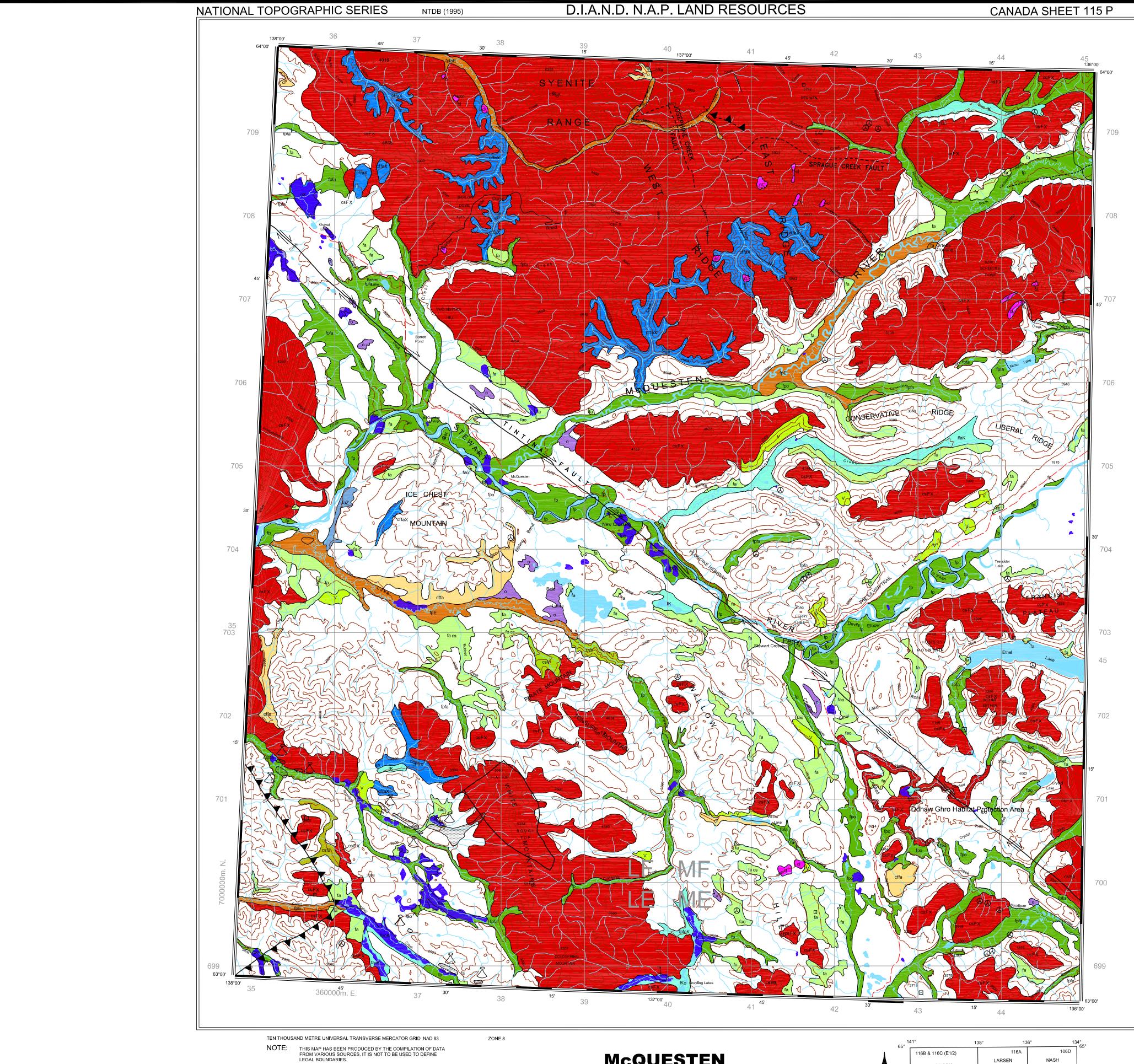
INFERRED HAZARDS

Rock fall and debris flows common







**GEOPROCESS FILE SUMMARY REPORT** McQUESTEN MAP AREA - NTS 115P

INTRODUCTION

The GEOPROCESS File is a compilation of information and knowledge on geological processes and terrain hazards, including mass movement processes, permafrost, flooding risks, faults, seismic activity and recent volcanism, etc. Please refer to the GEOPROCESS File User Guide or more in-depth information on how the maps were developed, which other GEOPROCESS File maps are available, how to utilize this inventory and how to interpret the legend. Special interest should be taken in the detailed description of the terrain hazard map units. Appendices in the User Guide include summary papers on the geological framework, permafrost distribution and Quaternary geology in Yukon and a list of comprehensive GEOPROCESS File references. This report includes a brief discussion of the scope and limitations of the GEOPROCESS File

## compilation maps followed by summaries of the bedrock geology, surficial geology and terrain hazards for this NTS map area, and a list of references. Geological Processes and Terrain Hazard Compilation Maps

The GEOPROCESS File map units were drafted on the 1:250 000 topographic base maps through interpretation from bedrock geology maps, surficial geology maps and in some cases terrain hazard maps at various scales. The compilation maps have a confidence level reflecting the original source material. All materials used to produce the maps are listed in the references on each map. A file containing the documentation used to construct these maps is available at the Indian and Northern Affairs library in Whitehorse, Yukon. Areas for which no surficial geology or terrain hazard information is published were left blank. Summary reports on surficial geology and terrain hazards for these map sheets were written by extrapolating the data from adjacent map sheets or smaller scale maps. Information from small scale (e.g., 1:1 000 000) maps was used for the summary reports, but not redrafted onto the 1:250 000 GEOPROCESS

The GEOPROCESS File compilation maps are intended as a first cut planning tool; the legend on the maps describes the general aspects of terrain hazards (also see below) and associated geological processes. These maps should never replace individual site investigations for planning of site specific features, such as buildings, roads, pits, etc.

## Bedrock Geology Summaries

Each 1:250 000 NTS map area is described according to morphogeological belts and terranes defined by Gabrielse et al. (1991) and Wheeler et al. (1991). Bedrock geology (including structure) and mineral occurrences are briefly described and taken largely from the referenced, most recent 1:250 000 geological map with additional contributions from Wheeler and McFeely (1991), and Yukon MINFILE (1993). A summary paper ("A Geological Framework for Yukon") in Appendix A of the User Guide provides a framework and context for each of the bedrock

The level of knowledge and understanding of Yukon geology is constantly evolving with more detailed mapping and development of geological models. Names, ages and terrane affinities of rock units on the most recent 1:250 000 geological maps may, in some cases, now be considered incorrect. Thus information contained within some of the bedrock geology summaries may be out of date. Although much of the information reflects the knowledge at the time that the source map was published, additional information has been inserted whenever possible to assist the user in merging the information with current geological maps, concepts and understanding. The age ranges for similar packages of rocks may also vary between map areas since the actual rocks, or at least the constraints on their age, may vary between map

## BEDROCK GEOLOGY

The McQuesten map area is entirely within the Omineca Belt. The region has relatively low relief, and since only the southernmost portions have been glaciated, the topographic expression is subdued and dominated by low rounded hills and broad valleys. The most pronounced feature in the region is the very broad Tintina Trench which diagonally cuts the map area in half from northwest to southeast.

Bedrock in the southwest half of the map area is dominated by pre-250 million year old cataclastic sedimentary, volcanic and intusive rocks of the Nisutlin and Simpson Assemblages, including quartz-mica schist, orthogneiss, paragneiss, quartzite, phyllite and limestone. These high-grade metamorphic rocks are structurally overlain by gabbro, peridotite, serpentinite and diorite of Slide Mountain Terrane. The entire package, collectively known as Yukon Tanana Terrane, is intruded by numerous large, 100 million year old plutons of granite, syenite, granodiorite and quartz monzonite, and overlain by 70 million year old andesite and trachyte of the Carmacks Group.

Bedrock northeast of the Tintina Trench is composed almost entirely of 800-530 million year old Hyland Group schist, quartzite, phyllite and limestone which is overlain in the north by

the Selwyn Suite intrude the rocks in the northern part of the map area. Felsic volcanic flow rocks of similar age are exposed in the area of the northeastern map boundary. Mineral Deposits and Occurrences

of the map area, the package of old metamorphic rocks is overlain by 530-390 million year old

Group quartzite, slate, sandstone and conglomerate. Numerous, generally small, 100 million

year old plutons and dykes of granite, granodiorite, quartz monzonite, syenite and monzonite of

Road River Group limestone, slate, phyllite and quartzite; and 390-325 million year old Earn

THIS MAP IS ISSUED AS A PRELIMINARY GUIDE FOR WHICH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT

EDITION: 2 PRINT DATE: 99/07/19

There are approximately 35 known mineral showings in the McQuesten River map area. The majority of the mineralization is in the northeastern corner where 100 million year old granitic rocks intrude the ancient meta-sedimentary rock package. The mineral deposits and occurrences consist of silver-lead-zinc veins typical of the Keno Hill region, and polymetallic veins and skarns containing tin, tungsten, gold, silver, lead, zinc, and/or antimony. Other types of mineralization include a uranium showing, a sedimentary exhalative barite occurrence and an ultramafic- associated asbestos showing. The Clear Creek drainage basin continues to produce significant amount of placer gold as do several other creeks in the northern part of the map area.

Recent work by Bond (1997) in this area provides an updated glacial history of the early glaciations and a map at 1:250 000 scale of sediment distribution and types. During late Tertiary time (2 million years ago), smooth rounded summits and valleys formed as a mature landscape with a well-developed system of streams which drained in a southerly direction. After a period of tectonic stability (e.g., inactive faults), uplift occurred (e.g., upward movement in the crust) which continued into the Quaternary (2 million years to present, Templeman-Kluit, 1980). Drainage systems became entrenched and with the onset of Quaternary glaciation, drainage reversals in a northerly direction occurred throughout central

Yukon (Templeman-Kluit, 1980). "During their maximum extent, pre-Reid ice sheet inundated the area leaving isolated nunataks on Klondike Plateau and the northern part of Stewart Plateau near Syenite Range. North-trending intervalley channels on Stewart Plateau represent confined ice flow in Stewart and McQuesten River valleys from ice obstructions in Tintina Trench. Undifferentiated pre-Reid materials are thick in the lowlands of Klondike Plateau and in the Tintina Trench" (Bond, 1996). Reid ice advanced from the east and southeast and occupied the major valleys within the Stewart Plateau, Tintina Trench and Willow Creek Valley (Bond, 1997). Outwash terraces are present along the Stewart and McQuesten river valleys.

The McConnell ice sheet impinged on the east boundary of the study area, terminating approximately 20 km northeast of Stewart Crossing in the Tintina Trench. McConnell deposits consist mainly of a sandy till within the ice limit and outwash deposits immediately west of it. Colluvium covers most mid- to high-elevation surfaces in this area. The colluvium is usually loose, friable and is composed of frost-shattered or weathered rock, and locally includes till reworked by slope and permafrost processes. Colluvium tends to show imbrication of flat stones roughly sub-parallel to the slope. Till is commonly found in greater thickness at lower elevations, and as a thinner (less than two metres) blanket at higher elevations.

Valley bottom sediments are composed of sandy and gravelly alluvium commonly capped by

TERRAIN HAZARDS The main source of information for the terrain hazards is derived from surficial geology and geomorphology maps of Thomas and Rampton (1982a and b) adjoining map 115P, and on Bond (1997). The Geological Survey at the Canada Pacific Geoscience Centre in Victoria provided the seismic information.

organic- or silt-rich blankets.

Mass Movement Processes varicoloured slate, quartzite, slate, phyllite, limestone. Also in the northernmost part of the map

Permafrost is present on north-facing slopes, and processes such as solifluction, soil creep,

## **McQUESTEN** YUKON TERRITORY **CONTOUR INTERVAL 500 FEET Elevations in Feet above Mean Sea Level North American Datum 1983 Transverse Mercator Projection** Universal Transvers Mercator Grid ZONE 8

ation and cryoturbation occur locally. Slow mass movement processes such as creep, solifluction lobes and stripes are common on colluvium-covered slopes. Fine-grained sediments in the valley bottoms may be underlain by permafrost with high ice content, which may become thermokarst if disturbed. This risk is less severe if the fine-grained deposits are underlain by gravel. Avalanches and rock falls are a risk on steep slopes, and bedrock such as the Klondike schist and ultramafic rock may fail if slope conditions such as degrading permafrost or excessive moisture are present. An example of a mass movement failure is the large landslide above the town site of Dawson (NTS map area 116B/C) which is chiefly composed of friable ultramafic bedrock. Several small landslides mapped by Bond (1997) are shown on this map.

This map area lies within the widespread discontinuous permafrost zone (Brown, 1968). Permafrost is very common in thick organic-rich silt deposits. Large bodies of segregated ice, ice wedges and ice layers are visible in many of the placer mine pit walls excavated in such sediments (French and Pollard, 1986; Mougeot, 1994) in map sheet 116B/C, north of this area. Locally, the solid ice bodies were as thick as 15 m and could be as thick as 100 m. Most fine-textured sediments in poorly drained areas with peat, thick moss and/or organic soils are underlain by permafrost. The uppermost metres of bedrock are also locally frozen where composed of altered, friable schist. The active layer is at its thickest by mid- to end-August Frosion of the surface or slopes of these sediments, either by creek. river, forest fire or human activities can result in either mudslides, detachment slides, thermokarst subsidence, and/or deterioration of the drainage for several years.

High water levels have been experienced as a result of floating ice jams. Unusually high water levels can be caused by snow melt run-off, rainstorms events, or a combination of both, as well as ice jams during the spring break-up period. The effect of snow melt and heavy rain is greater on smaller drainage basins. The main source of information for the terrain hazards is derived from surficial geology and geomorphology maps of Thomas and Rampton (1982a and b) which adjoin 115P. It is assumed that similar processes may be active in this map area. The Geological Survey of Canada Pacific Geoscience Centre in Victoria provided the seismic information. There is no mapped

There are six recorded seismic events within the map area. All of the recorded events are 4.0 to 4.999

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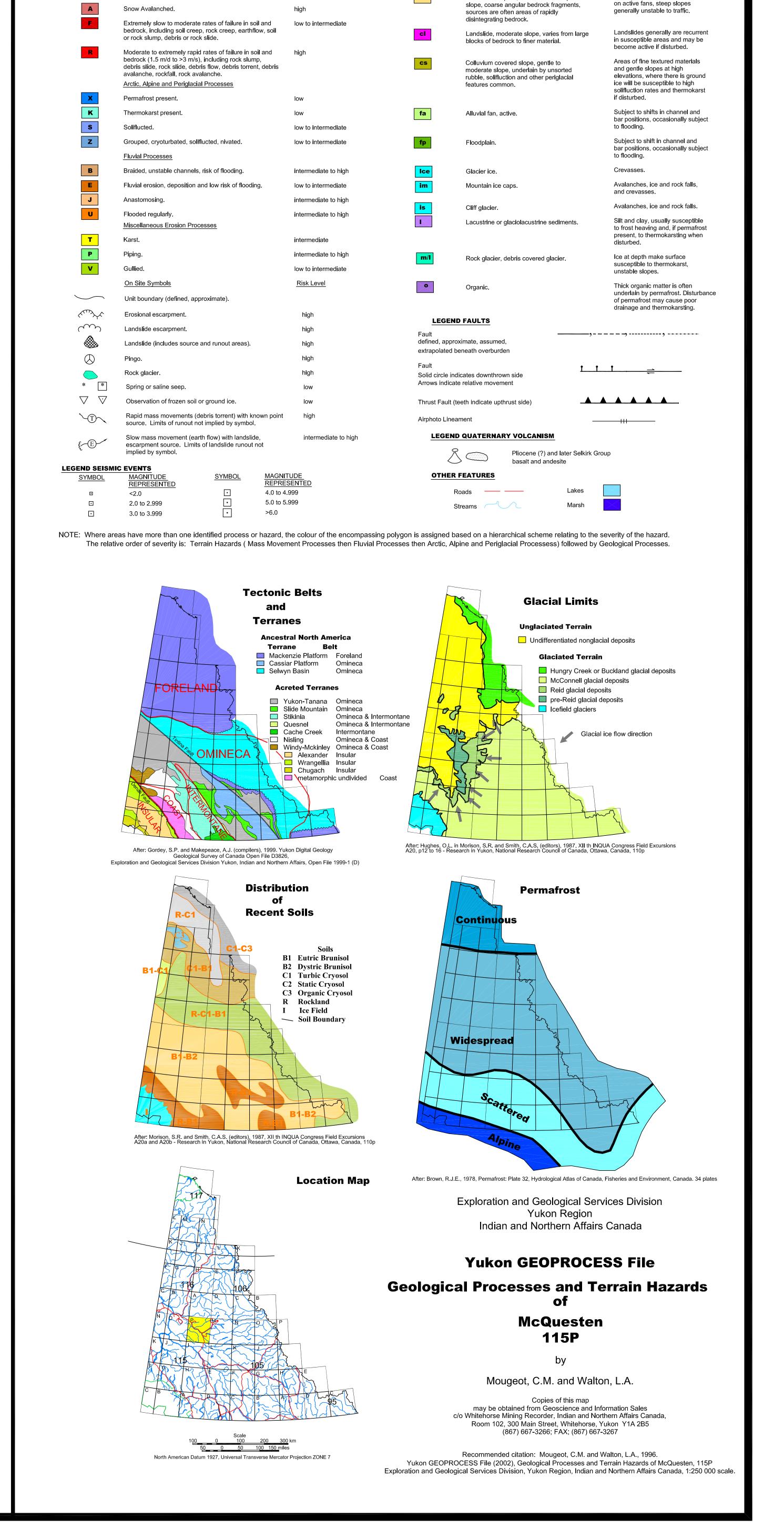
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**LEGEND** 

LEVELS, COMMENT

MAP SYMBOL

DESCRIPTION

Talus fan or apron, moderate to steep

MAP SYMBOL

TERRAIN HAZARDS

Mass Movement Processes