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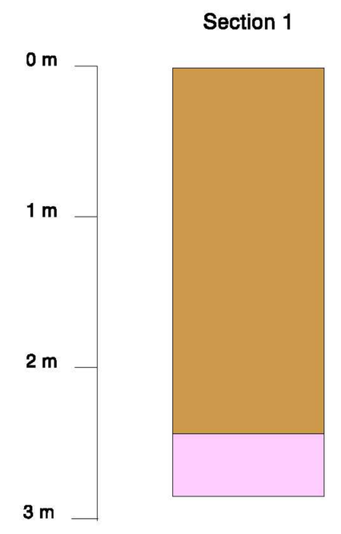
GEOLOGICAL SURVEY OF CANADA · COMMISSION GÉOLOGIQUE DU CANADA

NATMAP
CARTNAT
Canada's National Geoscience Mapping Program
Le Programme national de cartographie géoscientifique du Canada

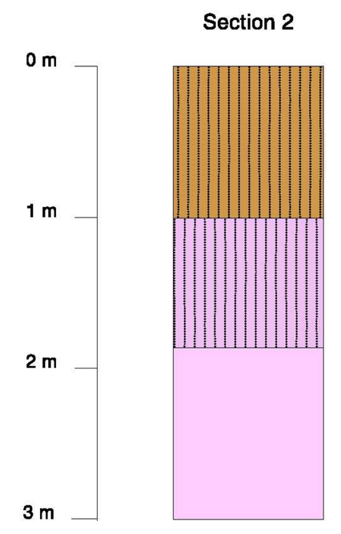


Section 1

Colluviated overburden exposed in trench; float of coarse pegmatite

Large angular to sub-rounded boulders in disaggregated gneiss sand (grus); appears to be a former rock glacier

Competent gneiss bedrock is 2-3 m below surface



Section 2

Pit in trench across slope (~8°)

Colluvium consisting of weathered and totally disaggregated chlorite schist bedrock; strong brown colour (7.5YR 5/6); cohesive due to the presence of clay produced by weathering; quartz nodules derived from former veins are the only competent clasts within the colluvium

Weathered chlorite schist bedrock; competent rock becomes recognizable below 2.5-3.0 m

STRATIGRAPHIC LEGEND

Note: Not all stratigraphic units from the legend are present on stratigraphic logs

HOLOCENE (< 0.010 Ma)

Modern soil

Stratified sand and gravel; alluvial sediments

LATE PLEISTOCENE TO EARLY HOLOCENE (< 0.125 Ma)

Silt (organic rich), peat, and organic detritus, and extensive interstratified and segregated ice; collectively called muck

Massive to stratified diamicton; colluvial sediments (may locally date to Middle Pleistocene)

Massive to stratified silt and fine sand; eolian sediments

Stratified silt and sand; resedimented eolian sediments locally interstratified with alluvial fan sediments

Stratified sand and gravel; alluvial sediments

MIDDLE PLEISTOCENE (0.780 - 0.125 Ma)

Paleosol developed in Reid and younger pre-Reid glaciofluvial sediments

Stratified sand and gravel; glaciofluvial sediments deposited during Reid glaciation

Stratified sand and gravel; glaciofluvial sediments deposited during younger pre-Reid glaciations

Massive to stratified silt and fine sand; primary and resedimented eolian sediments

LATE PLIOCENE AND EARLY PLEISTOCENE (2.7 - 0.780 Ma)

Paleosol developed in late Pliocene to early Pleistocene glaciofluvial and non-glacial sediments

Stratified sand and gravel; glaciofluvial sediments deposited during older pre-Reid glaciations

Stratified to massive diamicton; till deposited during one of several older pre-Reid glaciations

Fine sand, silt and clay; lacustrine or slack water fluvial sediments

Stratified to massive sand and gravel; non-glaciofluvial sediments, may be graded to pre-Reid outwash

PLIOCENE (pre-glacial, 5 - 2.7 Ma)

Basalt and basalt breccia

Stratified to massive gravel and sand; White Channel Gravel and equivalent clastic units predating regional glaciation, includes late Tertiary pediment sediments

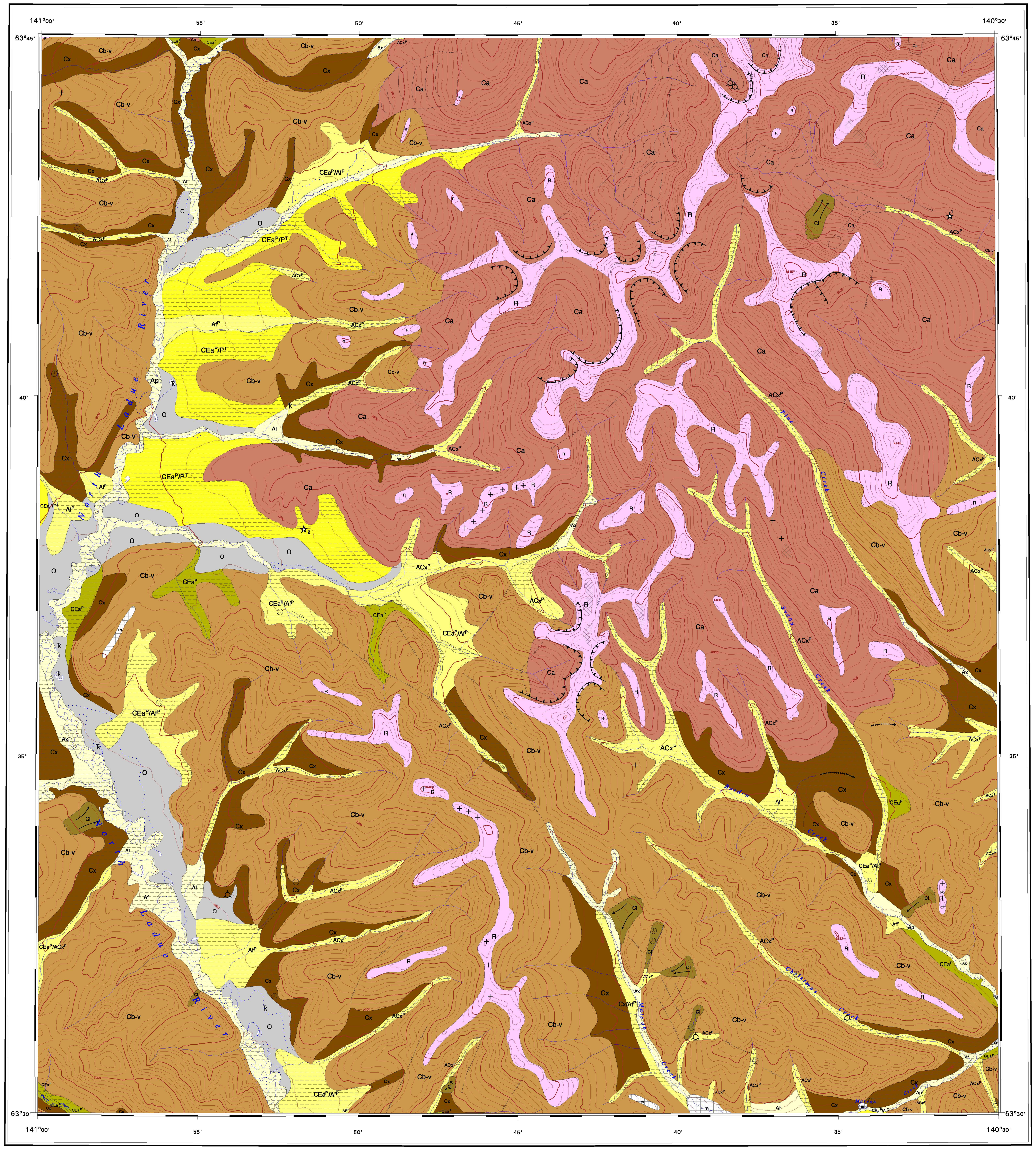
PRE-PLIOCENE (> 5 Ma)

Mesozoic and Paleozoic bedrock

SYMBOL

Tephra - identification and age, if known, described on stratigraphic log

Ice-wedge pseudomorph or sand wedge



LEGEND

Note: Map units listed below occur within one metre of the surface. Where organic or eolian sediments < 1 m thick overlie these, a pattern is overlaid upon the map unit. Along some valleys, colluvial or alluvial sediments > 1 m thick overlie older alluvial gravels that could contain placer gold. In order to accentuate these potentially exploitable deposits, a compound map unit is presented, e.g., **Cx/At^T**. *This means that colluvial complex sediments overlie alluvial terrace sediments thought to be late Tertiary in age. This legend is part of a larger regional study hence coloured boxes indicate units that appear on this map. In addition, not all symbols in the legend are represented on this map.*

CENOZOIC

QUATERNARY

HOLOCENE

m — ***Made Land:*** *placer mines, roads, and airstrip*

ORGANIC DEPOSITS: *peat and organic silt formed predominantly by the accumulation of vegetative material in bogs, fens, and swamps situated on valley bottoms; permafrost is commonly encountered within 1 m of the surface. Thermokarst collapse is common.*

O — ***Organic Blanket:*** *undivided; thickness > 1 m to 5 m*

Organic Veneer: *blanket bog generally < 1 m thick*

ALLUVIAL DEPOSITS: *gravel to silt size sediments, well stratified, deposited by streams*

Ap — ***Floodplain Sediments:*** *gravel, cobble to pebble; massive to well stratified, capped by sand and silt; flat lying; includes lacustrine and organic deposits in abandoned channels and backswamp areas; subject to periodic inundation and reworking by floods; thickness 1 to 5 m*

Af — ***Alluvial Fan Sediments:*** *gravel, sand, silt, and diamicton, massive to well stratified; sediments form fan-shaped landforms or complexes of coalesced fan-shape landform at the confluence of tributary streams; may be subject to flooding accompanied by sudden stream migration and inundation; thickness up to 10 m*

Ax — ***Alluvial Sediments Complex:*** *sediments forming floodplains, fans, and terraces that cannot be subdivided at this map scale*

HOLOCENE AND PLEISTOCENE (UNDIVIDED)

COLLUVIAL DEPOSITS: *stony diamicton resulting from the physical and chemical breakdown of bedrock and subsequent reworking and transportation by creep, solifluction, and landsliding; colluvial deposits may contain reworked glaciofluvial and morainal sediments within the limits of pre-Reid ice-cover and reworked eolian sediments; colluvial deposits are products of formation and reworking over a significant part of the Pleistocene and Holocene epochs; surface is commonly hummocky or undulating*

Cb-v — ***Colluvial Blanket and Veneer Sediments:*** *diamicton, stony with a sandy matrix; massive to poorly stratified; colluviated blankets generally conform to underlying bedrock and exceed 1 m in thickness; veneers are < 1 m in thickness and are commonly discontinuous over bedrock*

Ca — ***Colluvial Apron Sediments:*** *bouldery diamicton and bouldery sandy gravel, poorly sorted; massive; sediments form a wedge-like slope-toe complex of small steep debris flow and solifluction deposits; thickness is < 1 m at the upper and lower slope limit to up to 5 m or more in the thickest part of the apron*

Cl — ***Landslide Sediments:*** *silt loam to boulders, poorly sorted to unsorted; massive; clasts are subangular to angular and are locally derived; thickness varies greatly*

Cx — ***Colluvial Complex Sediments:*** *areas of intergrading colluvial and alluvial sediments which are too complex to subdivide at the scale of mapping; unit may include colluvial and alluvial fan, colluvial blanket, landslide sediments and colluviated drift within the limits of glaciation; the unit commonly occurs along the lower slopes of valley margins*

CEa^P — ***Colluvial/Eolian Apron (muck):*** *primary deposits of eolian fine sand and silt resedimented and interstratified with organic silt, and detritus, alluvial fan gravel and sand and variable amounts of stony colluvial diamicton; forms aprons along valley bottoms through resedimentation of eolian sediments from valley sides to valley floor, commonly preserved on north-facing slopes; thickness 1 to 20 m; commonly contains segregated bodies of ice and buried ice wedges*

MIDDLE TO LATE PLEISTOCENE (UNDIVIDED)

ALLUVIAL DEPOSITS: *gravel and sand deposited by streams that were not fed by glacial meltwater; sediments may have experienced several cycles of alluviation and erosion, but are now inactive due to burial or fluvial incision; basal gravels within these sediments commonly contain placer gold*

At^P — ***Alluvial Terrace Sediments:*** *gravel, cobble to pebble with a sandy matrix; massive to well stratified; capped by sand and silt; sediments are of flood plain origin now isolated from flooding by stream incision; thickness 1 m to 10 m*

Af^P — ***Alluvial Fan Sediments:*** *single fans or aprons of coalesced fans formed of gravel and sand, poorly to moderately sorted, now isolated from water and debris floods due to fluvial incision; sediments disturbed by cryoturbation; thickness up to 10 m*

ACx^P — ***Alluvial/Colluvial Complex Sediments:*** *silt, sand and gravel, poorly to moderately sorted; thin to thick bedded, interstratified with colluvial diamicton; sediments underlie the floors and margins of narrow upland valleys and grade laterally up slope into colluvial blankets; sediments may represent several depositional cycles; thickness may exceed 10 m in mid-valley locations*

EOLIAN DEPOSITS: *well sorted medium sand to silt initially transported and deposited by wind action during glaciations and commonly resedimented through fluvial and colluvial processes; deposits of very fine sand and coarse silt < 1 m thick are distributed discontinuously throughout low lying areas*

Eb^P — ***Eolian Blanket:*** *fine sand and silt, well sorted; massive; may form crescent-shape and linear dunes and featureless or gently undulating inter-dune eolian plains; thickness 1 to 5 m*

Eolian Veneer: *thin deposits of very fine sand and coarse silt distributed discontinuously throughout low lying areas, thickness < 1 m*

LATE PLEISTOCENE - McCONNELL GLACIATION

GLACIOFLUVIAL DEPOSITS: *gravel and sand deposited by streams flowing away from glacial ice; deposits display poor soil development with rare cryoturbation*

Gt^M — ***Glaciofluvial Terrace Sediments:*** *gravel and sand, unweathered, forming one or more terraces*

MIDDLE PLEISTOCENE - REID GLACIATION

GLACIOFLUVIAL DEPOSITS: *gravel and sand deposited by streams flowing away from glacial ice; deposits display moderate soil development with signs of cryoturbation; soil thickness < 0.5 m*

Gt^R — ***Glaciofluvial Terrace Sediments:*** *gravel and sand, moderately weathered, forming one or more terraces*

LATE PLIOCENE TO MIDDLE PLEISTOCENE - pre-Reid GLACIATIONS (UNDIVIDED)

GLACIOLACUSTRINE DEPOSITS: *well stratified sand, silt, clay, deposited in lakes ponded by glacial ice*

Lu^{PR} — ***Glaciolacustrine Undivided:*** *sand, silt, and clay; undifferentiated at this scale of mapping*

GLACIOFLUVIAL DEPOSITS: *gravel and sand deposited by streams flowing away from glacial ice in meltwater channels and outwash plains; massive to well stratified. Surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering*

Gt^{PR} — ***Glaciofluvial Terrace Sediments:*** *gravel and sand, deeply weathered; incised into flights of terraces; thickness 1 to > 5 m*

MORAINAL DEPOSITS (TILL): *glacial diamicton, mainly till, generally consisting of a matrix ranging from sand to clay that supports clasts ranging from boulders to pebbles in size; deposited either directly from glacial ice or by gravity flow from glacial ice; surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering*

Tb^{PR} — ***Till Blanket:*** *diamicton, stony, silty-sand matrix; massive; conforms to underlying topography, thickness > 1 m; extensively colluviated on slopes*

Tv^{PR} — ***Till Veneer:*** *diamicton, stony, silty-sand matrix; massive; discontinuous and may contain extensive areas of thin (< 1 m) colluvium*

ALLUVIAL DEPOSITS: *Gravel and sand deposited by streams that were not fed by glacial meltwater; sediments may have experienced several cycles of alluviation and erosion, but are now inactive due to burial or fluvial incision; basal gravels within these sediments commonly contain placer gold*

At^{PR} — ***Alluvial Terrace Sediments:*** *sandy pebble and cobble gravel deposited by streams having a fluvial source but graded to the margins of pre-Reid glaciers or glacial drainage; thickness 1 to 5 m*

UNDIFFERENTIATED DRIFT: *diamicton, gravel, sand, silt and clay deposited from glacial ice, glacial streams, and glacially damned lakes; extensive weathering, poor exposure and permafrost make differentiation into component glacial sediments difficult; thicknesses commonly exceed 10 m and mask underlying bedrock topography; commonly colluviated and intergraded with colluvium; surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering*

D^{PR} — ***Drift:*** *flat to gently sloping*

Dl^{PR} — ***Drift Modified by Landsliding:*** *drift translated along failure plains into irregular steps and sub parallel scarps*

De^{PR} — ***Fluvially Incised Drift:*** *formerly extensive areas of drift incised by closely spaced stream valleys*

LATE PLIOCENE

V^T — ***Basalt:*** *columnar alkaline olivine basalt and flow breccia; erosional remnants of formerly valley filling flows underlying terraces along lower Rosebud Creek; thickness 10 m*

PLIOCENE AND LATE MIOCENE

ALLUVIAL DEPOSITS: *preglacial gravel and sand; highly dissected and deeply weathered*

P^T — ***Pediment and Bajada Sediments:*** *inclined fluvial surfaces which are found at a midslope position in unglaciated drainage systems; usually thinner than 5 m; formed as a result of limited agradation of stream gravel and significant colluviation; composed of thin, poorly sorted gravel that contains both locally derived subangular stream gravel deposits and angular bedrock fragments*

At^T — ***High Level Terrace Sediments (includes White Channel Gravel and equivalent sediments):*** *weathered pebble to cobble gravel > 1 m thick; surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering; within the Yukon River valley, terraces above the 500 m contour may be remnant features from the southward-flowing paleo-Yukon River drainage system*

PALEOZOIC AND MESOZOIC

R — ***Bedrock:*** *schist, gneiss, ultramafics, granodiorite, monzonite, marble, and basalt; includes areas of thin colluvial cover, blockfields, and sorted stone polygons in alpine areas*

SYMBOLS

Geologic contact; defined, approximate, inferred

Open system pingo, collapsed open system pingo

Thermokarst collapse activity

Landslide movement direction in bedrock and colluvium

Scarps created by widespread landslide movement in drift

Terrace scarp (ticks on sloped side)

Degraded Cirque: active during pre-Reid Glaciations

Degraded Arête: active during pre-Reid Glaciations

Meltwater channel: flow direction, unknown flow direction

Large meltwater channel

All time (pre-Reid) glacial limit; defined, inferred

Cryoplanation terrace

Tor

Landform Streamlined by glacial ice

Vertebrate fossil locality

Stratigraphic section

Fault trace

Lineaments (fault, fracture, joint system) defined by linear drainage courses, aligned gaps in ridges, or aligned breaks in bedrock slopes

Abandoned valley: paleoflow defined

Abandoned valley: paleoflow undefined

Paleoflow, suspected buried valley

Rock glacier

DESCRIPTIVE NOTES

The physiography of the Borden Creek map area is dominated by 'V' and 'U'-shaped valleys incised up to 300 m into the Klondike plateau. Bedrock is dominated by Paleozoic schist in the southwest one-third of the map area and Paleozoic gneiss in the remainder of it (Tempelman-Kluit, 1974). Drainage radiates from terrain underlain by gneiss.

Natural exposures of surficial deposits are rare in the map area. Dense vegetation covering lower slopes and valley bottoms and permanently frozen ground a few tens of cm below the surface make creation of exposures with hand tools extremely difficult. Consequently, surficial sediments have been largely mapped from the interpretation of air photographs. Reconstruction of late Cenozoic history is made with reference to map areas to the east where surficial sediments and their stratigraphies are better exposed and understood.

Degraded cirques are common on uplands exceeding about 1200 m (Nelson and Jackson 2002). These are located at the heads of U-shaped valleys such as those of Pine, Sven and Borden Creeks. These features suggest that, at one time, cirques fed local valley glaciers. Glacial deposits to the north of the map area have a fossil soil developed on them. This relationship suggests that the last valley glaciers were early Pleistocene in age. It appears that moister conditions prevailed at that time which permitted the formation of cirque and valley glaciers. During the subsequent Reid and McConnell glaciations, it appears that the firn line was too high for glaciers to form in this area.

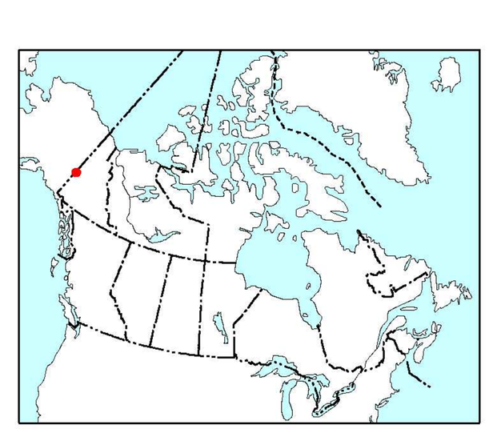
With the exception of these uplands and adjacent valleys, the map area escaped glaciation. Colluvium is the dominant sediment. It is formed by the breakdown of bedrock into regolith that is transported down-slope by gravitational processes such as solifluction and landsliding. Where mountain slopes are underlain by coarsely jointed rock such as gneiss, intense periglacial processes such as frost heaving detaches angular blocks commonly one to two metres in size. These form sorted stone polygons on level sites. On slopes, these form almost continuous bouldery regolith denoted as unit 'Ca'. In some areas, movement has converged to form rock glaciers. On south facing slopes, these are weathered and appear inactive (section 1). On north facing slopes, they are locally advancing. Collapse features near their margins indicate that they contain segregated ice. In areas underlain by schist, exploration trenches cut into gentle bedrock slopes reveal that rock has been totally disaggregated and partly weathered to clay to depths of more than two metres (section 2).

Organic deposits, formed in bogs and fens, and muck, consisting of resedimented eolian silt (loess), are extensive in valley bottom settings and commonly contain massive lenses of ice. They overlie most of the fluvial deposits in the map area. Valley bottom and bench gravels along Matson Creek have yielded economic concentrations of placer gold. However, the placer potential of most of the map area is unproven.

REFERENCES

Nelson, F.E.N and Jackson, L.E. Jr.
2002: Cirque forms and alpine glaciation during the Pleistocene, west-central Yukon; *in* Yukon Exploration and Geology 2002, D.S. Emond and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs, Canada, p. 183-198.

Tempelman-Kluit, D.J.
1974: Reconnaissance geology of Aishihik, Snag and part of Stewart River map areas, west-central Yukon; Geological Survey of Canada, Paper 73-41, 97p.



LOCATION MAP

OPEN FILE 4578

SURFICIAL GEOLOGY

BORDEN CREEK

YUKON TERRITORY

Scale 1:50 000/Échelle 1/50 000

kilometres 1 0 1 2 3 4 kilomètres

Universal Transverse Mercator Projection
North American Datum 1983

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

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115 N/15 OF4579	115 N/16 OF4580	115-O/13 OF4590	115-O/14 OF4591	115-O/15 OF4592	115-O/16 OF4593
115 N/10 OF4578	115 N/9 OF4577	115-O/12 OF4589	115-O/11 OF4588	115-O/10 OF4587	115-O/9 OF4586
115 N/7 OF4575	115 N/8 OF4576	115-O/5 OF4582	115-O/6 OF4583	115-O/7 OF4584	115-O/8 OF4585
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115 K/15	115 K/16	115 J/13	115 J/14 OF4344	115 J/15 OF4345	115 J/16 OF4346

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

Geology by L.E. Jackson, Jr. (1999 - 2002)

Co-ordinated through the auspices of the Ancient Pacific Margin NATMAP

Digital cartography K. Shimamura, Terrain Sciences Division

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 Parm Dhesi, Earth Sciences Sector Information Division (ESS Info)

Magnetic declination 2005, 25°19' E, decreasing 18.5' annually

Elevations in feet above mean sea level

Contour interval 100 feet

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2005

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