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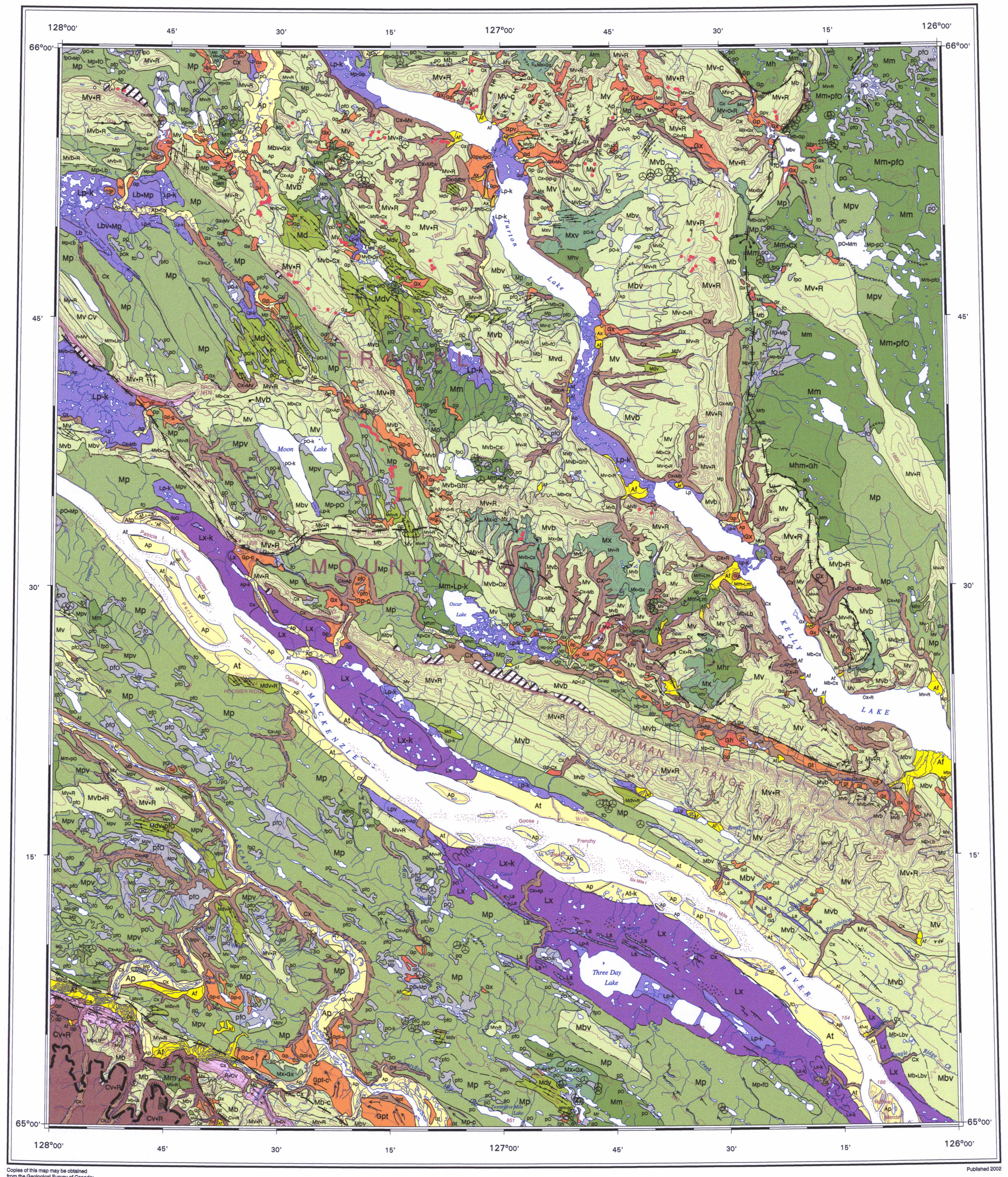
GEOLOGICAL SURVEY OF CANADA COMMISSION GÉOLOGIQUE DU CANADA

MAP UNIT	NAME	MATERIAL	THICKNESS	TOPOGRAPHY	DRAINAGE PATTERN	GROUND ICE	COMMENTS
fO	Organic fenland	Peat, typically woody sedge peat	2–3 m	Flat to gently sloping, in part with reticulate network of low ridges (50 cm high). Slope: 0–2°	No organized drainage; water at surface throughout summer months	Commonly unfrozen to > 2 m; little data available on segregated ice content at greater depths	Poor drainage, plus high compressibility and low strength of the material make it unsuitable for any type of construction
pO, pO-k	Organic peatland	Peat, typically sedge and woody sedge overlain by sphagnum peat; commonly treeless or with scattered black spruce; lichens commonly constitute 50% or more of surface vegetation, resulting in high albedo	2–4 m	Flat to very gently sloping, typically with numerous shallow steep-sided (2–3 m) depressions occupied by lakes, ponds, and bogs (pO-k)	Depressions interconnected by seepage channels	Commonly up to 20%, locally up to 60%, segregated ice within peat; typically 30–100 cm, locally up to 3 m total thickness segregated ice in mineral soil immediately below peat. Peat in wet depressions commonly thawed to > 1 m	Subsidence of up to 1 m common and subsidence up to 3 m possible when vegetation is removed; alteration of permanently frozen peat plateaus and thawed depressions and water bodies presents serious problems in construction of roads, pipelines, etc.; material highly compressible when thawed
Ap	Alluvial plain	Medium coarse sand, locally gravel of point bar deposits, overlain by silt and fine grained sand of overbank deposits. Streams in mountainous areas commonly have a braided channel system and lack overbank deposits	3–5 m	Floodplain and low bordering terraces, commonly with meander scrolls. Floodplain of mountainous areas interrupted by shallow braided channels. Slope 0–3°. Relief to 1 m	No integrated drainage system; impeded by meander scroll ridges where present	Permafrost absent in unvegetated part of floodplain; elsewhere 10–25% segregated ice by volume as thin (1 mm–2 cm) seams. Cement ice only in coarse sand and gravel	Subject to periodic flooding; silt and sand of overbank deposits may be underlain by gravel, but extraction of the gravel may produce serious deleterious changes in the stream course or downstream changes in stream regimen
Ap-k	Thermokarst alluvial floodplain	Fine grained sand and silt	3–5 m	Floodplain, in part with meander scars and numerous channels and thermokarst ponds. Relief to 5 m	Seepage to ponds and lakes then by connecting channels to trunk streams	20–50% or more segregated ice by volume	Thermokarst processes active around pond margins; widespread occurrence of ice wedges, which upon removal of vegetation will mel and produce a polygonal network of depressions
At, At-k	Alluvial terrace, thermokarst alluvial floodplain	Sand and silt; may be underlain by gravel	2–5 m	Flat to gently sloping, in part with meander scrolls, channels, and thermokarst ponds	No integrated drainage system; poorly to moderately well drained	No data; ice content probably low to moderate	Mapped only along Mackenzie River. Thermokarst alluvial plain mapped only along south side of Mackenzie River. Constitutes a potential source of aggregate
Af	Alluvial fans and fan aprons	Within mountainous areas mainly gravel, locally within lenses of mudflow deposits; in remaining area, mainly silt and fine grained sand, commonly with organic layers, but some fans consist mainly of gravel		Discrete simple fans or fan aprons; gravelly fans in mountainous areas have slopes to 10°, fine grained fans typically have slopes of 1–4°	One or more shifting streams usually present; downslope seepage in poorly defined runnels	No data. Ice content probably medium to high in fine grained fans; cement ice only in gravelly fans or permafrost may be absent	Fans subject to sudden and damaging shifts of streams; generally unsuitable for construction. Gravelly fans in mountainous areas constitute readily available source of aggregate
Ax	Alluvial complex; includes Ap and Af undivided	Same as for Ap and Af		Same as for Ap and Af	Same as for Ap and Af	Same as for Ap and Af	Same as for Ap and Af
Cv	Colluvial veneer	Rock detritus and surficial deposits transported by gravity	< 2 m	Veneer conforms to bedrock topography; occurs mainly along valley walls and scarps. Slopes 15–42°	Generally freely drained. No organized drainage; generally moderately well drained	No data	Active transportation of material by rock fall, creep, and slumping; active layer detachment slides common, especially following forest fires
Cb	Colluvial blanket	Rock detritus and surficial deposits transported by gravity	> 3 m	Blanket conforms generally to bedrock topography	Generally freely drained. No organized drainage; generally well drained	In other map areas the unit is known to have large irregular ice bodies	Potential slope instability limits any kind of construction. Occurs only as part of Cx unit
Ca	Sheetwash deposits	Mostly organic silt and sand	1–2 m	Occurs as veneer or blanket on gently sloping (5–10°) scarps and valley sides developed on glacial lacustrine sediments or soft bedrock. Slope 1–30°. Relief to 90 m	No integrated drainage system; poorly to moderately well drained	No data; material suggests that moderate to high ice content is likely	The probability of high ice content makes this unit unreliable for construction. Occurs in restricted areas only
Cz (present in Cx only)	Slide, slump	Most commonly developed on shale, sandstone, and dolomite of Proterozoic Tsezotene Formation, and on shale of Hare Indian and Imperial formations. Usually too small to be mapped as a unit, they are included in Cx unit		Commonly stepped rotational slumps, spoon-shaped slump walls; highly irregular in the case of rockslides; undulated in the case of gentle mass movement	No organized drainage; poorly to moderately well drained	No data, but because of poor drainage, high ice content likely	Slumping occurs as retrogressive-thaw flow slides in glacial lacustrine sediments; and as rotational slumping in shale, sandstone, and dolomite of Proterozoic Tsezotene Format on; and shale of Paleozoic Hare Indian Formation
Ct	Cryoplanation terrace	Colluvium derived from mass wasting of local bedrock	1–3 m	Terraces up to 750 m long and 450 m wide, typically occurring as steps on mountain slopes; "treads" have slopes of 1–5°; intervening "risers" have slopes of 20–30°	Downslope seepage in shallow subparallel runnels	Ice content probably low to medium; subjacent bedrock typically free of segregated ice	Restricted to high elevations in unglaciated Mackenzie Mountains. (Individual cryoplanation terraces shown by symbol)
Cx	Slope complex (Cv, Cb, Ca, Cz, and Af; may include two or more units undivided)	Deposits derived from entire range of surficial material plus bedrock detritus transported by gravity, sheetwash, and intermittent or permanent streams	0–5 m	Occurs as veneer or blanket on gently to steeply sloping scarps and valley sides. Slope 1–30°. Relief to 90 m	No organized drainage; poorly to moderately well drained	No data; ice content probably highly variable depending on texture and thickness of material forming the unit	Potential slope instability presents major problems for any kind of construction
Lp	Glacial lacustrine plain	Glacial lacustrine silt and clay, minor sand; discontinuous organic cover	2–15 + m	Flat to gently sloping. Relief to 3 m	Subsurface seepage through fen-filled depressions; poorly drained	Commonly 10 to 25% segregated ice as thin (1 mm–2 cm) seams in upper 1–3 m; segregated ice as reticulate network to 50% by volume, or thick tabular bodies of nearly pure ice at greater depth	Active layer detachment slides followed by development of retrogressive–thaw flow slides common on slopes developed on this unit, especially following fire or other disturbance of vegetation. Highly susceptible to gullying even on gentle slopes, following removal of vegetation.
Lp-k	Glacial lacustrine thermokarst plain	Glacial lacustrine silt and clay, minor sand; discontinuous organic cover	2–15 + m	Flat to gently sloping, numerous thermokarst lakes and ponds. Slope 0–5°. Relief to 6 m	Seepage centripetal to ponds and lakes, intermittent seepage along fen-filled depressions between ponds and lakes; poorly drained	Commonly 10 to 25% segregated ice as thin (1 mm–2 cm) seams in upper 1–3 m; segregated ice as reticulate network to 50% by volume, or thick tabular bodies of nearly pure ice at greater depth	Thermokarst processes active around pond margin; active layer detachment slides, followed by development of retrogressive-thaw flow slides common on slopes developed on this unit especially following fire or other disturbance of vegetation
Lb	Glacial lacustrine blanket	Glacial lacustrine silt and clay, minor sand; discontinuous organic cover	2–8 m	Flat to moderately sloping conforming to subjacent deposits, typically Mb, Mv, Mm	No integrated draina e system; poorly drained	Commonly 10 to 25% segregated ice as thin (1 mm–2 cm) seams in upper 1–3 m; segregated ice as reticulate network to 50% by volume, or thick tabular bodies of nearly pure ice at greater depth	Active layer detachment slides followe by development of retrogressive-thaw flow slides common on slopes developed on this unit, especially following fire or other disturbance of vegetation. Highly susceptible to gullying even on gentle slopes, following removal of vegetation. Commonly appears confined with Mb unit
Ls	Shoreline deposits of glacial lake, beaches, spits, offshore bars	Sand, minor gravel	Up to 10 m	Low ridges up to 10 m along former glacial lake shoreline	No surficial drainage, well drained	No data, but ground ice content probably low	Offers restricted well drained sites for construction purposes at margins of larger areas of Lx and Lx-k along south side of Mackenzie River. Others are found as simple featur s with Mp and Mpv areas along north side of Mackenzie River
Lx	Glaciofluvial–lacustrine complex	Sand and silt; may overlie glacial lacustrine silt and clay	3–20 m	Gently irregular topography. Slope 0–5°	Generally moderately well drained	Low to medium ice content; higher ice content (as for Lp, Lp-k) in underlying glacial lacustrine silt and clay, if present	Active layer detachment slides followed by development of retrogressive-thaw flow slides common on slopes developed on this unit, especially following fire or other disturbance of vegetation. Highly susceptible to gullying even on gentle slopes, following removal of vegetation. Occurs along Mackenzie River, as part of the former glacial Lake Mackenzie
Lx-k	Thermokarst glaciofluvial–lacustrine complex	Sand and silt; may overlie glacial lacustrine silt and clay	3–20 m	Flat to gently sloping. Numerous shallow thermokarst lakes and ponds. Slope 0–5°	Drainage by seepage along channels connecting thermokarst ponds	Low to medium ice content; higher ice content (as for Lp, Lp-k) in underlying glacial lacustrine silt and clay, if present	Active layer detachment slides followed by development of retrogressive-thaw flow slides common on slopes developed on this unit, especially following fire or other disturbance of vegetation. Highly susceptible to gullying even on gentle slopes, following removal of vegetation. Occurs only along Mackenzie River as part of the former glacial Lake Mackenzie
Gp, Gt, Gd	Glaciofluvial plain, terrace, delta	Gravel, sand locally with veneer of eolian silt or sand; silt and/or peat may occur as filling in channels (Gp-c)	2–30 m	Flat to gently sloping. Commonly retains shallow braided channe s in case of Gp-c. Slope 0–2°	Drainage mainly subsurface, locally with seepage along channels; well drained except for channels	Very low ice content, but when ice present consists of cement ice only	Offers good construction sites; major source of aggregate where the material is gravel rather than sand. Where the unit grades into units Lx, Lx-k, the surface deposit is typically sand rather than gravel and may be underlain by ice–rich silt. Specifically abundant along meltwater channels of Kelly Lake phase
Gv	Glaciofluvial plain veneer	Gravel, sand locally with veneer of eolian silt or sand; silt and/or peat may occur as filling in channels (Gp-c)	< 3 m	Flat to gently sloping. Commonly retains shallow braided channels in areas designated Gp-c. Slope 0–2°	Drainage mainly subsurface, locally with seepage along channels; well drained except for channels	Very low ice content, but when ice present consists of cement ice only	Offers good construction sites; major source of aggregate where the material is gravel rather than sand. Occurs only along meltwater channel deposited by Kelly Lake phase
Gh, Gr	Hummocky, ridged glaciofluvial deposits (includes esker complexes)	Gravel, sand	2–20 m	Hummocks and ridges. Slope 5–15°. Relief to 25 m	Drainage mainly subsurface. Hummocks and ridges well drained; intervening depressions may be poorly drained	Very low ice content	Major source of aggregate where the material is gravel rather than sand. Occurs only as part of Gx
Gx	Glaciofluvial complex (Gh, Gr, and Gp, undivided)	Gravel and sand	2–20 m	Flat to highly irregular. Slope 0–15°. Relief to 25 m	Same as for Gh, Gr, Gp	Very low ice content	Major source of aggregate where the material is gravel rather than sand
Mp	Moraine plain	Till: diamicton with a silty clay matrix containing minor sand	3–20 m	Flat to gently sloping. Slope 0–5°	Downslope seepage in shallow subparallel runnels. Generally poorly to moderately well drained	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams in upper 2–3 m; thicker (10 cm to > 3 m) ice lenses may occur at depth	Potential subsidence on removal of vegetation typically less than 1 m. Possible high ice content in organic deposits within the unit. Because drainage is by numerous runnels, roads, or berms normal to slope direction, requires numerous culverts to avoid impoundment of surface water
Mpv	Moraine plain, thin till cover	Till: diamicton with a silty clay matrix containing minor sand	1–3 m	Flat to gently sloping; conforms to underlying bedrock topography. Slope 0–5°	Downslope seepage in subparallel runnels; poorly to moderately well drained, but locally well drained where subjacent bedrock is sandstone or limestone	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams. Subjacent bedrock typically free of visible ice	Offers fairly good to good construction sites
Mv	Till veneer	Till: diamicton with a silty clay matrix and minor sand in plains and plateau areas, but stonier and with a silty sand matrix in mountains	< 2 m	Gently to steeply sloping veneer conforms to the underlying bedrock topography. Slope 8–15°	Downslope seepage in subparallel runnels; poorly to moderately well drained, but locally well drained where subjacent bedrock is sandstone or limestone	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams. Subjacent bedrock typically free of visible ice	Offers fairly good to good construction sites where slope is not limiting
Mb	Till blanket	Till: diamicton with a silty clay matrix and minor sand in plains and plateau areas, but stonier and with a silty sand matrix in mountains	3–6 m	Gentle to steeper slopes. Slope 5–15°	Downslope seepage in shallow subparallel runnels; generally poorly to moderately well drained	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams in upper 2–3 m. Thicker (10 cm to > 3 m) ice lenses may occur at depth	Potential subsidence on removal of vegetation typically less than 1 m; potential for creep of active layer. Because drainage is by runnels, roads, and berms normal to the slope direction, requires numerous culverts to avoid impoundment of surficial water
Md	Drumlinoid till plain	Till: diamicton with a silty clay matrix containing minor sand	2–30 m	Moraine plain with individual drumlins, to fluted moraine plain. Slope 2–15°	Parallel seepage or streams in fluted moraine to trellis pattern or deranged drainage in moraine plain with drumlins	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams in upper 2–3 m. Thicker (10 cm to > 3 m) ice lenses at depth	Construction (e.g., roads) easier parallel to rather than normal to orientation of drumlins
Mm	Rolling moraine	Glacial till, typically with 5–20% pebble size and larger in a silty clay or clayey silt matrix in plains; typically bouldery till in mountains	Up to 20 m	Broad hummocks 10–20 m high. Slope 0–10°	Drainage centripetal to local depressions; elevated areas moderately well drained; intervening depressions generally poorly drained	Commonly 10–25% segregated ice as thin (1 mm–2 cm) irregular discontinuous seams in upper 2–3 m; irregularly distributed large masses of segregated ice common at greater depth	Summits of broad hummocks typically well drained; removal of vegetation may cause differential subsidence up to 3 m due to thawing of segregated ice masses
Mh	Hummocky moraine	Glacial till with 20–50% (locally 60%) pebble size and larger in clayey silt to silty sand matrix	Up to 20 m	Individual or coalescent hummocks. Slope 0–20° , exceptionally 30°. Relief 15–50 m	Hummocks well drained; intervening depressions may be poorly drained	Few data; ice content probably low	Crests of prominent hummocks are commonly well drained offering restricted good construction sites; ice content and potential for subsidence may be high in depressions
Mr	Ridged moraine	Glacial till with 20–50% (locally 60%) pebble size and larger in clayey silt to silty sand matrix in plains; typically bouldery till in mountains	15 to 50 + m	Individual and compound straight to sinuous ridges; relief 15 to 60 m. Slope 0–20°	Ridge crests well drained; intervening depressions may be poorly drained	Few data; ice content probably low	Crests of prominent ridges are commonly well drained and offer restricted good construction sites
Mx	Moraine complex, includes Mh, Mr, Mm, undivided	Glacial till as in Mh, Mr, Mm	Up to 20 m	Same as for Mh, Mr, Mm	Same as for Mh, Mr, Mm	Same as for Mh, Mr, Mm	Same as for Mh, Mr, Mm
R	Bedrock	In mountainous areas: siltstone and shale of quartzite of the Proterozoic Tsezotene Formation and Katherine Group; sandstone and shale of the Lower and Middle Cambrian Mount Cup Formation, evaporitic shale of the Upper Cambrian Saline River Formation; dolomite of the Upper Cambrian to Silurian Franklin Mountain and Mount Kindle formations; limestone breccia of the Lower Devonian Bear Rock Formation; limestone and shale of the Middle Devonian Hume, Hare Indian and Ramparts formations; shale and sandstone of the Upper Devonian Canol and Imperial formations. In plains area: Cretaceous shale and sandstone. For reference, see Cook and Aitken (1976)		Mainly prominent ridges, scarps, and hills developed on shale, sandstone, dolomite, and quartzite	Generally freely drained but with some poorly drained depressions	No data	As a dominant unit R occurs only in areas underlain by Devonian Bear Rock and Mount Kindle formations. Solution karst sinkholes are abundant where Bear Rock Formation is near the surface whereas collapse type of sinkholes are more common in Mount Kindle Formation (Everdingen, 1981). Shale of the plains area of Mackenzie Lowland can be rip-rapped to produce common fill but is unsuitable for road metal. Carbonate rocks and quartzite in mountainous areas can be quarried to produce large blocks suitable for rip-rap or can be crushed to produce aggregate. Rock is near the surface in all areas of "v" units (e.g., Cv and Mv) and areas designated as combined map units with R as the second unit component (e.g., Cv·R and Mv·R)

Canada



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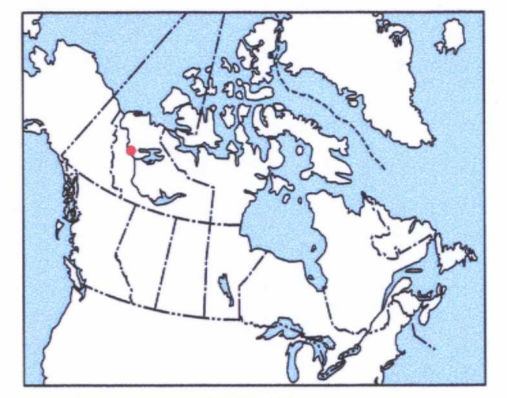


LOCATION MAP

MAP 1989A

SURFICIAL GEOLOGY

NORMAN WELLS

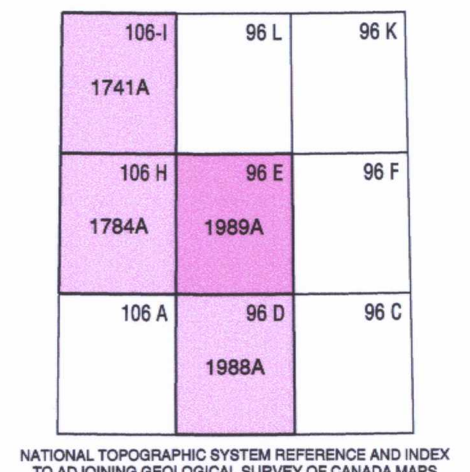
NORTHWEST TERRITORIES

Scale 1:250 000/Échelle 1/250 000

kilometres 5 0 5 10 15 20 kilomètres

Universal Transverse Mercator Projection
North American Datum 1983

Projection transverse universelle de Mercator
Système de référence géodésique nord-américan, 1983



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

LEGEND

** Dominant map unit not present in this map (may occur as subordinate part of the map)*

QUATERNARY

HOLOCENE

ORGANIC DEPOSITS: *peat and muck; occurs as flat to gently sloping plains*

fO,pO, pO-k,pfO, fpO — fO – *fenland, consisting of woody sedge peat, 2–3 m thick,* pO – *peatland, sphagnum peat generally underlain by sedge and woody sedge peat, 2–4 m thick,* pO-k – *peatland containing thermokarst depressions,* pfO – *peatland and fenland undivided, peatland dominant,* fpO – *peatland and fenland undivided, fenland dominant*

ALLUVIAL DEPOSITS: *sand, silt, and minor gravel in association with modern drainage regime*

Ap,Ap-k, At,At-k — Ap – *floodplain sediments, coarse sand and gravel with silt and fine sand occurring as channel and overbank floodplain sediments, 3–5 m thick,* Ap-k – *floodplain sediments containing thermokarst depressions,* At – *sand and silt, in places underlain by gravel; occurs as terraces, 2–5 m thick,* At-k – *sand and silt, occurring as terraces containing thermokarst depressions*

Af — *Mainly silt, sand, and minor gravel with discontinuous layers of peat; occurs as fans and aprons; within mountainous areas comprises mainly gravel, locally with lenses of mudflow deposits*

Ax — *Complexes of* Ap *and* Af, *undivided*

COLLUVIAL AND SHEETWASH DEPOSITS: *diamicton, rubble, and organic-rich silt and sand derived from bedrock and surficial materials by a variety of colluvial and sheetwash processes*

Cv,Cb,Ca — Cv – *veneer deposit that conforms to bedrock topography, <2 m thick,* Cb – *blanket deposit that conforms to bedrock topography, >3m thick,* Ca – *organic-rich silt and sand developed on glacial lacustrine sediments or soft bedrock, 1–2 m thick*

Cz — ***Landslide deposits:*** *rubble and/or diamicton occurring as stepped or fan-shaped deposits; formed by rotational slumping or retrogressive-thaw flow failure of glacial lacustrine sediments or shale*

Cx — *Complex consisting of two or more of* Cv, Cb, Ca, Cz, *and* Af, *undivided*

PLEISTOCENE

GLACIAL LACUSTRINE DEPOSITS: *silt and clay with minor sand, in many places overlain by a discontinuous veneer of organic deposits and locally overlain by sand; sediments laid down in a glacial lake*

Lp,Lp-k, Lb,Ls — Lp – *thick sediments occurring as a flat to gently sloping plain, 2–15 m thick,* Lp-k – *lacustrine plain containing thermokarst depressions,* Lb – *blanket of lacustrine sediments occurring as gently to moderately sloping plain, 2–8 m thick,* Ls – *sand and less gravel occurring as shoreline deposits, up to 10 m thick*

Lx,Lx-k — Lx – *lacustrine complex or transitional between glaciofluvial and lacustrine deposits, with upper 0–3 m consisting of sand; 3–20 m thick,* Lx-k – *lacustrine complex containing thermokarst depressions, 3–20 m thick*

GLACIOFLUVIAL DEPOSITS: *sand and gravel, locally with a veneer of eolian silt or sand; deposited as proglacial or ice contact sediments by glacial meltwater*

Gp,Gt, Gv,Gd — ***Outwash deposits:*** Gp – *flat to gently sloping plain, 2–30 m thick,* Gt – *underlying a terrace, 2–30 m thick,* Gv – *underlying a terrace,<3 m thick,* Gd – *gentle sloping fan 2–30 m thick*

Gh,Gr — ***Ice contact glaciofluvial deposits:*** Gh – *hummocks, 2–20 m thick,* Gr – *ridges, 2–20 m thick*

Gx — ***Glaciofluvial complex:*** *glaciofluvial complex areas of* Gp, Gh, *and* Gr, *undivided*

GLACIAL DEPOSITS: *nonsorted silt, sand, and clay with some coarser clasts (till); till of mountainous areas has abundant pebbles, cobbles, and boulders in silty sand matrix; deposited by glacial ice and occurring in a variety of different landforms.*

Mp,Mpv — ***Moraine plain:*** *till occurring as:* Mp – *flat to gently sloping plain, 3–20 m thick,* Mpv – *variable area of thick and thin till, 1–3 m thick*

Mv,Mb — ***Till veneer and till blanket:*** Mv – *veneer of till with slopes conforming to underlying bedrock topography, <2 m thick,* Mb – *gently to moderately sloping plain controlled by bedrock, 3–6 m thick*

Md — ***Drumlinoid and hilly plain:*** *plain with individual drumlins or extensively fluted, 2–30 m thick,*

Mh,Mr,Mm — ***Hummocky and ridged moraine:*** *Generally coarse till (20–50% pebble size) in plains, typically bouldery till in mountains:* Mh – *individual and coalescent hummocks; locally contains hummocks of gravel; relief 15–50 m; up to 20 m thick,* Mr – *individual to compound, either straight or sinuous ridges 15 to 60 m high, 15–50+ m thick,* Mm – *broad hummocks or low hills with 10–20 m relief, <20 m thick*

Mx — ***Moraine complex:*** *largely hummocky, ridged, and hilly till undivided*

PRE-QUATERNARY

BEDROCK: *Devonian dolomite, limestone, shale in Norman Ranges; Cretaceous shale in Mackenzie lowlands; rocks of mountainous areas range from relatively weak shale, sandstone, and dolomite to resistant carbonates to highly resistant quartzite of Proterozoic to Late Devonian age*

R — *Primarily prominent ridges, escarpments, and hills; associated with siltstone, shale, quartzite, sandstone, evaporitic shale, limestone breccia (see extended legend)*

UNCORRELATED

Ct — ***Cryoplanation terrace deposits:*** *colluvial rubble occurring as a 1–3 m thick mantle on a step or bench in a mountain slope*

PREFIXES, COMBINED MAP UNITS, AND MODIFYING PROCESSES

*Lower case prefixes are used to distinguish two types of organic deposits: fenland (*fO*) and peatland (*pO*)*

Combined map units are used where, for reasons of scale, two intermingled units cannot be delineated individually. There are two different forms of combined unit designators: 1) Where the two units are from the same genetic group, the second upper case letter representing the genetic category of the subordinate unit is dropped (e.g., alluvial plain and terrace undifferentiated becomes Apt*). In some cases, where the combined unit has characteristics different from the two individual units, the combined unit is described in the legend (e.g.,* Mpv *- thick and thin till). 2) Where the map unit designator is composed of different genetic categories, the dominant unit (>50%) is followed by a dot and then the second unit which makes up 20–50% of the map unit (e.g.,* Mp•fO*)*

The organic units are shown as any other geological unit with colour where the organic deposits are dominant (e.g., fO•Mp, fpO•Mp*) and without colour where the organic deposits make up the secondary unit (e.g.,* Mp•fO, Mp•fpO*)*

Geological boundary (defined, approximate)
All-time limit of Laurentide Ice Sheet
Limit of Katherine Creek Phase
Limit of Kelly Lake Phase
Limit of Gayna River and Mountain River glaciations
Cirque (Mountain River Glaciation, Gayna River Glaciation)
Shield glacial erratic
Moraine ridge
Drumlin or drumlinoid ridge (sense of ice flow determined, not determined)
Esker
Kame field
Glacial meltwater channel (major, minor)
Glacial lake shoreline
Area of rock glaciers
Karst sinkhole
Cryoplanation terrace
Eolian veneer mainly of fine sand, dunes
Retrogressive-thaw flow slides (may include other forms of mass wasting)

Geology by A. Duk-Rodkin 1989, 1990

Digital cartography by J.D. Narraway, Earth Sciences Sector Information Division (ESS Info)

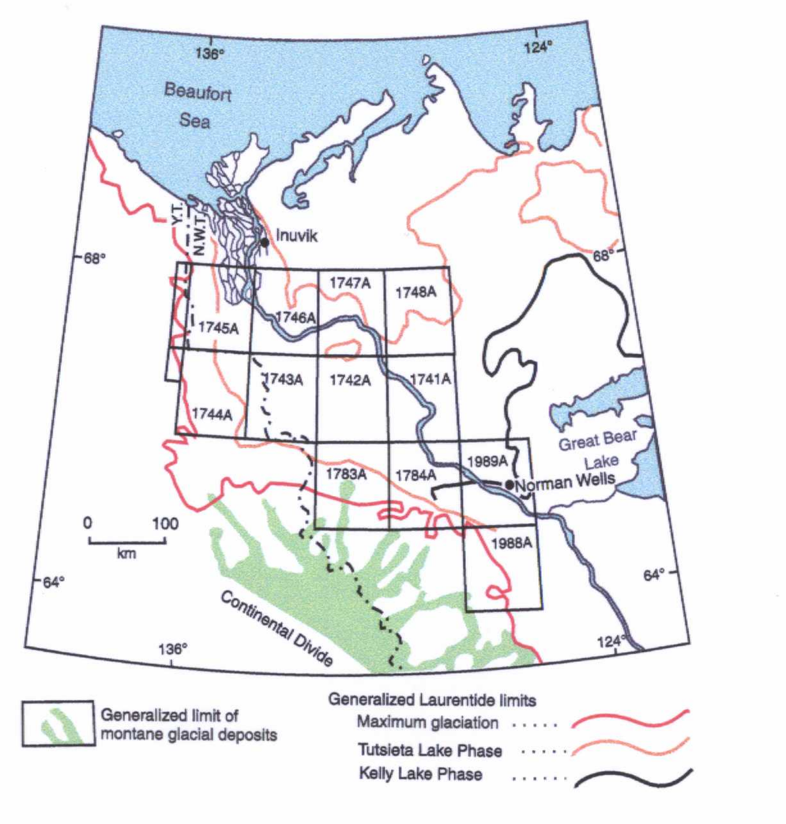
This map was produced from processes in conformance with the Cartographic Services Section Quality Management System, Ottawa, registered to the Quality System ISO 9001: 1994 standards

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

Digital base map from data compiled by Geomatics Canada, modified by ESS Info

Mean magnetic declination 2002, 29°16′E, decreasing 26.4′ annually. Readings vary from 28°52′E in the SW corner to 29°41′E in the NE corner of the map

Elevations in feet above mean sea level



REFERENCES

Cook, D.G. and Aitken, J.D.
1976: Norman Wells (96 E) and Mahony Lake (96F) map areas, District of Mackenzie; Geological Survey of Canada, Open File 304, scale 1:250 000

Everdingen, R.O.
1981: Morphology, hydrology and hydro chemistry of karst in permafrost terrain near Great Bear Lake, Northwest Territories; NHRI,paper, no.1, IWD scientific series. No.114.

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2002: Surficial geology, Norman Wells, District of Mackenzie, Northwest Territories; Geological Survey of Canada, Map 1989A, scale 1:250 000.

1989A