

Descriptive Notes

Physiography and Drainage
This map area is part of the Yukon Plateau physiography region. The major topographic components in the area include the Yukon River valley (Figure 1) which is bound by uplands. Unnamed highlands that are part of Cape Ridge is to the north of the Yukon River, which includes Grey (Canyon) Mountain. South of the Yukon River is the north ridge of Mount Lone. The Cowley Creek valley (Cattross Road) is a large north-trending valley that joins the Yukon River valley in this map area.

All drainages in the map area are part of the Yukon River basin. The Yukon River flows from east to west across the map area. Its main tributaries in the map area include Cowley and Wolf creeks. Lakes found in the map area include Centric, Chudrum, Cowley and Mary.

The McConnell Glaciation in the Whitehorse area
During the Late Wisconsinan McConnell Glaciation (~20 000 years ago), the Whitehorse map area (NTS 105D) was glaciated by ice lobes originating in the Coast Mountains and the Cassiar Mountains of southern Yukon. Initial ice accumulations in the area probably began in the higher regions of the Coast Mountains to the south. It was likely not until localized ice caps had formed that the more distal Cassiar Lobe advanced into the map area from the southeast through the Marsh Lake-Yukon River valley. The convergence of the two lobes of glacial maximum occurred over the Coast Mountains west of the city of Whitehorse. At the height of the last glaciation, movement of ice over this area was to the northwest and flowed unobstructed by topography. An erratic found on the summit of Mount Granger to the west (2087 m a.s.l.; see map 7) suggests a minimum ice thickness over Whitehorse of 1550 m and was likely closer to 1500 m.

The pattern of deglaciation is highlighted by periods of differential retreat and fluctuating ice fronts. During the retreat phase of the glaciation the Cassiar lobe re-advanced into this area from the southeast. Evidence of this re-advance is well preserved in this map area. During retreat from the Cassiar re-advance limit the ice continued to pause and perhaps experience short re-advances. The most evident recessional pause in the map area was the Chudrum stage (see dashed blue line). During the Chudrum stage Cassiar ice entered the map area from the Marsh Lake valley. Ice-flow was confined to the Yukon River valley until it passed north bank of Mount Lone and spilled southward into the Cowley Creek valley (Figure 2 and 3).

Evidence of limited alpine glaciation following glacial maximum is preserved on Croucher Mountain (see cluster of cirque symbols). Ice accumulations on this mountain would have been restricted to north-facing clear aspects (Figure 4).

Landforms
Chudrum Lake area
Chudrum and Hidden lakes are closed drainage water bodies contained in ablation moraine (Figure 5). This area of rolling topography consists of gravelly material that was laid down at the terminus of the retreating Cassiar lobe of the Croucher ice sheet. The position of the ice front likely remained in this location for a relatively long period of time depositing a thick cover of glacial sediment (see Chudrum Stage glacial limit symbol). Many of the depressions in the landscape, including the lake basins, are likely the result of buried glacial ice melting out.

Cowley Creek area
The flow of meltwater northward from an ice front near Lewes Lake cut a deep channel through glacial fill at Cowley Lake. The meltwater emptied into a narrow glacial lake that filled the Yukon River valley near the Alaska Highway. Today, both Cowley Creek and Cowley Lake are situated in this former over channel. Meltwater erosion was also responsible for development of the Mary Lake channel.

Figure 1. A view to the east of the Yukon River near the mouth of Cowley Creek. Grey Mountain is visible in the background left. Thick deposits of glacial and alluvial lake material fill the Yukon River valley bottom in this area. A narrow and relatively shallow glacial lake would have inundated this area at the end of the McConnell glaciation.

Figure 2. Deeply incised meltwater channels cutting across the Mount Lone valley south of the Yukon River. The view is looking south.

Figure 3. Meltwater channels cut into glacial sediment and bedrock. These channels were cut by meltwater that was draining along the side of the glacier that spilled into the Cowley Creek valley during the Chudrum recessional stage. The view is to the east towards the M-Crossing valley in the background.

Figure 4. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 5. An aerial view to the northwest over Chudrum Lake with the city of Whitehorse in the background. This area of rolling moraine, eskers and kettles was deposited by the Cassiar Lobe as it retreated to the southeast. Deposition of landforms like this suggest the retreating ice front paused at this location for a relatively long period of time. This recessional pause is referred to as the Chudrum stage. It is an easily traced recessional limit in the Whitehorse area.

Figure 6. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 7. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 8. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 9. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 10. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 11. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 12. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 13. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

Figure 14. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

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Figure 17. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

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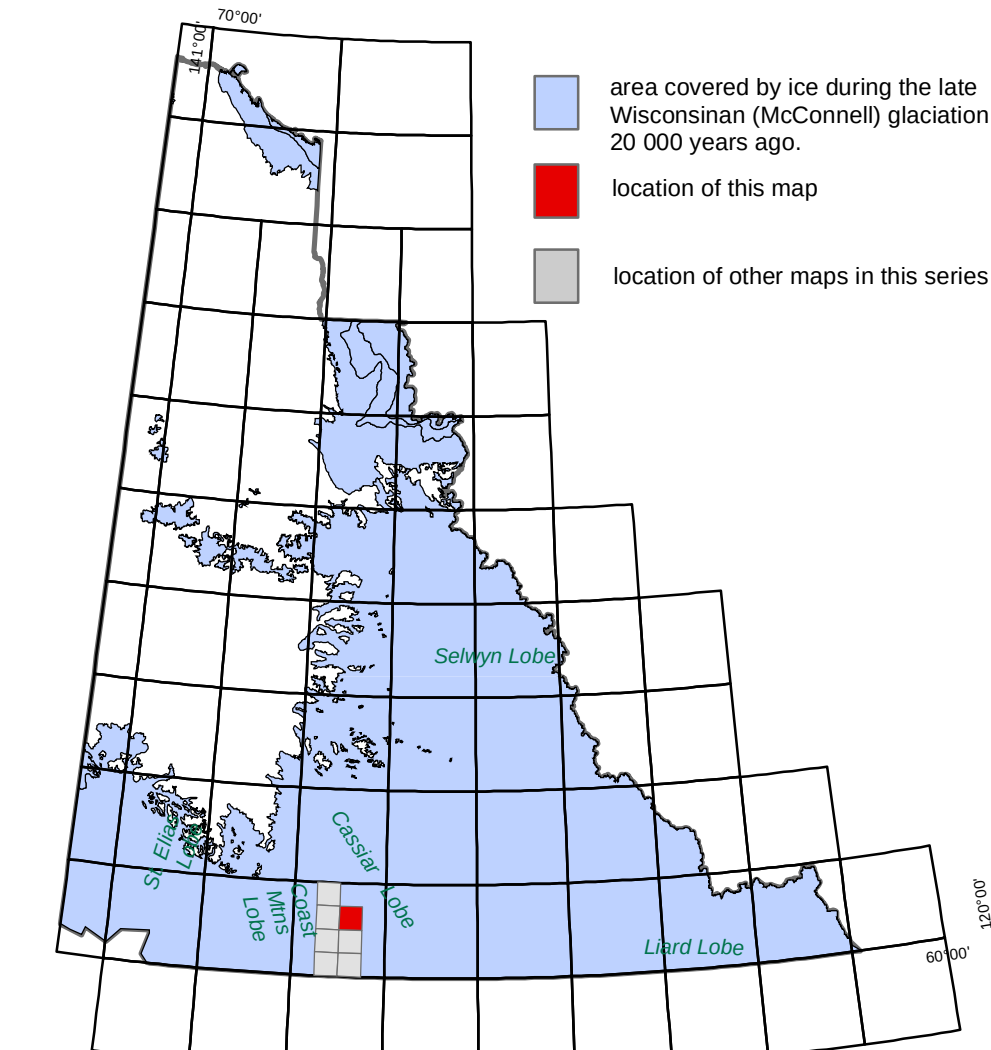
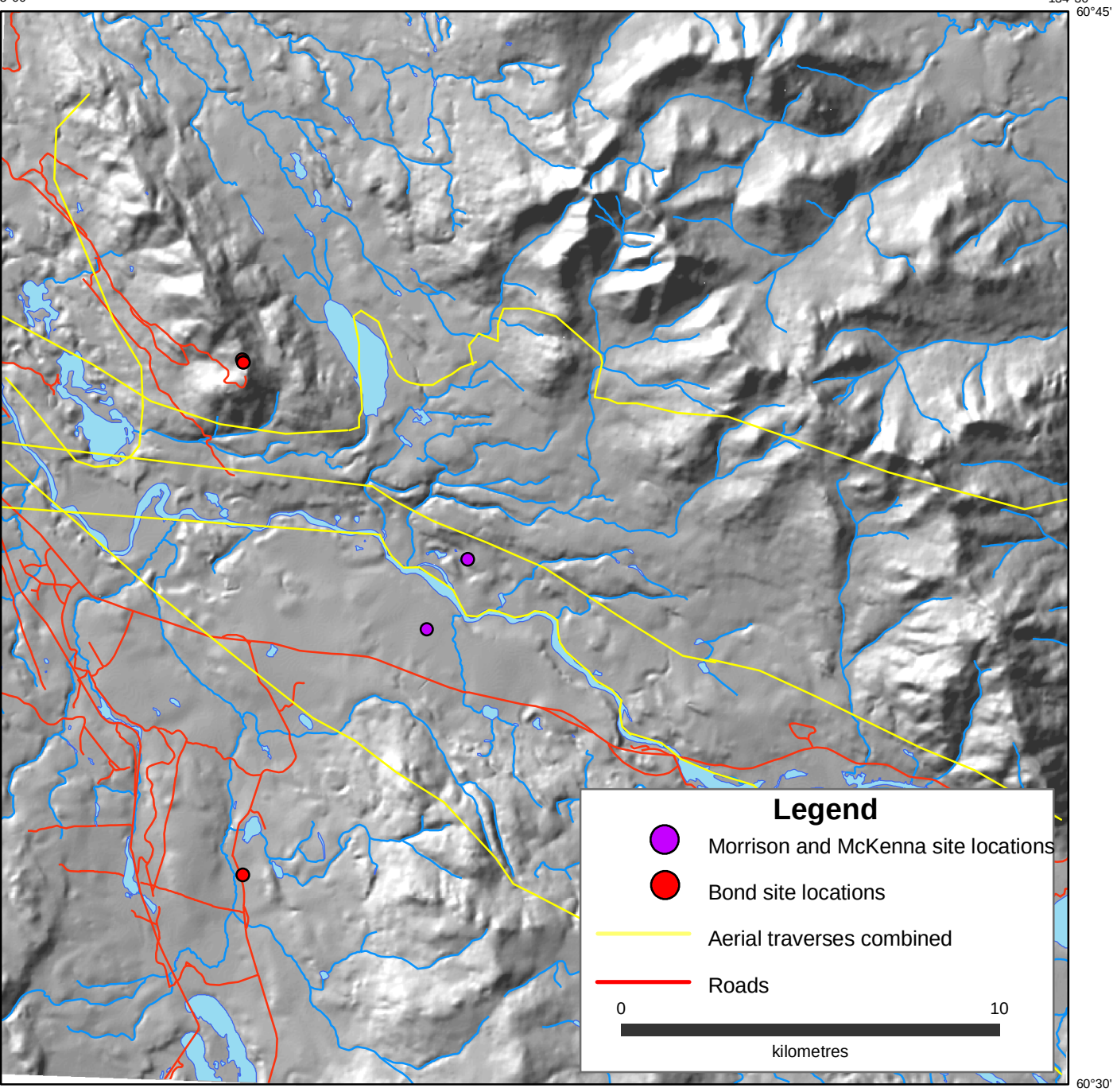
Figure 21. A view to the south of kame terraces near the northwestern-facing cirque on Croucher Mountain (see FGR-E on map). An alpine lateral moraine is visible on the ridge extending to the right (see arrow).

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Aerial Traverses and Site Locations

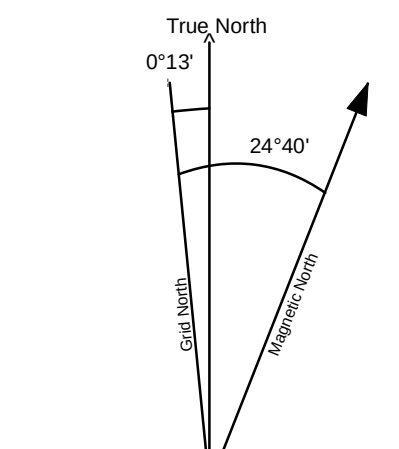


SURFICIAL GEOLOGY
MACRAE
NTS 105D/10
YUKON
SCALE 1:50 000

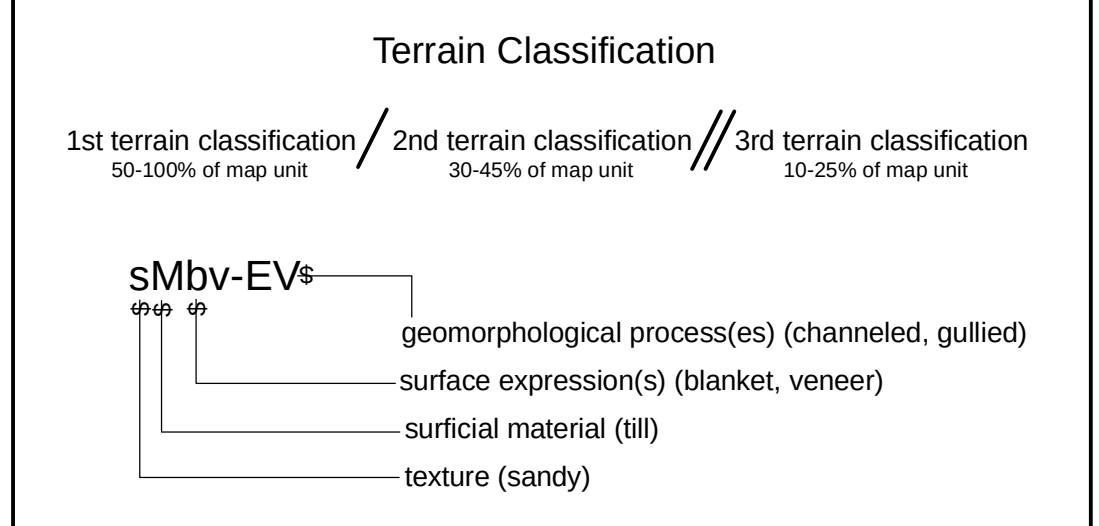
CONTOUR INTERVAL 100 FEET
Elevation in feet above Mean Sea Level
North American Datum 1927
Universal Transverse Mercator

1:50 000-scale topographic base data
produced by
Topographic Data Production
CENTRE FOR TOPOGRAPHIC
INFORMATION
NATURAL RESOURCES CANADA
Copyright by Her Majesty the
Queen

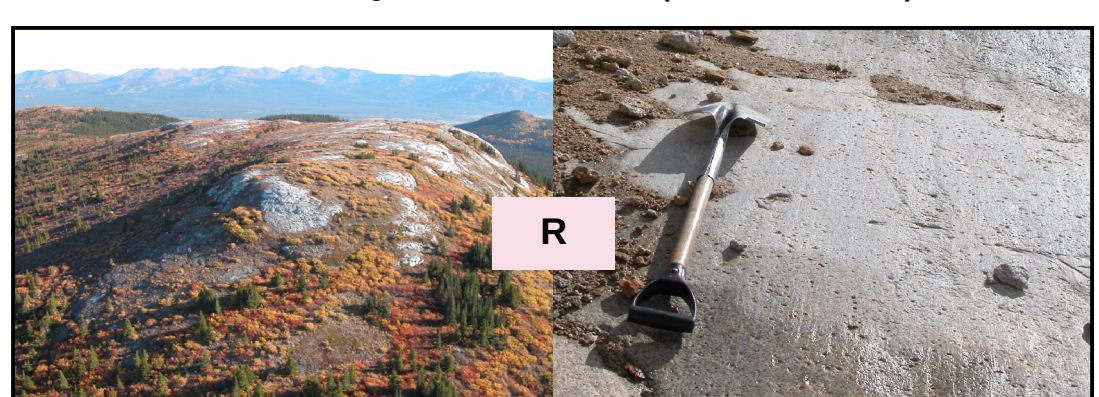
ONE THOUSAND METRE
Universal Transverse Mercator Grid
Zone 8



Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 1925
FOR CENTRE OF MAP
Annual change decreasing 11.5'



PRE-QUATERNARY (UNDIVIDED)



Bedrock: Bedrock outcrops and rocks covered by a thin mantle of unconsolidated or organic material. Rocks in the Whitehorse area are part of the Mesozoic Trough (Whitaker, 1961; Lowy, 2005). These rocks largely consist of volcanic, sedimentary, and igneous rocks of the Lower Trough Group (Lower Trough) and the Upper Trough Group (Upper Trough). The Lower Trough Group is composed of volcanic, sedimentary, and igneous rocks of the Lower Trough Group (Lower Trough) and the Upper Trough Group (Upper Trough). The Upper Trough Group is composed of volcanic, sedimentary, and igneous rocks of the Upper Trough Group (Upper Trough) and the Lower Trough Group (Lower Trough).

The bedrock photograph shows a lateral moraine in the form of a ridge of glacial till and sand. The moraine is composed of glacial till and sand, and is a remnant of the glacial system that once covered the area. The moraine is a good example of the type of landform that can be formed by glacial erosion and deposition.

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Legend

SURFACE EXPRESSION
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 determined by the form of the underlying topography. A surficial material is a non-vegetated surface. Surface expression is indicated by up to three lower case letters, placed immediately following the surficial material designation, listed in order of decreasing extent.

Label	Name	Description
a	apron	Moraine that has been transported down a slope and deposited in accumulations at the base of the slope.
b	blanket	A layer of unconsolidated material thick enough to mask minor irregularities of the surface of the underlying material, but still conforms to the general underlying topography. A blanket is greater than 1 m thick and possesses no constructional forms typical of the material's genesis; outcrops of the underlying unit are rare.
d	delta	Flat to gently sloping surface deposited at the mouth of a river in a body of water. Channel scars on the delta surface are commonly visible.
f	fault	A fault is a relatively smooth sector of a cone with a slope gradient from apex to toe to and including 15° (20%), and a longitudinal profile that is either straight, or slightly concave or convex. Commonly applies to basal fans.
h	hummocky	Steep-sided (bedrock) and (bedrock) with undulating slopes dominantly between 15 and 30° (20 to 70%) if composed of unconsolidated materials; bedrock slopes may be steeper. Local relief is greater than 1 m, in plan, an assemblage of non-linear, generally chaotic forms that are rounded or irregular in cross-profile. Commonly applied to kames and kettle glacial terrain.
m	rolling	Elongate (bedrock) with slopes dominantly between 3 and 15° (5 to 20%) with local relief greater than 1 m, in plan, an assemblage of parallel or sub-parallel linear forms with subdued relief. Commonly applied to bedrock ridges and fans or streamlined hills.
p	plain	A level or very gently sloping, unconsolidated (glacial) surface with gradients 0 to 2° (0 to 10%) local surface irregularities generally have a relief of less than 1 m. Applied to glacial/fluvial floodplains, organic deposits, lacustrine deposits and till plains.
r	ridge(s)	Elongate (bedrock) with slopes dominantly between 10 and 35° (20 to 70%) if composed of unconsolidated materials, bedrock slopes may be steeper. Local relief is greater than 1 m, in plan, an assemblage of parallel or sub-parallel linear forms. Commonly applied to streamlined hills, moraine ridges, conicose fillings and ridged bedrock.
s	steep slope	A level or very gently sloping, unconsolidated (glacial) surface with gradients 0 to 2° (0 to 10%) local surface irregularities generally have a relief of less than 1 m; bedrock slopes may be more irregular. Commonly applied to terraced slopes, gently sloping and bedrock cliffs.
t	terraced	A single or assemblage of step-like forms where each step-like form consists of a steep face and a horizontal or gently inclined surface (broad) 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 material. It is between about 10 cm and 1 m in thickness, and possesses no constructional form typical of the material's genesis. Commonly applied to eroded kames and colluvial veneers.
x	complex	A combination of several surface expressions.

GEOMORPHOLOGICAL PROCESSES			
Geomorphological processes are natural mechanisms of weathering, erosion and deposition that result in the modification of the surface materials and landforms at the earth's surface. Processes are initiated by the use of various upper labels, listed in order of increasing importance, placed after the surface expression syntax, and separated from the surface expression by a dash (-).			
Group	Process	Label	Description
Erosion	deflation	D	O The removal of sand and silt from unconsolidated materials by wind.
	glacial erosion	G	O Characterized by subglacial and glacial erosion due to melting or grinding ice in permafrost areas.
	glacial erosion	H	O Shallow water, local movement and/or snow sublimation, resulting in the formation of parallel and subparallel long, narrow ridges.
	glacial erosion	I	O Shallow water, local movement and/or snow sublimation, resulting in the formation of parallel and subparallel long, narrow ridges.
Weathering	weathering	W	O Water action on locally, turning water (e.g., melting) resulting in ice deposits formed by the removal of fines from surface of coarse and fine particles.
	weathering	X	O O or placed by running water, water, and/or subglacial deposits.
	weathering	Y	O
	weathering	Z	O
Mass Movement	snow avalanches	A	O Rapid downward movement of snow and ice, as well as incorporated rock, surface material and vegetation debris, down a slope.
	sliding	F	O Gradual movement of masses of cohesive or non-cohesive surface material and/or bedrock by creeping, flowing, sliding, and/or sliding.
	sliding	F	O
	sliding	F	O
Periglacial Processes	cryoturbation	C	O Movement of surface material by heaving and/or churning due to frost action (repeated freezing and thawing).
	solifluction	N	O Shallow water, local movement and/or snow sublimation, resulting in the formation of parallel and subparallel long, narrow ridges.
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Permafrost Processes	permafrost processes	P	O Substrates controlled by the presence of permafrost, and permafrost degradation by degradation. Applied to areas with no wedge polygons, thermokarst features, patterns and polygons.
	permafrost processes	P	O
	permafrost processes	P	O
	permafrost processes	P	O
Geological Processes	weathered by meltwater	M	O Eroder and thermal erosion by meltwater, and/or snow sublimation, resulting in the formation of parallel and subparallel long, narrow ridges.
	weathered by meltwater	M	O
	weathered by meltwater	M	O
	weathered by meltwater	M	O