MARGINAL NOTES

The Village of Mayo is located in central Yukon, within the Stewart River Plateau. The physiography is characterized by rolling uplands with steep slopes leading into U-shaped valleys about 1000 m below the upland surface. The Village of Mayo is at the confluence of the Mayo and Stewart rivers, in the broad Stewart River valley. The Stewart and Mayo rivers are incised into the Stewart Plateau to a depth of 460 m a.s.l.; most of the Village of Mayo is >500 m a.s.l. on the floodplain of the Stewart River.

Vegetation in the region is dominantly a northern mixed deciduous and coniferous forest (boreal forest), consisting predominantly of white spruce (*Picea glauca*) and minor amounts of black spruce (*Picea mariana*) and paper birch (*Betula papyrifera*). Aspen (*Populus tremuloides*), balsam (*Populus balsamifera*) and poplar (*Populous*) are common and the northern limit of the lodgepole pine (*Picea contorta*) is located near Mayo in the Stewart River valley. South-facing slopes commonly have artemesia grasslands or steppe vegetation. The understory consists of feathermoss, willows, sagewort and ericaceous shrubs; sphagnum mosses are present in wetter terrain.

Surficial geology in Mayo reflects a glaciated landscape that has undergone significant modification from fluvial, eolian and permafrost processes. The Village of Mayo is located just inside the limit of the maximum extent of the last glaciation that occurred in Yukon, known as the McConnell Glaciation. This glacial advance occurred approximately 20 000 years before present, leaving behind minimal deposits on the slopes above the town site (Fig. 1). Deglacial lakes, deltas and terraces filled the valley as the glacier retreated, leaving thick deposits of fine-grained lacustrine (Fig. 2) and coarse-grained glaciofluvial (Figs. 3 and 4) materials across the valley.

Glacial limits in the Mayo region were originally noted by Bostock (1966) and later the surficial geology was mapped by Hughes (1983). Bostock (1966) recognized four advances of the Cordilleran Ice Sheet: Nansen, Klaza, Reid and McConnell (from oldest to youngest respectively). However, subsequent authors have rarely distinguished between events that are older than the Reid advance, and collectively refer to these older glacial episodes as the 'Pre-Reid' glaciation, which represents up to seven glacial advances.

Only the most recent two glacial advances are easily distinguishable in the Mayo region. The Reid advance was more extensive than the McConnell advance, and reached its westward limit ~80 km west of Mayo at Reid Lakes. This advance likely took place ~130 000 years before present and inundated all but the highest peaks around Mayo (*Ward et al., 2008; Stroeven et al., 2010*). Late Wisconsin McConnell-age glacial deposits are readily recognizable and well preserved in the Mayo region. The McConnell advance was the least extensive Cordilleran advance in Yukon and the western limit in central Yukon occurs ~20 km west of Mayo in the Stewart River valley. This less-extensive advance only reached elevations of ~700 m in the Mayo area and left most of the uplands ice-free.

The late Quaternary history of the Mayo region was outlined by Giles (1993) based on his work at various exposures around the town site:

1. Mid-Wisconsinan Interglacial (~30 000 years before present): A large wandering gravel-bed river flowed south through the Mayo River valley and into the Stewart River valley, similar in appearance to the modern Stewart River downstream of Mayo. The Stewart River at this time was likely a small tributary to the Mayo River and would have formed a wide braidplain at its confluence with the larger Mayo River.

2. Proglacial: As ice advanced down the Stewart River valley, a pro-glacial lake formed in the Mayo River valley and discharged along the northwest margin of the ice in the Stewart River valley. The outlet of this lake incised deep meltwater channels in bedrock – one of which is currently being used by the Mayo River (the Wareham Dam is built in one of these channels). The discharge from this lake also contributed to thick gravel terrace deposits on the north side of the Stewart River valley. When this southern outlet was blocked by advancing ice, water was diverted west through Minto Creek and formed a deeply incised meltwater channel near Minto Lake.

3. Glacial (~20 000 – 25 000 years before present): Ice in the Stewart River valley advanced past Mayo, forming a lateral or re-advance moraine across lower Mayo River valley (*i.e.*, near 5 Mile Lake). Deposition of till was limited at this time and ice-marginal drainage was likely maintained along the north margin of the ice sheet.

4. Postglacial: As the ice sheet began to retreat, an ice mass blocked drainage below the Village of Mayo and impounded a lake to ~550 m in the Stewart River valley. Meanwhile, retreat of the Stewart River valley ice allowed the lake in the Mayo River valley to begin draining south into the Stewart River valley, forming high glaciofluvial terraces against the ice front (*i.e.*, the Cemetery Road bench). A minor readvance likely formed a lateral moraine across the Mayo Valley and dammed water in the Wareham Lake basin to ~610 m.

5. Holocene (~10 000 years ago until present): After ice retreated and the remaining lakes drained, a large volume of fine-grained glaciolacustrine and glacially scoured material was available to be transported and reworked by eolian processes. The transport of fine-grained eolian material likely remained a dominant sedimentary process until moister conditions prevailed and vegetation became established ~9000 years ago (*Wolfe et al., 2011*). Since this time, eolian deposition has been limited to cliff-top loess deposition above unvegetated sediment bluffs. Permafrost processes may have taken over as the dominant landscape-forming process around this time (*Burn et al., 1995*). The growth of permafrost in poorly drained fine-grained materials in the area is responsible for shifts in vegetation cover and the establishments of thermokarst lakes and ponds over much of eastern Mayo. Finally, ongoing incision of glacial sediments by the Stewart and Mayo rivers continues to transport large volumes of sediment within the map area.

The materials making up the surficial geology in and around Mayo are, for the most part, stable. However, geological, hydrological and climatological processes operating on these materials can pose a hazard to existing and future development. Mayo has abundant gravel and sand-rich landforms that are stable, well drained, and ice free. Many of these landforms also occur above the floodplains of both the Mayo and Stewart rivers. These are ideal building sites for future infrastructure. Less stable landforms in the Mayo region include those that contain glaciolacustrine materials, moraine deposits, and some point bar deposits along the Stewart River.

FIGURES

Figure 1. Moraine ridge on the east side of the map area (dashed line). Photo was taken beside the Silver Trail Highway ~0.5 km south of Five Mile Lake.

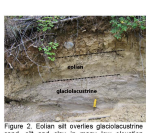


Figure 2. Eolian silt overlies glaciolacustrine sand, silt and clay in many low elevation exposures near the Village of Mayo.

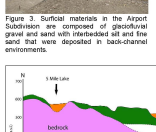


Figure 3. Surficial materials in the Airport Subdivision are composed of glaciofluvial gravel and sand with interbedded silt and fine sand that were deposited in back-channel environments.

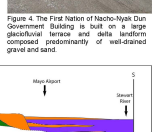
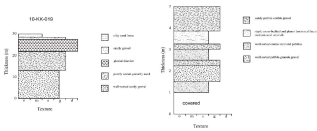
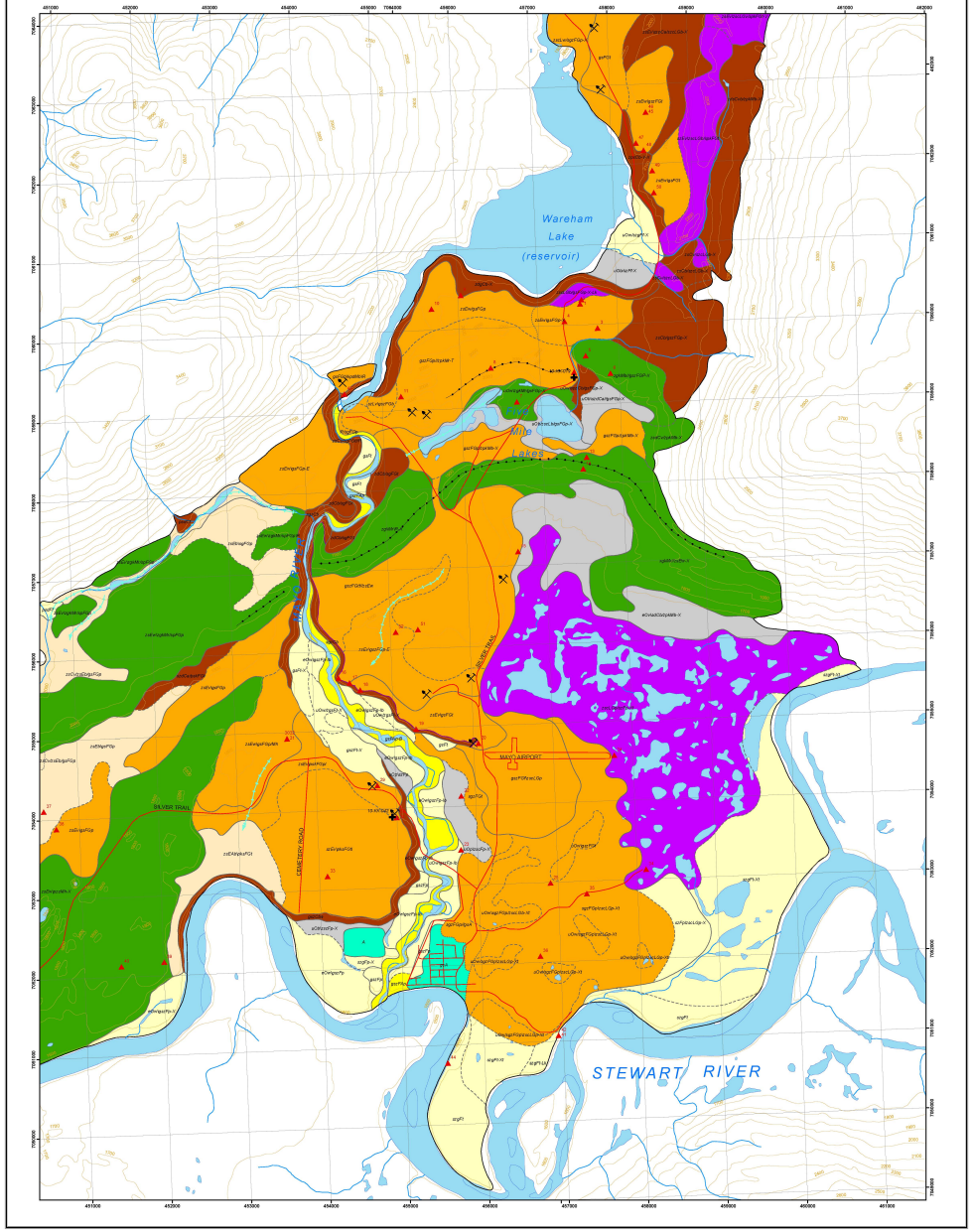


Figure 4. The First Nation of Nacho-Nyak Dun Government Building is built on a large glaciofluvial terrace and delta landform composed predominantly of well-drained gravel and sand.

Figure 5. A profile of the distribution of surficial sediments in the Mayo area illustrates the probable subsurface contacts between unconsolidated materials and underlying bedrock.

STRATIGRAPHY




Wareham Lake (reservoir)
STEWART RIVER
MAYO AIRPORT
SILVER TRAIL
LOWER DISTRICT ROAD
STEWART CROSSING ROAD
Mayo
Stewart River
Mayo River
Wareham Lake
Minto Lake
Reid Lake
Mayo Lake
Duncan Creek
Minto Creek
Mayo River
Stewart River
Mayo Airport
Mayo Landing
Mayo Lake
Mayo Lake Road
Stewart River
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