



SURFICIAL GEOLOGY OAK LAKE, MANITOBA (62F/NE)

SURFICIAL MATERIALS

Quaternary

COLLUVIAL DEPOSITS: silty to clayey diamiction occurring as a variety of slopes and slump deposits derived largely from till but in places from lacustrine deposits and shale.

Cf Colluvial Fan Sediments: Silty diamiction with thin sand beds; fan shaped deposits occurring at the mouths of gullies cut in steep slopes; formed largely as mud flows; unit thickness < 5 m.

Ch Slope Failure Deposits: Silty to clayey diamiction and shale slabs and blocks; occur as irregular hummocks, ridges and steps on slopes, and as ridges and hummocks within valleys; formed by slumping and slope failure; unit thickness < 10 m.

Cx Colluvial Complex: Silty to clayey diamiction; veneers, blankets, aprons, and fans of colluvial debris occurring on and at the base of steep slopes; complex of colluvial materials which can include areas of till, washed till and locally may contain small inclusions of alluvial plains and terraces; unit thickness < 5 m.

ALLUVIAL DEPOSITS: clayey to sandy materials containing some gravel and organic-rich sediments; formed as stream deposits and now underlie modern floodplains; low terraces or broad plains.

Ap Modern Floodplain Sediments: silt, clay, and sand with minor gravel and organic muck and organic-rich silt and clay; poorly sorted and stratified; occurs as gently undulating plains containing swales and abandoned stream channels; locally swampy; unit thickness < 5 m most areas but in Assiniboine Valley < 20 m.

At Alluvial Terrace Sediments: sand, silt, and clay with minor gravel; generally well sorted and stratified; occurs as low benches up to 5 m above present stream level; unit thickness < 5 m.

LACUSTRINE AND GLACIAL LACUSTRINE DEPOSITS: silt, sand, and clay; generally underlying flat to gently undulating plains with variable densities of small closed depressions (potholes); relief generally < 2 m but locally up to 20 m; the surface metre of sandy lacustrine deposits has, in many places, been reworked by wind and locally is overlain by isolated dunes < 20 m high; includes deposits of glacial Lake Hind and other temporary and existing lakes.

Li Lacustrine Plain Sediments: silt, sand, and clay with organic-rich muck at the surface in poorly drained areas; well to moderately well sorted, massive to laminated; nearly flat (level) surface, with some low rises and shallow hollows (relief < 2 m); l+e - low rimming ridges present around some closed depressions; sl - sand dominant; c/sL - veneer of clayey lacustrine sediments overlying sand dominated lacustrine sediments; c/L - veneer of clay lacustrine sediments overlying silt dominated lacustrine sediments; o/L - organic-rich clay (swamp and slough sediments); unit thickness < 50 m.

Lp Lacustrine Plain Sediments, Gently Undulating: clay, silt, and sand with organic muck at the surface in poorly drained areas; well to moderately well sorted, massive to laminated; gently undulating surface (relief 2-5 m), marked either scattered sand dunes or erosional features such as scoured channels; in places relief may mimic underlying units; slp - sand dominant; slp+r - sand dominant with abundant ridges (dunes); unit thickness < 50 m.

Lu Lacustrine Plain Sediments, Undulating: clay, silt, and sand; well to moderately well sorted, massive to laminated; broadly undulating to rolling with 4-10 m relief probably inherited from underlying units; unit thickness < 30 m.

GLACIOFLUVIAL DEPOSITS: sand and gravel in ridges and hummocks, underlying benches well above present stream level, and underlying broad flat to undulating plains; coarse clast composition variable and in many places dominated by shale; deposited as glaciofluvial materials in contact with melting ice, as glacial outwash plains and deltas, and as catastrophic flood deposits.

Gt Glaciofluvial Terrace Sediments: sand, gravel, and bouldery gravel; well washed and sorted; occurs as benches 5-40 m above modern valley floors; remnants of glaciofluvial outwash plains; 'Gt - dominantly shale-rich gravel; unit thickness < 5 m.

Gi Glaciofluvial Plain Sediments, Flat: sand, gravel, and bouldery gravel; well washed and sorted; nearly flat (level) to gently undulating with relief < 2 m; coarse clast composition variable and generally high in shale; largely formed as deltaic deposits at the margin of glacial Lake Hind and other temporary lakes; g/G - dominantly gravel; G - dominantly shale-rich gravel; unit thickness < 10 m.

Gp Glaciofluvial Plain Sediments, Gently Undulating: sand, gravel, and bouldery gravel; well washed and sorted; gently undulating plain marked by low ridges and abandoned scour channels with relief 2-5 m; coarse clast composition variable and generally high in shale; deltaic deposits formed at the margin of glacial Lake Hind and other temporary lakes; 'Gp - dominantly shale-rich gravel (locally < 99%); unit thickness < 10 m.

gGu Glaciofluvial Plain Sediments, Rolling: gravel, bouldery gravel, and sandy gravel; moderately well sorted and well stratified; occurs as area of closely spaced mounds and hummocks (relief 4-15 m); interpreted as catastrophic flood deposits; unit thickness < 20 m.

gGr Glaciofluvial ridge sediments: sand, gravel, and bouldery gravel; well washed and sorted; occurs as a complex series of ridges; 'gGr - dominantly shale rich gravel (locally < 99%); unit thickness < 5 m.

gGh Glaciofluvial hummocky and Ridge Gravels: gravel, and gravelly diamiction with minor sand and silt; poorly sorted; in most places the coarse clasts are dominantly shale; occurs as mounds, hummocks, and ridges with 2-20 m relief and deep potholes and lakes; formed as ice contact glaciofluvial deposits; unit thickness < 15 m.

MORAINAL DEPOSITS: till (diamiction), in many areas overlain by a surface layer (~1 m) of massive, sparsely pebbly, clayey silt; in places also includes variable amounts of stratified glacial deposits, and minor veneers of postglacial alluvial and eolian silt and sand, and organic-rich silt and clay; till generally is a sandy, clayey, silt diamiction having a minor content of pebbles and variable content of boulders; morainal deposits are the direct deposits of glacial ice; till layers of different ages commonly underlie the surface but stratigraphy and thickness can be assessed only by drilling; a discontinuous layer of large (< 1.5 m diameter) faceted boulders lies at the base of the surface till layer in many places; thickness varies from as little as 1 m where a single till sheet overlies bedrock, to 100 m in buried valleys and in the western part 62 F of map area where multiple till layers are present.

T-w Till Plain, Eroded: till, gravel, boulders, sandy silt, sand, and muck; consists of till, in many places with an overlying discontinuous lag of gravel, sand, and boulders; includes muck and silty sediments in poorly drained valley floor locations; occurs as flat plains, on benches in valley bottoms, and on slopes at the margins of meltwater channels; patchy gravel and sand occurring as part of this unit is in places < 2 m thick.

Ti Till Plain, Flat: till, in many places overlain by massive clayey silt < 1.5 m thick; nearly flat (level) to very gently undulating with relief < 2 m in the form of low rises and shallow depressions; T1+e - flat till plain including rim ridges (arcuate ridges in part outlining shallow depressions).

Tp Till Plain, Gently Undulating: till and minor stratified sediments; gently undulating areas of low rises and shallow depressions (relief 2-5 m); T1+e - gently undulating till plain including rim ridges (arcuate ridges in part outlining shallow depressions).

Tr Till Plain, Ridged: till with variable inclusions of stratified sediment; generally occurs as broad (50-175 m), moderate relief (2-10 m), ridges which are 500 m to 2 km long and spaced at

intervals from 0.5 to 2 km; ridges developed by ice thrusting and various ablation related processes during melting of the ice sheet.

Tu Till Plain, Undulating: till and minor stratified sediments; undulating areas made up of rises and depressions (relief 3-10 m).

gA' OLDER ALLUVIAL GRAVELS: sand and gravel; well stratified, sorted and washed; shale and other friable lithology content low, quartzite a common component and may contain agate, chert, Jasper, petrified wood, and bone; variable cover of till and other sediments but mapped only where cover < 2 m thick (east of Souris); gravels which were deposited before advance of the last ice sheet; unit thickness < 5 m.

BEDROCK

Creaceous

R Rock: shale, soft greenish brown bentonitic, hard grey siliceous, and buff silty; outcrops locally in roadcuts and valley walls; locally present in scoured floors of meltwater channels but difficult to recognize because it quickly weathers to a clay that is difficult to distinguishable from Quaternary sediments.

Geological boundary

defined,
approximate,
assumed

Escarpment in surficial materials

Abandoned meltwater channel

Esker

Ice flow direction from striation on boulder pavement

Bedrock outcrop

Gravel pit

Ground observation

Till analysis site

Borehole log site

stratigraphy only analyses available

Geology by C. Sun and R.J. Fulton, 1994

Bedrock Geology

BEDROCK UNITS

Pierre Formation

Odanah Member: Shale, olive-grey, weathering light grey, siliceous, and brittle, with thin interbeds of soft olive grey shale

Millwood Member: Shale, soft uniform, olive-grey, with high content of montmorillonites and numerous calcareous concretions

Odanah Member and Undivided Pierre Formation

Niobrara Formation

Shale, calcareous, soft greyish-black with interbeds of chalk speckled shales and rare bentonite beds

Source of bedrock geology information:
Betcher, R.N. 1983: Groundwater availability map series, Virden area (62 F); Manitoba Natural Resources, Water Resources Branch.
McNeil, D.H. and Caldwell, W.G.E. 1981: Cretaceous rocks and their foraminifera in the Manitoba Escarpment; Geological Association of Canada, St. John's, Newfoundland, Geological Association of Canada Special Paper 21, 459 p.

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