FINAL REPORT

SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT FOR THE NORTHERN AIRPORTS INFRASTRUCTURE IMPROVEMENT PROGRAM: SALLUIT

Prepared by
MAKIVIK RESEARCH DEPARTMENT

LPA
société Makivik corporation

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SOCIAL AND ENVIRONMENTAL IMPACT ASSESSMENT FOR THE NORTHERN AIRPORTS INFRASTRUCTURE IMPROVEMENT PROGRAM: SALLUIT

Prepared by:

MAKIVIK RESEARCH DEPARTMENT

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LE SERVICE DE L'ENVIRONNEMENT

MINISTÈRE DES TRANSPORTS

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THE IMPACT ASSESSMENT STUDY:

OVERVIEW, OBJECTIVES AND METHODOLOGY

1. INTRODUCTION

This report presents a summary of the findings and recommendations for Salluit on the social and environmental impact assessment of the Northern Airports Infrastructure Improvement Program. The impact study began on November 25, 1983. The original schedule called for the submission of a final report in the winter of 1984, with construction to begin the following August. As soon as the impact assessment began, it became clear that a major reevaluation of the project was required. By November 29, 1983, the community stated that the first and overwhelming impact of the northern airport program was that the airstrip would be built at the wrong place. The proposed site was poorly located, the airstrip would be difficult to build and it would not significantly improve the safety of flying.

Although Salluit is desperately in need of a new airport infrastructure, the Inuit were being asked to accept a project they knew would not solve their basic problem or provide a long term benefit to the community. It can be easily understood why some individuals were reluctant to take any action that threatened the start of construction, but after a long and serious debate, the Municipal Council was prepared to pass a resolution stating they would not accept the airstrip as proposed by Transport Canada. This decision was widely discussed over the F.M. radio and supported by the community. A delegation was selected and given a mandate to negotiate for an alternative site long favoured by the community.

This decision changed the nature of the impact assessment study and created a need to work very closely with the community for information exchange and animation. The impact assessment study has had to incorporate all of the changes in plans, and to adjust both the schedule and the information required to complete the study. The findings are presented in eight sections and these in turn, have been grouped into five major parts.

Part I provides an overview of the study and methods used. It also reviews the Inuit perception of impact assessment and its role in the north. It concludes with a brief discussion of Inuit opinions about the 1984 Ivujivik project. Part II describes the Northern Airport Infrastructure Improvement Program and the development and present pattern of air service in northern Québec. Part III describes the community and its environment in relationship to the airport program and its expected impact. Part IV presents the justification for the Salluit program reviews the alternative airstrip and, it provides a description of the project plans. Part V states the findings on social and environmental impacts and identifies the proposed corrective measures needed to mitigate the negative impacts.

The information presented in Parts III, IV and V (sections 5 to 8) is organized to conform with the topics suggested in Section 3.2 of Québec Environmental and Social Impact Assessment and Review Procedures North of the 55th Parallel: Guide for Proponents, that was issued by the Kativik Environmental Quality Commission.

1.1 Justification for a New Airstrip

A new airstrip must be built in Salluit because of the dangerous flying conditions that now exist and because of the community's plans for its economic and social development. Salluit is situated on the south coast of Sugluk Inlet approximately 10 kilometers from the open waters of Hudson Strait. Its exact location is at 62°12' north and 75°38' west (Figure 1).

The present population is almost 700, making it the fourth largest settlement in northern Québec. The community plays an active role in the social and economic life of the region, and its size, vitality and geographic location give Salluit a special importance when planning the

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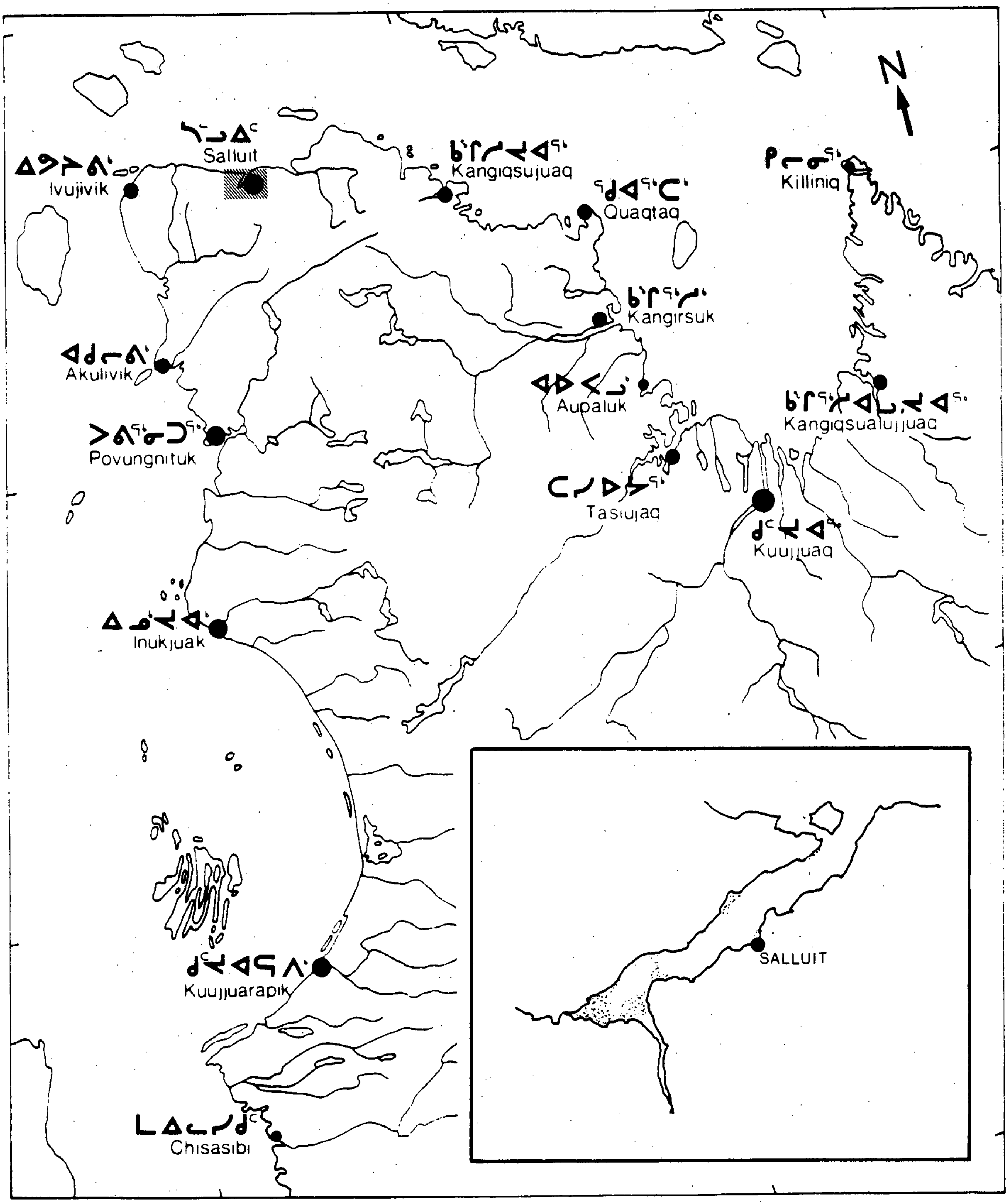
Figure 1 THE LOCATION OF SALLUIT
L'EMPLACEMENT DE SALLUIT



development of a northern Québec air network. Unfortunately, the critical need for improved air transportation is difficult to meet because of the mountainous landscape and irregular surface of the valley.

Pilots and the travelling public consider the airstrip now in use to be the most dangerous one in northern Québec and, perhaps, the most dangerous of any functioning community airstrip in the Northwest Territories. It has an effective length of about 330 meters (1,000 feet) although pilots would argue that they really have about 800 feet to execute landings and take offs. There are high hills on both the east and west sides, and any wind is usually a cross wind, with mechanical turbulance.

The dangerous conditions of the present airstrip, and the urgency to change the situation through the Northern Airports Infrastructure Improvement Program, is intensified by the fact that since 1977 there have been three serious air crashes at Salluit. The community still vividly recalls the fatal crash in the winter of 1977 when a DC-3 attempted to land on the ice strip during bad weather. Four people were killed and it has left a lasting impression on the Inuit. This fatal accident was followed in the winter of 1984 by the crash of a twin engine Aztec, again on the sea ice, and in October of 1984, a Twin Otter of the Hudson Bay Company was badly damaged when landing on the community airstrip.

It is easy, therefore, to understand why the people of Salluit must have a new airstrip that they feel is safe and which will enable them to have adequate service to meet the basic needs and expanding requirements of this growing and active community.

The airstrip now in use is located .8 kilometers south of the community. It was constructed by the Municipality in an attempt to solve the critical air and ground transportation problems that have plagued Salluit since the early 1970's when some form of regular air service

became a possibility. This airstrip is one of three that have been built. A fourth is now proposed for construction beginning in August 1985. The location of these airstrips is illustrated in Figure 2.

The new proposed airport complex, and the two existing airstrips to the south of the community are part of a system that also includes a small landing area at the head of Sugluk Inlet and a winter landing strip that is set out each year on the sea ice (Figure 2). From 1970 until about 1981, the fiord airstrip was used from May to the end of December. Travel to this site required a 12 kilometer trip by canoe or, often by canoe and snowmobile. It was always uncomfortable and often hazardous, especially in the spring and fall. Under normal conditions a one-way trip took about an hour, but trips of four hours were not unusual when using both canoes and snowmobiles, or when the winds, heavy seas and strong tides required long delays.

1.2 The Impact Study

The information and conclusions on environmental and social impacts, and on the identification of appropriate corrective measures, were obtained from a field and library study that began on November 17, 1983. This impact assessment study was originally to be carried out for the airstrip and access road noted as No. 2 on Figure 2. The site for airstrip No. 2 was selected and surveyed by Transport Canada in October, 1983, but it was never considered by the community to be the best location. The Inuit stated that the airstrip and access road would be very difficult to construct, that it could never be 3,500 feet in length, and, most important, they thought that the location would be almost as dangerous as the airstrip now in use.

These concerns of the community were directly stated at the beginning of the impact assessment, and the Inuit requested that both

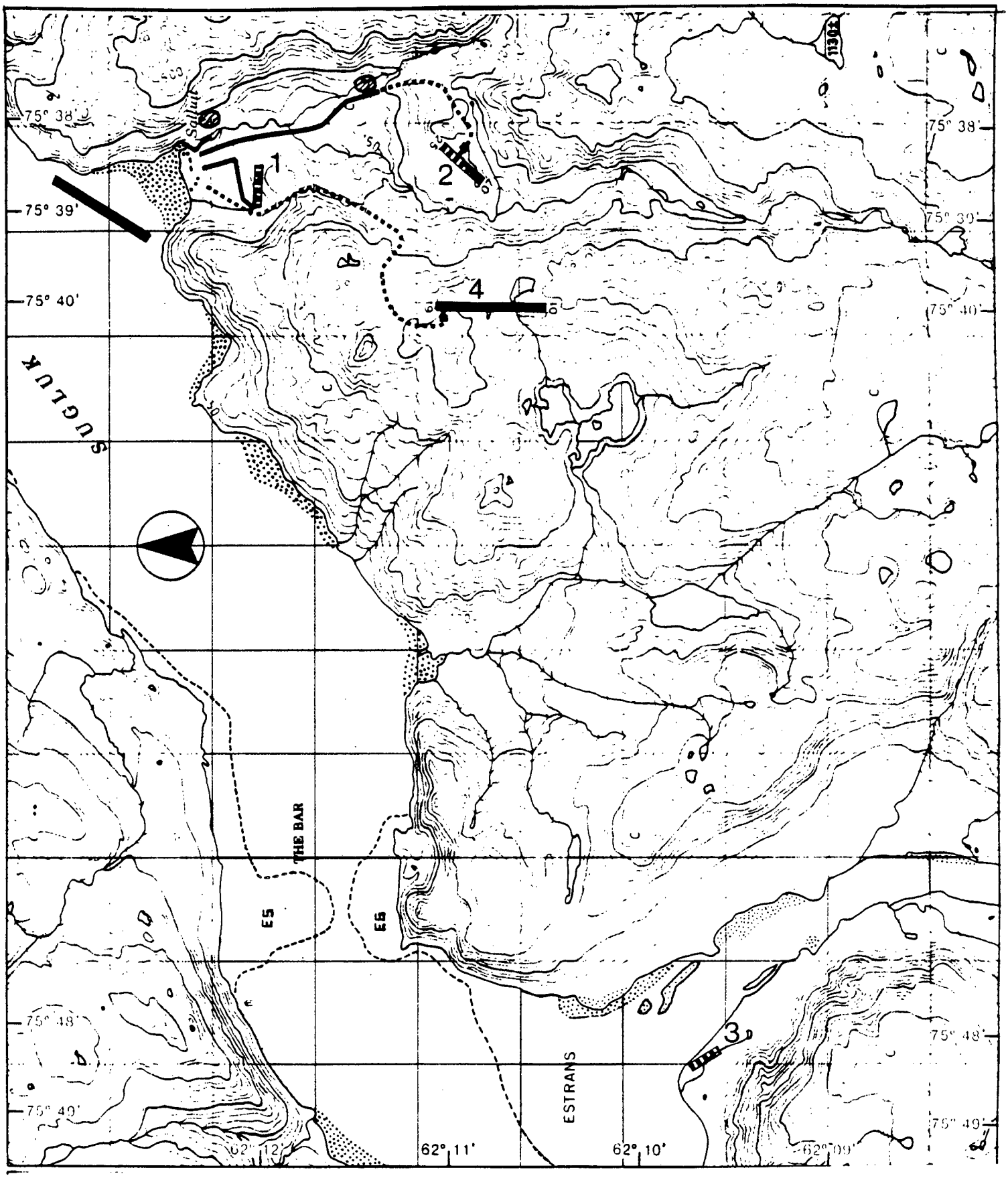


Figure 2
SALLUIT AIRSTRIPS: EXISTING AND PROPOSED

1 Existing Site and Access Road

2 First Proposed Site and Access Road

3 Community Proposed Site and Access Road

4 Fiord Airstrip

Existing Sand and Gravel

Source: Transport Canada Nouveau Québec Master Plan

Transport Québec and Transport Canada be notified about this situation. After a series of meetings was held in Salluit and in Montreal, Transport Canada agreed to investigate a different site that was suggested by the community. This site is identified as No. 4 in Figure 2. The decision of Transport Canada reduced the anxiety felt by most members of the community but it resulted in a one-year postponement of construction, to August 1985.

The airstrip now proposed, and the one which is the subject of this environmental and social impact assessment study will be 1070 meters (3,500 feet) and is situated to the south west on a plateau some 700 feet in elevation. It will be reached by an access road 3.5 kilometers in length.

Because of these changing plans and delays, the impact assessment study required a different approach, and schedule to meet the objectives first described in the terms of reference prepared by Le Services de l'Environnement, ministères des Transports, Gouvernment du Québec. Field work for the first stage of the impact study began on November 17 and ended on December 3, 1983. The second phase of intensive field work was from January 15 to January 25, 1984. The information that was gathered during the two periods of field work was basic to the decision to build at Site No. 4. Contact has been maintained with Salluit throughout this study and all of the recommendations on impacts and corrective measures have been reviewed with the Mayor who in turn, has discussed the findings and recommendations with the Municipal Council and with the community at public meetings.

1.2.1 The Approach For Field Work

Schedule "A" of the Environmental Quality Act requires that a social and environmental impact assessment study be carried out prior to

the construction of all airstrips in the territory north of the 55th parallel. The purpose of impact assessment studies, however, is not always clear to Inuit, especially when these studies involve the evaluation of small scale projects that are perceived to be critical for the well-being and development of the communities and region. This perception is further complicated by the fact that the construction of the airport infrastructure usually takes place in an area that has already been severely disrupted by unplanned community growth.

Inuit do not reject the need for impact assessment prior to the construction of vital community facilities, but they insist that their opinions be reflected in all stages of the assessment process. Consequently, an important objective of this study was to explain the rationale of impact assessment and to discuss its value for protecting the social, economic and bio-physical environment. These explanations were balanced by listening to Inuit views about impact assessment, and how it should be modified in order to incorporate their concerns, knowledge and perceptions. This approach is fundamental if we are to answer a basic northern question of "how shall we plan?".

The particular situation that occured in Salluit, provided a special opportunity for the Inuit to see that impact assessment can be directly beneficial for the community and for resolving important problems. The opinions and concerns that were collected from Ivujivik and presented in Section 3 provides another perspective on impact assessment.

The study described in this report involved Inuit in all phases of impact assessment. The research was designed at the Kangiqsujuaq Research Centre whose personnel also participated in the field research, data analysis and development of the final report. Details of the general principles and research methodology underlying the involvement of Inuit are set out and discussed in Section 2.

The information collected for the study, was obtained from a series of meetings with the Municipal Council and with representatives from the other community organizations. These meetings were supplemented by individual interviews, by discussions on the FM radio and by many informal contacts that were made possible because the researchers were provided with work space in the municipal office building. The information from interviews and group discussions was then integrated with data from the interpretation of aerial photos, from the completion of an archeological potential study and from discussions with outsiders who have particular expertise.

Interviews for the study were non-directed and were not based on a standardized questionnaire or set of specific questions. In this type of procedure, people have the freedom to tell their own story and in doing so, ideas tend to accumulate and points of view emerge. The concerns of one individual can be used to animate discussions with other individuals, and as conclusions become evident these are "taken back" to the population for review and comment. The methodology represented in this approach has been fully discussed in the book, The Discovery of Grounded Theories: strategies for qualitative research, by B.G.Glaser and Anselm L. Strauss.

Specific facts, opinions and points of view were either written into field notebooks or placed on recording tape. The tapes and written comments or data, provide the information for the first person voice which is used throughout this report.

The study was carried out by William Kemp, Souie Gorup and Attasi Pilurtiut. Mr. Juusipi Illimasaut of the Kangirsujuaq Research Center has recently became involved with impact assessment and has played an active role in the impact studies carried out by The Makivik Research Department. A description and analysis of the geomorphology and especially of granular deposits using aerial photographs, was undertaken by Professor Benoît Robitaille of the Department of Geography, Laval University at the

request of the Makivik Research Department. An assessment of the archeological potential was carried out by the consulting firm Aménatech under a subcontract to the Makivik Research Department. The final engineering plans for the project were made available for the impact assessment by Hamel Beaulieu and Associés. The plans were reviewed and discussed in detail during two meetings with Michael Martineau, who is the engineer for the project. (See Annex 1 for a list of personnel).

Throughout this study the Municipal Council of Salluit has been kept informed of the status of the impact assessment study and of the new information that was required to meet changes in project design. Meetings with the Mayor and a representative of the Municipal Council took place on December 14, 1984 and again on January 25, 1985. On February 4, 6, 8, 11, 14 and 15, the community was contacted by telephone to review their copy of the engineering plans and answer specific questions raised by the analysis of these plans. On Frebruary 13, the Municipal Council met to review certain problems raised by the impact study and the entire project was discussed by the community in a public meeting on February 18, 1985.

1.2.2 Shedule of Events

March, 1983	: Mayors select Salluit as first priority.
September 27, 1983	: Signing of comprehensive airstrip agreement.
November 23 to December 1, 1983	: Impact assessment study phase I.
November 29, 1983	: Community rejects proposed airstrip site.
December 4, 1983	: Meeting in Montréal with Transport Canada and Transport Québec to discuss community decision.
January 15 to January 25, 1984	: Impact assessment study phase II.
January 20, 1984	: Transport officials in Salluit to review new site proposal.
January 31, 1985	: Engineering plans on new site presented to Makivik Research.
February 11, 1985	: Impact assessment completed.
February 12 to 15, 1985	: Review of findings with community.

2. INUIT PERCEPTION OF IMPACT ASSESSMENT AND PLANNING

2.1 General Principles of Inuit Involvement

The research methodology applied to impact assessment studies in the north must identify problems and address issues that are relevant to the current conditions and long term needs of Inuit. In order to help accomplish this task, the methods used in the Salluit study are part of a larger program within the Makivik Research Department that is concerned with the use of Inuit knowledge as an essential element in northern research. The program is also commited to the development of Inuit expertise in the design and execution of research, and in the evaluation and application of research findings. This approach can best be accomplished through the creation of a cooperative association between Inuit and southern-trained scientific personnel. Both groups have the capacity to act as teachers rather than lose themselves in endless argument over "who knows best".

The effective participation of Inuit in cooperative research involves five basic principles. First, each group must respect the knowledge of the other. Inuit knowledge is reflected in the vast amount of information that has been acquired over time about the behaviour, patterns, cycles and eccentricities of the biological and physical environment. Such an approach to learning is significantly different from the formal, often very emperical and precisely structured studies that characterize southern science. Second, both groups must also respect the means by which information is collected, organized and arranged in a coherent structure. For Inuit, the nature of this structure may differ considerably from that which characterizes southern scientific thought. Third, the specific information and organized knowledge of both Inuit and southern sicentists is bounded by certain restraints and limitations that must be identified and respected. Cooperative research should act as one important catalyst for creating a new integration between northern and southern frames of reference that is required by the first three principles.

The fourth and fifth principles involve certain political as well as scientific implications if they are to be acted on. Fourth. The quality and accuracy of both northern and southern knowledge need not be evaluated on the degree to which they correspond. At times, the knowledge of one group can provide answers to the questions asked by the other group. At other times, the explanations of both groups may differ significantly yet both explanations can be equally correct in explaining the problem under investigation. Finally, the conflict in knowledge and explanation may be very real. At times, cooperation will allow for a common answer to be found or it may mean that both groups must maintain a separate understanding of the problem and its resolution. The fifth principle applies primarily to the utilization Inuit knowledge. What Inuit know will only assume its rightful place in the larger framework of explanation if the rules that govern the conduct of inquiry and if the hierarchy that controls these rules are modified to accomodate and give equal value to the Inuit way of viewing and understanding the world.

The development and application of these principles to northern research requires time. The impact assessment studies provide an opportunity to develop the process yet another step and, at the same time, to provide the Inuit of northern Québec with a series of community studies that reflect their ideas and concerns about the airstrip program and its impact. Over time a new methodology will emerge and new research associations will be created. As the impact assessment process changes and evolves so will its relevance for the Inuit of northern Québec.

2.2 An Overview of the Inuit Perspective

Social impact assessment in the north can only be effective if it incorporates the perspectives, values and participation of Inuit in each of the four phases that comprise the assessment process. These phases

are: First, establishing the terms of reference for impact assessment studies; second, participating in the planning and execution of these studies, and in the analysis, interpretation and, presentation of findings about impacts and corrective measures; third, maintaining an active membership in the Environmental Quality Commission, and; fourth, exercising a control over decisions that occur during the final stage of project planning and throughout actual construction.

Access to information and decision-making, through the Environmental Quality Commission, is the cornerstone of Inuit involvement in impact assessment. At the present time the Inuit hold three positions on the Commission and, consequently, they have the opportunity to contribute specific knowledge, perspective and values to the deliberations and decisions on the merits and conditions of development projects. Inuit also have the opportunity to participate in the design and execution of research and data analysis for impact assessment studies of the airstrips, through the Makivik Research Department and through the archeological program between Transport Québec and Avataq Cultural Institute.

The most important problem that must be resolved, is how Inuit can participate more effectively in Phases 1 and 4 of the assessment process. Participation in Phase 1 requires that a well-defined procedure be established to assure that Inuit have a continuing voice in determining the content for the terms of reference that must be submitted by project proponents. The need for establishing this role is demonstrated by the fact that Inuit do not feel they are presently able to make any significant contribution towards setting the principles, questions and priorities for impact assessment studies. To this end, the Inuit are adamant in their opinion about what elements in the life of their communities are most important with respect to potential impact from projects. They also cautioned researchers not to try to establish the only value system around which the positive and negative impacts from airstrips or other projects should be evaluated.

Inuit question who controls the assessment procedure; what type of protection impact assessment actually provides for the bio-physical and socio-economic environment of their community and region; why these protections are needed; and how specific impacts are determined and corrective or remedial measures established. In order to answer these questions, appropriate terms of reference must be developed so that they identify problems and address issues that are relavent to the current conditions and long term needs of Inuit.

Such an approach does not mean that southern-based concerns are disregarded, or basic principles of research and analysis ignored. It simply means that the context for identifying and solving problems must be enlarged and the time frame, methods and statement of results made accountable to Inuit. What these questions imply is that the proponent of a development project must be able to interact with Inuit values and points of view in a manner that enables a cross cultural understanding of problems and their solutions to be addressed in the terms of reference of the research and in the recommendations. An excellent model of how Inuit can be included is illustrated by the way in which the archeologists of Transport Québec have worked with Avataq Cultural Institute. Appropriate terms of reference for the archeological surveys required for the airstrip program have been designed; a structure for training Inuit to undertake the research is being put in place; and a means for Inuit to evaluate the findings and implement the recommendations has been established.

Closely tied to the question of social impact assessment is the question of planning and of establishing a better framework for coordinating all of the different decisions that are made on behalf of the community by outsiders who are themselves usually not knowledgeable of one another. Fieldwork on social impact assessment for the northern airstrips has now been carried out in four communities and there is a coalescing of Inuit opinion about their roles and their rights in this process. Ideas first stated at Salluit and Ivujivik were heard again in Povungnituk and

Kangirsuk, and the experiences of Ivujivik are now known by the other communities. In particular, questions are raised about how the Inuit can gain an effective sharing of control over a process that in itself has a potential for negative impact.

The Inuit considered that impacts resulting from the airstrip or other community infrastructure developments are often related to ineffective planning. They questioned why it seemed to take impact assessment for a project to create a concern about planning. The problem as stated by Inuit is that no one is really in control of community planning and thus, every mandate is treated in isolation. They called upon the different organizations that were proposing projects to coordinate their plans and specific requirements prior to coming to the community. It was felt that the municipal councils or other bodies could never make rational decisions since they never knew the full range of issues.

The Inuit felt that certain groups were very naive about the requirements of northern projects and the type of planning that was necessary to make them successful. They also said they felt that some of the people sent to do studies are unaware of how to work in the north, and do not ask the proper questions or seem to understand the issues. These people are said to bother the community and it is felt they can not write strong reports if they are unprepared and do not have the time to understand.

The Inuit stated that, although it may be the mandate of project proponents to identify planning requirements and impact assessment, it is the communities that are penalized when improper studies and poor consultation lead to the failure of a project to meet the criteria necessary for the review process. If a project needed by the community is rejected because of poor planning, or because the people were not able to do a proper study, it is the community that is the big loser.

These concerns are well summarized in the statements that were made in a formal meeting of the Kangirsuk Municipal Council on November 12, 1984.

> You say that you are here to find out how the new airstrip will affect our lives, and we don't know why you bother to ask that question because it should be clear to anyone who knows our problems. But it always seems that people down south know more about our problems than we do because their answers are stronger than ours.
>
> If everybody in all the governments is worried about all that is going on up here in this community, why do they come to us the very last, after everything is done, to ask what we think; does it matter to them anyway if we like something or are against something. You are asking all these questions about a little airstrip, but are people busy asking why all those caribou were killed by one of those projects your people had to have. If we cooperate and tell you what we think or what we worry about, will anybody down south pay attention if they think we should be thinking or worrying about something else?

2.3 Inuit Concern with Ivujivik Project

A better understanding about the meaning of impact assessment, the role of assessment studies, and the responsibilities of the communities, the proponent and the other interest groups, comes about through actual experiences with, and evaluation of, the process. Thus the Inuit wanted to know more about Ivujivik before they started reviewing another community airstrip. The idea was raised and acted upon by Juusipi Illimasaut as a way to increase community knowledge and to animate the upcoming field studies. A three-day trip to Ivujivik has provided important insights about the project in relationship to the assessment study, the post assessment study planning and the actual construction. The following comments are derived from the taped and written notes in Inuktitut that resulted from formal discussion with the Council and other individuals. The notes assembled by Juusipi Illimasaut included a series

of topics that were classified as comments from the Municipal Council; problems voiced by the people of Ivujivik; and problems arising from construction activities.

In Section 1.2.1 of this report the need to incorporate Inuit opinions, knowledge and concerns was stressed. These needs can be written and circulated, but the question is, if they are considered and incorporated into planning and decision making. The comments recorded at Ivujivik indicate that there are stpes that must be taken to assure that what Inuit say about a project will be respected once activity begins.

Although Salluit field work was completed before construction began at Ivujivik, the Municipal Council is now well aware of the Ivujivik experience and also of the reactions to this experience by Kangirsuk and Povungnituk as reflected in the response ot these two communities to the impact assesment study.

2.3.1 The Council Viewpoint

The Municipal Council of Ivujivik expressed that the construction of their airport will greatly improve that facility and that they are very pleased with a long airstrip. However pleased that they are, they feel that there have to be some improvements made to the procedures of making airstrips in the Inuit territory so that other communities might benefit from the Ivujivik experience. There are certain problems. Therefore, the other communities must prepare themselves in advance in order to be ready for the renovation of their airstrips. The organizations should be concerned over this and Makivik Corporation and Transport Québec should always know exactly what is going on. And also, the president of the construction company building the airstrip should come to the community often to see construction of the airport before it is completed.

2.3.2 Dynamiting Problems

The construction of the Ivujivik airstrip has required dynamiting, the explosions are noisy and the Municipal Council said it was bothersome but could not be helped because rock is needed. The wildlife usually follow certain routes, but even though there has been blasting, there don't seem to be any changes in usual wildlife behaviour and especially the whales were not disturbed.

2.3.3 The Land After Construction

When the Ivujivik Airport is completed, some parts of the hills of Ivujivik will have been removed. The long time community look-out point will not be there anymore and the people of Ivujivik are sorry about it. However, the aspect of getting a better airstrip is greater than that loss. Another impact that the new airstrip will have when completed is that it is right on the hunters' route when leaving or arriving at Ivujivik. This means that they will have to find another route.

2.3.4 The Council Viewpoint on Employment

The Council expressed that they are very pleased with the airport construction at Ivujivik. However, there are some very noticeable problems. Before the construction of the airport, they were told that the Inuit would get employment and that there would not be enough local men to fill all the jobs. They were told to be prepared to receive people from the other communities coming to work at Ivujivik. And then when the construction started, there were very few Inuit working and very many white people. Therefore, because of this, the people of Ivujivik kept mentioning that they were not told the truth.

2.3.5 Other Problems of Employment

The employment of Inuit and non-native people is causing some uneasiness and this is due to their salary differences. This problem should be corrected by the organizations concerned. The reason for this is that the white people come to work in the Inuit territory. They are a source of great expense, their airfare has to be paid, also their food and lodging, and they also bring a lot of equipment for which transportation has to be paid.

The salaries of the non-natives and all the other expenses could be better suited for people of the territory. We feel very sorry for the Inuit because of this. This also does not look good because most of these jobs they do could be filled by the Inuit, like driving vehicles and such, although it is fine in areas of work which cannot be performed by the Inuit.

One of the reasons they do not like this situation is that the people who live in the Arctic face very high prices whereas in the south, the goods are a lot less expensive. In the north also, there are not often many jobs and the Inuit are not happy if too many of he jobs are not done by them. After construction, there will not be the chance to earn money because the work goes away and the Inuit cannot follow. This situation has to be solved by us Inuit before the next airstrips are started.

Also, there is a kitchen at the lodging house of the white people who come to work. The cook has an Inuk helper who had this to say, "The Inuit work very hard, seven days a week. Why are they so underpaid? And why are the white people being paid a lot more? Why is this so?"

2.3.6 Concern with Shipping of Crushed Rock

The hills of Ivujivik are dynamited, removing parts of them, then the shattered rock is crushed by a crusher and then washed. Some of the crushed rock is put in small bags and sent south. The people here would like to know why this rock is being shipped south and if it is valuable. Maybe someone is making money with this if it is gold or other valuable stone. Do the white people keep it for themselves or will they sell it or make an exchange?

2.3.7 Food and the Co-op

The white people mainly brought up there own food because we said that there was never enough in our store for such a large group. This worked pretty good except that the construction would fill up plane after plane and this would mean we could not get our own fresh food in. Maybe we lost about $1,400 from food spoiling. But we were also glad for all of the other business from the workers for our Co-op.

2.3.8 Selection of Contractors

The people want to point out that when the organizations are looking for contractors to build for them, they should not look for the cheapest contractors. When an organization finds the least expensive contractor, it can turn out that a cheap contractor will do a much more inferior work and a more expensive one do a much better job. This should be taken into consideration. And also, when the Ivujivik Airport is completed, they want it reviewed to see if it was done properly.

2.3.9 Bothering the Municipal Council

The Council and the secretary and Mayor want to say that they sometimes had problems getting the work of the community done because they often had to be finding parts and many other things for the contractor's equipment, housing and other things. The contractor should try to have more of these things with him. Sometimes it was a real bother, but they needed everything they asked for and they were very careful to make sure they always returned or replaced anything they borrowed.

2.3.10 Equipment Breakdowns and Borrowing

The construction company is also to bring up their equipment that is in good working order because we told people in Québec that the community did not have equipment to use for the airstrip because it was always busy in doing other jobs in the community. The front-end loader was hard for the community to use when it was at the airstrip and even more the water truck was there because they didn't have one to start with. The equipment people bring up should not be too old and in need of repair before the work starts because then the Inuit are asked to stop working and parts must be brought up. We never minded lending equipment or anything else as long as we were able to get our own work done and not always be delayed.

PART II

THE NORTHERN AIRPORT INFRASTRUCTURE IMPROVEMENT PROGRAM

AND THE HISTORY OF ITS RELATIONSHIP TO AIR SERVICE

IN NORTHERN QUÉBEC

3. THE NORTHERN AIRSTRIP PROGRAM

3.1 Project Justification

The fundamental need for the Northern Airports Infrastructure Improvement Program is based on the reality that air travel is the only feasible transportation alternative for the Inuit communities of northern Québec. This justification is strengthened by the fact that the airstrips now in use are both unsafe and unable to accommodate any improvement in services that are based on the use of larger aircraft. The construction of airstrips and airport facilities that are safe, and which have the capacity to accommodate different aircraft and expanding local needs, is vital for the health, safety and development of every northern Québec community. There are no other means of public transport available to the Inuit, and the future expansion and delivery of services within the region is fully dependent on the quality of air service.

In the world of today's Inuit, it is the airplane that saves lives, delivers essential goods and personnel, and facilitates the movement of travellers within the north and between north and south. Air travel has become a way of life for many Inuit who are active in the social, educational, political and economic development of northern Québec. This mode of transportation is gradually becoming more accessible to those Inuit wishing to travel for personal or professional reasons and to tourists or other southern based travellers. The adventures and delays of the "bush pilot" should be over, at least when flying on regularly scheduled service. However, many serious problems with northern air travel still exist. Most of these problems relate directly to poor quality of the airport infrastructure that characterizes every municipality north of the 55th parallel, except Kuujjuaq and Kuujjuarapik.

Community airstrips present a constant danger to pilots and air travellers. The runways are too short and too narrow, with soft and uneven surfaces that cannot be improved or easily maintained with the equipment and budgets available to the communities. Lighting and navigational

aids are poor or non existant and there are no passenger or freight facilities. Night landings often require the aid of snowmobile lights; beacons can guide a plane to the community but not get it to the ground; wind conditions and ceiling are guess work; and patients, passengers or freight may either freeze or get wet, depending on the season. Nevertheless, these airstrips are all there is, so they are used day in and day out, good weather and bad. They must accommodate the long dark of winter, the fog of summer and the rapidly changing weather conditions that can occur at any time. Most northern flyers soon realize that their only margin of safety lies in the technology of the STOL aircraft and in the skill and direct northern experience of the pilots.

Individuals, communities and northern organizations are all vitally concerned that the present conditions of air travel be greatly improved. Northern air service still involves frequent delays and many anxious moments, especially while flying at night or in bad weather. The skill and experience of pilots and the remarkable adaptability of the Twin Otter aircraft have reached the limits of their capacity to overcome poor and unsafe facilities. This can only be accomplished by upgrading the physical infrastructure and navigational aids.

The standards for improvement that have been set out in the Northern Airports Infrastructure Improvement Program will, in the mind of Inuit, create a significant and positive change in the quality of air service, that is already long overdue. Inuit state that the most important change will be the safety of air travellers and the improved conditions for evacuating the sick and injured. Inuit also realize that improvements in the airport infrastructure will have significant implications for the economic, social and political development of their communities and the region.

3.2 The Northern Airport Program

The precarious state of the airports was an important subject for negotiations related to the James Bay and Northern Québec Agreement. Before the signing of the Agreement, the then-Minister of Indian Affairs and Northern Development, Mr. Judd Buchanan, in a letter dated November 15, 1974, addressed to Mr. Charlie Watt, President of the Northern Québec Inuit Association, stated Canada's commitment to undertake the construction of adequate airstrips for permanent northern communities. Negotiations began in 1975, and from 1981 until the fall of 1983, long and complex negotiations were needed to reach an acceptable agreement on the improvement of community airstrips.

On September 27, 1983, a comprehensive agreement was signed by the federal and provincial governments, creating the Northern Airports Infrastructure Improvement Program. The stated objective of this program is to promote the economic and social development of northern Québec. The program calls for Québec and Canada to jointly plan and carry out the construction of new, or upgrading of, present airstrips and other infrastructures in eleven Inuit communities north of the 55th parallel. At a meeting held in March 1983, the mayors of all eleven communities established the following priority list for airport construction: Salluit, Ivujivik, Povungnituk, Kangirsuk, Tasiujaq, Inukjuak, Kangiqsujjuaq, Quaqtaq, Kangiqsualujjuaq, Akulivik and Aupaluk. This list was formally ratified by a resolution of the Council of the Kativik Regional Government. The mayors also indicated that the planned community of Umiujaq (Richmond Gulf) and the proposed community of Taqpangayuk (Singer Inlet) would have to be included on their priority list when relocation agreements are signed and funding provided.

The program began in August 1984, at Ivujivik and it is scheduled to continue for approximately 10 years. As of January 1985, the program has not followed the schedule since the location of the Salluit

airstrip has caused major problems. This delay means that the most dangerous situation for air travel in northern Québec will not be resolved as quickly as needed for the safety of air travellers. A decision to proceed with Salluit was made on December 13, 1984. The new schedule now calls for Ivujivik to be completed in early summer 1985, and Salluit and Kangirsuk to be started in the summer of 1985.

The cost of the Northern Airports Infrastructure Improvement Program is estimated to be $68.5 million. This amount will not be indexed over the duration of the program. Québec will pay 40% of the total and the Federal government, 60%. The Federal government will be responsible for the selection of each airstrip site, technical studies and engineering plans, project costing, and for the purchase, installation and maintenance of navigational aids. Transport Québec, as the proponent, is responsible for the environmental and social impact studies; the purchase and maintenance of mobile equipment required for the construction and operation of the airports; and for obtaining the required rights, and authorizations needed for construction. Transport Québec will also be responsible for the long term operation and maintenance of airport facilities and equipment, with the exception of navigational aids.

The program is the same for each community except Povungnituk and will include: a gravel runway, 1,065 m (3,500 ft) long and 30 m (100 ft) wide, a taxi way and parking area, a system of airstrip lights and navigational aids; facilities for passengers, freight, equipment, and airport operations. An access road to the airstrip will be built or improved and power transmission lines will be erected. At Povungnituk, a 1,220 to 1,370 m (4,000 to 4,500 ft) paved airstrip will be constructed to provide jet ambulance service for the new hospital. A program for training Inuit to operate heavy equipment during the construction phase is now underway and further training will be provided to assure permanent employment of Inuit in the operation and maintenance of the completed airport infrastructure.

3.3 Development of Air Services in Northern Québec

The utilisation of the airplane in northern Québec has a history that began in 1927, when a major air survey was undertaken in the vicinity of Ivujivik and Kangiqsujuaq. In the 1940's, major airstrips were built at Kuujjuaq and Kuujjuarapik in support of the military effort of World War II. In the early 1950's, a sophisticated airport infrastructure associated with the Direct Early Warning (DEW) radar system was established in the Northwest Territories. This sopisticated air network did nothing to ameliorate the severe problems that were facing eastern Arctic Inuit at that particular time in their history. Personnel, material and fresh foods could be routinely delivered to remote radar sites, but the needs of the Inuit population of Québec and the Northwest Territories could not be met. Although there were many discussions and an active exchange of memos and correspondence about the critical need for an improved northern air service, no general policies nor specific programs were put forward. Thus it seemed quite easy to overcome the obstacles of getting airlifted supplies into a defense establishment but almost impossible to routinely move vaccines or other critical materials into Inuit settlements.

Charter service using single engine aircraft with float or ski landings, characterized air travel from 1955 to around 1970 for most communities. Flights were erratic and at its best, single engine charter service could never respond to the changing needs of northern people or to the growing responsibility of government to provide improved health and other services. During these years, no one was able to depend on air service as a reliable means of northern travel. Chartering a plane could secure priority of use and determine destinations but it could never guarantee the actual completion of a northern air journey. Until the development of land-based airstrips, there was no service during freeze-up and break-up; each of which could last from four to six weeks. At other times of the year, poor weather, especially fog, caused prolonged delays.

There was no regularity to freight or mail and no assurance that even the most critical circumstances of sickness or other community problem could be alleviated by calling in an aircraft. Throughout the mid-1950's to the late 1960's, there were occasional air borne miracles, but there were also many tragedies occasioned by the fact that no infrastructure was developed for community air service.

In the 1960's, charter service for the Ungava region was based in Kuujjuaq and relied on single engine Beavers, Norsemen or Otters equipped with skies or floats. For special purposes, such as the movement of personnel or heavy equipment, Cansos were available for water landings and DC-3's could be used on the winter ice. Wheeler Airlines and St- Félicien Air Service were common names in the Ungava Bay region. On the Hudson Bay coast, Austin Airways established charter and mail service as far north as Povungnituk, basing their operation in Timmins and Moosonee, Ontario.

In the early 1970's, small community airstrips started to be built, and it was hoped that 'charter only' air service could eventually be replaced by some type of scheduled flights. From 1972 to 1977, some of the airstrips were extended and, in 1978, a federal-provincial agreement on airstrips provided $100,000 per community for upgrading. In the late 1970's, the use of Twin Otter aircraft became more common, and regularly scheduled air service was established by Austin Airways on the Hudson Bay coast and by Survair in Ungava bay.

3.4 Present and Future Air Service

In 1977, Air Inuit was incorporated and began scheduled service for the Ungava Bay and Hudson Strait routes. On January, 16, 1984, Air Inuit acquired the Austin Airways route and mail contract for all points from Kuujjuarapik north to Salluit and across Hudson Strait to Cape Dorset. Since January 1984, Twin Otter air service operated by Air Inuit

TABLE 1

NORTHERN QUÉBEC AIRSTRIPS

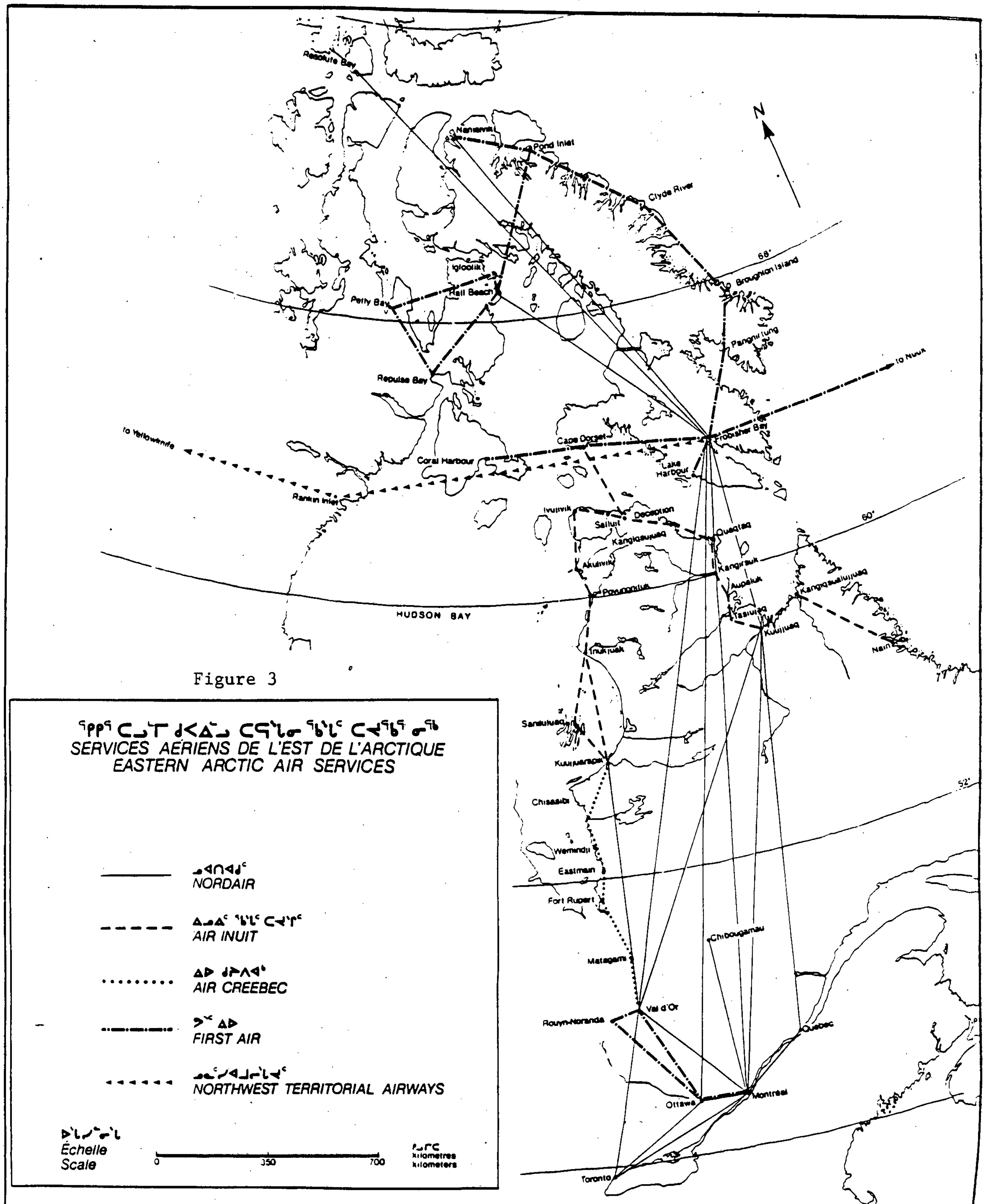
	LENGTH Meters	LENGTH Feet	WIDTH Meters	WIDTH Feet	EVALUATION OF CONDITION	ACCESS
INUKJUAK	610	2000	34	111	sandy and very soft	adjacent to the village
POVUNGNITUK	280	800	20	63	bad	5 km of road in bad condition
AKULIVIK	366	1200	30	96	bad	adjacent to the village
IVUJIVIK	250	810	25	81	good	adjacent to the village
SALLUIT	**458**	**1500**	**23**	**73**	**dangerous**	**1.5 km of road to be constructed**
KANGIQSUJUAQ	400	1300	20	63	good (soft)	approximately 500 m. from the village
QUAQTAQ	400	1300	25	81	pitiful	300 m. from the village
KANGIRSUK	350	1100	20	63	bad	1.7 km from the village, on the hillside, bad condition
AUPALUK	450	1500	20	63	very soft	adjacent to the village
TASIUJAQ	750	2400	30	96	good	0.7 km of good road
KANGIQSUALUJJUAQ	650	2100	25	81	dangerous	300 m. to the village

Note: These statistics were gathered by Transport Québec and reflect the size and condition as of 1980.

TABLE 2

NORTHWEST TERRITORIES AIRSTRIP INFRASTRUCTURE

	LENGTH (Feet)	WIDTH (Feet)	BEACON	LIGHTS
FROBISHER BAY	9000	200	X	X
LAKE HARBOUR	1700	50	X	X
RANKIN INLET	5000	150	X	X
PELLY BAY	3524	110	X	X
IGLOOLIK	3500	75	X	X
HALL BEACH	5400	150	X	X
REPULSE BAY	3400	100	X	X
CORAL HARBOUR	5200 6000	140 200	X X	X X
CAPE DORSET	4000	100	X	X
RESOLUTE BAY	6500 4000	200 150	X X	X X
PANGNIRTUNG	2500	100	X	X
NANISIVIK	6400	150	X	X
POND INLET	4000	100	X	X
CLYDE RIVER	3500	100	X	X
BROUGHTON ISL.	3475	98	X	X



SERVICES AÉRIENS DE L'EST DE L'ARCTIQUE
EASTERN ARCTIC AIR SERVICES
NORDAIR
AIR INUIT
AIR CREEBEC
FIRST AIR
NORTHWEST TERRITORIAL AIRWAYS
Échelle
Scale
0
350
700
kilomètres
kilometers
N
Resolute Bay
Nanisivik
Pond Inlet
Clyde River
Igloolik
Hall Beach
Pelly Bay
Broughton Island
68°
Pangnirtung
Repulse Bay
to Nuuk
to Yellowknife
Cape Dorset
Frobisher Bay
Coral Harbour
Lake Harbour
Rankin Inlet
Ivujivik
Deception
Salluit
Quaqtaq
Kangiqsujuaq
60°
Akulivik
Kangirsuk
Aupaluk
Kangiqsualujjuaq
Povungnituk
Tasiujaq
Kuujjuaq
HUDSON BAY
Nain
Inukjuak
Sanikiluaq
Kuujjuarapik
52°
Chisasibi
Wemindji
Eastmain
Fort Rupert
Chibougamau
Matagami
Val d'Or
Rouyn-Noranda
Quebec
Ottawa
Montreal
Toronto

Figure 3

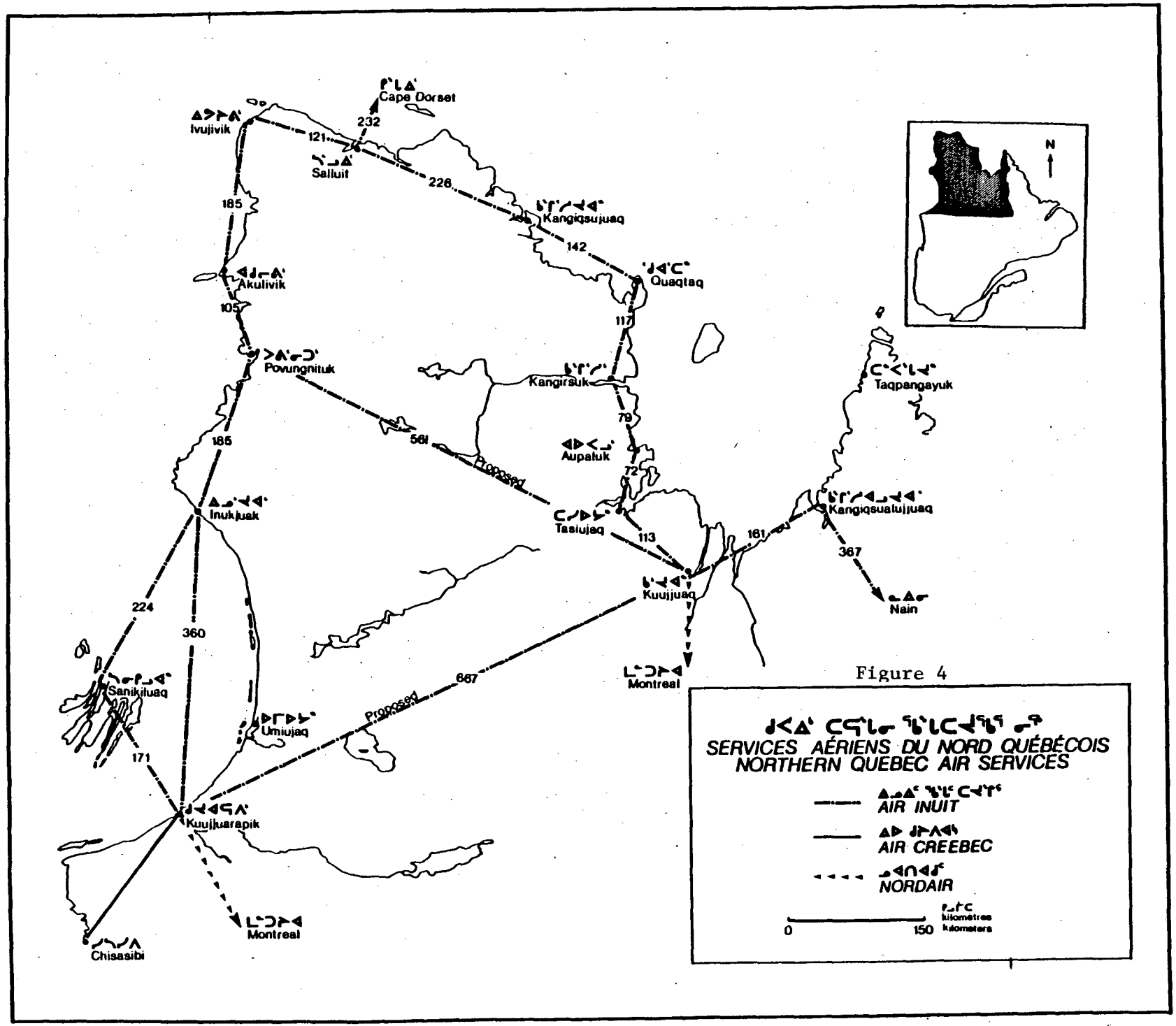

Cape Dorset
Ivujivik
232
121
Salluit
226
185
Kangiqsujuaq
142
Akulivik
Quaqtaq
105
117
Povungnituk
Kangirsuk
Taqpangayuk
79
561
Proposed
Aupaluk
185
72
Inukjuak
Tasiujaq
Kangiqsualujjuaq
113
161
367
Kuujjuaq
Nain
224
360
Montreal
667
Proposed
Sanikiluaq
Umiujaq
171
Kuujjuarapik
Montreal
Chisasibi
N
SERVICES AÉRIENS DU NORD QUÉBÉCOIS
NORTHERN QUEBEC AIR SERVICES
AIR INUIT
AIR CREEBEC
NORDAIR
0
150
kilomètres
kilometers

Figure 4

is available to every municipality north of the 55th parallel. The development of essential airport and navigational facilities have not however, kept pace with improved air service and this fact has had a serious negative impact on the delivery of safe and efficient air travel. Characteristics of airstrips in Northern Québec are summarized in Table 1, and comparisons with Eastern Artic communities of the Northwest Territories are described in Table 2. The air service network for Québec and the Eastern Arctic is illustrated in Figures 3 and 4.

Air Inuit operates De Havilland Twin Otter aircraft out of Kuujjuarapik and Kuujjuaq. Overnight bases are maintained at Povungnituk and Quaqtaq to facilitate early morning travel south to Kuujjuaq or Kuujjuarapik for connections to Nordair. The planes stationed at Povungnituk are used to service Akulivik, Ivujivik and Salluit to the north, Inukjuak and Sanikiluaq to the south, and to provide once a week service between Salluit and Cape Dorset. In the summer of 1984, once a week air service was initiated between Kuujjuaq and Kuujjuarapik, using a Hawker-Siddley 748 aircraft. Movement from the Ungava to the Hudson Bay coast can also take place on Saturdays by travelling north to Salluit and connecting with the flight for Povungnituk. Weather conditions, however, can often make such a trip very risky, with long delays. Consequenty, movement between coasts frequently requires travelling through Montreal.

Pilots, users and management all express confidence in the role of Twin Otter aircraft for northern service. It was this development in technology (short take-off and landing capability), rather than any significant upgrading of the airport infrastructure, that has enabled the present level of air service to be established and maintained. The Twin Otter aircraft, however, is both expensive to purchase and to operate. The freight payload is 1,134 Kg (2,500 lbs.) maximum and it can carry 20 passengers with 2 pilots. It is considered to be slow with a cruising speed of 130 nautical miles per hour, which is significantly reduced when strong headwinds are encountered. Since the planes are constantly combin-

ing freight and passenger service, it is impossible to have any on-board facilities for passenger comfort. Space is often cramped and the seats uncomfortable for long distance travel. It should be noted that the flight from Kuujjuaq to Salluit is 616 km and takes 4 hours when stopping in other communities. Kuujjuarapik to Salluit, is 800 km and takes 5.5 hours. Time spent in the air is often greatly extended when a destination cannot be reached and the flight has to return to its point of departure.

Precise information on passenger and freight volume is not available for either the Hudson Bay or Ungava Bay coast. Tables 3 and 4 provide an indication of the volume of passengers movement between communities for 1984. These figures only represent scheduled passenger service, not charter flights that comprise approximately 20 per cent of Air Inuit business and which move a considerable number of people and pounds of freight.

Air Inuit is currently able to meet passenger demand as it exists on a day to day basis, although there are problems of overcrowded flights, schedule delays and poor connections. Special situations requiring the transport of large groups of people, medical evacuations or off schedule travel can only be accomplished by charter service. Estimates of total air service are more accurate therefore when using total hours flown. This figure has increased steadily from 1979 to 1983. In 1979, Air Inuit flew 2,928 hours. By 1983, this figure almost doubled to 5,650 hours. The 1984 figure illustrates almost a 100% per cent increase to 11,000 hours. In order to meet the demand represented by these hours, eight Twin Otters are now in use. Early in 1985, Air Inuit will purchase an HS-748.

Travel patterns in the north are dependent on many factors. Travellers can be divided into two groups: those that travel for business or professional reasons and those that travel for personal reasons. The majority of those in the first group have their airfares paid by an

TABLE 3

UNGAVA COAST AVERAGE PASSENGER VOLUME 1984	KUUJJUAQ	AUPALUK	TASIUJAQ	KANGIRSUK	QUAQTAQ	KANGIQSUJUAQ	SALLUIT	DECEPTION BAY	KANGIQSUALUJJUAQ	NAIN	ASBESTOS	KUUJJUARAPIK
KUUJJUAQ	---	483	524	743	555	389	497	16	869	51	27	0
AUPALUK	408	---	95	267	39	17	4	0	3	0	0	0
TASIUJAQ	504	115	---	48	41	9	7	0	4	0	0	0
KANGIRSUK	649	223	57	---	236	47	83	0	4	0	0	0
QUAQTAQ	484	32	44	192	---	161	47	4	9	1	5	0
KANGIQSUJUAQ	356	5	7	95	145	---	232	1	0	0	3	0
SALLUIT	**413**	**12**	**7**	**77**	**75**	**196**	---	**8**	**12**	**0**	**15**	**0**
DECEPTION BAY	61	0	3	0	3	0	16	---	0	0	0	0
KANGIQSUALUJJUAQ	633	0	4	0	8	4	3	0	---	116	0	0
NAIN	51	0	1	0	3	0	1	0	127	---	0	0
ASBESTOS	71	0	0	3	5	0	3	0	0	0	---	0
KUUJJUARAPIK	63	0	0	0	0	0	0	0	0	0	0	---
TOTAL	3,693	870	742	1,425	1,110	823	893	29	1,028	168	50	

TABLE 4

HUDSON BAY COAST AVERAGE PASSENGER VOLUME 984	KUUJJUARAPIK	SANIKILUAQ	INUKJUAK	POVUNGNITUK	AKULIVIK	IVUJIVIK	SALLUIT	CAPE DORSET	LA GRANDE	QUAQTAQ	KUUJJUAQ
KUUJJUARAPIK	---	639	6	99	6	76	4	0		0	9
SANIKILUAQ	7	---		3	0			4	0	0	0
INUKJUAK		0	---	63	65		89	3	0	0	0
POVUNGNITUK	65		699	---	9	39	03	6	0	0	0
AKULIVIK	0	4	59	4	---	44	88	8	0	0	0
IVUJIVKI	116	0	16	3	75	---	0	5	0	0	0
SALLUIT	**5**		**59**	**69**	**0**	**60**	---	**7**	**0**		**0**
CAPE DORSET			4	5	5	3	95	---	0	0	0
AUPALUK	0	0	4	0	0	0	0	0	0	0	0
KANGIQSUALUJJUAQ	0	0	0	0	0	0		0	0	0	0
KUUJJUAQ		0	0	0	0	0	0	0	0	0	---
QUAQTAQ	0	0	0	0	0	0	0		0	---	0
KANGIRSUK	0	0	0	0	0	0	0		0	0	0

TABLE 5

CARGO MOVEMENT 1984
(AVERAGE PER POUNDS)

	KUUJJUAQ	TASIUJAQ	AUPALUK	KANGIRSUK	QUAQTAQ	KANGIRSUJUAQ	SALLUIT	KANGIQSUALUJJUAQ	DECEPTION BAY	TOTAL
KUUJJUAQ	------	51,111	32,740	75,070	43,310	50,685	62,291	94,619	1,953	411,779
TASIUJAQ	8,011	------	1,144	100	96	776	0	0	0	10,127
AUPALUK	6,767	573	------	628	442	327	0	0	0	8,737
KANGIRSUK	15,293	806	2,018	------	1,395	60	1,445	48	0	21,065
QUAQTAQ	14,182	517	185	3,136	------	309	185	142	0	18,656
KANGIQSUJUAQ	6,586	56	590	524	1,296	------	5,699	0	0	14,751
SALLUIT	6,384	40	0	38	33	265	------	0	0	6,760
KANGIQSUALUJJUAQ	27,745	0	201	1,168	33	55	0	------	98	29,300
DECEPTION BAY	1,080	0	0	0	0	0	0	229	------	1,309
TOTAL	86,048	53,103	36,878	80,664	46,605	52,477	69,620	95,038	2,051	522,484

organization, and most of their travel is to the south via Kuujjuaq - Kuujjarapik. The figures in Table 3 and 4 show that a total of 22,061 individuals departed the 18 communities and that 7,295 or 33 per cent of them travelled to either Kuujjuaq or Kuujjarapik. For all other departures the overwhelming majority or approximately 70 per cent only travelled one community away. Part of this fact reflects individuals travelling on business who move through the region community by community. Most, however, probably represents the travelling northern public that has a more limited range of either travel need or affordability. A review of passenger information from Salluit for 1983 supports these generalizations. For those travelling from Salluit to either Kuujjuaq or Kuujjuarapik, 78 per cent were paid for by an agency. For the two closer communities, only 14 per cent were paid for by an agency.

The cost of northern air travel continues to be very high and it is argued that it is not possible to make significant progress in lowering this cost until there are more options available for the type of aircraft that can be used. If a person wants to travel directly from Kuujjuaq to Salluit, for example a return ticket will cost $468. If all of the communities are visited en route the cost will be $882. If travel requires a trip south, then another $736 must be added to the total fare. A return trip from Kangirsuk to Inukjuak will cost $1,060 via Salluit, $872 via 748 service and $2,006 via Montreal. Northern travel is expensive and when travelling between the coasts or to the south it can also be very time consuming. For example, a mid-week meeting of one day in Montréal requires people from Ivujivik or Salluit to be gone for a minimum of six to eight days, which usually includes at least one weekend. The average cost of this trip is $1,000 for lodging and meals, and $1,800 for travel.

Freight costs also create problems in the economic development of the north although some options are available for the shipment of smaller

items. The use of Canada Post can significantly reduce freight costs, but there are limitations on weight and size. If the limitations on size do not pose a problem, then a 30 kg. package can be shipped from Montreal to Salluit via Kuujjuaq via post for $11.40. The same package sent air freight will cost $119.70.

Charter service is an essential element of northern air travel, from both Kuujjuaq and Kuujjuarapik. In addition to Air Inuit, Johnny May Air Charters, a privately-owned company based in Kuujjuaq, operates a charter only service with one Cessna 185, two Beavers, and one twin engine Aztec. Air charters using single engine aircraft or the Aztec are less expensive and they provide the only float or ski service into remote areas. The range of this operation is somewhat restricted by an absence of aviation gas in many communities, and by weather conditions that are often more limiting when flying visual flight rules. The Cessna 185 is expected to average 400 to 450 flying hours per year on floats only; the Beavers 1,100 to 1,500 hours and the Aztec 160 to 200 flying hours.

A major source of charter business for the Ungava Bay region are the fishing and caribou hunting camps that operate from mid-July to late September. The Ungava Bay region has sixteen active tourist camps and there are five areas where permits have been issued for future development. At the present time, there are no active outfitting camps on the Hudson Bay or Hudson Strait coast, although three permits have been issued for sites in the Povungituk region. One of the problems that is said to to limit tourist camp operations on the Hudson Bay coast are the unreliable 737 flights into Kuujjuarapik.

3.5 Future Planning

Northern residents are outspoken about the problem with air travel and they are determined to make their voice heard. The Inuit

accept the fact that major changes can not be accomplished until the physical infrastructure is greatly improved. They also insist that the improvements must be to the same standards in every community to assure that decisions on equipment used and the facilities required, do not have to vary. This, they say, would be expensive and therefore slow the process of improvement.

The terms of reference for the impact assessment focuses primarily on the construction of an airstrip, but this is not a narrowly defined subject in the minds of Inuit. The terms of reference for this airstrip impact assessment define specific topics with respect to the bio-physical, social and urban environment, but Inuit are equally concerned with many other airstrip related issues that are more likely to have an impact on their lives. Service, schedules, fares and freight rates; safety and the personnel treatment and respect for Inuit passengers; access to specific information about flights and more general information about the operations and priorities of northern air service; and the availability of adequate personnel and ground support within each community are the issues most frequently raised in the community meetings.

A major limitation for the development of future air service is the inability to provide efficient cargo service. Cargo shipments are the lifeline of each community and it is not possible to carry enough combined passenger/cargo loads with Twin Otters to be economical. At the same time, Air Inuit cannot maintain enough Twin Otters to run cargo only. Larger aircraft would greatly improve the situation and it is assumed by Air Inuit that the capacity to carry greater payloads would generate a growth in the demand for air service. The HS 748 aircraft, for example, has an average freight payload of 5,215 kg (11,500 lbs). Even the utilisation of the Macdonnell-Douglas DC-3 in all seasons provides a freight capacity that averages 2,945 kg (6,500 lbs). Both of these aircraft can operate on an airstrip of 1,065 m (3,500 ft). A summary of

TABLE 6

CHARACTERISTICS OF AIRCRAFT USED IN NORTHERN OPERATIONS					
TYPE OF AIRCRAFT	FREIGHT CAPACITY (FULL TANK)	PASSENGER CAPACITY (FULL TANK)	RANGE OF AIRCRAFT (FULL TANK)	FUEL TYPE	REQ'D RUNWAY LENGTH WIDTH
BOEING 737	22,000 lbs.	119	5 hours	JET	6,000 ft.
F 27	26,000 lbs.	20 30	8 hours 6.5 hours	JET	4,500 ft.
HS-125	20,000 lbs.	6	3.5 hours	JET	4,500 ft.
HS-748	11,500 lbs.	52	6 hours	JET	3,500 ft.
DC-3	6,500 lbs.	28	10 hours	AVGAS	3,500 ft.
DHC-4 CARIBOU	5,608 lbs.	30	7-9.8 hours	AVGAS	2,030 ft.
DHC-6 TWIN OTTER	3,000 lbs.	16	5.25 hours	JET	1,500 ft.
SINGLE OTTER	2,003 lbs.	11	n/a	AVGAS	1,600 ft.
BEAVER	1,000 lbs.	4-5	6 hours	AVGAS	1,200 ft.
AZTEC	1,000 lbs.	5	6 hours	AVGAS	1,500 ft.
CESSNA 185	800-900 lbs.	3	6 hours	AVGAS	800 ft.

the characteristics and requirements for aircrafts used in the north are illustrated in Table 6.

The need for greater freight capacity of aircraft must, in the future, be integrated with plans to decrease the volume transported by the annual sealift. It is becoming more apparent that some of the cargo now sent north by ship once a year, would be sent by air, alleviating long delays in receiving items such as building materials, equipment, parts, vehicles and food. This service would also significantly reduce warehousing costs and enable organizations to carry smaller inventories and thus plan more efficiently. Management personnel of Air Inuit felt the larger payloads would help slow down the fare and rate increases over time which, according to airline management, would mean savings to the consumer.

The new 3500' airstrips and their supporting infrastructure will allow Air Inuit to expand its operations to include the acquisition of more appropriate and cost efficient aircraft and to develop new staging points which will increase the efficiency of service for passengers. This could, for example, mean that planes are stationed in one of the Ungava Bay communities, thus dividing the present "long run" up the Ungava coast from Kuujjuaq to Salluit into a different arrangement of routes.

There is also the concern with the placement of services in the northermmost point at Salluit so that both coasts can be served from a single point. As pointed out above, direct air service between Kuujjuaq and Kuujjuarapik was established in the fall of 1984. This link has yet to prove itself as an integrating force between the two coasts. The next phase in a more integrated air system will connect the Ungava Bay and Hudson Bay network in the north at Salluit. This development will strengthen all three major points of the air service triangle; Kuujjuaq, Kuujjuarapik and Salluit. The intended relocation from Kuujjuarapik to Umiujaq, coupled with the longer paved air strip to be built in

Povungnituk, may mean that this community could replace Kuujjuarapik as the western point of the triangle.

Many scenarios can be suggested for future air service but there is no accurate way to establish a specific plan prior to at least the partial completion of the infrastructure improvement program. The program will take at least 10 years to finalize and until then, service and planning can only incorporate the pieces, not create a unified system. Most important, safety will be greatly improved; safety of passengers, communities, pilots and equipment. The communities will achieve a greater sense of security knowing that medical evacuations will be possible day or night and that direct flights from any community to Québec City or Montréal by aircraft could be available. This peace of mind cannot be measured in payloads and air hours but it remains a central concern of the communities. Important decisions on future air transport networks will be included as part of continuing discussions on the economic future of northern Québec and specific choices should become part of a structure that will be suggested once an integrated plan for regional economic development is formulated for northern Québec.

PART III

DESCRIPTION OF THE COMMUNITY AND ITS ENVIRONMENT

AS RELATED TO THE AIRSTRIP AND POTENTIAL IMPACTS AND BENEFITS

4. THE COMMUNITY AND ITS ENVIRONMENT

4.1 The Community

Salluit is located on the south coast of Sugluk Fiord, approximately 10 kilometers from the open waters of Hudson Strait (Figure 5). It is an important place in an area that has a long and rich history of cultural development. Salluit valley has been seasonally occupied for the last 4,000 years and the same resources that supported the hunters and their families in the distant past are still important to the economy and culture of today. Although the people of Salluit have strong ties with the past and with the traditions of Inuit culture, they also have a vision of the future that encourages certain types of change and the creation of new traditions. Air service has played an important role in this change, and the Inuit consider it to be important if they are to realize opportunities for the social and economic development of the community and its region.

4.1.1 Development of the Community Landscape and Infrastructure

The specific location of Salluit represents a selection for site advantages that were appropriate to the needs of a seasonally mobile hunting population and to the services required to support this population during the first 50 years of this century. Salluit has a safe anchorage, access to inland, marine and freshwater resources and protection from the storms of Hudson Strait and from the strong winds that sweep across the peninsula. The bay adjacent to the community that provided a safe harbour for ships, also provided calm waters required to land the float equiped aircraft that first serviced the region.

These locational advantages are still important to the life of the Inuit, but as the community grew, the infrastructure needed to support and service the Inuit population became more complex and required larger

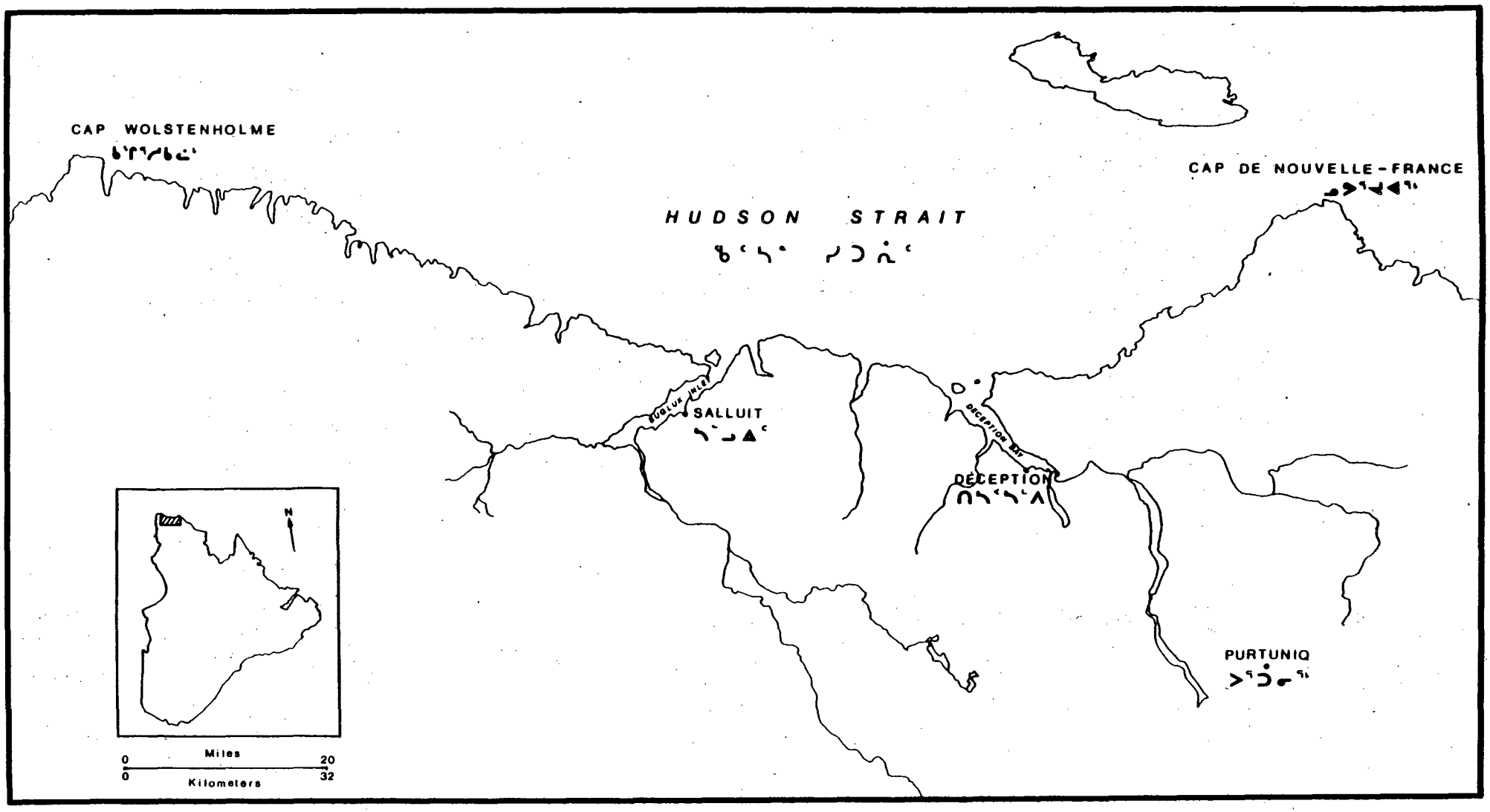


FIGURE 5

LOCATION OF SALLUIT *EMPLACEMENT DE SALLUIT* ᓇᓗᓕᕆᓂᖅ ᓴᓚᐃᑦ

areas of usable space. Today, a functional, not to mention a visual integration between the cultural and physical elements of the landscape is very difficult to achieve.

The most recent process of population concentration and community development dates to 1927 when a Hudson Bay Company post was opened. In 1947 a Roman Catholic mission was established and this was followed by the Anglicans in 1955. A government day school was started in 1957 and a nursing station was built in 1960. After the early 1960's there was a steady increase in the population and in the services provided. Families were becoming less seasonally mobile, and by 1959 snow houses started to give way to shacks made of scrap lumber. Around 1964 government housing programs were started and over the last 20 years, there was been a steady growth in housing and in other infrastructure services.

All of this activity, all of the people, all of the buildings and all of the requirements for maintaining the people, the agencies, the organizations, the facilities, the equipment and the roads has placed an extreme pressure on the valley of Salluit. Garbage dumps cannot accomodate the daily collection of waste, a dumpsite on the margins of the community 15 years ago is now surrounded by living space; fresh water is less available; sand and gravel pits have cut deeply into the exposed summer landscape and a good drainage system has not been implemented so that large wet areas exist from spring to late summer. The valley location and steep surrounding hills provides little in the way of good building sites. Areas that are level are often poorly drained, and the unconsolidated material of the valley floor is subject to permafrost heaves from winter to summer, and to shifting when disturbed.

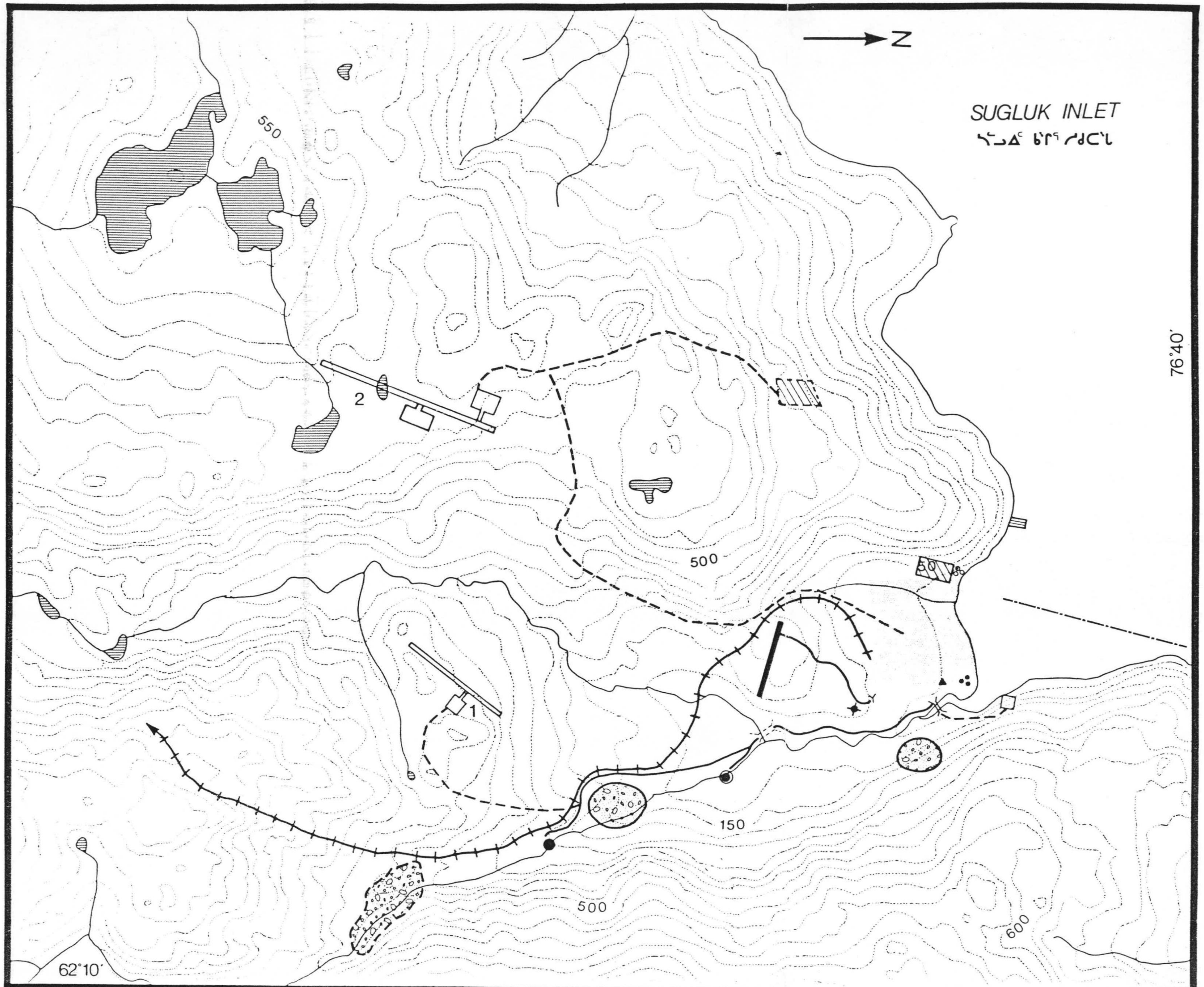
The limits of the physical landscape on the community have now been incorporated into the mood of the people as they search for ways to compensate for the physical difficulties imposed by the site. The Inuit of Salluit live with poor drainage, garbage still accumulates near the

center of the built up area, and their new municipal office and recreational complex is splitting apart as the badly engineered structure shifts on its foundation in disturbed permafrost. It was these factors along with the accumulating tensions from the uncertain future of the airstrip program that drove the community to hold a referendum in December, 1983. In this referendum they gave approval to begin investigations into the possibilities for a community relocation to Deception Bay. This resolution was formally withdrawn once Salluit was assured that an adequate airstrip would be built in a location approved by the community.

4.1.2 Infrastructures and Landscape

The pattern of community infrastructure is illustrated on Figure 6. The community of Salluit suffers from other infrastructure problems besides the airstrip. The factors of topography, soil stability and drainage also have an impact on the location and development of other important community facilities. The major problems with infrastructure are, according to the community: the relocation of the garbage dump and filling in of the old dump site; expanding the land that is solid enough for housing requirements and; obtaining better engineering expertise for erecting buildings on permafrost or on the unstable soil so that thay will not be destroyed or made to be unlivable by natural causes.

The community said that the lack of space has created a severe problem of overcrowding from buildings, roads, electrical wires and storage areas. They note that there has never been a plan to follow and until recently any southern agency built where they wished without consultation or community review. Certain improvements are being made, but nothing will be settled until the airstrip is under construction and the garbage dump is finally relocated to a proper site, and adequate drainage pipes are installed to dry out the low, wet zones that now



AIRSTRIP AND RELATED INFRASTRUCTURE

EXISTING INFRASTRUCTURE	PROPOSED INFRASTRUCTURE
AIRSTRIP	1 AIRSTRIP (TRANSPORT CANADA)
WINTER ICESTRIP	2 AIRSTRIP (COMMUNITY)
ACCESS ROAD	AIRSTRIP APRON
SKIDOO ROUTE	ACCESS ROAD
GRAVEL PIT	GRAVEL PIT
WASTE DISPOSAL	WASTE DISPOSAL
FUEL TANK DEPOT	ROTATING BIOLOGICAL CONTACTOR
SUMMER WATER POINT	FUEL TANK DEPOT
WINTER WATER POINT	BRIDGE
POWERHOUSE	DOCK
GARAGE	COMMUNITY
TELESAT	LAKES
BRIDGE	

PISTE ET INFRASTRUCTURE RELIÉE

INFRASTRUCTURE ACTUELLE	INFRASTRUCTURE PROPOSÉE
PISTE	1 PISTE (TRANSPORT CANADA)
PISTE DE GLACE (HIVER)	2 PISTE (COLLECTIVITÉ)
ROUTE	TABLIER DE PISTE
ROUTE DE MOTONEIGES	ROUTE
BANC DE GRAVIER	BANC DE GRAVIER
DÉPOTOIR	DÉPOTOIR
PARC A CARBURANT	UNITÉ DE DISQUES BIOLOGIQUES ROTATIFS
POINT D'EAU-ÉTÉ	PARC A CARBURANT
POINT D'EAU-HIVER	PONT
CENTRALE	QUAI
GARAGE	COLLECTIVITÉ
TÉLÉSAT	LACS
PONT	

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prevent the land from being used for specific purposes including playground space.

The visual landscape of the community has never been under local control and since it also changes from summer to winter the problems and criteria also change. . There is a noticable concern voiced by Inuit when questioned on the visual qualities of their community environment: Inuit feel that they are being held responsible for a situation they did not create. This does not mean that they are not concerned. They state, however, that

> "what we see is out on the land away from the community. This is where the shapes of the land and of the rocks tells a story and reminds us of many things. Out there we are familiar with the way the land looks, because it is never changed by people being there."

It is not necessary to move a great distance away. The Inuit insist that the river valley that runs south from the community must be protected and that the expansion of the community or any special projects should not destroy the valley, its river, and especially, the small water falls.

4.1.3 Community Population and Economy

The population structure and economic characteristics of Salluit are similar to the other northern municipalities. In 1981 a study for the community master plan showed that 62 percent ot the population is 20 years of age or less and only 2 percent is over 65 years of age. The major social and economic responsibility is usually carried by the 26 to 55 year old age group, and this segment of the Salluit population is only 25 percent compared to almost 40 percent for the rest of Canada.

The economy of the community is difficult to characterize since a precise data base is not available. The master plan produced by the Regional Government in 1981 estimated that if hunters and carvers are not considered to be employed, the unemployment rate is about 55 percent based on a potential work force of 183 people between the ages of 16 and 65 years of age. Although this figure includes individuals who are engaged in activities such as hunting and carving, it illustrate why government transfer payments are an important component of the cash economy, and which, in fact, help provide the money required to maintain subsistance hunting.

A list of permanent and part time employment by occupation is provided in Table 7. Again this list does not include all possible sources of self employment especially carving and other handicrafts that are estimated to contribute $20,000 a year. Also missing from the list of employed people are the individuals who have full or part time jobs during the construction season. An estimate for this category indicates that in 1984 people worked on various types of seasonal construction with an estimated revenue of $140,000. There are many other sources that provide income from time to time, such as meetings, rental of snowmobiles or other equipment and the hosting of large meetings. In 1983, for example it is estimated that over $20,000 dollars was available to family units that housed delegates for several regional meetings of northern organizations. The Hunter Support Program administered by the Municipal Council subsidized $144,000 worth of hunting, fishing and trapping related activities in 1984. Of this total, approximately $88,000 went directly to hunters.

4.2 Physical Environment

The physical environment of Salluit, as related to the infrastructure of the community, is dominated by the topography, by the type

Table 7

LIST OF EMPLOYERS AND EMPLOYEES (SALLUIT, 1984)

EMPLOYERS	EMPLOYEES			
	Inuit			
	Part-time	Full-time	Others	Estimated Salary
Air Inuit	0	0	1	
Canada Post	1	0		$10 - 12,000
Canada Employment Center	1	0		40,000.
Housing Authority	0	5		39,000.
Kativik School Board	9	13	20	30,000.
Hudson's Bay Co.	2	4	3	$5-6/hour
Co-Op	1	5		18,000.
Landholding (includes ski doo shop)	0	2		18,000.
Municipal Corporation	37	18	1	26,000.
Hydro-Québec	1	1		30,000.
Minister of Social Affairs (Nursing, Social Worker, Welfare)	4	3	3	part time 12,000. full time 30,000.
Sanak Maintenance	2	1		part time 16,000. full time 32,000.
Shell Canada		1		25,000 - 30,000.
TNI	0	16		20,000.
Telesat Canada	1	0		3hrs/month $1,000./yr.
Tikivvik Inc. (hotel, restaurant, snack bar)	4	5	1	$12-13,000.
Qarqalik	3	1		11,000. - 21,000.

and distribution of materials that form the surface of the land and, by the surface waters and drainage network. The interaction of these factors, with the seasonal patterns of wind, precipitation and fog, create the environmental setting of the community.

4.2.1 Geology and Surface Features

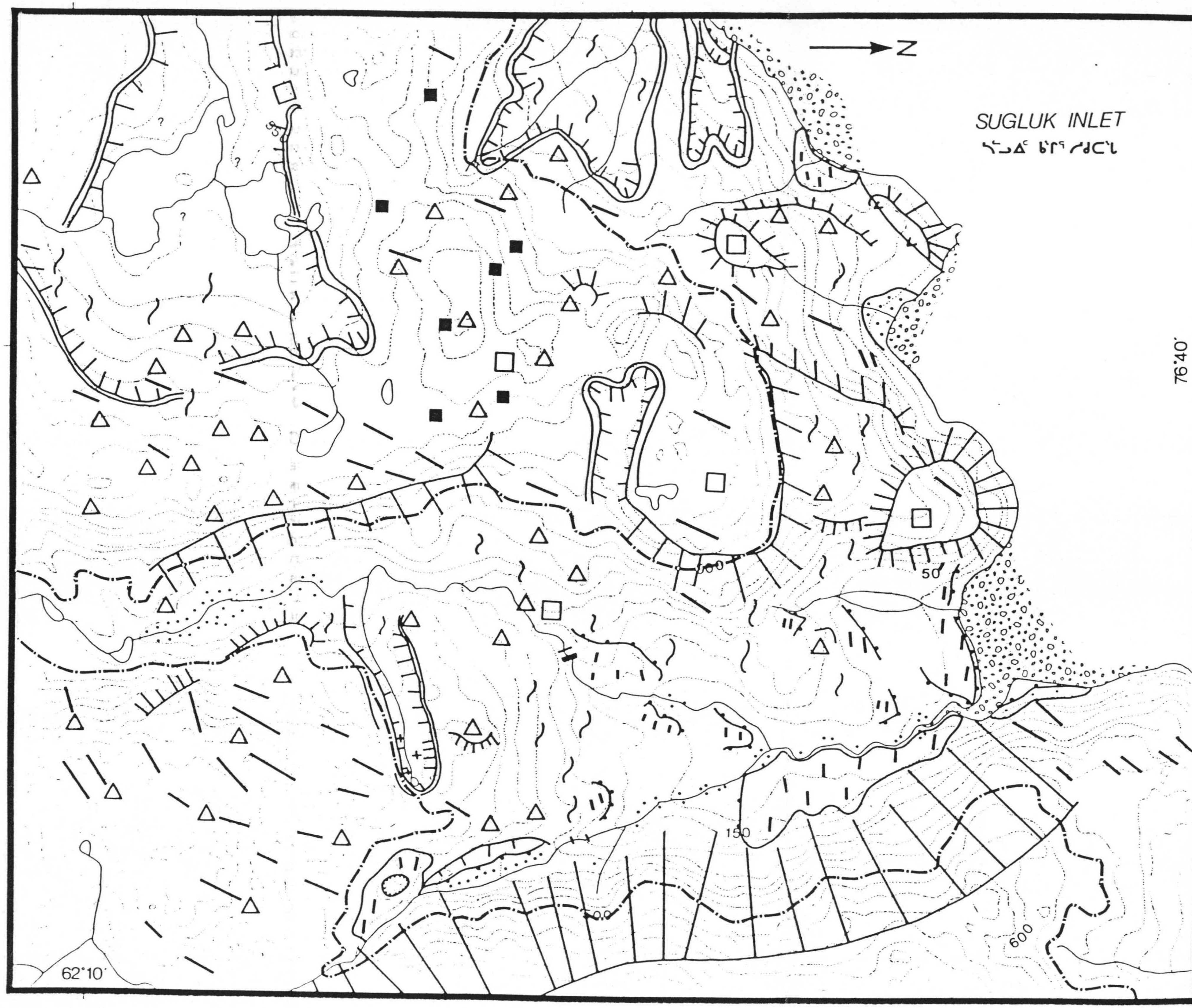
A study of the geology and geomorphology was carried out by Professor Benoît Robitaille, of the Department of Geography Laval University. This study was based on the use of aerial photos, published literature and on his own field investigations in the region. The interpretation of the physical landscape is summarized in Figures 7 and 8.

Rocks of the Salluit area are Precambrian (Protorozoic) in age and belong to the Churchill geological province. A rock sample, collected about 6 miles south of the settlement, has been dated at 1,655 million years.

Rock formations consist mainly of metamorphosed gneiss of sedimentary origin, or paragneiss. Biotite gneiss (micaschists) and amphibolite gneiss, are tha main rock types. They are part of an extended zone starting at the northern limit of the Cape Smith-Wakeham Belt and terminating on the northwest shore of Sugluk Inlet. There, rocks with the amphibolite facies grade into a granulite facies. A mass of amphibolite outcrops along the escarpment just east of the settlement. Another mass, of intrusive rocks (pegmatite), forms a conspicuous dyke across a small headland, along Sugluk Inlet, 1.5 mile due west from the settlement.

Rocks were deformed and metamorphosed during the Churchillian orogeny, as were those of the Cape Smith-Wakeham Bay Belt. In the Salluit area, structural directions (lineaments) are mostly north through north-

FIGURE 7



GEOMORPHOLOGY - LANDFORMS

- STRUCTURAL LINEAMENTS
- PROMINENT DYKES OR SILLS
- STEEP SLOPES AND ESCARPMENTS
- SOLIFLUCTION SLOPES
- CIRQUES
- KETTLES
- ALLUVIAL STREAM BEDS
- PATTERNED GROUND
- POST-GLACIAL MARINE LIMIT
- HILLS
- RIDGES-KNOBS
- TERRACES
- TALUS SLOPES
- STREAMS
- FALLS
- RAPIDS
- MODERN BEACH

GÉOMORPHOLOGIE - FORMATIONS TERRESTRES

- DIRECTIONS STRUCTURALES
- PRINCIPAUX DYKES ET SILLS
- PENTES RAIDES ET ESCARPEMENTS
- PENTES DE SOLIFLUCTION
- CIRQUES
- KETTLES
- LITS FLUVIAUX ALLUVIONNAIRES
- SOL GÉOMÉTRIQUE
- LIMITE MARINE POST-GLACIALE
- COLLINES
- CRÊTES ET BOSSES ROCHEUSES
- TERRASSES
- PENTES D'EBOULIS
- COURS D'EAU
- CHUTES
- RAPIDES
- PLAGE

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FIGURE 8

GEOMORPHOLOGY - MATERIAL

- BEDROCK
- TALUS
- FELSENMEER
- SOLIFLUCTION MATERIAL
- SAND AND GRAVEL
- SILT AND SAND
- POST-GLACIAL MARINE LIMIT
- WATER (ponds, lakes, rivers)

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- ᑕᓯᑦ/ᑕᓯᐊᐸᐃᑦ/ᑯᐅᑦ

GÉOMORPHOLOGIE - MATÉRIEL

- ROCHE EN PLACE
- ÉBOULIS
- FELSENMEER
- MATÉRIEL DE SOLIFLUCTION
- SABLE ET GRAVIER
- LIMON ET SABLE
- LIMITE MARINE POST-GLACIALE
- EAU (étangs, lacs, rivières)

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Région à l'Étude (Salluit)

east. A north-south fault-line coincides with the prominent escarpment just east of the Sugluk brook.

The area, from the point of view of physiography, is composed of an old plateau of crystalline rocks, the Sugluk plateau, which extends north of the Cape Smith-Wakeham Bay folded belt. This plateau is quite massive between Salluit and Deception Bay, with a mean elevation of 1,500 feet. The edge of this undissected portion of the Sugluk plateau is reached within 1 mile to the southeast of the settlement. The dissected border of the plateau is formed by Sugluk fiord and adjacent areas of hills, ridges and knobs, under 800 feet in elevation. Besides the fiord valley proper, two tributary valleys indent the plateau south of the settlement. Both are occupied by streams. Although the main relief features are pregracial, both glacial and subsquent marine processes have modified to a considerable extent the previous landscape.

Presumably, Pleistocene glaciations covered the whole area. Ice-flow direction, in the last phases of the last glaciation, were to the north and northeast, towards Sugluk Inlet. Although till is not often visible, except for the occasional patches or isolated erratic, it may well be more common than expected, due to overspreading by solifluction material. The most apparent effect of glacier ice has no doubt be the deepening and widening of Sugluk fiord, as well as the enlargement of amphitheaters, represented as cirques on the landform map. Kame and kettle deposits occur conspicuously along the stream flowing into Sugluk brook, between the two falls.

At the onset of deglaciation, ice was already channeled through Sugluk fiord. Some 8,000 years BP, the Tyrrell Sea invaded the area and reached the present-day 510-foot contour-line. However, glacial ice was still present along the shore, as is evidenced by a large kettle in a marine terrace at 450 feet-elevation, 2.3 kilometers upstream on the Sugluk brook. Since then, marine deposition and erosion has been very

active in the sheltered locations afforded both by the fiord and the adjacent low areas between hills. Marine terraces are present from the 510-foot marine limit to the present-day shore. They are best developed in those sectors lying below 150 feet, where they are composed of finer material such as silt, sand and gravel. Above that, marine deposits tend to be coarser presenting less and less fines, up to the marine limit.

Since deglaciation, periglacial processes have been prevailing in the landscape evolution. Frost-shattering of bedrock has been intensive especially on biotite paragneiss. Also, talus cones and shettes are widespred along the steeper slopes (cliffs, escarpments, valley and hill-sides) in the mas-area. Geligraction is also responsible for the coarse, angular debris forming a veil, a thin overburden, at the top of hills ridges and knobs, and which appear as "felsenmeer" on the landform map. Felsenmeer is characteristic of surfaces above the marine limit and is uncommon below it.

On gentle and moderate slopes, solifluction is universal, in the form of sheets, lobes and terrassettes. Solifluction material is heterogeneous and ranges from a matrix of fines to boulders, without sorting. In the area, the best-developed solifluction features are found in the cirques, especially the one with the two neighbouring lakes.

4.2.1.1 Granular Deposits

The description of geology and surface deposits, indicates that there is an abundance of granular materials scattered throughout the Salluit area. Major exploitable deposits of angular, frost-shattered rock can be found near all of the steeper slopes, but accumulations of this type of material are not plentiful on the highland plateau near the airstrip. Granular deposits now exploited by the community are located as part of the community infrastructure on Figure 6. The most important

areas are deposits of fine sands and gravel located in the river bed and along the eastern shore. A major deposit of sand and larger granular material has been identified on the west bank of the river, approximately two kilometers south of the village. This deposit has been partially exploited, but the Inuit want to minimize future use in order to maintain the valley sides and to assure that the river is not polluted with silt or other fine materials.

Although there is an abundance of sand and gravel, the community needs are also great since many of the road surfaces and building sites must be significantly raised to avoid the wet conditions of spring and summer. As well, the need to cover the existing dump site will require a large amount of granular material. For these reasons, the community is concerned about having crushed rock stockpiled from the airstrip project for their future use.

4.2.1.2 Drainage and Snow Accumulation

Salluit has large parts of the community that cannot be adequately used because of poor drainage. Most of this area is located in the central and northwestern sector of the community. A map of the land surrounding the community shows a pattern of small streams that serve as drainage courses for valley areas of snow accumulation and spring runoff. These streams carry water from early summer until the snow melt is complete, at which time most of them have dry beds. A major tributary of the Salluit river enters from the west approximately one kilometer north of the community. This stream flows all year and floods during the spring. It would have posed a major problem for the access road of airstrip site No. 2. A wet area is designated northeast of the airstrip and is on the present access road. The Inuit state that surface water or flooding does not occur but that it dries out later in the season. There are scattered areas of snow accumulation that are confined to low areas in

the land, none of which pose a potential problem to the winter maintenance of the access road.

4.2.2 Climatic Factors

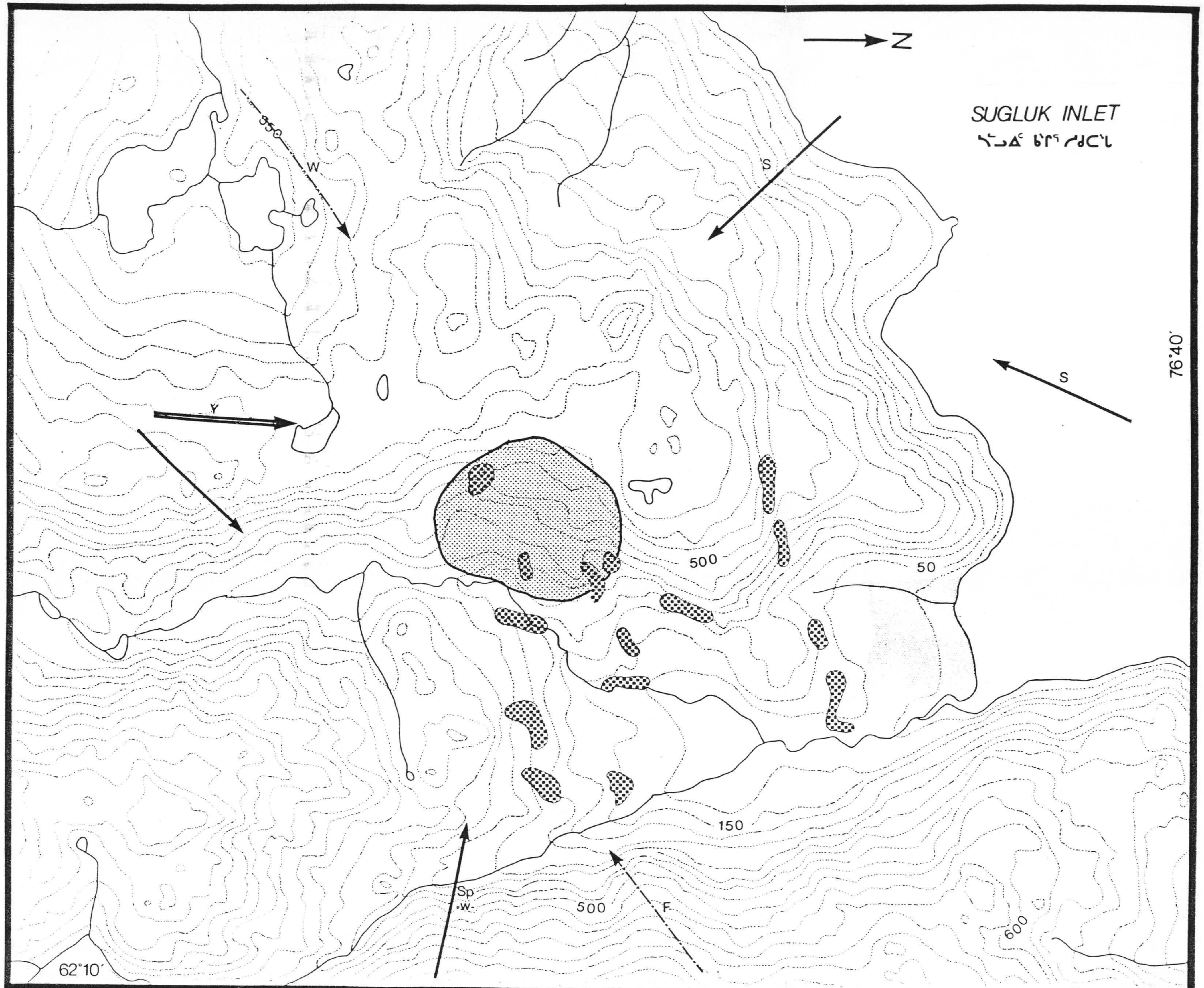
The climate, particularly wind and fog, of Salluit, has a direct impact on the delivery of air services, . The Inuit distinguish between plateau or highland winds, valley winds and coastal winds. Of these three groups the valley winds are the most unpredictable. The general pattern of winds is shown on Figure 9, and denotes the real winds. Inuit also distinguish, however, between real winds and apparent winds, noting that in certain areas if the wind appears to be from one direction, you know the real wind is coming from a different direction.

On the plateau the wind is steady in direction and intensity. The prevailing direction follows the north-south alignment of the proposed airstrip. The Inuit state, however, that on the present airstrip (No.1) the "real" wind is up on the plateau, and that there is an apparent wind at the airstrip as indicated by the "wind sock". At the same time, there are also winds along the valley walls that are irregular, and unpredictable. It was also noted by the Inuit that some of the most irregular winds of all occur near the first proposed airstrip site (No.2). This is an area where they often observe blowing snow that is shooting upwards along the valley wall in one zone, down the valley side a few hundred meters away, and across the area of the proposed airstrip site.

Fog and low ceilings are the other enemy of safe air service, and there is no exact description of the patterns. The Inuit note that dense fogs can develop in the spring especially after a few warm days when there is much moisture in the air from melting snow. This fog usually moves in from the sea to the land. Sometimes it is low and the plateau is clear and at other times the fog will form a thick layer over the valley and the

FIGURE 9

62°10′



SNOW ACCUMULATION, WET AREAS AND WINDS

- AREAS OF SNOW ACCUMULATION
- WET AREA
- WIND DIRECTION
  - Strongest wind
  - Occasional winds
  - -W- Warm wind
  - Y All year

W	Jan-March
Sp	Spring
S	Summer
F	Sept-Nov

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ACCUMULATIONS, TERRAIN HUMIDE ET VENTS

- ZONES D'ACCUMULATION
- TERRAIN HUMIDE
- DIRECTION DU VENT
  - Vent le plus fort
  - Vents occasionnels
  - -W- Vent chaud
  - Y Annuel

W	Jan-Mars
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F	Sept-Nov

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Northern Airport Impact Assessment
Salluit Study Site

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Étude d'Impacts des Aéroports Nordiques
Région à l'Étude (Salluit)

PART IV

PROJECT JUSTIFICATION AND DESCRIPTION

hills. The general consensus is that the possibility of having problems with fog is greater for the valley floor than for the plateau. In the fall the fog is often more widely distributed over a larger area and can be much further inland than the fogs of spring and fall.

Visibility problems created by blowing snow are usually greater in the valley than on the plateau, but not always. On the plateau the steady winds can create bad visibility at ground level, but the land surface is often more visible from the air. Under these conditions landings should be easier on the new airstrip than on the valley floor. The plateau also allows for a landing to be attempted and then aborted more safely than in the valley.

4.3 Resources

The environment of the land area adjacent to the community and the airstrip is not considered by Inuit to have any areas that have special importance for biological resources. This is particularly true for the region near the proposed airstrip. This is described as:

> An area where no one really goes for hunting or other activities. There can be birds or small geese just about anywhere so I cannot say the land is empty. But this is not a place we would go to look for anything except some geese in the fall around the lake (near the south east end of the airstrip). Once a big lake trout was caught in this lake (two lake systems east of airstrip) but that is all. People sometimes jigged there but they only caught a few little fish. People can also collect berries up on the hills but that is not where we go to pick them. They are along the river and closer to the shore towards the old airstrip (Sugluk Inlet airstrip).

4.3.1 Fish

The Inuit note that there used to be some small fish in the river that flows through the community, but it was never used by arctic char. This species is caught along the shore near the community in spring and fall, and at the river near the Fiord airstrip and at Deception Bay are most important.

The Inuit stated that there are very small fish in the shallow lake southeast of the airstrip. It is this lake that will have its drainage diverted because of construction. The drainage diversion, however, will only carry off the excess of spring water that usually flows west through a small water course. The fish found in this lake are typical of many small, shallow arctic lakes usually found on higher plateaus. Dr. G. Power, a fisheries biologist with many years' experience in Arctic Québec, indicates that these lakes become over-populated with small fish, usually arctic char, although they are often deformed and not recognizable by visual identification. A lake of this type usually has only one or two larger fish (around 14" and weighing 2 or 3 pounds). Consequently, the lakes do not contribute to the subsistance economy or to the long-term biological development of fishery resources. The two larger lakes that are located west of the proposed airstrip have some small lake trout. These lakes are never seriously fished but they do provide recreational fishing for some members of the community.

4.3.2 Birds

The geese fly up the Salluit Valley and across the hills to the east and west. Sometimes geese will land on the lakes near the airstrip, but never in great numbers and they do not stay there for long. They usually only land there if the wind is strong from the south in the fall. Sometimes people will drive there three-wheeled vehicles to these lakes:

> Sometimes in the fall I will go up to see if there are geese on the lake. And I can usually get one or two each fall depending on the wind. Anyway it is a nice ride up over the hills, even if there are no geese.

Ptarmigan can be found along the sides of the valleys in the spring time and occasionally in the fall. The plateau where the airstrip is to be built is not hunted for ptarmigan and those that usually appear are located further south along the valley sides. Close to the community the birds are in widely scattered and small groups.

4.3.3 Vegetation

The area of Salluit is vegetated with a moss lichen tundra on the plateaus and well-drained and protected valley slopes. The vegetative cover is also comprised of grasses in the lower areas that are poorly drained. The most heavily vegetated area of Salluit is in the river valley where willow bushes may reach hights of 2 to 3 feet. The vegetation cover of Salluit, like all other northern areas, can be easily disturbed by vehicle activity, that range from motorcycles or three-wheel vehicles to heavy trucks and tracked vehicles. The degree of disturbance is most pronounced for vegetation that overlies poorly drained areas that have an active layer which develops above the permafrost in summer. The community is concerned with maintaining a cover of vegetation, and although there are no regulations to control personnal vehicles, they want to make sure that heavy equipment maintains specific routes of travel in order to minimize damage to the ground cover and thus create exposed wet areas.

5. PROJECT JUSTIFICATION

The mayors of northern Québec selected Salluit as the first community to receive a new airstrip under the Northern Airport Infrastructure Improvement Program. Although no municipality has good facilities, Salluit has the very worst. The primary reason underlying the mayors' decision is a widely-held recognition by northern Québec Inuit that Salluit has suffered for years from a situation that is extremely dangerous, when landing on any of the three community airstrips or when travelling the 12 kilometers by sea between the "fiord strip" and the community. The concern with the dangerous conditions that face all travelers into and out of Salluit is emphasized by the three air crashes and four deaths that have occured since 1977.

A second set of reasons to justify the Salluit airstrip for the community and as the first priority of the mayors is that the conditions that have affected passenger safety and convenience have also had a negative impact on the economic and social development of Salluit and on its potential role in the regional economy. The new airstrip and infrastructure should improve this situation, and it will help create an effective northern linkeage between the Hudson Bay and Ungava Bay coasts. Such a link is considered by many Inuit to be essential for the political and economic growth of northern Québec.

The change in the proposed site has meant that the Inuit of Salluit have had to wait one more year to see the beginning of construction. This means that planes continue to use an unsafe airstrip, the community continues to worry, and the problem of freight, mail and fresh food delivery are not yet corrected through improved service. The importance of completing the project according to the new schedule and without delays is best stated by a councilor of the Municipality:

> After 10 years of worry and struggling to get a proper airstrip, we are finally close and the community is tired of the time and energy it takes to keep discussing this problem. If the strip is not begun this August, it will seriously demoralize the town and

this simply cannot be allowed to happen. If it doesn't happen again this year we simply don't know what else to do.

The concern of the community to finally begin and complete this project is felt by every adult. Even questions that are interpreted as not really understanding the depth of individual concern can provoke an angry response:

> I don't know what these questions (about certain impacts) are all about. My relative and a friend were killed out there on the ice when trying to land and you are asking what the airstrip will look like, kind of asking if it will be pretty. What I want to ask you is if it will be a good strip in the proper and safe location.
>
> Sure this place doesn't look too good and sometimes in the summer the dump really smells; we want it moved and lots of other improvements need to be done. But whose fault is this? Come here to live, go to school, get a good house, but no one really consulted us about how we want to develop our community. You can't all of a sudden change the past. We want the river valley and the small hills not to be destroyed but don't start saying the airstrip is not going to be built.

5.1 Safety of the Salluit Airstrip

The justification for the new airstrip incorporates many types of specific concerns. Some of the comments are expressed in the technical language of the pilots, while other people simply talk about their feelings about the condition of the Salluit airstrip.

A pilot for Air Inuit, who is also a resident of Salluit, provides an overview of the situation:

> This airstrip here in my home town is very, very hazardous to land on; the worst of all the communities. This is because its so short and there is usually trouble with the wind and the hills. It is a very difficult landing to execute and we only attempt to do it if the winds are less than 20 knots. Even though I live here and know the hills very well, the company will

> only allow experienced captains with more than 100 flying hours in northern airstrips at night for medical emergencies, but that is extremely difficult and it is always the pilot's choice. So far, we have been very lucky and have always been successful in getting the Twin Otter safely to the ground, even in darkness and sometimes in poor flying conditions if the emergency is very serious.

Problems of wind and terrain are further complicated by difficulties caused by a lack of navigation equipment. Again, the Air Inuit pilot from Salluit states:

> Problems in Salluit are made a lot worse because the air navigational beacon at Deception Bay is no longer operational. There isn't a beacon at Salluit itself, so we have no guidance system for locating the settlement. When the Deception Bay beacon was working, we would fly there and then follow the coast to Salluit Inlet.
>
> Since there is not a working beacon at Salluit or Deception Bay, we need the Omega Navigation system but between Kuujjuaq and Salluit it can be off by over one mile.

The chief pilot for Air Inuit has the final responsibility for authorizing flights into Salluit and for establishing the rules that govern the way aircraft must be handled for this community:

> Salluit is a very difficult airstrip even for the most experienced pilots. It is in an extremely dangerous valley and the airstrip is too short and at a steep angle which means there is little opportunity to manoeuvre. Because of this, we have had to put strict limitations to assure passenger safety. We have a 20 knot wind limit from any direction because of mechanical turbulance in the valley and a 2,000 pound payload limit because of strip length and angle of incline. We are lucky that the pilots all fly into each community regularly so they are familiar with the characteristics of the land and winds and they know what to watch out for even in night landings.
>
> We can not go to the community with passengers at night because we must land downhill. I do not like landing downhill but it is better than trying to estimate how close the plane is to the hills if you use an east approach. On the west, we can use the community lights as a guide, once we are below ceiling. You must fly along the edge of the community lights and then it gets dark so you go straight and then pick up the skidoo lights on the strip as we bank at low altitude and watch for the small hill and

> then drop to the strip. No matter if you use the east or west approach, once you let down over the sea, the problem is that you must execute two right angle turns at only 500 feet, at low speed, and a steep angle of bank.

Austin Airways, that has been the major airline servicing Salluit had an abrupt change of service on December 1, 1983. They called to tell the community that they would not permit any further service by their Twin Otter aircraft on the Salluit airstrip. They would not use the strip for any reason and based this decision on their judgement that the airstrip is not safe and do not want even experienced pilots to run the risk. This decision meant that Salluit would not have regular food and mail supplies, since these were carried out of Kuujjuarapik on an Austin contract. Austin stated that they would not resume service until the sea ice reached a minimum thickness of 23".

The public that must travel by air has respect for the skill of the pilots but they approach the problem of safety somewhat differently:

> Every time I have to fly, I start to get a little nervous, not so much when I am leaving because I can always go another time if the weather is bad. But when I come home, not knowing what the weather is going to be, that's when I can really worry. What I usually start thinking about is all those things we say to each other on the ground, like our airstrip isn't a real runway at all, it's just an accident waiting to happen 'or' getting in and out of this community is going to kill some of us one of these days. I always wish I wouldn't have heard those kind of things, but if we arrive here and there is plenty of clear sky, it's only at the very last turn that I get kind of nervous.

Concern is not limited to the Salluit Inuit. A visitor from Ivujivik noted:

> Even though I don't live in Salluit, other Inuit travel here a lot. I am never certain if we are going to survive... Also when we used to land down the fiord, we were always taken by canoe and so the danger is never over... Inuit feel the same way.

5.2 Economic and Social Factors

The economic future of northern Québec cannot be described with any degree of accuracy, and it is not possible to assign an exact economic or social value to air service. Nevertheless, the simple fact that the Inuit are involved in a great many activities that require the movement of people or materials indicates that air travel is essential to any type of future development.

The size of economic requirements of Salluit means it must have a dependable system of freight delivery to support commercial activity and consumer demands. The need for freight service is attested to by the volume of goods that enters the community by plane either as mail or regular cargo. The estimate for total community freight from all sources is between 12,000 and 15,000 pounds per week. This amount alone requires 7 cargo flights per week. The freight rate is only 19 cents per pound for parcel post which can include the sending of fresh or regular foods. Since regular freight is $2.20 from Kuujjuaq or $2.44 from Kuujjuarapik per pound, the consumer or entrepreneur in Salluit is able to offset costs to some degree if parcel post service can be utilized. Without this advantage, the freight cost becomes a major deterant to economic well being. Assuming that parcel post rates will continue to apply, then its productive use becomes a matter of available freight service.

In 1984, an estimated freight load of 600,000 to 650,000 pounds was flown to Salluit. Approximately 85 percent of the freight originates out of Kuujjuarapik. In that same year approximately 1,332 passengers flew into or departed Salluit. For passenger flights approximately 85 percent utilize the Ungava route. Most travel is to Kuujjuaq, and represents people travelling on an agency budget. Local travel is primarily to Kangiqsujuaq, Ivujivik and Povungnituk. Most of the inter-community travel is personal and paid for by the individual.

It has already been mentioned that the Inuit want to join their region together as much at the northern point as across the southern leg of the territory. Salluit views itself as the logical meeting place whenever groups from both sides of the Ungava penninsula must be in contact. This role will become more important as air fares increase and travel budgets become more restrictive. The creation of self-government will require a strengthening of east/west links but many of these will center on Salluit and then move from there to the south along both coasts.

5.3 The Airstrips of Salluit

The airstrip now selected for the project (Airstrip No.4) is one of four, that have been built or proposed (Figure 10). Three airstrips have actually been built. Airstrip No. 1 is directly south of the community and is now being used as the regular airstrip. Site No. 2 is approximately 2.5 km from the community and was partly constructed by the Municipal Couuncil and occasionally used by aircraft. There is no access road. Site No. 3 is 12 km away in Sugluk Fiord and is difficult and hazardous to reach. It was regularly used for almost 10 years. Site No. 4 is the new site proposed by the community. It has long been favored by the Inuit as the only logical location. It is on the plateau 3.5 km. south. There is no construction or installation at this site.

5.3.1 Airstrip No. 1 - Present Airstrip

It was noted earlier that Salluit has the most dangerous airstrips in northern Québec. The impact of this situation on the population and on the pilots responsible for the day to day delivery of air service is clearly stated in the Justification for the airstrip program.

Figure 10
The Airstrip of Salluit

The Salluit Airstrip (No 1)

View to the east showing hills that plane must follow to land on uphill slope. The orientation of the airstrip within the valley is the cause of cross winds and irregular turbulance. The small hill (A) will be blasted for granular material for new airstrip.

The airstrip presently used is dangerous because it is too short and too narrow. It slopes steeply uphill from the east so that it has only one possible approach which is from the east; it has steep hills and cliffs immediatly to the west, and a high ridge of hills across the small river to the east; and the east-west orientation is at right angles to the prevailing valley winds, which are also very unpredictable and subject to strong localized drafts and to sudden shifts in velocity and direction.

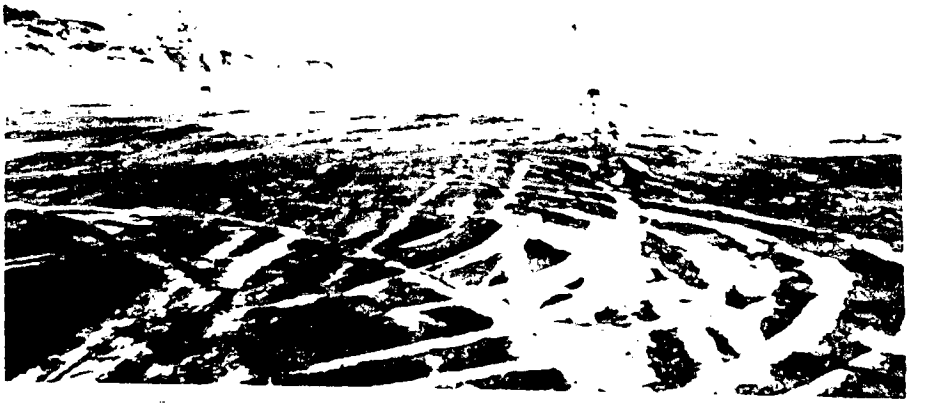
The dangers created from the physical setting and position of the airstrip are not alleviated by any navigational aids. The only instrumentation is a wind sock. There are no lights, and no beacon. Weather is given to the pilots without any equipment to indicate wind speed, direction or ceiling. Since conditions can change quickly, flights are often cancelled only to have conditions improved, or terminated after take off when conditions deteriorate.

The general conditions of the present airstrip are illustrated in Figure 11. A visual comparison between the Salluit airstrip now in use and the size of the proposed airstrip creates an obvious image of the limitations for this airstrip. Figure 11 A illustrates the position of the airstrip in the community. Figure 11 B illustrates the approach from the east and Figure 11 C shows the hills that rise on the west. The small rock outcrops shown in the center of the airstrip on Figure 11 A represent illegal obstacles for an approved airstrip.

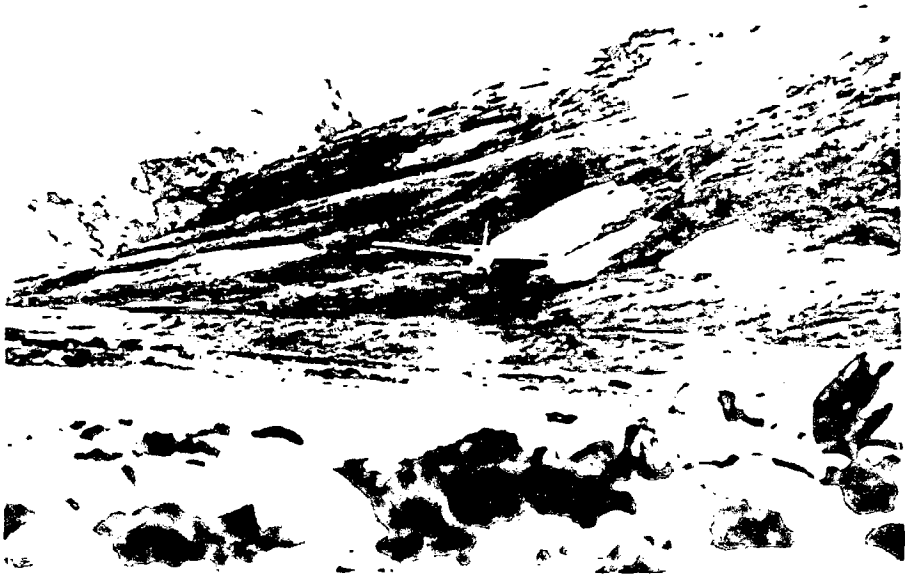
5.3.2 Airstrip No.2 First Proposed Site

This airstrip is located 2.5 kilometers south of the village. It was located as a possible site in 1980 and in 1981 an attempt was made to develop the site. Equipment was driven to the site and the land was scraped and filled to create a runway about 300 meters (900 feet). The runway was occasionally used by Austin and Air Inuit and was described by pilots as:

Figure 11



View of hill directly west of airstrip. The plane must approach the airstrip from right (north) to left (south) to make night landings down hill.



Plane approaching from east

> Absolutely terrible... the angle is so steep that it is difficult to make any positive contact with the ground and it is too much of an angle to land down slope if required by the wind. The orientation is better for cross winds than the other one but not that much better. The surface is very rough in some places and soft in others, so it is certain that we are going to loose a wheel some day and this could spin the plane depending on our speed. It is also a dangerous situation when taking off because of the surface condition.

The community also felt that this was a very poor spot for an airstrip and consequently they gave up any attempt to improve its length or surface, choosing instead to continue working on airstrip No.1. This airstrip was selected in October, 1983 in spite of community objections in July 1983, the Municipal Council was told that a study would be made for this airstrip and also for the airstrip prefered by the community. In fact, it appears as though the community preference was never seriously considered and no formal survey was undertaken. As described by one of the Municipal Councilors:

> We had a meeting in the summer and told the government people that the only place to build was on top of the hill. The people in charge of assessing the airstrips returned later in the fall and came to the area of airstrip No 2. They spent some wasted time with a few of the councellors. The people here in Salluit felt no response or attention from these people.

The community has strong objections to this location and they have voiced there objections from the very first. They state that the wind currents are worse here than at airstrip No.1 because they can see how the winds move in different directions when there is blowing snow. They also state that the slope is so steep that it can never be long enough and they feel it would be very expensive to construct.

The road to the airstrip is also considered to be difficult to build and ecologically damaging. They said that the streams that have to be crossed flow with much water in the spring and it will be very difficult to maintain unless an expensive bridge is built. They also stated that the valley could be seriously damaged by the road and that it would destroy the snowmobile route up the valley since the airport road

Figure 12

Above: Landscape and orientation (left to right) for first proposed airstrip (No 2).

:A major outcrop adjacent to aristrip No 2. (The airstrip parallels this hill). The Inuit note that this hill created very difficult wind conditions.

would be raised above ground level. They were also concerned that the exploitation of the sand and gravel deposits and road construction would severly alter the landscape and visual beauty of the area.

In December, 1983, after the survey and engineering study was completed it was anounced by Transport Canada engineers that the airstrip could only be 1,700 feet for its maximum length and that it would cost $17,000,000 to build. The people of Salluit were not surprised.

5.3.3 Airstrip No. 3 - Sugluk Inlet

The only reasonable alternative for airport infrastructure that is presently available to the people of Salluit is to reopen a landing strip that is located west of the community at the head of Sugluk Inlet. This airstrip is approximately 12 km by sea from Salluit and thus the hazards of the airstrip itself to passengers, pilots and planes is greatly intensified by the often dangerous trip using a canoe or a canoe and snowmobile combination that is required to travel this distance in all seasons but mid winter.

This site was selected in 1970 and the airstrip was built in the summer of 1972. A bulldozer was driven over the ice and then used to level and smooth a small area on the sand and gravel foreland that lies between the hills and the river. This airstrip is estimated to be 300 meters (900 feet) in length. Air Inuit pilots, however, estimate its effective length to be under 300 meters (900 feet). Sugluk Inlet airstrip is considered to be a reasonably easy airstrip to land on according to Air Inuit pilots. They say the strip has a very soft surface of fine sand. The only approach is from the north, and although this is over the sea, the southern end of the airstrip faces steep hills that rise abruptly to almost 330 meters (1,000 feet) above the water. Winds are irregular with strong drafting along the hills. The problem that has occured on this airstrip involves the "picking" of dust into the manifolds of the engine,

creating a potential for engine trouble. Since it is not possible to maintain this airstrip, the problem of fine sand cannot be easily solved.

Even if the surface can be used for planes, the trip to and from the community is still difficult. The problems encountered are well summarized in the following description.

> Maybe we can use the strip down the bay but people here aren't anxious to start travelling back and forth again. Its just too much trouble for everybody and it is never an easy trip.
>
> We used this landing strip in summer time, and those Inuit that bring people or mail and merchandize wants to get paid for delivering, because it used a lot of gasoline for reasons that it is far. The only way, they have to travel is by canoes, it's the real problem, and when the tide is low, and our tide is very wide, and the tides at the fiord are also very wide at the lowest level. And when, the weather is not good it is very hard to travel. When we really don't know if the plane would come, we sometimes don't want to get our canoes on the water and if the sea is rough. Only when we know for sure that the plane is arriving, we get our canoes on the water, sometimes we have to hurry, sometimes people that are travelling have to be left behind. During the spring time, there are even more dangers and at the fiord there is a current at the narrows. Even when it is dangerous to cross, they used it. There have been almost loss of life while using it at spring time. This is how it is dangerous in spring and when the sea ice is melting at some areas. We travel by snowmobile carrying canoes on the sleds that would be used to cross the open water getting to the other side and than travel by ski-doo again. Nobody here can travel like this again and how can Air Inuit make any schedule if this is how we must meet the plane and cause them long delays.

PART V

DESCRIPTION OF PROPOSED SITE AND PROJECT CONSTRUCTION

6. DESCRIPTION OF PROPOSED SITE AND PROJECT CONSTRUCTION

The northern airport infrastructure for Salluit includes the airstrip and access road for the project that will be located south east of the community. The airstrip will be 1037 meters (3,500 feet long) and 30 meters (100 feet) wide. The access road will be 5.4 meters wide and extend 3.2 kilometers between the community and the airstrip. In addition to the airstrip and access road, the airport will be supplied with power from the Hydro-Québec generating plant near the southern margin of the municipality. Power will be used to maintain heated facilities for passengers, freight and equipment. It will also power the lighting and navigation systems. A list of infrastructure and their specifications is provided in Table 8.

6.1 Location and Characteristics of Airstrip and Access Road

The location of the proposed airstrip and access road, as prepared by the engineering consultants is almost exactly the same location established by the Inuit in December, 1983 and shown to Transport Québec and Transport Canada officials on January 27, 1984. The characteristics of the land where the airstrip is to be built is shown in the photos on Figure 13. The details of location for the airstrip and access road are show on Figure 14. An enlarged copy of Figure 13 is included as Figure 14 A in the back of the report.

The proposed airstrip is positioned on a high plateau, in an area where the surface is reasonably smooth and without great irregularities or slopes. There are no high hills on either the north or south approach, and the small obstacles on the southeast side will be removed and used as fill. The prevailing wind is north-south, so that it blows along the length of the airstrip itself and there are no areas of heavy snow accumulation.

TABLE 8

CHARACTERISTICS OF PROPOSED AIRPORT INFRASTRUCTURE

Installation	Description
Runway	1067m X 30m, gravel
Parking area (aircraft)	46m X 76m, gravel
Taxi way	50m wide
Aircraft parking platform	13m X 13m, concrete
Hangar	109m^2, equipped
Garage	229.5m^2
Access road	
Water supply/sewage	well or haul, 2 septic tanks
Vehicle parking	10 vehicles, gravel
Fence	2m high, chain link, 300m max.
Gravel reserve	1000 tons
Meteorological instruments	Stevenson screen, anemometer, wind direction indicator, ceiling projector, 2 altimeters, 1 barometer, ceiling balloons
Electrical transmission line	
Rotating beam (ARCAL)	
Lighting	runway, taxiway, parking area
Navigation aids	illuminated wind socks, ARCO beam runway identification lights, non-directional beacon
Heavy equipment	snow plow (5 ton), JD544B loader, compactor

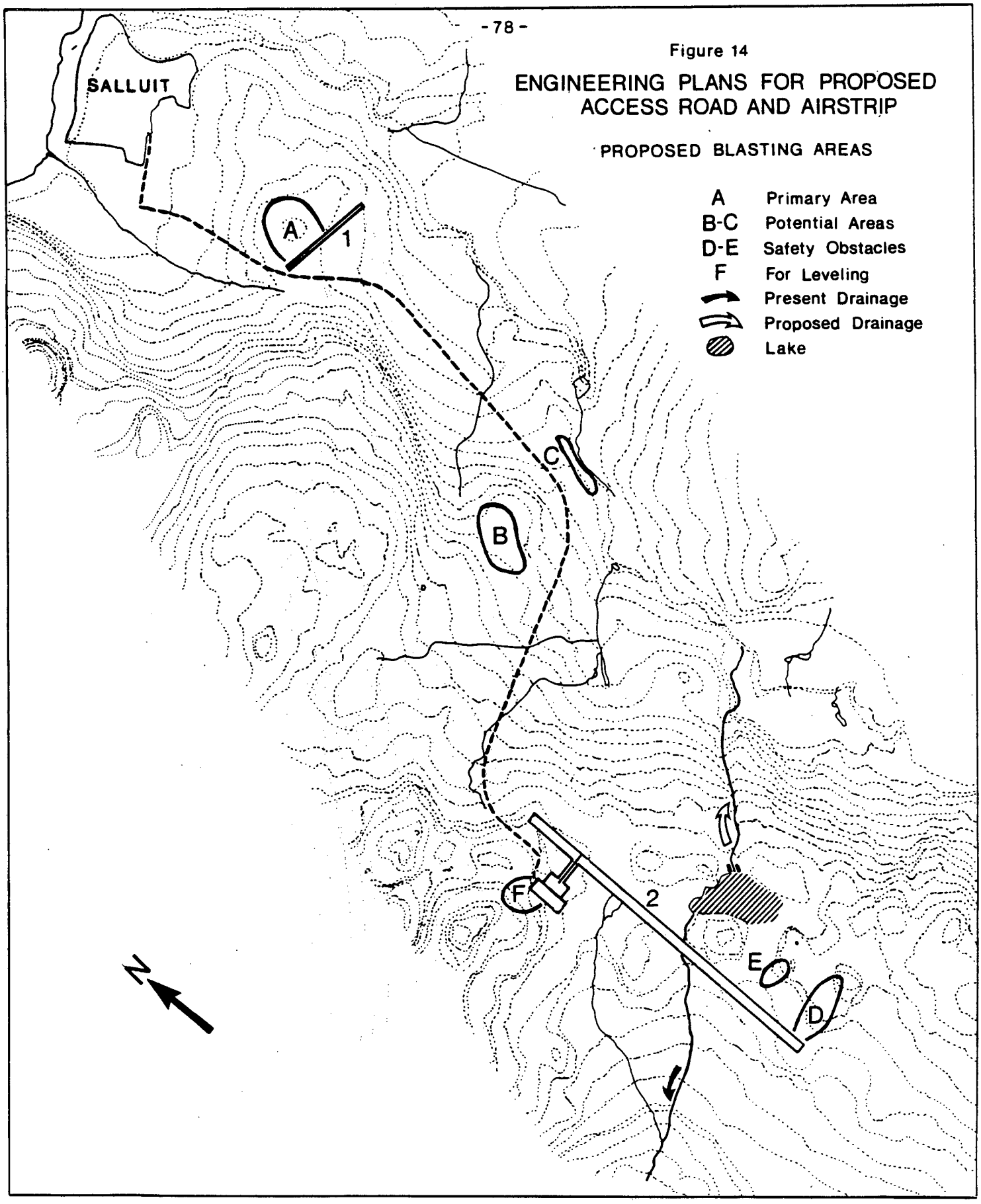
Figure 13

North. The airstrip location first proposed by community and now scheduled for construction. The orientation is from the lake on the south, north along the level surface of the plateau.

Figure 14

ENGINEERING PLANS FOR PROPOSED ACCESS ROAD AND AIRSTRIP

PROPOSED BLASTING AREAS



The only environmental impact concerns the drainage pattern. At the present time, the drainage from the small lake (A on Figure 14) is to the west, where it flows into a pair of small lakes approximately .5 km west. This drainage pattern will be diverted and an artificial outlet will be created at the lake to move water east ans into a small stream that then drains into the river. The lake is not deep and it only feeds the lakes to the west during spring runoff. By August the flow of water is significantly reduced, and in some seasons, there is no flow. The catchment basin is small, but no specific figures are available to calculate the volume of runoff. The lake is illustrated on Figure 13.

The access road begins on the northwest boundary of the municipality and follows a route approximately 3.5 kilometers that goes from the northwest section of the community south to the western edge of the present airstrip from which point it follows the gentelar valley slope southeast for 350 meters and then directly south for approximately 850 meters. From this point the road curves westward up the valley slope, rising almost 500 meters in approximately 950 meters of road length. From the top of the hill it curves south and still uphill to the airstrip and hanger area. The road should be built on top of the ground surface except for two areas that must be cut. The road surface of 5.4 meters (16.2 feet) will be raised approximately 60 meters (90 feet) from ground level. The road does not cut across any major water course and although culverts must be installed where the road crosses small streams no bridges are required.

6.2 Construction Procedures and Schedule

Construction of the Salluit airstrip scheduled to begin in August of 1985 and to continue for 3 years. Year 1 will involve the location for the rock crusher at a blasting site most probably a short distance north of the existing airstrip. From that point work will concentrate on building the access road towards the airstrip. This activity will finish

activity will finish in the late fall of 1985. Year 2 will begin after the snow melts in 1986 and continue until early winter. During this construction, the road will be finished and the airstrip will also be started and finished. In 1986, the buildings will be erected and the lighting and navigational aids installed.

The entire project will be based on a cutting and filling procedure. A total of 50,000 m^3 of crushed rock will be needed. 16,000 m^3 will be used for the road and 34,000 m^3 will be required for the airstrip. The main blasting site selected for the project is identified as area A on Figure 14. Two other rock outcrops have been identified (B and C) and a third potential source (D) has also been located. Because of the terrain and surface conditions it is necessary to build the road from blasting area A towards the airstrip. Estimates for area A indicate that there is 100,000 m^3 rock material in this zone. The hill that is being considered for blasting is identified on the photograph on Figure 11. The implications for the community with respect to this hill will be discussed in the section on impacts. The option of moving all of the equipment to area B or C is not viable in the view of the engineer because of the difficulty and damage to be caused by moving the heavy equipment across the landscape.

Material for the airstrip itself will be obtained from a cut and fill procedure. The southern one-third and the northern one-third of the airstrip will be cut and the center one-third will be filled. Significant amounts of fill will also be obtained by blasting the rock in the two obstacles that must be removed from the southeast corner of the airstrip for safety reasons (Figure 14 E, F). No estimates have yet been made for the material that is available in these two outcrops.

6.3 Construction Equipment and Workforce

At the writing of this report, a list of required equipment that will be used to construct the airstrip is not available. It is responsibility of the contractor to determine equipment needs and to establish all of the estimates that are required for rock blasting. It is certain, however, that the project will require more equipment than was utilized in Ivujivik. The trucks will have a ten foot wheel base and range from 22 to 35 tons empty. The top of the truck is 16 feet from the ground and they will be 50 to 70 tons when loaded. These size characteristics are given as a example of the equipment that must be off loaded, moved through the village, and put in place near the existing airstrip.

The movement of the heavy equipment from the beach to the construction site will require a further engineering plan and close consultation with the community. None of the community roads have been built to accomodate such large equipment and the electrical wires on route may have to be temporarily disconnected. Details of this procedure will be discussed in the section on impacts and correctives measures.

The workforce required for construction is also the responsibility of the contractor. The composition of this workforce however, will be determined by the number of people required, the skills needed and the absolute requirement to utilize Inuit labor and heavy equipment operators. The workforce therefore represents a social commitment on a part of the contractor that must be formally recognized in the contract agreement.

PART V

IDENTIFICATION OF SOCIAL AND ENVIRONMENTAL IMPACTS AND OF CORRECTIVE MEASURES

7. IMPACTS AND CORRECTIVE MEASURES

7.1 Airstrip Alternatives and their Impact

It is self evident from the facts and opinions expressed in this report that the most improtant question to be asked is what will happen to the community of Salluit if the airstrip is not built. The community has three possible answers.

1. The community will be seriously demoralized, and its potential for growth and for contributing to the development of the region will be significantly reduced.

2. The serious air accident that everyone feels is a matter of time under present flying conditions will happen and once again create an issue over the need for a safe airstrip.

3. The community will again consider the alternative of relocation to Deception Bay as the only possible solution for improving the airstrip and other needed community infrastructure.

The people of Salluit have had a solution to the problem for at least the last six years, when they located a site for airstrip construction on the high plateau south, southwest of the community. This solution was either ignored or deemed to be not feasible until the meeting on January 27, 1984, when a decision was made to have the Inuit site selected for study as the prefered site.

The selection of the site row under study has substantially reduced the real and perceived impacts to the local environment that would have occured if the first proposed site had been construted. The potential environmental impacts from that proposed site are outlined in Section 6.1.3. These environmental impacts would have been accompanied by the intense social impact that would occur when the

community knew they would have a very expensive yet inappropirate airstrip for safety and for community development.

7.2 Project Planning

7.2.1 Perceived Impact

The Inuit of Salluit stated that project planning is the most important factor to consider, and it is the community's highest priority for impact assessment and for establishing corrective measures. That will be most effective for successfully completing the airstrip construction. The Inuit of Salluit are quick to point out that project planning was off to a very bad start in their community because no one really listened to their point of view about the location of the first proposed airstrip. They felt that if there had been a shared responsibility in planning, then the delays would have been avoided. Certain problems that arose during construction of the Ivujivik project also serves as a model for why it is ciritcal to have Inuit supervision and not to end the impact assessment process at the stage of the K.E.Q.C. If the process ends at that point no one can assure that the recommendations will be acted on, or that phase 2 and 4 as described in Section 2.2 (page 12) of this report are respected.

Many specific ideas have been expressed, but there is agreement on the principles that underlie this situation: From the Municipal Council meeting on November 28, 1983:

> "We are sometimes being asked for our opinion, but no one ever does anything after we present our ideas. Usually they ask about little things and don't bother to consult with us about the important problems until they decide what is best, then they always want us to agree so it can be said they were here to consult with the community".
>
> "You are coming to ask about the airstrip and how we want to build a huge project that is very important but which is not the right project. If things would be serious to begin with you would be here to talk about a different airstrip".

"What choice do we have if we want something safer than the landings that now take place. If we say this isn't the right airstrip it means that everything is slowed down, maybe even for other communities. If we say no it isn't like we changed our mind. We never had the opportunity to express our opinion, but now all of a sudden we are asked to talk how this airstrip is going to hurt this or that and cause a problem. But if we talk of this, what about planning a whole new airstrip that the community knows is better, then that is the real impact."

By January of 1985, the ideas about project planning were expressed more specifically since the location of the airstrip was changed to conform with the original proposal put forward by the community. The emphasis shifted to planning the project in a way that would minimize construction problems. The concerns stated by the Municipal Council also reflect the information they have received from Ivujivik, since it is felt in Salluit that many unnecessary problems occured that had a negative impact on Ivujivik and probably on the project as well.

"We know what was happening with the Ivujivik Council, being asked to carry out all kinds of favors. We have many projects here and the amount of running around some contractors expect us to do is absolutly ridiculous. They expect us to be at their service when everytime they want something. It is crazy what they ask for".

"There are so many things that have to be looked after if a project is going to work without too many problems. If they would really consult us, not just expect to use us, I think we could reduce the serious problems by 50 or 60 percent, if we have a chance to be involved. Without input from the community there will be hassles of every type. We have a fairly good idea about what can happen up here, and all the engineers and others don't have a clae except for what the plan calls for. Some companies are more experienced but every community is different".

"Look what happened last year, we got a call from the foreman at Ivujivik to see if we can send the garbage bags. It probably took us about three or four hours to find out if we had enough and then even more time to package them and get them out to the airstrip. Then the plane that was to pick them up never arrived and after that we heard from someone else the project was stopped until spring so we had to haul them back and they are still in our warehouse. This seems just like a little thing but we are

busy and someone from the community should have known that their sea lift order was not adequate."

"The thing we can do is contribute to the plan of action and let the contractor and the engineers know what to expect once they are up here."

"Adequate preparation is a must, and we have to make sure that we are not caught in the middle. We have had enough of that in the past; and the community always suffers and the contractor ends up losing money or not doing as good a job. Already we could list so many things that could go wrong and fix them properly before anything arrives in the north."

"If we can do this the way we are talking, then this could serve as a model for the other community airstrips and save lots of headaches and wasted money."

7.2.2 Corrective Measures

The community has made recommendations to reduce future planning problems.

1. Consultation. The primary concern of the municipality is to have the opportunity for real consultation with Transport Québec before the contractor is selected and then with the contractor. The community has no budget for this type of activity but it is seen as critical. The consultation must begin as soon as possible after review by the K.E.Q.C.

2. Selection of contractor. The most important decision to be made is to select the best contractor. Consultation with the community will help Transport Québec to write up the requirements for the project in a way that will force the contractor to "build in", not "add on" the community point of view and knowledge about what must be accomplished and how. The community pointed out that there are many special things the contractor knows more about than the Inuit, but they are sure to avoid serious mistakes if both groups put their ideas together.

3. Project Review. The Municipal Council pointed out that there never seems to be a "final plan" in this type of project because new problems

are always being discovered. Nevertheless it is possible to minimize problems if there is a review of the plans that will enable the three groups (Inuit, contractor and Transport Québec) to discuss all relevant aspects of the project. The community points out that the need for a review is especially critical because every group is now working independently and there is no formal mechanism to integrate the separate decisions.

The community stated that Transport Québec has the responsibility to call all of the parties together, and they want this done as a workshop in Salluit. They said it should include the community, the contractor, the engineers, Transport Québec, personnel from the impact asessment study and, a representative from manpower. They also said that the people attending the workshop should come in on scheduled aircraft and not by a charter, because chartered aircraft are expensive and always mean the meetings will be too short to fully discuss the issues and find the best solutions to all of the problems.

4. Questions to Contractor. In order to accomplish a better working relationship between the community, the project proponent and the contractor, a set of questions was prepared by the Kangiqsujuaq Research Center, in conjunction with their Municipal Council. It is felt that these questions provide the basis for informing the contractor about the expectations of the community and they seem to highlight the responsibilities associated with the airstrip construction.

1) Before you prepare your bid for the airstrip, what factors will you consider?

2) Before you prepare your plans for the airstrip, will you consult with the Inuit to find out how they feel?

3) How will you proceed to find out how the Inuit feel about airstrip construction and what conditions they have set out for the contractor to follow?

4) When you will make the plans for the airstrip, how will you proceed to find out how many workers you will need?

5) Before you hire the workers, will you take into consideration the Inuit that have been trained for operating heavy equipment?

6) Will you be prepared to train Inuit for certain types of work on construction and with vehicles and other equipment?

7) What is your policy concerning licensed and unlicensed employees?

8) Will there be equal pay between non-native and Inuit workers?

9) Have you read the Environmental and Social Impact Assessment Report that defines what should be done to protect the environment and the community?

10) Will the president of the company be willing to travel to the community when necessary to settle problems and meet with the Inuit and other responsible people?

7.3 Project Supervision

7.3.1 Perceived Impacts

The community stated that all of the impacts that were noted in their discussion of project planning also relate to project supervision, and that all of the corrective measures required to minimize these impacts will only be carried out if there is responsible supervision. This supervision will also oversee all of the other impacts identified in the report, and be responsible for solving problems that will arise during the project itself. They stated that supervision must be shared between the community and Transport Québec and they felt that many of the problems that occured in Ivujivik would not have happened if the community would have been formally asked to help supervise to work.

7.3.2 Corrective Measures

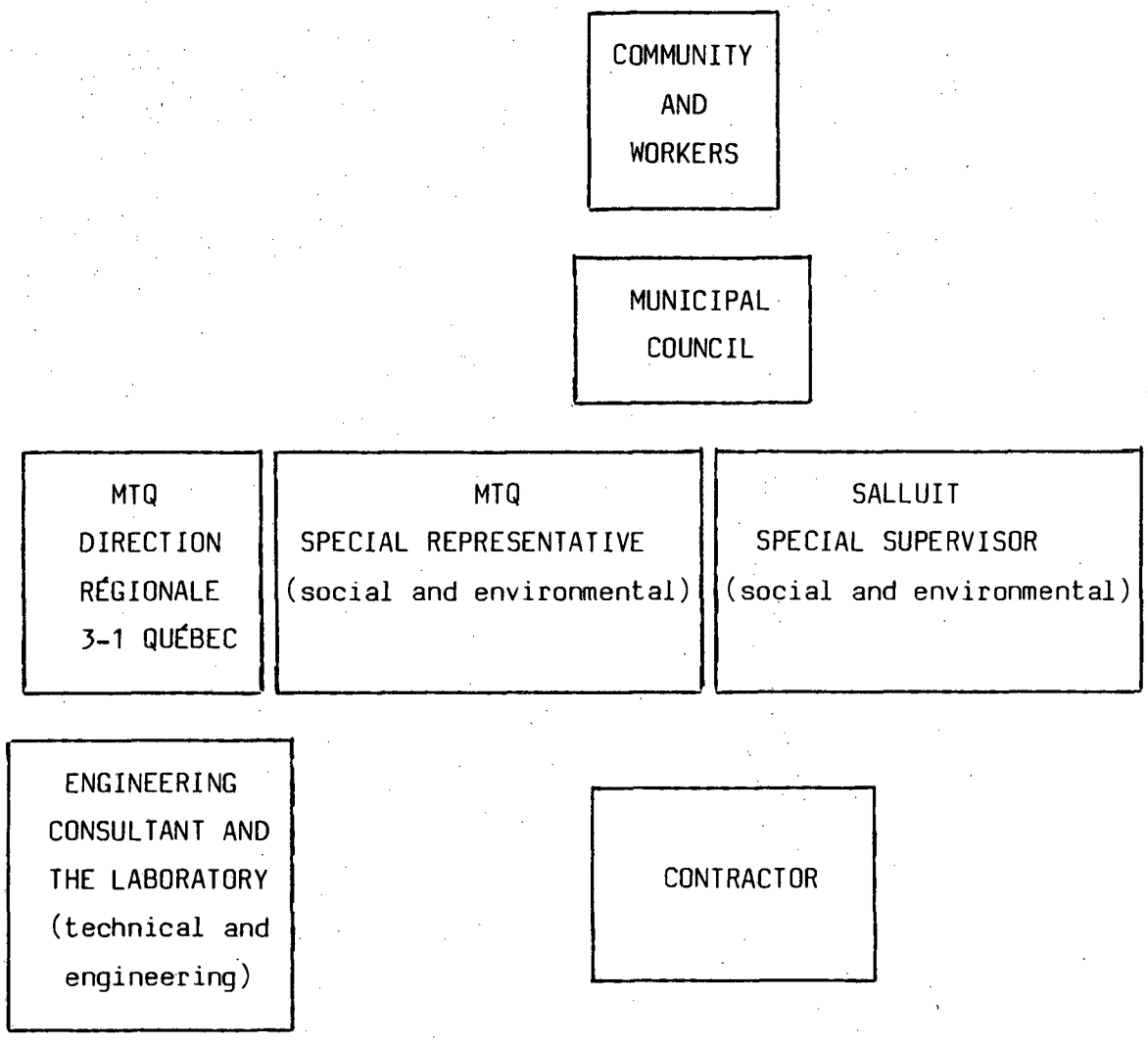
1. Inuk Supervision. A local person should be hired to act as a project coordinator and to participate in supervising the project with the appointed representative from Transport Québec. This individual will be salaried from the airstrip budget, and be selected by the community as soon as the project has been reviewed and accepted. This is to be a full time position before and during construction. Transport Québec recommends, however, that this be a liaison position with the Ministry, the contractor and the sub-contractors, under the supervision of the Ministry's on-site supervisor. This person would not be responisible for technical supervision.

2. Transport Québec Supervision. A representative from Transport Québec will be on site to supervise the project. Transport Québec, has notified the impact assessment researchers that this position will be the same as in Ivujivik, but he will be expected to work closely with and when necessary provide on the job training for, the Community supervisor.

3. Municipal Council Responsibility. The Municipal Council stated that they would be the community group responsible for representing the community. They did not feel that a special airstrip commitee would be required.

4. Respect for Construction Norms. All construction norms and environmental controls will be respected. The proponent will have on site, during the entire construction period, an engineering consultant and a laboratory to monitor all technical and engireering aspects of the construction of the runway, the road, the terminal building and the garage. The special representative of MTQ will work with the Inuk representative to monitor the social and environmental aspects and to ensure that the mechanisms that have been set out in the impact assessment and which will be established by the Municipal Council are respected.

The following chart illustrates the structure of the supervision.



7.4 Employment

7.4.1 Perceived Impact

The Inuit of Salluit stated that they expected the airstrip program to provide a significant source of employment for Inuit workers. They are aware of, and concerned with, the situation that developed in Ivujivik with respect to work force problems. The Municipal Council and representatives of community organizations discussed their ideas about employment in a meeting held on November 29, 1983. In this meeting it was pointed out:

> "We have had men training on heavy equipment away from home for almost a year. Some of these men will be working for the Council but they expect two years of work during the construction season right here at Salluit. The other Inuit are welcome here once our own people are working."
>
> "Work is never easy to find in Salluit and everything costs more money every year. We have always welcomed outsiders to come to Salluit and work along with Inuit. Like you can see at T.N.I. and in the school. But there is a lot of work we already know how to carry out or can learn very quickly. This is very true for outside construction and heavy equipment. Now we have a lot of workers from down south building the new school, but everything is very complicated for us in that type of construction because of the plans and the kind of materials that we have to work with because everything and even the very small things like a door knob has special directions and it is complicated without the training. We have been building roads and working with heavy equipment for many years here in the community and at Asbestos hill. We can work with the engineers and often they need our advice if the job is to be done properly."

On February 11, 1985 comments were again received from the community in which they stated the need to fully employ Inuit for drivers and for other labor. They also mentioned that the community would have to know the number of workers and types of skills required very soon because of the competititon with other summer employment.

7.4.2 Corrective Measures

1. Hiring Inuit. The contractor who will be selected to build the Salluit airstrip must be willing to hire Inuit for all levels of work. In order to assure that the Inuit have an opportunity to select appropriate employment the contractor should submit a clear description of the manpower requirements and each position should be defined by a job decription.

2. Utilization of Heavy Equipment Operators. The contractor must be willing to use the heavy equipment operators that have been trained for this purpose in the south. Two groups of people are available. The first are those from Salluit itself, and the second are those from other Inuit communities. This second group must be considered for employment before southern workers are brought north. The process of selecting heavy equipment operators should be based on the names listed in Table 9. Transport Québec's position is that only operators from Salluit will be given priority. Employment for Inuit operators from other communities will not be guaranteed.

3. Rates of Pay and Benefits. It is expected that the pay scale of each position is clearly defined and that the conditions governing the rate of pay stated. The basic principle in Salluit as in the other communities is that of equal pay for jobs of equal skill.

4. Hiring Formula. In Ivujivik a formula that guaranteed a minimum number of hours for Inuit employment was established. Although such an approach provides certain protection to Inuit workers, it cannot be easily established and it should involve a wider representation for the Inuit party. In order to assure a fair policy for Inuit employment the development of a set of principles required to establish a formula for hiring Inuit.

TABLE 9

HEAVY EQUIPMENT OPERATOR PROGRAM	
Moses Alaku	Salluit
Noah Angutijivk	Salluit
Arngnatuk Kopergualuk	Salluit
Lyiatuk Ajiaruk	Ivukivik
Jimmy Qunnilaaluk	Ivujivik
Levi Ammarualik	Povungnituk
Irquaq Kumarluk	Povungnituk
Sam Willie Kumarluk	Povungnituk
Charlie Kunvaquak	Povungnituk
Adamé Alaku	Kangiqsujuaq
David Tukkiapik	Kangiqsujuaq
Tommy Annahatak	Quaqtaq
Elijah Tukkiapik	Kangisuk
Mark Yates	Kangirsuk
Charlie Iggyook	Aupaluk
Peter Kudluk	Kuujjuaq
Jobie Munick	Kuujjuaq
Billy Saunders	Kuujjuaq
Tommy White	Kuujjuaq
David Baron	Kangiqsualujjuaq

7.5 Housing the Workforce

7.5.1 Perceived Impacts

The Inuit of Salluit have stated that, at the present time, there is no available structure in the community that can be used to house the workforce. Specific arragements cannot be made until the number of individuals is known but even a small group will have to be accomodated in structures brought in or built by the contractor. The small hotel should not be used to house the workforce because it is the only space available for short term transients that visit the community in summer. The community also stated that out of town Inuit workers must be "looked after" by the contractor in the same manner as southern workers. The Inuit workforce should have accomodations with the non-native workers or with local families.

7.5.2 Corrective Measures

1. Size of workforce. The contractor must determine the number of non-natives and natives non-resident who will be employed and housed for the project.

2. House Types and Location. The workers will have to live in prefabricated dwellings or trailers that will be erected, or transported to a site selected by the community in consultation with the contractor. The Municipal council stated that the site will have to be accessible for water and garbage services and they have suggested a zone on the southern margin of the community (Figure 15).

3. Housing Inuit Workforce. The non-resident Inuit workforce will have to be housed in buildings supplied by the contractor or in private homes with contracts for room and board to the household head. If local Inuit homes are used a rate of pay required to compensate for the northern cost of living will have to be paid to the household. As noted in 7.4.2 (3) Transport Québec will not guarantee employment for non-resident Inuit, and as such, would not support this recommendation.

7.6 Feeding the workforce

The Inuit stated that the workforce can be fed in the community, by using the hotel facility for cooking and eating. This contract will provide income to a local business. The arrangements for food will be made by the contractor and the hotel will be responsible for orders and storage of food from the south.

7.6.1 Corrective Measures

1. Food Deliveries. Food must be brought in from Val-d'Or using freight or mail service. It is expected that all supplies will be brought in by air and not by sealift.

2. Employment. A local cook can be used if available or the contractor can bring in his own cook that can be supported by a local Inuit staff. Kitchen help will be local.

3. Place. A room will be made available in the hotel for use by the construction workers. Provisions can be made for delivering food to the construction site.

4. Equipment and Supplies. Most equipment is available locally although some special utensiles maybe required by the contractor. It will also be necessary for the contractor to supply additional tanks of propane gas for the kitchen. There will be consultation with the community at all stages to ensure that community food and equipment supplies are not depleted.

7.7 Service Contracts

7.7.1 Perceived Impacts

The Municipal Council stated that they expect different enterprises within the municipality or within the community to have an opportunity of receiving service contracts on the airstrip. This will enable moneys from the airstrip program to be more widely distributed in the community.

7.7.2 Corrective Measures

1. Determining available contracts. The contractor should meet with the Municipal Council to discuss the requirements for the construction period and a list of required services should be drawn up. The Municipal Council will then make appropriate contacts with other community organizations or individuals and determine what services can be locally supplied.

2. Water and Garbage. The Municipal Council is prepared to provide services to the contractor for water delivery and garbage disposal. This service is dependent upon locating the housing and office in an appropriate area.

3. Community Equipment. The Municipal Council is not prepared to supply equipment to the contractor except under emergency conditions or for special purposes that are arranged in advance. One special purpose identified by the community is a preparation of a living site and service road that would take place before the arrival of the heavy equipment on the sealift. For most of the summer season, community equipment is already fully utilized to carry out local projects and services. The list of available equipment includes:

1) 4 dump trucks	2) D-6 Caterpillar
3) 850 bulldozer	4) 450 bulldozer and backhoe
5) 2 water trucks	6) 1 sewage truck
7) 1 pick-up truck	8) 1 station wagon

4. Garage and Equipment Service. The municipality has 1 two-door garage and 1 three-door garage. At the present time, they cannot house 60 percent of their own equipment. The contractor should bring a prefabricated garage in order to accomodate repair of equipment.

5. Fuel Supplies. Fuel including diesel and gasoline for construction vehicles will be supplied by the Shell Canada dealer. The contractor should contact the northern office for Shell Canada which is located in Montréal to make sure that supplies are adequate.

7.8 Staging Areas and Community Roads

7.8.1 Perceived Impacts

The Municipal Council has stated that there are 3 areas that will be affected by the delivery, movement, and storage of construction equipment. The first area is the offloading zone at the beach site: the second zone is the road that must be used to transport the construction equipment from the beach to the beginning of the construction site: the third is the storage area at the construction site for equipment and required maintenance buildings. The movement of heavy equipment will present a short lived but significant impact because the road surfaces may have to be improved for moving the trucks through the community, and electrical wires may also have to be temporarily disconnected.

7.8.2 Corrective Measures

1. Beach Staging Area. The contractor must determine the space required for the equipment and other supplies that will arrive by sealift. The Municipal Council will set aside a specific area for storage of equipment and supplies until the permanent area is prepared.

2. Transport Through Community. The contractor or a representative should visit the community as soon as the ground and the road are visible. A route for moving the equipment to the construction site will then be determined. Measurements of electrical wires will also be made and Hydro-Québec must be contacted to determine the temporary removal of these wires if required.

3. Construction Site Staging. The staging area for the construction site must be determined at the same time as the road connection through the community is chosen. The Municipal Council is not prepared to designate an exact area until they meet with the contractor but they suggest that this site should be located in the area of the presently used airstrip. Two possible areas have been noted on Figure 14.

4. Construction Road. The blueprint supplied by the engineer and labelled as Figure 11 A (Map pocket) has identified a road system called "Rue en construction" and "Rue future". The engineers stated that they were under the impression that the "Rue en construction" has already been completed in the summer of 1984. The Municipal Council, however, states that no road was constructed and that they did not have any notification asking them to carry out this project. This point should be communicated to the contractor in order to facilitate proper planning and estimates of costs.

7.9 Environmental Disturbance - Access Road

7.9.1 Perceived Impacts

Construction of the access road can produce two potential impacts on the environment. The first is the disturbance of the vegetative surface and active layer from the movement of heavy equipment. The second impact is possible disruption of drainage patterns for the small seasonal

streams that flow down the valley. The Inuit pointed out that these streams do not carry a large volume of water even during spring runoff. They are dry or almost dry from mid summer until freeze up. The impact to be considered is whether these small streams could affect the quality of the road and its maintenance.

7.9.2 Corrective Measures

1. Road Construction Methods. The access road will be raised above the surface of the tundra with only two areas of cutting required. In order to minimize damage to the permafrost the road surface will be built on a raised bed that is 600 millimeters thick. Because of the fill required for this construction method, it is essential to locate the site of the quarry and rock crusher at outcrop A since this will minimize any disturbance of the tundra surface during construction.

2. Restriction of Vehicle Travel. In order to minimize environmental damage to the surface of the tundra the contractor in consultation with the Ministry of Transport and local Inuk supervisors must established a transport corridor to be used by all vehicles. This corridor will follow the suggested road plan. It should also be clear that most vehicle traffic should not move across the tundra area before the road surface is completed.

3. Road Drainage Culverts. The engineer has designed the access road to accomodate the drainage problems posed by the seasonal streams. Two systems have been divised, one is a drainage ditch which will parallel the edge of the road surface on both the up slope and down slope side of the raised road bed. Intersections of the road and the streams will each have a culvert to carry off the flow of spring water. The location of these drainage culverts is clearly marked on the engineering plans.

7.10 Construction Blasting and Granular Materials

7.10.1 Perceived Impacts

The blasting and crushing of rock from rock outcrops has been selected as the most appropriate option for obtaining the required granular materials. Consequently, the deposits of sand and gravel now used by the community will not be exploited by the contractor. In particular no new gravel or sand deposits will be "opened up", which means the perceived impact of damaging the river valley will be avoided.

The utilization of crushed rocks is preferable to the community but it requires the selection of outcrops for source material, the placement of the crusher and the landscaping of the quarry area. The use of blasting also requires establishing safety procedures to protect the workers and the population of Salluit.

7.10.2 Corrective Measures

1. Selection of Rock Quarries. The rock quarry that will be used for the beginning of the construction has been located directly north of the present airstrip. (Zone A Figure 14). The only other available rock outcrops are 500 meters further south and would require trucks to severely disrupt anunprotected tundra surface. The Municipal Council gave approval of the selected rock outcrop north of the airstrip on February 13. This decision was approved by the community on February 18. The community is willing to have this hill removed as long as the area of blasting can be relandscaped for use by the community. The intensive utilization of quarry A is also supported by the fact that Department of Municipal Affairs will provide funds for the purchase of additional crushed rock that will be used for other local projects.

2. Quantities of Rock Removed. The quarry selected for blasting can produce 100,000 m^3 of rock. The project requires 16,000 m^3 for the road and 34,000 m^3 for the airstrip. The blasting and crushing should attempt to remove as much of the hill as possible in order to provide a stock pile of crushed rock for future community use and to facilitate re-landscaping the zone of blasting into a flat area.

3. Other Blasting Sites. Additional blasting will occur at the rock outcrops located on the south eastern corner of the proposed airstrip (Figure 11 D, E). This blasting is required to remove the obstical for flight safety. The removed material will be used for fill in the airstrip and the quarry must be levelled to prevent any dangerous area from being created. A second and smaller zone of blasting may also take place northwest of the parking apron (Figure 11 F). This blasting is required to obtain a level surface and must be re-landscape in a visually appealing manor.

4. Safety Requirements. The blasting must be done under conditions that assure worker and public safety. The situation in Ivujivik called for one blast per day and the following safety procedures where implemented:

1) In conjunction of the Municipal Council the contrator established a procedure whereby a truck equipped with a siren toured the village with a 12 short and 1 long signal.

2) Guards, supplied by the contractor, were posted at all access points to the construction site to ensure that nobody wandered into the area during the blasting.

3) Transport Canada issued a directive to air carriers not to use radios within a 2 mile radius of the community. All planes were also required to execute one passover before landing.

7.11 Lanscaping

7.11.1 Perceived Impacts

The concern of the community is that the hill utilized for crushed rock is made available for other uses. They are concerned with space for housing, recreation or other municipal needs. Le Service de l'Environnement, ministère des Transports has expressed their concern with the visual elements of the landscape. The concerns of both groups are not in conflict.

7.11.2 Corrective Measures

1. Identification of Community Use. The first step should be to consult with the community and determine in more detail their particular requirements for using the land after construction.

2. Identification of Contractors' Responsibility. The second step should be to consult with the contractor in order to establish the additional blasting required to meet the community needs, after the 50,000 m^3 have been obtained for the project. Since the hill has an estimated capacity of 100,000 m^3 community needs and landscape requirements must be considered in the pattern of blasting itself.

3. Consultation with Landscape Architect. The Service de l'Environnment, ministère des Transports requests that re-landscaping be carried out in consultation with a landscape architect. Re-landscaping will be done after construction in conformity with normal procedures, rules and environmental regulations.

This consultant must be in close communication with the community and contractor prior to project start up. The consultant will visit the community in June 1985 and prepare a report for the contractor by July 1st, 1985.

7.12 Garbage Dump Relocation

7.12.1 Perceived Impacts

The community has long been in need of a new garbage dump. One of the original concerns with the first proposed airstrip (airstrip No.2) was that it did not provide a road infrastructure for accomodating access to a new dump site that as been located for future development on the plateau west of the community (see Figure 6). The choice of airstrip No.4 recognized this need and allowed for an integration between the airstrip road and the proposed dump site road. To date no action has been taken on the dump site, but it remains a major concern to Salluit.

7.12.2 Corrective Measures

1. Regional Government Contracts. The original intention of integrating the airstrip road with a branch road to the new dump site should be seriously investigated once again. The available heavy equipment and access to crushed rock minimizes to cost of this secondary construction. The plans originally developed by Kativik Regional Government must be reviewed and a budget established so that a proper relocation of the dump site can take place in year 2 of construction.

2. Material availability. The availability of adequate supplies of crushed rock to carry out this project will be assured by the Department of Municipal Affairs that will allocate a special budget to Salluit for crusching and stockpiling granular material.

7.13 Maintenance of Air Service

7.13.1 Perceived Impacts

Both the community and the construction project will be severly affected if adequate air services cannot be maintained during construction. Air Inuit has stated that airstrip No.1 is their only choice for supplying this service since it is felt that airstrip No.2 would require major upgrading and airstrip No.3 is too far from the community especially in view of the air service required during construction.

7.13.2 Corrective Measures

1. Safety Requirements. In order to make sure that this critical service is maintained the location of the rock crusher and blasting area must respect safety requirements for the airstrip As well there will have to be landing procedures carefully worked out between Air Inuit and the contractor. In Ivujivik all radio contact by airplanes was forbidden within a two mile radius of the community. One passover by the airscraft was also required. A new set of procedures may be needed for Salluit. This procedure must be established an approved by the community and Air Inuit prior to construction.

2. Contractual Agreements. A clause has been written for the contractors contract requiring air service to be maintained. In order to assure that the operation of the Salluit airstrip is understood by all parties, and the methods for this are also understood, a written agreement must be drawn up between the contractor and Air Inuit and submitted to Ministère des Transports, Québec for review.

8. IMPACTS ON ARCHAEOLOGY

The archaeological information that is summarized in Appendix A has been prepared by M. Denis Roy, archaeologist for ministère des Transports, Québec. The material on which this summary is based was compiled by Mr.Ian Badgley, archaeologist, with the consulting firm of Aménatech Inc. Mr. Badgley completed a literature survey of the archaeological potential and, in 1984, a short field survey was completed in Salluit. M. Denis Roy also visited the community in June 1984, to explain an archaeological program associated with airstrip construction, to briefly observe areas of archaeological interest in or near the community and, to collect relevant information from Inuit.

The recommendations on archaelogical work associated with airstrip construction will be implemented through Avatuq Cultural Institute. Avatuq is presently establishing an archaeological policy and program for northern Québec which includes airstrip related surveys and excavations. A local Avatuq representative for Salluit will serve as the local contact person. It is expected that all decisions relating to the seclection of archaeologists and the program of required survey work will be the responsibility of Avataq in consultation with M. Denis Roy.

On February 28th, 1985 a meeting between Avatuq and Transport Québec was held to establish an agreement and protocal for the archaeological survey and possible excavation related to northern airstrips. The role of Avatuq in this process has been assured by adding a full time professional archaeologist to the Avatuq staff.

A list of specific recommendations has been set out by M. Denis Roy. The Municipal Council of Salluit has also called for one other protective measure. They require that the contractor bring a supply of wood to erect a fence to protect the historical graves since they are located in an area that could be easily disturbed by the movement of heavy equipment during airstrip construction.

1.0 INTRODUCTION

The present synthesis summarizes the principal aspects and results of the archaeological potential study of the immediate environs of the village of Salluit, located in the Sugluk Fjord, near the Hudson Strait, northern Quebec. The study, prepared by a specialized firm in archaeology for the Service de l'Environnement, Ministère des Transports du Québec, was carried out within the context of the impact assessment studies engendered by the Northern Quebec Airports Development Project.

The study focuses on the theoretical determination and mapping of zones in the area which were possibly used for settlement or other purposes by human populations occupying or frequenting the region through time. More explicitly, the study represents a preliminary phase in the mitigation of impacts on cultural heritage resources which may occur in the airport construction area. The study is also intended to provide the community with information concerning potential archaeological site locations adjacent to the village.

2.0 METHODOLOGY

An archaeological potential study involves, firstly, the research of all library information relevent to human occupation of the study area through time (i.e., archaeological, ethnohistorical and historical data, paleoenvironmental and present environmental circumstances, biological resources, etc ...).

The archaeological data is complemented by pre-inventory information gathered by the Service de l'Environnement du Ministère des Transports du Québec. The pre-inventory activities comprised interviews with local Inuit informants and a brief visual inspection of parts of the study area. The information collected concerns, in particular, prehistoric and historic site locations, traditional settlement-subsistence patterns and resource availability in the region. This information, coupled with the available archaeological data, allows the verification of the criteria previously established for the evaluation of the archaeological potential of the study area.

This information, of importance to the clarification of the culture-history of the region, represents the basic data necessary to the establishment of criteria for the evaluation of archaeological potential.

These evaluating criteria derive from the integration and hierarchical organization of the biophysical variables constituting the contexts of the archaeological sites previously reported in the region. These criteria, referring basically to physical variables (i.e., morphology, sedimentology, hydrographic associations, etc ...), are organized in terms of three relative degrees of archaeological potential: high, moderate and low or nul.

These degrees are translated into three corresponding zones of potential: A, B and C. The first of these zones represent localities most likely to contain archaeological resources while the third, indicates zones where probabilities to find sites are lowest. The moderate potential zones B suggest the possibility but not necessarily the probability of site occurence.

The evaluating criteria are applied to the study area through the interpretation of aerial photographs and topographic maps. The various potential zones determined are circumscribed on a topographic map scaled to 1 : 20 000. The extent and principal physical characteristics of each of the zones illustrated are described in an accompanying table (Table 1).

TABLE 1 : ARCHAEOLOGICAL POTENTIAL ZONES: PRIMARY DELIMITING CRITERIA

	ZONES OF POTENTIAL		
	High (A)	Moderate (B)	Low or Nul (C)
Morpho-sedimentology	Marine formations (beach ridges, terraces, etc.), fluvio-glacial, glacio-lacustrine and fluvial deposits (deltas, eskers, kames, beaches, etc.), composed of sand, gravel and/or cobbles or boulders overlying granular materials.	Thin till deposits overlying bedrock, sand, gravel and/or cobbles or boulders deposited directly on bedrock or silty-clayey formations.	Sporadic surface deposits on bedrock; bedrock outcrops; deposits composed principally of clayey or silty materials.
Drainage	Well-drained with rapid sub-surface infiltration.	Moderately well-drained with intermittent surface run-off.	Poorly-drained with slow infiltration; stagnation (bogs) and seasonal accumulation (marshes).
Topography	Relatively level or slightly inclined relief.	Irregular or undulating surface; moderate inclines (i.e., hill slopes, etc.).	Marked surface irregularities; steep inclines; depressions; etc.
Hydrography	Close proximity to present or past water bodies or courses; marine littoral; rivers or streams of various dimensions and character leading to inland lakes.	Variable distances from present or past hydrographic systems; featureless shorelines (absence of bays, etc.); ponds.	Absence of association with eigher present or past hydrographic systems; intermittent streams.

3.0 THE STUDY AREA

3.1 GEOGRAPHIC LOCATION AND GENERAL DESCRIPTION

Salluit is located on the south shore of Sugluk Fjord, northern Quebec, approximately 10 km inland from Hudson Strait (Figure 1).

The village is set in a small, fairly flat valley bordered, to the east and west, by steep hills and, to the north, by Salluit Fjord (Figure 2). A relatively wide river flows along the east side of the village. The hill slopes are abrupt and nearby mountains attain altitudes in excess of 550 m.

The surrounding hills and valley slopes consist of bare bedrock outcrops. Soil deposits in the valley are composed mainly of sand and clay, interspersed with bedrock outcrops. Sand and gravel fluvio-glacial deposits are also apparent in the valley.

The study area is located in the municipality of Salluit. This area, arbitrarily defined, is defined by a 5-km radius (islands excluded) centred on the village.

The definition of the study area is based, firstly, on the location of construction zones and, secondly, on the natural characteristics of the general environment. The construction zones include the proposed and selected airstrip sites (as indicated by the documents available for this study), the proposed access road site, and the two (2) suggested gravel pits.

The valley slopes rise steeply to more than 250 m. The elevation of the study area varies between roughly 20 m (the northern extremity) and 160 m (the southern limit). The surface of the area consists basically of exposed bedrock. Marine and fluvio-glacial and glacial deposits are also apparent. Raised gravel-boulder beaches occur in the area of the more northerly airstrip site and at the confluence of the two (2) rivers. Recent alluvial deposits form the banks of both rivers.

3.2 GEOLOGY AND PHYSIOGRAPHY

Geologically, the study area is located in the Cape Smith Fold Belt of Churchill Province, the northeastern section of the Canadian Shield (c.f., Stockwell et al., 1972). This Belt is characterized by sturctural unconformities marking the boundary between the Churchill and Superior geological provinces. The unconformities consist of folded Aphebian rocks of the Hudsonian Orogency grading into the more highly metamorphosed rocks of Churchill province. The major deposits include conglomerate, greywacke, sandstone, quartzite, limestone, dolomite and chert (c.f., Stockwell et al., 1972: 52).

The Cape Smith Fold Belt corresponds to the Sugluk Plateau division of the James physiographic region (c.f., Bostock, 1972). This plateau, borderec to the south by the Povungnituk Hills, is of undulating relief, attaining an elevation of roughly 590 m.a.s.l. At certain places along the north coast of the Ungava Peninsula, it drops precipitously as much as 525 m into Hudson Strait. To the west, it slopes gently toward Hudson Bay. The western section is within the limits of the Tyrrell Sea and contains landscape features and deposits associated with this postglacial marine transgression. The overwhelming majority of the plateau consists of exposed bedrock covered, in places, by a thin mantle of glacial till. (c.f., McCart and Beste, 1979; Vezinet, 1982). Too, clams, several varieties of mussels, and krill are found in the region.

3.4 PALEOENVIRONMENT

As illustrated by Prest (1972, Figure XII-15), the final Wisconsin deglaciation began in the eastern Hudson Strait region around 9 000 B.P., and, by roughly 8 000 B.P., the Ungava Peninsula coastline had been freed from Laurentian ice. This ice-mass continued to retreat toward the interior and, by 6 500 B.P., the majority of the peninsula had been deglaciated. Five hundred years later, remnant ice in the interior had disappeared.

The deglaciation of the Hudson Bay coast was accompanied by the Tyrrell Sea marine transgression. This transgression, dated to between 8 000 B.P. and 7 000 B.P., extended to variable distances inland along the entire perimeter of Hudson and James Bays (c.f., Hillaire-Marcel, 1979, Figure 41). In northeastern Hudson Bay, however, it was generally restrictec to the present coastal zone, attaining a maximum limit of 167 m at Cape Wolstenholme (Hillaire-Marcel, 1979: 98). The Tyrrell Sea retreated in correspondence with isostatic rebound and, by 3 000 B.P., the northwestern section of the Ungava Peninsula had fully emerged. The present Hudson Bay littoral developed following this latter date.

The final Wisconsin deglaciation is associated with a general climatic warming trend which culminated, around 3 500 B.P., in the Climatic Optimum (c.f., Liu, 1981; Richard, 1981). This trend was followed by a climatic deterioration and progressive decrease in precipitation. As summarized by Bryson and Wendland (1967), major fluctuations during this period include the warmer and drier Neo-Atlantic episode (ca. 1 000 - 750 B.P.), the transitional Pacific episode (ca. 750 - 400 B.P.) and the colder Neo-Boreal episode (beginning around 400 B.P.).

According to Richard (1981; intra vida), the coastal areas of the northern Ungava Peninsula were probably colonized by a sparse herbaceous tundra vegetation sometime shortly after 8 000 B.P. This tundra expanded into the upland areas coincidental with the deglaciation of the interior. The colonizing vegetation was replaced by a shrub tundra around 6 200 - 5 500 B.P. However, beginning around 4 500 B.P., this more luxuriant flora was succeeded by a second herbaceous tundra. As indicated by the palynological evidence, this latter tundra has undergone little change during the past 3 500 years.

4.0 ANALYTICAL DATA

4.1 ARCHAEOLOGICAL DATA

Consultation of the archaeological site files in the archives of the Ministère des Affaires Culturelles du Québec indicates that a registered Dorset site occurs in the extended study area. An historic cemetery and several metal fox-traps were observed in the summer 1984, during the pre-inventory phase of the potential study.

The Dorset site (KbFl-1), excavated by Taylor in 1957 (Taylor, 1958, 1959), is located on Sugluk Inlet, approximately 2 km southwest of Salluit. This site comprises a single tent ring situated on a small point. The elevation of the structure is 12 m.a.s.l. The excavated material and the structure are interpreted as indicating a brief summer camp occupied by a single family. Typological comparisons of lithic implements suggest that the site may date to as early as 600 B.C.

The historic cemetery is located in the centre of the village of Salluit. This cemetery consists of about 12 oval alignments of cobbles indicating burials. According to a local Inuit informant, the burials date to the 1920's-1930's.

The second site is represented by a tent ring, a number of stone structures tentatively interpreted as caches and a surface scatter of bones. This site is situated on the western edge of the valley south of the village, at approximately 60 m.a.s.l. Several metal fox-traps were noted in the vicinity of the site.

The Inuit informants also informed of the presence of numerous tent rings and burials along the north shore of Sugluk Inlet. No precise locations were noted, however.

5.0 HUMAN OCCUPATION OF NORTHERN UNGAVA

5.1 DATA INTERPRETATION

Archaeological data presently available suggest that northern Ungava was initially populated by Early Paleoeskimo Pre-Dorset groups sometime around 3 500 B.P. These occupations, although possibly of short duration, probably endured until the development of the Late Paleoeskimo Dorset culture at about 900 B.C. While Early Dorset occupations are poorly understood in northwestern Ungava, a cultural continuum in excess of 600 years may be indicated for this region.

Regardless, between approximately 400 B.C. and the beginning of the Christian era, Dorset populations expanded throughout Ungava as far south as Great Whale River on the Hudson Bay coast and into southern Ungava Bay. In certain areas, such as Richmond Gulf and northwestern Ungava Bay, local Dorset populations appear to have persisted into the 15th century.

However, by as early as the mid-12th century, Neoeskimo Thule groups had began to populate northern Ungava. Although evidence of cultural contacts and interaction between Dorset and Thule groups in Ungava is lacking, it may be presumed that resident Paleoeskimo populations in the region were eventually assimilated by the Neoeskimo groups.

This presumed cultural assimilation had been completed by the beginning of the historic period, the ethnohistoric groups encountered in the region during the early 17th century being the direct descendants of late Neoeskimo peoples. During the following 200 years, European-Inuit contacts in Ungava remained virtually inexistant. By the mid-19th century, regular cultural contact situations involving European and Inuit interaction had been established in Ungava Bay.

With the intensification of trading activities and commercial fishing shortly thereafter, Inuit economic adaptations became progressively oriented toward trapping and the acquisition of manufactured commodities. This final acculturative trend culminated during the 1940's and 50's with the installation of permanent logistic facilities and southern-based government

social service agencies in the area.

The prehistoric adaptations interpreted from the research data suggest that, while Ungava Pre-Dorset groups were restricted to maritime zones, the later Dorset and Thule populations exploited interior as well as coastal areas. However, since the study area is located in the coastal zone of northern Ungava, only the maritime components of these latter two (2) adaptive systems are relevent to the present study. The archaeologically most salient points within this context may be summarized as follows.

- Concerning Early Paleoeskimo occupations:

Pre-Dorset sites occur on isostatically-raised marine formations located at river mouths and on interior bays situated either on islands or the mainland. Well-drained localities composed of boulder fields overlying sand deposits and gravelly beach ridges were favoured site localities. The elevation of these localities varies in accordance with regional rebound rates, extending from approximately 16 m.a.s.l. (northwestern Ungava Bay) to roughly 126 m.a.s.l. (Great Whale River). Intermediate elevations are suggested for northwestern Ungava Peninsula.

- Concerning Late Paleoeskimo occupations:

Dorset sites occur consistently on elevationnally low, well-drained gravel beach ridges situated on both offshore islands and bay islands, on the edges of mainland bays and points, and along river banks extending inland. Featureless shorelines do not appear to have been prefered as habitation site locations. The majority of Dorset sites are situated below 15 m.a.s.l. In certain areas, however, Dorset occupations occur at high elevations; in these latter cases, the sites are usually situated some distance from the active shoreline and are frequently associated with small lakes or ponds.

- Concerning Neoeskimo Thule occupations:

Late prehistoric Thule site localities are both geomorphologically and locationnally similar to Dorset site situations.

Multi-component Dorset-Thule sites are not uncommon. Neoeskimo sites are also found in a variety of physical locations that do not appear to have been occupied by Dorset groups. Thule sites are situated at low elevations in close proximity to (if not on) active shorelines. Thule sites at elevations higher than 10 m.a.s.l. are rare.

- Concerning historic Inuit occupations:

Historic Inuit habitation sites in northern Ungava are located on active beaches composed of various granular materials providing efficient drainage of surface water. Occupation was generally restricted to a relatively narrow coastal zone, with inland movements occurring mostly through major river valleys. High elevation zones and areas removed from present hydrographic networks do not appear to have figured significantly in northern Ungava historic Inuit land use patterns.

In sum, the study area occurs in a coastal location which, in theory, was probably occupied and/or exploited by both prehistoric and historic northern Ungava Inuit populations. Consequently, the archaeological potential zones determined in the study area concern, primarily, possible Pre-Dorset, Dorset, Thule and historic Inuit site probability.

6.0 ARCHAEOLOGICAL POTENTIAL ZONES

6.1 ZONES OF HIGH POTENTIAL (A)

Extensive sections of the shoreline on both sides of Sugluk Inlet and the immediate environs of Salluit are assessed as being of high archaeological potential. These zones are characterized by sedimentary deposits occurring at river and stream mouths, along the shores of bays and points, and on irregular shorelines. Some informations suggests that the western edge of the valley south of Salluit is of high potentiel. This latter zone is situated at roughly 60 m.a.s.l. The remaining zones of high potential occur, generally, below 35 m.a.s.l.

6.2 ZONES OF MODERATE POTENTIAL (B)

The principal zones of moderate archaeological potential determined are contiguous with the major zones of high potential. In several cases, moderate potential zones extend to and along the shoreline. These zones are composed basically of discontinuous bedrock outcrops interspersed with relatively well-drained sand and gravel deposits. Sedimentary deposits bordering on the two inter-connected lakes west of the selected airport site and the two proposed gravel pits south of Salluit are also assessed as being of moderate potential. The southernmost gravel pit site and the lake are located at 150 m.a.s.l. The rest of the moderate potential zones are situated below 50 m.a.s.l.

6.3 ZONES OF LOW OR NUL POTENTIAL (C)

The vast majority of the study area is assessed as being of low or nul archaeological potential. Although possibly used or exploited for various specific reasons, this extensive area is lacking in general and particular physical characteristics commonly associated with settlement sites.

7.0 RECOMMANDATIONS

In consideration of the numerous zones of high and moderate archaeological potential delimited in the study area and in order to mitigate eventual construction impacts on the possible cultural heritage resources occuring in these zones, a systematic archaeological reconnaissance will be undertaken in this area. Reconnaissance activities, will concentrate on the high and moderate potential zones and include, additionally, the excavation of test pits.

The field crew for this reconnaissance will be composed of a minimum of two individuals, one of which a senior archaeologist experienced in the region and the other, of preference, a local Inuk.

The reconnaissance project should involve the active participation of Inuit organizations and the municipality concerned.

The community of Salluit will be fully informed of reconnaissance results immediately following completion of field-activities. In particular, these results might be published in Inuktittut and diffused to the community.

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ANNEX 1

PERSONNEL

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