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AIRPHOTO SELECTION OF POTENTIAL AIRPORT
SITES IN THE VICINITY OF HAY RIVER, NWT

J. D. Mollard & Associates Limited

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VICINITY OF HAY RIVER, NWT

Prepared for:

Department of Transport
1046 Federal Building
Edmonton, Alberta.

Attention: V. R. Currie, P. Eng.
Regional Construction Engineer.

April 2, 1963.

Prepared by:

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INTRODUCTION

Purpose of the study reported here was to select potential airport sites in the vicinity of Hay River, NWT.

Airphotos covering a large area (see Fig. 5) in the vicinity of Hay River were obtained from the Department of Transport in Edmonton, and from the National Airphoto Library in Ottawa. These airphotos have an average scale of approximately 1:40,000, or one inch equals 3333 feet. Airphotos scaling one inch equals 1200 feet were obtained from the Department of Transport in Edmonton. These photos cover only very limited areas along proposed railway locations in the region.

Airphotos and reference material concerning the search area were studied in detail. Three potential airport site areas were selected for further study. The site areas are located as follows:

- 1) North of Mile 14 on the proposed railway branch line to Pine Point. Location of runways and terrain details are shown on Figures 1 and 2.
- 2) Seven and a half miles east of Mile 16 on the MacKenzie Highway. See Figure 3.
- 3) Two miles west of Mile 9-10 on the MacKenzie Highway. This site is just north of previously investigated site "A". See Figure 4.

SOILS AND GEOLOGY

The study area is underlain by shale and limestone beds of Upper Devonian age. The following paragraph is quoted from Paper 58-11, Geological Survey of Canada (1959):

"The upper part of map-unit 15, which includes the Hay River shales of Cameron, is almost continuously exposed in the canyon of Hay River below Alexandra Falls. Some 745 feet of strata (composite section) are present between the base of the overlying Alexandra formation and the end of exposures downstream near the Frobisher Hay River No. 8 well."

The well that is mentioned in this quotation is located on the east side of the Hay River opposite Mile 11 on the MacKenzie Highway. Bedrock outcrops are indicated on the map accompanying Paper 58-11 on both sides of the Hay River from this point south through Alexandra Falls. Although these outcrops are indicated in an upland position adjoining the river, we believe that they refer to bedrock exposures in bluffs along the river. No bedrock outcrop was observed in an upland position as a result of our airphoto studies. In local upland areas, however, bedrock is believed to be thinly covered by glacial drift.

Glacial till is believed to overlies bedrock over most of the search area. Properties of the till are likely well represented by samples taken in connection with your investigation of Sites "A" and "B"

(Site "A" $w_L = 38.4$, $w_p = 22.6$, $I_p = 15.8$ Natural $w\% = 18.1$.
 Site "B" $w_L = 37.2$, $w_p = 20.4$, $I_p = 16.8$ Natural $w\% = 16.4$).

A postglacial lake extended as far south as the escarpment running through Enterprise and Escarpment Lake. As this lake receded to the north, wave action left a series of beaches and wave-cut strandlines on the sloping land surface south of Great Slave Lake.

Sands of glacial-lake origin locally cover the till surface. These deposits have been reworked and redeposited in the form of beach ridges.

Most of the beaches are little more than low sandy ridges that impede drainage and promote the growth of muskeg areas.

Shallow muskeg and wet ground cover most of the area examined in airphotos.

Permafrost appears to be sporadic in nature and is clearly revealed in the photographs in many localities.

Waves breaking (erosion) in ancient times on the sloping till terrane lying between the escarpment and Great Slave Lake have likely left local surface accumulations of boulders on the till.

Deeper-looking deposits of granular material occur in the southeast part of the search area; these will be described under the "Granular-Material Prospects" section of the report.

TOPOGRAPHY

The land surface making up the search area slopes gradually to the north from the escarpment at Enterprise to Great Slave Lake. Calculations indicate that this slope is of the order of 0.15 to 0.25 percent. This figure is well within the maximum of 1% overall and 1½% locally permitted for runway construction.

GRANULAR-MATERIAL PROSPECTS

Granular-material prospects appear to fall into three categories within the search area. They are:

1) Sand beaches. These deposits were derived from sandy lakebed material or sandy material laid down as shallow deltas built into the glacial lake. With few exceptions, these deposits appear to contain only sand sizes and are likely shallow with potential high water table and little recoverable volume.

2) Kame-deltas. These deposits exhibit wave markings resulting from wave erosion on the lake that surrounded them. Their origin and apparent great depth results from stream deposition in to a glacial lake located at the ice front. These deposits are located in the southeast extremities of the search area. The best looking of this type of deposit is located at latitude 60°38' longitude 115°20' (see Figure 5) and is outlined on photo A11338-146.

3) Hay River Terraces. Gravel is reported at Mile 16 and Mile 23 of the MacKenzie Highway in your report on Sites "A" and "B". Other terraces (both high-level and low-level) along the Hay River should be examined carefully in the field. We would suggest examining exposures along the river south of Mile 11 from a motor boat. High-level terraces not exposed along the river should be "test pitted" from the upland. Places to check river terraces are marked on airphotos and on the one inch equals four-mile map that shows all granular prospects. Special attention should be paid to examination of terraces marked in the vicinity of Mile 23 on the MacKenzie Highway.

POTENTIAL AIRPORT SITES

Potential airport sites are shown on the one inch equals four-mile map and on airphoto tracings (Figures 1 to 4). No really "high and dry" site was discovered in the search-area. The sites mapped are what we consider to be the best available in the study area.

Terrain classes at each of the potential sites are based largely on anticipated drainage conditions (see legend on plans). Generally, we expect the areas marked "1" will tend to be sandy in texture or at least reveal thin sands overlying glacial till. The other site-area terrain classes are expected to be composed mainly of glacial till. Shallow depths of sand are anticipated locally on the till surface.

The well-developed linear-trend pattern seen in airphotos at each of the sites is believed to reflect leaching along fracture lines in the underlying bedrock. We do not feel, however, that bedrock is so close to ground surface at any of the sites that it will be encountered in normal construction cuts. Since the bedrock surface is expected to be fairly regular, two or three "deep" test holes at each site should indicate the importance of the buried bedrock surface.

We favor the potential site west of Mile 9-10 on the MacKenzie Highway as our first choice. Terrain conditions at this site are likely the poorest of the three. The reasons for ranking it as our first choice are as follows:

- 1) Closest to Hay River. This site is located about 12 miles by road from Hay River.
- 2) No bridge is required for access.
- 3) Only two miles of new highway construction are required for access.
- 4) Close to proposed railway.

The potential site near Mile 14 on the proposed branch line railway to Pine Point is our second choice. Terrain conditions appear to be the best at this site. Also, proximity to railway would allow transport of heavy materials to a location near the indicated site. On the debit side of the ledger, this site will be located 21 miles by road from Hay River. Fourteen miles of new highway and a bridge across the Hay River would have to be constructed to provide access.

We place the potential site east of Mile 16 on the MacKenzie Highway in last position. Terrain conditions appear to be better than our first choice, but inferior to our second choice. Distance by road to Hay River would be 24 miles. About eight miles of new highway and a traffic bridge across the Hay River would be required to provide access to this site. No access to railway service is available.

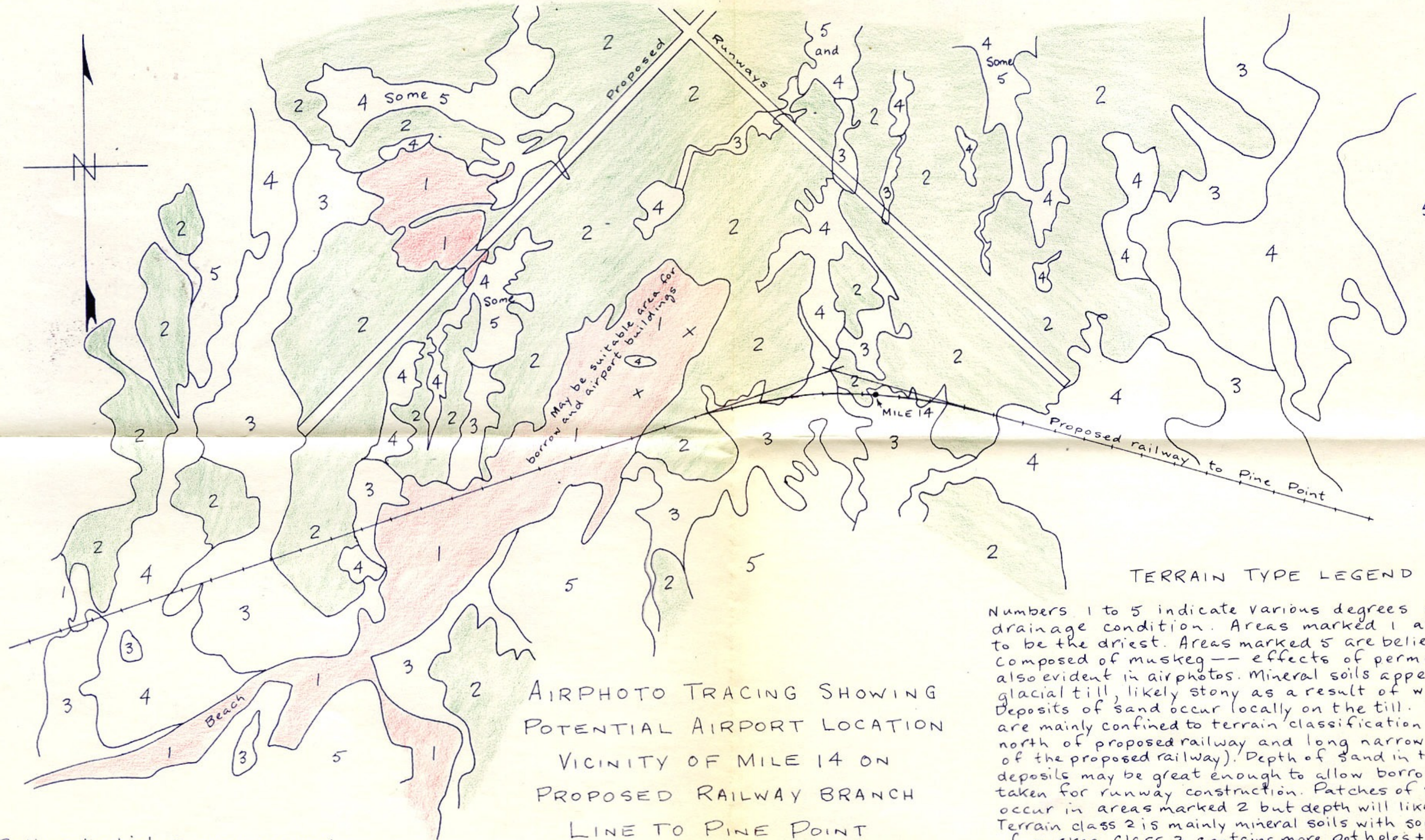
Proximity to sources of construction materials cannot be assessed at this stage. Field work will be required to supply this information.

WATER-SUPPLY PROSPECTS

Water supply at all sites may be available either from fissures in the bedrock (see "crack pattern") or from the sandy glacial drift. Neither of these prospects sounds too promising at first consideration. Water from the bedrock is likely to be very hard and water from the upland drift is likely to be brown and highly organic.

The Hay River is reasonably close to our first-choice site. The river is located 13 miles and 7 miles, respectively, from our second and third choice sites. Accordingly our recommendation would be to field check nearby Hay River granular terraces that occur at and extend below low-water river levels. If the granular materials appear to extend below river level, the terrace should be test drilled and, if a good water-bearing formation is discovered, the prospective source of water should be properly pump tested and evaluated. These prospective ground-water sources could be assessed at the same time the terraces are inspected as sources of aggregate.

BOUNDARY OF PHOTO COVERAGE AT 1 INCH EQUALS 1200 FEET



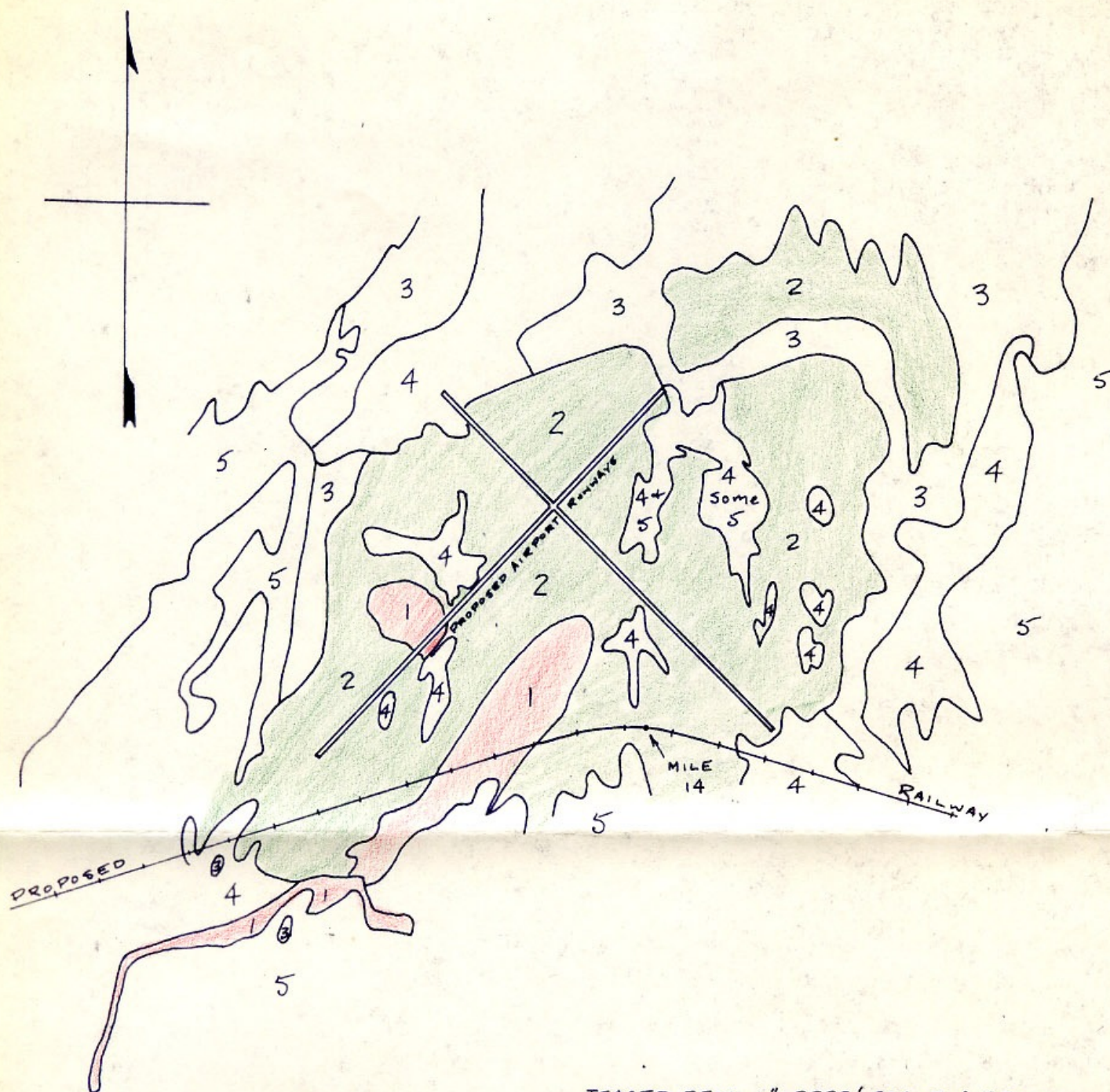
TERRAIN TYPE LEGEND

Numbers 1 to 5 indicate various degrees of terrain drainage condition. Areas marked 1 are believed to be the driest. Areas marked 5 are believed to be composed of muskeg — effects of permafrost are also evident in airphotos. Mineral soils appear to be glacial till, likely stony as a result of wave action. Deposits of sand occur locally on the till. Sand areas are mainly confined to terrain classification 1 (see 'X's' north of proposed railway and long narrow area south of the proposed railway). Depth of sand in these beach deposits may be great enough to allow borrow pits to be taken for runway construction. Patches of sand likely occur in areas marked 2 but depth will likely be shallow. Terrain class 2 is mainly mineral soils with some pot holes of muskeg. Class 3 contains more pot holes than 2. Class 4 is mainly shallow muskeg and wet ground with some areas of fairly dry mineral soil.

Note -- Both potential runways exceed 10,000 feet in length. Limited photo coverage prevents showing total length. See Figure 2.

AVERAGE SCALE 1" = 1200' MARCH 28, 1963. J. D. MOLLARD + ASSOCIATES LIMITED.

FIG. 1.

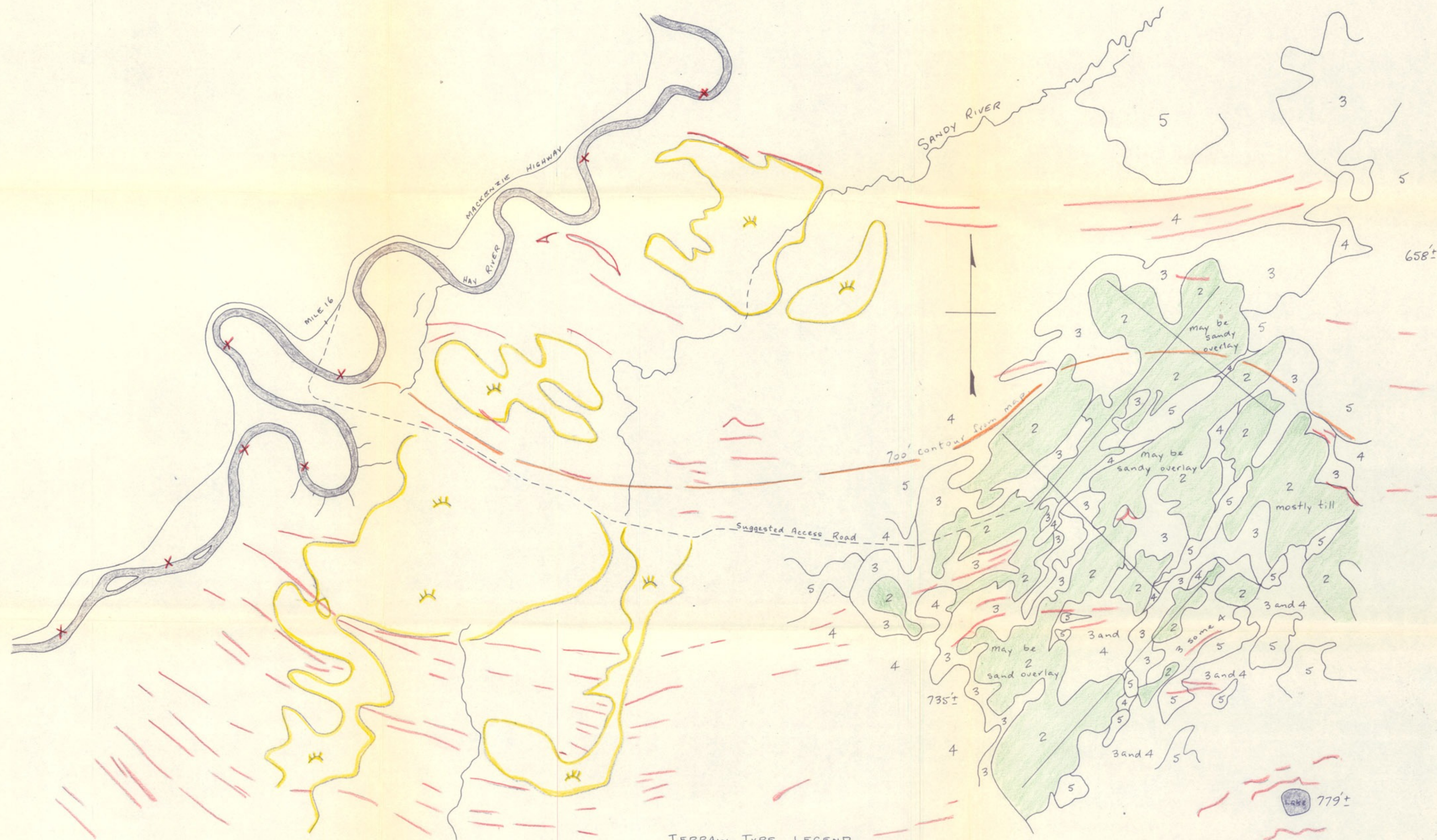


TRACED FROM 1" = 3333' SCALE AIRPHOTO
A11128-9.

FIG. 2.

Note-- This drawing was prepared to supplement figure 1. It shows the terrain crossed by the north portions of the proposed runways. Although terrain legend used on this drawing is the same as used on figure 1, the smaller scale of photos do not allow the refinement shown on figure 1.

DEPARTMENT OF TRANSPORT	
AIRPHOTO TRACING SHOWING POTENTIAL AIRPORT LOCATION VICINITY OF MILE 14 ON PROPOSED RAILWAY BRANCH LINE TO PINE POINT	
J.D. MOLLARD AND ASSOCIATES LIMITED	
REGINA	SASKATCHEWAN
APPROVED <i>H. D. Dishaw</i>	DATE MARCH 29, 1963.



LEGEND AND NOTES

- Beaches and strand lines
- Areas predominantly muskeg.
- Drainage
- 735± Elevations taken from 4 mile map
- Center line of potential runways.
- Slope of land in vicinity of potential airport believed to be north at 0.15 to 0.20 percent.
- Check for gravel at 'x's.

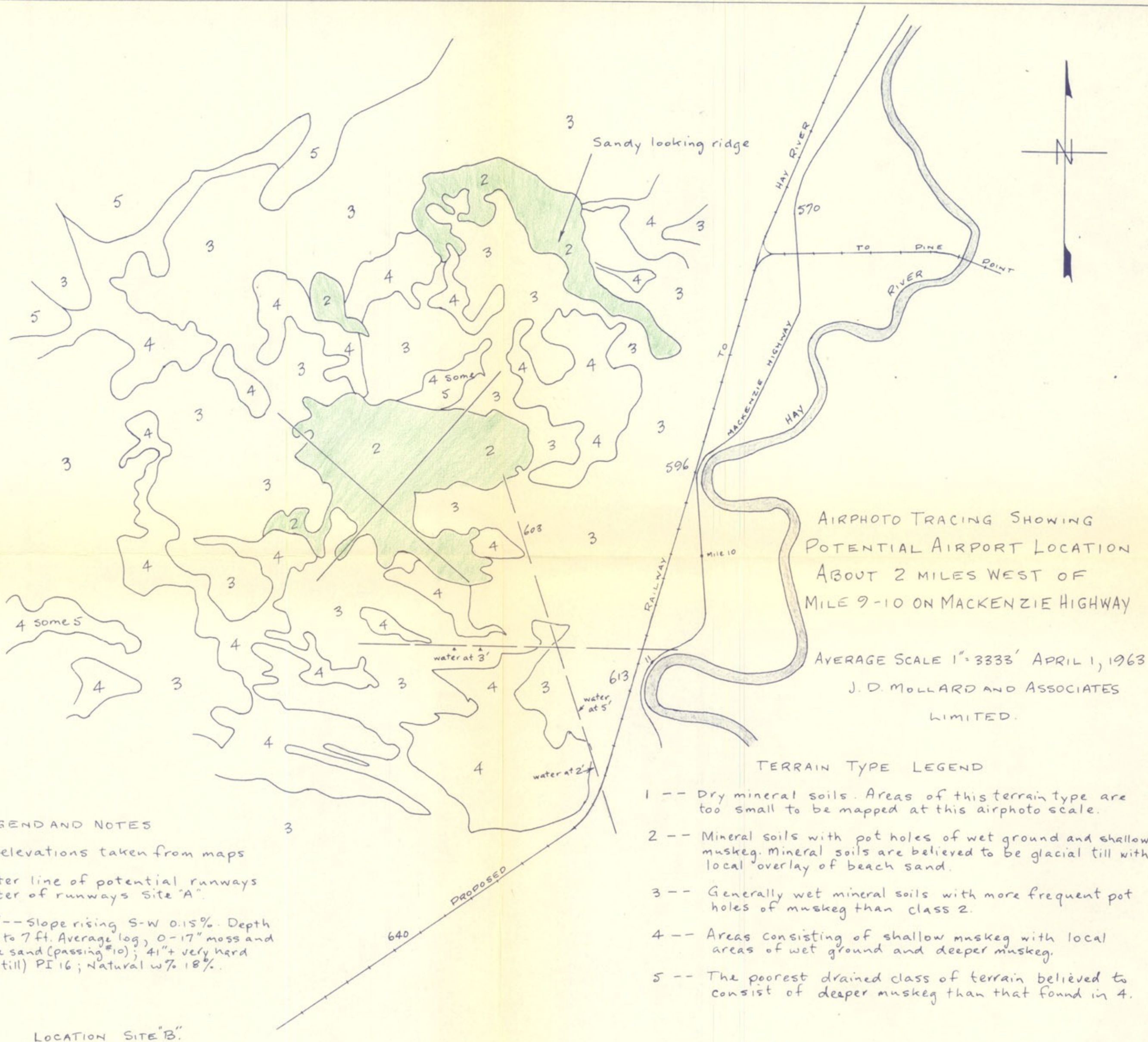
TERRAIN TYPE LEGEND

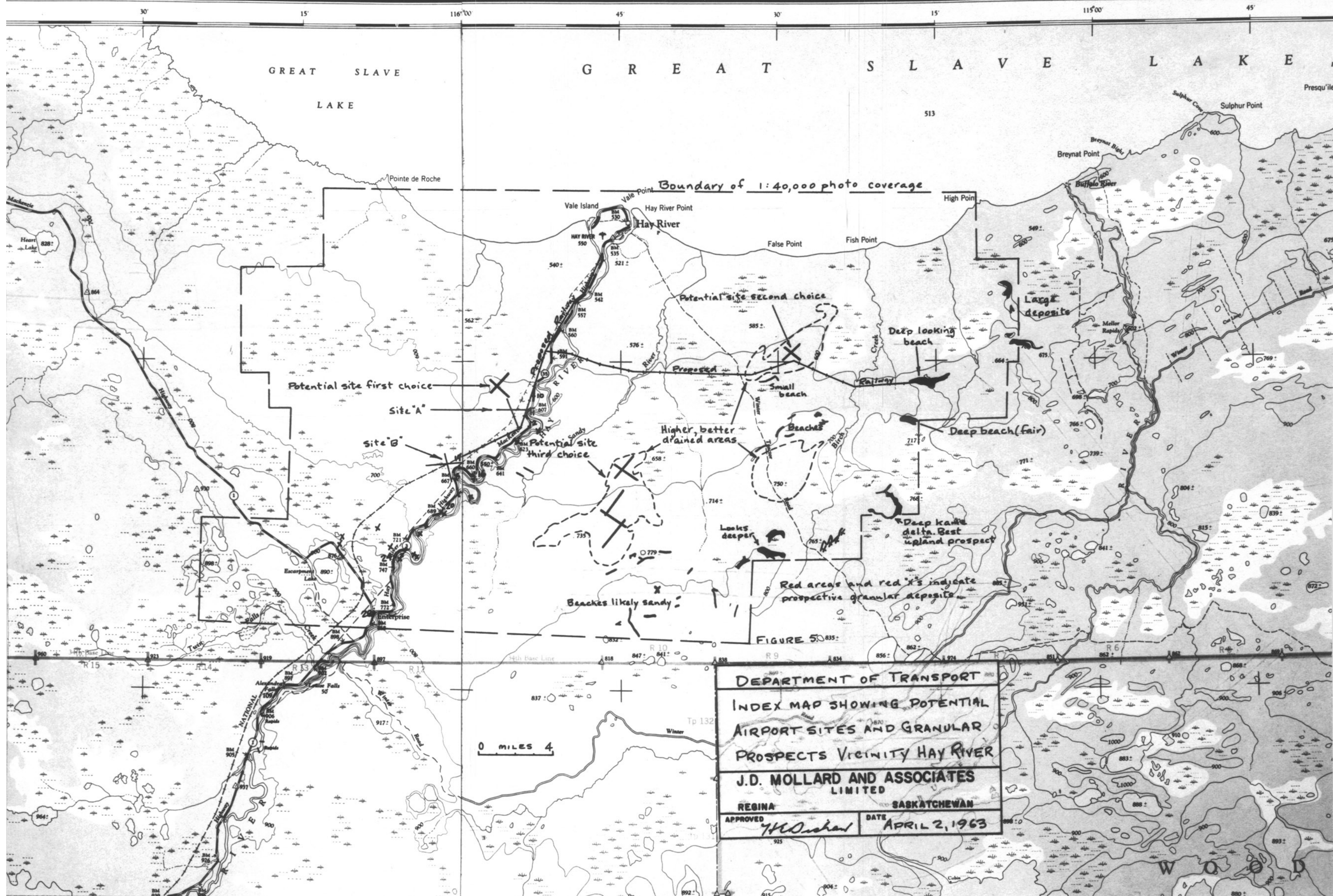
- 1 -- Dry mineral soils. Areas of this terrain type are too small to be mapped at this airphoto scale.
- 2 -- Mineral soils with pot holes of wet ground and shallow muskeg. Mineral soils are believed to be glacial till with local overlay of beach sand.
- 3 -- Generally wet mineral soils with more frequent pot holes of muskeg than class 2.
- 4 -- Areas consisting of shallow muskeg with local areas of wet ground and deeper muskeg.
- 5 -- The poorest drained class of terrain; believed to consist of deeper muskeg than that found in 4.

AIRPHOTO TRACING SHOWING
POTENTIAL AIRPORT LOCATION
ABOUT 7 1/2 MILES EAST OF MILE
16 ON THE MACKENZIE HIGHWAY

AVERAGE SCALE 1" = 3333' MARCH 30, 1963.

J. D. MOLLARD AND ASSOCIATES LTD.





END OF REPORT