rate was obtained from the same source and it is assumed that any variation experienced will lie between the high and low estimates used.

Net migration, which in this case is in-migration, was predicted to be 1,400 persons per year. This prediction was based on estimates given in the Reid Crowther study of permanent basic employment generated by the new extraction plants, and the experience of G.C.O.S. in Fort McMurray in relation to population and economic multipliers. For purposes of contrast, and for purposes of indicating the range of variation depending upon different rates of in-migration, results are also shown where yearly averages of in-migration of

1,300 and 1,500 per year are employed.

The allowance for the addition of local men to the work force each year was based upon a percentage of males between the ages of 15 and 19 who either join the work force, and thereby reduced the employment opportunities which induce in-migration, or leave Fort McMurray, reducing net migration. The percentage was obtained using Canada Census Age-Sex breakdowns for 1966 and 1971.

The various factors which were included in this projection are itemized on Table II and it will be noted that the middle range projection, that is based upon an average net migration of 1,400 persons per year, yields a 1980 population range of between 19,274 and 19,756, and a 1986 range of between 30,431 and 31,715. Reference to Table III will indicate graphically the various projections and their yearly ranges.

Table II also reveals the lowest and highest predictions for 1980 and 1986, which vary in accordance with the assumed rate of net migration. It will be noted that for 1980 this range varies between 18,638 and 20,396, and for 1986 varies between 29,085 and 33,106.

Table III also indicates the Reid Crowther population projection for the same period which, it will be noted, predicts a slightly greater population increase. This slightly higher figure may be attributable to the

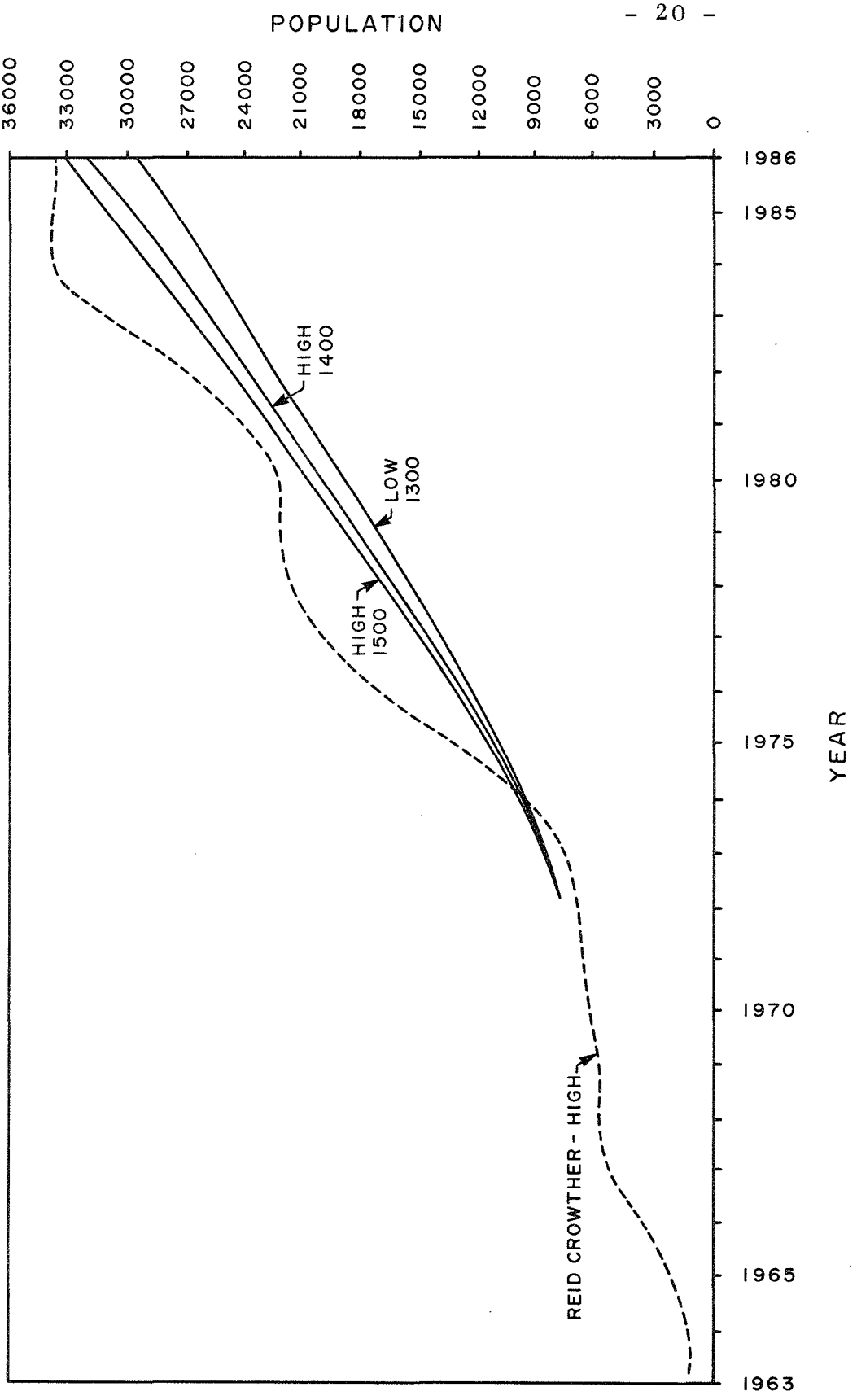
TABLE II

FORT McMURRAY - POPULATION PROJECTIONS

Average Annual Net Migration	High 1500	Low 1500	High 1400	Low 1400	High 1300	Low 1300
Birth Rate; 1979 changes to; 1985 changes to;	33.5 32.5 31.0	32.0 31.0 29.5	33.5 32.5 31.0	32.0 31.0 29.5	33.5 32.5 31.0	32.0 31.0 29.5
Mortality Rate	3.5	4.5	3.5	4.5	3.5	4.5
% of Previous Total Population 15-19 Entering Labour Force	0.5%	0.75%	0.5%	0.75%	0.5%	0.75%
1980 Projection	20,396	19,898	19,756	19,274	19,090	18,638
1986 Projection	33,106	31,759	31,715	30,431	30,260	29,085
	Highest					Lowest

TABLE III

FORT McMURRAY - POPULATION PROJECTIONS



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SUBJECT: POPULATION PROJECTIONS				
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assumption of a higher annual net migration figure. It appears that the Reid Crowther projection assumes an annual net migration figure of approximately 1,800, which is rather more than the figure of 1,000 indicated by the experience of G.C.O.S.. The assumption, however, of this higher figure may be justified on the basis that future growth in Fort McMurray will manifest a trend toward the increasing of its non-basis to basic employment ratio, which has been the experience in many parts of urban Canada. In any event, the population projection included herein, in combination with that calculated by Reid Crowther, provides a range of future populations for the Town of Fort McMurray which indicate, assuming that extraction plants are constructed periodically, a significant amount of future growth for the Town. The announcement on September 18, 1973 by Premier Lougheed that the Government of Alberta has reached an agreement with Syncrude Canada Ltd. to permit that Company to construct its major oil extraction plant near Fort McMurray would appear to be a major event in the future growth of the Town.

The significance of the magnitude of Fort McMurray's potential growth within the context of this study lies in the fact that a significant portion, if not all, of the possible areas of urban expansion outlined on Drawing 2. would be required to accommodate such a population increase. In view of the fact that three of the larger potential expansion areas are presently traversed by existing pipelines emphasizes the necessity of establishing a future pipeline corridor, in advance of actual expansion, that will be compatible

with the Town's future pattern of physical development.

B. Specific Corridor Considerations

1. Existing Pipelines:

The location of the existing G.C.O.S. pipeline in the Fort McMurray region is illustrated on Drawing 2.. As mentioned previously, actual subdivions and development of single family residential land is taking place in Area 5 as outlined on Drawing 2. in the residential area known as Thickwood Heights. It is noteworthy that in this area the G.C.O.S. oil pipeline lies within a 50 foot right-of-way, immediately parallel to which is another 50 foot right-of-way utilized by the Albersun Gas Pipeline. A one hundred foot pipeline right-of-way therefore traverses this area of residential expansion and imposes significant constraints to the development and use of land in its vicinity.

The real significance of these existing pipeline rights-of-way is not that they constrain the development and use of the land across which they run, but that urban development which is now taking place severely constrains additional use of the existing rights-of-way. Although there exists within these rights-of-way the physical space to accommodate some additional pipelines, assuming agreement of the present right-of-way owners was obtainable, the presence of residential development immediately adjacent to these rights-of-way renders construction more difficult and more objectionable. Moreover, even if some future transmission pipelines could be constructed within this 100 foot right-of-way, the right-of-way would almost certainly not accommodate

all of the transmission lines which future development of the Tar Sands might require.

The responsibility of the Corridor Study Group must therefore include consideration of a corridor route around the present development area in Thickwood Heights. Not only must the adequacy of the existing 100 foot corridor be examined from the standpoint of physical capacity and potential intrusion upon adjacent urban land uses, the alternative of skirting the entire area of development which is already planned must be considered.

In other areas of potential urban expansion which are bisected by the existing pipeline rights-of-way, but not yet developed for urban uses, examination of the addition to the existing corridor should be made on the basis of integrating the existing rights-of-way, plus any forseeable expansion, into the plans of development for such areas. The constraint of existing development does not affect the corridor location decision in such areas, but the prospect of future development and its relationship to the proposed corridor will require detailed study. As with the case of Thickwood Heights, the possibility of skirting presently undeveloped areas of future expansion should also be considered.

Reference to Drawing 2. will indicate some schematic alternatives to expansion of the existing pipeline corridor as they relate to areas of present and future expansion. One alternative in Thickwood Heights is to skirt existing development with the new corridor without bypassing entirely the area of future development.

The adequacy of this solution would depend upon the width of the proposed corridor and its multi-use potential within the area of residential development. Another alternative is the total bypassing of future development areas. The implications of multi-use are discussed in Sub-section 3. below.

2. The Tar Sands Gathering System:

In conjunction with the corridor study, the Department of the Environment has commissioned a consortium to study in a general sense a desirable gathering system for pipelines, and transportation facilities, in the Tar Sands area north of Fort McMurray in which extraction plants will be constructed. Although the results of the gathering system study have not been finalized, it is assumed for the puposes of the corridor study at this time that the gathering system will focus on a terminal located on the west side of the Athabasca River, north of those areas outlined on Drawing 2. as possible future expansion areas. In the event that a different terminal is recommended by the Tar Sands Gathering System Study, modifications to the actual recommendation of the Corridor Study will have to be altered accordingly. Nevertheless, where the corridor is required to pass through or near areas of future urban expansion, similar location principles will apply.

3. The Multi-Use Concept:

The examination of multi-use of the future corridor right-of-way should be examined in the context of the Fort McMurray region from the standpoint of the compatibility

of adjacent urban land uses to the use of the space required for the corridor. Reference to the Thickwood Heights situation, which is similar to many portions of urban Alberta, indicates that the only real use to which the corridor right-of-way may be put is as a recreational open space of limited utility which can only function as a major walkway. Its limited width precludes any intensive recreational use of the space and minimizes its impact as a passive green space within the urban environment. Additionally, the fact that the pipeline alignment was determined in advance of, and independently of, the open-space system of the residential area through which it passes, minimizes the likelihood that the right-of-way could serve any pedestrian circulation function within the residential subdivision.

Assuming that a generous width of the proposed pipeline corridor is adopted, the corridor becomes in an urban, or suburban, setting such as Fort McMurray's expansion areas, a wide tract of land which must be kept free of intensive development. To the extent that such a right-of-way, which could vary in width between 250 and 500 feet, can be integrated in some meaningful way with the planned system of open spaces within a neighborhood, it could emerge as a positive element in the planning of expansion areas through which the corridor must pass. In the event that such a green belt was necessary, the corridor should be so located as to create on each side of the corridor areas which are viable for the creation of logical housing groupings and, groupings which are capable of economical municipal servicing. Additionally, where possible, the corridor should pass through the planned school

and park site for whatever neighborhoods it must cross. Although the corridor itself must remain free of structures, the possibility of using corridor space for playgrounds, outdoor skating rinks and playfields represents a compatible combination of corridor and neighborhood land use requirements.

In cases where the topography, watercourse crossings and similar geographic constraints permit, it would be logical to locate the pipeline corridor around the periphery of future areas of expansion. In cases where this is feasible, urban expansion may take place up to the right-of-way without the constraint of an internally located pipeline corridor. A pipeline corridor located around the perimeter of a residential expansion area would, in the cases of most potential expansion areas around Fort McMurray, present an unusual opportunity to create a wide green space at the edge of residential areas separating those residential areas from the ravines and watercourses which actually define the expansion areas. The corridor space could be used for active or passive recreation and, in so doing, act as a green belt in the real sense of the term. The feasibility of such total bypasses will, however, be limited not only by the region's topography but also by the necessity of maintaining a relatively straight alignment for the corridor itself.

C. Recommendations - Fort McMurray Region

1. A pipeline corridor location which traverses areas of future urban expansion should be avoided wherever possible. The objective should be to bypass those areas

which have been determined as future urban growth areas.

2. In Thickwood Heights, and any other areas where urban development surrounds the present pipeline rights-of-way, a new corridor for future pipelines should be established which, according to recommendation one above, should bypass future development areas.

3. In cases where external geographic constraints make it necessary for the pipeline corridor to traverse areas of future urban expansion, the corridor right-of-way should be so located as to form a functional component of the open-space system of the area through which it passes. Special consideration of such uses as school playgrounds, recreational areas, walkways and bikeways should be a factor in locating the corridor. Additionally, the corridor should be so located that it does not create fragments of developable land upon which logical development groupings cannot be constructed.

II. THE WILDERNESS REGION

A. The Settlement Pattern

1. The Geographic Setting:

The wilderness region which is generally outlined on Drawing 1. as that area lying between Fort McMurray and Wandering River may be characterized in terms of its human settlement pattern as being largely uninhabited. It is generally forested and void of significant economic activities and the pipeline corridor location constraints generated by this region will relate primarily to such physical geographical features as the natural drainage pattern and the general topography of the region.

The principal features of the settlement pattern of the region include those communities located along the two major transportation facilities, Provincial Highway #63 and the Northern Alberta Railway, and those communities inhabited by natives of the area.

2. Highway Service Communities:

Two small settlements have been generated by the service demands of Highway #63 within the wilderness region. These settlements, Wandering River and Marianna Lake, owe their existence to the Highway and provide basic convenience services to users of that Highway in the form of service stations, restaurants and overnight accommodation. The quality of the services provided may be characterized as typically frontier

and would indicate that the economic viability of these services is marginal.

The community of Wandering River consists of a combined service station and restaurant, a small motel with approximately six units, a small school and a scattering of homes of varying description. A bulk oil service facility that was originally included in the service station operation is apparently no longer in use. The prospect of future expansion of these facilities is directly related to the amount of traffic using Highway #63 which is, in turn, directly related to the growth of Fort McMurray. Wandering River is conveniently located as a rest stop for travellers on Highway #63 and increases in traffic on the Highway should contribute to the viability of its modest service function.

Marianna Lake consists of a campsite near which is located a very basic combined service station and restaurant. One permanent cabin houses the operator of the service station and his family, and the staff is housed in temporary quarters which, at the time of survey, consisted of a one room dwelling and a tent. A site is presently available at Marianna Lake for lease as a motel site but, to date, no development proposals have been received. Although Marianna Lake is not as conveniently located as a rest stop as is Wandering River by virtue of its proximity to Fort McMurray, future increases in traffic on Highway #63 should contribute to the viability of this service center.

3. Native and Railway Settlements:

A second type of small settlement found in the wilderness region is the railway oriented community which characterizes the settlement pattern along the Northern Alberta Railway from Fort McMurray to Lac La Biche. These communities also manifest a high percentage of native and Metis population, and their economic bases may be characterized as being dependent upon intermittent employment on the railway, part time trapping and government welfare.

Only four settlements along the railway in the wilderness region warrant mention by virtue of their relative size. Anzac and Imperial Mills are served by roads which connect these communities to the Provincial Highway network, while Conkin and Chard are totally dependent for access upon the railway. There appears to be no prospect of any of these communities experiencing substantial growth in the foreseeable future due to the nature of the settlements and the absence of economically useful resources in their vicinity.

Other settlements located along the railway consist only of intermitently located trappers' cabins, often in groupings of two or three, and a few dwelling units occupied by regular railway personnel. The presence of these trappers' cabins would indicate that perhaps the most important basic economic activity exclusive of the railway is trapping and, to the extent that any significant concentration of trap lines in any

particular area may be observed, it might be regarded as a location constraint for the pipeline corridor.

The extent to which any of these settlements might be regarded as pipeline location constraints will depend upon their degree of permanence and the disruption that might accrue as a result of pipeline construction. Many of the smaller settlements which are inhabited only by trappers on an intermittent basis would not emerge as corridor location constraints. However, those communities, in particular the four mentioned above, will likely remain permanent settlements for the foreseeable future and should therefore be bypassed by any corridor in their vicinity. Since the growth of these communities does not appear likely, the bypass distance of the corridor could be relatively flexible.

An additional aspect to consider in locating a pipeline corridor adjacent to such communities is the potential social disruption that would be caused, albeit over a short period, by the movement of itinerant construction crews through such areas. These communities, dependent on welfare to a large degree and characterized by a highly unstable social structure, would perhaps suffer more permanent damage from exposure to itinerant construction crews than would more stable communities.

B. Specific Corridor Considerations

1. Orientation of Corridor:

The relatively wide separation of the three major lineal features of the wilderness region toward which

the future corridor might be oriented will force the Study Group to make a definite choice between the present pipeline right-of-way, Highway #63 or the Northern Alberta Railway. From the standpoint of human settlements, the railway features the most intensive pattern of settlement and the parallelling of the railway by the proposed pipeline corridor would therefore probably result in the highest degree of disruption of the settlement pattern. Highway #63 is less intensively developed and the existing pipeline right-of-way, as it passes through the wilderness region, is virtually unrelated to the human settlement pattern.

2. Settlement Bypasses:

In the event that the proposed pipeline corridor is required to pass near an existing settlement, it will be necessary to bypass such settlements in order to minimize physical and social disruption and minimize land acquisition costs. The bypass should, wherever possible, bypass the settlement in such a manner that it does not restrict foreseeable growth of that settlement and does not inhibit whatever relationship is enjoyed by that settlement with the transportation facility adjacent to which it lies.

In the case of settlements along Highway #63, a corridor bypass should allow for foreseeable expansion of the existing service facilities to ensure that sufficient area is reserved for development of a viable combination of service facilities and related accommodation. Two alternative bypass methods would be available, depending upon the detailed

requirements of particular sites. The corridor could bypass the settlement on the same side of the Highway as the settlement, in which case careful study of future space requirements of the settlement should be undertaken. Alternatively, the corridor could be located on the opposite side of the Highway and would probably represent no development constraint to the service function of the settlement.

A similar approach should be adopted for communities lying adjacent to the N.A.R.. In view of the unpredictable nature of growth of such communities, it would be preferable to bypass these communities where necessary upon the opposite side of the railway from the majority of the developed portion of the settlement. Such a location, however, would have to be evaluated in terms of the potential multiple use it might generate, and the extent to which it might restrict use or expansion of the railway in the direction of the corridor.

3. Multiple Use Potential:

In view of the relatively uninhabited nature of the wilderness region, the question of multiple use of the corridor relates largely to those multiple transportation uses which could be made of a corridor. The combination of a highway and pipeline corridor, or a railway and pipeline corridor are obvious examples. The major consideration in evaluating multiple use in this region should be based upon the esthetics of combining such facilities, since the spatial constraints affecting corridor location are virtually non-existent.

The esthetic considerations should include an evaluation of the desirability of creating, in an area which is naturally forested, a cleared strip of land for pipelines and whatever other transportation facilities such as highways or power lines might be included. In the event that such combinations appear to be desirable or feasible in certain locations, consideration should be given to the creation of lineal buffer strips between different components of the corridor which would be left in their natural forested state.

Additionally, insofar as the possible combination of a highway right-of-way in proximity to a major power line, consideration should be given to the esthetic impact of an overhead power transmission line near, or in sight of, a major highway. In cases where it is necessary that these two facilities run parallel to one another, the buffer strip concept may result in a satisfactory resolution of the esthetic problem.

C. Recommendations - Wilderness Region

1. From the standpoint of human settlements, and the potential physical and social disruption relating thereto, a corridor route should be selected which avoids all settlements and, in particular, those located along the Northern Alberta Railway.

2. The pipeline corridor, by itself or in combination with other transportation components, should be designed in the wilderness region in such a manner that broad strips of the natural forest are not removed. The creation of lineal strips of natural forestation within the corridor should be a design criterion for the corridor within this region.

III. THE SETTLED AGRICULTURAL REGION

A. The Settlement Pattern

1. The Geographic Setting:

The area dilineated on Drawing 1. as the settled agricultural region may be characterized as generally flat and cleared land which is settled and used for agricultural purposes. The landscape is not dominated by any major topographical or geographical features which affect the settlement pattern with the exception of such large water bodies as Lac La Biche.

The rural pattern of settlement may generally be characterized as being based entirely upon the economy of private agriculture with an emphasis, along the northern margins of the agricultural area, upon economically marginal farming of a frontier nature. The agricultural pattern, in turn, supports a pattern of towns and villages which provide services to the agricultural population. The economic base of these communities, with some exceptions which will be described below, depends upon the agricultural service function.

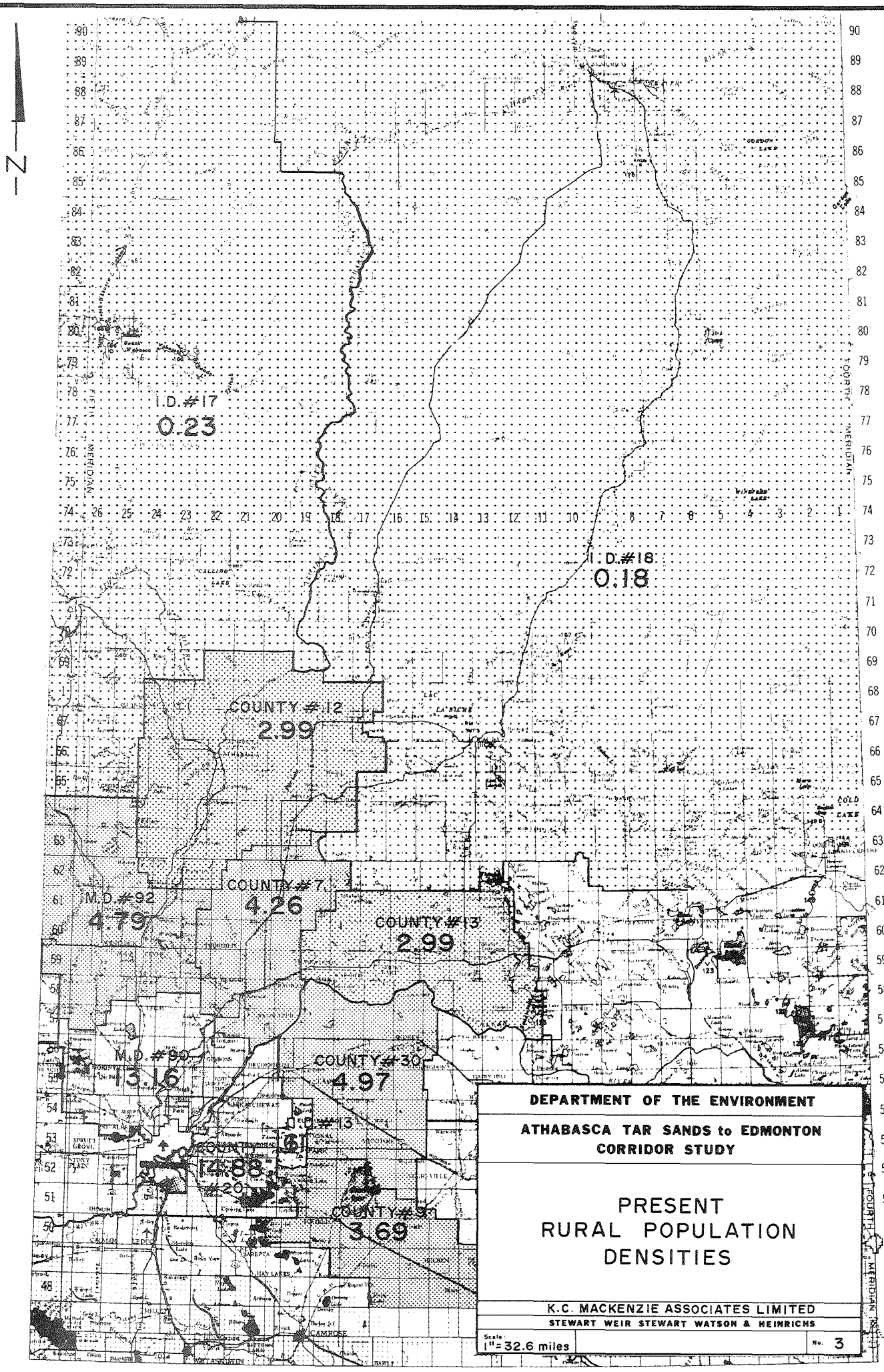
The following paragraphs will discuss in more detail specific aspects of the settlement pattern and will analyze those trends which will affect these settlement patterns over the period of years during which the implementation of a pipeline corridor will likely take place.

2. The Rural Settlement Pattern:

Reference to Drawing 3. will reveal the pattern of rural population densities in the study area. The relative intensity of agricultural activity, and agricultural population, increases from the northern edge of the settled agricultural region in a continuum southward toward Edmonton. Despite the variation in rural population density, the locational constraints exerted by the agricultural settlement pattern upon the corridor will be very similar throughout the region. The basic unit of subdivision in the region is the quarter section although many farming operations cover two or more quarter sections. Larger farms, of course, tend to be found in the less intensively developed and less productive agricultural areas. A typical pattern of rural agricultural settlement is indicated on Drawing 4. and the location of farm buildings within the pattern of subdivision does emerge as a possible factor affecting corridor location. This will be discussed in more detail under Specific Corridor Considerations.

In order to determine the extent to which farming operations might represent a corridor location constraint, some rural population density projections were undertaken. In general terms, a major trend in rural depopulation is evident in the province of Alberta and, to the extent that this phenomonon is a feature of agricultural portions of the study area, it would become a factor in choosing a corridor route.

The projections made for rural population density herein



DEPARTMENT OF THE ENVIRONMENT

ATHABASCA TAR SANDS to EDMONTON CORRIDOR STUDY

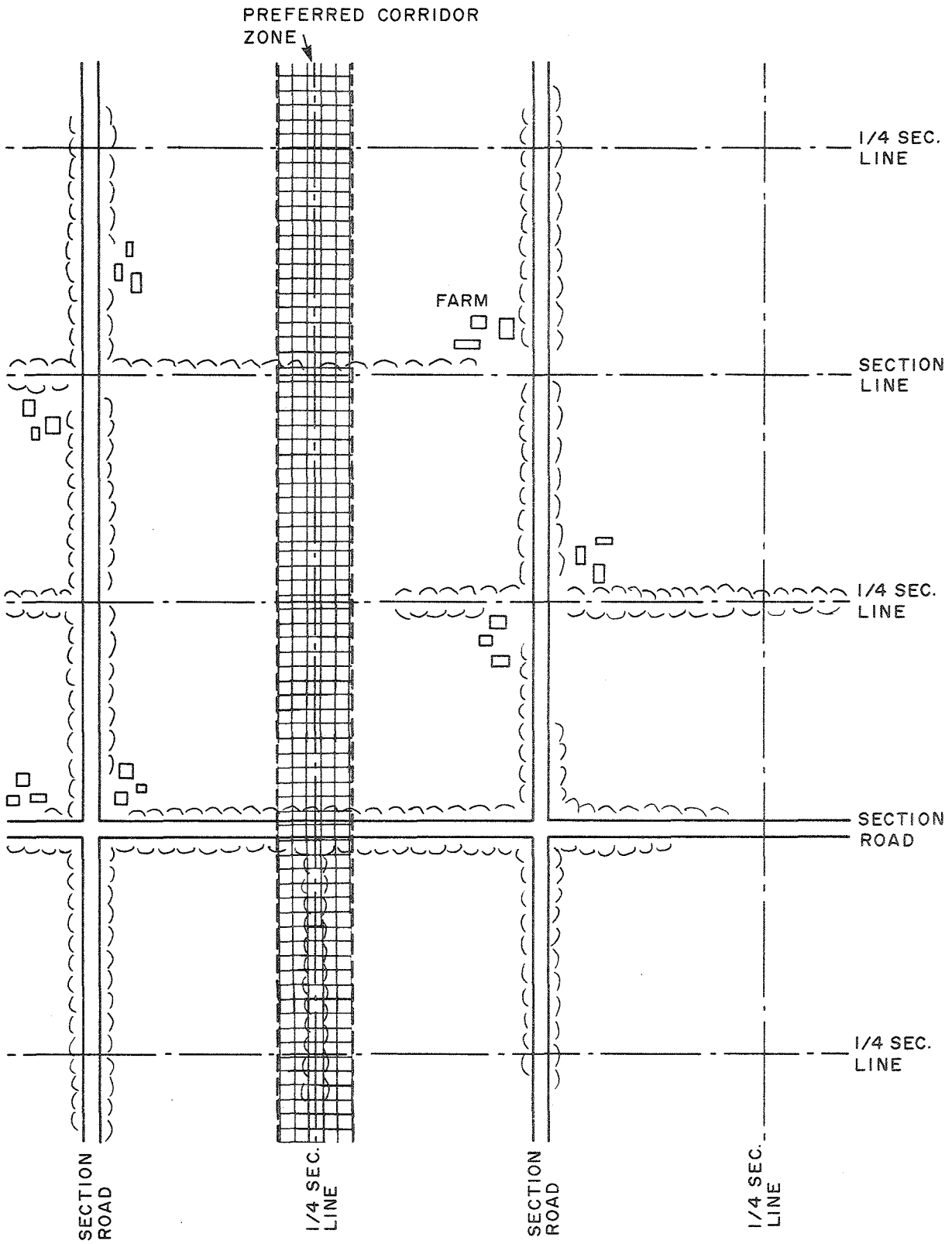
PRESENT RURAL POPULATION DENSITIES

K.C. MACKENZIE ASSOCIATES LIMITED

STEWART WEIR STEWART WATSON & HEINRICHS

Scale 1" = 32.6 miles

No. 3



K.C. Mackenzie Associates Limited

SUBJECT: TYPICAL RURAL PATTERN OF SETTLED AGRICULTURAL REGION

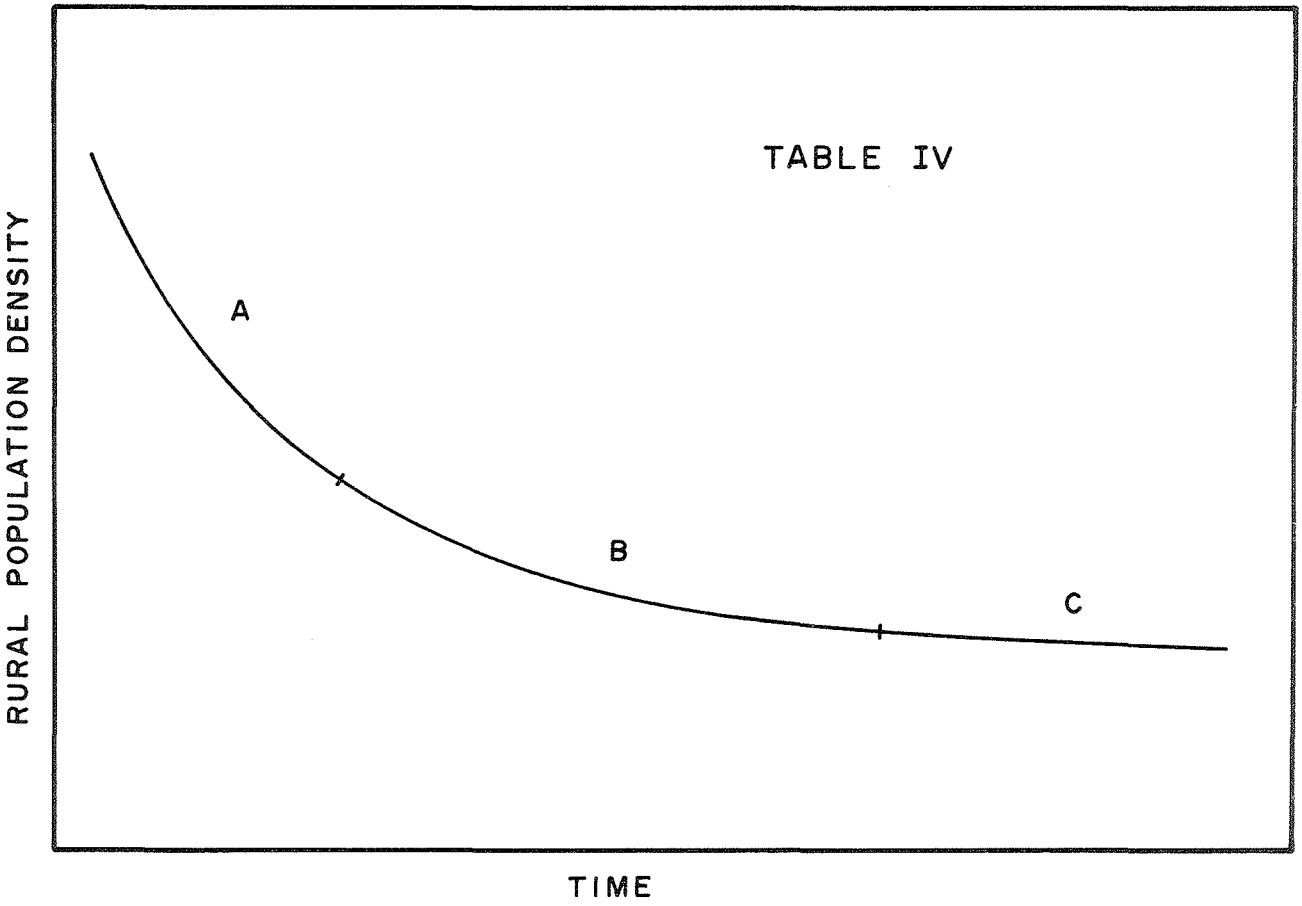
DATE:	SCALE:	DWN. BY:	DWG. No.	FILE No.
SEPT/73	N.T.S.	J.G.	4	

are based upon census subdivisions and are the result of a linear process. The adoption of such a process is necessitated by the fact that alternative processes would be very difficult to apply under the circumstances. The fact that only pronounced changes in population density are significant within the context of this study means that the determination of trends, rather than actual finite densities, is most important. Moreover, the fact that the declines projected are subject to certain limitations further modifies the result of the linear process.

Two major factors which will tend to limit the decline in rural population include the following: Firstly, a certain minimum number of persons are required, under a given state of agricultural technology, to carry out agricultural operations. Agricultural land, therefore, will always sustain and require a certain level of population. Secondly, we assume that a certain number of people would, within the context of the urban life style alternative, prefer the rural way of life.

It is therefore assumed that a rural depopulation trend will take the form of that which is graphically illustrated on Table IV. and, that any decline in rural population, no matter how pronounced it may be at the outset, can be expected to level off at a certain equilibrium level. It is this equilibrium level which a strictly linear process of population projection would not establish and which is adopted herein as a limitation on that linear process.

The rural population densitites projected to the years 1980 and 1990 by this linear process are outlined on



A. Pronounced decline in rural population density.

B. Leveling off as balance between those who wish to stay and those who emmigrate is approached.

C. Equilibrium is reached at minimum population necessary to work land available plus population which prefers rural way of life.

K.E. Mackenzie Associates Limited				
SUBJECT: RURAL DEPOPULATION TREND				
DATE: SEPT/73	SCALE: nil	DWN. BY: J.G.	TABLE No. IV	FILE No.

Table V. and the densities shown thereon may be related to the present rural population density pattern indicated on Drawing 3.. The general trend is one of pronounced rural population decline with the exception of those rural municipalities lying near the City of Edmonton. These exceptions, the Municipal District of Sturgeon and the County of Strathcona, feature a significant amount of country acreage residential development which dramatically increases the population densities of these otherwise rural municipalities. Population statistics for the M.D. of Sturgeon were complicated by the fact that a significant amount of population was lost from the municipality by virtue of annexation of densely populated areas to neighboring urban municipalities. Estimates were therefore made for increases in rural population by extrapolation of the trend which was evident from analysis of trends in the County of Strathcona.

Population projected for the Elk Island Improvement District #13 according to the linear process proved to be unrealistic in that population densitites became negative within the projection period. Since this district is not similar in terms of its agricultural settlement pattern and population pattern to any other areas, we assume that its population density will remain similar to its present level. Population within this district depends largely upon the number of resident staff required to maintain and operate the national park.

The linear projections outlined on Table V. are therefore assumed to be low. The significance of these

TABLE V

PROJECTED RURAL POPULATION DENSITY

IN PERSONS PER SQUARE MILE

Census Subdivision	Rural Population Density Projected to:	
	1980	1990
Athabasca County #12	2.50	1.91
Beaver County #9	2.21	1.66
Lamont County #30	3.27	1.36
Smoky Lake County #13	2.07	1.05
Strathcona County #20	17.11	19.57
Thorhild County #7	3.32	2.26
Sturgeon Municipal District #90	18.00**	23.00**
Westlock Municipal District #92	4.16	3.45
Elk Island Improvement District #13	*	*
Improvement District #17	0.16	0.09
Improvement District #18	0.16	0.14

* Projections become negative

** Estimates

projections is that a decline in population of significant magnitude can be anticipated for rural portions of the settled agricultural region. The conclusion which may be drawn from these declines in relation to the corridor study is that they constitute an advantage in terms of corridor location. As rural population declines, the establishment of a pipeline corridor through the agricultural portion of the region would result in less social and physical disruption.

3. Urban Settlements:

The general pattern of urban settlements within the region is one of agricultural service centers which are oriented to one or more components of the regional transportation network. Although all settlements, including hamlets, villages and towns will represent significant constraints on corridor location, only those settlements with a 1971 population in excess of three hundred are analyzed in detail. To the extent that a growing urban settlement represents a greater constraint on pipeline location, it is assumed that urban settlements with a 1971 population below 300 do not have the potential to serve as future nuclei for growth. In fact, it will be observed from the following analyses that many settlements with a 1971 population in excess of 300 are projected to lose population in the foreseeable future.

In order to determine the growth potential for urban settlements, a combination of two methods was used to obtain an insight into the future of these settlements. The settlements considered are listed on Table VI. and include settlements in both the settled agricultural

TABLE VI

ATHABASCA CORRIDOR URBAN SETTLEMENTS DATA MATRIX

SOURCES: Alberta Bureau of Statistics and Department of Municipal Affairs

SETTLEMENT / VARIABLE	1971 Population	Potential Growth Index Number	Provincial Planning Branch Projected Population (1981)	Average Annual Growth Rate (1966 - 1971)	Net Migration (1966 - 1971) in person/year (Annual Average)	AGE STRUCTURE: 0 - 15 Years	AGE STRUCTURE: Child-bearing Age	AGE STRUCTURE: 45 Years and Up	Retail Sales Trend	% of Labour Force Employed Full-time	NUMBER OF EMPLOYEES IN: Wholesale Storage	Retail Sales	Auto Sales/Service	Personal Services	Health and Welfare	Education	Government	CENTRAL SERVICE TOTAL	Manufacturing	Construction	TOTAL MANUFACTURING/CONSTRUCTION	Service to Business	Finance, Insurance Real Estate	BUSINESS SERVICE TOTAL	TRANSPORTATION, COMMUNICATION, UTILITIES	RESOURCES: Arable Land	Livestock	Mixed Farming	Potential/Productive Forest	Commercial Fishing	Recreation	Coal	Gas	Oil	Minerals	Primary Highway	Railway	Commercial Airfield	Scheduled Airline Stop
SETTLED AGRICULTURAL REGION																																						
Andrew	466	-7.4	357	-2.2%	-10.8	17%	18%	49%	DOWN	15.2%	28	11	1	5	0	25	4	54	6	0	6	5	9	14	2	✓	✓				✓	✓	✓			✓	✓		
Athabasca	1,765	30.9	2,119	2.8%	43.6	30%	36%	35%	STABLE	30.3%	34	62	28	16	87	84	101	412	13	52	65	1	23	24	34	✓	✓	✓	✓		✓		✓			✓	✓		
Boyle	460	2.1	540	1.0%	6.4	26%	35%	41%	UP	23.3%	7	18	9	6	33	21	3	97	1	0	1	0	6	6	3	✓	✓	✓	✓		✓		✓			✓	✓		
Lac La Biche	1,791	23.0	2,348	4.0%	51.4	40%	41%	20%	DOWN	26.4%	7	53	35	29	96	101	96	417	0	13	13	1	14	15	28	✓	✓		✓	✓	✓		✓			✓	✓	✓	
Lamont	889	2.9	1,058	1.6%	13.0	19%	32%	39%	UP	21.1%	20	8	4	17	87	33	7	176	3	0	3	0	7	7	2	✓	✓	✓								✓	✓		
Smoky Lake	881	8.9	1,020	0.2%	3.4	21%	28%	42%	UP	22.6%	8	15	30	9	38	35	18	153	26	2	28	0	6	6	12	✓	✓		✓							✓	✓		
Thorhild	509	1.7	668	3.7%	16.0	25%	32%	40%	UP	18.5%	12	4	21	1	0	38	7	83	0	0	0	1	10	11	0	✓	✓	✓				✓	✓				✓		
Vilna	303	-11.0	234	-2.4%	-7.6	13%	23%	60%	DOWN	18.1%	5	12	6	2	14	26	2	67	0	0	0	1	5	6	0	✓	✓		✓							✓	✓		
Willingdon	325	-10.8	201	-4.5%	-18	19%	19%	30%	UP	18.1%	5	7	1	0	24	16	0	53	0	1	1	0	4	4	1	✓	✓	✓								✓	✓		
REGION OF METROPOLITAN INFLUENCE																																						
Bruderheim	350	-1.7	425	4.1%	10.8	31%	36%	30%	DOWN	6.0%	2	3	5	0	0	5	0	15	5	0	5	0	1	1	0	✓	✓		✓			✓		✓	✓	✓	✓		
Redwater	1,287	21.0	1,579	4.7%	46.8	33%	40%	28%	UP	15.9%	37	18	3	9	0	27	14	78	11	42	53	2	16	18	56	✓	✓						✓		✓	✓	✓		

region and the region of metropolitan influence. This Table indicates not only the populations which are projected for these settlements, and their potential growth indeces, but describes in statistical form the age structure and employment structure of the communities' populations, and outlines in general form the resources of the settlements that might contribute to future growth.

In the case of each settlement, two calculations were made to indicate growth potential. Firstly a linear population projection was undertaken and the results are subject to the usual limitations of these projections. Secondly, for purposes of comparison, an Index of Potential Growth was devised to include consideration of some of the more important factors which will affect the growth of settlements.

The linear population projections were based upon the Provincial Planning Branch's formula as follows.

Let P1 be the 1951 population
Let P2 be the 1956 population
Let P3 be the 1961 population
Let P4 be the 1966 population
and P5 be the projected 1971 population

Let X be the long term (5 year) average = $\frac{P4 - P1}{3}$

and Y be the more recent (5 year) average = P4 - P3.

Then $P5 = P4 + \frac{(X + Y)}{2}$

$= P4 + (\frac{P4 - P1}{3} + P4 - P3)\ \frac{1}{2}$

$= P4 + \frac{4P4 - 3P3 - P1}{6}$

The potential growth index consists of a calculation, resulting in a unitless number, which indicates each settlement's growth potential in relation to the other settlements studied. Basic data was assembled under the items suggested as growth variables which are listed in the data matrix outlined on Table VI.. The variables were chosen on the basis of their significance as indicators of urban growth potential and on the basis of the availability of relevant data. The variables included provide a sufficiently complete picture of each settlement's economic base and population trends to establish which communities should be regarded as growth centers to be avoided in considering corridor location.

In determining the potential growth index, each variable was weighted according to its subjectively assessed significance as an indicator of urban growth potential. The weighted factors thus obtained were totalled for each settlement to yield a potential growth index number which is indicated on Table VI.. This index number is employed, in the following consideration of individual settlements, to modify in a subjective manner the population projections calculated according to the linear process.

As an example of the determination of the potential growth index a calculation is shown on Table VII. for a hypothetical settlement. It should be emphasized that the result obtained from the potential growth index calculation is purely subjective and is relevant only as a means of comparison with other settlements within the study area.

TABLE VII

CALCULATION OF POTENTIAL GROWTH INDEX

FOR HYPOTHETICAL SETTLEMENT

	Variable	Raw Data	Weighting Factor (Hypothetical)		Factor Score
1.	Presence of Commercial Airport	0 - 1 airport	x 5	=	0 - 5
2.	0/0 child-bearing population	0 - 100% 0/0	x .1	=	0 - 10
3.	Diversidication of Industry	0 - 4 types of industry	x 3	=	0 - 12
	Total for hypothetical settlement				0 - 27
					Potential Growth Index

Urban settlements within the settled agricultural region are described in relation to the data matrix on Table VI. below in the order of their present magnitude of population. The location of these settlements is shown on Drawing 1..

a. Lac La Biche: The 1981 population projected by the linear process indicates a population increase of 557 to a population of 2,348. The Town also has a high potential growth index which would indicate, in relation to other settlements in the area, that it would have some expectation of reaching its projected population. However, there appears to be little evidence to justify the expectation that the economic base of the community will be substantially expanded,and the fact that the community presently has a very high birth rate might mean that when the present baby boom reaches the age of employment, a significant out-migration might be expected if no increase in employment opportunities takes place. In view of the uncertainty of the expansion of employment opportunities, it would be realistic to expect a somewhat more modest increase in population by 1981 than is indicated by the linear projection.

b. Athabasca: A 1981 population of 2,119 is predicted according to the linear projection and the Town manifests the highest potential growth index number of the settlements considered. This results from a healthy past growth rate and net migration, a relatively even age-sex distribution, and a fairly high degree of diversification in its economic base. This Town would appear to possess the best opportunity

of achieving its projected population increase by 1981 and should be regarded, like Lac La Biche, as a potential growth center.

c. Smoky Lake: The 1981 population is projected to become 1,020 by the linear process and the more modest potential growth index number suggests that the Town has some prospect of achieving this increase in population. Manufacturing plays a large role in employment and the economic base is reasonably diversified. It is noteworthy, however, that the age-sex structure of the community is not well balanced with approximately 25% of the population being over 70 years of age. It would appear that the Town could expect a modest rate of population increase.

d. Lamont: The 1981 population is projected to become 1,058 by the linear process. The potential growth index number, however, indicates relatively little potential for growth. The Town is almost exclusively an agricultural service center and shows a higher than average proportion of persons 45 years of age and over, and deaths have exceeded births between 1966 and 1971. This would suggest that any foreseeable population increase would be modest.

e. Thorhild: The 1981 population is projected to become 668 by the linear process and the potential growth index number does not indicate a substantial amount of growth potential. The population is also older than average and the death rate exceeds the birth rate. It is, and shall probably remain, a reasonably

viable agricultural service center but its expansion prospects are not significant.

f. Boyle: The population projected to 1980 is 540 according to the linear process and the potential growth index number does not suggest this community has significant growth potential. Although it serves as an agricultural service center, its location with respect to the Highway network and the railway would suggest it has somewhat more potential than other agricultural service centers. We predict that, to the extent that any of the communities below 1,000 population in the settled agricultural region will benefit from the processes of centralization in rail service, grain collection, and education, Boyle would be the urban settlement most likely to experience growth.

g. Andrew: The projected 1981 population of 357 represents a significant decline from the Town's present population of 466. This decline is characteristic of small service centers on the Canadian prairies. The Town has a high percentage of persons over 45 with more than 15% over 70 years of age. Out-migration over the 5 years prior to 1971 has averaged 11 persons annually which is the second highest rate of out-migration of the settlements studied. Retail sales have a downward trend and the economic base is not diversified, although there is some employment in manufacturing. The potential growth index number is negative and would appear to substantiate the projected decline in population.

h. Willingdon: This community is similarly projected to lose population. It is an agricultural service center with a present population of 325 and this is projected to decline to 201 by 1981. This is substantiated by the potential growth index number which is negative. Over 20% of the population is over the age of 70.

i. Vilna: A population decline is also predicted by the linear projection and by the potential growth index number. The present population of 303 is anticipated to become 234 by 1981. Like Willingdon, it is an agricultural service center with a disproportionately large segment of the population over the age of 70. Like Willingdon, a pronounced decline in population is probable.

The foregoing descriptions of various settlements within the region indicate that relatively little urban growth may be anticipated around these settlements and, that in most cases, no growth or a decline in population is probable. This is characteristic of such settlements in the province as a whole and relates directly in many cases to the rural depopulation trend discussed previously. In fact, a further decline in population of those settlements which are already projected to decline may be expected when it is considered that many communities which are presently merely maintaining their population level are doing so by replacing younger persons, who have migrated to large centers, with retiring farmers who have given up their farms in the surrounding area. This retirement trend, which has contributed to the decline in rural population densities, has also tended to increase at an abnormal rate, the large proportions of older

people which characterize the population of Alberta's agricultural service centers.

Another factor which may accentuate the decline in population of these settlements is the fact that, in 1975, the moratorium now in effect on railway abandonment will expire and it is probable that some settlements in the region will lose their rail service, a significant component in their economic base.

For those communities which do manifest some growth potential, the absence of any foreseeable addition to their economic bases suggests that any expansion in their populations will depend upon expansion of their transportation functions, centralization of grain handling and educational facilities, and in-migration from surrounding agricultural areas. The implications of this growth potential are discussed below under specific corridor considerations as they relate to urban settlements.

B. Specific Corridor Considerations

1. Rural Areas:

A typical pattern of rural settlement within the region is outlined on Drawing 4.. The universal pattern of subdivision in these areas is the quarter section and the most repetitive feature is the roads which are constructed along section lines in a grid pattern throughout the region. The groupings of agricultural buildings or farmsteads on each farm constitute the major pipeline corridor location constraint within agricultural areas. The disruptive impact, and the actual cost of corridor acquisition, will be minimized

to the extent that the corridor avoids alignments which necessitate the removal of actively used farmsteads.

In order to determine the path of least resistance for a pipeline corridor a series of three sample surveys was undertaken to determine the frequency of farmsteads located with respect to the basic components in the settlement pattern - lines of subdivision and portions of the roadway grid. Three sample areas were selected within the settled agricultural region one mile in width and ten miles in length. Within the one mile width, four possible pipeline corridor locations were tested with an assumed corridor width of 500 feet. These locations were: immediately adjacent to roadway or highway; straddling a section line with no road; staddling a quarter section line; and, exactly between quarter section lines.

The results of this sample survey are tabulated on Table VIII. entitled Rural Location Alternatives. It will be observed that the greatest frequency of farmsteads occurs adjacent to highways or roadways and the next most frequent location is adjacent to section lines. A dramatic diminuition of the frequency of occurence of farmsteads is evident along quarter section lines or between quarter section lines. It is therefore concluded that a pipeline corridor location in an alignment along or between quarter section lines would result in the least disruption or relocation of existing farm buildings.

An additional consideration in optimizing corridor alignment arises if it is necessary to include overhead power or telephone lines within the corridor at certain

TABLE VIII

RURAL LOCATION ALTERNATIVES

Length of Sample Distance - 10 Miles

Assumed Corridor Width - 500 Feet

	Number of Buildings Encountered if Corridor Located			
	Adjacent to Highway or Roadway	Straddling Section Line	Straddling Quarter Section Line	Between Quarter Section Lines
Sample 1	10	6	2	2
Sample 2	13	3	3	0
Sample 3	12	13	1	2
TOTAL	35	22	6	4

locations. It has been determined in the farm resident survey conducted by Stewart, Weir, Stewart, Watson & Heinrichs that farmers object to power poles being installed across land which is being cultivated. These poles make for inefficient cultivation patterns and represent an inconvenience to the farmer. In the event that it is necessary to include overhead power or telephone lines within the corridor, it would be logical to place such lines at the edge of cultivated areas along existing lineal features such as quarter section lines, wind breaks or roadways.

An additional factor to be considered in selecting a corridor route relates to the desirability of retaining existing rows of trees along quarter section lines and section lines as wind breaks. The farm resident survey also revealed a strong preference on the part of farmers to retain existing tree cover where possible as a wind break to prevent wind erosion. Finally, one further factor which should be considered is the desirability of maximizing whatever economic benefit might accrue to farmers to the selling of a portion of their land for pipeline corridor purposes. In the event that a quarter section line becomes a logical feature to which the corridor is oriented, the benefits of acquisition could be broadened if the pipeline corridor straddled a quarter section line, rather than running on one or other side of the quarter section line. Although this will tend to increase the number of owners who must initially be dealt with, it will spread the economic benefit accruing to acquisition among more farmers.

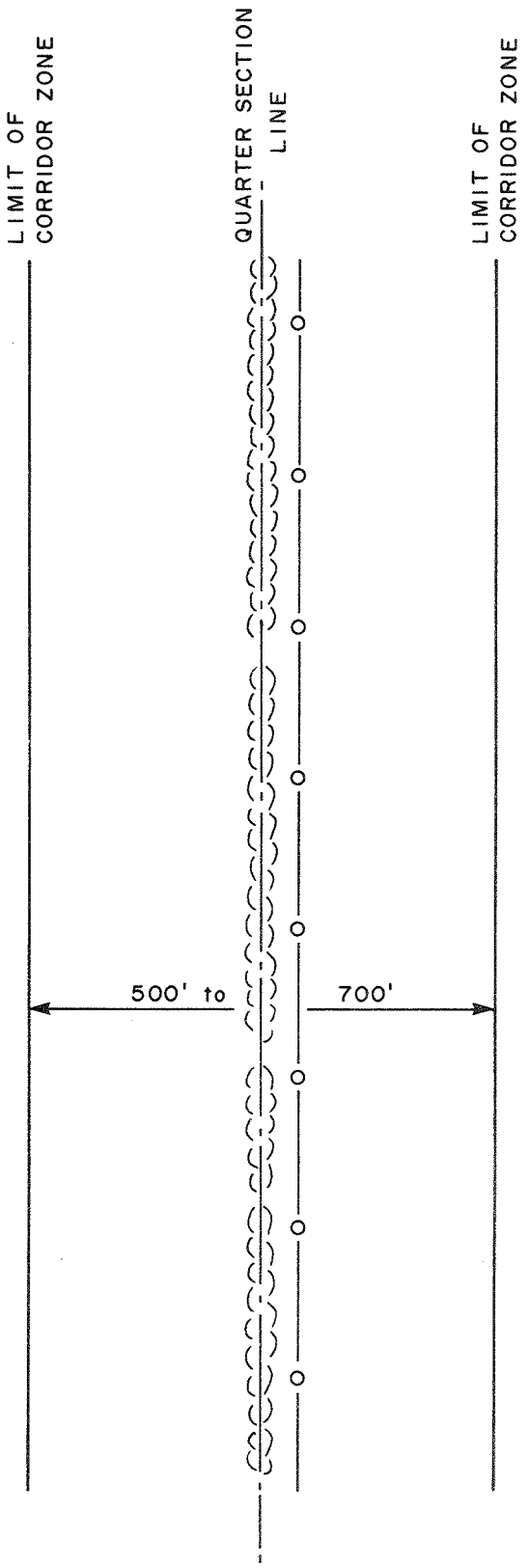
The composite effect of these location factors is schematically indicated on Drawing 5. where a proposed pipeline corridor straddles an existing quarter section line. The wind break created by existing trees is retained, power lines if required lie adjacent to the quarter section line, and the existing trees are preserved as a wind break a safe distance from the power lines.

2. Urban Settlements:

All urban settlements, whether hamlets, villages or towns, are assumed to be significant pipeline corridor location constraints. The physical and social disruption devolving from the placement of a pipeline corridor through such settlements, and the costs of land acquisition, render these settlements significant location constraints. In addition to existing built up areas, a further constraint upon pipeline corridor location is urban growth which can be foreseen or anticipated to any extent.

In determining the nature of this constraint, the growth prospects of settlements within the study area were considered and, within the settled agricultural region, the communities of Athabasca, Lac La Biche, Boyle, Thorhild, Smoky Lake, Andrew and Lamont were selected as communities that had any foreseeable potential for growth.

The pipeline corridor located within the expansion area of a community could represent a significant constraint to that community's growth. In the cases, therefore, of urban settlements with any prospect of growth it becomes desirable to establish zones of protection



LEGEND

EXISTING WIND BREAK

—o— OVERHEAD POWER OR TELEPHONE LINES

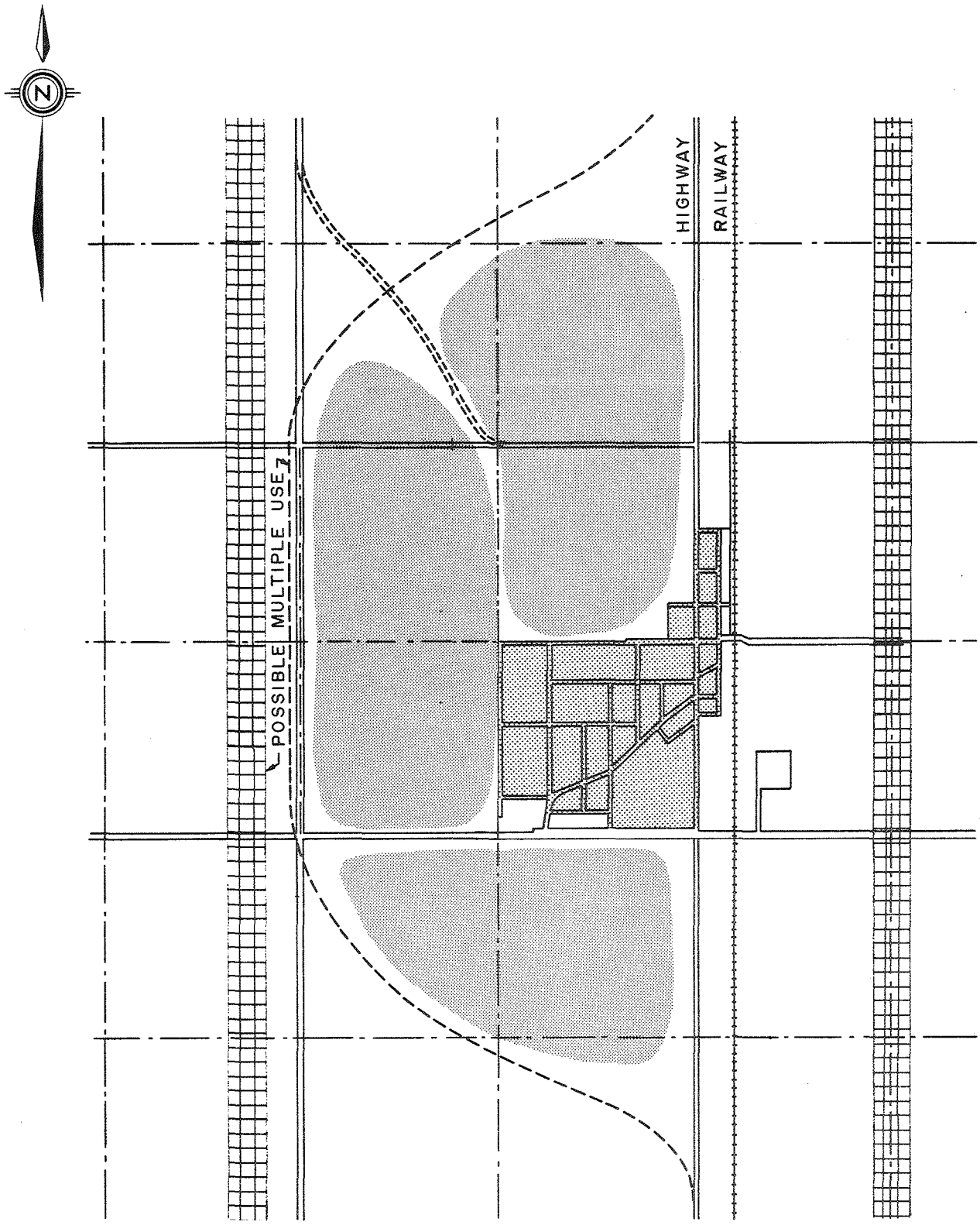
K.E. Mackenzie Associates Limited

SUBJECT: TYPICAL RURAL SECTION OF PIPELINE CORRIDOR

DATE:	SCALE:	DWN. BY:	DWG. No.	FILE No.
SEPT/73	N.T.S.	J.G.	5	

near settlements with growth potential inside of which a pipeline corridor route should not be considered. In determining the magnitude of this protection zone or bypass area, the nature of future growth must be considered. Since the growth prospects of settlements in the region are modest at best, the necessary corridor bypass areas would not need to be large in area. However, in providing space for future growth, the amount of area set aside should be based upon the creation of space in which logical growth units could be developed. The standard unit of growth in urban areas is the neighborhood unit, a school-centered unit which can vary from 150 to 400 acres in area and 2,000 to 6,000 in population. Even if the foreseeable growth prospects of most settlements in the region do not include enough population for one neighborhood unit, it would still be sensible to allow space for the development of such units if any space at all is to be set aside.

Reference to Drawing 6. will reveal in diagramatic form the implications of pipeline corridor location and space for future growth. The diagram represents an existing built up area adjacent to a highway and railway. Development is confined to one side of both of these transportation facilities and it is therefore assumed that the settlement's direction of growth is away from the highway and railway, contiguous to the existing built up area. Potential units of expansion covering areas in which neighborhoods could be developed are indicated and it is beyond these expansion areas that a pipeline corridor should be located. It will also be noted in the schematic example rendered that a highway bypass of the community, which would also encompass



LEGEND

- BUILT-UP AREA
- POTENTIAL UNITS OF EXPANSION (NEIGHBORHOOD UNITS)
- POSSIBLE CORRIDOR ROUTES
- ====== REROUTED SECTION ROAD
- – – – POSSIBLE HIGHWAY BYPASS

K.E. Mackenzie Associates Limited

SUBJECT: TYPICAL TOWN AND CORRIDOR BY-PASS CONSIDERATIONS

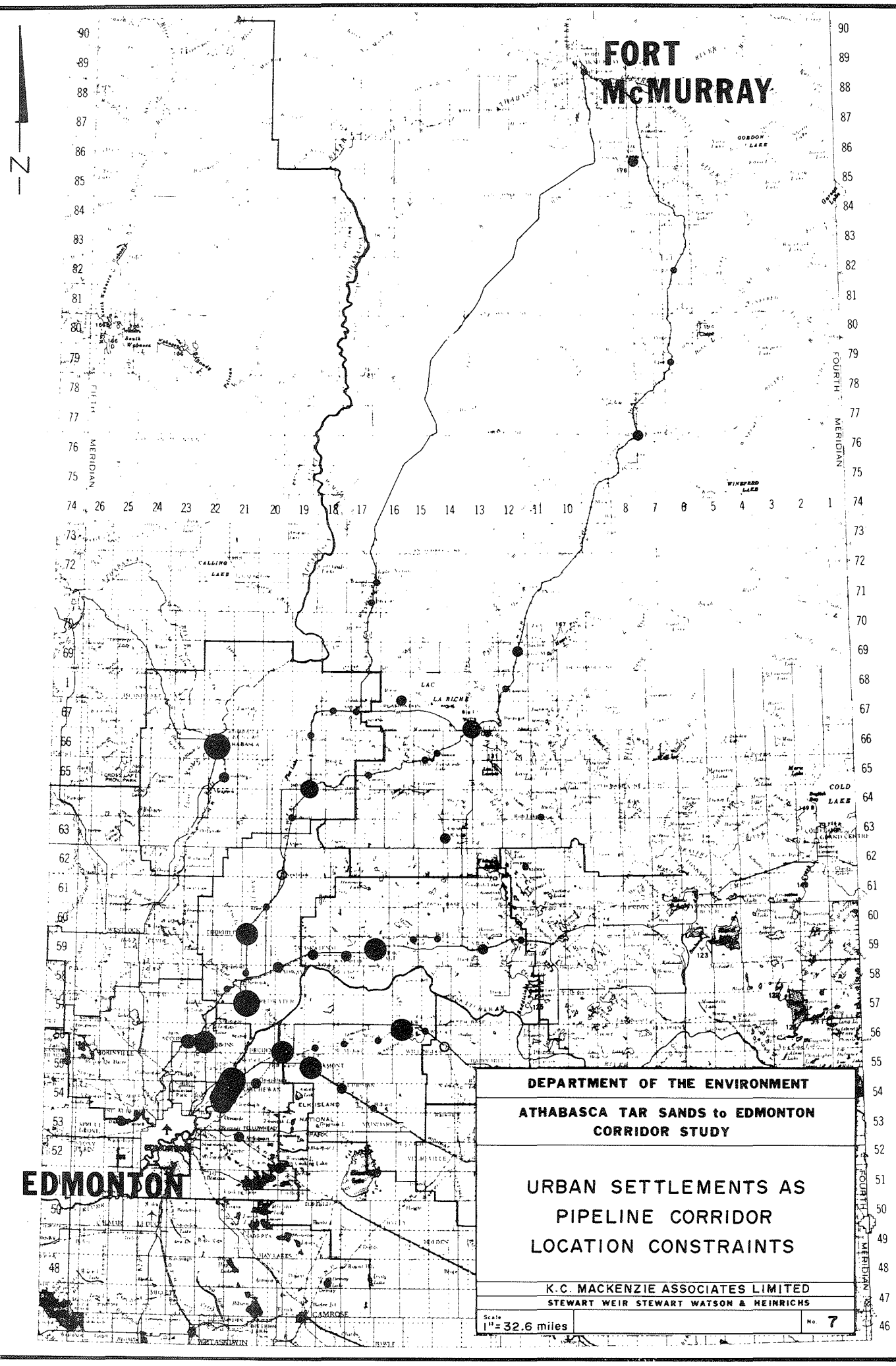
DATE:	SCALE:	DWN. BY:	DWG. No.	FILE No.
SEPT/73	N.T.S.	J.G.	6	

future expansion areas based on neighborhood units, could, in terms of its right-of-way requirement, be combined over a portion of its distance with one of the possible corridor routes.

Bypass distances for urban settlements within the settled agricultural region are therefore suggested and the magnitude of these bypass distances is described below.

a.	For settlements less than 100 population	$\frac{1}{2}$ mile radius
b.	Settlements between 100 and 300 population	1 mile radius
c.	Settlements over 300 population but declining	1 mile radius
d.	Settlements over 300 population and not declining	$1\frac{1}{2}$ mile radius

The geographic effect of the bypass distances suggested is illustrated on Drawing 7.. Although these bypass distances do not represent absolute locational constraints for a pipeline corridor, they do represent desirable distances that should be left between communities of differing standards and the pipeline corridor for the purposes of establishing generalized corridor route alternatives. At such time as one generalized route is selected, specific communities near the proposed corridor could be examined in more detail as to their most probable directions and magnitudes of growth. Upon more detailed examination of specific settlements in relation to the proposed corridor, adjustments in the suggested bypass distances could certainly be made. Table IX. lists all settlements within the study area and the suggested bypass distance relating thereto.



DEPARTMENT OF THE ENVIRONMENT

ATHABASCA TAR SANDS to EDMONTON CORRIDOR STUDY

URBAN SETTLEMENTS AS PIPELINE CORRIDOR LOCATION CONSTRAINTS

K.C. MACKENZIE ASSOCIATES LIMITED

STEWART WEIR STEWART WATSON & HEINRICHS

Scale 1" = 32.6 miles

No. 7

TABLE IX

URBAN SETTLEMENT BYPASS DISTANCES

Radius ½ Mile

Abee
Atmore
Bellis
Breynat
Caslan
Chard
Donatville
Edward
Egremont
Ellscott
Grassland
Hilliard
Hylo
McRae
Opal
Quigley
Rich Lake
Spedden
St. Michael
Star
Tweekie
Venice
Wandering River
Whitford
Wostok

Radius 1 Mile

Anzac
Ardrossan
Chipman
Colinton
Conklin
Imperial Mills
Josephburg
Kikino
Newbrook
North Cooking Lake
Plamondon
Radway
Vilna
Warspite
Waskatenau

Radius 1½ Miles

Andrew
Athabasca
Bon Accord
Boyle
Bruderheim
Fort Saskatchewan
Gibbons
Lac La Biche
Lamont
Redwater
Smoky Lake
Thorhild

3. The Multi-Use Concept:

The results of the farm resident survey suggest that, in rural areas, no urban forms of use should be contemplated in conjunction with the pipeline corridor where it traverses agricultural land. The most basic form of multiple use of the actual pipeline corridor space relates to its agricultural potential once pipelines have been installed. It is therefore assumed that throughout the agricultural area, the pipeline corridor would remain, under a lease or similar instrument, as agricultural land for the use of the abutting farm owner.

In cases where the pipeline corridor bypasses an urban settlement with any prospect of growth, the possibility should be examined of placing the pipeline corridor in an alignment that would encourage such multiple use as a highway which might also be required in future to bypass the settlement. This concept is illustrated on Drawing 6. which was discussed previously. An additional use of the pipeline corridor in such instances would be as a green belt defining a settlement's future expansion area and ultimate form. The rate of growth of most communities in the settled agricultural region, however, will tend to postpone the likelihood of this possibility arising within the near future.

C. Recommendations - Settled Agricultural Region

1. In this region, the generalized pipeline corridor route or route alternatives should be selected on the basis of avoiding all existing urban settlements

and their suggested bypass areas.

2. In rural areas, pipeline corridor locations adjacent to, or straddling, quarter section lines should be considered to minimize dislocation and acquisition cost, and to preserve effecient units of cultivation.

3. In instances where the pipeline corridor passes near an existing urban settlement such multiple uses of the right-of-way for transportation and green belt purposes should be examined.

IV. THE REGION OF METROPOLITAN INFLUENCE

A. The Settlement Pattern

1. The Geographic Setting:

This region is characterized by a terrain very similar to that of the settled agricultural area with the exception of the presence of the valley of the North Saskatchewan River as a major topographic feature. Otherwise, the pattern of rural settlement and development is very similar to that of the region previously discussed. The major differentiating factor in this region relates to its proximity to the City of Edmonton and the influence which will be exerted by the City of Edmonton upon surrounding urban settlements by virtue of that proximity.

2. Minor Settlements:

Four relatively small settlements lie within the region of metropolitan influence which could emerge as pipeline corridor location constraints. These include Bon Accord, Gibbons, Redwater and Bruderheim. Of these, Bruderheim and Redwater were subjected to the same analysis as settlements within the settled agricultural region and the results of this analysis appear on Table VI.. Bon Accord and Gibbons, on the other hand, were regarded as settlements whose future growth would not be related in any meaningful sense to their present economic and demographic composition.

a. Redwater: The projected 1981 population is 1,579 by the linear process, and a relatively high potential growth index number suggests this is a reaonable prospect for population increase by virtue of the

Town's economy and population characteristics. Past rates of growth have been high and employment is high as a result of the proximity of the nearby Imperial Oil Plant and industries located in Fort Saskatchewan. Redwater also manifests a relatively high birth rate, and it has high levels of employment in transportation, communication, manufacturing and construction which would suggest a diversified economic base. Additionally, it can expect some growth pressure by virtue of its proximity to Edmonton.

b. Bruderheim: A 1981 population of 425 is calculated by the linear process, an increase of approximately 75 over its present population. It is noteworthy that the potential growth index number is negative but, since this index does not take into account the Town's dormitory function within the metropolitan area, it really indicates that the Town would probably not grow by virtue of its own economic base. Bruderheim serves as a dormitory community for workers in the industries in both Fort Saskatchewan and Redwater and, to a small extent, the City of Edmonton. Its central-place functions are declining like most other small agricultural service centers but the Town's growth can be expected to result from the expansion of its dormitory function to serve industries within the region. As a dormitory community, the Town's growth potential is somewhat volatile and difficult to predict.

c. Bon Accord: This settlement is expected to have a population of approximately 1,000 by 1981 according to the Edmonton Regional Planning Commission. Although no specific projections of population were possible, this prediction is apparently based on development plans which are known for the Town.

d. Gibbons: This Town has a more established central-place function than Bon Accord but, by virtue of the unpredictability of the expansion of its dormitory function, its growth cannot accurately be foreseen. The E.R.P.C. suggests a 1981 population of 3,300. The fact, however, that Gibbons is a well established Town with a broad range of established services could cause it to become a nucleus for more substantial growth as the metropolitan Edmonton region develops.

3. The Town of Fort Saskatchewan:

The Town of Fort Saskatchewan is regarded as a special case within the region by virtue of its size and future growth prospects. Its location within the region is indicated on Drawing 8. in relation to the City of Edmonton and the previously discussed settlements.

The Town possesses a reasonably well balanced economic base which includes petrochemical industries, the provincial correctional institute and an established retail core with a broad range of outlets and services. The Town is now experiencing a significant growth in its population like many other towns in the vicinity of Edmonton and significant expansion proposals are

20′ 15′ 10′ 05′ 113°

Tp.58

Tp.57

Tp.56

Tp.55

Tp.54

Tp.53

Tp.52

REDWATER

GIBBONS

FORT SASKATCHEWAN

SHERWOOD PARK

CITY OF EDMONTON

N.E. EDMONTON

EDGE OF METROPOLITAN AREA

Val Soucy

Fedorah

Eastgate

Coronado

Fifteenth Base Line

Amelia

New Lunnon

Scotford

Duagh

Lamoureux

Josephburg

Simmons

Riverbend

Grisbach

Partridge Hill

Oliver

St. Paul Junction

Akenside

Clover Bar

Bremner

Ardrossan

Lambton Park

Salisbury Corner

Whitecroft

N.A.R.

C.N.R.

C.P.R.

SASKATCHEWAN RIVER

LEGEND

DEVELOPED URBAN AREAS

AREAS PROPOSED FOR URBAN EXPANSION

CORRIDOR BY-PASS ZONES

EXISTING PIPELINES

CORRIDOR LOCATION CONSTRAINTS METROPOLITAN REGION

DWG. No. 8

Rg. 23 Rg. 22 Rg. 21

underway or in the course of preparation.

A population of 13,000 is predicted by the E.R.P.C. by 1981 which represents a spectacular increase from the 1971 population of 5,726. It is significant, however, from the standpoint of the proposed pipeline corridor that virtually all of the proposed residential expansion of the Town will take place directly south of the existing built up area. To the extent that the built up area already represents a major constraint to any pipeline corridor located in a north-south alignment, the expansion area would appear to lie largely within an area that would not be affected by a pipeline corridor.

Reference to Drawing 8. will indicate that the proposed area of future expansion approaches an existing pipeline corridor which lies in a northeast to southwest alignment. This present corridor represents a potential constraint to future expansion but, were it to be combined with a major corridor, could become an impermeable limitation on the Town's future growth.

Highway #55, in its north-south alignment, represents the western edge of the Town's proposed expansion area. To the extent that this Highway could be regarded as a boundary of development, the area west of the Highway might be considered as a potential corridor route.

B. Specific Corridor Considerations

1. Miscellaneous Factors:

Reference to Drawing 8. will reveal certain other factors which will affect the location of a pipeline corridor within the metropolitan Edmonton area.

The rural pattern of settlement in agricultural areas is essentially the same as that which was discussed for the settled agricultural region. Drawing 8. reveals the pattern of farmstead location with respect to the grid of rural section roads and the recommendations made in respect of rural portions of the settled agricultural region would also be applicable in this region.

Drawing 8. also reveals a scattering of hamlets such as Ardrossan, Josephburg and Opal which are historically nothing more than grain collection points adjacent to railways which serve surrounding agricultural areas. Although the prospect of these centers serving as nuclei for expanded settlements is remote, the settlements as they exist do represent a location constraint for the pipeline corridor.

Another settlement phenomenon which occurs to some degree within that portion of the metropolitan area which is the subject of this study is acreage subdivisions. Although relatively few such subdivisions have been developed in the northeast sector of the metropolitan region, they do represent fixed constraints for pipeline corridor location. An example of such a subdivision is that which has been developed immediately north of Ardrossan, adjacent to Highway #16.

Drawing 8. also reveals the haphazard network of existing pipelines which traverse the metropolitan portion of the study area. It should be noted that very few of these pipelines have been located with respect to any other lineal feature or transportation facility. An exception to this is the pipeline which

lies parallel to and north of Highway #16. This pipeline is separated from the adjacent Highway by a number of farmsteads and, it will be noted, lies so close to the Highway that interchanges developed along the Highway must be constructed over the pipeline.

2. Settlement Bypass Distances:

Urban Settlements within the region of metropolitan influence are more likely to experience unforeseen growth by virtue of their proximity to the City of Edmonton. The concept of bypass distances which was applied to settlements within the settled agricultural region may be applied somewhat differently within the region of metropolitan influence.

Reference to Drawing 8. will indicate the suggested corridor bypass zones which were determined according to the same standards applied in the settled agricultural region. However, since the overall pipeline location constraints which will affect corridor location near metropolitan Edmonton tend to restrict the number of alternative locations available, these bypass distances should be regarded as being desirable, but flexible. If it is necessary to place the pipeline corridor within these zones, special study should be given to the effect such a corridor would have upon a particular community's growth, and the manner in which the corridor right-of-way could be integrated into the land use pattern of the settlement. The corridor bypass zones should therefore be regarded as special study areas rather than fixed pipeline location constraints.

3. Multiple Use Potential:

The relative intensity of development within the metropolitan area demands that special attention be given to the possibility of multiple-use of the pipeline corridor right-of-way. Although the merits of placing a pipeline corridor adjacent to a developed roadway, highway or railway is highly questionable in view of the amount of derivitive development adjacent to such facilities, there may be specific instances where the corridor may be combined with existing transportation facilities.

Perhaps the most promising multiple-use possibility within the region is the use of the pipeline corridor as a green belt and highway bypass route around such settlements as Fort Saskatchewan and Redwater. At such time as expansion plans for these communities are finalized, the area of expansion could become well defined and fixed by a pipeline corridor located around the periphery in conjunction with a bypassing highway ring road. Another potential application of this concept would be the use of a pipeline corridor right-of-way as a buffer area between incompatible land uses such as heavy and light industry, or industry and residential.

A further possible multiple-use of the pipeline corridor in the metropolitan area is as a recreational facility, accommodating active or passive recreational activities. Special study of this potential should be undertaken where the corridor intersects or runs adjacent to such natural topographic features as valleys and ravines

which themselves possess recreational potential.

C. Recommendations - Metropolitan Influence Region

1. Existing built up settlement areas should be regarded as absolute pipeline location constraints.

2. Expansion areas for urban settlements in this region, such as Fort Saskatchewan's expansion area, which do not constrict pipeline location to any major extent, should be regarded as flexible pipeline location constraints.

3. The multiple-use concept should be examined when specific route alternatives are considered from the standpoint of combining the pipeline corridor with existing transportation facilities and, where possible, using the corridor as a planning tool in shaping the land-use pattern of the settlements in the region, with particular reference to recreational and green belt uses.

V. THE EDMONTON METROPOLITAN REGION

A. The Settlement Pattern

1. The Existing Land Use Pattern:

The Edmonton metropolitan region is, for the purposes of this report, considered to be that area so defined on Drawing 8.. It includes certain developed residential areas which are indicated as developed urban areas on Drawing 8., and includes the concentration of heavy industrial land uses located east of the City of Edmonton in the County of Strathcona, an area commonly referred to as "refinery row". This area is indicated on Drawing 8. by the numerous industrial activities shown thereon in the form of refineries and chemical and cement plants. It will be noted that this industrial complex is the focus of the pipeline network in the region.

2. Areas of Planned Development:

Two areas are indicated on Drawing 8. as areas proposed for urban expansion. These areas are proposed for residential development but they differ in status substantially.

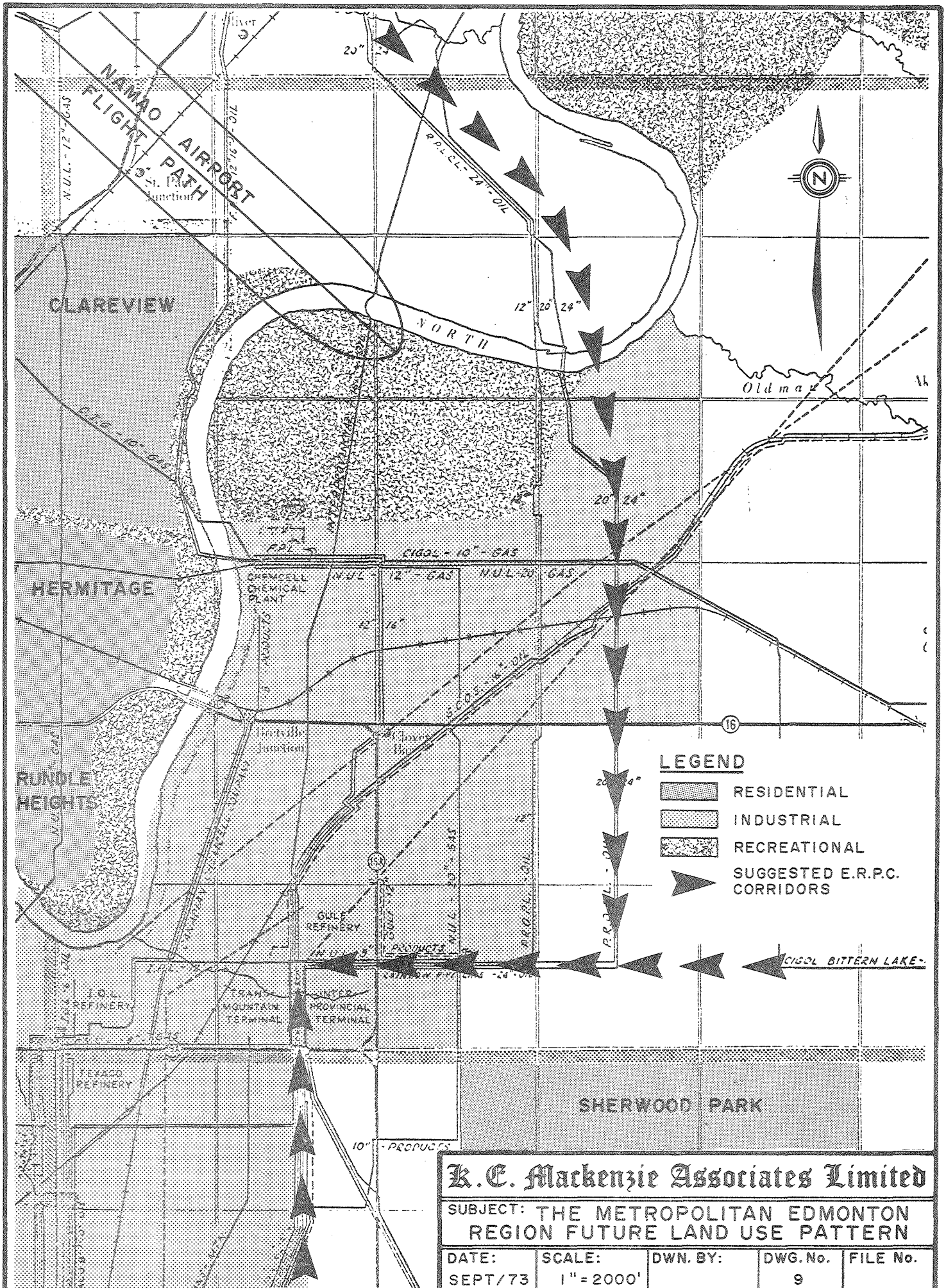
That area indicated as northeast Edmonton has been proposed for residential expansion for many years. It is zoned under the Edmonton Regional Plan - Metropolitan Part for residential use and it is also eligible for residential development under the Edmonton General Plan and the Edmonton Zoning Bylaw. Development will begin in 1973 and the entire area is covered by

approved development plans of significant detail. The area has been planned as a unit and it should therefore be regarded as a fixed constraint upon pipeline corridor location and unavailable for corridor purposes.

The area indicated on Drawing 8. as the future expansion area of Sherwood Park is of a totally different status. The area which encompasses approximately 8.5 square miles is, at this point in time, a proposal for development made by land developers. The area proposed for expansion is classified under the regional plan as low density agriculture and any change that would permit such development would represent a major change in the regional plan. The County of Strathcona has not adopted a policy with respect to this particular proposal. This expansion proposal should not, in view of its present status, be regarded as a fixed constraint for purposes of the pipeline corridor.

3. The Future Land Use Pattern:

The principal influence in shaping the land use pattern of the metropolitan region will be the preliminary Regional Plan - Metropolitan Part. The major land use categories presently proposed by this plan are outlined on Drawing 9. and no distinction is made on Drawing 9. between areas which are zoned for a particular use, or designated as reserve zones. It should be noted that significant portions of the area outlined as industrial land are not presently developed and designated as industrial reserve land. In any event, Drawing 9. should indicate reasonably accurately the future land use pattern in this area.



K. E. Mackenzie Associates Limited

SUBJECT: THE METROPOLITAN EDMONTON REGION FUTURE LAND USE PATTERN

DATE:	SCALE:	DWN. BY:	DWG. No.	FILE No.
SEPT/73	1" = 2000'		9	

Superimposed on Drawing 9. is a pipeline corridor route that was proposed by the Edmonton Regional Planning Commission when it studied the need for pipeline corridors within the metropolitan Edmonton region. Although this route was suggested previous to any significant activity in the Athabasca Tar Sands, it does reveal what might be considered a desirable relationship between such a corridor and the regional land use pattern. It is also significant that the Planning Commission had no specific powers with respect to pipeline location and acted only as an advisory body on these matters.

Drawing 9. also indicates another feature which will shape Edmonton's regional land use pattern. This feature, the flight path for the Namao Airport, represents a constraint upon residential development. Although industrial uses can be considered in the flight path, such an area might also be reserved as a green belt and, as such, become a logical route for a pipeline corridor. The alignment of this flight path, however, would not appear to lend itself for use as a corridor route for the Athabasca pipeline corridor although this will depend upon the corridor route alternatives which emerge from this study.

B. Specific Corridor Considerations

1. The Sherwood Park Proposal:

The uncertain status of the major expansion proposal for the area north of Sherwood Park makes it possible to consider this area as being available for a pipeline corridor right-of-way if necessary. This becomes significant when the future land use pattern of the

area is considered in conjunction with the existing alignments of pipelines in the area with respect to the familiar grid pattern of legal subdivision. The existing pipelines have been installed in an alignment which represented the shortest route for the pipeline companies and little regard was paid to the fragmentation of the pattern of land subdivision. The fragmentation could have been minimized had the corridor concept been applied but the multiplicity of independent diagonal pipeline rights-of-way has resulted in a significantly fragmented pattern of land subdivision, especially in the eastern portion of the future industrial land area of Metropolitan Edmonton.

The alternative to a diagonal alignment for the pipeline corridor is an alignment which follows the direct east-west, or north-south pattern of legal subdivision. A corridor following such an alignment would not create awkward triangular portions of land which will present future problems in the achievement of orderly and efficient development, but will ensure that the large scale grid of unsubdivided land is maintained. Assuming that the corridor would follow the pattern of grid subdivision in one direction or other, the alternatives are reduced to a corridor directly from the pipeline terminal area within the industrial complex to the east or the the north. Reference to Drawing 9. will reveal that either of these alternatives would follow in general fashion the recommended route of the E.R.P.C. as shown on Drawing 9.. The fact that both of these routes traverse that area proposed for expansion of Sherwood Park would mean that the corridor would become a significant constraint upon any development taking place in that area.

A corridor in the Sherwood Park expansion area might render residential development impossible or, alternatively, necessitate that the corridor be integrated into the proposed pattern of development in a meaningful manner.

2. Industrial Land and the Corridor:

Industrial land uses, in particular heavy industrial uses which characterize "refinery row", are not as adversely affected by pipelines as are more intensive uses of urban space. This relates to the fact that heavier industries require large sites with a substantial amount of open-space for buffering and storage purposes. The future pattern of industrial land use should therefore not be regarded as a fixed constraint to pipeline corridor location.

The extent to which industries might benefit from a nearby pipeline corridor is not easy to determine. Although it is customary for pipelines to distribute their product from a terminal, rather than directly from the pipeline, it is possible that some direct connection between a pipeline and an industry could be made. Although it is not anticipated that the pipeline corridor will directly generate industrial land uses adjacent to it, the possibility does exist.

3. Multiple Use Potential:

The multiple use potential of a corridor right-of-way within metropolitan Edmonton is substantial by virtue of the intensity of development within the area. The combination of the pipeline corridor with existing

or proposed transportation routes, in particular major roadways, is one obvious form of multi-use. Other multiple use possibilities lie in the use of the pipeline corridor as a buffer or green belt between different land uses, or between transportation facilities and adjacent residential land uses.

The compatibility of major roadways running parallel to and in the same right-of-way with pipeline corridors will depend entirely upon the width of the total right-of-way. The fact that major roadways require, at interchange points, wide areas for the construction of approach roads and turning ramps, means that the total right-of-way must be wide enough to ensure that any portions of the interchange do not cover the pipelines themselves and require, as a result, more elaborate crossings of those pipelines. In the event that a portion of the pipeline corridor is proposed to run adjacent to a major roadway, a total corridor width approaching one-half mile would appear to be required. A corridor of this width could also serve as a buffer between the roadway and adjacent residential development if the necessity exists.

C. Recommendations - Metropolitan Edmonton Region

1. The existing built up urban areas, industrial and residential, and those residential areas for which specific plans have been approved, should be regarded as fixed locational constraints for pipeline corridor purposes.

2. The pipeline corridor should follow direct east-west or north-south alignments throughout the metropolitan

region and the region of metropolitan influence in order to avoid fragmentation of land.

3. In cases where the combination of the pipeline corridor with existing transportation facilities is being considered, the width of the right-of-way should be sufficient to ensure the compatible joint use of the right-of-way by both facilities.

4. The possibility of utilizing the pipeline corridor right-of-way as a green belt or buffer between incompatible land uses or transportation facilities should be considered.

5. In the event that the pipeline corridor is required to traverse an area being proposed for residential development, and the implementation of that residential development is still being contemplated, the corridor right-of-way should be integrated to the maximum degree possible, both functionally and aesthetically, with the proposed pattern of development with emphasis on the use of pipeline corridor space for recreational purposes within the area.

TABLE X

LIST OF SETTLEMENTS IN THE STUDY AREA

ACCORDING TO REGION

Corridor Settlements Listed By Study Area

1. Fort McMurray Region
   a) Fort McMurray - waterways

2. Wilderness Region
   a) Marianna Lake
   b) Wandering River

3. Settled Agricultural Region
   a) Andrew
   b) Athabasca
   c) Boyle
   d) Lac La Biche
   e) Lamont
   f) Smoky Lake
   g) Thorhild
   h) Vilna
   i) Willingdon

4. The Region of Metropolitan Influence
   a) Bon Accord
   b) Bruderheim
   c) Fort Saskatchewan
   d) Gibbons
   e) Redwater

5. Edmonton Metropolitan Region
   a) Edmonton
   b) Sherwood Park
   c) St. Albert

6. Special Settlements - Tar Sands Area
   a) Fort Chipweyan
   b) Fort McKay