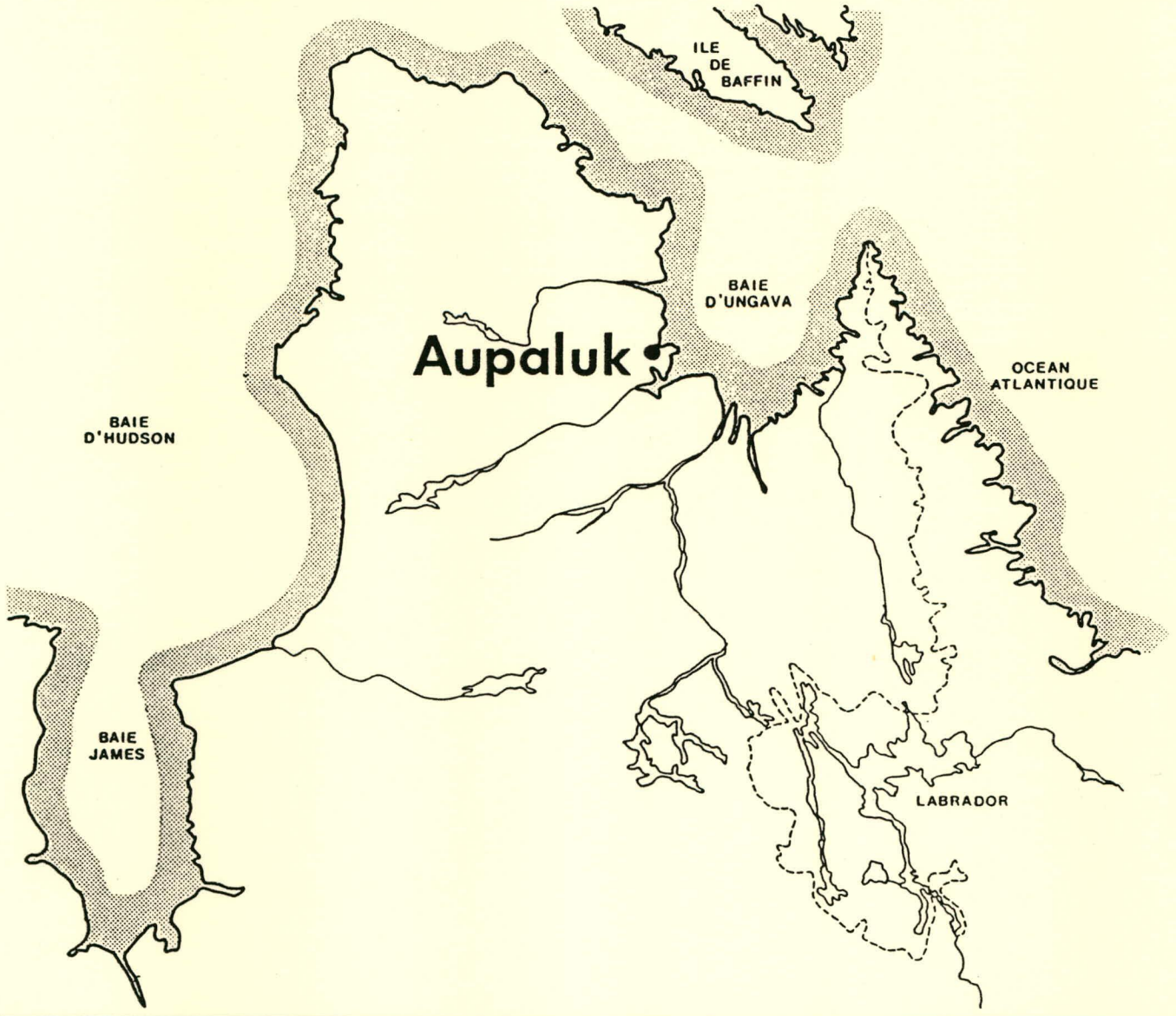
Gouvernement du Québec
Ministère des Transports
**Service de l'Environnement**



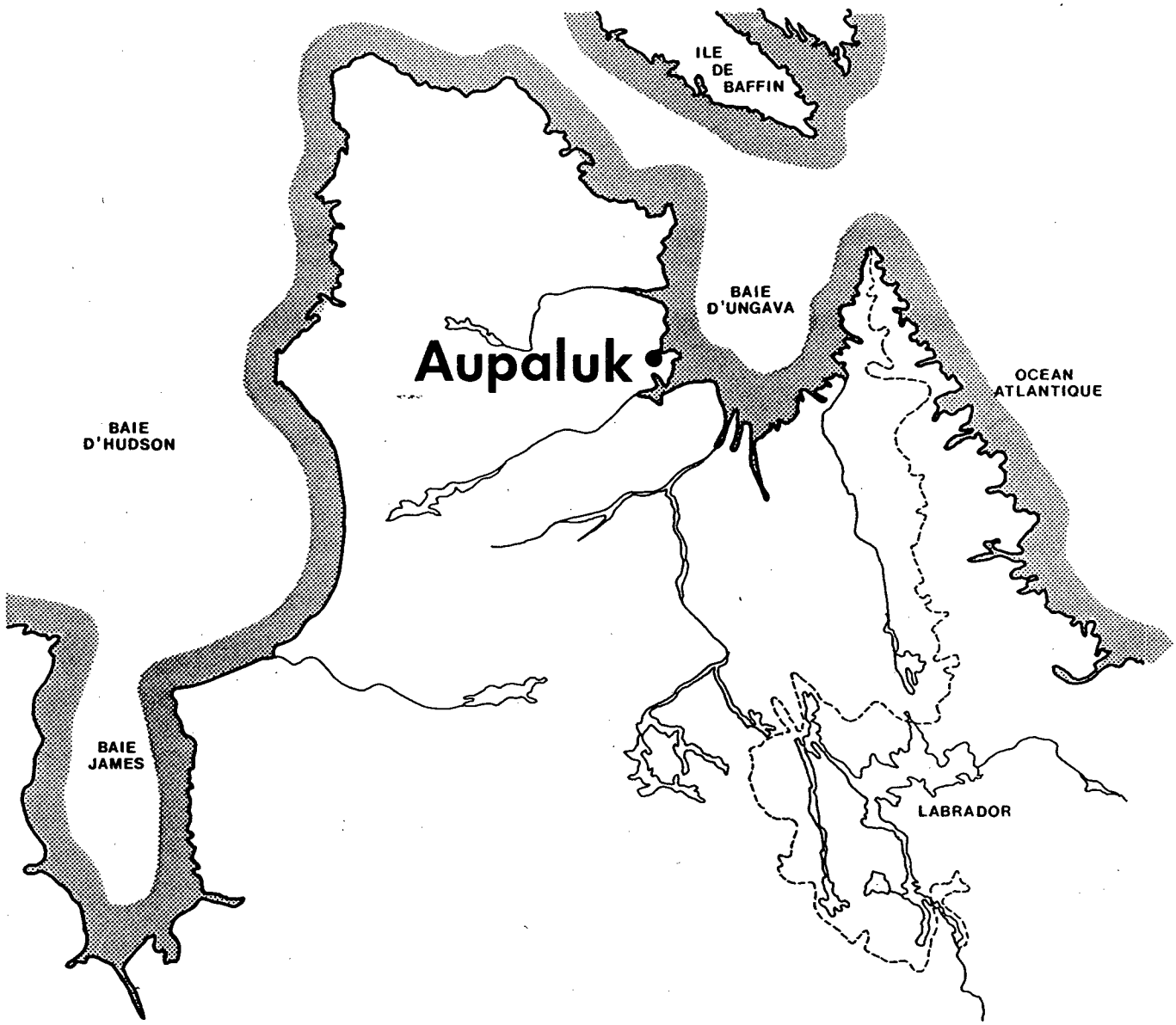

# AUPALUK NORTHERN AIRPORT

# ENVIRONMENTAL IMPACT STUDY

pluram inc.

MAY 1989

## RESUME



# AUPALUK NORTHERN AIRPORT

# ENVIRONMENTAL IMPACT STUDY

## SUMMARY



MAY 1989

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# 1. INTRODUCTION

# 1. INTRODUCTION

The present document is an environmental impact study of the plan to improve the airport infrastructures of the village of Aupaluk. The study involves essentially the identification and evaluation of the repercussions the project could have on the components of the physical, biological, visual and human environment, and the description of the mitigating measures designed to alleviate the potential impact of the project.

Because of the peculiar characteristics of the environment in which the project is to be carried out, the study has taken into consideration the knowledge and views of the Inuit community in order to integrate them into the impact evaluation process.

Bringing together all the elements of the required content of an impact study, this document is structured as follows:

1. description of the elements justifying the project;

2. description of the main operations proposed under the project to improve the airport infrastructures;

3. inventory of the various environmental components;

4. identification and evaluation of the expected repercussions of the project, on the basis of the proposed operations and of the environmental characteristics;

5. description of mitigating steps and residual impacts;

6. conclusion regarding the degree of insertion of the project in-the territory.

## 2. JUSTIFICATION OF PROJECT

## 2. JUSTIFICATION OF PROJECT

The plan to improve the airport of the village of Aupaluk, located some 150 kms north-east of Kuujjuaq, is part of the overall programme to improve airport infrastructures in Northern Québec.

The increase in needs linked to the demographic growth ot the Northern communities requires that airports in the Northern areas now be able to accomodate planes with a greater range, the whole under safety conditions meeting air transport regulations.

A summary analysis of the characteristics of Aupaluk airport is sufficient to understand the urgency of improving this facility. Actually, the present infrastructures constitute a danger at take-off and landing mainly because the airstrip is short (450 meters) and narrow and is laid on poor foundations (a very soft airstrip); moreover, navigational aid facilities are non existent.

### 2.1 INFRASTRUCTURES IMPROVEMENT PROGRAMME

Under the Northern airport infrastructures improvement programme, the Government of Québec pays 40% of the cost of carrying out the project and the Federal Government is in charge of technical studies, engineering and purchase plans as well as the establishment and maintenance of navigational aid facilities. Transport Québec, as developer of the project, is in charge of the environmental and social impact study, the purchase and maintenance of the equipment required to operate airports, the obtention of the building rights and permits, the building and supervision of the work. Transport Québec is also in charge of the long term operation and maintenance of the airport infrastructures and facilities, except for the navigational aid facilities.

## 2.2 HISTORY OF AIR SERVICE IN NORTHERN QUÉBEC

Regular air service was established to the Hudson Bay and Ungava Bay regions only in the mid-Seventies. Prior to that time, the absence of land infrastructures, in the villages, imposed the use of single-motor aircraft unable to give a regular and efficient service, specially when ice was either forming or thawing, i.e., for periods lasting each from four to six weeks. Despite the effectiveness of the aircraft used since the mid-Seventies (aircraft of the "Twin Otter" type), their low load capacity results in major transport operation costs. Moreover, because freight and passengers are generally accommodated on a same flight, it is practically impossible to provide user comfort.

## 2.3 FUTURE REQUIREMENTS

One of the major objectives in the field of air service in Northern Québec is the efficient transport of goods. Given the efficiency and profitability problems now characterizing the air transport system in a nordic environment, the use of planes with a greater load capacity would improve conditions considerably. For example, the Hawker Siddley 748 can carry up to 5215 kgs (11 500 lbs); even a DC-3 can carry 2 945 kgs (6 500 lbs). However, both types of planes require 1070-meter-long airstrips which necessarily implies the improvement of the airstrips now existing in Northern areas.

The new 1070-meter airstrips and their infrastructures will make it possible to extend air operations with the acquisition of more appropriate aircraft, less expensive to operate, and the development of new embarkation facilities to improve passenger service. The increase of the air transport capacity will also reduce the present problems related to the use of boat transport. Thus, the use of aircraft will avoid the long delays and reducing warehousing costs; it will permit lower stocks and facilitate supply planning. Finally, the airport improvement programme will raise the level of safety for passengers, pilots, equipment and mainly the Inuit communities, secure in the knowledge that urgent medical cases can be flown night and day to Montréal or Québec.

# 3. DESCRIPTION OF PROJECT

## 3. DESCRIPTION OF PROJECT

### 3.1 LOCATION OF PROJECT

The village of Aupaluk is located on the west shore of the Ungava Bay, at 59°, 18' North latitude and at 69°, 40' West longitude; the village which borders a small bay called Hopes Advance is 80 kms south of the village of Kangirsuk and 150 kms north of Kuujjuaq (see figure 1.).

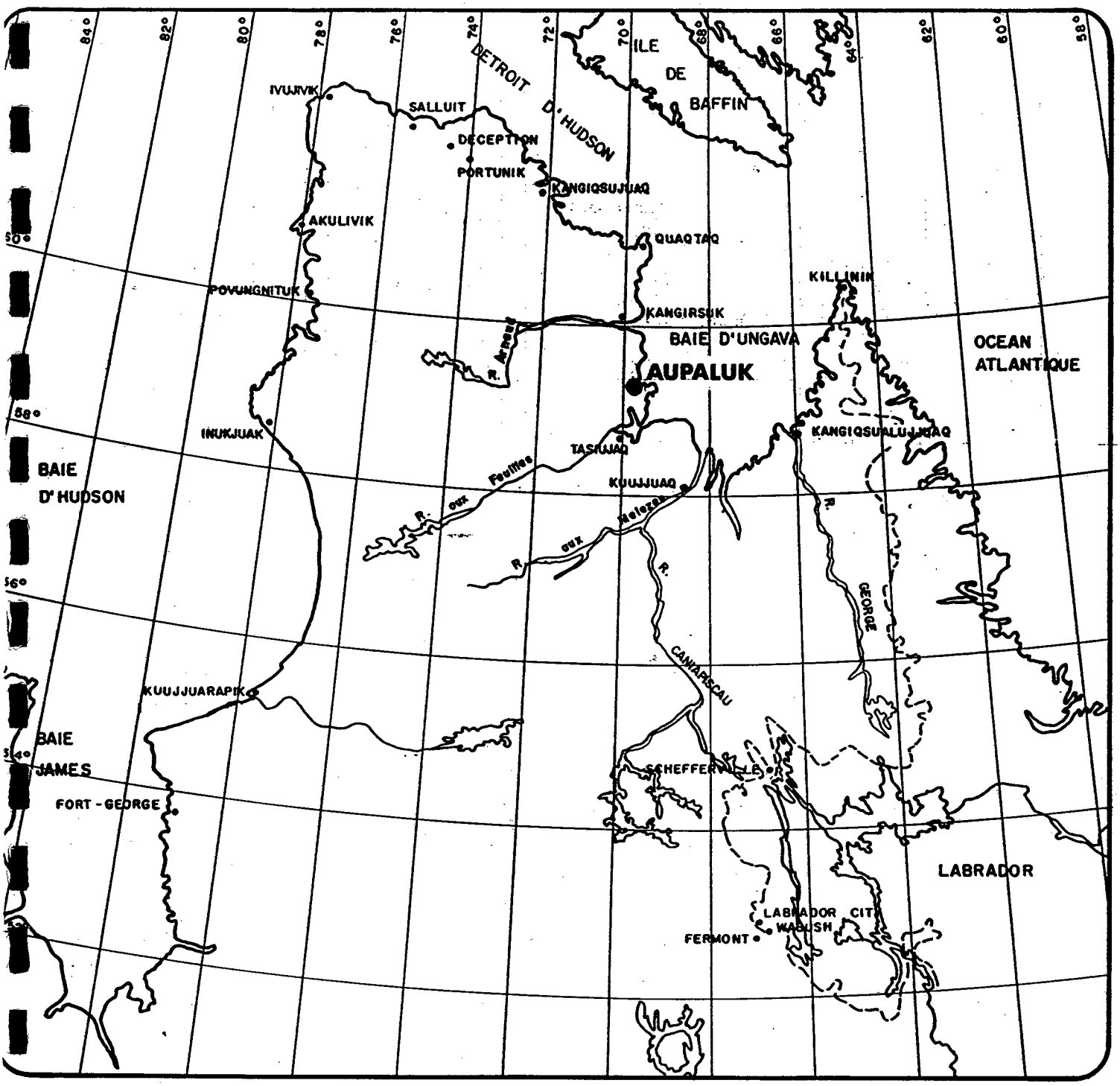
### 3.2 PROPOSED INFRASTRUCTURES

Because of the physical characteristics of the territory and of the requirements with respect to air zoning, only one site has been selected for the establishment of the new airstrip, the axis of which intersects at its north end the present airstrip. (magnetic orientation 05-23).

The project provides for the development of a gravel backfill airstrip 1070 meters long and 30 meters wide.

A traffic area and an apron will also be developed in the north-west part of the airstrip so as to provide a link between the airstrip and the reception facilities (airport and garage) to be located opposite the apron. Navigational aid equipment, such as airstrip lights, an anemometer and an NDB antenna are also proposed.

The access road now linking the village to the drinking water reservoir to the east will be intersected by the proposed airstrip; the project provides for a new layout of this road to run north of the future airstrip.




environmental impact study

# STUDY AREA LOCATION PLAN

Gouvernement du Québec
Ministère des Transports
Service de l'Environnement

DESSINÉ PAR:
VÉRIFIÉ LE_____PAR_____
ÉCHELLE : 1 : 9 333 333 approx.

0 100 200 300 km

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figure 1

## 3.3 COMPLEMENTARY DATA

The establishment of the facilities will require major earthworks, and therefore the need for a granular material supply. In all, five (5) extraction sites have been evaluated through geotechnical surveys: three (3) borrow pits and two (2) quarries.

According to initial evaluations, the work could be carried out over a four (4) to five (5)-month period. In all, forty or so employees would be called upon to work on the site during that period; of that number, some ten workers are to be from Aupaluk village. In the longer term, the operation of the landing strip would make possible the establishment of a permanent position and perhaps two (2) part-time ones, such positions to be assigned on a priority basis to the residents of Aupaluk.

# 4. INVENTORY OF ENVIRONMENT

# 4. INVENTORY OF ENVIRONMENT

## 4.1 METHODOLOGY

The inventory of the environment was carried out by putting together the data and information obtained through the various following processes:

- interpretation of aerial photographs on a scale of 1:5000;
- visit of site under study;
- bibliographical research;
- consultation of the Aupaluk Village Council and of various private and government agencies;
- anthropological studies the main purpose of which being the evaluation of the repercussions of the project on the urban milieu;

The environmental elements as a whole were taken into consideration at the inventory stage:

- climatology, geology and geomorphology
- flora and fauna
- archaeology
- human milieu
- visual analysis

## 4.2 GENERAL CLIMATOLOGY DATA

In the Aupaluk region, the mean temperature hovers around -5°C and the frost-free period lasts 40 days. The mean annual duration of the growth season is 80 days. The territory receives each year precipitations in excess of 400 millimeters, 45% of which in the form of snow. Generally speaking, the dominant winds blow from the north and northwest. These winds have a mean annual 20 km/hr rate of speed while the maximum mean hourly wind rate of speed is 88 kms/hr.

## 4.3 DESCRIPTION OF PHYSICAL ENVIRONMENT

The Aupaluk region is part of the Labrador slopes physiographic unit which runs along the west coast of the Ungava Bay.

On the site under consideration, the terrain is composed mainly of a series of sand terraces which extend up to a major rocky slope located around 1 km inland and rising to an altitude of a little more than 90 meters.

The cover of the area under study is made up almost exclusively of crumbly or loose deposits left by d'Iberville Sea following the recession of the Quaternary glaciers.

The presence of these loose deposits has made it possible to identify some potential borrow pit areas to supply material for concrete mixes; these borrow pits are located as follows:

1- a first borrow pit has been located 250 meters east of the proposed strip;

2- two borrow pits have been located less than 300 meters on both sides of the north end of the proposed airstrip.

The rocky outcrops observed in the area under consideration form part of the gneissic complex of the east Labrador geosyncline.

Two potential quarry sites have been identified within these rocky outcrops. The first site is located 500 meters north of the airstrip, beside the existing aeration basin and cemetery. It is made up of a rocky mount having an altitude of 45 meters. However, this site has special significance for Aupaluk residents who use it, among other things, as an observation point.

The second quarry site is located 400 meters east of the site of the future landing strip.

The Inuit seem to be aware of some steatite outcrops to be found in one of the crevasses in the rocky slope east of the airstrip; the residents of Aupaluk attach considerable importance to this small steatite bed.

The Aupaluk region is located in the discontinuous permafrost zone. Thus the upper part of the dead ground or cover is subject to the annual frost and thaw

phenomenon. The presence of permafrost must be taken into consideration during the building period.

Finally, a small solifluction zone can be found in the last third of the proposed airstrip, slighty west of the profile. This type of phenomenon indicates possible stability problems with respect to back fills if adequate building steps are not taken.

## 4.4 THE BIOLOGICAL ENVIRONMENT

### 4.4.1 VEGETATION

The territory under study is situated in the Arctic tundra zone. Harsh climatic conditions and the absence of trees characterize this nordic region. The dominant vegetation is made up of only a few clumps of bushes and a cover of lichens and mosses.

The vegetation inventory, carried out under the framework of this study is not exhaustive. This inventory includes in all 29 vascular and non vascular species broken down into 16 different families. It must be stressed that this summary inventory does not necessarily reflect the exact portrait of the vegetation prevailing in that part of New Québec. The object of these vegetation surveys was to give an idea of the plan species found inside the zone under study and to evaluate their importance in terms of covering.

An inventory of three (3) types of habitat or vegetation units has been made in that region:

- the dry tundra
- the damp tundra
- the rocky tundra

Building of the airport infrastructures will take place almost exclusively inside the habitat designated as being dry tundra. A continuous lichen cover, on which has developed a low bush stratum, relatively abundant although little diversified,, characterizes this vegetation unit. This type of habitat occupies an area of around 240 hectares, that is 50% of the total area of the zone under consideration.

The vegetation characterizing the damp tundra is located

in the north-east and southwest sectors of the zone under consideration; this type of habitat covers a total area of around 125 hectares, that is 25% of the zone under consideration. The vegetation of this habitat is made up essentially of mosses and of an herborescent stratum constituted mostly of cyperaceae.

Finally, a rocky tundra is to be found in the low hill sector east of the village as well as in the north part, along the sea coast. The area covered by this type of habitat is estimated at 135 hectares (or 25% of the zone under consideration).

### 4.4.2 FAUNA

#### 4.4.2.1 LAND MAMMALS

The caribou is undoubtedly the land mammal deserving of the most attention in the context of the implementation of this project. Two (2) major caribou herds can now be found in Northern Québec: the best known being the George River and the Leaf River herds.

From the observations reported by Couturier (comm. pers., 1988) and the information gathered from the documents drafted and published by the MLCP (see bibliography), it would seem that caribou from the George River or Leaf River herds have been coming to the Aupaluk region for only a few years. During field work, no caribou was observed in the Aupaluk region; however, it can be surmised from the many tracks observed in the sector around the village, including the zone determined for the present study, that the caribou have roamed freely over the general area. It should be noted that the present airstrip to be found in the same axis as the proposed strip, does not hinder the movement of the caribou.

Finally, the documentation referred to does not identify or mention any birthing or herding grounds close to Aupaluk.

Given the natural predation phenomenon, we feel that the presence or passing of the wolf in the zone under study should also be mentioned. Three other typically nordic species are likely to live or to be found in the zone under study, namely: the arctic hare, the arctic fox and the Ungava lemming.

These mammal species are not exclusive to the Aupaluk region. The type of habitat in which each of these species lives is found in all Northern environments, except for the caribou herding and birthing grounds. The proximity of the village and the many human activities carried out at its outskirts allow one to imagine that the number of individuals is not high for all the animal species, the same being true for the entire proposed zone of work. The fact that the village hunters often travel far from the village to get a good catch would tend to confirm this hypothesis.

#### 4.4.2.2. AQUATIC MAMMALS

The following aquatic mammals are likely to be found, at a certain time of the year, in the Ungava Bay waters:

- the ringed seal
- the bearded seal
- the harp seal
- the harbour seal
- the white whale
- the minke whale

We deem it in order to underline that these species can, occasionally, be found close to the seacoast located more than five (5) kilometers from the limits of the site of the proposed facilities. The coastal area under consideration is not known, according to the documentation referred to, as a place favoured for the herding or the reproduction of any aquatic mammal whatsoever.

#### 4.4.2.3 ICHTYOLOGIC FAUNA

Of all the fish species found in the New Québec region, it would seem that the Arctic char is by far the main

species captured, corresponding to close to 60% of all registered catches. The grey trout comes second at 20%.

The observations made in the course of the biological resources inventory of the sector chosen for the building of the future airstrip tend to show that the lake and the small ponds located at the north end of the said airstrip have no ichtyologic potential. This evaluation is based on the following considerations:

- the shallowness of the lakes;
- the limited surface of the lakes;
- the absence of any tributary or emissary stream of these lakes favourable to the ascent and reproduction of salmonidae;
- the appreciable quantity of suspended particles in the lakes;
- the drying up of the water courses.

#### 4.4.2.4 AVIAN FAUNA

The documentation referred to and listed in the bibliography mentions more than 100 different bird species likely at a given moment to stop or to fly over the Ungava peninsula territory. During the brief inventory period of August 1985, several species were observed:

- pigeon hawk;
- herring gull;
- common tern;
- horned lark;
- common raven;
- warblers spp.;
- sparrows spp.

The largest bird concentrations were observed at three (3) different locations inside the zone under consideration:

- at the present garbage disposal site;
- at the sewage oxidation pond;
- at the former garbage disposal site.

Although the Aupaluk region is located in the axis of the most important migratory wildlife corridors, the information gathered on the village site confirms that the area does not constitute a privileged area for the reproduction or nesting of avian fauna.

## 4.5 THE HUMAN ENVIRONMENT

### 4.5.1 POPULATION

In July 1986, the population of the village of Aupaluk stood at 110 inhabitants. This population is particularly young, 65% of it being made up of individuals less than 24 years old.

### 4.5.2 ECONOMIC ACTIVITIES

The life of the Aupaluk Inuit is based strongly on hunting, fishing and harvesting activities. The welfare of the residents of Aupaluk is assured, to a large extent, by the harvesting of renewable resources.

Close to 80% of the jobs available in Aupaluk are in the service industry sector and are offered mainly in the public and parapublic fields. Native businesses employ three (3) persons and only two (2) hunters or sculptors jobs are registered.

At the commercial level one finds in the village:

- a general store of the Corporation foncière:
- a MTPA shelter;
- a snowmobile spare parts store (private).

In addition, the village has a local cooperative incorporated in 1981.

### 4.5.3 INFRASTRUCTURES AND SERVICES

The village of Aupaluk owns all the basic infrastructures (roads, drinking water, sewage disposal, police, power, telephone, etc.).

In the health services field, two (2) nurses, assisted by an interpreter, provide first aid services in a clinic equipped with a bed where a patient may be kept under observation.

The village has a school. As to transport facilities,

Air Inuit operates three (3) weekly flights to the village.

## 4.6 THE VISUAL ENVIRONMENT

The sector surrounding the village of Aupaluk is included in a landscape made up of sand terraces with a sprinkling of lakes and rocky hills.

The village is located on the two first terraces bordering Funnel Cove Bay. On the West, the residents see the bay; on the South, the view opens on a deep valley, while on the North and East, it is blocked by a boulder and the embankment of the top terrace (3rd terrace). The site chosen for the establishment of the new landing strip is located on the third terrace.

## 4.7 THE ARCHAEOLOGICAL POTENTIAL

The study of the archaeological potential makes it possible to note that 23% of the area under consideration could have presented a high human occupancy potential and 7,4% of the said area could have presented an average human occupancy potential. The remaining part corresponds to various zones with a low human occupancy potential.

# 5. IMPACTS AND MITIGATING MEASURES

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## 5.1 METHODOLOGY

The identification of the possible repercussions of the airport infrastructures building project on the environment was made on the basis of a pre-determined project to be established on an also pre-determined site, proposed by the Québec ministère des Transports and by Transport Canada. For that reason, we have chosen an evaluation method which makes it possible to characterize the potential impacts of the project in terms of degree of intensity, extent and duration on the receiver environment ([1]).

In the evaluation process, a first step was aimed essentially at verifying, in keeping with well defined criteria, the existence or non existence or repercussions generated by the project on different environments (physical, biological, human and visual). These criteria, both qualitative and quantitative, can be defined as follows:

-physical environment:

- erosion of surface soil;
- change in draining conditions;
- lowering of the permafrost level;
- change of the hydrographic system.

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1 The concept of the resistance of an environment to the establishment of a project was not broached in this study. This concept, used mainly to hierarchize the sectors being analyzed in relation to their level of resistance or tolerance to proposed operations (a level of resistance which can be high or low), is not really applicable to the present situation where the airstrip is established on an already known site.

-biological environment:

- degradation of vegetal resources;
- displacement of the various wildlife species distribution areas;
- operations within the nesting, reproduction, feeding or resting ground limits;
- risk of bringing about the extinction of a floristic or wildlife resource;

-human environment:

- change of village living conditions;
- loss of the use of hunting territories;
- loss of the use of recreational areas;
- destructuring of public service facilities (refuse dump, drinking water supply ...);
- transport of people.

-visual environment:

- operation affecting visually interesting landscape elements (observation point, landmark ...)
- visual constraint created by the visible perception of the airport infrastructures.

In the eventuality that this procedure has made possible the identification impacts, a recourse to certain describers, such as the duration of the impact, its degree of intensity as well as its extent, will make it possible to evaluate their importance. These describers or indicators can be defined as follows:

- the duration of the impact corresponds to an evaluation of the period of time over which the impact will be felt; such a duration may be either permanent (for the lifetime of the project), medium term (a period shorter than the lifetime of the project) or temporary (an impact over a limited period corresponding more often than not to the facilities building period);

- the degree of intensity of the impact, which may be considered as low, medium or high according to the degree of disturbance caused by the project to each of the elements of the environment under consideration. Thus, the total and irreversible destruction of one environment resource would confirm the high degree of intensity of an operation while another which would disturb one resource though not endanger its existence, could be qualified as being of medium or low intensity,

according to the characteristics of the element affected;

- the extent of the impact may be qualified as being regional or local, according to the type of project being studied, the importance of the proposed operations as well as the environmental characteristics of the receiving environment. The impact will be regional to the extent that it will be felt throughout a region; it will be local if it affects only the immediate environment of the project.

## 5.2 EVALUATION

### 5.2.1 LAND EROSION

As the excavation work for the strip and its infrastructures will be almost exclusively limited to the backfilling of the existing strips, it must be estimated that the overall impact of the project on soil erosion by wind will be low. Only Number 3 borrow pit will be more subject to wind erosion, the deposit being made up of fine to medium fine sand and located in a non wooded environment.

As to land erosion problems produced by runoff water, it will be required to make sure that the channelling of water at the south end of the strip does not produce erosion problems along the water course running towards the sea.

Despite the low importance of the expected impacts, we recommend that the following steps be taken:

- the movement of machinery must be limited exclusively to the building zones and within the defined corridors wherever possible;

- the areas stripped of their vegetal cover during the work must be renatured as soon as possible after the work is finished;

- the surfacing of the drainage ditches is also recommended to prevent erosion problems resulting from the concentration of runoff water;

- finally, the excavation escarpments must have a sufficiently slight final slope to minimize erosion effects.

To control permafrost degradation, it is recommended to leave the vegetal cover under the fill and mainly along the fill border. Stripping, if required, must be done as the fill work proceeds. Moreover, water accumulations must be avoided because they lead to the degradation of the permafrost and of the underminings. Excavated zones must be renatured as soon as possible so as to limit the permafrost degradation in the medium term.

### 5.2.2 BORROW PITS AND QUARRIES

It is recommanded not to mine No. 2 borrow pit located close to the village, given the problems which might be generated with respect to safety and dust spread in the village. It is also recommended to mine No. 2 rather than No. 1 quarry given the reluctance voiced by the residents of Aupaluk.

## 5.3 THE BIOLOGICAL ENVIRONMENT

### 5.3.1 VEGETATION

The putting in of granular materials to be used mainly for the development of the airstrip will remove totally and permanently a land surface equivalent to around 10 hectares and located mainly in the dry tundra habitat. Globally, this work will affect only a small area of a vegetation unit corresponding to the dry tundra which occupies the greater portion of the area under consideration; the lowering of the vegetal cover ratio attributable to the establishment of the work does, however, constitute a degradation of the natural environment of this sector and will have a medium overall impact.

The movement of heavy machinery during the construction phase will lead to the destruction or compaction of the vegetal cover over all the temporary roads. Since this impact is temporary in character and local in extent, it is considered to be low. The main steps considered with

respect to the control of impacts on vegetation consist in salvaging all the vegetal cover on the excavation sites so as to re-use it when the site is restored; this need to salvage the vegetal cover results mainly from the fact that the possibility of reconstituting the flora in nordic regions and the number of species which can be established there, are relatively limited, all of which explains the advantage of re-using the existing environmental resources.

Two other steps should be taken at the building stage:

- determination and marking off of the right-of-way and direction of the temporary roads providing access to the work zones as a whole, including the quarries and borrow pits;

- ensuring that adequate draining conditions are maintained during and after the building work, so as not to alter, in the medium and long terms, the existing vegetation at the outskirts of the affected zones. The maintenance of a system channelling water towards existing accumulation points would seem an acceptable measure.

The application of these simple mitigating measures, following the implementation of the programme to renature the sites affected by the project, would make it possible to foresee low residual impacts on vegetation.

### 5.3.2 FAUNA

Generally speaking, the project will have low impacts on the caribou. To begin with, the establishment of the airstrip will have no real incidence on the possibility for the animal to get food if one considers, among other things, the major caribou movements in this Québec region. The presence of the airport infrastructures does not raise the question of the survival or even of the reproduction possibilities of the species, the Aupaluk region not being a birthing areas.

The other possible impact on the caribou comes from larger aircraft flying over the territory at low altitude (less than 300 meters), such aircraft having eventually to be used to serve the Inuit communities. The impact takes the form of increased sound conditions

which could provoke the sudden flight of part of all the herd during its migrations, a phenomenon which could result in the injury or even the death of a number of animals. However, the temporary character of this phenomenon, the regional extent of the impact and its low degree of intensity produce a weak overall impact.

Two specific measures are proposed to alleviate the identified impacts:

- prior to the beginning of the building work, the Inuit supervisor must submit the project building schedule to the representatives of the M.L.C.P.; moreover, during the caribou migration period, the Inuit supervisor must contact the aforesaid representatives of the M.L.C.P. to determine the location and movement of the herd and ask what measures he must take, if need be.

- when the airstrip is in operation, its operators must inform the pilots of the presence of caribou herds in the region, specially during the migration period, in order to establish, if need be, flight plans limiting low altitude approach manoeuvers in the migration corridors.

The repercussions of the project on the other land mammals remain low in general. Thus, all the building activities, as well as the main airport activities at the operational stage, are likely to provoke a displacement of the animal population outside the zone where the facilities are to be established, without however real consequences on the resources as such, given the absence of sites favoured for the reproduction or the nesting of the species.

Finally, the impact of blasting operations on the aquatic mammals which might be present in Ungava Bay is considered to be negligible, for the following reasons:

- the minimal distance between the potential quarry mining sites and the bay (more than 1 kilometer);

- the low choc wave zones produced by blasting, given the low land penetration depth;

- on the basis of available inventories, the absence of habitat or reproduction areas of aquatic mammals in the Aupaluk sector.

So as to minimize any eventual risk of impact on the aquatic fauna, we propose however that a minimum buffer zone of 300 meters be maintained between the blasting sites and the coast, and that all blasting be stopped when white whales are seen within a radius of five (5) kilometers around the blasting site.

-Avian fauna

At the operation stage, it should be pointed out that the closeness of a garbage disposal site and of an oxidation pond will bring about a concentration of wildfowl in the area of the future landing strip.

Although no incident has been reported up to now at Aupaluk with respect to a wildfowl danger, the high impact resulting from the presence of these birds on the operation of the airport should nonetheless be underlined, particularly in that it increases the risk of birds colliding with aircraft during take-off and landing manoeuvres.

In order to control the problems resulting from the presence of birds in the airstrip sector, we recommend that the municipality make sure that periodical cleaning operations are carried out at the garbage disposal and oxidation pond sites.

## 5.4 THE HUMAN ENVIRONMENT

### 5.4.1 HOUSING ZONE

Repercussions at the building stage relate mainly to the emission of dust and to an increase in background noise produced by the movement of machinery and by blasting.

At Aupaluk, the concentration of the work some five hundred (500) meters east of the village, together with the fact that the dominant winds in the region blow from the north and north-west, mean there will be a low level intensity of impact. Given the temporary character of the work and the low extent of the repercussions, the overall impact on the inhabited milieu is considered to be negligible.

### 5.4.2 USE OF THE ENVIRONMENT BY RESIDENTS

#### 5.4.2.1 USE OF LAKE FOR RECREATIONAL PURPOSES

The lake adjacent to the existing airstrips remains the sole real recreational resource to which the community attaches major importance with the area set aside for the building of the airport facilities.

Therefore, building work must not result in the emptying of polluting material in the lake or any filling activity.

#### 5.4.2.2 USE OF THE THIRD TERRACE FOR HUNTING AND HARVESTING PURPOSES

The building work sector is not a hunting ground for the residents of the community. The local committee has indicated that the territory affected by the project does not constitute a zone rich in wildlife resources. The sector does not constitute a favoured harvesting site either.

#### 5.4.2.3 USE OF THE THIRD TERRACE FOR MOVEMENT PURPOSES

Airstrip bulding activities could hamper the movement of Aupaluk residents towards the territories located east of the village, and particularly towards lake Nipirqanaq where they go to fish. The road providing access to that sector runs through the third terrace, on the site of the future airport facilities.

It is recommended that the redevelopment of the road come before the airstrip building work, given that the said airstrip will intersect the existing road.

#### 5.4.2.4 ARCHAEOLOGY

All the components of the Aupaluk village airport improvement project will affect in part zones with an archaeological potential.

As the zones with potential correspond only to locations where there is some probability that they were used in ancient times by human groups, it becomes necessary to carry out a systematic inventory of these zones having a potential in order to verify the presence or absence of traces of ancient human occupancy.

### 5.4.3 CONSIDERATIONS RELATING TO HEALTH AND SAFETY

#### 5.4.3.1 HUMAN SAFETY

The work required for the establishment of a new airstrip involves some risk for the residents of Aupaluk, in the context of the use of the third terrace for various purposes.

With respect to blasting operations during building work, it will be necessary to inform the population of blasting places and periods; the use of sound warning devices will be compulsory. The movement of machinery must be restricted to the temporary roads previously identified and clearly defined on the land.

#### 5.4.3.2 CONFIGURATION OF BORROW PITS AND QUARRIES

The configuration of the granular material borrow pits and quarries represent some risk for the local population.

At the end of the work, the borrow pit backfill must have a final sufficiently slight slope. To that end, the recommended slopes should be 5H/IV.

#### 5.4.3.3 PUBLIC HEALTH

It is important for the contractor to take the required steps to maintain acceptable public health conditions and thus that waste and rubbish from the worksite not be scattered over the territory but rather be gathered up and destroyed.

#### 5.4.3.4 HEALTH SERVICES

The local committee wishes to be advised of any pollution and health problems which could be generated by the building or the operation of the airport facilities. Its concerns relate to the risk of an accidental spilling of fuel and to the products to be used for airstrip maintenance.

### 5.4.4 SOCIAL AND ECONOMIC CONSIDERATIONS

#### 5.4.4.1 SOCIAL CONSIDERATIONS

The real challenge, from the social point of view, is to create and maintain, during the landing strip preparation and construction period, a context of healthy and harmonious social relations between all those involved, the group of workers on the worksite in particular.

Generally, consultation and information are the vehicles ideally designed to reduce the negative social impacts of a project. On this account, the population of Aupaluk and its representatives on various committees wish to be informed of everything connected with the airport infrastructures improvement project.

The developer and the contractor must also respect the areas coming under the competence of the Municipal Council and the Corporation foncière and acquaint themselves with the by-laws adopted by both these bodies.

#### 5.4.4.2 ECONOMIC FALLOUT

The presence of workers from outside the region (estimated at around thirty individuals) could provide economic fallout for the village of Aupaluk, and more specifically for certain bodies such as the local Cooperative (sale of local products), the Corporation foncière (sale of hunting and fishing permits, sub-contracting with the general contractor).

#### 5.4.4.3 LOCAL MANPOWER

The airport infrastructures improvement project should generate around ten temporary jobs for the residents of Aupaluk. In addition, the putting in operation of the landing strip should lead to the creation of one permanent job and probably two (2) part-time ones for the population of Aupaluk.

#### 5.4.4.4 SOCIAL PROBLEMS

The presence of workers from the south alters community life. Past experience shows that such a presence very often generates the appearance of social drug and alcohol-related problems which affect mainly the young.

The contractor should apply various measures in order to reduce the risk of such problems:

- no alcohol consumption except at the camp site;
- no drug or alcohol distribution to the village inhabitants;
- no women or young girls admitted to the camp site;
- firing from the worksite of any worker who does not observe these interdictions.

## 5.5 VISUAL ENVIRONMENT

The impacts of the construction work on the visual environment relate mainly to the airport buildings, the borrow pits and quarries and, finally, the constructions roads which will clash the landscape as it is now perceived by the residents of the village, and more specifically, by the users of the third terrace.

# 6. CONCLUSION

# 6. CONCLUSION AND RECOMMENDATIONS

In the light of the main analysis results, it appears that the facilities and activities connected with the airport infrastructures improvement project at the village of Aupaluk are generally compatible with the environment and with the development objectives of the community. The optimum integration of the project to the territory will, however, be achieved only if all the mitigating measures proposed in the report are selected and applied at the building and operational stages.

The most significant residual impacts are at the visual level, although they are relatively limited. To the opposite, it is important to underline the positive fallout of the project, both temporary and permanent, which affects mainly the human environment.

Lastly, it is deemed important to mention that the full and complete success of the project depends on the quality of the relations which the various parties involved can establish and maintain. To that effect, certain criteria must be observed:

1. inform the population fully of the project as this will be conducive to an in-depth reflexion;

2. allow the time required for this process, which implies spending more time discussing it with the members of the community;

3. ensure that relations are maintained and followed up with the community thus kept constantly informed of developments as they occur on the worksite;

4. recognize the Inuit decisional process and adjust thereto.

Finally, we recommend that the developer promote the establishment of harmonious contacts between the local Inuit population and the workers who will live at Aupaluk for a few months. This may be done in several ways, in particular through the circulation of information giving each of the groups involved an opportunity to know and to appreciate the other.

# SYNTHESIS

## (IMPACTS AND MITIGATING MEASURES)

A. PHYSICAL ENVIRONMENT

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -1- | -1- | |
| Land erosion by wind and runoff water during borrow pit excavation and mining work (overall low impact). | Restrict the movement of machinery to the development areas.<br><br>Renature the zones stripped for work purposes.<br><br>Give excavation sites and backfill low final slopes. | Negligible in the med term. |
| -2- | -2- | |
| Underwashing of land through permafrost degradation (medium overall impact). Condition provoked-by land excavation and stripping work. | Maintain the vegetal cover under the backfill.<br><br>Strip as the need arises to avoid permafrost damage.<br><br>Avoid water accumulations.<br><br>Restrict the movement of machinery to previously determined roads. | Negligible. |
| -3- | -3- | |
| Modification of draining during backfilling work (low overall impact). | Provide oversized culverts to prevent their being blocked by ice.<br><br>Make the access road backfill high enough to avoid flooding (pond sector north of the proposed airstrip). | Negligible. |

B. BIOLOGICAL ENVIRONMENT:

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -4- | | |
| Destruction of part of the vegetation in the dry tundra habitat during the putting in of the granular material. (medium overall impact) | None | Medium and permanent |
| -5- | -4- | |
| The movement of machinery at the building stage results in the destruction or compaction of the vegetal cover over temporary roads as a whole (low overall impact) | Determine and identify the right-of-way and direction of the temporary roads providing access to the work zone.<br><br>Ensure that adequate draining conditions are maintained so as to avoid modifying the existing vegetation at the outskirts of the affected zones.<br><br>Renature the stripped surfaces. | Low in the medium term |
| -6- | -5- | |
| Removal of vegetation during the mining of the granular borrow pits. (low overall impact) | Salvaging all of the vegetal cover on the excavation sites in order to use it again to restore the sites.<br><br>Restore the sites | Low in the medium term |
| -7- | -6- | |
| Possible modification of the behaviour of the caribou moving about at the outskirts of the village during the landing strip construction work. (low overall impact) | Forward the schedule for the carrying out of the project to the MLCP representatives. Contact the MLCP to determine the location and movement of the herd and to be advised as to what measures to take. | Negligible and temporary |

B. BIOLOGICAL ENVIRONMENT
(cont'd)

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -8- | -7- | |
| Possible modification of the movement habits of the caribou during the operation of the airport (overflight of aircraft, maintenance of facilities). (low overall impact) | Inform pilots of the presence of caribou herds in the area to determine, if need be, flight plans restricting low altitude approach manoeuvres (less than 300 meters) in the migration corridors. | Low and permanent. |
| -9- | -8- | |
| Possibility of moving the wildlife resources (land mammals) because of the activities linked to the construction and operation of the landing strip. (low overall impact) | Proceed with the restoration, for work project purposes, of all the sites disturbed by the project. | Negligible in the l term. |
| -10- | -9- | |
| Negligible overall impact of construction work on the aquatic and ichtyologic fauna. | Maintain a minimum 300-meter buffer zone between blasting sites and the bay coast. | Negligible. |
| -11- | -10- | |
| Intensification of risk due to the presence of birds following the development of the landing strip (more frequent take-offs and landings, presence of larger, less "mobile" aircraft). (high overall impact). | Make sure that the municipality proceeds with the regular cleaning of the garbage disposal and oxidation pond sites (e.q. the covering up of wastes).<br><br>Make sure that the former garbage dump located 300 meters east of the future landing strip is not re-opened. | Low and permanent. |

C. HUMAN ENVIRONMENT:

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -12- | | |
| Spread of dust throughout the village during the building period. (negligible overall impact). | No special measure given the low intensity and temporary duration of the impact. | Negligible and temporary |
| -13- | -11- | |
| Incompatibility between the mining of a borrow pit on the 2nd terrace and the residential calling of the site. (high overall impact) | Not mine No. 2 borrow pit; make up for the lack of materials by mining quarry sites. | Nil. |
| -14- | -12- | |
| Intersection of the present strip during the building period of the new airstrip. (high overall impact) | Build the new airstrip beginning at its south extremity to allow a maximum use fo the present airstrip. | Low and temporary. |
| -15- | -13- | |
| Building activities could hamper the free movement towards municipal facilities and lake Nipirqanaq. (low overall impact) | Avoid blocking the access road and inform the municipal authorities<br><br>Maintain a permanent road link in the direction of Lake Nipirqanaq. | Low and temporary. |
| -16- | -14- | |
| Building of the landing strip in an archaeological area with a good potential. | Prior to the building work, carry out a systematic inventory of the zones with potential so as to preserve any remaining vestiges. | |

C. HUMAN ENVIRONMENT
(cont'd)

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -17- | -15- | |
| Risk with respect to the safety of persons using the third terrace at the building stage (low and temporary overall impact). | Advise the population of blasting locations and periods; use sound warning devices. | Low and temporary. |
| -18- | -16- | |
| Temporary increase of road traffic in the village (low overall impact). | Strict application of the Highway Code. | Low and temporary. |
| -19- | -17- | |
| Borrow pits with sharp slopes involve a risk of accident. | A 5H/IV slope configuration. | Negligible and permanent |
| -20- | | |
| Positive fallout of the landing strip building project with respect to the improvement of transport infrastructures safety. | - | Positive. |
| -21- | -18- | |
| Positive fallout of the project on the economic activities of the village of Aupaluk (supply of services, etc.) | Advise the population of available opportunities. | Positive and temporary. |
| -22- | -19- | |
| Positive fallout of the project on local manpower, at the building and operation stages of the airport infrastructures. | Benefit from past work experience in a nordic environment to adapt the work better to the social realities of the region. | Positive. |

D. VISUAL ENVIRONMENT

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -23- | -20- | |
| The excavation of Nos 1 and 3 borrow pits results in the transformation of the topometry of the environment/destruction of the natural environment and creation of scars on the landscape. (medium and permanent visual impact for Nos. 4 and 5 landscape units). | Proceed with the levelling and restoration of the borrow pits once the work is finished. | Low in the medium term. |
| -24- | -21- | |
| The mining of No. 2 borrow pit results in a major modification of the natural environment close to the inhabited habitat. (high and permanent visual impact for No. 2 landscape unit). | Avoid mining No. 2 borrow pit. | Nil. |
| -25- | -22- | |
| The mining of No. 1 quarry results in the disappearance of a part of the rocky mountain, highly visible from the village. (high and permanent visual impact for No. 3 landscape unit). | Avoid mining No. 1 quarry. | Nil. |

D. VISUAL ENVIRONMENT
(cont'd)

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -26- | -23- | |
| The mining of No. 2 quarry results in a modification of the natural environment. (Medium and permanent visual impact on No. 4 landscape unit). | Avoid mining the west flank of the rocky outcrops so as to make the excavation as little visible as possible to an observer located on the landing strip. | Low and permanent. |
| -27- | -24- | |
| The development of construction roads produces landscapes scars. (medium and permanent visual impact for Nos. 2, 4 and 5 landscape units). | Stricly limit the number of construction roads in keeping with actual needs.<br><br>Level and restore the roads once the work is finished. | Low in the medium term. |
| -28- | -25- | |
| Accumulation of building débris on the work site. (low and temporary visual impact for Nos. 2, 4 and 5 landscape units). | Identify storage areas.<br><br>Transfer waste to garbage dump periodically. | Nil. |
| -29- | | |
| The rebuilding of the access road to the future airstrip produces a positive visual impact for users. (No. 2 landscape unit). | - | Positive and permanent. |

D. VISUAL ENVIRONMENT
(cont'd)

| Description of impact | Mitigating measure | Residual impact |
|---|---|---|
| -30- | | |
| The building of the airport facilities introduces clashing elements into the landscape. (medium and permanent visual impact for No. 4 landscape unit). | - | Medium and permanent. |
| -31- | | |
| The presence of the landing strip modifies the natural landscape, specially at water level. (low and permanent visual aspect at the level of Nos. 4 and 5 landscape units). | - | Low and permanent. |