### MARGINAL NOTES

### INTRODUCTION

The topography of this unglaciated portion of the northern Dawson Range is characterized by broad ridges, convex slopes and v-shaped valleys (Fig. 1). Ridges and summits range in elevation from 760 to 1600 m above sea level. Upland surfaces consist of bedrock outcrop and tors, weathered bedrock and/or loess-enriched colluvium modified by periglacial processes such as cryoturbation, cryoplanation and solifluction (Figs. 2 and 3). Slopes are generally covered in mantles of colluvium that grade into thick loess-enriched aprons along lower slopes and valley bottoms. The broad braided floodplains of the Donjek and White rivers to the south and west are the source of most of the eolian or wind-blown silt and fine sand (loess) deposited throughout the map area. Thick eolian blankets form benches along many valley bottoms in the map area, particularly along Home Creek (Figs 4 and 5).

Streams that flow directly into the Yukon River on the north side of the Dawson Range have experienced a drop in base level, potentially associated with reversal of the Yukon River from a south to a north-flowing drainage during the early Pleistocene (Tempelman-Kluit, 1980). Tributaries such as Independence and Carlisle creek became more deeply incised in response to the base level change, leaving fluvial terraces preserved along their middle to lower reaches. Some gold was recovered in preliminary heavy mineral testing undertaken on these terraces (10JB032 & 10JB048).

## PERMAFROST

Permafrost is widespread but discontinuous in the map area (Bond & Lipovsky, 2011). Several landforms that indicate the presence of permafrost were found in the map area, including cryoplanation terraces, solifluction lobes and open system pingos. Permafrost distribution and character (depth, thickness and ice content) vary widely with local scale variations in both macro and micro-topography, surface cover and soil texture. It is likely absent on steep south-facing slopes with bedrock outcrop and thin, coarse-grained colluvial veneers. It is most prevalent on north-facing slopes and in valley bottoms where thick fine-grained colluvial aprons (interbedded loess, colluvium and peat) and organic veneers are located (Fig. 6). Ice-rich permafrost is most commonly found in valley bottoms and zones of groundwater convergence. Clearing or disturbance of organic cover in these areas may lead to rapid thaw and terrain destabilization.

HEAVY MINERAL SAMPLING Preliminary heavy mineral sampling was undertaken in Carlisle Creek, Independence Creek, Home Creek, and some smaller

pan (x1) no gold; fine magnetite-rich heavies

3 small flakes of gold and lots of magnetite.

15 fine colours (\$0.56/yd @ \$1000/oz)

Site Number Location (UTM Zone 7, NAD 83) Type Results

10JB032 571743 E, 6983773 N 1 large colour (\$4.69/yd @ \$1000/oz); many quartz crystals, (24 gallons) red garnets, coarse magnetite 10JB033 571834 E, 6983749 N sluice no gold; translucent pink mineral

10JB045 557118 E, 6961191 N 572345 E, 6962821 N 10JB048 570358 E, 6975617 N 570495 E, 6975450 N 10JB050 570632 E, 6975750 N

10PL056 10PL057

572254 E. 6976744 N 551583 E, 6959804 N 557648 E, 6975758 N 557145 E, 6976140 N

pan (x2) 2 colours 2 very fine colours; abundant orange garnet pan (x2) pan (x2) no gold; minor magnetite no gold; abundant heavy minerals pan (x2) no gold; scarce heavy minerals pan (x1) no gold; abundant heavy minerals

sluice

(100 gallons)

### DATA SOURCES This surficial geology map was interpreted from high resolution digital stereo imagery (2.5 m panchromatic CartoSat-1 satellite data captured in 2007) and 1:40 000 scale digital aerial photographs flown in 1988.\* Selective field checking was performed in

\*National Air Photo Library photographs A27386 (1988): 56-65 & 94-103; A27383 (1988): 137-145; and A27384 (1988): 2-10 &





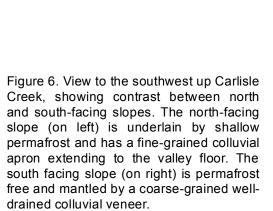
Figure 1. View looking southwest up the headwaters of Independence Creek, showing typical narrow v-shaped valleys and convex slopes characteristic of nglaciated terrain.



Figure 2. Ridge top with tors west of Mt. Laderoute Figure 3. Solifluction lobes on north-facing slope near Mt. McLennan (10PL052). (10PL053). Frost boils are common in this topographic position and soils consist of weathered bedrock enriched with loess. Soils are cryoturbated and commonly saturated in summer months due to a shallow permafrost table.



Figure 4. View to the southwest over Home Creek, looking Figure 5. Exposure of colluvial apron sediments in Home towards White River in the background. Loess benches up to Creek cutbank. Sediments consist of loess, interbedded 20 m thick are visible in the top left corner. Cutbank in organics and massive ice. Stratigraphic section from this site foreground shown in Figure 5. shown above (10PL050).

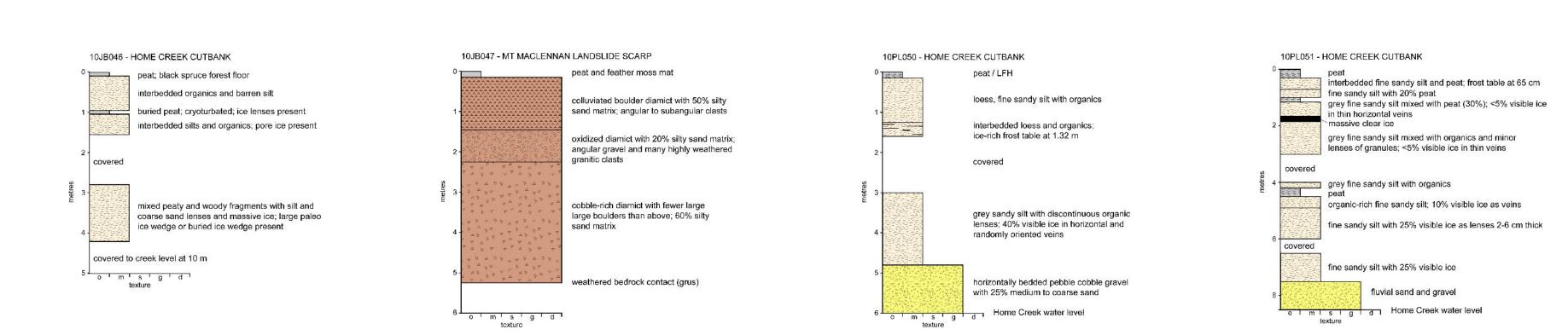


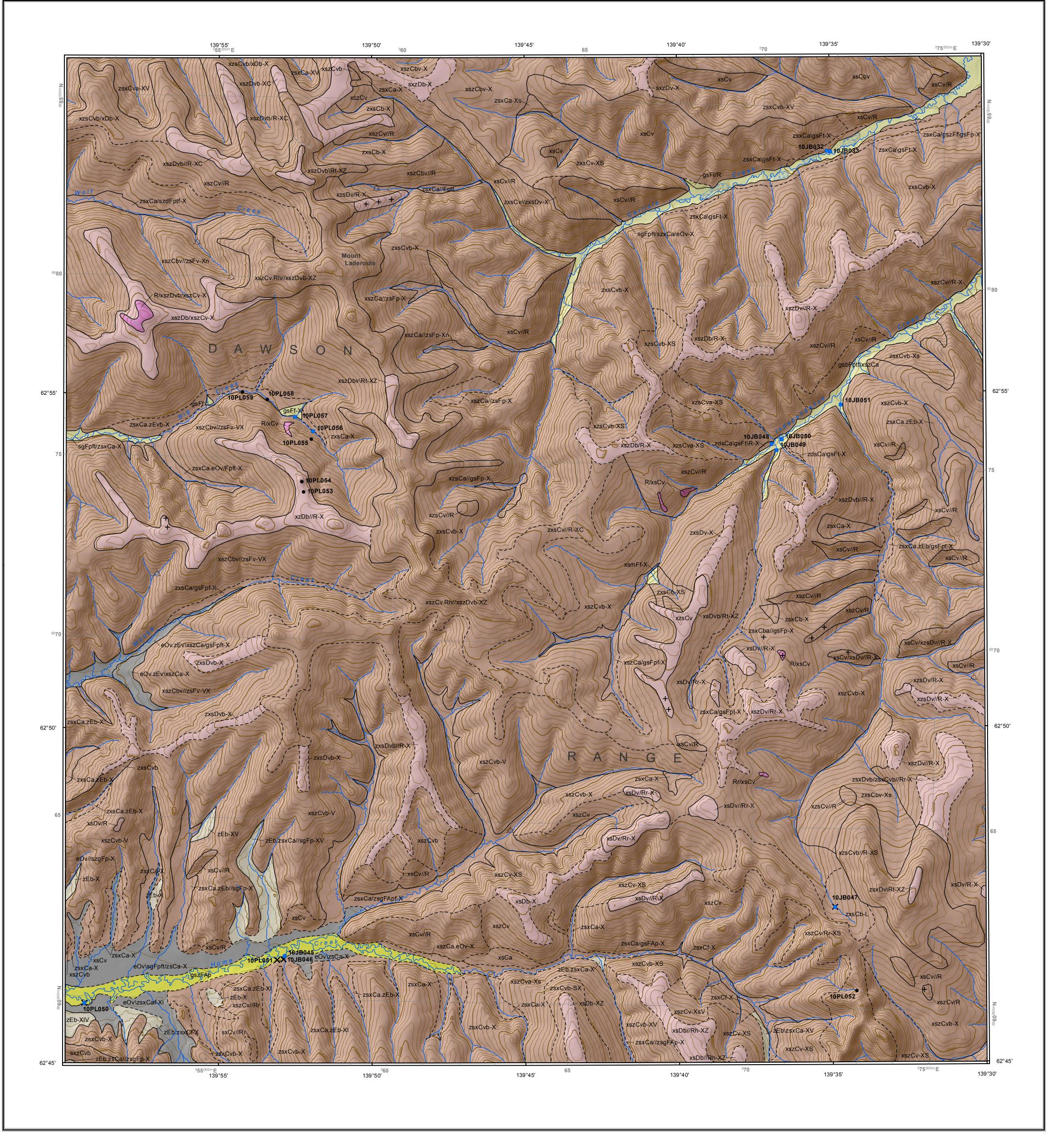
B.C. Ministry of Crown Lands, Victoria, B.C.

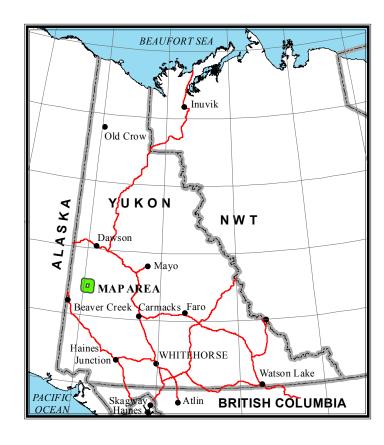


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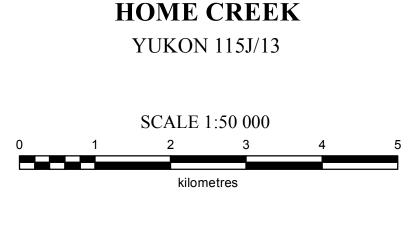




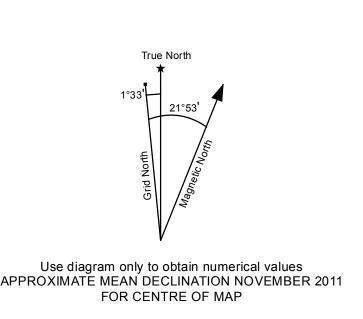
1:50 000 scale topographic base data produced by
CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA Copyright Her Majesty the Queen FIVE THOUSAND METRE GRID

Universal Transverse Mercator Projection North American Datum 1983 Zone 7 CONTOUR INTERVAL 100 FEET

Elevations in feet above Mean Sea Level



SURFICIAL GEOLOGY



1150/03 1150/04 LADUE CREEK LOS ANGELES THISTLE CREEK GSC open file 4573 GSC open file 4581 GSC open file 4349 115J/13 115K/16 HOME CREEK KATRINA CREEK open file 2012-5 GSC open file 4344 115J/12 115K/09 CALEDONIA CREEK TOM CREEK DOYLE CREEK open file 2012-4 open file 2012-3

### TERRAIN CLASSIFICATION SYSTEM

This surficial geology map was classified using the Terrain Classification System for British Columbia (Howes and Kenk, 1997), with minor modification to meet standards set by the Yukon Geological Survey. For example, we have added some permafrost process subclasses to accomodate the wider variety of permafrost features found in Yukon. We have also added an age classification to distinguish materials deposited during different Pleistocene glaciations.

A sample map unit label is shown below to illustrate the terrain classification system. Surficial materials form the core of the polygon map unit labels and are symbolized with a single upper case letter. Lower case textures are written to the left of the surficial material, and lower case surface expressions are written to the right. An upper case activity qualifier (A = active; I = inactive) may be shown immediately following the surficial material designator. The glacial qualifier "G" may alternatively be written immediately following the surficial material to indicate glacially modified materials. Age is indicated by a capital letter that follows the surface expression but precedes the process modifiers. Geomorphological processes (capital letters) and subclasses (lower case letters) always follow a

> GEOMORPHOLOGICAL PROCESS(ES) (-X = permafrost) SUBCLASS(ES) (s = sheetflow) —SURFACE EXPRESSION (pt = plain, terrace) -QUALIFIER (G = glacial; A = active; or I = inactive) -SURFICIAL MATERIAL (F = fluvial) -TEXTURE (sg = sand, gravel)

Due to scale limitations, up to 4 terrain units may be included in a single map unit label (e.g. sgFGptM.dsmMbM/xsCv\zcLGpM-XsV). Each component is separated by a delimiter that indicates relative proportions between the components (".", "/", "//") or a stratigraphic

"." - terrain units on either side of the symbol are of approximately equal proportion "/" - terrain unit(s) before the symbol is more extensive than the one(s) following //" - terrain unit(s) before the symbol is considerably more extensive than the one(s) following "\" - terrain unit(s) before the "\" symbol stratigraphically overlies the one(s) following

> 1st terrain unit /2nd terrain unit //3rd terrain unit \ Underlying terrain unit >50% of map unit / 30-49% of map unit // 10-29% of map unit

## **SURFICIAL MATERIALS**

Surficial materials are non-lithified, unconsolidated sediments. They are produced by weathering, sediment deposition, biological accumulation, human and volcanic activity. In general, surficial materials are of relatively young geological age and they constitute the parent material of most (pedological) soils. Note that a single polygon will be coloured only by the dominant surficial material, but other materials may exist in that unit.

Organic: Organic deposits are accumulations of vegetative matter thicker than 1 m. They are commonly found in floodplains, areas of near-surface permafrost such as north-facing slopes, and locations where there is poor drainage. Thin veneers of organic material are widespread and generally unmapped. Organic material in the map area commonly consists of peat with fibric to mesic decomposition.

Eolian: Sediment transported and deposited by wind. The dominant eolian sediment in the map area is loess, which is predominantly silty in texture with a smaller fraction of fine sand. Loess veneers and blankets were deposited over the landscape during glacial periods. On stable sites, the loess is intact, whereas in cryoturbated or colluviated areas, the loess is reworked into the soil profile and its presence is indicated by the "z" textural symbol. Resedimented loess is a major component of colluvial aprons in the area. Ice-rich permafrost is common within lowlying eolian sediments.

Colluvium: Material transported and deposited by down-slope, gravity-driven processes such as creep, solifluction, landslides and snow avalanches. Colluvium is the most dominant surficial material in the northern Dawson Range as most of the area escaped Pleistocene glaciation. It commonly has a stratified structure with a highly variable texture and composition controlled by the parent material, transport mechanism and travel distance. Colluvium on uplands and slopes in the northern Dawson Range is generally derived from weathered bedrock and loess, resulting in a silt-rich diamicton containing angular, local bedrock clasts. On steeper slopes colluvium is generally coarser grained, as it has been deposited by rapid mass wasting processes such as rock fall, debris flows and avalanches. Slower processes such as sheetwash, solifluction and creep occur on gentler slopes and produce finer grained colluvium. Colluvial aprons found on lower slopes are commonly ice-rich and are primarily composed of resedimented loess and peat.

Fluvial: Sediments transported and deposited by modern streams and rivers, found in floodplains, fans and terraces. Fluvial deposits typically consist of well-sorted stratified sand and gravel comprising sub-angular to rounded clasts In the unglaciated regions of the northern Dawson Range, low order streams are confined to very narrow V-shaped valleys and their fluvial deposits are generally not mapped due to scale limitations; their sediments, however, are more coarse grained and more locally derived than in higher order streams. Active fluvial (FA) materials are subject

> Glaciofluvial: Sediments transported and deposited by glacial meltwater above, in, below, or adjacent to a glacier. Glaciofluvial materials are deposited in meltwater channels, eskers, plains, terraces, kames and deltas. Sediments consist of moderately to well-sorted, rounded, stratified sand and gravel, although the nature and texture may vary locally depending on transport distance. Near surface ground ice is generally absent in glaciofluvial deposits unless there is a poorly drained underlying unit present.

LATE WISCONSIN - MCCONNELL (M) No McConnell glaciofluvial deposits are found in the map area.

No Reid glaciofluvial deposits are found in the map area.

Morainal: Morainal (till) materials are diamicts deposited by either: primary glacial processes such as lodgement, deformation and melt-out (ablation); or secondary glacial processes caused by gravity and water. Therefore, this term applies to all types of till including flow tills, which are not directly deposited by glacial ice. Ablation tills are relatively coarse grained and tend to have a hummocky or rolling surface expression; lodgement tills typically have a finer grained matrix with fewer clasts and a smoother surface expression. Tills are generally colluviated when found on slopes. Permafrost is widespread within morainal deposits. As most of the northern Dawson Range is unglaciated, morainal sediments are rare in the region. Even in upland areas that show evidence of alpine glaciation, no morainal sediments remain as they have likely been buried in colluvium and/or modified by intense periglacial and colluvial processes.

LATE WISCONSIN - MCCONNELL (M) No McConnell morainal sediments are found in the map area.

EARLY WISCONSIN - GLADSTONE (G) No Gladstone morainal sediments are found in the map area.

ILLINOIAN - REID (R) No Reid morainal sediments are found in the map area.

Glaciolacustrine: Stratified sand, silt and clay deposited in a lake that formed on, in, under or beside a glacier; may contain dropstones (ice-rafted clasts). Ice-rich permafrost and thermokarst erosion is widespread in these deposits as they are generally poorly drained with high in situ moisture contents that promote the growth of massive ice lenses. Glaciolacustrine sediments are not exposed in the map area.

PRE-QUATERNARY Bedrock: In general, the bedrock geology of the northern Dawson Range consists of Paleozoic metamorphic rocks of the Yukon-Tanana terrane intruded by Cretaceous and early Cenozoic plutons (Bennett et al., 2010). Regionally, the Cretaceous intrusions are associated with major strike-slip faults that may extend into the Dawson Range, imposing a primary northwest-trending structural trend in the region. The southern third of the map area is underlain by the mid-Cretaceous Dawson Range batholith granodiorite (Whitehorse suite) intruded by an Early Tertiary pluton (Nisling Range suite) south of Home Creek. Early Cenozoic Skukum/Mount Creedon volcanics also outcrop along ridges within the Dawson Range batholith. The Mount Laderoute area and the drainage basins of Carlisle, Independence, Moose and Wolf creeks are underlain by Paleozoic Yukon-Tanana terrane metamorphic rocks, with

Weathered bedrock: bedrock decomposed or disintegrated in situ by processes of chemical and/or mechanical weathering, such as freeze-thaw. Weathered bedrock is common in the uplands of the northern Dawson Range, especially along ridge tops and near tors. The material texture is coarse grained and sandy where derived from plutonic bedrock, although a silty component may be present due to incorporation of loess by cryoturbation.

isolated pockets of Klondike Schist and Early Jurassic plutons (Gordey and Makepeace, 2003).

# SYMBOLS

#### GEOLOGICAL BOUNDARIES: GROUND OBSERVATION SITES: / approximate assumed field station **X** stratigraphic section AGE OF GLACIAL FEATURES:

Gladstone (G) - early Wisconsin Reid (R) - Illinoian Pre-Reid (>R) - early to middle Pleistocene GLACIAL FEATURES:

meltwater channel cirque

moraine ridge

GLACIAL LIMITS: \* defined

✓·× assumed OTHER LINEAR FEATURES:

escarpment escarpment sand dunes 

———— lineation (fault, joint, tension crack)

TOPOGRAPHIC FEATURES:

contours streams trails

wetlands

(labelled with site number, e.g. 10JB004)

radiocarbon sample cosmogenic sample

heavy mineral sample erratic, unspecified age erratic, Gladstone

erratic, Reid

 $\triangle$  no erratics found

OTHER SURFACE FEATURES:

open system pingo; uncollapsed, collapsed drumlin (coloured by glacial age) cryoplanation terrace

landslide, active layer detachment

palsa thermokarst pond X placer mine

Yukon mineral occurrence

Texture refers to the size, shape and sorting of particles in clastic sediments, and the proportion and degree of decomposition of plant fibre in organic sediments. Texture is indicated by up to three lower case letters, placed immediately before the surficial material designator, listed in order of decreasing abundance.

Specific clastic textures a - blocks: angular particles >256 mm in size b - boulders: rounded particles >256 mm in size

k - cobbles: rounded particles >64 - 256 mm in size p - pebbles: rounded particles >2 - 64 mm in size s - sand: particles between >0.0625 - 2 mm in size z - silt: particles 2 µm - 0.0625 mm in size

concave/convex; typically applied to talus cones

c - clay: particles ≤2 μm in size

Common clastic textural groupings d - mixed fragments: a mixture of rounded and angular particles >2 mm in size x - angular fragments: a mixture of angular fragments >2 mm in size (i.e., a mixture of blocks and rubble) g - gravel: a mixture of two or more size ranges of rounded particles >2 mm in size (e.g., a mixture of boulders, cobbles and pebbles); may include interstitial sand

r - rubble: angular particles between 2 and 256 mm; may include interstitial sand m - mud: a mixture of silt and clay; may also contain a minor fraction of fine sand y - shells: a sediment consisting dominantly of shells and/or shell fragments

Organic terms o - organic: general organic materials e - fibric: the least decomposed of all organic materials; it contains amounts of well-preserved fibre (40% or more) that can be identified as to botanical origin upon rubbing u - mesic: organic material at a stage of decomposition intermediate between fibric and humic

### less than 10% of the volume of the material SURFACE EXPRESSION

h - humic: organic material at an advanced stage of decomposition; it has the lowest amount of fibre, the highest bulk

density, and the lowest saturated water-holding capacity of the organic materials; fibres that remain after rubbing constitute

Surface expression refers to the form (assemblage of slopes) and pattern of forms expressed by a surficial material at the land surface. This three-dimensional shape of the material is equivalent to 'landform' used in a non-genetic sense (e.g., ridges, plain). Surface expression symbols also describe the manner in which unconsolidated surficial materials relate to the underlying substrate (e.g., veneer). Surface expression is indicated by up to three lower case letters, placed immediately

following the surficial material designator, listed in order of decreasing extent. a - apron: a wedge-like slope-toe complex of laterally coalescent colluvial fans and blankets. Longitudinal slopes are generally less than 15° (26%) from apex to toe with flat or gently convex/concave profiles

b - blanket: a layer of unconsolidated material thick enough (>1 m) to mask minor irregularities of the surface of the underlying material, but still conforms to the general underlying topography; outcrops of the underlying unit are rare c - cone: a cone or sector of a cone, mostly steeper than 15° (26%); longitudinal profile is smooth and straight, or slightly

f - fan: sector of a cone with a slope gradient less than 15° (26%) from apex to toe; longtitudinal profile is smooth and straight, or slightly concave/convex

h - hummock: steep sided hillock(s) and hollow(s) with multidirectional slopes dominantly between 15-35° (26-70%) if composed of unconsolidated materials, whereas bedrock slopes may be steeper; local relief >1 m; in plan, an assemblage of non-linear, generally chaotic forms that are rounded or irregular in cross-profile; commonly applied to knob-and-kettle glaciofluvial terrain

I - delta: landform created at the mouth of a river or stream where it flows into a body of water; gently sloping surfaces between 0-3° (0-5%), and moderate to steeply sloping fronts between 16-35° (27-70%); glaciofluvial deltas in the map area are typically coarse-grained with steep sides and gently inclined kettled or channeled surfaces m - rolling: elongate hillock(s); slopes dominantly between 3-15° (5-26%); local relief >1 m; in plan, an assemblage of

parallel or sub-parallel linear forms with subdued relief (commonly applied to bedrock ridges and fluted or streamlined till

p - plain: a level or very gently sloping, unidirectional (planar) surface with slopes 0-3° (0-5%); relief of local surface irregularities generally <1 m; applied to (glacio)fluvial floodplains, organic deposits, lacustrine deposits and till plains r - ridge: elongate hillock(s) with slopes dominantly 15-35° (26-70%) if composed of unconsolidated materials; bedrock

slopes may be steeper; local relief is >1 m; in plan, an assemblage of parallel or sub-parallel linear forms; commonly applied

t - terrace: a single or assemblage of step-like forms where each step-like form consists of a scarp face and a horizontal or gently inclined surface above it; applied to fluvial and lacustrine terraces and stepped bedrock topography v - veneer: a layer of unconsolidated materials too thin to mask the minor irregularities of the surface of the underlying

to drumlinized till plains, eskers, morainal ridges, crevasse fillings and ridged bedrock

material; 10 cm - 1m thick; commonly applied to eolian/loess veneers and colluvial veneers

## **GEOMORPHOLOGICAL PROCESSES**

Geomorphological processes are natural mechanisms of weathering, erosion and deposition that result in the modification of the surficial materials and landforms at the earth's surface. Unless a qualifier (A (active) or I (inactive)) is used, all processes are assumed to be active, except for deglacial processes. Up to three upper case letters may be used to indicate processes. These are listed in order of decreasing importance and placed after the surface expression symbol, following a dash (-)

Subclasses are used to provide more specific information about a general geomorophological process, and are represented by lower case letter(s) placed after the related process designator. Up to two subclasses can be associated with each process. Process subclasses used on this map are defined with the related process below.

# **EROSIONAL PROCESSES**

V - gully erosion: running water, mass movement and/or snow avalanching, resulting in the formation of parallel and sub-parallel, long, narrow ravines

# FLUVIAL PROCESSES

B - braiding channel: active floodplain consists of many diverging and converging channels separated by unvegetated bars I - irregularly sinuous channel: a clearly defined main channel displaying irregular turns and bends without repetition of similar features; backchannels may be common, and minor side channels and a few bars and islands may be present, but regular and irregular meanders are absent

J - anastamosing channel: a channel zone where channels diverge and converge around many islands. The islands are vegetated and have surfaces that are far above mean maximum discharge levels M - meandering channel: a clearly defined channel characterized by a regular and repeated pattern of bends with relatively

uniform amplitude and wave length MASS MOVEMENT PROCESSES

F - slow mass movements: slow downslope movement of masses of cohesive or non-cohesive surficial material and/or bedrock by creeping, flowing or sliding

L - mass movement with an unspecified rate R - rapid mass movements: rapid downslope movement by falling, rolling, sliding or flowing of dry, moist or saturated debris

derived from surficial material and/or bedrock

Subclasses: (b) rockfall; (d) debris flow; (g) rock creep; (s) debris slide; (u) slump in surficial material PERIGLACIAL PROCESSES

C - cryoturbation: movement of surficial materials by heaving and/or churning due to frost action (repeated freezing and

S - solifluction: slow gravitational downslope movement of saturated non-frozen overburden across a frozen or otherwise

X - permafrost processes: processes controlled by the presence of permafrost, and permafrost aggradation or degradation Z - general periglacial processes: solifluction, cryoturbation and nivation, possibly occuring in a single polygon

Subclasses: (e) thermokarst erosion; (f) thaw flow slides; (l) segregated ice; (n) pingo; (t) thermokarst subsidence; (r) patterned ground; (s) sheetwash; (w) ice-wedge polygons

# DEGLACIAL PROCESSES

E - channeled by meltwater: erosion and channel formation by meltwater alongside, beneath, or in front of a glacier H - kettled: depressions in surficial materials resulting from the melting of buried glacier ice

# T - ice contact: landforms that developed in contact with glacier ice such as kames

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SURFICIAL MATERIAL AGE

APPROXIMATE GLACIAL MAXIMUM MARINE ISOTOPE STAGE GLACIATION TIME PERIOD M - McConnell late Wisconsin 15 000 years ago G - Gladstone early Wisconsin 55 000 years ago

## >R - Pre-Reid early to Middle Pleistocene 2.6 million to 200 000 years ago 8-102 RECOMMENDED CITATION

130 000 years ago

R - Reid Illinoian

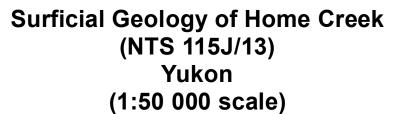
Lipovsky, P.S. and Bond, J.D., 2012. Surficial geology of Home Creek (115J/13), Yukon (1: 50 000 scale). Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon, Open File 2012-5.

Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey. Paper copies of this map may be obtained from Yukon Geological Survey, Geoscience Information and Sales, Energy, Mines and Resources, Government of Yukon, Room 102 - 300 Main St., Whitehorse, Yukon, Y1A 2B5. Phone: 867-667-3201, Fax: 867-667-3198, E-mail: geosales@gov.yk.ca.

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