Ministry of Natural Resources
Ontario

Hon. James A.C. Auld, Minister
Dr. J.K. Reynolds, Deputy Minister

ONTARIO GEOLOGICAL SURVEY
PRELIMINARY MAP P. 2365
GEOLOGICAL SERIES

Quaternary Geology of the RENFREW AREA

SOUTHERN ONTARIO

Scale: 1:50 000

Mile 1 0 1 Mile
Metres 1000 0 1 Kilometre

NTS Reference: 31 F/7
ODM-GSC Aeromagnetic Map: 67G

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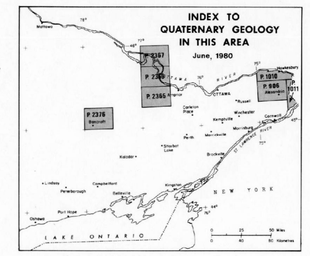

LEGEND

PHANEROZOIC
CENOZOIC
QUATERNARY
RECENT

15 Modern alluvium: unsubdivided — clay, silt, sand, gravel, muck

14 Landslide debris: highly contorted clay, silt, sand

13 Bog and swamp deposits: muck, peat, marl.

PLEISTOCENE
Wisconsinan

12 Older alluvium in terrace remnants: sand, gravelly sand

11 Glaciolacustrine and lacustrine beach, bar, or near shore deposits: gravel, gravelly sand
11a Glaciolacustrine
11b Lacustrine

10 Glaciolacustrine and lacustrine shallow-water deposits: sand, silt
10a Glaciolacustrine
10b Lacustrine*
10c Either a or b, modified by wind*

9 Glaciolacustrine and lacustrine deeper water deposits: massive to laminated or varved, silt, clay
9a Glaciolacustrine
9b Lacustrine*

8 Marine beach, bar, or near shore deposits: gravel, gravelly sand, minor clay; fossiliferous

7 Marine shallow water deposits: sand, silt
7a Greater than 1 m thick
7b Usually greater than 1 m thick with occasional scattered outcrops*
7c Modified by wind

6 Marine deeper water deposits: silt, clay
6a Clay, silty clay, clayey silt
6b Silt dominant*

5 Glaciofluvial outwash and deltaic deposits: gravel, gravelly sand, sand
5a Greater than 1 m thick
5b Usually greater than 1 m thick with occasional bedrock outcrops

4 Glaciofluvial ice-contact stratified deposits: gravel, gravelly sand, sand, silt, minor clay and till; occurs in moraines, eskers, kames and ice-marginal deltas

3 Till: sandy to silty; stony
3a Greater than 1 m thick but may contain an occasional bedrock outcrop
3b Usually greater than 1 m thick, with scattered bedrock outcrops

UNCONFORMITY

PALEOZOIC
ORDOVICIAN

2 Bedrock: limestone, minor dolostone, shale, sandstone; minor drift cover

UNCONFORMITY

PRECAMBRIAN

1 Bedrock: unsubdivided marble, clastic metasediments, nepheline and alkaline syenites, granites, anorthosites, diabase, gabbro
1a Abundant bedrock exposure with thin drift cover
1b Extensive but discontinuous drift cover, in places sufficiently thick to subdue the bedrock topography.

*not present in this map area

MARGINAL NOTES

INTRODUCTION

Quaternary geological mapping in the Renfrew (31 F/7) map-area was completed during the summer of 1977 by P.J. Barnett and W.S. Clarke, assisted by John Heinonen and M.A. Bells.

Field mapping, including the examination of natural and man-made exposures, soil probing, augering and test pitting for approximately six weeks was combined with extensive use of air photographs to produce this map. Results of this mapping are summarized below, and will be included in a geological report which will cover five additional map-areas (Fort Coulonge, Cobden, Brudenell, Golden Lake, and Pembroke N.T.S. 1:50000 map sheets) in the Ottawa and Bonnechere valleys. Preliminary maps for the Fort Coulonge and Cobden areas are also available (Barnett 1980, Barnett and Clarke 1980). Helpful discussions with Dr. N.R. Gadd of the Geological Survey of Canada on the deposits and features of the above map-areas are gratefully acknowledged.

BEDROCK GEOLOGY

The bedrock geology of the area has been mapped by Quinn (1951), and is also covered by a compilation map prepared by Lumbers (1980). The area is underlain by Precambrian rocks of the Grenville Province which are dominantly metasediments and intrusive rocks (1a, 1b), and several outliers of Paleozoic age (2). The Mount St. Patrick Fault scarp, which is the southern edge of the Ottawa Bonnechere Graben, is the major topographic feature in the area.

QUATERNARY GEOLOGY

Glacial Deposits

The glacial deposits within the map-area are Wisconsinan in age. The till resting directly on the rock may be correlative with the Gentilly Till in the St. Lawrence Lowlands (Gadd 1971) or the Adam Till in the Moose River Basin (Skinner 1973). In either case, this till was deposited by the glacial ice which occupied the Ottawa Valley for at least 60,000 years prior to the invasion of the Champlain Sea waters (into this area). For the most part, the outwash and ice-contact sediments were deposited during the northward retreat of the glacial ice.

TILL

Till (map unit 3) is the dominant surficial material in this map sheet. It is, however, often very thin and discontinuous over a large portion of the area (1b,1a). Where the till is found as a thin cover (less than 0.5 m) it is usually stoney, very sandy, and the clasts reflect the local bedrock geology. In areas of Ordovician carbonate outliers, the till is finer grained.

Where the till cover is thicker (3a,3b), its surface is usually fluted or drumlinized. Here, the texture ranges from gritty to silty to sandy with variable percentage of clasts. The till becomes compacted and often fissile with depth. Till was observed up to a thickness of 4.5 m along the Madawaska River.

Glaciofluvial Deposits

Glaciofluvial ice-contact sands and gravelly sands occur in an esker, which can be traced between Balmer Lake and Dempseys Lake, in Champlain Sea ice-marginal deltas east of Renfrew, and in small isolated kames or kame terraces.

Glaciofluvial outwash deposits of gravel, gravelly sand, and sand are present along valley bottoms throughout most of the southern three quarters of the area. South of the Mount St. Patrick Fault, scarp meltwater drained southward along bedrock controlled valleys. Only deposits along the major creeks are shown on the map; although, thin deposits and/or deposits of small areal extent may exist in the minor creek valleys of this area.

North of the Mount St. Patrick Fault, outwash sediments were deposited in meltwater streams flowing southeastward along the retreating ice-front and in fault controlled valleys. One large channel occurs along Constant Creek between Dacre and Calabogie Lake.

Bedrock sills, present along most of these meltwater channels probably were responsible for the formation of small proglacial lakes at the time of meltwater occupation. At present, these bedrock sills create high water tables in these deposits and/or numerous linear bogs and swamps along the abandoned channels.

Marine Deposits

Marine deposits of the Champlain Sea are restricted mainly to the northern quarter of the map-area. The plain, surrounding the Bonnechere River between Douglas and Lochwinnoch is composed predominantly of deeper water silts and clays (map unit 6). These deep water sediments range from faintly laminated to massive beds consisting of clayey silt to clay.

An apron of shallow water sediments consisting of very fine to coarse-grained sand separates this clay plain from the higher bedrock area to the south. Shoreline features are few and fragmentary along the south shore of the sea because of what would have been a rocky coastline with numerous islands to protect the shore. The belt of shallow water sands best approximates the southern limit of the Champlain Sea in the Renfrew area.

Shoreline features are better developed on the ice-marginal deltas in the vicinity of Renfrew and along the highlands between Renfrew and White Lake where several levels of the sea ranging from 175 m (575') to 122 m (400') a.s.l. are recorded.

Glaciolacustrine Sediments

Glaciolacustrine sediments (10a) were only of mappable extent at one area near Condon Lake. However, evidence of several small proglacial lakes does exist. These lakes existed along river valleys between bedrock highs and the glacier front. They were probably short lived lakes, and typically these sediments consist of silt with thin sand, clay and till-like layers (possibly debris flow).

Post-Glacial Sediments

Older alluvium consisting of sand and gravelly sand and occasionally containing till and clay balls occurs along the Bonnechere River in terrace remnants. At several localities fossil pelecypods and gastropods were collected.

Bog and swamp deposits of peat, muck and marl are found throughout the map area, especially in areas of thin drift covering bedrock (1a,1b) and in abandoned meltwater channels. Ice block depressions north of Renfrew also contain swamps and bogs and landslide debris areas are often poorly drained.

Numerous landslide scars and landslide debris can be observed east of Renfrew along the Bonnechere River and its tributaries, with a few also occurring west of Douglas. Generally, these are older slides, however, one very small, recent slide has occurred in the Lochwinnoch area. Landslide debris consists of a mixture of clay, silt and sand which was originally deposited as marine sediments. These marine sediments failed and have been redeposited at the base of the slope. This landslide debris is sometimes highly contorted, massive, or can be made up of tilted blocks which form a poorly-drained ribbed surface.

Modern alluvium occurs along the Bonnechere and Madawaska Rivers. It is variable in texture, being dependant on the material the river is eroding and on the facies preserved.

ECONOMIC GEOLOGY

Sand and Gravel

Nesbitt's Sand and Gravel and Smith's Construction Limited operate sand and gravel pits on a continuous basis in extensively reworked ice-marginal deltas located east of Renfrew. All other pits are either active-on-demand or were inactive during the summer of 1977. Sand and gravel in the area around Renfrew, is probably sufficient for local needs. Admaston, and parts of Bagot and Brougham Townships, however, may be deficient in mineral aggregates in the future; but, at present, the local demand is low.

Clay

Marine clay is being used in the production of tile at Arnprior (Guillet 1967) and in the past has been excavated at Renfrew and Douglas, for brick and tile (Keele 1924). Keele (1924) and Guillet (1977) presented results of ceramic tests from several sites in the area.

ENGINEERING AND ENVIRONMENTAL GEOLOGY

Several geological deposits and features of the map-area could pose serious problems to future development or land use changes. Aside from the "normal" problems associated with construction on flood plains, valley walls, and in rock, bog and swamp terrain; karst development in Paleozoic carbonate outliers, landslides in marine clays and silts along river valleys and debris slides in steep bedrock areas are additional problems which should be considered during planning and development in this area. Underground caverns and sinkholes, locally known as the Bonnechere Caves are located at the Fourth Chute of the Bonnechere River, about 1 km west of the northwest corner of the map-area and provide good examples of karst development in the Paleozoic Limestones of the area. Although solution widening of bedrock joints was found in the Renfrew map-area, no sinkholes were observed.

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SYMBOLS

- Glacial striae, direction of ice movement known or inferred
- Drumlin
- Glacial fluting
- Crag and tail
- Trend of moraine crest
- Kettle hole
- Esker, direction of flow known or inferred
- Small meltwater channel, inferred direction of flow
- Terraced escarpment fluvial
- Shore bluff or scarp
- Beach bar, spit crest or near shore bar
- Area of dunes
- Quaternary fossil locality
- Small landslide scar
- Large landslide scar
- Geological boundary, approximate
- Sand and gravel pit
- End or recessional moraine
- Small bedrock outcrop

SOURCES OF INFORMATION

Base-map: Map 31F/7 of the National Topographic Series, Ottawa Aerial Photography: Ministry of Natural Resources, Toronto and the National Airphoto Library, Ottawa.
Renfrew Map-Area, Renfrew and Lanark Counties, Ontario; Geological Survey of Canada, Paper 51-27, 79p. by H.A. Quinn, 1952.
Geological Survey of Canada, Ottawa, unpublished information.

CREDITS

Geology by P.J. Barnett and W.S. Clarke, 1977

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Natural Resources does not assume any liability for errors that may occur. Users may wish to verify critical information; sources include both the references listed here, and information on file at the Resident or Regional Geologist's office and the Mining Recorder's office nearest the map area.

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Information from this publication may be quoted if credit is given. It is recommended that reference to this map be made in the following form:
Barnett, P.J. and Clarke, W.S.
1980: Quaternary Geology of the Renfrew Area, Renfrew County; Ontario Geological Survey Preliminary Map P. 2365, Quaternary Geology Ser., Scale 1:50 000. Geology 1977.

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