GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 42 A/SE

Adjoins Map 46-1959, "Iroquois Falls"

LEGEND

CENOZOIC

- 5 — ORGANIC DEPOSITS: open and semi-open bogs consisting of woody sphagnum peat, minor sedge peat, and gyttja
- 4 — FLUVIATILE DEPOSITS: silt, sand, and gravel of modern flood plains
- 3 — BARLOW-OJIBWAY DEPOSITS: 3a, varved sediments (varved glacial-lake deposits); 3b, sand and gravel (shore and near-shore deposits)
- 2 — GLACIO-FLUVIAL DEPOSITS: sand and gravel; in part mantled by Barlow-Ojibway varved sediments
- 1 — GLACIAL DEPOSITS: grey, sandy, boulder till with minor contained stratified drift; in part thinly mantled by Barlow-Ojibway sand and gravel

PRECAMBRIAN

- R — Bedrock outcrop; in part with thin discontinuous drift cover

- Bedrock outcrop, observed or interpreted from airphotos
- Bedrock outcrop, reported from various sources
- Geological boundary (approximate, transitional)
- Glacial striae (direction of ice-movement known, unknown)
- Drumlins and drumlinoid forms, fluting
- Esker ridge or median ridge of outwash plain
- Erosional and constructional shorelines of glacial Lake Barlow-Ojibway
- Dune ridges
- Gravel or sand pit (GP)
- Mine or quarry
- Fill, mine waste or tailings (Mill Slime)

Geology by O. L. Hughes, 1956, 1957

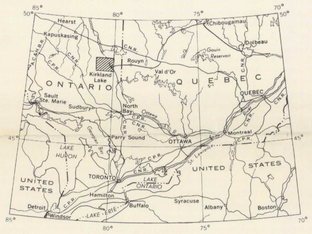
- Main highway
- Other roads
- Trails
- Power transmission line
- District boundary
- Township boundary
- Intermittent stream
- Rapids
- Height in feet above mean sea-level (695)

Cartography by the Geological Survey of Canada, 1960

Approximate magnetic declination, 9° 51' West

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



INDEX MAP

1-1960 c.2

PUBLISHED, 1960.
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

MAP 1-1960
SURFICIAL GEOLOGY
KIRKLAND LAKE
TIMISKAMING AND COCHRANE DISTRICTS
ONTARIO

Scale: One Inch to Two Miles = 1/126,720
Miles
2 1 0 2 4 6

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DESCRIPTIVE NOTES

Kirkland Lake map-area straddles the Hudson Bay - St. Lawrence divide, and includes part of the Great Clay Belt (north of the divide) and part of the Little Clay Belt (south of the divide). Although the clay plains on either side of the divide attain an elevation of only about 1,025 feet, strand lines indicate that all of the area below 1,200 feet was formerly submerged beneath glacial Lake Barlow-Ojibway. Between 1,200 and 1,025 feet there are successively lower shorelines of the glacial lake, and abundant additional evidence of wave action in the form of wave-swept rocky hills and lag concentrates of boulders. Above 1,200 feet, evidence of wave action is lacking.

Glacial deposits (1) form a discontinuous mantle on bedrock in the areas above 1,025 feet, and extend as a more or less continuous sheet beneath the Barlow-Ojibway varved clay which forms the clay plains. At elevations below 1,200 feet the deposits have been modified at the surface to beach deposits of boulders, gravel or sand, or to lag concentrates of boulders.

Glacio-fluvial deposits (2) are confined mainly to elongate esker complexes, which have been much flattened and otherwise modified by wave erosion. In the median parts of the large esker complexes, sand and gravel attains thicknesses of 100 feet or more.

Barlow-Ojibway varved clay (3a) mantles underlying glacial deposits and laps up onto the flanks of esker complexes, bedrock hills and drumlins. The unit consists of silt-clay or sand-clay couplets (varves) that range in thickness from several feet at the base of the deposits to a few millimetres near the top. Average thickness of the unit is about 45 feet. Barlow-Ojibway sand and gravel (3b) occurs as beach ridges of boulders, gravel or sand on the flanks of bedrock hills and eskers, or as aprons of sand extending outward over varved clay. The constituent material was derived by wave erosion and sorting of glacial deposits (1) and glacio-fluvial deposits (2). Typical thickness is 5 to 15 feet. Large tracts in the central and northeastern parts of the map-area are occupied by dunes (symbol), mainly upsiloidal or U-shaped in form. External form and internal structure of the dunes indicate that the effective dune-forming winds were west-northwest, as they are today. The sand was derived mainly from deposits of lacustrine sand (3b) and to a lesser extent from the glacio-fluvial deposits (2). The dunes have been stable for the past 4,500 years, except for minor activity following forest fires.

Fluviatile deposits (4) are found in restricted areas along all of the major streams, but only those within the flood plain of Englehart River, in the south-western part of the map-area, are large enough to be mapped at the present scale.

Organic deposits (5) up to 15 feet thick occur in poorly drained situations. Typically they overlie Barlow-Ojibway deposits but in limited areas they may overlie any of the other units.

The area was overridden by a continental ice-sheet that laid down glacial till containing lenses of gravel. The latest direction of movement of the ice was south, as indicated by striae, orientation of drumlins and till fabric. Concurrent with northward retreat of the ice-margin, ths area was occupied by glacial Lake Barlow-Ojibway, the glacial lake extended from the south end of Lake Timiskaming northward across the continental divide, which was then depressed below the level of the outlet through the Timiskaming gorge.

Subglacial streams, debouching into the lake at the ice-margin, deposited sand and gravel as the ice-margin retreated, forming elongate esker complexes. Silt and clay carried by the subglacial streams were deposited on the lake bottom as annual layers or varves.

With further northward retreat of the ice-margin, isostatic adjustment produced differential uplift to the north, with resultant shallowing of the glacial lake. As the lake level dropped, relative to land, bedrock knobs appeared as islands that were swept free of drift by wave erosion. Beaches were formed on the flanks of bedrock hills and esker complexes, and broad, boulder-strewn, wave-cut platforms were developed on some of the esker complexes. Sand, washed from glacial and glacio-fluvial deposits, was carried offshore to form a veneer over varved clay.

The large esker complexes provide abundant supplies of gravel and sand. Esker or median ridges, indicated by a chevron symbol on the map, are the best potential sources of coarse gravel. Locally, gravel beaches have been exploited for road metal. Whereas gravel and sand of the esker complexes extends to depths of 40 feet or more, beach deposits are only a few feet thick over bedrock or unsorted till, and are only a minor source of sand and gravel. Boulder beaches provide coarse fill, and are a potential source of material for crushing. Sand of dunes has been used for road fill, but is too fine grained for other purposes. The surface of the sand dunes is bonded by roots and by a podsolic soil; when these are removed the surface is impassable for ordinary wheeled vehicles unless gravel or other surfacing material is applied. Wind erosion occurs when the dune sand is cultivated or burned over, and continues until covering vegetation is re-established.

Varved clay of the area is suitable for the manufacture of common brick and tile, but present demand is probably insufficient to warrant a plant of economic size.

Abundant ground water is available from the gravel and sand of the esker complexes. Where varved clay laps up onto the flanks of the esker complexes, flowing or non-flowing artesian wells are obtained by drilling through the clay into the underlying gravel. Water may also be obtained from thick sandy varves at the base of the varved clay, from gravel lenses within the glacial deposits, and from lacustrine and aeolian deposits.

A small deposit of freshwater marl occurs in a boggy depression 0.5 mile distant on bearing S10°E from the south end of Sunny Lake, Dunmore township. At present, such marl deposits have no economic value.

The map is based on airphoto interpretation supplemented by extensive observations on the ground. On the airphotos, it is not always possible to clearly distinguish areas of bedrock outcrop from areas of bedrock with thin drift cover. As a consequence, areas of bedrock (R) and glacial deposits (1) are grouped together over wide areas. This composite unit also includes minor areas of Barlow-Ojibway deposits (3a, 3b), especially at elevations between 1,000 and 1,050 feet. Surficial geology of adjacent areas is described in the publications listed below:

Hughes, O. L.: Surficial Geology of Smooth Rock, Cochrane District, Ontario; Geol. Surv., Canada, Paper 55-41, preliminary report and map (1956).

Surficial Geology, Iroquois Falls, Cochrane District, Ontario; Geol. Surv., Canada, Map 46-1959, preliminary map with marginal notes (1959).

MAP 1-1960
KIRKLAND LAKE
ONTARIO
SHEET 42 A/SE