



LEGEND for SURFICIAL GEOLOGY MOSAICS HAYES RIVER and KETTLE RAPIDS, MANITOBA (54C,D)



GEOLOGIC MAP UNIT	MATERIAL	LANDFORM		ASSUMED THICKNESS (range in feet)	ORGANIC COVER AND PERMAFROST	GENERAL COMMENTS	
		ORIGIN	TOPOGRAPHY				
(G,S,C) A f(c)	gravel, sand, silt and clay	alluvial floodplain	nearly flat or gently irregular surface in places marked by abandoned channels; local relief up to 5 feet	10 to 40	generally thin or absent; patchy bogs 2 to 6 feet thick with permafrost at 1 to 4 ft. depth occur in abandoned channels and other poorly drained areas; tree cover consists mostly of closed stands of Jack Pine and Aspen	good source of aggregate; textures are rather variable and deposits are commonly poorly sorted; surfaces are mostly well-drained	
(G,S,C) A t(c)		alluvial terrace					
GAa		alluvial delta		20 to 80		good source of coarse uniform textured aggregate; large gravel pit at Bird is within only deposit of this type mapped; material exposed in the pits is well-sorted, medium to fine gravel at least 20 feet thick	
GA v		alluvial veneer	reflects topography of thicker underlying material	0 to 10		generally poor source of aggregate; limited amounts of poorly sorted material may be recovered locally	
(S,C) Wp	sand, silt and clay	marine nearshore	nearly flat surfaces between beach ridges	10 to 20	bog and fen occur between beach ridges; where bog is more than 2 feet thick permafrost occurs at 1 to 4 ft. depth; tree cover is mostly scattered stands of Black Spruce, Jack Pine and Aspen	minor beaches, spits and bars occur between main beaches resulting in discontinuous organic cover between better drained patches	
SW a(t,c)		marine delta	nearly flat surfaces in places marked by abandoned channels some 5 to 10 ft. deep	20 to 100			the thickest and most continuous deposits occur along the Hayes River; thinner discontinuous deposits occur along the Nelson; deposition occurred in a series of deltas at the river mouths when sea level fell from the highest beach; sediments commonly are fossiliferous
(S,C) Wv		marine offshore	nearly flat surface; local relief of 2 to 8 ft. reflects mostly organic terrain	4 to 10			these deposits are mapped as complex units for they veneer extensive water eroded till plains; coarse lag deposits and/or lacustrine sediments less than 2 ft. thick commonly separate the marine veneer and till
(G,S) B(r,v)	gravel and sand	marine beaches, spits and bars	single ridge, series of ridges, and/or intervening low areas; local relief is 4 to 10 ft.	4 to 10	generally thin or absent; tree cover is mostly closed stands of Jack Pine and Aspen	continuous beach ridges are source of coarse aggregate and discontinuous short ridges or rises are source of fine aggregate	
(S,G) F(n,r)		proglacial outwash	broad rise or series of rises from 10 to 50 ft. above adjacent terrain	10 to 50	generally thin or absent; tree cover is mostly open to closed stands of Jack Pine and Aspen	good source of coarse to fine aggregate	
(S,G) Fv	silt, sand and gravel		relief is variable reflecting topography of underlying material; mostly surfaces of less than 10 feet local relief	0 to 10		mostly poor source of aggregate; limited amounts of aggregate may be recovered locally	
(S,G) F t(c)		proglacial outwash terrace	gently irregular surfaces with less than 10 ft. relief along the sides of main valleys; surfaces are separated from the adjacent plain and valley bottom by a break in slope; shallow, abandoned channels mark some terrace surfaces	20 to 50		good source of mostly fine aggregate	
(S,G) F t k		pitted outwash terrace	surface marked by numerous closed depressions with 10 to 50 feet local relief			good source of fine and coarse aggregate	
(C,S) Lv	clay, silt and sand	glacial lake basin	gently irregular or broadly rolling with 5 to 25 feet. local relief reflecting topography of underlying material; much local relief from 2 to 8 ft. reflects organic terrain	mostly 2 to 5 ft. thick; locally may be more than 10 ft.	bog and fen are widespread in this generally low relief terrain; bog is 2 to 9 feet thick and permafrost occurs at 1 to 4 ft. depth and continues to more than 10 ft.; ice lenses 1 to 2 ft. thick are common between the peat and clay; organic deposits are thin or absent over scattered rises of till or bedrock; tree cover is mostly open to closed stands of Black Spruce	clay and silt are commonly varved and overlie till and bedrock; in places thin wedges of fine sand separate the lacustrine veneer and underlying material; bedrock rises and drumlins, common in the terrain south of Nelson River, are only in part covered by lacustrine sediments and a thin gravelly lag commonly occurs on the crests of drumlins (TMpde)	
(S,G) I h(k)	sand, silt and gravel	ice-contact outwash (kames and eskers)	hills and prominent ridges that form a nearly continuous linear landform 50 to 250 feet above the plain between Limestone Lake and Little Limestone Lake; surfaces are commonly pitted and channelled with 25 to 100 feet local relief	50 to 250	generally thin or absent; tree cover is mostly closed stands of Aspen and Jack Pine	good source of aggregate; most hills, knolls and ridges have sandy surfaces devoid of boulders or gravel and prominent exposures are sandy; bouldery surfaces do occur in places and coarse aggregate probably occurs at depth within the central parts of the hills and ridges particularly in the vicinity of discontinuous meltwater channels	
(S,G) I(n,r,k)			knolls and ridges; some 10 to 50 ft. above adjacent plains; occur as isolated features or clusters of features along a linear trend; surfaces commonly have shallow pits with a local relief of 5 to 25 ft.	10 to 50			
TMp	mostly sandy till, high in igneous rock detritus; minor gravel and sand; silty till, high in carbonate rock detritus comprises the units northeast of Limestone River	ground moraine	gently irregular or broadly rolling till plain with 5 to 15 ft. local relief; scattered streamlined till ridges and rises of bedrock	0 to 100	see (C,S)Lv	heterogeneous mixture of silt, sand and bouldery gravel suitable as fill material; degree of consolidation is variable; mostly veneered by lacustrine clay and silt (C,S)Lv	
TMpd		drumlinized ground moraine	gently irregular or broadly rolling till plain with 5 to 25 ft. relief; numerous streamlined till ridges and scattered rises of bedrock		bog and fen are widespread in low areas between drumlins and bedrock rises; bog is 2 to 6 ft. thick and permafrost occurs at 1 to 4 ft. depth and continues to more than 10 ft.; ice lenses 1 to 2 ft. thick are common at the base of the peat; tree cover in low areas is open to closed stands of Black Spruce, but on drumlins closed stands of Jack Pine, Aspen and Black Spruce occur	limited quantities of coarse aggregate on drumlin crests; certain drumlinized ridges (crevasse fillings?) are mostly sand and gravel	
TMpde		water eroded drumlinized ground moraine					
TMn		end moraine	broadly hummocky topography with 15 to 50 ft. relief between knolls and depressions	15 to 100	bog and fen occur in depressions; permafrost probably occurs at 1 to 4 ft. depth in bog; tree cover is mostly closed stands of Black Spruce	heterogeneous mixture of silt, sand and bouldery gravel suitable as fill material	
TMo		water eroded till	walls and bottoms of meltwater channels including eroded hills and escarpments; relief is from 25 to 100 ft.	25 to 150	generally thin or absent; tree cover is mostly open to closed stands of Jack Pine, Aspen and Black Spruce	slopes are stable and only minor earth movement (solifluction, soil creep etc.) scars are evident	
TMo(h,n)							
TMpe		mostly silty till, high in carbonate rock detritus; minor gravel and sand	water eroded ground moraine	gently irregular to broadly rolling with 5 to 15 ft. local relief; where mantled by marine veneer (S,C)Wv surface is nearly flat and local relief (2 to 8 ft.) reflects mostly organic terrain	15 to 150	see (C,S)Lv for units veneered by marine deposits; where eroded till forms the surface bog and fen are common but not as widespread or deep as in veneered terrain; bog is 2 to 6 ft. thick and permafrost occurs at 1 to 4 ft. depth; ice lenses 1 to 2 ft. thick are common at the base of the peat	heterogeneous mixture of clay, silt, sand, and gravel suitable as fill material; compact and fairly hard beneath well-drained sites
Rp	mostly Precambrian granitic rocks	glacial erosion	gently irregular to broadly rolling with 5 to 25 ft. local relief	not applicable	bog and fen occur in low areas between bedrock outcrops; tree cover is mostly Black Spruce in low areas and mixed Jack Pine, Aspen and Black Spruce on outcrops	bedrock exposures are discontinuous and patchy; map units are restricted to areas where outcrops are numerous but not necessarily extensive	
Rn			knolls and elongate ridges with 25 to 80 ft. relief		generally thin or absent; tree cover is semi-closed stands of Jack Pine, Aspen and Black Spruce		

EXPLANATION MAP SYMBOLS

TEXTURAL (large capital letter)	GENERIC (small capital letter)	MORPHOLOGIC (lower case letter)	Boundaries (geologic, geologic and organic, organic)	Complex Units:
G - gravel and sand	A - alluvial	n - knoll(s) (<50' relief)	Drumlin or Drumloid (ice direction shown, not shown)	A horizontal line — separating two units indicates a veneer (2 to 5 ft.) unit overlying a thicker and morphologically dominant unit e.g. CLv
S - sand and silt	W - marine	h - hill(s) (>50' relief)	Esker (direction flow assumed, uncertain)	Composite Units: A single slash / or double slash // between two units is used to designate areas where two distinctive units (mineral or organic) occur but are mapped as one unit. The first unit indicated comprises more than 50 percent (rough estimate) of the area; the second unit designated comprises from 25 to 50 percent where separated by a single slash e.g. CLv / TMde or less than 25 percent where separated by a double slash e.g. CLv // TMde
C - silt and clay	B - beach	r - ridge(s)	Abandoned beach	Organic Units: Organic deposits designated as bog (1) and fen (2) cover the surficial sediments and bedrock in most of this region. These deposits are developed on the low relief poorly drained terrain typical of much of this region. Bogs are composed of peat material between 2 and 12 ft. thick (mostly 5 to 10 ft.); permafrost commonly occurs at a depth of 1 to 4 ft. depending upon local factors (tree cover, slope, water table etc.); minor ice lenses occur throughout the frozen peat and are thickest (1 to 2 ft.) at the contact of the peat and underlying sediment; permafrost occurs in the underlying sediments to at least 10 ft. below the surface (maximum penetration depth of sampling tool). Fen are areas of peat covered by shallow water or areas of water covered by a floating peat blanket; permafrost was not penetrated in fen areas and probably is at a depth greater than 10 feet or absent.
T - till	L - glaciolacustrine	d - drumlins or drumloids	Partly buried channel (large, small)	
R - bedrock	F - glaciolacustrine	f - floodplain	Spillway or Meltwater channel (large, small)	
	I - ice-contact	t - terrace	Assumed direction meltwater flow (large channel, small channel)	
	M - morainal	v - veneer (commonly 4' - 10' thick)	Escarpment or steep bank	
		c - channel(s)	Minor intersecting lineaments	
		k - kettles	Isolated bedrock outcrop	
		e - water eroded	Dam site or cofferdam (completed, proposed)	
		o - delta	Limit of flooding	
		p - plain	Location of described section	

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