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### QUATERNARY GEOLOGY OF THE DUNDALK AREA SOUTHERN ONTARIO

Scale 1:50,000  
1.25 inches to 1 mile approximately  
N.T.S. Reference: 61 A/1  
G.C. Aeronautical Map: 8396C

**QUATERNARY**

**Recent**

- 10 Wind-blown deposits. Fine sand in sand dunes.
- 9 Modern alluvium, unconsolidated. Silt, sand, and gravel.
- 8 Bog deposits. Peat, muck, and marl.
- 7 Older alluvium. Sand and gravel.

**Pleistocene**

- 6 Glacial-lake or pond deposits. Very fine sand, silt, and clay.
- 5 Glacial-outwash sand.
- 4 Glacial-outwash gravel.
- 3 Ice-contact stratified drift. Sand and gravel, includes some till and silt.
  - a) Mainly gravel.
  - b) Mainly sand.
- 2 Till. Mainly sandy silty till with some pebbly silty sandy till.

**PALEOZOIC**

**SILURIAN**

- 1a Anabel Formation
- 1b Clinton and Cataract Groups

**ORONOVICAN**

- 1a Georgian Bay Formation
- 1b Georgian Bay Formation

Note: Deposits less than 3 feet thick are not shown as separate units.

**SYMBOLS**

- Geological boundary (actual or interpreted).
- Small bedrock outcrop.
- Sand or gravel pit.
- Rock quarry.
- Glacial striae (ice movement direction inferred).
- Glacial fluting in till.
- Drumlin.
- Glacial meltwater channel with inferred direction of flow.
- Esker (arrowheads show movement direction inferred).
- Terrace scarp.
- Diagram showing orientation of long axis of till pebbles in two dimensions; 100 pebbles were measured at each site.

**MARGINAL NOTES**

Mapping was done during the summer of 1971 by the writer with the assistance of B.D. Cairns who mapped the western half of the area, G.B. Eggenson, and A.C. Wiggins. Field techniques included the examination of road exposures, foundation excavations, and soil auguring. Air photographs on a scale, 1 inch to 3,000 feet were used.

**Bedrock Geology:** There are numerous outcrops, west of Union are in the vicinity of the Niagara Escarpment, the Escarpment trends north-south, through the middle of the eastern half of the map-area. East of the Escarpment, outcrops of Georgian Bay and Onondaga Formations, both of the Oronovician period, are visible in the Whitfield-Mansfield-Buckview region. Silurian formations of the Cataract and Clinton Groups are not well exposed but are best at Hornings Mills and at Rome River north of Fricourt. The youngest formation in the area, the Silurian Anabel Formation, is exposed extensively at the Niagara Escarpment and in the area west of Union.

**Glacial Deposits:**

**Till:** Till covers 40 to 50 percent of the map-area and only one mappable till unit was found. However, exposures were examined in which there were two or three tills. The surface till has a sandy silty texture and contains generally less than 10 percent pebbles. It is compact, massive, and olive-colored (OY, Hummel System). In some areas, particularly in the hummocky topography north and east of Honeywood, the till is bouldery and has slightly more sandy matrix.

Two other till units underlie the surface till in foundation excavations at Shelburne. The lowermost till is a sandy pebbly till, compact, and light yellow-brown (10YR5/3). The middle till is silty with few pebbles and red-brown (10YR3) matrix. The upper till is a silty clay with a sandy matrix and minor pebbles. The two lower tills are at the surface at only two other locations, and are not found in section elsewhere.

**Ice-Contact Stratified Drift:** In the western half of the map-area, ice-contact is restricted to three eskers and two cone complexes. The eskers trend northwest-southeast, with southeast flow directions indicated. The gravel in both the eskers and cones is typically coarse gravel to pebbly sand.

**Ice-contact drift covers approximately 35 percent of the eastern half of the area. Generally, it is mainly medium-grained sand with some gravel, pebbly sand, and bouldery sand. This material is in two moraine ridges: the Orangeville Moraine and a second hummocky ridge which is parallel to and east of the Orangeville Moraine. It is not known whether the eastern ridge is a separate moraine (Stoughton Moraine) or part of the Orangeville Moraine. It is suggested that it marks the location of the ice margin during the period when the Violet Hill Spillway was in use.**

**Outwash Gravel and Sand:** In the map-area, the Violet Hill Spillway extends from Black Bank through a gorge, thence across a delta south of Black Bank, and on to the southwest to Esler and Violet Hill and south past Mono Centre. Abundant sedimentary structures indicate that meltwater flowed southward in the Spillway. However, both proglacial and postglacial drainage is to the east, thus the ice evidently dammed the east-flowing rivers.

There are two distinct parallel channel levels within the spillway; one at 1,425 feet and one at 1,310 feet. The higher channel is closer to the Mount Pleasant ice limit. As the ice retreated, and with the normal eastward drainage still ice-dammed, the lower channel to the east of the higher one was formed.

At the higher channel level, gravel predominates although it is underlain by medium- to fine-grained sand in several gravel pit exposures. At the lower level sand is the main deposit with minor amounts of pebbly sand and gravel. In the western part of the map-area, medium- to fine-grained sand and silty sand was deposited in numerous small meltwater channels. Most of these were later drained southward into the Grand River system.

**Wind-Blown Sand and Silt:** Anolian silt forms a thin veneer covering a large area of till in the Conover-Honeywood-Melickville region. Although it is not a mappable unit it covers a wide area and fills hollows and small depressions. South of Shrigley, there are three sand dunes. Based on the orientation of lee slopes, the transporting wind is from the west.

**Economic Geology:** Only one stone quarry has been operated in the Dundalk area. The Mitchell Co. Stone Co. Ltd. quarried dolostone of the Anabel Formation 1.5 miles east of Shelburne in the late 1920s.

The gravel in the eskers in the western and central parts of the map-area are the main source of this material presently being developed. The gravel contains sufficient amounts for local requirements. The gravel contains less than 5 percent of deleterious pebble lithologies such as silty sandstone, shale, and chert.

Very large reserves of sand and gravel are found principally in outwash and ice-contact deposits in Mono, Mulmur, and in the southeastern part of Melancthon Townships. The outwash gravel in the Violet Hill Spillway has a very coarse, silty sandstone, siltstone, shale, and chert. The gravel in the ice-contact deposits is irregularly distributed and has pebble lithology similar to the gravel outwash. There is a sufficient supply to support several commercial operations.

**Selected References:**

**Bedrock Geology and Topography:**

- Karr, P.T.: 1965: Dundalk Sheet, Bedrock Topography Series; Ontario Dept. Mines, Prelim. Map P.706, scale 1:50,000, 1.25 inches to 1 mile approximately. Geology 1964.
- Liberty, B.: 1969: Paleozoic geology of the Lake Simcoe area, Ontario; Geol. Surv. Canada, Mem. 355, 201p. Accompanied by Map 1228A, scale 1 inch to 1 mile.

**Geology:**

- Huffman, D.W., Hutchins, B.C. and Michalski, R.E.: 1964: Soil survey of Hufferin County; Research Branch, Ontario Dept. Agriculture, Report No. 38 of the Ontario Soil Survey, 75p.

**Physiography:**

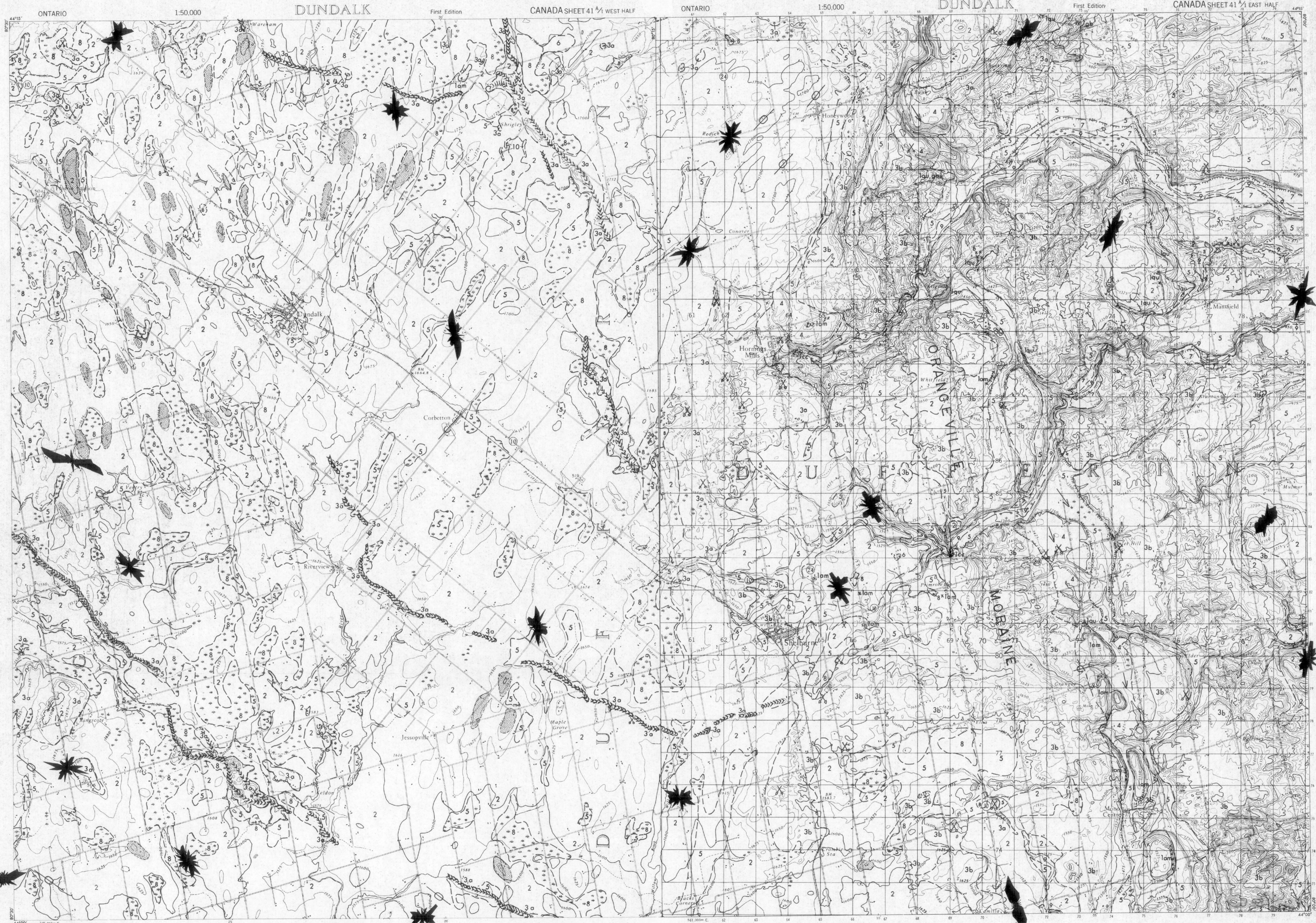
- Chapman, L.J., and Pitman, D.P.: 1966: The physiography of southern Ontario; University of Toronto Press, 2nd ed., 386p.

**SOURCES OF INFORMATION**

Geology by G.H.J. Goy and assistants, 1971.  
Topography from Map 61 A/1 of the National Topographic Series.  
Aerial Photography: Ontario Department of Lands and Forests; National Air Photo Library, Ottawa.  
Issued 1972.

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Goy, G.H.J.: 1972: The Quaternary geology of the Dundalk area, Southern Ontario; Ontario Dept. Mines and Northern Affairs, Prelim. Map P.727, Geol. Ser., scale 1:50,000, Geology 1971.



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