

Canada
Department of Mines

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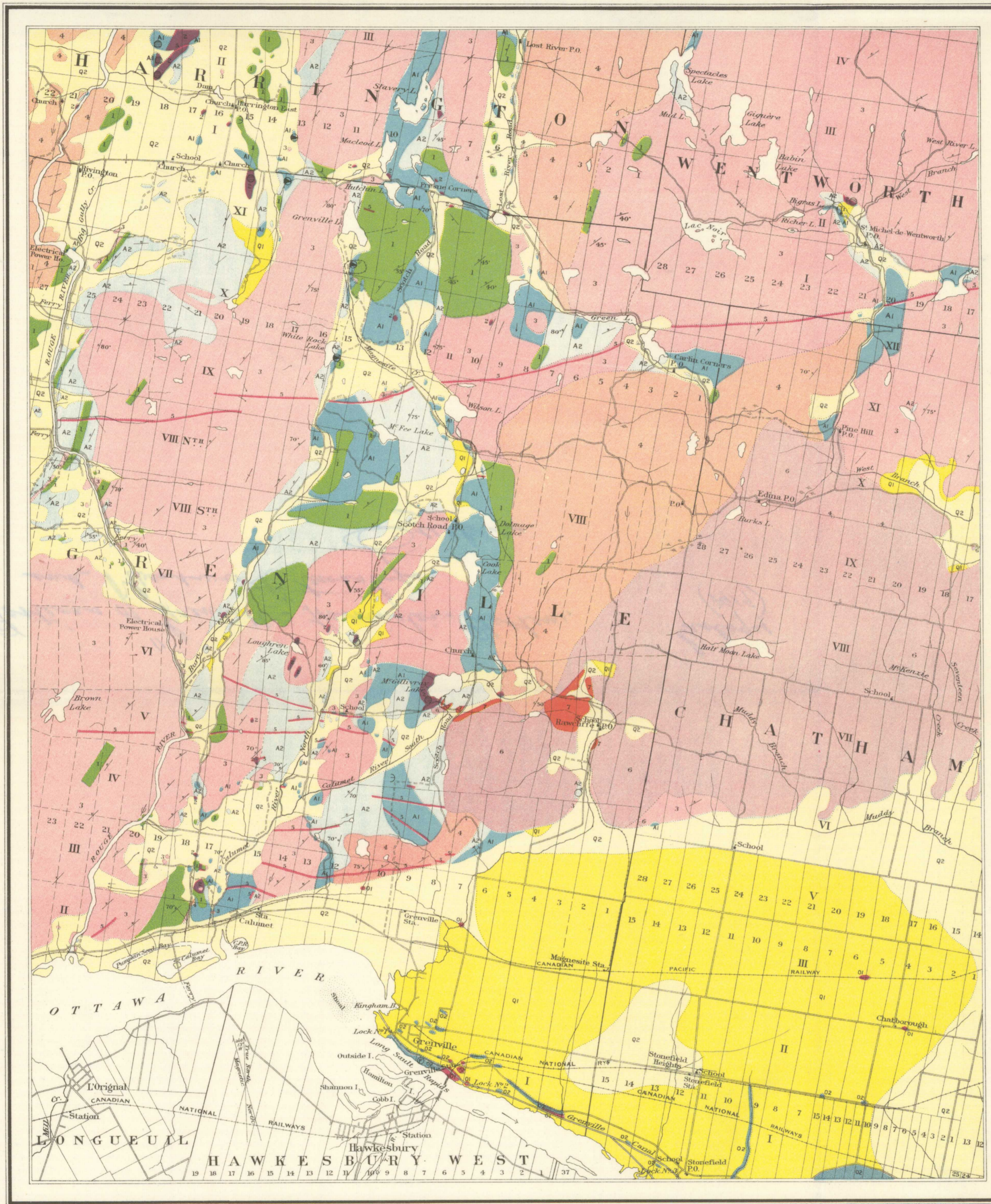
GEOLOGICAL SURVEY
WILLIAM McINNES, DIRECTING GEOLOGIST.

Issued 1919

OUTLINE MAP

LEGEND

- QUATERNARY
CHAMPLAIN
GLACIAL
CHAZY
BECKMANTOWN
LATE PRE-CAMBRIAN
BATHOLITHIC INTRUSIVES
EARLY PRE-CAMBRIAN
BUCKINGHAM SERIES (IGNEOUS)
GRENVILLE SERIES
- Q2 Clay, sand and gravel
 - Q1 Boulder clay, boulders, sand and gravel
 - Q2 Shale, sandstone and limestone
 - Q1 Shale and dolomite
 - 7 Granite and syenite porphyry
 - 6 Granite and syenite
 - 5 Diabase
 - 4 Porphyritic granite and syenite
 - 3 Granite gneiss
 - 2 Metamorphic pyroxenite
 - 1 Pyroxene quartz monzonite, pyroxene monzonite, pyroxene syenite, pyroxene diorite, gabbro, anorthosite.
 - A2 Sillimente garnet gneiss quartzite
 - A1 Crystalline limestone
- Symbols
- Geological boundary (defined)
 - Geological boundary (undefined)
 - Vertical strata or foliation
 - Strike
 - Dip and strike
 - Glacial striae
 - Quarry
 - Iron
 - Mica
 - Graphite
 - Magnetite
 - Fossil locality



C.O. Senécal, Geographer and Chief Draughtsman.
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Publication No 1680.

PORTIONS OF GRENVILLE, HARRINGTON, CHATHAM AND WENTWORTH TOWNSHIPS,
ARGENTEUIL COUNTY, QUEBEC.

Scale of Miles
1 1/4 1/2 3/4 0 1 2

EXPLANATORY NOTES

GEOLOGY

The rocks occurring in the Grenville district, when classified in a general way according to their age and structure, fall into four definite groups:
(1) A basal group of Pre-Cambrian rocks which have all been more or less deformed and metamorphosed.
(2) Intrusive igneous rocks of late Pre-Cambrian age.
(3) Approximately flat-lying sandstone, shale, and sandstone of early Palaeozoic age.
(4) Unconsolidated gravel, sand, and clay of Pleistocene and Recent age.

BASAL COMPLEX

The oldest of the four great groups into which the rocks of the Grenville district have been subdivided—the basal complex—is composed of a heterogeneous assemblage of sedimentary and igneous rocks which, although not all contemporaneous in age, have all been partially or completely transformed to a crystalline or foliated condition as a result of the regional metamorphism to which they have been subjected. In this respect they are in striking contrast with the rocks that succeed them in that the latter are not metamorphosed and retain all the characteristics by which they were originally distinguished. If classified on the basis of age only, the rocks of the complex must be regarded as belonging to only three groups: (1) a group of recrystallized marine sediments constituting the Grenville series; (2) a group of igneous pyroxenic rocks of intermediate composition intruding the rocks of group 1—the Buckingham series; and (3) batholithic masses of granite gneiss and syenite gneiss intrusive into the rocks of both 1 and 2; but the metamorphic action of the pyroxene gneisses of group 2 on the limestone member of the Grenville series has transformed considerable masses of this rock into diopside and related minerals forming a fourth common rock type generally known as pyroxenite.

The rocks of the Grenville series being generally less resistant to erosive agencies, are usually found to underlie the valleys of the district whereas the granite and syenite gneisses which are less easily eroded, form all the prominent hills.

LATE PRE-CAMBRIAN INTRUSIVES

The rocks occurring in the Grenville district, which have been classed as late Pre-Cambrian, are igneous intrusions which are lithologically different from the rocks of the basement complex and, unlike the rocks of the basement complex, have not been greatly deformed or otherwise metamorphosed. On the other hand, no rocks of similar character have been observed to intrude the Palaeozoic sediments which overlie the Pre-Cambrian in the southern part of the district. It is probable, therefore, that these intrusives are not only considerably younger in age than the basement complex but also are older than the Palaeozoic and are, therefore, late Pre-Cambrian in age. They include two separate types of intrusives: (1) diabase dykes and (2) a single stock-like mass of granite, quartz syenite, and quartz syenite porphyry.

PALAEZOIC

That portion of the Grenville district which lies adjacent to the Ottawa river and south of the Laurentian escarpment is underlain by approximately flat-lying beds of Palaeozoic shale, sandstone, and dolomite which protrude here and there as ledges in the stream bottoms or as low east-west trending escarpments. The formations represented by these sediments named in ascending order include the Potsdam (not exposed), the Beckmantown, and the Chazy.

PLEISTOCENE

In common with the whole territory formerly covered by the Labradorian continental glaciers, the bedrock surface of this region is covered by an irregular mantle of glacial debris. This consists in the main of scattered boulders or of irregular knobs and ridges of gravel and sand. In places where the gravel and sand are most abundant deep undrained depressions (kettles) are very commonly present.

Throughout all the lower portions of the Grenville district the Glacial and older formations are overlain by stratified marine clay and sand which form extensive flats in the depressions within the Laurentian plateau up to elevations of 735 feet above sea-level. The character of these deposits varies considerably from point to point, but in the main, the clay beds predominate at the bottom and the sand at the top. In the vicinity of the Ottawa river, the sand occurs in extensive areas, in places with a typical desert-like duned surface.

MINERAL DEPOSITS

The principal minerals of commercial value found in the Grenville district are magnetite, amber mica, graphite, and magnetite. Of these, magnetite is especially important, 38,340 tons of the material valued at \$525,966 having been shipped from the district in 1917.

MAGNETITE

The deposits of magnetite so far discovered in the district occur in the major valleys where they protrude through stratified marine clay and sand in ridges up to 1,000 feet in length and 300 feet in width. They consist chiefly of magnetite and dolomite, intermingled in varying proportions and associated with considerable amounts of serpentine and diopside. The proportion of magnetite free from dolomite or of dolomite free from magnetite in the deposits is therefore very small. Development work has shown, however, that considerable masses of magnetite are present, in which the lime content resulting from the presence of dolomite averages 7 to 10 per cent. The deposits have been so intensely deformed since their formation that the masses of serpentine, dolomite and other variations present have been squeezed out into lenses. From a study of the character and relations of the deposits it has been concluded that they are of metamorphic origin and have been formed by the replacement of the limestone member of the Grenville series through the agency of magnesia-rich solutions.

PHLOGOPITE

Deposits of phlogopite or amber mica are known to occur in the Grenville district on lot 18, range II, Harrington township; lot 20, range XI, lot 9, range VI, lots 16 and 12, range VII, Grenville township. All of these occurrences are of the usual type, consisting chiefly of diopside containing mica as scattered crystals or in irregular leads from a few inches to 3 feet in width.

GRAPHITE

The mineral graphite (plumbago or black lead) occurs widely disseminated through the rocks of the Grenville series and is especially abundant in association with the crystalline limestone member. The principal occurrences of the mineral observed in the district are situated on lot 10, range V, lot 16, ranges II and III, Grenville township; and on lot 15, range I, Harrington township. The most important deposits are those on lot 10, range V, Grenville. These consist of irregular veins or aggregates of graphite, associated with wollastonite, green pyroxene, quartz, titanite, and related minerals of the contact metamorphic types. The largest mass of this type on the property had originally an average width of approximately 5 feet, and a length of approximately 100 feet.

A much more important deposit of graphite is present, however, on lot I, range III, Wentworth township, a locality situated a few miles to the east of the Grenville district. The ore at this point is of the disseminated type and has been developed on the contact of the Grenville limestone and anorthosite.

MAGNETITE

Magnetite occurs in the Grenville district in a number of localities in association with the Grenville sediments. The most important occurrence is found on lot 3, range V, Grenville. In this locality the magnetite occurs in association with calcite, diopside, and other lime silicates in crumpled and broken beds interstratified with quartzite. The deposits are now largely hidden by rock debris, but, according to Sir William Logan who examined the deposits in 1857, the magnetite occurs throughout a width of 6 to 8 yards for a distance of 150 yards; the percentage of iron contained in a large part of this mass is exceedingly small, however, and the deposit as a whole is too low in iron content to have any value under present conditions.

Geology by M. E. Wilson

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