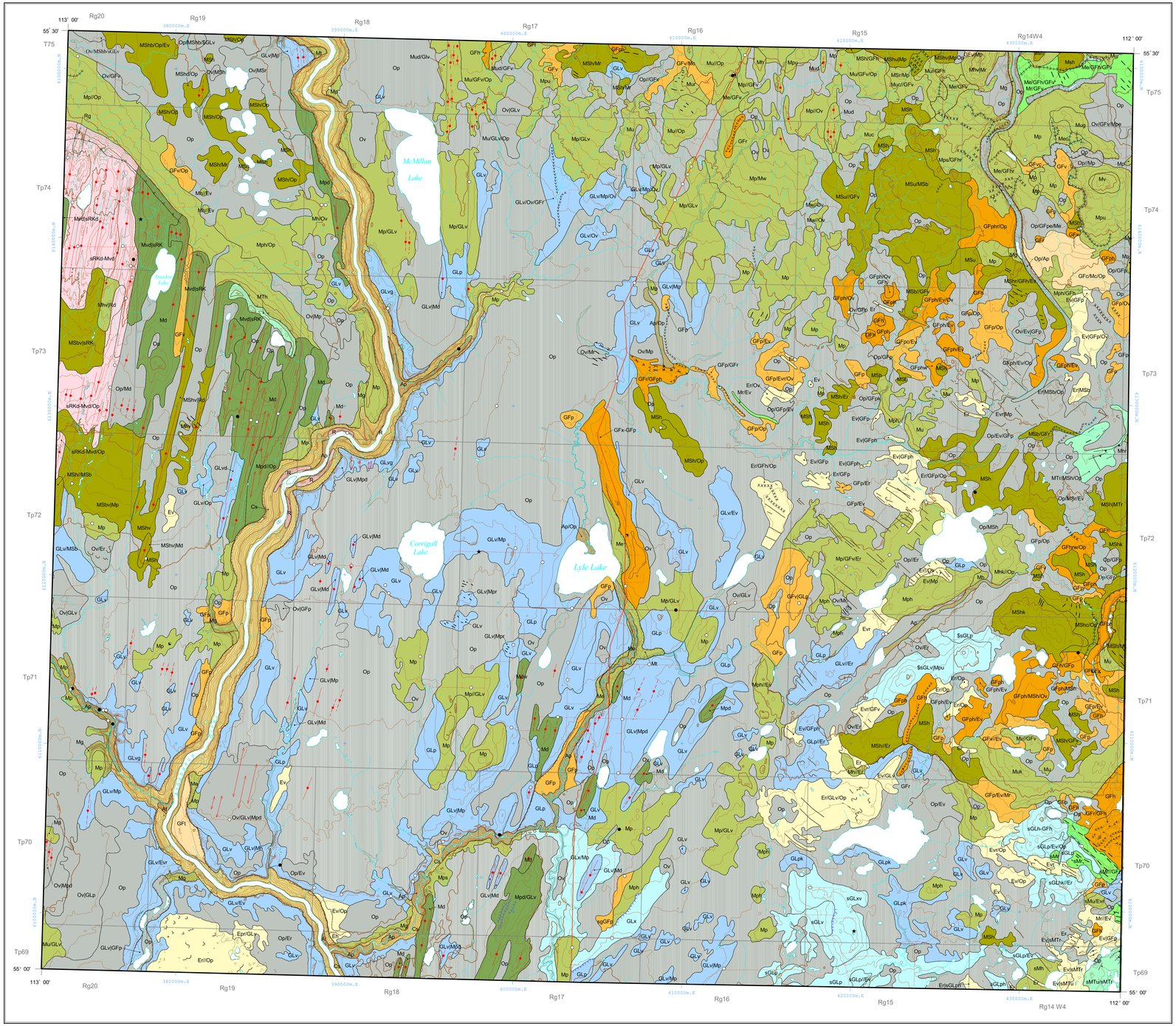
NTS 83P/SE
SURFICIAL GEOLOGY



UNIT SYMBOL / UNIT NAME / DESCRIPTION AND GENESIS

QUATERNARY

HOLOCENE

O — **ORGANIC DEPOSITS:** Undifferentiated bog, fen, swamp and marsh deposits; woody to fibrous to mucky peat; commonly underlain by fine glacial lake deposits.
- **Ol** patterned fen, string bogs
- **Oh** palsas
- **Opk** organic terrain with thermokarst features

C — **COLLUVIAL DEPOSITS:** Massive to stratified silty to clayey diamicton and bedrock slabs; slope and slump deposits formed by gravity-induced movement; confined to valley slopes and floors.
- **Cf** talus cone; debris flow
- **Ct** solifluction lines
- **Cs** landslide blocks, slumps

E — **EOLIAN DEPOSITS:** Wind-deposited sediments; well-sorted medium- to fine-grained sand, and minor silt (loess); generally massive to locally cross-bedded or ripple laminations; includes both active and vegetated deposits
- **Eh** blowout and remnant sand dune ridges
- **Er** longitudinal and parabolic dunes

A — **ALLUVIAL DEPOSITS:** Sand, silt, clay, gravel and organic sediments deposited by modern streams; commonly well sorted and stratified.
- **Af** alluvial fan

L — **LACUSTRINE DEPOSITS:** Sediments deposited in and adjacent to recent lakes; offshore sand, silt and clay, and minor organic deposits; littoral (nearshore) sand and silt, and minor gravel.
- **Lr** modern beach deposits and lake ice push ridges

PLEISTOCENE

GL — **GLACIOLACUSTRINE DEPOSITS:** Sediments deposited in glacial lakes; massive to stratified clay, silt, sand, and minor gravel; thickness varies from <1 to >5 m; lake sediments may form a discontinuous cover; sediments reworked by wave action of glacial lake or carried into the lake basin mainly by glacial meltwater and deposited offshore in deep water; predominantly silts and clays; commonly flat to gently rolling plain.
- **GLh** glaciolacustrine sediments with irregular hummocky topography resulting from deposition in ponded water on stagnant ice (supraglacial); generally silt with minor sand, clay and diamicton; moderate relief
- **GLb** circular hummocks with a central depression, plateau mounds and/or irregular chaotic ridges composed of supraglacial lake silts and clays; low to moderate relief

Offshore (distal): Fine-grained sediments, predominantly clay and silt, minor sand and diamicton, deposited in a deep water environment (i.e., GLv, GLp). May include ice rafted dropstones and diamicton inclusions.

Nearshore and littoral: Sand, silty sand and gravel, moderately well sorted and commonly horizontally bedded; occurs as a blanket of sand grading basinward into finer sediments, or as foreset deltaic deposits (GLx), or as isolated or series of ridges including beaches, bars and spits. Sandy or gravelly nearshore and littoral lake sediments are prefixed with a textural modifier (i.e., sGLp, sGLx)
- **GLr** strandlines, raised beaches; sand and minor gravel ridges marking paleoshorelines of glacial lakes; commonly < 1 m to 3 m in height, includes cobble beaches

GF — **GLACIOFLUVIAL DEPOSITS:** Stratified gravel and sand, minor silt, clay deposited by glacial meltwater in contact with or near the glacier (colour indicates undifferentiated glaciofluvial sediments).

Distal (proglacial): Predominantly well-sorted sand with minor gravel and silt; deposited subaerially in front of the ice (outwash) or within meltwater channels in front of or beneath the glacier (i.e., GFp, GFv); flat to gently undulating plain that may be marked by channel scars and kettle holes (K).

Proximal (ice-contact): coarse grained sediments (predominantly gravel and sand, locally till) deposited in contact with the ice; irregular undulating to hummocky (kame and kettle) topography, may also have associated ice crevasse ridges and eskers; moderately to poorly sorted; stratified to massive; may exhibit features related to slumping and faulting
- **GFr** eskers and esker systems
- **GFh** stagnant ice hummocky stratified deposits
- **GFhr** crevasse ridges composed of stratified drift; appear very similar to small-scale eskers
- **GFd** previously deposited sands and gravels overridden and remolded into streamline features by glacial ice; landforms oriented parallel to ice flow
- **GFx** ice-contact delta; silt, sand, gravel and diamicton deposited in contact with the ice by outflow of meltwater at the ice margin into a glacial lake

M — **GLACIAL DEPOSITS/MORAINE:** Unsorted to poorly sorted diamictons deposited as till (a mixture of clay, silt, sand, minor pebbles, cobbles and boulders) at the ice margin or beneath a glacier; locally may include blocks of shale, siltstone, sandstone, or pre-existing stratified drift and till. Moraine may also include beds of glaciolacustrine and/or glaciofluvial sediments. The regional till is predominantly clay rich; locally the texture of the till may vary depending on the local source material. Thickness may exceed 150 m in buried valleys.

Md, Mpd, Mvd — drumlin, drumlinoid and/fluted terrain composed of ground moraine

Mr — DeGeer, Rogen, ribbed moraines; undivided morainal ridges including end moraine

MS — **Stagnant ice moraine:** Terrain resulting from the collapse and lateral movement of englacial and supraglacial sediment in response to melting of buried stagnant ice at the ice margin; sediment is mainly till but locally includes stratified sediments of glaciolacustrine or glaciofluvial origin. Characterized by low- to high-relief hummocky topography.
- **MShr** commonly end and recessional moraines
- **MSr** crevasse fillings; subparallel to intersecting ridges believed to have formed under stagnant ice conditions by infilling of ice crevasses with glacial debris by either squeezing up from the base of the ice or flowing/slumping into open crevasses; till and stratified sediments; > 2 m high, low to moderate relief

MT — **Ice-thrust moraine:** Terrain resulting from glaciotectonic transport of originally subglacial sediment and deposited by the glacier more or less intact; deposits may include syngenetic till as well as masses of pre-existing till, stratified drift, and/or bedrock; topography generally moderate to high relief
- **MTh** 'rubble' moraine, 'hill-hole pairs'; high to moderate relief
- **MTr** glaciotectonic moraine ridges; moderate to high relief

PRE-QUATERNARY

R — **BEDROCK:** Undivided; may include crystalline (Shield), carbonates, clastic sediments and/or coal.
- **Rd, sRKd** fluted or drumlinized bedrock; undetermined if bedrock has been glacially eroded, transported, or deformed in situ
- **Rw** felsenmeer (frost-shattered bedrock)

gRT — **Tertiary gravels:** predominantly quartzite and chert gravel and cobbles; preglacial age.

RK — **Cretaceous:** Sandstone (s), siltstone ($) and shale (c), minor coal; bedrock often glacially deformed with the bedding folded and faulted

NOTE: Where necessary, genetic specific geomorphic landform notations are given under unit description.

GEOMORPHIC MODIFIER

m	**ridges and rings**	circular hummocks with a central depression (doughnut ridges), plateau mounds and brain pattern ridges, low to moderate relief
c	**channelled**	channelled or dissected by former streams of glacial meltwater
d	**drumlinoid**	glacial streamline longitudinal elements parallel to ice flow: drumlins, ispatinows, flutings, crag and tail, Roche Moutonee
e	**eroded**	planar surface eroded by glacial meltwater, often capped by a boulder lag deposit and/or thin deposit of sand and gravel
f	**fan**	gently sloping fan-shaped mass of detrital debris
g	**gullied**	slopes dissected by modern ravines created by intermittent runoff
h	**hummocky**	assemblage of approximately equi-dimensional hills and hollows; moderate to high relief (commonly greater than 2 m)
k	**collapse**	depressions: kettles, pitted outwash, thermokarst depressions, karst sinkholes
l	**linear structures or features**	solifluction lines, meander scars, bedrock lineaments, patterned fen
r	**ridged**	one or more parallel or subparallel, convex, linear morphological elements with a width-to-length ratio greater than 2 m; low to high relief
p	**plain**	deposit greater than 2 m thick; commonly masks geomorphic pattern of underlying deposits; flat to gently rolling topography (commonly less than 2 m relief)
s	**slumped**	landslide blocks, slope failure debris
t	**terrace**	terrace bench cut by either meltwater or wave action; antiplanation terrace, kame terrace
u	**undulating**	low-relief rolling terrain; swell and swale topography
v	**veneer**	thin deposit less than 2 m thick; may be discontinuous; commonly occurs as a drape revealing geomorphic pattern of underlying deposits
w	**winnowed**	sediments have been washed, winnowed and/or reworked by wave action; a boulder lag with associated sand and gravel may cap underlying sediments
x	**delta**	lake delta; ice-contact delta

UNIT NOTATION

Example: GLACIOLACUSTRINE plain

Textural Modifier
Textural characteristics may be applied to the terrain classification as a prefix based on field observations or by inference from distinctive genesis and/or morphology. When two modifiers are given, the second letter is the dominant texture, with the first letter indicating the secondary texture, i.e., sc for sandy clay
g = gravel
s = sand
$ = silt
c = clay

Complex
Where two or more classes of terrain are interspersed in a mosaic or repeating pattern on a scale too small to warrant meaningful differentiation, the proportion of each component in the combination is given in a two or three position designation set off by slashes denoting arbitrary percentage limits. For example,

- **'Mp/GLv'** means that the area is underlain by approximately 60% morainal plain and up to 40% glaciolacustrine veneer
- **'Mv/GLv/GFp'** means that at least 60% of the area is underlain by morainal veneer, with up to 40% glaciolacustrine veneer and less than 15% glaciofluvial plain.
- **'GLp/M'** means that more than 60% of the area is underlain by a glaciolacustrine plain, with less than 15% moraine

Stratigraphic Sequence
Where materials of different origin or texture are known to be superimposed or can be reasonably confidentially inferred, the sequence is indicated in conventional order using vertical separators. For example,

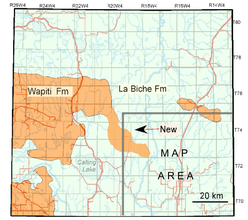
- **'Mhv|Md'** indicates thin hummocky moraine deposited on drumlinoid moraine

Transitional Association
Locally, two or more terrain units are juxtaposed by reason of related origin, temporal sequence, or ambiguous geomorphic distinction. In the case of the latter, both components may or may not be present. Such situations are identified by a compound designation marked by a hyphen. Examples are: 'GFx-GLx' indicating ice-contact delta indistinguishable from glaciolacustrine delta; 'GFh-MSh' indicating ice-contact kame and kettle topography that blends with hummocky stagnant ice moraine.

Morphologic Overprint
Where a sequence of geomorphic processes has produced a multi aspect or compound terrain fabric, the geomorphic modifier suffixes are appended in the inferred order of super position. 'Mvdc' means that a veneer of till has been moulded into a drumlinoid form and finally channelled by former meltwater streams. 'GFphr' means that a glaciofluvial plain has been discontinuously covered by ice-contact hummocks and ridges.

Generalized Bedrock Geology NTS 83P

(after Geological Map of Alberta Map 236D, 2001)



Wapiti Fm: grey, feldspathic, clayey sandstone; grey bentonitic mudstone and bentonite; scattered coal beds; nonmarine

La Biche Fm: dark grey shale and silty shale; ironstone partings and concretions; silty fish-scale bearing beds in lower part; marine

FEATURES LEGEND

Bedrock outcrop	×
Kettle hole/lake	
Thermokarst depression	
Drumlin, drumlinoid, ispatinow	
Drumlin, drumlinoid, ispatinow, weakly defined	
Flutings	
Flutings, weakly defined	
Esker ridge, direction known	> > > > >
Esker ridge, direction unknown	< > < >
Dunes; singular ridges	
Dunes; hummocky, blowouts, dune field, wind direction indicated	
Strandlines; raised beaches, terraces	
Meltwater channel, major	
Meltwater channel, minor	
Ice-walled channel, depression, buried valley	
Escarpment-ice contact, bedrock	
Ice thrust ridge	
Glacial thrust quarry depression boundary; direction of transport indicated.	
Ribbed, De Geer (washboard) or Rogen, moraine	
Major moraine ridge; end moraine, recessional moraine	
Minor moraine ridge undefined	
Crevasse filling	xxxxxx
Surface lineament; source unknown	

FIELD SITES LEGEND

Observation only	○
Observation + sample taken	●
Observation + diamond indicator sample	★
Borehole, auger	
Borehole, rotary	
Site/Borehole Name	JC00-041

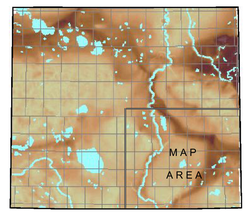
ROADS

Paved
Gravel
Unimproved
Truck-trail

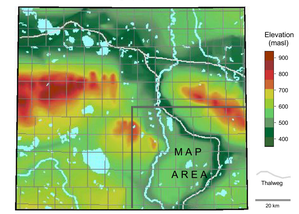
UTM, Zone 12 Grid 430000m.E
Contour intervals 10 metres

This is a common map legend. Not all units may be present on this map.

Drift Thickness of Pelican 83P



Bedrock Topography of Pelican 83P



Copies of this map may be obtained from:

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Website: www.ags.gov.ab.ca

Head Office Website: www.eub.gov.ab.ca

EUB Alberta Energy and Utilities Board | AGS Alberta Geological Survey

Map 242

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Surficial Geology of the Wandering River Area, Alberta (NTS 83P/SE)

Geology by: J.E. Campbell, M.M. Fenton and J.G. Pawlowicz, 2001.

Scale 1:100 000

2 0 2 4 6 8 10 Kilometres
1 0 1 2 3 4 5 6 Miles

Projection: Universal Transverse Mercator
Datum: North American Datum, 1983

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Digital base produced by the Resource Data Division, Alberta Environment, supplied by Spatial Data Warehouse Ltd.

References:

Scafe, D.W., Edwards, W.A.D., and Boisvert, D.R., 1989. Sand and gravel resources of the Wandering River Area, Alberta. Alberta Research Council Open File Report 91-01.

Scafe, D.W., Sharn, P.C., and Ray, C.M., 1987. Sand and gravel resources of the Pelican (west central portion of 83P) map area, Alberta. Alberta Research Council Open File Report 87-02.