DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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SHEET 2 OF 2

DESCRIPTION OF MAP UNITS

	Description of materials	Distribution and thickness	Topography and drainage	Permafrost	Susceptibility to frost action	Suitability for construction	Special problems
Qt Thermokarst deposits	Lithology dependent upon the materials in which the thermokarst develops. Thermokarst deposits developed in unit Qat, are fine to medium sand and silty sand; those in eolian sand (Qe) consist of fine sand; and thermokarst deposits formed in the upland silt unit (Qus) are composed of silt to very fine sand. All of the deposits contain disseminated detrital organic matter and chunks of peat of various sizes. Unit includes the deposits of minor streams that cross or connect lake basins.	Occurs in areas underlain by surficial deposits throughout the quadrangle but not differentiated in areas underlain by alluvium. Generally less than 3 m thick.	Forms flat to moderately dissected areas within isolated, interlocking, or overlapping basins. Maximum surface relief within basins ranges from about 3 to 10 m and is determined by the degree of dissection and presence of pingos. Pingos occur primarily in lake deposits developed in eolian sand (Galloway and Carter, 1978; Carter and Galloway, 1979) and attain a maximum height of about 10 m. Maximum relief between basin floors and surrounding areas ranges from about 5 to 20 m. Drainage is poor except in those basins in the eolian sand unit that have been breached and deeply dissected.	Perennially frozen below an active layer about 0.5 m thick. Amount of excess ice is largely dependent upon the age of the deposit; early Holocene deposits are ice-rich, whereas the deposits and subjacent strata of recently drained basins may have relatively low ice contents. However, wedge ice in the subjacent strata may have survived the lake episode if the lake was shallower than 2 m.	Susceptibility varies within individual lake deposits depending upon silt content and amount of detrital organic matter; deposits in the central part of lake basins generally very susceptible due to concentration of silt and organic matter.	Generally unsuitable as a source of materials due to silt, organic, and ice content and the seasonal flooding of the lake basins by snow melt. The older deposits are less suitable as construction sites due to an increasing amount of excess ice with age.	Differential settlement may occur upon thaw of permafrost. Very poor drainage except where deeply incised. Pingos common where thaw-lake deposits developed in eolian sand.
Qal Alluvium	Stratified deposits of fine to medium sand, silty sand, gravel, and gravelly sand. Gravel and gravelly sand common along streams in areas of bedrock, and along the Colville River. Contains detrital wood and peat. Includes deposits of flood-plain lakes and thaw lakes. Organic-rich silt occurs as thin overbank deposits and as thicker lacustrine deposits that fill abandoned channels. Small eolian dunes are common on modern point bars.	Occurs along all the major streams in the quadrangle. Includes flood-plain and alluvial terrace deposits as much as 8 m above modern streams. Probably not more than 5 m thick along modern channels, except along the Colville River where the deposits may be as thick as 20 m.	Forms channels and bars of the modern rivers and terraces of older river courses. Meander scrolls are well preserved on the lower terraces. Terrace drainage generally poor. Subject to flooding to 6 or 8 m above low water on some streams.	Permafrost underlies the entire unit except for a 2-to 6 m-thick unfrozen layer beneath some of the larger channels and lakes, and a thicker (perhaps perforating) unfrozen zone beneath the Colville River. Elsewhere, active layer about 0.5 m thick. Ice wedges are well developed in the terrace materials, and the silty deposits that form the filling material of abandoned channels contain abundant interganular ice.	Organic-rich silty materials that fill abandoned channels and form overbank deposits are highly frost susceptible. Point bar and channel deposits with less than 6 percent silt generally are not frost susceptible.	Provides good foundations in channel and bar areas where material consists of medium to coarse sand, gravelly sand, and gravel; and moderately good to poor foundations on terraces and the older parts of flood-plains. Organic-rich lacustrine silt that fills abandoned channels is not suitable for foundations. Deposits with low silt content may be suitable for fill.	Subject to bank erosion, scour, channel shifting, and seasonal flooding. Wind erosion and dune building common on point bars and would occur on other parts of the flood plain and on terraces if surface vegetation is disturbed. Excavation of stream-bed materials may pose environmental problems.
Qat Alluvial terrace deposits	Fluvial deposits of interbedded sand and silty sand. Includes deposits of lakes on flood-plain and thaw lakes. Detrital wood and chunks of peat locally common. Overlain by thin eolian sand and peat.	Occurs on the east side of Wolf Creek where it turns abruptly west and on the east side of Ikpikpuk River south of its juncture with Fry Creek. Thickness undetermined but probably in excess of 10 m. Overlying eolian sand and peat from 0.5 to 2 m thick.	Forms residual surfaces adjacent to incised stream valleys. Surfaces are fluvial terrace remnants that occur from 10 to 20 m above modern flood plains. Drainage poor to good.	Permafrost present beneath an active layer that is generally less than 0.5 m thick. Ice wedges occur in the upper few meters.	Silty sand marginally frost susceptible depending on silt content.	Not suitable for foundations because of excessive differential settlement on thaw of ice-rich permafrost. Sand may be suitable for fill, base course, or surfacing.	Easily eroded by running water if flow is concentrated by construction activities or if surface vegetation is removed. Susceptible to wind erosion if surface vegetation is removed.
Qe Eolian sand	Fine to very fine sand containing abundant quartz with minor dark minerals. Well sorted. Stratified, with large-scale cross bedding in places. Contains peat beds and wood in upper few meters. South of Price River locally contains interdunal lake deposits of silt, sandy silt, and organic-rich silt.	Occupies most of the northeastern part of the quadrangle. Thickness ranges from a few m to more than 30 m; interstratified lake deposits may be several meters thick. This unit forms part of a large Pleistocene sand sea (Carter, 1981).	North of Price River forms generally well drained linear dune ridges as much as 30 m high upon which are superimposed parabolic dunes that are generally less than 1 m high. Contains poorly drained depressions that are not part of an intergrated drainage system. South of Price River dune ridges are lower, parabolic dunes are absent, and poorly drained interdunal depressions are larger.	Permafrost underlies entire unit. Active layer less than 1.5 m thick on well drained slopes and summits and less than 0.5 m thick in poorly drained depressions. Ice wedges occur in the upper few m but the remainder of the deposits is generally free of ice in excess of natural voids. However, the presence of deep lakes (Sloan and Snyder, 1978) may indicate that the eolian sand overlies sediments that contain large amounts of massive ice.	Generally not frost susceptible, except where silt content exceeds 6 percent.	Adequate for natural foundations but requires stabilization for use as a surfacing material or fill. Relatively easy to excavate with a ripper on well drained dune ridges.	Extremely susceptible to wind erosion when protective vegetation is removed. Very sensitive to surface disturbances. Active blowouts present in places. Locally, sand may be liquefiable when thawed and if saturated.
Qc Colluvial deposits	Silt and very fine sand locally with dispersed pebbles and cubbles. Contains disseminated, fine-grained organic matter and, in places, chunks of peat of various sizes, and pieces of detrital wood. Bones of extinct Pleistocene mammals present locally. Includes gravelly alluvium in valley bottoms.	Occurs throughout the southern half of the quadrangle. Thickness from 1 to 10 m.	Forms valley and gully slopes and bottoms. Drainage good on upper slopes, poor on lower slopes and in valley and gully bottoms.	Perennially frozen beneath an active layer that is generally less than 0.5 m thick. Contains ice wedges and moderate to high volumes of interstitial ice beneath lower slopes and valley bottoms.	Highly frost susceptible.	Generally unsuitable as a source for materials because of organic content. Not suitable for foundations on lower slopes and valley bottoms because of excessive differential settlement on thaw of ice-rich permafrost.	Easily gullied by running water. Disruption of surface vegetation on lower slopes and valley bottoms may cause melting of ground ice and lead to subsidence.
Qus$_1$, Qus$_2$, Qus$_3$ Upland silt and sand	Predominantly wind blown silt and very fine sand. Includes some clay and layers and lenses of chert granules and pebbles. Stratification indistinct. Gravelly sand to sandy gravel locally composes lower part of deposit. Clasts predominatly pebble-sized, well rounded, chert and quartz. Very poorly exposed. The designation Qus$_2$ indicates that the deposit overlies a sheet of pebble, cobble, and boulder gravel 10 to 20 m thick that forms an extensive terrace of the Colville River. The top of the silt cover ranges from 50 to 100 m above the Colville River. The designation Qus$_1$ indicates that upland silt and sand overlies discontinuous deposits of pebble, cobble, and boulder gravel as much as 10 m thick in the southeastern part of the quadrangle that are the eroded remnants of ancient fluvial or glaciofluvial terraces from 120 to 150 m above modern river courses.	Occurs throughout much of the quadrangle except for the northeast and northcentral parts. Ranges from a few meters to as much as 30 m thick.	Forms flat to gently rolling terrain broken by deep thermokarst basins (Carter 1988), major stream valleys, and ravines. Drainage good on slopes, fair to poor on flatter surfaces.	Active layer generally less than 0.5 m thick. Ice wedges well developed and may extend to depths of 25 to 30 m (see Carter, 1988 for examples). Sediment may contain a high volume of interstitial ice.	Silt and silty sand are frost susceptible.	Not suitable for borrow except as binder material. Not suitable for foundations because of excessive differential settlement on thaw of ice-rich permafrost.	Easily gullied by running water when water is channeled by construction activities or when surface vegetation is removed. Disruption of surface vegetation may cause melting of ice wedges and lead to subsidence. Deposits locally may be liquefiable when thawed and saturated.
Kc Rocks of the Colville group	Nonmarine and marine shale, siltstone, and sandstone with coaly beds and thin tephra layers. Thinly to thickly bedded; moderately to poorly indurated. Fine-grained beds are commonly bentonitic.	Occurs primarily in the southeast one-fourth of the quadrangle.	Forms rolling uplands and steep river bluffs. Well drained.	Perennially frozen but ice content insignificant except in thoroughly weathered surficial zones and in the upper few meters of shale on low gradient upland surfaces where ice wedges may be present.	Thin bedded and/or fine-grained units susceptible to frost action.	Locally suitable for borrow when not bentonitic.	Subject to debris flows, and rock falls. Slopes may be inherently unstable where bentonitic beds are present.
Kn Rocks of the Nanushuk group	Nonmarine and marine sandstone, conglomerate, siltstone, and shale with coaly beds and thin tephra layers. Thinly to thickly bedded; well to poorly indurated. Includes rocks of the Torok Formation on Knifeblade Ridge.	Occurs primarily in the southwest one-quarter and the southern part of the southeast one-quarter of the quadrangle.	Forms east-west trending hills and valleys and steep river bluffs.	Perennially frozen but ice content generally insignificant except in thoroughly weathered surficial zones.	Thin bedded and/or fine-grained units susceptible to frost action.	Locally suitable for borrow. Normally makes good foundations.	Subject to rock falls on steep slopes. Landslide shown by hachures in extreme southeast corner of map.

ENGINEERING-GEOLOGIC MAPS OF NORTHERN ALASKA, IKPIKPUK RIVER QUADRANGLE

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