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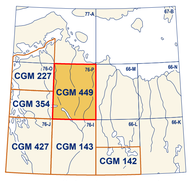
Abstract

Preliminary surficial geology studies, based on air photo interpretation and limited legacy field data in the Brichta Lake map area, provide an understanding of the distribution and nature of surficial materials, and regional glacial history. The terrain is characterized by extensive glacial and meltwater scouring that has affected bedrock outcrops, and eroded hummocky and streamlined till, till blankets, and till veneers in the southwest regions. Streamlined bedrock and till landforms indicate ice flow towards the northwest and north-northwest during the last glaciation. Subglacial meltwater corridors and broader erosional zones, trending north-northwest, consisting of eskers, washed till veneer, ridged till, and scoured bedrock, result from late-phase ablation of the ice sheet during deglaciation. Glaciomarine and postglacial marine sediments extend discontinuously inland from the Queen Maud Gulf to 200 m a.s.l. elevation, notably up Tingmeak and Ellice rivers and their tributaries. In some eastern parts of the map area below 160 m a.s.l. elevation, thick marine deposits form plains that blanket broad shallow valleys.

Résumé

Des études préliminaires de la géologie des formations superficielles de la région cartographique de Brichta Lake, fondées sur l'interprétation de photos aériennes et une quantité limitée d'anciennes données de terrain, permettent de comprendre la répartition et la nature des matériaux superficiels et l'histoire glaciaire régionale. Le terrain est caractérisé par un important affouillement par la glace et les eaux de fonte qui a modifié les affleurements rocheux et érodé les dépôts de till bosselé et profilé ainsi que les couvertures et placages de till dans les régions du sud-ouest. Les formes de relief profilées du substratum rocheux et du till indiquent un écoulement glaciaire dirigé vers le nord-ouest et le nord–nord-ouest au cours de la dernière glaciation. Des couloirs d'eau de fonte sous-glaciaires et des zones d'érosion plus larges, de direction nord–nord-ouest, constituées d'eskers, de placages de till délavé, de till à crêtes et de substratum rocheux affouillé, résultent de l'ablation de phase tardive de l'inlandsis pendant la déglaciation. Depuis le golfe Queen Maud vers l'intérieur des terres, jusqu'à une altitude de 200 m au-dessus du niveau de la mer, s'étendent de façon discontinue des sédiments glaciomarins et des sédiments marins postglaciaires, notamment dans le cours supérieur des rivières Tingmeak et Ellice et de leurs affluents. Dans certaines régions de l'est de la carte, à moins de 160 m au-dessus du niveau de la mer, d'épais dépôts marins forment des plaines tapissant de larges vallées peu profondes.



National Topographic System reference and index to adjoining published Geological Survey of Canada maps

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CANADIAN GEOSCIENCE MAP 449

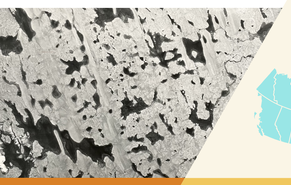
RECONNAISSANCE SURFICIAL GEOLOGY

BRICHTA LAKE

Nunavut

NTS 76-P

1:125 000



QUATERNARY

HOLOCENE

POSTGLACIAL ENVIRONMENT

O — **Organic deposits, undifferentiated:** peat and muck; up to 2 m thick but commonly less than 1 m thick; formed predominantly by the accumulation of vegetative material in bogs; occur in depressions and along valley bottoms; commonly overlie marine silt and clay and till; may contain ice-wedge polygons; small unmapped organic deposits occur in most terrain units.

EOLIAN SEDIMENTS: fine to medium sand; varied thickness; deposited by wind.

Er — **Dune sediments:** fine to medium sand; varied thickness; deposited by wind; forming dune ridges and blowouts, active and stabilized; derived primarily from alluvial, marine, glaciomarine, and glaciofluvial sediments.

E — **Eolian sediments, undifferentiated:** fine to medium sand; varied thickness; deposited by wind; active and stabilized areas; may contain small dunes and blowouts; derived primarily from glaciofluvial and marine sediments.

ALLUVIAL SEDIMENTS: silt, sand, and gravel deposited by modern streams and rivers.

Ap — **Floodplain sediments:** silt, sand, and gravel; varied thickness; include inactive and seasonally flooded terrain along modern meandering streams and rivers; may be overlain by organics.

At — **Terraced sediments:** silt, sand, and gravel; 3 to 5 m thick; forming raised terraces above modern rivers; confined to valleys; include mid-late Holocene terraces cut into unit Mb; surfaces may exhibit paleochannels, thermokarst, retrogressive thaw flow slides, and patterned ground.

A — **Alluvial sediments, undifferentiated:** silt, sand, and gravel; deposits generally are stratified and moderately sorted; 1 to 5 m thick; may occur as floodplains and terraces.

L — **Lacustrine sediments, undifferentiated:** silt and sand; varied thickness; associated with partially drained or infilled lakes; may include organics; surface may be vegetated.

MARINE SEDIMENTS: clay, silt, sand, and gravel; 1 to 15 m or more thick; deposited during marine inundation and regression of the Arctic Ocean during deglaciation, resulting in a coarsening-upward sequence; may include fine-grained glaciomarine sediments between 125 and 175 m elevation; may contain ground ice.

Mr — **Beach sediments:** sand to gravel, may contain cobbles; varied thickness; derived mainly from reworked glaciofluvial sediments; forming raised beach ridges and swales associated with falling sea level, generally well below 200 m elevation marine limit; may also include ice-wedge polygons and shingle beaches derived from exposed bedrock outcrops; may be underlain by marine or glaciomarine sediments.

Md — **Deltaic sediments:** silt, sand, and gravel; varied thickness; deposited by modern and late Holocene rivers draining into the sea.

Mn — **Littoral sediments:** silt and sand, may also consist of small cobbles and shingles; 1 to 3 m thick; littoral and near-shore sediments forming raised beaches with undulating surfaces; in places overlies fine-grained marine sediments; recently emerged surfaces near sea level may be windblown; may contain ice-wedge polygons.

Mv — **Marine veneer:** undifferentiated sediment, consisting of a clay to sand matrix containing pebbles, cobbles, and boulders but predominantly silt and sand; less than 2 m thick; occurs as sediments infilling depressions between bedrock outcrops and as a lag on washed bedrock and till surfaces below 200 m elevation marine limit.

Mb — **Marine blanket:** clay and silt with minor sand; 2 to 15 m thick; flat to gently undulating surface; may contain segregated ice; may be gullied and exhibit retrogressive thaw flow slides and ice-wedge polygons.

PROGLACIAL AND GLACIAL ENVIRONMENT (WISCONSIN GLACIATION)

GLACIOMARINE SEDIMENTS: silt, sand, gravel, and cobbles; deposited at or beyond a retreating ice front by meltwater entering the sea.

GMr — **Beach sediments:** sand to gravel, may contain cobbles; varied thickness; derived mainly from reworked glaciofluvial sediments; forming raised beach ridges and swales associated with high sea levels; may also include ice-wedge polygons and shingle beaches derived from exposed bedrock outcrops; elevations range from 150 to 200 m.

GMd — **Deltaic sediments:** sand to cobbles; up to 10 m or more thick; deposited by glacial meltwater draining into the sea at or beyond retreating ice front near 200 m elevation; exhibit channelled surfaces, ice-wedge polygons, and beach ridges.

GMv — **Glaciomarine veneer:** undifferentiated sediment, consisting of a clay to sand matrix containing pebbles, cobbles, and boulders but predominantly silt and sand; less than 2 m thick; occurs as sediments infilling depressions between bedrock outcrops and as a lag on washed bedrock and till surfaces near but below 200 m elevation marine limit.

GMb — **Glaciomarine blanket:** clay to sand with minor gravel; greater than 2 m thick; deposited in deep-water environments; may contain segregated ice; may be gullied and exhibit retrogressive thaw flow slides and ice-wedge polygons in river valleys and on steep slopes; generally occurs between 150 m and 200 m elevation marine limit.

GLACIOFLUVIAL SEDIMENTS: sand, gravel, and minor silt; 1 to 20 m or more thick; deposited by meltwater flowing from, or in contact with, glacier ice; may contain ground ice.

GFt — **Terraced sediments:** sand to cobbles; varied thickness; forming raised terraces above modern rivers; confined to valleys; surfaces may exhibit paleochannels and patterned ground.

GFc — **Ice-contact sediments:** sand to rounded gravel; massive to cross-stratified; 2 to 20 m thick; deposited at the ice margin and subglacially; occur as hummocky terrain; may exhibit kettle lakes, ice-wedge polygons, and raised beaches.

GFe — **Esker sediments:** silt, sand, and gravel; 1 to 20 m thick; forms sinuous ridges with both sharp-crested and flat-topped segments, mounds, and flanking aprons; formed subglacially or in subaerially exposed ice-walled channels; may exhibit raised beaches below 200 m elevation; may contain ground ice and ice-wedge polygons.

GF — **Glaciofluvial sediments, undifferentiated:** sand, gravel, and minor silt; 1 to 20 m thick; may occur as braided fans, outwash plains, and hummocky terrain; may contain massive ground ice.

GLACIAL ENVIRONMENT

GLACIAL SEDIMENTS (TILL): unsorted glacial debris, diamicton; deposited beneath, or along the margin of, a glacier as lodgment till, meltout till, and gravity flow deposits; may be fossiliferous below marine limit; may contain ground ice.

Th — **Hummocky till:** diamicton; silt to sand matrix with pebbles, cobbles, and boulders; varied thickness; consisting of small to large hummocks and mounds, and minor rounded to irregular morainal ridges; overlies streamlined till; heavily dissected by subglacial meltwater in southcentral map area; may contain ground ice.

Tm — **Moraine complex:** diamicton, sand, and gravel; varied thickness; associated with east-trending recessional moraine ridges, up to 4 km long, in the northeastern map area; may contain minor moraine ridges.

Tr — **Ridged till:** diamicton; silt to sand matrix with pebbles, cobbles, and boulders; varied thickness; contains minor ribbed and other minor ridges, varying in orientation from parallel to transverse to ice flow; associated with glaciofluvial sediments, subglacial meltwater corridors, scoured till veneer, and bedrock; predominantly in the southwest map area.

Ts — **Streamlined till:** diamicton; silt to sand matrix with pebbles, cobbles, and boulders; varied thickness; forming well developed drumlinoid ridges, drumlins, and crag-and-tails in the southwest map area; heavily dissected by subglacial meltwater.

Tv — **Till veneer:** diamicton; silt to sand matrix with pebbles, cobbles, and boulders; less than 2 m thick; occurs as a discontinuous layer where rock structure is generally visible on airphotos, and as a lag on washed bedrock below 200 m elevation marine limit; unit may include bedrock outcrop, glaciofluvial sediments, and glaciomarine and marine sediments below 200 m elevation; heavily dissected by subglacial meltwater.

Tb — **Till blanket:** diamicton; silt to sand matrix with pebbles, cobbles, and boulders; 2 to 10 m thick; surface mimicks bedrock topography, locally with drumlinoid ridges and crag-and-tails; may include pockets of till veneer; heavily dissected by proglacial/subglacial meltwater in southwest map area.

PRE-QUATERNARY

R — **Bedrock, undifferentiated:** various lithologies; surface may be glacially scoured or represent zones of washed bedrock (meltwater scours with minor till ridges or marine wave action); may include pockets of marine, glaciomarine, and glaciofluvial sediments or till.

Stratigraphic relationship: two map-unit designators separated by a slash (/) are used where a stratigraphic relationship is observed or confidently inferred (e.g. Mv/Tb indicates marine veneer overlying till blanket). The map-unit polygon is coloured according to the overlying unit.

- Geological contact, defined
- Landslide escarpment, active, may be inactive
- Retrogressive thaw flow, direction known, may include other landslides
- Thermokarst depression, small
- Patterned ground, ice-wedge polygons
- Felsenmeer
- Dune crest, active, stabilized
- Extensive gullied terrain, generally in marine sediments, along rivers
- Terrace scarp
- Beach crest
- Kettle depression, small
- Meltwater channel:
  - *Minor subglacial or proglacial, paleocurrent direction unknown*
  - *Minor subglacial or proglacial, paleocurrent direction known*
- Meltwater erosional depression
- Major subglacial meltwater corridor margin, channel scarp
- Moraine ridge:
  - *Minor, ridged till, may include other small ridges*
  - *Major, recessional*
- Kame
- Esker ridge:
  - *Direction known or inferred*
  - *With beach ridges, direction known*
- Drumlinoid ridge:
  - *Buried, 1 = older, 2 = youngest*
  - *Large*
- Drumlin ridge:
  - *Buried*
  - *Large*
- Crag-and-tail ridge:
  - *Buried*
  - *Large*
- Pre-crag ridge
- Fluted bedrock or drift, poorly defind, may be buried, direction unspecified
- Fluted bedrock, roche moutonnée:
  - *Poorly defined, may be buried, direction known*
  - *Well defined, direction known, 1 = older, 2 = youngest*
- Striation:
  - *Ice-flow direction unknown*
  - *Ice-flow direction known*
- Small outcrop
- Station location:
  - *Remote observation (see Supplementary Data)*
  - *Ground observation, stratigraphic section (see Supplementary Data)*

Recommended citation
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Geological Survey of Canada
Canadian Geoscience Maps

Canada

Author: D.E. Kerr

Geology by D.E. Kerr, 2021, based on airphoto interpretation of 1:60 000 scale photos taken in 1956; limited field investigations by D.E. Kerr, 1989 (Kerr, 1994); striations from unpublished field manuscript map by W. Blake Jr., 1962

Geological data conforms to Surficial Data Model v. 2.4.0 (Deblonde et al., 2019).

Geomatics by L. Robertson

Cartography by N. Côté

Scientific editing by L. Ewert

Initiative of the Geological Survey of Canada, conducted under the auspices of the Supporting Adaptation in Coastal Studies project as part of Natural Resources Canada's Climate Change Geoscience program

Map projection Universal Transverse Mercator, zone 13
North American Datum 1983

CANADIAN GEOSCIENCE MAP 449

RECONNAISSANCE SURFICIAL GEOLOGY

BRICHTA LAKE

Nunavut

NTS 76-P

1:125 000

2 0 2 4 6 8 10 km

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications
Elevations in metres above mean sea level

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area.
Mean magnetic declination 2022, 8°04'E, decreasing 1.4' annually
Readings vary from 6°39'E in the NE corner to 9°22'E in the SW corner of the map.

This map is not to be used for navigational purposes.

Title photograph: Meltwater-scoured bedrock with remnants of fluted till, Nunavut. Photo from the National Air Photo Library. NAPL photo A15788-58

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Data may include additional observations not portrayed on this map. See map info document accompanying the downloaded data for more information about this publication.

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CANADIAN GEOSCIENCE MAP 449
RECONNAISSANCE SURFICIAL GEOLOGY
BRICHTA LAKE
Nunavut
NTS 76-P