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**GEOGRAPHICAL PAPER No. 8**

**Miscellaneous Papers Series**

# **Notes on Potential Building Sites in the Bathurst Inlet Area, N.W.T.**

*J. B. Bird*

*M. B. Bird*

**GEOGRAPHICAL BRANCH  
Department of Mines and  
Technical Surveys, Ottawa**

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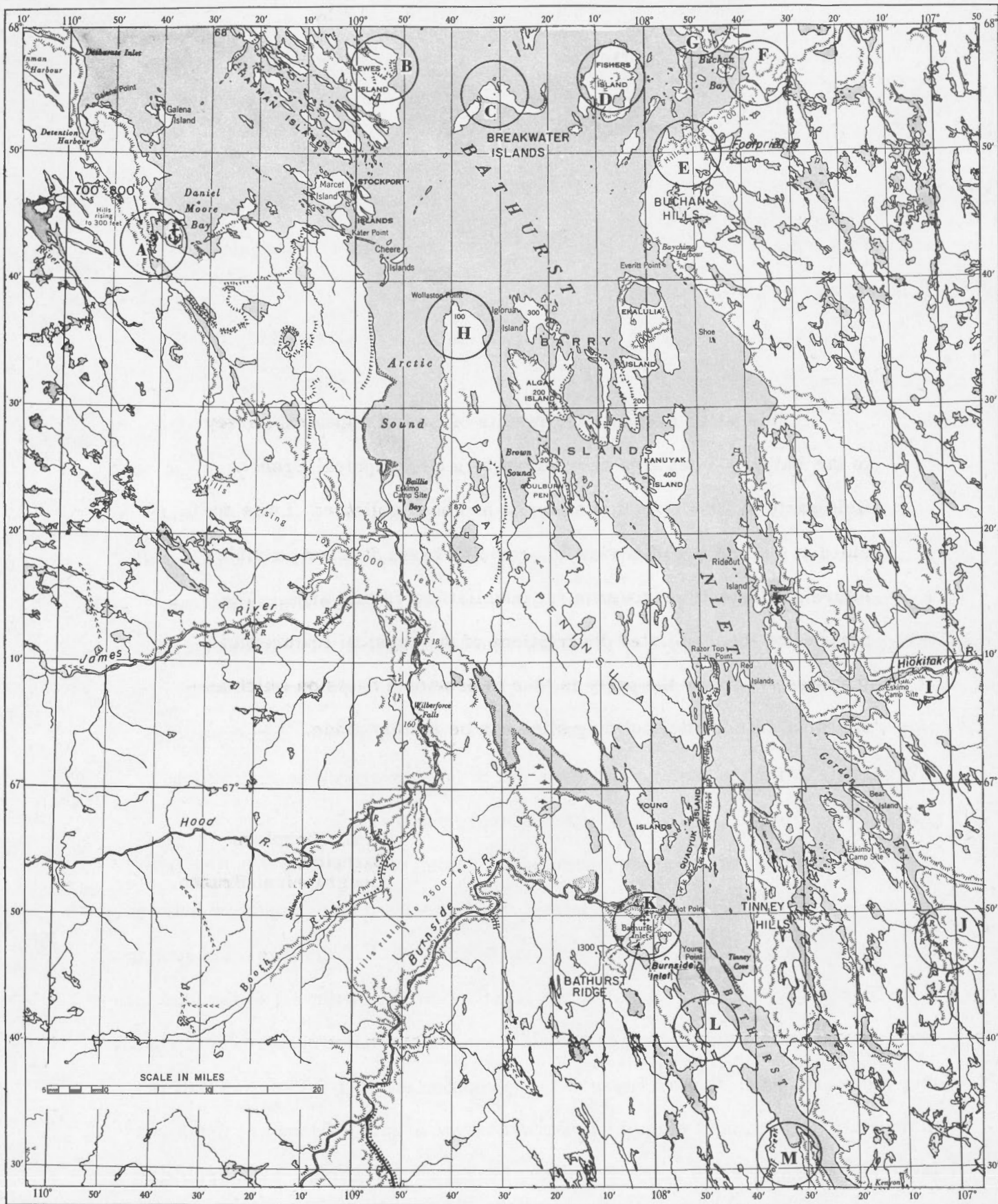




## PREFACE

This paper presents the results of part of a general survey of the Bathurst Inlet area carried out by a Geographical Branch field party in 1954. As this material had been collected it was decided to publish it with a view to providing basic data for possible future settlements or government installations in this area. The purpose of these collated descriptions of the physical features of the sites visited by the party is thus to provide a basis on which an appraisal of potential building sites can be readily made.

N. L. Nicholson,  
Director,  
Geographical Branch.



LOCATION MAP

NOTES ON POTENTIAL BUILDINGS SITES  
IN THE BATHURST INLET AREA, N.W.T.

Bathurst Inlet is in the centre of the arctic mainland coast of the Northwest Territories. It extends south for over 150 miles into the continent and, after Mackenzie River, affords the easiest penetration into the northern part of the continent west of Hudson Bay.

The inlet appears to be structurally a rift valley, subsequently filled with sediments and recently exhumed and partly drowned. The cuesta and low-land scenery within the inlet is in striking contrast to the rugged nature of the Canadian Shield on either side. A broken, diabase hill ridge (Bathurst Ridge, and an extension through north and south Quadyuk islands) divides the inlet into two unequal parts. The northern and larger part is about 40 miles, and the southern about 15 miles wide. West of the inlet, the rolling and hilly plateau, dissected by the deep valleys of the Mara, Burnside, Hood, and James rivers, has an elevation of 1,000 - 1,600 feet. On the east side the plateau is lower, with elevations between 800 and 1,100 feet. Within Bathurst Inlet comparable elevations are found in the highest hills (all of igneous origin) most of which have summits between 900 and 1,300 feet above sea level.

The Bathurst Inlet area, including the basins of the rivers that flow into it, lies beyond the tree-line. The inlet forms a clearly defined boundary between the true barren grounds of the Arctic Slope to the east, and the transition zone to the Subarctic on the west. Summer temperatures in the southwest of the inlet are in fact so warm that the regime would probably support a fair growth of spruce if it was introduced. The richness of the vegetation south of Coronation Gulf is matched by the wealth of animal life throughout the area. Caribou are found in large numbers in the summer and wolves, bears, and even musk-oxen are relatively plentiful.



Bathurst Inlet was first visited by Europeans in 1821, when Franklin surveyed the shores by canoe. The entrance was subsequently crossed by explorers on a number of occasions in the following 90 years, but it was not until 1912 that Europeans again reached the middle of the inlet. In July of that year, Radford and Street crossed overland from Chesterfield Inlet and were murdered on Quadyuk Island by Eskimo. The first scientific observations on Bathurst Inlet were made in 1915 by members of the Canadian Arctic Expedition based at Bernard Harbour 200 miles to the west.

The earliest European settlement in the district was west of Bathurst Inlet, at Tree River, in 1917. Charlie and Patsy Klengenberg, using their boat as a trading post, wintered in the southern part of Arctic Sound in 1920. In the same year Hudson's Bay Company established a post on Kent Peninsula, and in 1925 built an outpost at the south end of the inlet, near Western River. During the next few years there was considerable competition between the Hudson's Bay Company and other trading groups. The posts were frequently moved, the more important sites being on the islands at the entrance to the inlet and near Wollaston Point.

In 1929 Dominion Explorers Ltd., which was examining the northern part of Bathurst Inlet for copper deposits, created a small base immediately south of the Burnside River delta. The buildings were located on a silt terrace adjacent to the channel leading from Burnside Inlet. When Dominion Explorers left, the Hudson's Bay Company bought the buildings and moved them to a low, till ridge 300 yards east of the Dominion Explorers' site. This is the location of the present Bathurst Inlet (formerly Burnside Harbour) post. In 1935, Roman Catholic Oblate missionaries built a small mission nearby. In 1955, Pacific Western Airways constructed a radio station at the site; the only other buildings on the inlet are a number of single-room mission and native huts.

At present there are approximately 160 nomadic Eskimos around Bathurst Inlet. They travel extensively in their search for caribou and fur animals, the largest groups in the summer of 1954 being at Gordon Bay, near the mouth of Hood River, in Daniel Moore Bay, and south of Young Point. In the past they were also numerous around the northeast part of the inlet.

At present, economic activity in the area is restricted to trapping. The rocks in the centre and north portions have long been known to contain metallic copper. Recent geological exploration has failed to find any economically exploitable deposits in the inlet although exploratory drilling has been undertaken on the plateau to the northwest.

Neither the present nor the former trading posts on Bathurst Inlet have been located on sites that would permit easy expansion or the construction of heavy buildings. The good potential building sites may be divided into two groups; those in the northern part of the inlet, principally in the basalt areas, that are readily accessible from Coronation Gulf; and those in the centre and southern sections of the inlet that are generally less suitable, but may have certain advantages because of their location.

None of the rivers entering Bathurst Inlet is navigable. It is therefore essential, if large quantities of material are to be brought to or taken out of a site, that it have a coastal location, or that a road can be built quickly from the site to the sea. In practice, the site should preferably be within 2 to 3 miles of the sea.

The sites discussed in this report have been chosen on the basis of six significant site factors.

- 1) Deep-water approaches and a sheltered anchorage.
- 2) Absence of strong tidal currents and consequently sound sea ice for winter and spring aircraft landings.
- 3) Suitable dry building sites without serious permafrost difficulties, and room for expansion.



- 4) A readily available source of sand and gravel.
- 5) Level ground for an airfield.
- 6) A good supply of fresh water.

Bathurst Inlet is normally approached by sea through Coronation Gulf from western Arctic ports. The inlet has not been charted, and there are numerous navigational hazards, particularly in the vicinity of the northern basalt coasts. Vessels in the 500-750-ton class may negotiate the inlet with care. Any large development in the area would render urgent the need for hydrographic charts of the inlet and its approaches. In the absence of such charts, the following comments on areas that are hydrographically suitable for settlement must be considered to be of a preliminary nature.

At present, vessels entering the inlet for the trading post pass on either side of Breakwater Islands and steer southeast, passing midway between Everitt Point and Ekalulia Island. A southerly course is then taken east of Shoe Island and between Kanuyak and Rideout islands. Although there is a line of low islands off Rideout Island, it is advisable to keep close to it, as there is a reef near the centre of the channel. Red Islands are passed on the east side, where there are also several reefs. Vessels pass through the channel between Quadyuk Island and the mainland to the east and finally enter Burnside Bay round the southerly tip of Quadyuk Island. They have to anchor about  $1\frac{1}{2}$  miles off the post because of sandbars in the bay.

It seems probable that, in the absence of charts, any but small vessels would be subject to considerable hazards in Daniel Moore Bay, Buchan Bay, and the Brown Sound-Barry Islands area. The outer parts of Arctic Sound and Gordon Bay are relatively deep. In general, to the north of the present trading post the east side of the inlet is deeper than the west. There are no obvious navigational hazards to vessels in the southern part of the inlet, although shipping

has always been restricted to shallow-draft vessels. Such craft are able to operate in all parts of the inlet, except by the Chapman and Stockport Islands, where the channels are extremely shallow. Good harbours for smaller craft may be found in Daniel Moore Bay, Buchan Bay, Gordon Bay, and the Barry Islands; elsewhere, harbours are few, inshore waters are often very shallow, and anchorages are poor.

The tidal range in Bathurst Inlet is 1 to 2 feet. The amplitude of the regular tides is increased and the periodicity is disrupted by winds and, particularly, variations in barometric pressure; rapid short-period fluctuations were also observed in 1954. Although the tidal range is unlikely to play any part in the choice of a building site, the currents that result from the tide are more significant. Despite the small tidal range, currents are strong among the outer islands (notably Breakwater and Fishers), the Barry Islands, and around Quadyuk Island, where they reach  $3\frac{1}{2}$  to 5 knots. Small boats occasionally find themselves in difficulties in these areas because of the heavy seas that form when wind and current are opposed. The currents off the outer islands also produce uneven ice conditions in contrast to those in the inner part of the inlet.

Southern Bathurst Inlet begins to develop an ice cover towards the end of October. In the north, where the currents are strong and the sea has a greater salinity, open water will remain longer, sometimes until December. The narrowest channels, for example the narrows between north and south Quadyuk Island, may not freeze at all in some years. In the centre and southern part of the inlet the sea ice is remarkably smooth, with few leads, no pressure ridges, and an insignificant tide crack.

The ice breaks up on the larger rivers in the first or second week of June. Open water appears off the mouths shortly afterwards; these areas expand, particularly in the south, and by the end of June all the area south of north

Quadyuk Island, the inner part of Gordon Bay, and the south end of Arctic Sound should be open. Farther north, ice remains longer but is generally gone by the third or fourth week of July. Some ice may still be found in bad years in early August in the north of the inlet and in Daniel Moore Bay. It is therefore usually possible for boats to move around in the inner part of Bathurst Inlet for as long as five weeks before the first ship can get in from farther west along Coronation Gulf.

There are four main types of terrain close to sea level in Bathurst Inlet. Unfortunately, none is entirely suitable for building sites and a compromise is inevitable between the desirable and the available. Unbroken bedrock can be found in many parts of the inlet, particularly northwest of Daniel Moore Bay and along the whole eastern side. Deep inshore water is usually found in such areas, except where the rock is basalt. Although a bedrock foundation eliminates most of the permafrost problems, the difficulties of pipe-laying and road construction, as well as the normally steep slopes, limit the value of such areas. The potentially most valuable bedrock site is on the island north of Buchan Bay, where low, gently rolling smooth rock outcrops are found associated with beach material (site G).

Terrain developed on glacial till only occupies a limited area in the southwest of the inlet between Young Point and Western River. Till soils have a large clay component and permafrost problems can be expected. Throughout the inlet terrain has developed on beach material formed during the period of postglacial submergence, when the sea was 700 feet higher than at present. Raised beach material varies considerably in size from sand and fine gravel to cobbles and boulders. It is most widespread in the northern basalt area, where it is sufficiently extensive to form excellent site areas.

The most widespread terrain has developed on the clays and silts deposited in the postglacial sea. This material is rarely found above 300 feet, but



below that height it is present in all parts of the inlet. It contains a high proportion of ground ice, and is extremely unstable when the natural slope or thermal regions are disturbed.

Sand and gravel for construction purposes are most readily obtained from eskers. These are common in the south of the inlet and in Gordon Bay, but rare in the north. Here, however, beach material could be substituted at many sites. The marine clays and silts which so severely limit the number of good building sites also restrict the supply of potable water. During spring and summer the fine materials are washed out by melting snow and rain and are carried into the streams and rivers. The result is that a supply of clear, fresh drinking water is extremely difficult to find in summer; similarly, in winter, water is scarce because large lakes are rare and river ice may still have silt in suspension.

#### SITES IN THE NORTH OF BATHURST INLET

The majority of building sites in Bathurst Inlet are in the northern half of the inlet. None of them meets all the requirements of a desirable site, and many of the better sites are deficient in a number of factors. Eight main sites may be recognized, (Figure 1):

- A. Daniel Moore Bay
- B. North Lewes Island
- C. Breakwater Island
- D. Fishers Island
- E. Footprint River
- F. Buchan Bay
- G. Island in north Buchan Bay
- H. Wollaston Point.

#### Daniel Moore Bay (site A)

This site is probably the most desirable on the inlet. On the west side of Daniel Moore Bay the granitic plateau that forms the west side of Bathurst Inlet approaches the sea. The upper surface of the plateau is flat bare rock, and has an elevation of about 800 feet. The approach to the plateau is relatively steep but

should be easy for vehicles after a limited amount of grading, in both summer and winter. In the southwest corner of Daniel Moore Bay, at the foot of the scarp, is a broad enclosed inner bay providing good shelter for any small vessels anchored in it. The approach to the inner bay is easy for small craft, but larger ships would require charts to enter the outer bay and would probably have to unload off the point.

On the west side of the bay is an area of shattered dolomite varying in width from a few yards to about half a mile. This would seem to offer a very desirable situation for building purposes if the total construction was going to be limited and if an airfield was not required in summer.

On the southeast side of the bay is a broad basalt lowland 3 miles wide covered with shattered basalt partly reworked into beach ridges. There are a few lakes, but they are shallow and could easily be filled in with beach material. This area is suitable for a larger settlement and a medium-sized airfield could be constructed on the lowland.

Although at neither site is there fresh water, it could be obtained in summer without difficulty from the large lakes at the foot of the granite scarp south of the sites.

North Lewes Island (site B), East Breakwater Island (site C), Fishers Island (site D).

Many of the islands in the north of the inlet have similar characteristics and are suitable for the location of specialized, single-function settlements such as a radio station. They are not large enough and lack the resources for larger settlements. Lewes Island is part of a low-lying archipelago of which only a diabase ridge on the extreme west and north of Lewes Island rises above 250 feet. The area was not visited during the summer of 1954, but from a distance it appeared to have suitable dry ground for building purposes and easy approaches

from the northeast. From other directions the coast is shallow and reefs are numerous. The main disadvantages of the site would seem to be the absence of sources of fresh water and of natural harbour facilities. Although airstrip construction would not be possible in the north of the island it is feasible on the flat, shattered-basalt area in the south.

The Breakwater Islands are formed from a basalt ridge that once extended continuously from Cheere Islands northeastwards to Kent Peninsula. The ridge was subsequently breached by the sea to form a series of islands of which the Breakwater Islands are the largest. Both islands have cliff scarp faces on their southern and eastern sides. From the north, however, the approach is easier and more gradual. The islands are divided by a narrow, 100-yard channel that is unnavigable for large vessels. The eastern island is preferable for a building site as it is considerably larger. A suitable anchorage is available on the north side of the island, although it is not well protected from northern winds. Most of the island is bare diabase rock or shattered beach ridges of basalt. Road construction would offer no difficulties, as large quantities of beach material are available. The disadvantages of the site are the absence of a reliable fresh water supply and the restricted space that is available for an airstrip. The maximum open space in an ESE-WNW direction is about  $1\frac{1}{2}$  miles and less than  $\frac{1}{2}$  mile in all other directions.

Fishers Island site is the least valuable of the three in this group. Although part of the same chain of islands as Breakwater Islands, Fishers Island is formed of quartzite. The northwest side of the island is a quartzite hill ridge with a height of 600 feet. Elsewhere the island is low, with no part above 250 feet, and is formed of low rock ridges and broad tundra areas built on silt and beach ridges. There are a few shallow lakes and the largest in the southeast of the island would provide sufficient water for a small number of people. Anchorages around the island are poor. Some protection, however, can be obtained to the southeast



amongst the outer islands of Buchan Bay. The terrain is unsuited to airstrip construction, and although this would not be impossible it would certainly be difficult owing to the rock ridges and swampy lowland areas.

Buchan Bay (sites E, F, G).

In the northeast of Bathurst Inlet there are three good building site areas near Buchan Bay. All of them suffer from shallow water inshore with numerous reefs, although the island north of Buchan Bay has deep, though exposed, water on the north side.

The site in the valley of Footprint River (site E) is on a series of sandy terraces between the Buchan Hills on the south side and a lower rock bluff on the north. Water in summer could be obtained from the river; in winter it would have to be fetched from lakes  $3\frac{1}{2}$  miles to the south. This site could only support a small settlement. Rather larger is site F in the northeast corner of Buchan Bay. The seaward approaches are shallow, but it appears to have the advantages of fresh water, lakes, flat ground, and sand.

Site G is on a low island north of Buchan Bay, with a maximum elevation of about 300 feet. The island is composed largely of rock with a veneer of marine-sorted pebbles and gravel. Conditions are not ideal for airstrip construction but there is sufficient level, naturally-drained ground to make it feasible. Fresh water is present in limited quantities but would not be sufficient for any large number of people.

Wollaston Point (site H)

Barry Islands and north Banks Peninsula have many features in common as far as the choice of sites is concerned. The northern part of Banks Peninsula in the vicinity of Wollaston Point is the most desirable site. The land is low, rising slowly to 200 feet towards the south, and is very dry, as it is covered with fine

shattered basalt with occasional low basalt cuetas. There are moderately deep water approaches to the point but no protection for larger ships from a northerly quarter. Good beaches over which material could be landed from lighters are available. Behind the point there is sufficient level ground, and fine basalt gravel and pebbles for building and airfield construction. Good drinking water is not available, although there are some small silt-laden streams.

Good building sites are difficult to find elsewhere in the northern half of Bathurst Inlet. The shores of Arctic Sound and Brown Sound are low and muddy, with scarps a few hundred yards inland. Sites in these narrow lowlands would experience serious permafrost difficulties, and good drinking water is almost impossible to obtain. Barry Islands have numerous small, dry, level, building sites but the shallow approaches, limited area, and poor water supplies (except on north Ekalulia Island) restrict their value. The east side of the inlet, south of Buchan Hills, also has some good small sites, but the lack of shelter for boats, the relief, and the high proportion of silt terrain in the lower parts are limiting factors.

#### SITES IN CENTRAL AND SOUTHERN BATHURST INLET

There are very few good building sites in the central and southern part of the inlet. This is primarily because the total amount of lowland is small and it is largely silt-covered; in addition, the broad areas of basalt pebble beaches which provide dry sites in the north are absent in the south. Three areas offer moderately attractive building sites:

Gordon Bay  
Bathurst Inlet post (Burnside Inlet)  
Southwest shore of Bathurst Inlet.

#### Gordon Bay (sites I, J.)

Gordon Bay is a complex group of inlets formed when a series of steep-sided, structurally controlled valleys were partially drowned by the sea. The

water is shallow in the more southern inlets but is deep north of Bear Island. All the inlets provide some shelter for boat operations. The potential building sites are all at the ends of inlets. Sites at the mouth of the Hiokitak River and at the southeast end of the bay appear to be better than others.

The Hiokitak River, (site I), enters the inlet through a raised sand and silt delta that has a broad, dry, flat surface. Although the silt sections may be expected to provide permafrost problems, coarser materials predominate and construction should be easy. There is room on the delta for a small airstrip. Fresh water is available from the river, which is almost free of silt. The only serious liability of the site is the shallow water, which would make it impossible for large ships to approach inshore, and difficult for lighters to unload. This could easily be overcome by building a road less than a mile in length along the north shore of the inlet to deeper water.

The Hiokitak River valley provides the easiest route into the upland area east of Bathurst Inlet.

The second good site, (site J), is at the southeast corner of Gordon Bay. The valley here is choked with sand that rises in steps for three miles inland. There is only a small stream in the valley proper although a larger river enters  $1\frac{1}{2}$  miles to the west. The site is dry and has good supplies of sand and gravel. It is, however, more restricted than the Hiokitak River site and the water approaches are considerably shallower.

#### Bathurst Inlet Post (Burnside Inlet) (site K).

The present trading post is built on the south side of Burnside Inlet in a commanding position where the narrow southern part of Bathurst Inlet broadens out. The site is not suitable for considerable expansion although many more buildings could be located than are there at present; it is on a boulder-filled, glacial clay that quickly becomes water-logged when it thaws. There is con-



siderable sand in the adjacent river delta but the nearest gravel is about 4 miles away in the raised part of the Burnside delta. Fresh water of poor quality has to be brought  $2\frac{1}{2}$  miles by boat from the mouth of Burnside River. It would not be possible to build an airstrip on the south side of Burnside Inlet but a large one could be constructed easily on the raised, western part of the Burnside delta. Small boats can enter Burnside Inlet and tie up alongside the site; larger ships, however, have to anchor  $1\frac{1}{2}$  miles off.

Southwest Shore of Inlet (sites L, M).

South of Bathurst Inlet post good building sites are increasingly hard to find. At the south end of Tinney Cove there is a broad area of low rock ridges separated by raised beaches of shattered dolomite. It would provide a dry site but there is no space for expansion and no fresh water. Elsewhere on the east side of the inlet there are high hills separated by narrow, silt-filled lowlands.

On the southwest side of the inlet the hills are farther from the water and the lowland is from 2 to 5 miles wide. The terrain has developed on glacial clays and silts and is therefore wet and not ideal for construction. Sites at the base of Young Point, (site L), and near Wolf Creek, (site M), are better than other sections. At both there is rock close to the surface, sand and gravel that may be obtained from adjacent eskers, and good supplies of fresh water. There is space for small airfields in both cases, but the sea approach is shallow.

Analysis of Sites in Probable Order of Value

14

| Location                                    | Site No. | Dry and level site | Extensive area for development | Sands and gravel available | Suitable area for airstrip | Deep water approaches | Small boat harbour | Beaches to land freight | Fresh water | Smooth unbroken ice in winter |
|---|----------|--------------------|--------------------------------|----------------------------|----------------------------|-----------------------|--------------------|-------------------------|-------------|-------------------------------|
| <hr/> North Bathurst Inlet <hr/>            |          |                    |                                |                            |                            |                       |                    |                         |             |                               |
| Daniel Moore Bay                            | A        | 1                  | 1                              | 1                          | 1                          | 3                     | 1                  | 1                       | 2           | 1                             |
| Is., N. Buchan Bay                          | G        | 1                  | 1                              | 1                          | 2                          | 2                     | 3                  | 1                       | 3           | 2                             |
| Buchan Bay                                  | F        | 2                  | 2                              | 1                          | 2                          | 3                     | 1                  | 1                       | 1           | 1                             |
| Footprint River                             | E        | 1                  | 3                              | 1                          | 3                          | 3                     | 1                  | 1                       | 1           | 1                             |
| Wollaston Pt.                               | H        | 1                  | 1                              | 2                          | 1                          | 2                     | 3                  | 1                       | 3           | 1                             |
| Breakwater Is.                              | C        | 1                  | 2                              | 2                          | 3                          | 2                     | 3                  | 2                       | 3           | 2                             |
| Lewes Island                                | B        | 1                  | 2                              | 2                          | 3                          | 2                     | 3                  | 1                       | 3           | 2                             |
| Fishers Island                              | D        | 2                  | 2                              | 2                          | 2                          | 3                     | 3                  | 2                       | 2           | 2                             |
| <hr/> Centre and South Bathurst Inlet <hr/> |          |                    |                                |                            |                            |                       |                    |                         |             |                               |
| Hiokitak River                              | I        | 2                  | 1                              | 1                          | 2                          | 2                     | 1                  | 3                       | 1           | 1                             |
| S. E. Gordon Bay                            | J        | 2                  | 2                              | 1                          | 3                          | 3                     | 1                  | 1                       | 1           | 1                             |
| Burnside Inlet                              | K        | 3                  | 3                              | 2                          | 2                          | 3                     | 1                  | 2                       | 2           | 1                             |
| Young Point                                 | L        | 2                  | 1                              | 1                          | 2                          | 3                     | 2                  | 3                       | 1           | 1                             |
| Wolf Creek                                  | M        | 2                  | 1                              | 1                          | 2                          | 3                     | 3                  | 1                       | 1           | 1                             |

- 1 Meets requirements under this heading.
- 2 Not very good but could be improved or would probably suffice.
- 3 Does not meet requirements







**Date Due**

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