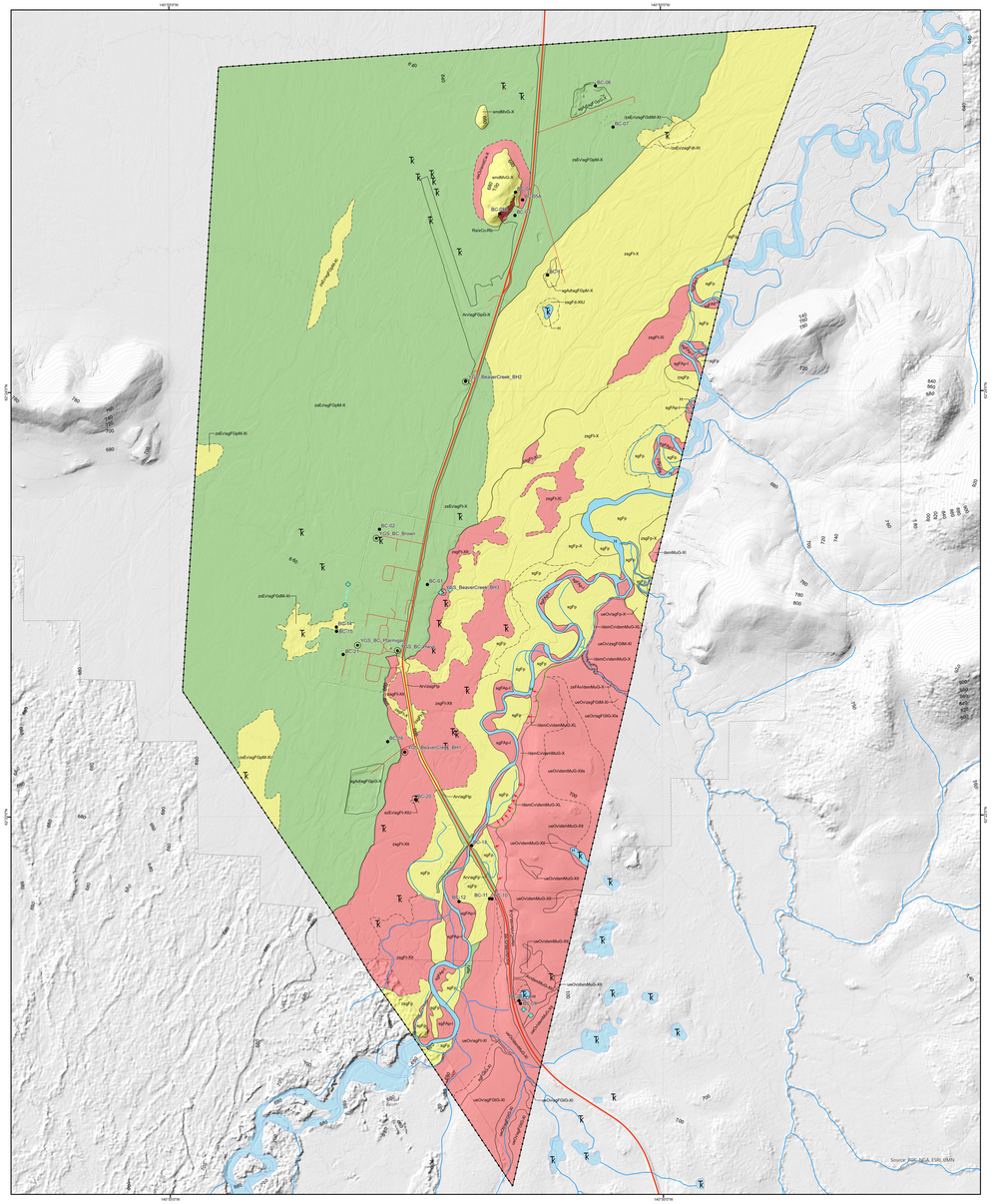


LANDSCAPE HAZARD SUSCEPTIBILITY

BEAVER CREEK, YUKON

PARTS OF NTS 115K/07

SCALE 1:15,000

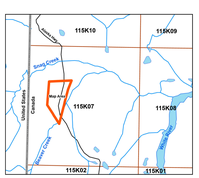
0 0.5 1 2

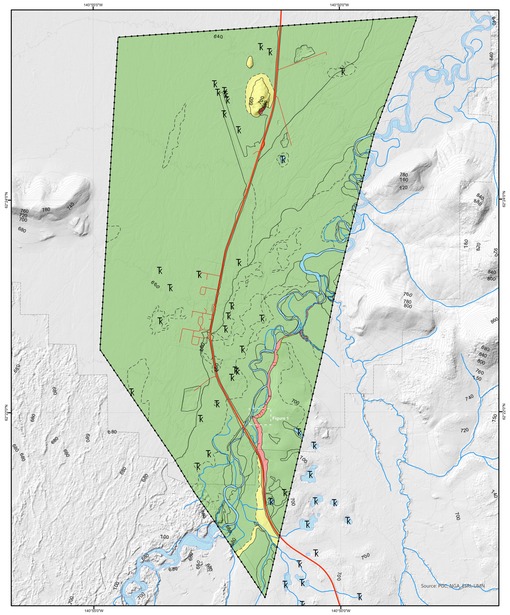
kilometres

Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION APRIL 2020
FOR CENTRE OF MAP

1:50 000 scale topographic base data produced by CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA

ONE THOUSAND METRE GRID
Universal Transverse Mercator Projection
North American Datum 1983
Zone 7
CONTOUR INTERVAL 25 FEET
Elevations in feet above Mean Sea Level





LANDSLIDE SUSCEPTIBILITY

Landslide susceptibility is the spatial tendency of an area to experience landslides based on terrain characteristics. Landslide susceptibility is dominantly controlled by slope steepness, with steeper slopes being more susceptible to landslides than gentler slopes. Other important controls on landslide susceptibility include surficial material texture and presence of permafrost and ground ice. Because surficial geology map polygons form the spatial units of this susceptibility map they do not consider the downslope runout of landslides where none have previously occurred and left a deposit of mappable size.

Low Susceptibility:
Low susceptibility areas are those with flat to gentle slopes, coarse free-draining materials, and no evidence of past slope movement. Landslides are not expected to occur in these locations irrespective of climate change and permafrost thaw.

Moderate Susceptibility:
Moderate susceptibility areas are characterized by moderate to moderately steep slopes with no indication of previous slope movement. Landslide initiation is possible but unlikely.

High Susceptibility:
High susceptibility areas are characterized by moderate to steep slopes commonly with fine-grained soils susceptible to fluctuations in pore-water pressure and influence of permafrost. Evidence of previous slope movement is common but not requisite. High susceptibility slopes are more likely to be sensitive to permafrost thaw and climate change.

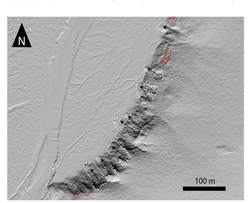
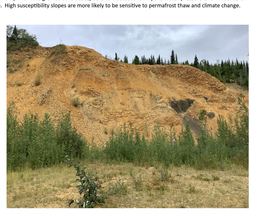


Figure 1. Evidence of historic landslides (dashed white lines delineate events that have occurred since deposition of modern floodplain) visible on a LiDAR hillshade model. Tension cracks indicating additional slope instability are indicated by dashed red lines. The location of this figure is shown by the dashed square on the Landslide Susceptibility map.



Steep rock slopes and adjacent downslope areas zones of high rockfall hazard (BC-03).

LANDSCAPE HAZARD SUSCEPTIBILITY

Landscape hazard susceptibility is evaluated here as the spatial tendency of an area to be affected by permafrost, landslide and flooding processes. Susceptibility was evaluated for each surficial geology polygon for three different hazard categories, permafrost, landslides, and flooding. These individual evaluations are combined, selecting the highest susceptibility classification of the three categories for the rating of the composite landscape hazard susceptibility map. Individual process maps can be consulted to determine which processes are of greatest concern in a given area.

Low Susceptibility:
Characterized by terrain devoid of ice-rich permafrost and buried glacial ice. If permafrost is present, thaw of these materials is unlikely to lead to ground subsidence or landslides. These materials are typically coarse-grained (dominantly pebble or coarser texture) or thawed to depths unlikely to contain significant ground ice.

Moderate Susceptibility:
Characterized by coarse materials with minor components of silt and sand (e.g. thin loess overlying glaciofluvial gravels). Permafrost is always present here though unlikely to be ice-rich throughout most of the polygon. Unless buried glacier ice is present, thaw of this terrain is likely to produce only minor ground subsidence.

High Susceptibility:
Characterized by ice-rich materials likely to produce significant subsidence or landslides when thawed. Ice may be segregated or buried glacier ice. Evidence of segregated ice or thermokarst subsidence is commonly observed.

SYMBOLS

GEOLOGICAL BOUNDARIES:
- defined
- approximate
- assumed
- map boundary

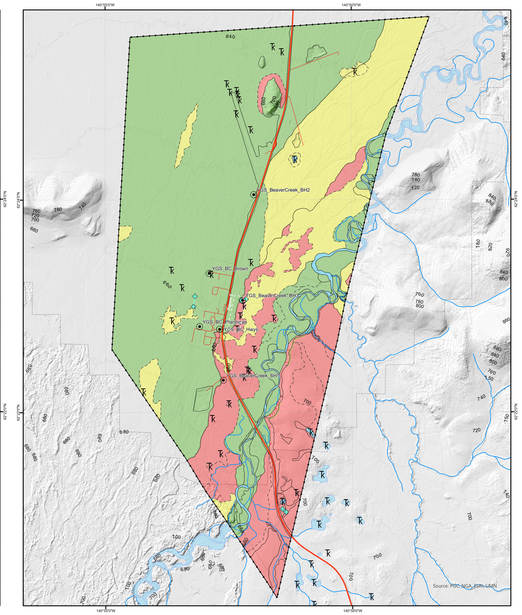
GEOLOGICAL FEATURES:
- escarpment, undefined
- gully, unclassified

TOPOGRAPHIC FEATURES:
- contours
- streams
- roads and trails

GROUND OBSERVATION SITES:
- field station
- permafrost borehole
- ERT Survey

PERMAFROST AND PERIGLACIAL FEATURES:
- thermokarst depression

MASS MOVEMENT FEATURES:
- landslide, direction of movement



PERMAFROST HAZARD SUSCEPTIBILITY

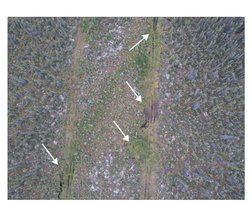
Permafrost hazard susceptibility is the spatial tendency of an area to experience loss of soil bearing capacity, subsidence, or other mass movement caused by thaw of permafrost. This classification is based on evaluation of terrain and permafrost characteristics including texture, thickness and distribution of surficial materials, active layer thickness, ground temperature, and quantity and distribution of ground ice.

Low Susceptibility:
Characterized by terrain devoid of ice-rich permafrost and buried glacial ice. If permafrost is present, thaw of these materials is unlikely to lead to ground subsidence or landslides. These materials are typically coarse-grained (dominantly pebble or coarser texture) or thawed to depths unlikely to contain significant ground ice.

Moderate Susceptibility:
Characterized by coarse materials with minor components of silt and sand (e.g. thin loess overlying glaciofluvial gravels). Permafrost is always present although unlikely to be ice-rich throughout most of the polygon. Unless buried glacier ice is present, thaw of this terrain is likely to produce only minor ground subsidence.

High Susceptibility:
Characterized by ice-rich materials likely to produce significant subsidence or landslides when thawed. Ice may be segregated, wedge or buried glacier ice. Evidence of ground ice or thermokarst subsidence is commonly observed.

Segregated ice found in the upper 2 m of YGS_BeaverCreek_BH3 drill core. Ground ice is common within the thin loess veneers overlying glaciofluvial outwash and within the fine-grained overbank sediments overlying the modern floodplain and fluvial terraces.



Thermokarst subsidence is common along ATV trails in the map area. The compaction and disturbance of surface organics in this location reduced ground insulation and caused ice-rich permafrost to thaw resulting in ground subsidence.

Figure 2. Lidar-derived elevation change along a firebreak on the east side of Beaver Creek. Ground subsidence is dominantly related to thaw of ice-rich permafrost in disturbed areas. Positive elevation changes are related to human activity such as plowing and levelling. The location of this figure is shown by dashed lines on the Permafrost Hazard Susceptibility map.

FLOOD SUSCEPTIBILITY

Flood hazard susceptibility is the spatial tendency of an area to be affected by fluvial flooding and lacustrine-style inundation. This classification is uses a landform based analysis where polygons with evidence of recent flooding (recent fluvial deposits, scour, or vegetation indicators) or continuously inundated areas are classified as high. Susceptibility ratings decrease with lateral and vertical distance from active fluvial landforms, lake margins, or topographic depressions that are inundated by high ground water levels.

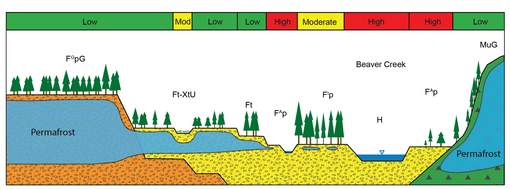
Low Susceptibility:
Low susceptibility areas are those distal to or elevated from modern fluvial environments. These are commonly fluvial terraces or upland landforms. Low susceptibility areas are not exposed to seasonal inundation or significantly affected by high groundwater tables.

Moderate Susceptibility:
Characterized by inactive but geologically modern fluvial landforms. Activity states are inferred by vegetation indicators where an inactive landform is typically occupied by a mature stand of forest. Elevated marginal lacustrine or seasonally inundated environments are also classified as moderate susceptibility.

High Susceptibility:
Characterized by river and stream channels, active fluvial landforms, and areas seasonally inundated by high lake or ground water levels. These areas generally occupy local and regional topographic lows.

A seasonally inundated depression formed from recent thermokarst subsidence on a McConnell-aged glaciofluvial terrace at BC-20.

Floodplain of Beaver Creek immediately downstream of the Alaska Highway bridge (BC-13) with large woody debris on a lateral bar from a recent flood event.



Schematic landscape cross-section illustrating how various landforms are classified by relative flood and inundation susceptibility. Permafrost is generally discontinuous or absent on the Beaver Creek floodplain. Where permafrost is present it is likely much thinner than on older landforms.

ACKNOWLEDGEMENTS

This map covers a portion of the traditional territory of the White River First Nation. Panya Lipovsky, Jennifer Humphries, and Moya provided assistance with field investigations. ERT surveys were completed by Kryotek Inc.

RECOMMENDED CITATION

Cronmiller, D.C., 2024.Hazard Susceptibility of the Beaver Creek area, Yukon; Parts of NTS 115K/7. Yukon Geological Survey, Energy Mines and Resources, Government of Yukon, Open File 2024-1, 1:15 000 scale.

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

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Open File 2024-1

Hazard Susceptibility of the Beaver Creek Area, Yukon
Parts of NTS 115K/7
1:15 000 scale

by
D.C. Cronmiller

Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Yukon