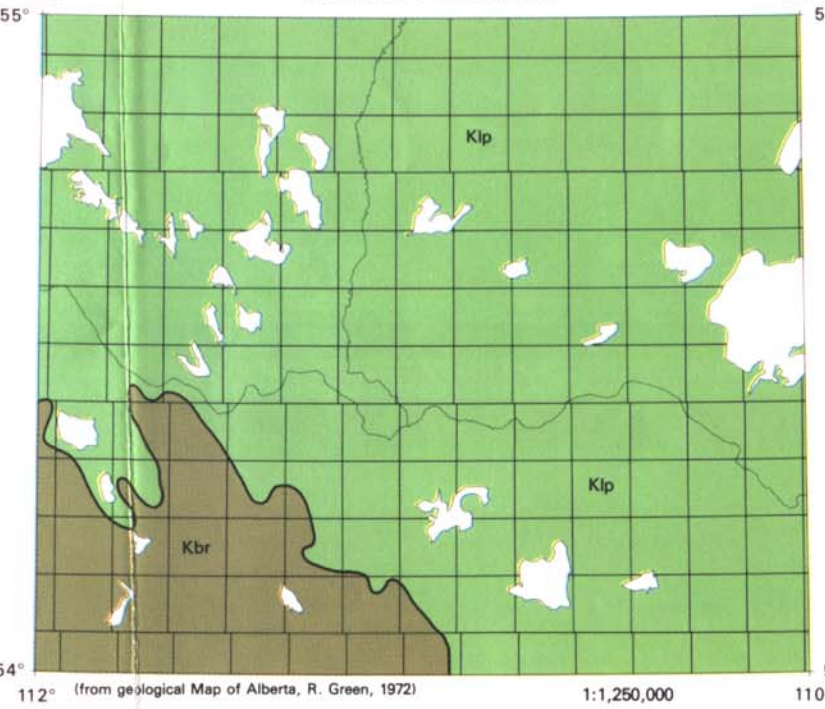


**BEDROCK GEOLOGY**



**LEGEND**

**BELLY RIVER FORMATION:** grey to greenish gray, thick bedded, siliceous sandstone, grey clayey siltstone, grey and green mudstone, concretionary sandstone, calcareous sandstone, calcareous shale, calcareous siltstone.

**LEA PARK FORMATION:** dark grey shale, pale grey, siliceous, silty shale with tonstone concretions, marine.

**EXPLANATION OF MAP SYMBOLS**

River or stream: blue line with wavy dashes

Intermittent river or stream: blue dashed line

Intermittent lake: blue dashed outline

Road, hard surface, all weather: black line with cross-hatches

Railway: black line with cross-ticks

Township boundary: red dashed line

Section line: red solid line

Unit boundary, definite, approximate, assumed: black solid, dashed, or dotted line

Mudstone channel: large, small, margin poorly defined: black solid, dashed, or dotted line

Buried valley: black solid line

Lineament, any linear feature visible on air photographs, in moraine terrain features usually perpendicular to the local glacial flow direction; symbol may represent more than one feature, location may be approximate

Glauciously stratified feature, flow, direction or discharge; arrow indicates glacial flow direction; symbol may represent one or more features; location is approximate

Lateral boundary of quarry-depression excavated by glacial fluting; arrow indicates direction of transport of excavated sediment

Dune: black solid line

**Surficial Geology Sand River Area, Alberta**

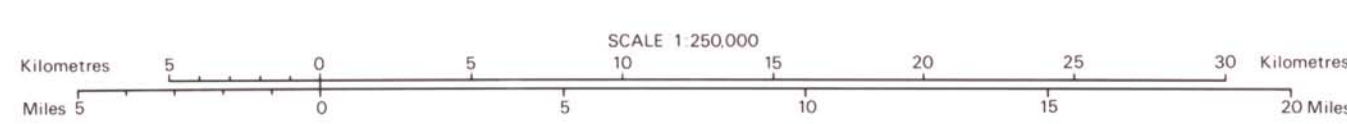
NTS 73L

M.M. Fenton and L.D. Andriashuk

Published 1983  
Geological folio conducted in 1976-1977.  
Any revisions or additional geological information would be welcomed by the Alberta Research Council.

Base maps provided by the Survey and Mapping Branch, Department of Energy, Mines and Resources, Ottawa.  
Cartography by Alberta Research Council, Graphic Services, C.G. Neugebauer.

**ALBERTA RESEARCH COUNCIL**  
Natural Resources Division  
Alberta Geological Survey

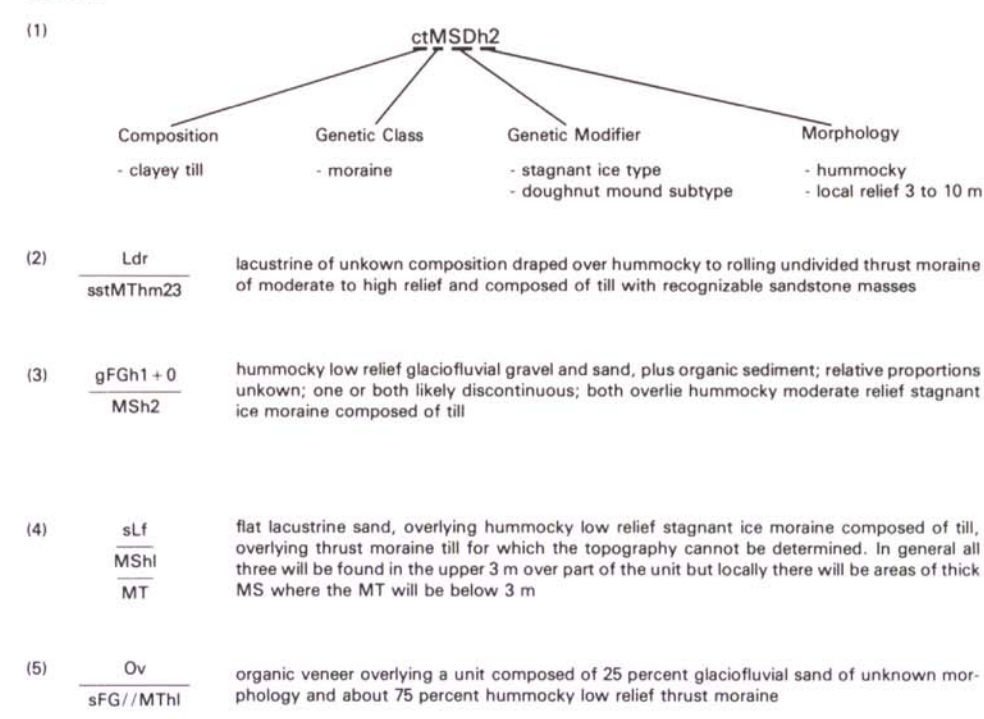


**UNIT NOTATION**

Composition	Genetic Class	Genetic Modifier	Morphology and Relief
a - sand, silt and clay	O - Organic	CE - eroded slope	d - discontinuous; unit absent in some places
b - sand and silt	C - Colluvium	CS - slumped colluvium	dr - drapage; unit more than 2 m thick but does not completely mask underlying topography
c - clay	F - Fluvial	D - dissected	f - flat; local relief less than 1 m
e - fine grained silt and clay	E - Eolian	S - irregular	h - hummocky; assemblage of hills and hollows; approximately equidimensional
g - gravel and sand	L - Lacustrine	T - straight	k - knobbed; one or more isolated hills on a generally level surface
h - silt	M - Moraine	G - glacial	m - rolling; alternating concave and convex morphologic elements with a length to width ratio of more than 2; elements parallel to nonstratified
i - sand	N - transverse	W - washboard	n - rolling; alternating concave and convex morphologic elements with a length to width ratio of more than 2; elements parallel to nonstratified
l - till	B - Bedrock	Δ - delta	p - pitted; a relatively flat area having prominent depressions or pits
u - undivided; one or more of shale, siltstone and/or sandstone			r - ridged; one or more convex, parallel to sub-parallel, morphologic elements with a length to width ratio of more than 2; may rest on a level surface or have associated hollows
sh - shale			s - terrace
st - sandstone			v - veneer; less than 2 m thick
m - mixed; three or more of the above components			1 - low local relief, less than 3 m
			2 - moderate local relief, 3 m to 10 m
			3 - high local relief, more than 10 m

**EXPLANATION OF UNIT NOTATION**  
A combination of letters and numbers is used to designate each map unit, for example cMSD2. Where present the lower case letters preceding the capitals indicate the composition of the unit. The first upper case letter which is always present indicates the genetic class. The following upper case letters indicate the genetic modifier and provide additional information about the genetic unit. The lower case letters following the upper case letters indicate the morphology, the type and amount of local relief.  
The absence of the compositional, genetic and/or morphologic modifier for a particular unit indicates the data is insufficient to determine that information.  
The map units generally show the sediment to be expected in the upper 3 m. An asterisk in an area where one moraine type overlies another; the upper moraine may be up to 2 m thick.

**Examples**



**UNIT PROPORTION**

O/F	unit composed of approximately 75 percent organic sediment and 25 percent fluvial sediment
O	approximately 50 percent organic and 50 percent fluvial sediment
F	approximately 25 percent organic and 75 percent fluvial sediment
O + F	organic and fluvial sediment present but their relative proportions not estimated; one or both units may be discontinuous

UNIT SYMBOL	UNIT NAME	DESCRIPTION AND GENESIS	GENERAL MORPHOLOGY AND RELIEF	GENERAL THICKNESS	COMMENTS
<b>HOLOCENE RECENT</b>	<b>ORGANIC DEPOSITS</b>				
O	Undivided organic deposits	loess, peat, swamp and marsh deposits; usually to focus to mucky peat, commonly includes one or more layers of sand, silt, clay or silt in the lower part	flat, local relief < 1 m	> 2 m	unfavorable for construction; high susceptibility to subsidence, with water table at or near surface
	Thin or discontinuous organic deposits	thin or discontinuous cover of organic sediment	flat or reflects underlying topography	variable; thin < 3 m	
<b>COLLUVIAL DEPOSITS</b>					
C	Undivided colluvial deposits	massive to moderately well stratified, non-sorted to poorly sorted, clay to loesslike sediments that have been transported by direct gravity induced movements confined to the sides and floors of valleys	variable; moderately to rolling to flat; relief generally low but locally high	variable	sediment may locally be undergoing creep or may be prone to failure
CE	Eroded slope	valley side that has undergone erosion, usually by creep; having a composite thin to discontinuous cover of alluvium	generally low relief hummocks or flat	variable; thickest near base of slope 1.2 m and thinnest near top 1-2 m	sediment may locally be undergoing creep or may be prone to failure
CS	Slump deposits	colluvium deposited by slumping with visible slump scar	rolling to locally hummocky, low to moderate relief	generally > 2 m	sediment may locally be undergoing creep or may be prone to failure
<b>EOLIAN DEPOSITS</b>					
E	Undivided eolian deposits	wind deposited sediment; medium to fine grained sand; well sorted; generally massive; local cross bedding or ripple orientations	flat to hummocky; low to moderate relief	> 2 m	generally a good source of clean, well sorted fine to medium grained sand
	Thin or discontinuous eolian sediment	thin or discontinuous cover of eolian sediment	flat to hummocky or reflects underlying topography	variable; thin < 3 m	
<b>FLUVIAL DEPOSITS</b>					
F	Undivided Recent fluvial deposits	sand, silt, and minor clay, gravel, and organic sediment; deposited by a modern stream, commonly moderately to well stratified and sorted	generally flat to rolling, locally hummocky; low relief	variable	generally poor source of aggregate because of clay and organic content; limited areal extent
F.D	Delta	sediment deposited at the mouth of a modern stream; sand, silt, and minor clay, gravel and organic sediment	flat to rolling low relief	> 2 m	sediment may locally be undergoing creep or may be prone to failure
FE	Undivided fluvial and eolian deposits	both types of sediment present but cannot be separated at the map scale; generally well sorted and stratified	hummocky to relief to flat	> 2 m	
FL	Undivided fluvial and lacustrine deposits	both types of sediment present but inseparable at the map scale; generally sand, silt and minor clay	flat to rolling low relief	> 2 m	
FU	Undivided fluvial deposits	Recent and Pleistocene deposits inseparable at the map scale; generally sand and silt, with minor gravel, clay and organic material	variable; flat to hummocky to rolling; relief generally low to flat	> 2 m	poor to good source of aggregate depending on the proportion of silt, clay and organic material
<b>LACUSTRINE DEPOSITS</b>					
L	Undivided Recent lacustrine deposits	sediment deposited in and adjacent to lakes; off-shore sand, silt, and minor clay and organic material; near-shore or on-shore sand and minor gravel; at sediment generally well stratified and well sorted; includes beach deposits (unit Ld1)	flat to rolling low relief	> 2 m	generally thin and of limited areal extent
LU	Undivided lacustrine deposits	Recent and Pleistocene deposits inseparable at the map scale; generally fine sand to silt	flat to rolling low relief	> 2 m	
	Thin lacustrine sediment	thin cover of lacustrine sediment; sand and silt with minor local clay or gravel	flat to rolling low relief or reflects underlying topography	generally < 2 m	
<b>PLEISTOCENE</b>					
<b>GLACIOFLUVIAL DEPOSITS</b>					
FG	Undivided glaciofluvial deposits	fluvial sediment deposited by glacial meltwater; predominantly sand and gravel; stratified to massive, generally moderately to well sorted	variable; flat to hummocky to rolling to steepland; relief generally low but locally moderate	> 3 m	good aggregate source if sediment is well drained, and clay or organic material is absent
FOA	Glaciofluvial delta	sediment deposited where meltwater enters a lake; composition similar to above "FG"	variable; flat to hummocky to rolling to steepland; relief generally low but locally moderate	> 3 m	
FOIC	Ice contact deposit	sediment deposited in contact with glacial ice; composition similar to above "FG"; locally sediment may be folded or faulted	generally hummocky to rolling, low relief	> 2 m	potential aggregate source but may contain masses of clay or silt
FLG	Undivided glaciofluvial and glacio-lacustrine complex	one or both types of deposits are present but either cannot be distinguished or cannot be separated at the map scale; generally sand and silt with minor clay and/or gravel; stratified to massive, well sorted	generally flat to rolling, low relief	> 2 m	generally poor aggregate source; includes only a small amount of gravel and may include silt and clay
FOS	Stagnant glaciofluvial deposits	glaciofluvial sediment with irregular topography typical of deposition on stagnant ice; sand with minor local gravel or silt; local sediment shows evidence of collapse, such as slump, folding or faulting	hummocky, low to moderate relief	> 2 m	
	Thin or discontinuous glaciofluvial sediment	thin or discontinuous cover of glaciofluvial sediment; generally sand with local minor gravel	flat to hummocky, low relief, or reflects underlying topography	thin < 3 m, discontinuous to > 3 m	
<b>GLACIO-LACUSTRINE DEPOSITS</b>					
LG	Undivided glacio-lacustrine deposits	sediment deposited in glacial meltwater lakes; off-shore sand, silt, and minor clay and gravel; generally well stratified and sorted	flat to hummocky, low relief	> 2 m	
LGS	Stagnant glacio-lacustrine deposits	glacio-lacustrine sediment with irregular topography typical of deposition on stagnant ice; generally silt with minor sand and clay	hummocky, low to moderate relief	> 2 m	
	Thin glacio-lacustrine sediment	thin cover of glacio-lacustrine sediment; generally sand or silt	flat to hummocky, low relief or reflects underlying topography	thin < 3 m	
<b>GLACIAL DEPOSITS</b>					
	Mezasa (M)	terran consisting of unstratified, unsorted sediment transported and deposited by glacial meltwater; includes silt, clay and minor pebbles, cobbles and boulders; locally may be composed predominantly of silt and clay; includes, sandstone or stratified drift, or include discontinuous layers of stratified sediment - generally sand	hummocky to rolling, low to high relief	> 3 m	generally well graded sediment, suitable for road construction and for use as fill or as a fill in the center of the map area is the most suitable
MO	Dissected moraine	terran dissected by many closely spaced shallow channels, meanders and non-rectilinear crevasses that are separated at the map scale; fill with local minor sand and/or gravel	hummocky, low to moderate relief	> 3 m	
MOU	Dissected moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to moderate relief	> 3 m	
ME	Eroded moraine	terran in which the moraine is eroded to a relatively low relief with none of the original surface remaining; fill with local sand and gravel	hummocky to rolling, low relief, and terraces along Beaver River	> 3 m	
MEF	Eroded moraine and fluted moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	rolling to ridged, low to moderate relief	> 2 m	
MEU	Eroded moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky to rolling, low to moderate relief	> 2 m	
MF	Fluted moraine	at glacially streamlined terrain; ridges from alternating furrows and ridges to more moderate rounded ridges; fill with local sand and gravel; parallel to the local glacial flow direction; includes flutes, channels and terraces; fill with local sand and gravel	rolling to ridged, low to moderate relief	> 3 m	
MFU	Fluted moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	rolling to hummocky, low to moderate relief	> 3 m	
MN	Transverse moraine	parallel to subparallel ridges or hills which are perpendicular to the local glacial flow direction	ridged to rolling, to hummocky, moderate to high relief	> 3 m	
MNU	Transverse moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky to rolling, low to moderate relief	> 3 m	
MS	Stagnant ice moraine, undivided moraine complex	terran resulting from the collapse and lateral movement of a stagnant ice mass; contains either no distinctive features to indicate its origin, or consists of more than one type of stagnant moraine inseparable at the map scale; sediment is mainly fill but locally includes sand, silt, clay or gravel of glaciofluvial or glacio-lacustrine origin	hummocky, low to high relief	variable; generally > 3 m	some hummocks may contain sand and gravel and provide small local sources of moderate to poor quality aggregate
MSC	Crevasse fillings	stagnant ice moraine consisting mainly of subparallel to intersecting ridges believed to have been formed by the filling of crevasses with glacial debris; sediment is fill or fill and stratified sediment	rolling, low to moderate relief	> 2 m	sediment is mainly silt making it a poor prospect for aggregate
MSD	Doughnut moraine	stagnant ice moraine consisting of circular hummocks with a central depression	hummocky, low to moderate relief	variable; generally > 3 m	some hummocks may contain sand and gravel and provide small local sources of moderate to poor quality aggregate
MSI	Irregular moraine	stagnant ice moraine consisting of irregular hummocks	hummocky, low to high relief	variable; generally > 3 m	some hummocks may contain sand and gravel and provide small local sources of moderate to poor quality aggregate
MSCD	Crevasse filling and doughnut moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to moderate relief	variable; generally > 3 m	some hummocks may contain sand and gravel and provide small local sources of moderate to poor quality aggregate
MSCD	Crevasse filling and irregular moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to high relief	variable; generally > 2 m	
MSDI	Doughnut moraine and irregular moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to high relief	variable; generally > 3 m	
MSDU	Doughnut moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to high relief	variable; generally > 3 m	
MNF	Fluted moraine and transverse moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky to rolling, low to moderate relief	variable; generally > 3 m	
MNFU	Fluted moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky to rolling, low to moderate relief	variable; generally > 3 m	
MT	Thrust moraine	masses of originally subglacial sediment incorporated, transported and deposited by glacial meltwater or less direct processes may include irregular fill and masses of pre-existing till, stratified drift and/or bedrock	rolling to hummocky, moderate to high relief	variable; > 3 m	incorporated material results in abrupt lateral and vertical differences in sediment type; shear planes produced by including resistant planes of weak mass in the sediment
MTF	Fluted thrust moraine	thrust moraine which was subsequently partially fluted, being during the same glacial advance	rolling to ridged, moderate to high relief	variable; > 3 m	
MTI	Thrust moraine and eroded moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to high relief	variable; > 3 m	
MTN	Thrust moraine and transverse moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	rolling to hummocky, moderate to high relief	variable; > 3 m	
MTU	Thrust moraine and undivided moraine complex	two components inseparable due to similar appearance, or in individual areas of each component too small to map separately	hummocky, low to moderate relief	variable; > 3 m	
MU	Undivided moraine	moraine lacking distinctive features required to place it in any of the above subdivisions, or in a few areas includes three or more of the above subdivisions; inseparable at the map scale; with minor local sand, silt, clay or gravel	hummocky to rolling, moderate relief, flat to high	> 2 m	
MUF	Fluted undivided moraine	undivided moraine with local poorly developed flutes	hummocky to rolling, flat to low relief	> 2 m	
	Washboard moraine	low relief, parallel to subparallel ridges of hummocks; ridges are generally perpendicular to the local glacial flow direction; composed of fill with local minor sand, silt, clay or gravel	rolling, low relief	> 3 m	
	Thin or discontinuous moraine	thin or discontinuous distribution of the moraine type indicated by the descriptive modifier	hummocky, low relief or reflects underlying topography	thin < 3 m, discontinuous to > 3 m	