

GENERALIZED SURFICIAL MATERIALS LEGEND
KING CHRISTIAN ISLAND

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UNIT*	MATERIAL-GENETIC TERM	GENERAL DESCRIPTION	MATERIALS	TOPOGRAPHY**	DRAINAGE	ACTIVE PROCESSES	ACTIVE LAYER THICKNESS	GROUND ICE	RIVER BED AND BANK CHARACTERISTICS	MODERN SHORELINE	SENSITIVITY***		TRAFFICABILITY	
											Magnitude	Form	Roughness	Traction
12	s, sf Pd; s, sf Pd R: Ki	Raised and modern deltaic sediments; commonly with coarser grained topsets, fine grained bottomsets. However, the entire delta may be sand; upper units may be fine grained; sand strata may appear in basal fines; or three or more textural units composed of both Holocene and older sediments may occur. Thickness 5-20 m. Active deltas of sand, minor silt. Note that sediments commonly occupy older rock cut valleys, and that the upper surface of inactive sediments is commonly raised higher than laterally adjacent units.	Commonly massive sand or stratified sand, silt, clay, discontinuous gravel; over silt or clay marine or bottomset sediments. However, the entire delta may be sand; upper units may be fine grained; sand strata may appear in basal fines; or three or more textural units composed of both Holocene and older sediments may occur. Thickness 5-20 m. Active deltas of sand, minor silt. Note that sediments commonly occupy older rock cut valleys, and that the upper surface of inactive sediments is commonly raised higher than laterally adjacent units.	Valley flats wide, low gradients, sources usually at river mouth; may be sinuous upstream. Inactive surfaces commonly level, edged on active channel side by cliffs or steep slopes to 20 m high.	Much of channel zone dry after snowmelt, though a moist to saturated zone 10 to 30 cm thick may exist over the frost table. Inactive surfaces well drained; minor ponding in frost fissure troughs.	Active Channel zones covered by thin water flow at peak snowmelt. Flow restricted to one or more narrower channels at lower water stages. Banks subject to lateral fluvial erosion, gullyng, slumping, minor earthflows. Eolian processes active, without significant effect on morphology. Frost fissures widespread on inactive surfaces.	40-80 cm.	Visible ice probably 0-10% in sand, 10-50% in fine sediments. Frost fissures have primary sand filling.	-	As unit 10.	Medium	c	2	2/2
10	S Wb, W(b), + Pf	Sandy modern and raised near-shore, beach and fluvial sediments; thick or locally veneered over coarser rock.	Dominantly fine to coarse grained sand; minor fines, discontinuous quartz granule veneer on inactive surfaces. Underlain at >2 m, locally 1-2 m depth by planed bedrock, residual rock of unit 6.	Level, to gently inclined seaward slope, between 0 and 10 m elevation. Low beach berms, to 50 cm high and 3 m wide; some sandflat areas (see W(b) in material genetic description). Low (<2 m) channel bluffs.	Generally well drained, though 10-20 cm zone above frost table may be moist to saturated, and dry stream beds may have seepage over frost table. Numerous close spaced (0.5 km) wide wadi-like channels.	Fluvial erosion by sheetwash, gullyng, lateral erosion; deposition in close spaced fans and deltas. Eolian erosion and deposition without significant change to morphology. Scattered shallow frost fissure troughs - possibly fissures more widespread than surface expression.	60-80 cm.	Visible ice 10-50% in 50 cm below frost table, 0-10% at greater depths. Frost fissures partially ice filled, with 40-100% ice in 1 m below frost table. One occurrence of water saturated (unfrozen) sand below fissure ice.	Channel zones, and active deltas over ca. 20% of unit. Bedload dominated by sand. Banks where present rarely >2 m high.	Emergent shoreline with low narrow beach berm typically <50 cm high, <3 m wide composed of sand, minor gravel. Berm extends across fan and delta mouths, broken only by main active channels - but may be continuous if channel flow minor or beach built up during summer over water. Ice push common on coasts with northerly aspect; ridges to 2 m high pushed 5 to 50 m inland from high water.	Low		1	2/1
106	sf, s sl g W R: Ki	Sandy nearshore and beach sediment veneer; over coarse grained bedrock.	Dominantly fine to coarse grained sand; lesser to minor silt, minor clayey silt strata; discontinuous quartz granule veneer; minor areas of gravel ridges. Thickness 1-2 m, locally thicker, over planed bedrock or residual rock, of unit 6. Rock only exposed in deeper stream incisions.	Level, to gently inclined seaward slope, between 0 and 50 m elevation. Sandflat areas common (see W(b) in material-genetic description). Main drainage courses incised to 10 m.	As unit 10.	As unit 10.	60-80 cm.	As unit 10.	Generally straight wide channels, with dominantly sand bedload. Minor drainage courses depressed 1-3 m, with gentle to moderate, locally cliffed banks; major courses incised to 10 m, with moderate to cliffed banks. Lateral erosion causes minor slumping. Rock exposed in deeper incisions.	As unit 10.	Low		1	2/1
105	sf WPF R: Kc	Coarse and fine grained near-shore, beach and fluvial sediment veneer; over fine grained bedrock.	Sand, silt, minor clay; marine and fluvial terrace sediments derived from upstream coarser rock, overlying fine grained rock. Chiefly fines exposed in river banks.	Overall level to low rolling, in part deeply dissected to 20 m locally, by through drainage courses. Wide deep frost fissure troughs on level areas.	Interfluvies moderately well to well drained by rills, to moderately well drained. Local ponding in wedge troughs.	Rilling, minor gullyng; little mass movement on interfluvies.	No data: 40-80 cm	No data. River banks as 9/5? Sandy interfluvies probably have partially ice filled frost fissures with low ice content between fissures.	Bedload sand, minor fines; banks as unit 9/5.	None.	Medium	abc	2	3/2
9	f WPFd, f W	Thick fine grained raised and modern offshore and nearshore marine sediments and deltaic sediments.	Marine sediments are uniform silty clay or silt and clay; locally minor fine sand, or sandstone and siltstone rubble. Thickness 2 to >5 m generally overlying fine grained rock (unit 3), or minor coarser rock (unit 4). Deltaic sediments dominantly fines but may include thick sand units. Thickness locally >10 m. pH ca. 7; liquid limit 35-40; plasticity index 11-15.	Overall gently inclined to level; rectangular to concave seaward between 0 and 50 m elevation. Streams incised 2-10 m. Microrelief locally rough due to earthflows; chaotic close to coast where flows and ice push ridges internixed.	Poorly drained in wet summer, poorly to moderately well drained in dry summer. Extended seepage in shallow runs. Rills, broad runs in intervening areas.	Mass movement and fluvial. Rilling, gullyng, lateral erosion on steep delta cutbanks. Mass wasting highly active: earthflows widespread even on slopes of 1°; includes wide (100 m) detachment slides and narrow but long (to 300 m) 'bimodal' flows. Few frost fissures observed, ice push at shoreline.	30-40 cm.	Total ice content in upper 2 m is 10-70%, in bands to 10 cm thick. Frost fissures where present ice filled.	Main drainage courses straight to slightly sinuous, locally sinuous. Bedload of fines, minor sandstone or siltstone rubble. Banks moderately inclined to cliffed. Cliffs may extend for whole width of coastal plain. Banks generally unstable with much slumping, earthflow, minor gullyng (major where rivers deeply incised).	Emergent shoreline, gently inclined. Fine grained material. Beach berm only developed where sand available from adjacent or inland units. Commonly disturbed by ice push, with ridges to 2 m high pushed to 50 m inland from high water.	High	ABC	2	3/2-3
96	f WPFd R: Ki	Fine grained marine and deltaic sediment; over coarser rock.	Silt, clay, fine sand; local discontinuous lag gravel; over poorly to moderately well consolidated sandstone, siltstone, minor shale. Thickness generally <2 m; deltaic sediments locally much thicker.	Overall level to low rolling; in part deeply dissected by through drainage courses, locally to 20 m depth.	Poorly to moderately well drained by rills, shallow runs between rivers.	Chiefly fluvial between stream courses; rilling, minor gullyng. Little mass movement.	No data: 40-60 cm	No data: as unit 9/5?	Bedload fines, sand, lesser sandstone and siltstone rubble. Banks moderately inclined to cliffed. Deeper incisions (>5 m) expose sandstone, siltstone, shale. Rock fairly stable; overlying fines subject to earthflows and slumping.	As unit 9.	Medium	a c	2	3/2
95	f W R: Jkd	Fine grained offshore and nearshore marine sediment veneer; over fine grained bedrock.	Silt, clay, fine sand; unstructured to finely laminated; siltstone or mudstone veneer locally. Underlain by clayey silt residual material and planed poorly lithified rock of unit 5; contact rarely discernible. Thickness generally <2 m; locally >3 m, or may be stripped to residual rock. pH 3.3 - 8.7; liquid limit 24-27, exceptionally 54; plasticity index 1-15, exceptionally 26.	Gently inclined to level, low hills between 0 and 50 m elevation. Generally smooth surface with main drainage courses incised 2-10 m.	Poorly drained in wet summer; moderately well locally poorly drained in dry summer. Rivers and larger streams at 1-2 km intervals, rills in intervening areas. No lakes or ponds. See unit 3 for desiccation.	Chiefly fluvial: rillwork, minor gullyng; little mass movement.	40-60 cm.	In 50 cm below frost table, visible ice commonly to 50% in bands to 1 cm thick. Below, visible ice 5-40%.	Main courses commonly straight to slightly sinuous. Bedload fines, minor sandstone or mudstone rubble; very local sandstone or mudstone outcrop or concentration of fragments. Where headwaters are on a coarse unit, bedload is sand and silt. Banks moderately steep to cliffed, minor slumping; fairly stable. Deeper incisions expose poorly lithified shale.	As unit 9.	Medium	abc	2	3/2
7c	ss Wb Q?	Thick sand, gravel; beach spit and/or Quaternary fluvial sediments?	Gravely coarse and medium grained sand. Gravel is granule to pebble size quartz, quartz sandstone, siltstone, very minor chert, granite.	Linear, in places winding, very subdued ridge, 50 to 500 m wide, 7 km long. Running down divide to shore at C. Abernethy.	Well drained.	Generally stable relative to adjacent materials; minor rilling, shallow frost fissure troughs.	8-100 cm.	Visible ice <10%, except mixed sand and ice filling in 50 cm of frost fissure immediately below frost table.	None.	None.	Low		2	2/1
7b	gsf Q	Thick gravel, fines; Quaternary fluvial sediments?	Silty sandy gravel. Gravel is granule to boulder size angular to rounded, chiefly sandstone, mudstone. Height of ridge possibly much greater than thickness of gravel, as gravel protects underlying fine grained bedrock.	Linear subdued ridge 10 m high, 50 m wide, 5 km long, though broken by several water gaps.	Well drained, but note snow-banks and extended seepage period on flanks.	Generally stable relative to underlying and adjacent materials; rilling, shallow frost fissure troughs.	No data; 80-100 cm	No data; probably <10%, with mixed primary mineral filling and ice in frost fissures.	None.	None.	Low		2	2/1
7a	g-f TQ	Thick to veneered sand, gravel, fines; late Tertiary or Quaternary fluvial sediments.	Gravely sand to gravely silty clay 2 m to >10 m thick. Gravel is granule to boulder size angular to round sandstone, siltstone, mudstone, minor gabbro, limestone, granite.	Knolls and low mounds 2-15 m high. 10-500 m width.	As unit 7b.	As unit 7b.	40-100 cm.	As unit 7b.	None.	None.	Low		2	2/1
6	s, sl RW: Ki	Coarser grained lithologies (see unit 4) modified by marine processes during higher Quaternary sea levels.	Chiefly fine to coarse sand with ca 50% cover of lag quartz granules. Scattered sandstone rubble, and silt and fine sand marine sediments. Rare thick sand and gravel fluvial sediments. Thickness of brown washed/ weathered sand rarely >1 m, and white unconsolidated outcrop of unit 4 common. Bedrock structure visible on air photos.	Subdued form of unit 4. Gentle to moderate slopes on strike aligned ridges and valley slopes; relief to 30 m; few scarps or ledges.	River and major stream spacing <1 km. Well drained; minor poorly drained fine grained beds. No lakes or ponds. Extended snowmelt and seepage under cliffed slope facies and incised river banks.	Dominantly fluvial: sheetwash, rilling; minor gullyng, lateral erosion. Disaggregation by frost shattering. Mass movement minor. Eolian processes locally significant: sand ripples, etching of consolidated rock. Frost fissures possibly widespread, but have poor surface expression.	60-80 cm.	Visible ice 10-50% in 50 cm below frost table, 0-10% at greater depths. Frost fissures commonly have primary mineral filling.	As unit 4.	As unit 10.	Low		2	2/1
5	f RW: Kc, Jkd	Fine grained lithologies (see unit 3) modified by marine processes during higher Quaternary sea levels.	Silt and clay; minor discrete deposits or veneer of platy shale or mudstone fragments. Composed of marine reworked residual material 0-2 m thick, over residual rock or bedrock of unit 3.	Subdued form of unit 3; chiefly gentle slopes.	As unit 3.	As unit 3.	As unit 3.	As unit 3.	As unit 3.	None.	Medium	abc	2	3/2
4	s, sl, r, g R: Kh, Ki	Coarser grained resistant to recessive, commonly poorly consolidated, rock and residual weathered rock.	Sand, fine to coarse grained; lesser to minor silt, minor clay, in discrete strike aligned units. Commonly 1 to 2 m thick over compacted, in part consolidated bedrock. Continuous to granule to boulder size angular to round lag veneer. Rare to minor cemented outcrop and blocky rubble. See also rock formation-lithology superscript.	Chiefly gently and moderately inclined slopes. Minor steep and cliffed segments associated with a succession of minor and (rarely) major scarps, and incised drainage courses. Local relief 20-60 m. Isachsen Formation (Ki) particularly subject to differential erosion of inclined beds.	River and major stream spacing ca. 1 km. Well drained; minor poorly drained fine grained beds. No lakes or ponds. Extended snowmelt and seepage under cliffed slope facies and incised river banks.	Dominantly fluvial: rilling; minor gullyng, sheetwash, lateral stream erosion. Disaggregation by frost shattering. Mass movement minor. Eolian processes locally significant: sand ripples, etching of consolidated rock. Frost fissures possibly widespread, but have poor surface expression.	50-80 cm.	Visible ice 0-25% in 10-50 cm below frost table, rare at greater depths. Frost fissures commonly have primary mineral filling.	Channel zones straight to slightly sinuous, wide. Bedload sand, minor gravel. Flow only in larger rivers after snowmelt. Banks gently inclined to cliffed, minor lateral erosion, slumping.	None.	Low	a	2	2/1
3	f R: Kc	Fine grained rock and weathered rock.	Variable clay to clayey silt, 0.5 to 1 m thick over poorly lithified shale. Very minor outcrop of thin sandstone and mudstone beds; mudstone concretions to 5 m diameter. 0-75% cover of lag sandstone-mudstone fragments. Bedrock structure visible on air photos. pH 5-7; liquid limit 42-56; plasticity index 14-26.	Slopes gentle and moderate; very minor steep or cliffed segments. Rounded terrain, commonly with broad strike aligned ridges. Local relief 30-100 m. Streams depressed to 5 m but not generally incised. Main drainage courses incised where unit adjoins coastal plain.	River and main stream spacing <1 km. Divides moderately well drained in dry year, poor in wet year; slopes poorly drained. No lakes or ponds. Extended seepage period where snowbanks under steep slope segments. Desiccation: When rainfall above average, active layer may remain saturated or moist until freeze-ups in normal or dry years, active layer dries downwards with a desiccated crust overlying a saturated layer.	Fluvial action and rapid mass movement, minor disaggregation by frost shattering. Fluvial action: rilling, headward erosion of rills and runs, minor gullyng. Mass movement: earthflows on slopes at all inclinations in wet year, though not as common as in unit 9. Frost fissure troughs in rectilinear pattern 1-2 m wide, 10-20 cm deep on silty materials.	30-55 cm.	Visible ice 10-90% in 2 m below frost table. Ice strata 0.1-5 cm thick. Low or no visible ice at greater depths. Frost fissures ice filled; other massive ice not observed.	Channels straight to slightly sinuous. Bedload silt; minor clay and mudstone and sandstone fragments. Banks of low order streams gentle to moderate, locally steep or cliffed particularly near the coastal plain. Earthflow common on lesser slopes; cliffed slopes generally of shale and more stable.	None.	High	abc	2	3/2

* UNIT

Discontinuity in sequence where units present on other islands not present here.

** TOPOGRAPHY

Slope inclination: degrees	description
0-1	level
1-3	gentle
3-15	moderate
15-35	steep
>35	cliffed

*** SENSITIVITY AND TRAFFICABILITY, TENTATIVE RATINGS

Three periods of the year are recognized in the ratings.

Winter: Temperature of surficial materials is below freezing-point.

Snow may be blown clear of large areas.

Snowmelt: Period of snow ablation by melting, with air temperatures consistently above freezing-point. Generally between late June and

mid-July for this region, but variable areally and by altitude, and may only extend over 1-2 weeks at any one location. Can extend

through the summer below perennial snowbanks. The active layer is

shallow, with a high moisture content, often supersaturated. Even

gravels may be near a fluid state, and most mass movement takes place

in this period.

Summer: From the end of snowmelt to the onset of the winter freeze-up

in late August. Generally a period of evaporation from the active layer,

especially from the upper 5 cm in unvegetated areas, and desiccation of

fine grained materials. Precipitation mainly rain; usually light or

of short duration, on rare occasions heavy (ca. 5 mm in a 24-hour

period).

SENSITIVITY

This is considered to be the susceptibility of an area to disturbance,

where disturbance is a man-initiated change in surface characteristics.

Disturbance may be caused by direct action of man, or occur subsequent

to such action as a result of a change in the equilibrium of natural

processes. In the latter case, most physical changes of the surface

take place during the summer, even if the initiating activity occurred

in winter. Original surface conditions may be naturally restored though

it is more likely that changes will be permanent.

MAGNITUDE - the probability of disturbance occurring, and the degree to

which it occurs.

LOW: possibly medium, locally high during snowmelt or prolonged rainfall.

No disturbance or minor at other times.

MEDIUM: probably high during snowmelt or prolonged rainfall. Disturbance

of part or all of the area of activity, but processes not expected to

expand disturbance beyond this area.

HIGH: disturbance of all or substantial part of area of activity, and

processes likely to expand disturbance beyond this area. Expected to

hinder continued activities.

FORM - the probable form of disturbance.

A. Disruption of surface drainage, especially by:

(i) Concentration, leading to erosion (e.g. culverting only a small

percentage of the rills or gullies which cross a road route).

(ii) Ponding, leading to a) overflow and erosion;

b) thermal erosion under and adjacent to standing

water;

B. Thermal erosion: initiation or acceleration of ground ice thaw,

especially critical over ice wedges. Caused by stripping vegetation,

excavation, ponding water.

C. Slope failure: instability potential after excavating or loading.

Includes areas where mass movement processes are very active.

Lower case letters indicate only part of the unit affected: e.g., slope

failure on stream banks, thermal erosion of ice wedges which cover only

part of the unit.

TRAFFICABILITY

Assessment of terrain in terms of performance of Arctic tracked vehicles.

Roughness or grade.

1. Easily traversable in all directions.

2. Traversable, but with difficulty locally or in some directions.

3. Difficult or impossible.

Traction - includes assessment of ability of surface to bear the vehicle.

First value for snowmelt for heavy rain periods / Second value for summer.

Traction is not normally a problem in winter.

1. Easily traversable.

2. Traversable, with slight or local difficulty.

3. Difficult.