

UNIT SYMBOL	UNIT NAME	DESCRIPTION AND GENESIS
<b>QUATERNARY</b>		
<b>Holocene</b>		
O	ORGANIC DEPOSITS: Undifferentiated bog, fen, swamp and marsh deposits; woody to fibrous to mucky peat; commonly underlain by fine glacial lake deposits.	
C	<b>COLLUVIAL DEPOSITS:</b> Massive to stratified silt to clayey diamicton and bedrock slabs; slope and slump deposits formed by gravity-induced movement; confined to valley slopes and floors.	
E	<b>EOLIAN DEPOSITS:</b> Wind deposited sediments; well-sorted medium- to fine-grained sand, and minor silt (loess); generally massive to locally cross-bedded or ripple laminations; include both active and vegetated deposits	
A	<b>ALLUVIAL DEPOSITS:</b> Sand, silt, clay, gravel and organic sediments deposited by modern streams; commonly well sorted and stratified.	
L	<b>LACUSTRINE DEPOSITS:</b> 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.	
<b>Pleistocene</b>		
GL	<b>GLACIOLACUSTRINE DEPOSITS:</b> 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 lakes 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	
GF	<b>GLACIOLUVIAL DEPOSITS:</b> Stratified gravel and sand, minor silt, clay deposited by glacial meltwater in contact with or near the glacier (colour indicates undifferentiated glacioluvial sediments).	
GLr	strandlines, raised beaches; sand and minor gravel ridges marking paleoshores of glacial lakes; commonly <1 m to 3 m in height, includes cobble beaches	
GLp	<b>DISTAL (PROGLACIAL):</b> 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., GFL, GFV); flat to gently undulating plain that may be marked by channel scars and kettle holes (K).	
GLp	<b>Proximal (ice-contact):</b> 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.	
GFh	eskers and esker systems	
GFhr	stagnant ice hummocky stratified deposits	
GFd	crevasse ridges composed of stratified drift; appear very similar to small-scale eskers	
GFx	previously deposited sands and gravels overlain and remoulded into streamine features by glacial ice; landforms oriented parallel to ice flow	
GFx	ice-contact deltas, silt, sand, gravel and diamicton deposited in contact with the ice by outflow of meltwater at the ice margin into a glacial lake	
M	<b>GLACIAL DEPOSITS/MORAINES:</b> 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 beds of shale, siltstone, sandstone, or pre-existing stratified drift and till. Moraine may also include beds of glaciolacustrine and/or glacioluvial 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/or filled terrain composed of ground moraine	
Mr	De Geer, Rogen, ribbed moraines; undivided morainal ridges including end moraine	
MS	<b>Stagnant ice terrain:</b> 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 glacioluvial origin. Characterized by low- to high-relief hummocky topography.	
MSr	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	<b>Ice-thrust moraine:</b> 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	
<b>PRE-QUATERNARY</b>		
R	<b>BEDROCK:</b> undivided; may include crystalline (Shield), carbonates, clastic sediments and/or coal.	
Rd, sRkD	fluted or drummized bedrock, undetermined if bedrock has been glacially eroded, transported, or deformed in situ	
Rw	felsenmeer (frost-shattered bedrock)	
gRT	<b>Tertiary gravels:</b> Predominantly quartzite and chert gravel and cobbles; proglacial age.	
	<b>Cretaceous:</b> Sandstone (s), siltstone (S) and shale (c); minor coal; bedrock often glacially deformed with the bedding folded and faulted	

FEATURES LEGEND	
Bedrock outcrop	x
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 undulating	—
Minor moraine ridge undulating	—
Crevasse filling	xxxxxx
Surface lineament; source unknown	—

FIELD SITES LEGEND		ROADS	
Observation only	○	Road - paved	—
Observation + sample taken	●	Road - gravel	—
Observation + diamond indicator sample	◆	Road - unimproved	—
Borehole, auger	⊕	Truck-trail	—
Borehole, rotary	⊗	UTM, Zone 12 Grid	+ 4300000.E
Site/Borehole Name	JC00-041	Contour intervals 10 metres	

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	channeled: 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 Moutonnée
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, sink kettles
l	linear structures or features: scarpment ridges, 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: landside blocks, slope failure debris
t	terrace: terrace bench cut by either meltwater or wave action; aniplanation terrace, kame terrace
u	undulating: low-relief rolling terrain; swell and swale topography
v	vener: 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

**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, \*Mv/60GLV means that the area is underlain by approximately 60% morainal plain and up to 40% glaciolacustrine veneer

\*Mv/60GLV means that at least 60% of the area is underlain by morainal veneer, with up to 40% glaciolacustrine veneer and less than 15% glaciolacustrine plain

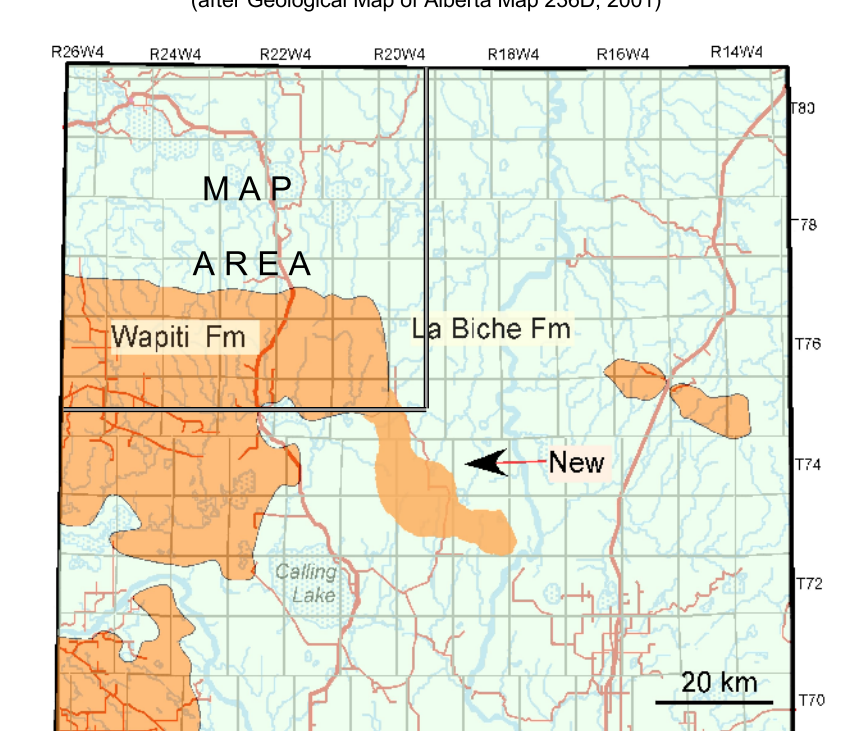
\*GLp/10M means that more than 60% of the area is underlain by a glaciolacustrine plain, with less than 15% moraine

**Stratigraphic Sequence**  
Where materials of different origin or texture are known to be superimposed or can be reasonably confidently inferred, the sequence is indicated in conventional order using vertical separators. For example, \*Mh/Mv indicates thin hummocky moraine deposited on drumlinoid moraine

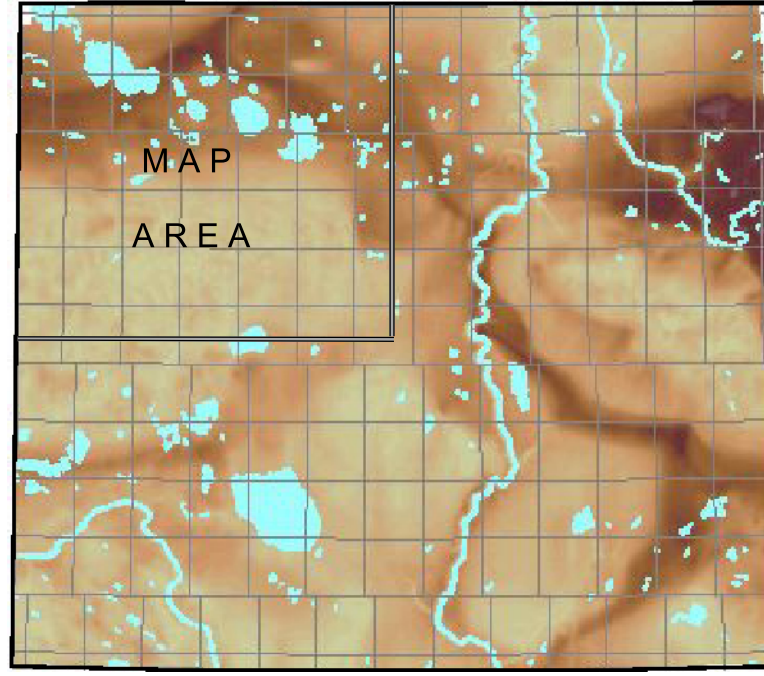
**Transitional Association**  
Locally, two or more terrain units are juxtaposed by reason of related origin, temporal sequence, or ambiguous geomorphic distinction. In the case of the latter, both components may or may not be present. Such situations are identified by a compound designation marked by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

**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. 'Mvd' means that a veneer of till has been moulded into a drumlinoid form and finally channelled by former meltwater streams. \*GFhr means that a glacioluvial plain has been discontinuously covered by ice-contact hummocks and ridges.

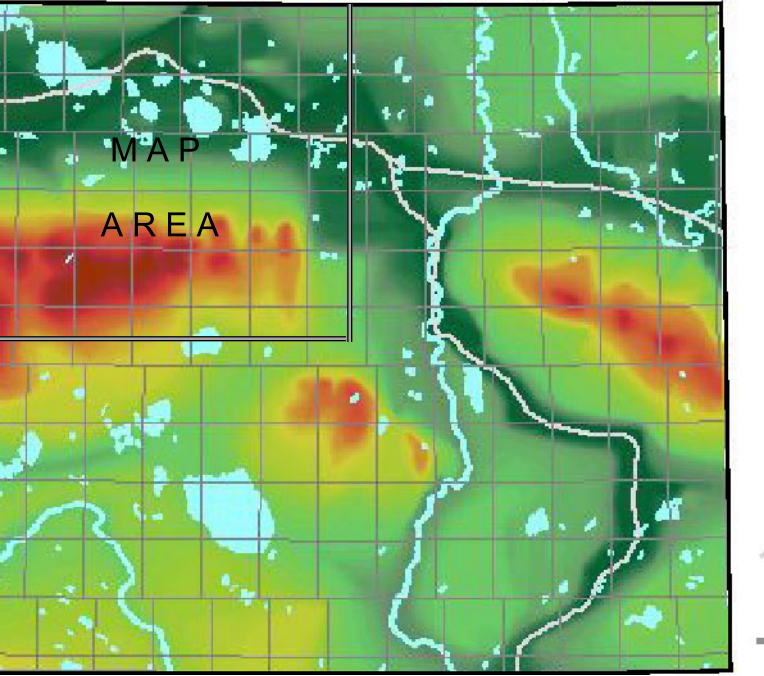
Generalized Bedrock Geology NTS 83P  
(after Geological Map of Alberta Map 236D, 2001)



Drift Thickness of Pelican 83P



Bedrock Topography of Pelican 83P



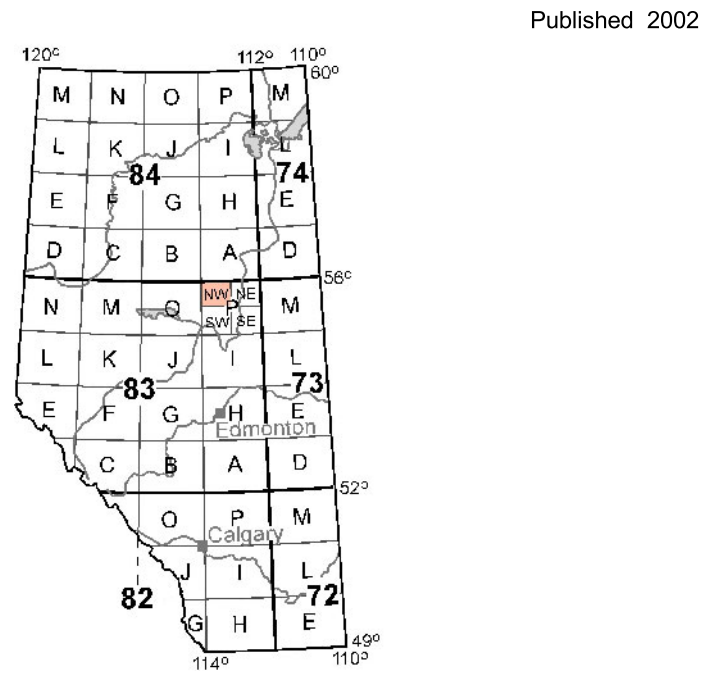
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Alberta Energy and Utilities Board | Alberta Geological Survey

Scale 1:100 000

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

Map 241  
**Surficial Geology of the Sandy Lake Area, Alberta (NTS 83P/NW)**  
Geology by: J.E. Campbell, M.M. Fenton and J.G. Pawlowicz, 2001.



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

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