

A REGIONAL STUDY
OF BROMLEY TOWNSHIP,
RENFREW COUNTY, ONTARIO

by

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1. INTRODUCTION

Bromley township is located in Renfrew county in eastern Ontario, approximately 60 miles west-north-west of Ottawa (Fig. 1). The town of Pembroke lies about 10 miles from the northern boundary of the township while the town of Renfrew to the south-east is about 8 miles from the south-east corner. The Ottawa River to the north-east is separated from Bromley by one tier of townships. Running parallel to the eastern boundary about a mile outside the township is Highway No. 17, the main route between Ottawa and Pembroke and North Bay. The village of Cobden is situated on this highway about mid-way between the north and south ends of the township. The village of Eganville is located about 5 miles to the west of the township.

Bromley has an extent of approximately 50,000 acres. It is irregularly shaped, and was not laid out along lines of latitude and longitude but was oriented along the Ottawa River as were the townships to the east. As a result the concessions run north-north-west to south-south-east rather than north to south. It will be easier, however, in referring to directions to assume that the township is laid out more or less along north-south lines. The township is about 9 miles wide at the southern end, while the northern boundary has a length of less than 5 miles. The north-south extent is about 12 miles.

Bromley is a very interesting township from a geographical standpoint. Physiographically it is quite diverse, for within it are seen wooded Precambrian rock ridges standing out in

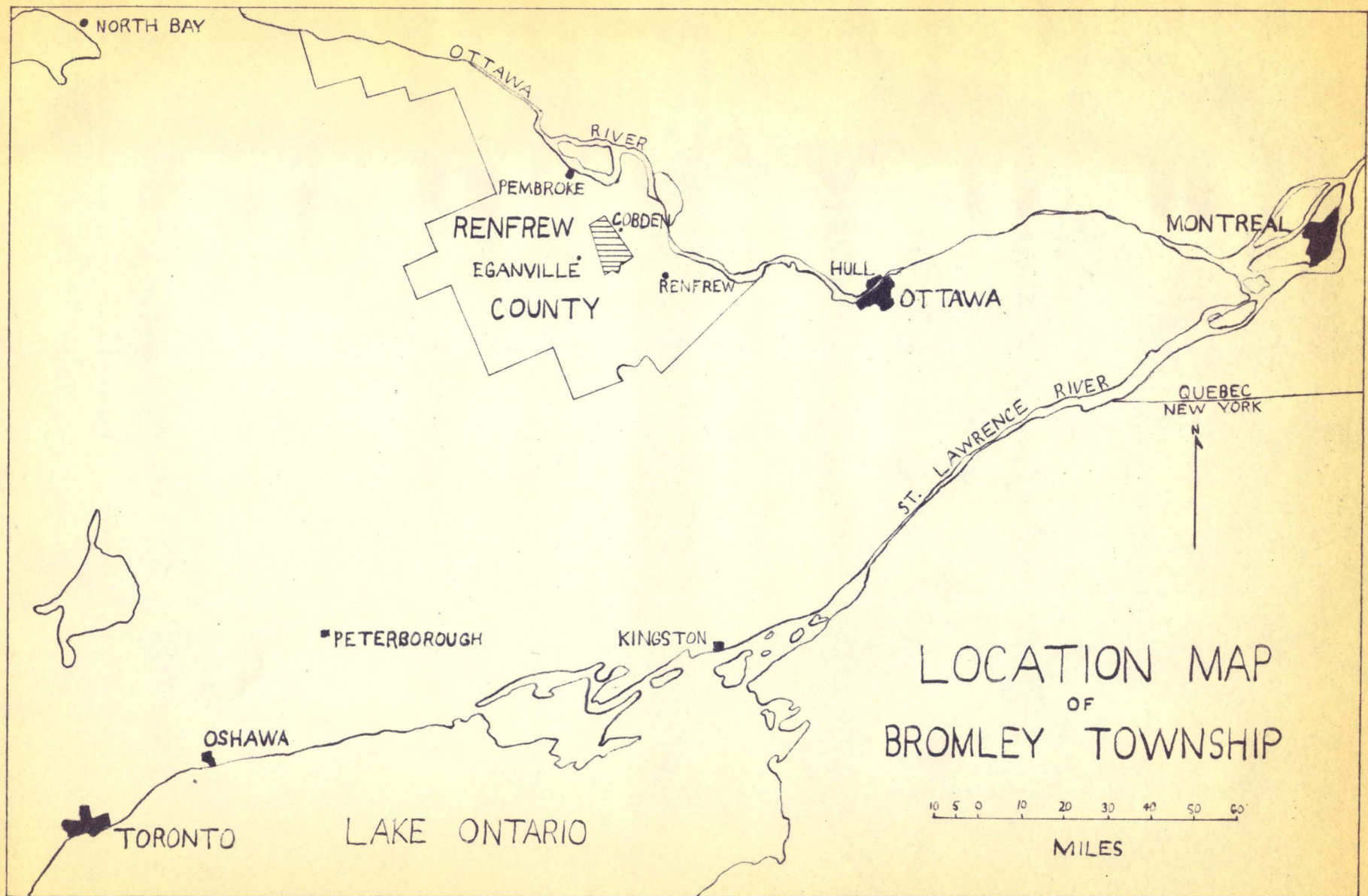


Fig. 1.

contrast to flat clay lowlands cleared for agriculture. Other physiographic types include a till plain, sand plains, and limestone plains. The economy of the township is based primarily on agriculture, almost two-thirds of the population of just over 1600 living on farms. The only centre of any size is the village of Douglas, situated on the Bonnechere River which flows through the south-western corner of the township. Osceola, on the Snake River, is more centrally located but is a very small community.

The primary objective of this study of Bromley township is to reveal the geographic differentiation within the township. In the process we shall discover what characteristics are most significant in creating this differentiation. When we are able to delineate the various geographic regions we shall have a clearer picture both of the varying aspects of the physical landscape and of the cultural landscape which the physical environment influences. We shall gain a better understanding of the variations of the economy within the township and the reasons for certain areas having greater potentialities than others.

The thesis is divided into two main sections. In the first section an attempt is made to describe the physical geography of the township and to show interrelationships between various phenomena. The second section gives an account of the activities of man upon this physical background.

Field work was carried out in the township during the week of September 12 to 17, 1955, with the assistance of Dr. Thompson and Mr. Wood of the Department of Geography of McMaster University, and Mr. McLeod of the University of Toronto. Material was gathered also from the library and from aerial photographs, soil maps, and other sources.

2. PHYSICAL GEOGRAPHY

Structure

The bedrock of the Ottawa valley has been relatively unstable compared to that beneath the rest of Southern Ontario, due to the presence of faults which trend generally from north-west to south-east. The valley itself has been formed along a graben about 35 miles wide. It is bounded on the south-west by the Frontenac Axis, a section of the Canadian Shield which forms a physiographic arch between Algonquin Park and the Adirondacks. On the north-east it is sharply bounded just beyond the Ottawa River in Quebec province by the edge of the main part of the Shield, which rises quite abruptly. Prominent scarps occur on both sides of this basin. On the south-west is the north-east facing bluff known as the St. Patrick scarp. On the north-east is the Coulonge fault-line scarp. Each has a maximum relief of about 1,000 feet. The large down-dropped block between, which is tilted toward the west, has been called the Ottawa-Bonnechere graben (Kay, 1942). The sedimentary rocks overlying the Shield in this depressed area have escaped the full forces of erosion, so that fairly extensive areas of Paleozoic bedrock remain, in contrast to the entirely Precambrian nature of the Shield.

Within the graben are several breaks caused by minor faults. The three south-west facing escarpments which parallel one another immediately inland from the Ottawa River are of greatest interest to us. These scarps form the southern edges of blocks that are tilted northward, and in each case an unfaulted Paleozoic

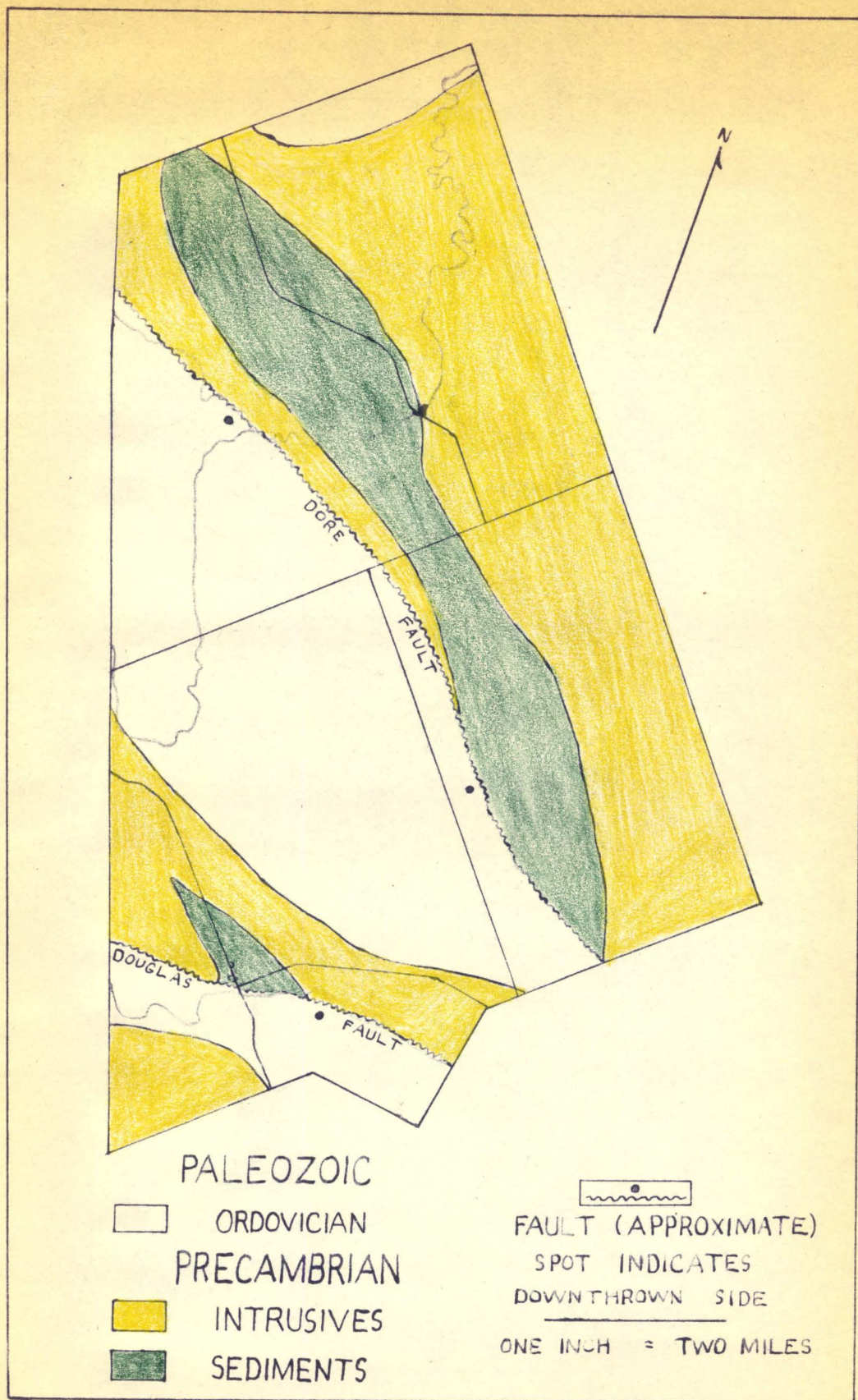


Fig. 2. GEOLOGY OF BROMLEY TOWNSHIP

outlier is preserved at the base of the scarp. The north-easternmost scarp is the Muskrat. It does not enter Bromley township but runs roughly parallel to the latter's eastern boundary. The second scarp, the one having probably the greatest influence on Bromley, is the Dore scarp which extends roughly from the north-west corner of the township through to the southern boundary (Fig. 2). The third scarp is the Douglas scarp which cuts through the south-west corner of the township mainly along the north side of the Bonnechere River. A fourth one is the Pakenham scarp which faces north-east and passes barely outside the south-west corner of Bromley, so that there is a depressed area between the Douglas and Pakenham scarps.

At the foot of the Muskrat scarp is the area of Paleozoic rocks known as the Stafford outlier. It lies mainly in Stafford township to the north of Bromley but its southern part extends for half a mile or so into Bromley. Most of it is deeply covered by marine clays though some small areas of shallower till extend into the township.

At the base of the Dore scarp lies the Bromley outlier which underlies much of the western section of the township and is by far the largest area of Paleozoics in Bromley. Most of this outlier, too, is deeply covered with marine sediments. There is, however, a limestone plain at the western end of the outcrop where the bedrock is close to the surface. Limestone crops out on and south of the Eganville-Cobden road as well. Another area in which limestone is relatively close to the surface lies north-east of Douglas. All these areas are covered with till rather than marine sediments, the last-mentioned

area having a fairly deep covering, obscuring in most places the underlying structure. The dips of the various exposures of limestone are consistently low and towards the Dore scarp.

At the base of the Douglas scarp lies the Bonnechere outlier, a fairly narrow belt paralleling the scarp. Along most of the south-western border the boundary runs across the peneplaned Precambrian surface that passes beneath the sediments. One area of considerable exposure lies south of the Bonnechere River below Douglas. At Douglas dolomite is displayed in the river, dipping north-eastward toward the scarp whose crystalline rocks rise for 150 feet. South of the river, separated from the formation seen at Douglas by a small scarp, are north-east dipping limestones which form a prominent cuesta extending to the south-east, parallel to the Bonnechere. West of Douglas and north of the river there is a northward dipping limestone terrace. The beds dip 30' towards the Douglas fault within 40 feet of the Precambrian which has slickensided and silicified sheer planes dipping 50' southward.

The Precambrian bedrock in Bromley falls into two main groups - sediments and intrusives (Fig. 2). The sediments are the older of the two and do not have so large an extent, though they make up about as great an area of the actual surface outcrops as the intrusives. They consist of crystalline limestone and dolomite with minor amounts of interbedded paragneiss and amphibolite. There is an occurrence of molybdenite west of Osceola. The main area of these Precambrian sediments stretches along the ridge which is formed at the Dore scarp. A small area occurs at Douglas, extending east of

the village along the Douglas scarp and also north from the village (Satterly, 1944, map).

The Precambrian intrusives are younger rocks consisting of granite-pegmatite, granite, and granite-gneiss, intimately associated with hybrid gneisses of igneous and sedimentary origin. Their main area is in the eastern part of the township, and they are found also above the Douglas scarp and in the south-west corner of Bromley.

The Paleozoic rocks are all of Ordovician age, Black River and Trenton being the two formations represented in Bromley. Limestone, dolomite, shale, and rocks intermediate in composition between these types are found.

Drainage

Bromley lies entirely within the Ottawa River drainage system, but is divided between two principal catchment basins. The one is that of the Bonnechere River in the south, while the other is the system of streams emptying into Muskrat Lake which lies along the base of the Muskrat scarp. The Bonnechere follows a course mainly along the base of the Douglas scarp. Its tributaries are fairly short, with the exception of the one which drains the southern part of the clay plain to the west of the Dore scarp. This stream empties into the Bonnechere after it has passed out of the township. The Bonnechere has a rather deep, probably rejuvenated, valley, being cut in Paleozoic limestones above Douglas, and in clay flats below Douglas.

The south-eastern part of the township, on the Precambrian ridge, is drained by the stream flowing into the southern end

of Muskrat Lake. The greater part of the township, however, is drained by the Snake River - Mink Creek system. The Snake River is the outlet for Lake Dore in Wilberforce township to the west. It follows the base of the Dore scarp into Bromley until it turns northward through a gap in the ridge at Osceola and flows sluggishly across the level clay plain towards Muskrat Lake. Mink Creek, which is the outlet for Mink Lake, also in Wilberforce, comes into the Snake River from the south, above Osceola.

Geological History

Evidence strongly suggests that the faulting in the region occurred after and not before the deposition of the Paleozoic sediments. Dips of the Paleozoic rocks are towards the scarps and tend to steepen as the scarps are approached, facts which discount the possibility that the sediments were laid down in synclinal basins after the faulting. We may assume that thick Paleozoic rocks concealed the Precambrian at the time of faulting which probably occurred in the early Tertiary. The faults have trends corresponding to those of joints of earlier origin. They have displacements of as much as 1500 feet. Erosion has exposed the Precambrian surfaces at the scarps and has removed the less resistant Paleozoic sediments, except those at the lowest elevations. The throw of the faults has been determined from the relief of the scarps and the thickness of the Paleozoic sediments in the downfaulted outliers, as seen from stratigraphy and structure. The maximum throw of the Muskrat fault is 250 feet, of the Dore fault 300 feet, and of the Douglas

fault 250 feet.

The ice ages of the Pleistocene had an important effect on the present-day physiography of Bromley. As the glaciers advanced they deposited till, a mixture of unstratified sand, clay, and boulders, over the whole area, both in the valleys and on the uplands. As the glaciers receded, meltwaters from their fronts carried sands over considerable areas. These deposits are known as outwash. Then developed the Champlain Sea, covering most of eastern Ontario and extending up the Ottawa valley well beyond Bromley. In this sea clay was deposited, the material having been washed down from the Laurentian uplands by the Ottawa River as it existed at that time and by other streams emptying into this sea. As uplift of the land proceeded in sympathy with the melting of the last ice sheet the sea gradually withdrew from the Ottawa valley. As it became shallower in the vicinity of Bromley a thin mantle of shallow-water sediments was laid down on top of the clay. This consisted of sand overlain by gravel and cobbles. Subsequent erosion has removed almost all of this layer along with some of the underlying clay. What appears to be an erosional remnant a block south of the Eganville - Cobden road, on the road that runs just west of the Dore scarp, gives us reason to credit the former existence of this layer. There was finally a brief readvance of the sea during which deposits of clay levelled off the surface again.

We shall now describe the various deposits of Pleistocene time in detail (Fig. 5).

Till. Surface deposits of till are quite extensive, especially in the south. Probably the only area which can be truly called a till plain is that which extends north and north-east from Douglas. Over much of this area are drum-linoid features with a north-east to south-west orientation. This fact, together with what we know about the general direction of the advance of the ice in eastern Ontario, indicates that the advance of the final ice sheet was from the north-east in this area. The soils are loamy, with frequent semi-rounded boulders. The farmland is fairly good, though not quite so productive as the clay plains. Some sheet erosion and minor gullying have taken place on the slopes.

Other areas of till in the township are, for the most part, shallower, and have been preserved on the surface because they were deposited on Precambrian and limestone ridges which were elevated enough to escape being buried by marine sediments. One patch of till lies over limestone at and south of the Cobden road. It is composed of much the same type of material as the till plain already described but is shallower and less productive, and has more land left in permanent pasture and forest. Along the western boundary of the township, between the Dore scarp and the Cobden road is a ridge of limestone with a shallow covering of till. It is very stony and hummocky in places, the boulders being derived mainly from the underlying limestone (Illus. 1). It makes poor farmland, the shallower and stonier sections being left almost wholly in permanent pasture and forest.

Along the northern boundary of the township, near the east end, where the underlying bedrock is limestone, three very small tongues of till extend into the township. The one situated right at the north-east corner appears to be a till moraine deposited as the ice advanced from the north-east, so that the more gently sloping side is on the south-west. The other two areas are on limestone ridges which become part of the same ridge where they join just outside the township. There is quite good farmland on all these areas.

Till is found on top of the limestone scarp which extends south-east from Douglas parallel to the Bonnechere River. Steepness of slope has caused this area to remain mainly wooded.

Elsewhere till is to be found over the higher parts of the Precambrian ridges. The Dore scarp has a covering of till for most of its extent south of Osceola. It is a shallow covering for the most part, the underlying crystalline rock cropping out in many places. This type of land is almost useless for agriculture and is mainly covered by forest. Approaching Osceola from the south we find a tract of slightly deeper till, but it too is fairly poor land, being boulder-strewn and rough because of the underlying rock knobs. Some farm abandonment has occurred here. Similar sections of shallow till in Shield areas occur north-west of Douglas and in the extreme south-western corner of the township where rough pasture and woodland dominate.

Outwash. As the ice gradually melted in the Ottawa valley the first areas to be uncovered in Bromley were the higher ridges, notably the Precambrian rocks of the Dore scarp, the Precambrian of the south-west, and most of the limestone ridges.



Illust. 1. Bouldery till on limestone plain near western boundary.



Illust. 2. Looking south-west over clay plain from just above Dore scarp. Rock knob area in foreground.

Ice remained in the valleys where the clay plains now are.

As the ice melted on the eastern, gently sloping side of the Dore ridge meltwaters carried sand and gravel from in front of the ice and deposited them as outwash over the Precambrian rocks of the ridge. The deposits become very shallow westward, with a greater amount of rock outcrop, as the elevation becomes higher. It is mainly on that section of the ridge north of Osceola, where the Snake River valley has made a water gap, that the meltwaters managed to deposit material right to the western edge of the ridge. There is another small section like this just north of the Cobden road. South of Osceola most of the ridge is higher, and shallow outwash has been laid down among the rock knobs only on the lowest sections, which are just inside the eastern boundary of the township. Like the areas of shallow till over Precambrian bedrock these sections are of little use for agriculture, and are left in permanent pasture or woodland.

As the ice in the basin west of the Dore scarp melted the outwash became piled up against the surrounding ridges in some places to form kames. These rather knobby hills consist of irregularly stratified sand and gravel. They were probably more extensive originally before suffering from erosion. One of these hills lies just inside the southern boundary of the township against the Dore scarp, and is the site of a gravel pit. Another kame is to be found in the west against the limestone ridge, about a mile and a half north of the Cobden road.

The largest kame is situated just south of the Snake River at Osceola which is partly built on the northern side of the hill as it slopes toward the river. The meltwaters from the ice west of the Dore scarp evidently used the break in the scarp here as an outlet to the east, the drainage being reversed from what was described above. The sands and gravels in this area are irregularly stratified, revealing that the running water which deposited them was constantly changing its course, perhaps from week to week. In this Osceola kame lines of stratification of the sediments laid down at a certain period lie at an angle to those of the immediately preceding period. A similar smaller area of sand and gravel lies to the north-east and may have been an extension of the larger one before being separated by wave and stream erosion. There is a large gravel pit just south of Osceola which is being utilized for road surfacing material. These outwash areas make fairly good farmland, being well-drained, though having cobbles in some places.

Other areas of gravelly, sandy outwash whose beds are more flat lying are to be found near the western boundary. A small patch along the Cobden road makes quite good agricultural land. About three miles north of Douglas, at the bend in the main road north of that village is a larger patch, though shallower than the last-mentioned one, overlying Precambrian rocks. It is not so good agriculturally as the other area and is largely wooded. An area of sandy outwash is to be seen in the southwest corner, beside the Precambrian in that corner. Most of it is cleared for agriculture.

Marine deposits. As the front of the glacier receded up the Ottawa valley the Champlain Sea followed it in a long inlet. The sea covered the valley for several thousand years, and deposited clay in the hollows between the ridges. The clay is grey in colour and it is only mildly calcareous. It was probably derived from the acidic rocks of the Canadian Shield. The clays in Bromley township, as in most parts of Renfrew county, are fairly silty. This is probably accounted for by the proximity of the mouths of the Ottawa River and other streams as they emptied into the Champlain Sea to deposit the coarser materials nearby. The clays now have a nearly level topographic expression and drainage is particularly poor in certain areas. Some large sections of marsh exist, especially on Mink Creek, just after it enters Bromley, and on the Snake River, just before it leaves the township. Most of the clay plain section is of considerable depth.

The clay plains are the most productive parts of the township agriculturally. There is very little woodland and permanent pasture; cropland dominates the scene (Illus. 2, 3 and 4). Poor drainage in a few places is a drawback to crop-raising.

As the ice moved farther and farther north, releasing the land from its ice load, there was a gradual crustal upwarping in the Ottawa valley so that the Champlain Sea became shallower in Bromley. Sands and gravels were laid down over the clay in much of Renfrew county as deltas at the mouth of the Ottawa River. As uplift continued the sea retreated farther down the Ottawa valley, and the recently deposited gravels and sands became subject to erosion by streams. These surface deposits



Illust. 3. Scene on cultivated land of clay plain, looking north-east toward Dore scarp.



Illust. 4. Looking north-east across clay plain from top of limestone ridge south-east of Douglas. Trees in middle distance line Bonnechere River. Dore scarp appears on horizon.

were carried away, along with some of the underlying clay, until only the erosional remnant south of the Cobden road remained, between the headwaters of the two local drainage systems. There was then a readvance of the sea and a deposition of clay a second time, levelling off the surface which had suffered stream erosion. This second sea is known in the region as the Ottawa Sea (Antevs, 1939). We may assume that the erosional remnant mentioned above was formed before the time of the Ottawa Sea, for the top of the clay layer in this remnant is higher than the surface of the clay which surrounds it. Since the Ottawa Sea deposits did not reach the level of those of the Champlain Sea we can conclude that the deposition of the Ottawa Sea was not so long-lived as that of its predecessor. The sea then left the region for the final time. Sand and gravel were not deposited to any great extent on top of the clay at this time, probably because of a change in the course of the Ottawa River toward the east.

The latest deposits consist of a few minor patches of reworked outwash over the marine clay. Some of these are found in the western part of the township south of the kame previously mentioned. Waves washing on the kame carried out some of the material and deposited it thinly nearby. There are also small pockets along the eastern boundary between the Cobden road and the southern end of the township. Sand was carried out from the outwash on the rock knobs and deposited thinly over the clay.

Climate

The climate of the upper Ottawa valley is distinctly affected by the proximity of the Laurentian uplands, especially the Algonquin Park area. The uplands of Algonquin Park lie athwart the prevailing winds which have passed over the extensive water surface of Georgian Bay and other parts of the upper Great Lakes. Heavy precipitation falls on the windward slope while the leeward areas around Renfrew county tend to be rainshadows where precipitation is less.

Whereas the lowlands of south-western Ontario are open to the moderating influence of winds across the lake waters, the lowlands of eastern Ontario are climatically controlled by land areas. In winter they receive the advancing cold waves from both north-west and north-east. All of Southern Ontario is directly in the path of westerlies as well as the majority of cyclonic storms, which pass from west to east making the climate stormy. The passage of cyclones and anticyclones produces weather fluctuating in cycles of from two to five days - from mild to fine and cool, to rain or snow, and so forth.

The mean annual temperature in the Renfrew area is about 40°. The winters are cold, averaging about 13°. The springs average about 39° or 40°, and the summers 64° to 66°. The mean fall temperature is 44° or 45°. There is a wide range between the highest and lowest temperatures ever recorded in the Renfrew area, being 143°: from 40° below to 103° above. The tendency toward extremes is shown also in the mean daily range

of 22°. It is as much as 26° in July (Putnam and Chapman, 1938). This tendency to extremes is due mainly to distance from the Great Lakes.

There is considerable areal variation in the mean annual precipitation of the Renfrew district. The town of Renfrew has less rain and snow than Pembroke, but it is not known precisely what the situation is in Bromley township, lying between the two towns. Since Renfrew is the closest weather station for which climatic data are available, evapotranspiration figures were worked out for Renfrew (Fig. 3). There is an annual precipitation of 26.5 inches. Calculations show that there is a moisture deficiency totalling about 3 inches during the period from July to September, which means that there is a need for irrigation if crops are to have optimum growing conditions. This is especially true of the sandier areas where drainage is excessive. The moisture surplus of about 7.5 inches which comes from December to April is largely in the form of snow, and thus does not all run off immediately. We may expect Bromley to be a bit moister than the station at Renfrew, lying as it does in the direction of Pembroke where more precipitation is recorded. The whole region, however, tends to be somewhat dry, so that there is, in all probability, a moisture deficiency in Bromley too.

The last spring frost comes between May 24 and June 1, and the first fall frost occurs about September 20. Frost is a real hazard, July being the only month in which it has not been recorded. In areas removed from lake influences there is

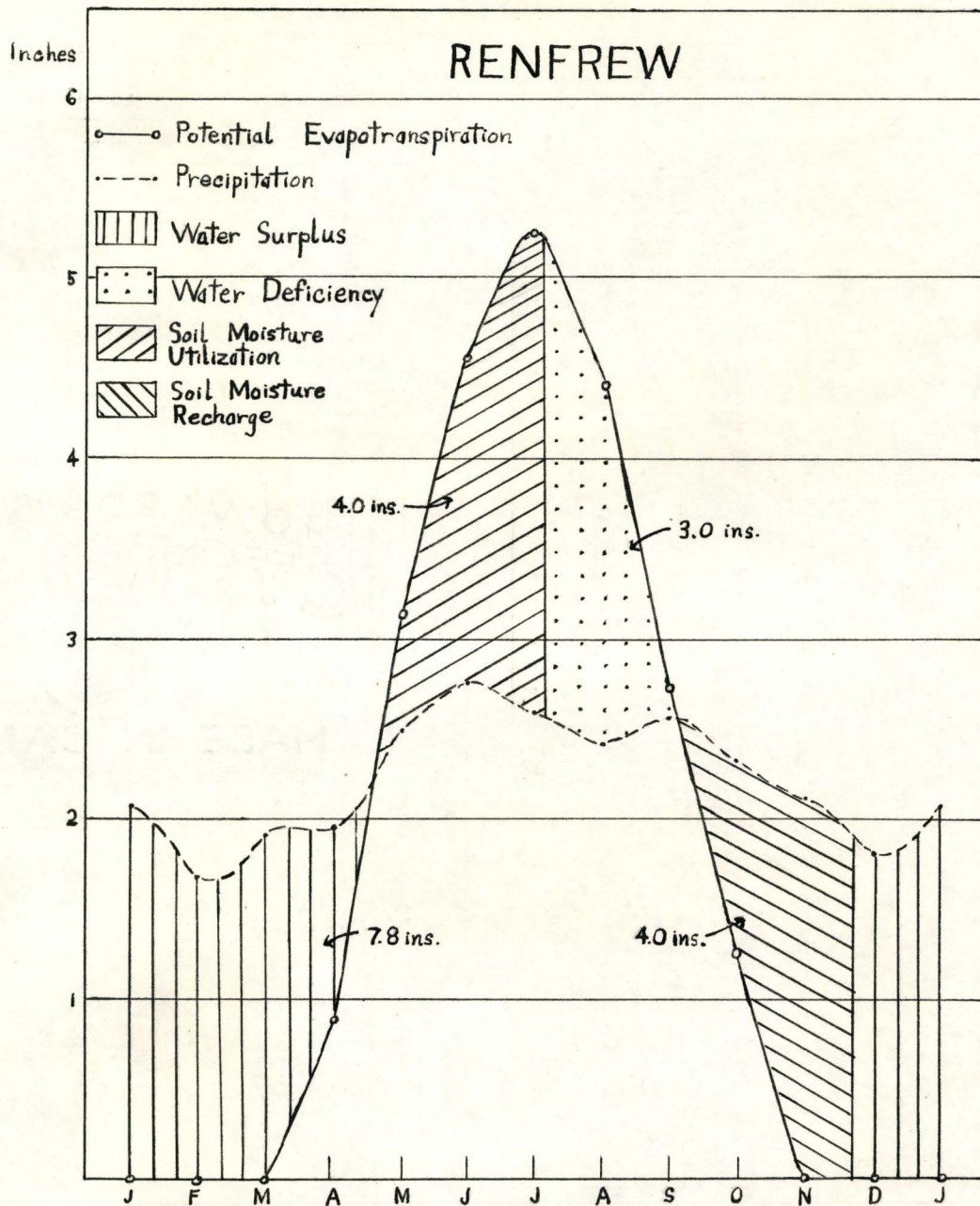


Fig. 3.

MOISTURE RELATIONS
(After Thornthwaite)

considerable variation in frost dates. The "lay of the land" and its effect upon air drainage, and thus upon the occurrence of frost, is an important factor in choosing sites for special crops. The low lying clay plains in Bromley are probably somewhat more susceptible to early and late frosts than are the uplands. The growing season, which includes those days with a mean temperature of 42° or higher, has a length of 185 to 190 days. It lasts from April 16 or 20 until October 21 or 25.

In summary we may say that Bromley is a typically cool inland region with a moderate rainfall suitable for general farming with hardy varieties. It cannot be considered safe for any of the special crops like tobacco, tomatoes, and various small fruits, which require a much less extreme type of climate.

Natural Vegetation

As in the rest of Southern Ontario the original vegetation cover of Bromley was a dense forest. The forest, however, except for that on the Precambrian ridges, has been practically all cleared by pioneer farmers and by lumbermen. This is especially true of the clay plains.

Climate has had a marked influence on the vegetation of this area. The cold winters gave rise to an original cover of spruce and pine on the clay plains of Renfrew, while on clay plains in slightly milder sections of Ontario a deciduous growth predominates. The till lands support a maple-beech forest in the uncleared areas, along with some white cedar. On the sandy areas there were originally some very fine stands of white and

red pine, but these were the main targets of the lumbermen. Some second growth pine is found to-day on these sections together with poplar, soft maple, and white birch. On the boggy lands there are quite extensive marginal forests of tamarack, black spruce, black alder, and black ash, as well as white cedar (Chapman and Putnam, 1941).

On the shallow soils overlying the knobby Laurentian rocks we find a mixture of evergreens and hardwoods. There were once some good stands of white pine too. Some second growth pine exists but, in general, the forest is now very mixed, and includes sugar maple, yellow birch, hemlock, white spruce, balsam fir, and many other species.

Soils

Renfrew county is near the southern border of the podzol zone. Proof of its location lies in the extensive occurrence of grey-brown podsollic soils and weakly developed podsols. They usually have only a thin grey A2 horizon in well-drained locations.

Climate and vegetation, which have already been discussed, are important soil-forming factors. Climate influences vegetation which in turn has a marked influence on soil development. A striking example of this is seen in the contrast between the clay soils of Renfrew county and those of the clay flats along the Carp River in Carleton county. In Renfrew we find an acid podsollic clay with a thin surface layer, and an ashy grey leached horizon beneath. This profile has developed under spruce and pine. In the Carp valley, on the other hand, there

is a dark surface layer of 3 to 6 inches. It is neutral in pH reaction and does not have a well-developed leached layer. It has developed under elm, ash, and soft maple, with some swamp white oak (Chapman and Putnam, 1941).

Bedrock geology also influences the formation of soils. Glacial till consists mainly of broken rock and rock flour from the underlying formation, whether sedimentary or crystalline, though the softer rocks lend themselves more readily to being broken off and ground up. On the other hand the material in the marine sediments in Renfrew county came from outlying sources, that is, from the surrounding Laurentian highlands. Weathering has been going on since the land emerged from the sea, which was only about 5,000 years ago (Chapman and Putnam, 1941), so that the soils are quite young. The younger the soils the more immature the profiles tend to be. Young soils also tend to be shallower, less acid, less heavily leached, and higher in humus than older ones, although the colder climate of the Renfrew area has had a counterbalancing effect, resulting in more severe leaching under the coniferous forests. In younger soils there is a greater influence from the geological materials from which they have developed. There is a strong correlation between parent material and the chemical and some of the physical properties of soils.

The most extensive single soil type in Bromley is the acid clay loam. In its virgin state it has a very shallow surface layer underlain by an ashy grey layer of mealy clay loam which may vary from a few inches to a foot in depth. It is mainly

this layer that forms the plowed soil in cultivated fields. The parent material is a marine clay of fairly uniform drab colour. As a rule free carbonates are lacking throughout. The natural vegetation was spruce and pine forests which encouraged leaching. This type of soil is a very good example of a podzol clay.

Flatness of terrain and freedom from stones mean that the clay plains can be cultivated very easily. Except in hollows where drainage has not been provided the soil dries up early in the spring. Despite its low organic content and the severe leaching the soil is quite fertile. Like all Southern Ontario soils it is low in available phosphorus, though higher than most soils, the parent clays having contained a good supply of phosphatic minerals. It is well supplied with potash, a fact which may be connected with the large amount of alfalfa grown.

Some sections of the clay plains have a soil known technically as clay loam (sand-spot phase). In this soil clay appears at the surface over most of the area and underlies patches of sand at less than 3 feet elsewhere. The drainage in the sand is good, though where it is shallow an impervious layer tends to form at the top of the clay underlying the sand, impeding drainage considerably.

Fairly deep loam soils developed on limestone till are present in the area north and north-east of Douglas, and in the tiny sections along the northern boundary of the township. The surface layer is 2 to 4 inches in depth, consisting of dark brown, granular, stony loam. The leached horizon is faintly

developed and is usually less than 3 inches thick. Below this lies a coffee-brown B layer, overlying the grey, stony loam till about a foot and a half from the surface. It is neutral or slightly acid in reaction, and has abundant lime, a medium humus content, and low potash content. Like the clay it is low in available phosphorus, though better supplied than some other Southern Ontario soils. The terrain is gently rolling, so that cultivation is not hindered by steep slopes. The stonier sections have been left wooded.

On the shallow limestone plain along the western boundary, and on the limestone ridge south-east of Douglas a stony loam soil has developed. It is mostly only a few inches deep over the bedrock, shallowness and drouthiness being its chief characteristics. The main agricultural use of the land is for pasture. The drouthiness does not make it economically worthwhile to apply commercial fertilizer.

A somewhat similar section exists north-east of the area of deep till, mainly south of the Cobden road. This section consists of stony loam but it is not quite so shallow as that described in the preceding paragraph. Stoniness keeps it, too, mainly in woodland and pasture.

The gravelly sandy loam soils are light, excessively drained, and developed on undulating terrain. General farm crops are grown on these soils. The most desirable type is that where there is a foot or two of fine sand covering the gravelly and stony material so that the stones do not interfere with cultivation. The soil is low in most plant nutrients, but it can be

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built up to a sufficient level through applications of commercial fertilizer, as well as barnyard or green manure to maintain a good organic content.

The sandy loam areas on the lowlands, where reworked outwash has covered marine sediments, consist of a soil complex of 3 or 4 feet of fine sand and silts over the clay. Drainage tends to be rather poor due to the impermeability of the clay base. This soil is chiefly used for general farming.

The final soil type to be discussed is the shallow soil of the rock knob areas. Its texture varies between clay, loam, and sand. The main sandy area lies north of Osceola, having developed on outwash. South of Osceola most of the soil is loam developed on till. Most of the soils of the rock knob areas are interrupted by frequent rock outcrops, making them suitable only for forest growth, though there is some rough pasture. A deeper loam has developed on till areas on either side of the Cobden road as it crosses the Dore scarp. There is more agriculture in this area, most of the land being used for pasture and hay. The sand north of Osceola deepens toward the north end of the township, and here too agriculture is carried on. The profile of all the soils on the rock knob uplands is that of a weakly-developed podzol, the grey A2 horizon seldom being as much as two inches thick.

Natural Regions

In dividing Bromley township into natural regions we may identify six different physiographic types. These are the clay

plains, the rock knob uplands, the limestone plains, the sand plains, the till plain, and the marsh.

The clay plains occupy the largest area of all. They include all the areas of marine sediments except the marsh. Included as well are the small level patches of thin sand on the clay plain which are too small and too similar agriculturally to the clay plain to be separated out. The rock knob uplands include all those parts of the Precambrian uplands where the soil is too shallow for us to divide the region into separate physiographic types based on soil texture. The limestone plains include the areas of relatively shallow till over limestone. The sand plains include the hilly areas of kames as well as the deepest section of the sands over the rock knobs in the north. The areal extent as well as the depth of these sands seem to warrant their being placed in a category separate from the rock knobs. The only area which can be called a till plain is the section north-east of Douglas where the drift is thicker than elsewhere in the township. In the category of marsh are included areas which are too wet for agriculture, though in most cases there are trees growing on them.

3. HUMAN GEOGRAPHY

Historical Geography of Settlement

Settlement did not push into the upper Ottawa valley until fairly late in the history of Upper Canadian Settlement. This was a lumbering area for many years and the townships were slow in being settled. The area was not opened up until after the land for a considerable distance north of Lakes Erie and Ontario as well as the lower Ottawa valley had been settled. By 1830 only the south-east corner of Renfrew county, around McNab township, had been settled. Settlement extended first along the Ottawa River beyond McNab, the townships of Horton, Ross, and Westmeath soon being opened up. The frontier was then pushed inland, Bromley being opened up in 1843 together with Stafford and Pembroke townships to the north.

Our township took its name from Bagot's Bromley, the chief residence of the Bagot family, situated in Staffordshire in England. Sir Charles Bagot, a member of this family, was Governor of Canada in 1842 and 1843.

An advance of settlement into the lowlands of Renfrew county was encouraged by lumbering operations along the Ottawa. In the early days following the opening up of Bromley and neighbouring townships the cultivation of the soil occupied little of the time or attention of the inhabitants, most of whom were merely a floating population based on lumbering. The raising of farm produce, however, gradually became more important in

this area. As lumbering operations receded, year by year, from the more settled localities in the south, thus causing an increase in the expense and trouble of bringing the necessary supplies to the camps it became necessary to raise as much produce as possible near the seat of lumbering operations. Some of the great lumber merchants themselves established farms in this area. The settlers, being able to command high prices for their produce, especially hay and oats, the former of which was too bulky to bring from a distance, thus could farm successfully and profitably, despite such drawbacks as long, severe winters and high wages to their hired men.

As lumbering became less important in the Renfrew lowland area, and the market and part-time work provided by the lumbering industry in the immediate vicinity disappeared some depopulation and farm abandonment occurred on the poorer sections of land such as the Precambrian ridges. Most of the farms on these poorer areas were never much more than part-time, supplying the shanty market with a few cash crops, especially hay, both wild and cultivated (Richards, 1955). As a result, when the lumbering market was lost, abandonment of the work farms was the logical result, since the land was too poor to bring sufficient profits from other types of farming. Farm abandonment has been taking place right up to the present day.

Early data (Smith, 1851, pp. 347-51) reveals that by 1847 there were two common schools in operation in Bromley, and a third was added by 1849. Two sawmills existed in 1848, but there were no grist mills, as was typical of the townships located this

far north, where the emphasis was more on forest activity than on tilling the soil. The Bonnechere River lent itself to saw-mill operations both as a source of power and as an aid to transporting logs from the site of lumbering operations farther upstream. Since it flows in a narrow, entrenched valley it was easily dammed for water power. The location at Douglas is particularly good, since the river is forced between limestone on one side and crystalline rocks on the other in following the base of the Douglas scarp. At about this same time, in the late 1840's, a settlement called Palmerston was started on the Bonnechere at the present site of Douglas. It had a post office and served the surrounding area in other ways.

The 640 inhabitants of 1850 were a small number compared to the population of townships like Horton and Westmeath, along the Ottawa River, which had been opened up earlier. There was, however, a fairly steady influx of settlers to Bromley. Cultivated land increased from 1,325 acres in 1848 to 1,610 acres in 1850. The total number of cattle increased from 160 to 250 in this same two-year period. Considerable numbers of sheep and hogs were introduced at the same time.

A second post office was established, at Osceola, in the early 1860's by Irish settlers. This site attracted settlers, since the hilly country in this area resembled the section of Ireland from which they had come. The land in this area, however, was not so productive, owing to the shallowness of the soil or its absence over the Precambrian rocks.

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The original settlers of Bromley township were predominantly Irishmen who had come to Canada following the potato famine in Ireland in 1846. A sizable settlement was made in an area which included Bromley and half a dozen of the neighbouring townships. Of Bromley's population in 1850, 80 to 90 per cent were Irish in origin. There was also a small settlement of Lowland Scots made in these early years, responsible no doubt for the renaming of the post office of Douglas in the mid-1850's. Another group of settlers, originating in Germany, came to Renfrew county around 1860, of whom a small group settled in Bromley (Hunter, 1901). The flat-roofed houses common in the area represent a German type of architecture. Since the early days of settlement people of other nationalities, especially English, have come to Bromley. In recent years many Poles have been buying farms in the township. The people are still predominantly of Irish extraction - probably around 50 per cent of the total population of 1628 - with Scots the second largest group.

As is to be expected from the dominant Irish strain, the population of the township is predominantly Roman Catholic, 53% of the people belonging to this faith. There are large Roman Catholic churches at Douglas and Osceola. United Church members make up 26% of the population. The remainder of the total is comprised of Presbyterians and Lutherans (each 7%), Anglicans (3.7%), Baptists (1.2%), and other denominations (about 2%).

Economic Geography (Historical and Present)

From the earliest years until the present oats has been the leading grain by acreage in Bromley. Wheat was important

for a considerable time also, but has decreased very greatly in importance over the last 30 years, due probably to the opening of western Canada more than to any other cause. According to the 1951 census there was more barley sown than wheat; as wheat acreage has declined barley acreage has tended to increase. Oats has dominated grain growing, due mainly to its adaptability to the cool climate. The acreage in oats, however, is considerably less than that in hay, which implies that livestock and dairy cattle in particular must have an important place in the economy. By far the greatest acreage of cropland is located on the clay plains where flatness of terrain and freedom from stones facilitate mechanized tillage. The till plain also has a considerable proportion of its area under crops.

Of the total occupied land of 45,900 acres, 26,000 acres are improved and 17,100 acres are under crops. Of the area under crops, 8,900 acres are in hay, 5,180 in oats, 888 in barley, 742 in wheat, 31 in rye, and a total of 1,150 in mixed or other grains. Of the 19,900 acres of unimproved land, 8,560 are wooded, by far the greatest proportion being found on the Precambrian ridges. The remainder of the unimproved land comprises chiefly rough pasture and marsh. The rough pasture is also largely on the Precambrian ridges but much is to be found on the shallow and stony sections of the sand plains and limestone plains. Marsh is most extensive on the low lying parts of the clay plains.

While total numbers of cattle have not greatly varied in the last 20 years, the proportion of dairy to beef cattle has

decreased greatly. Milk cows declined from 2,500 in 1941 to 2,170 in 1951. Over the same period beef cattle increased from 569 to 1,140. The clay plains are increasing in importance as far as beef cattle are concerned, especially the section east of the Dore scarp. Sheep have shown a marked decline in recent years, from 4,150 in 1931 to 1,670 twenty years later. Farm abandonment in the rougher and shallow-soiled areas may be one reason for this. Swine, of which there were 1,980 at the last census, have been maintained at about the same numbers during recent years. The same may be said for poultry; there were 10,000 hens and chickens (6 months old and over) in 1951, and a total of 21,800 other poultry. The place occupied by swine and poultry in the agricultural economy helps to point out the general nature of the agriculture. Long winters, when other activities on the farm slacken off, have encouraged the raising of hogs and poultry as a supplement to farm income.

There are 213 occupied farms in Bromley, of which only 59 are of less than 130 acres; 131 farms have between 130 and 400 acres. The reason for the large average size is that many farmers own a tract of woodland on the uplands in addition to their arable land. Farm values in 1951 totalled \$3,567,000. Of this amount \$1,470,000 was on land and buildings, so that the average value is about \$32 per acre. \$698,000 was on implements and machinery (including automobiles), and \$1,399,000 on livestock. Farm values are highest on the clay plains, but are fairly high on the till plain as well. Most of the capital

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in the form of implements and livestock is concentrated on the good farmlands of the clay plains.

Regional Geography

We shall now examine the various geographic regions in detail in an effort to determine the differences in the economic base within the township in their relation to the geographic regions. Whereas the selection of the natural regions was based upon the elements of the physical landscape - geomorphology, climate, natural vegetation, and soils - the selection of geographic regions is based upon a combination of physical and human elements. Since the physical factors are strongest in our township the boundaries of the geographic regions may be superimposed upon those of the natural regions already discussed. Thus we have six geographic regions: the clay plains, the till plain, the limestone plains, the sand plains, the marsh, and the rock knob uplands (Fig. 4).

Clay plains. The clay plains form a distinct geographical region for many reasons. They coincide essentially with the flattest sections of land in the township. Clay soils make up most of the surface of this region, in contrast to the coarser-textured soils of other regions. Spruce and pine forests were the main natural vegetation of the clay plains, a fact which can be related to the acid nature of the soil and to the cold winters. The clay plains coincide with the areas containing the most prosperous farms, and where crop-raising has its greatest development.

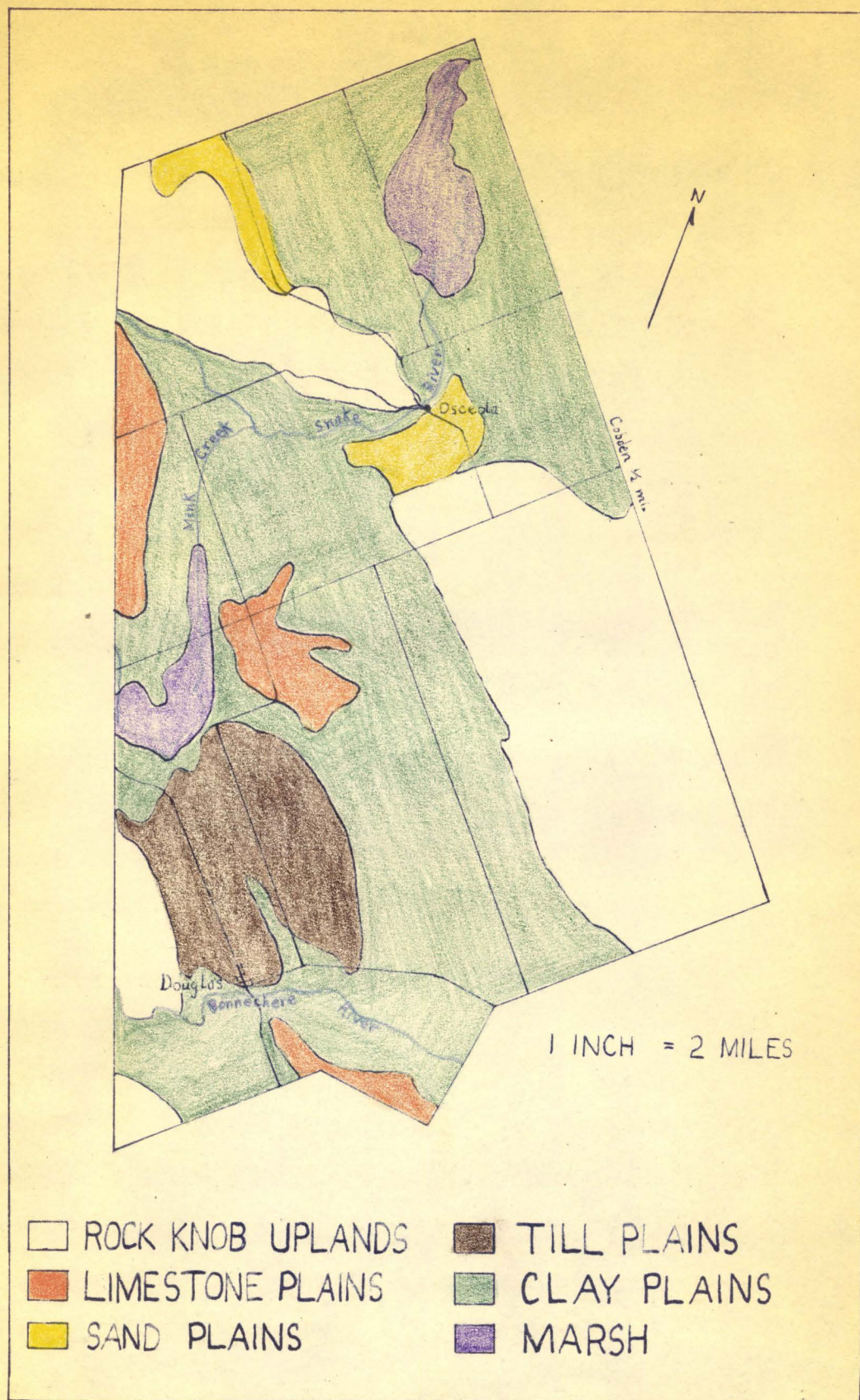


Fig. 4. GEOGRAPHIC REGIONS
OF
BROMLEY TOWNSHIP

Though crop farming is stressed on the clay plains the region must still be classified as one of general farming. It is true that cropland tends to dominate the scene rather than livestock, as only a small proportion of this virtually non-forested region is under pasture. Most farms follow an extensive cropping system with large areas of spring-sown grain. As a rule the early-sown crops mature much better than the late-sown ones, owing to the light rainfall of the late summer months. Poor drainage in some areas, however, causes late sowing, as the land does not dry out sufficiently until late in the spring. A striking feature of the agriculture is the number of good fields of alfalfa, used for hay and seed. This may be encouraged in part by the low rainfall as well as by the abundance of potash in the soil. The clay plains have a very good reputation for good, clean seed grain, due to the relative absence of weeds compared to some other parts of the province. Seed is most important in cropping on the clay plains. There are some excellent beef and dairy herds (Illus. 5), even though the emphasis is on crops. Hogs, sheep, and poultry are kept on most farms. At the southern boundary of Bromley is located the only cheese factory in Renfrew country (Illus. 6). Milk is sent here, not only from the clay plains but also from the till plain nearby, as well as from a wide area outside the township. There is a production of 60 to 80 tons of cheese per year. This is sent to the Kemptville cheese marketing board. What remains of the whey is sent to Perth in return for butter.



Illust. 5. Dairy farm on clay plain just west of Cobden.



Illust. 6. Cheese factory on clay plain at southern boundary of township.

The farm homes are usually large square frame or brick houses, rarely stone. They are often accompanied by rather second-rate barns which are often of the "small and numerous" pioneer type. There are many log buildings, used for such things as pigsties and sheepfolds even on farms where large frame barns have been built (Illus. 7). Most fences are of wire but many rail and stump fences are still used.

There will probably be an increase in urban markets as Ottawa and the smaller towns of the upper Ottawa valley expand in the future. Thus a further specialization in dairying and horticulture with a gradual disappearance of the older general crop system may result.

Till plain. The till plain is easily distinguished from the clay plains by its undulating relief and the occurrence of loam rather than clay soils. There are still some remnants of the original maple-beech forest cover. Agriculture has been affected somewhat differently here from the clay plains, mainly because of stoniness and the fact that there is a greater percentage of sloping land.

The till plain is the site of a general agricultural economy also, but the emphasis here is on dairy farming. Because of stoniness and greater susceptibility of the sloping land to soil erosion more of the cleared land is on pasture than on the clay plains. The crops which are grown - alfalfa, oats, barley, and silage corn - are the staple dairy farm crops and all are quite well adapted to this type of land. One factor which encourages dairy farming is that the porous nature of the soil and substrata ensures a good supply of well-water. Some farmers



Illust. 7. Typical farmstead on clay plain.



Illust. 8. Farm buildings on till plain just north-east of Douglas. Note the composite log barns.

send their milk to the cheese factory while others send cream to the creamery in Douglas. As on the clay plains hogs, sheep and poultry also enter into the economy in a secondary manner. The long winters, when income from dairying is lower than at other times of the year, are one reason for these important sidelines.

The farmsteads are not quite as prosperous looking as those on the clay plains. There are many log barns, often composed of various sections added on to the original building as the early farmer could afford them (Illus. 8). Rail fences with boulders heaped along them are more common than wire ones.

Limestone plains. The limestone plains are related in some ways to the till plain. They have a covering of till and have a tendency to be rolling. The original vegetation was of the same type in each region. The basis for making the limestone plains a separate region is the fact that soils are shallower and stonier than on the till plains, and so agriculture cannot be carried on to as satisfactory a degree.

Agriculture on the limestone plains is basically submarginal, that is, the land does not possess the qualities needed for a prosperous agricultural economy, and is used only because the better land is completely occupied. This type of agriculture yields only a subsistence income. In other words, those who work the land have only about enough produce for their own use with little remaining to sell at most times. The main use of the land is for pasture, though oats and hay will do well where the soil is sufficiently deep and not too stony. Milk or cream

and hogs are the main products, while the sale of cows occasionally supplements the rather meagre income from other sources. Sheep are kept in some places. Other products include maple syrup and turkeys as well as cord wood and logs from the woodlot. There has been some farm abandonment and amalgamation, a trend which will probably continue in the future.

Sand plains. The basic characteristic of the region known as the sand plains is the coarse texture of the soils. Most of the sands and gravelly sands in the township find themselves included in this region. The relief varies from gently undulating to strongly rolling. There is a fairly distinctive type of vegetation in this region, pine being typical along with poplar, maple, and birch.

The sand plains are not particularly important in the agriculture of Bromley. The farms are quite large, being of the mixed farming type, and their main activity is the raising of hay and oats. As market conditions improve, specialized and truck crops may be raised. Potatoes do quite well on this type of land. Considerable fertilizing and manuring is necessary to maintain a sufficient quantity of plant nutrients and organic matter.

Rock knob uplands. The rock knob uplands are possibly the most distinct region in the township. They are marked by many rock outcrops, shallow soils, and rough land in general. Perhaps the most noticeable feature is the fact that most of this region has been left in forest, in contrast to the generally cleared areas elsewhere in the township.



Illust. 9. Abandoned farmhouse on shallow, sandy soil at edge of Shield area north-west of Osceola. The larger barn appears to be still in use.



Illust. 10. School on the clay plain. Dore scarp appears in background.

The rock knob uplands are, in the main, non-agricultural. Some land was cleared in the early days of settlement, but much farm abandonment has taken place since the decline of the lumbering market (Illus. 9). The farms which exist are largely part-time and do not produce profits for the owners. Agriculture is upon less intensive methods than elsewhere, with little production of forage crops and greater use of the land for pasture and rough grazing.

In a sense the crystalline ridges form a complement to the clay plains, which have been deforested, making fuel scarce. As a result many farmers on the clay plains have secured woodlots on the rock knobs for firewood as well as to obtain marketable pine logs. The use of these areas as pasture for young cattle and dry cows is questionable, owing to drouthiness and low carrying capacity of the plants. In addition, the grazing of cattle tends to hinder regeneration of the woodlots, which, after all, are the most important resource of this region.

Urban Geography

The village of Douglas in the south-west is the only community of any size in the township. As well as serving the southern section of the area west of the Dore scarp it also influences sections of Admaston township to the south and Grattan township, which adjoins Bromley's western boundary south of the Bonnechere. Along the Cobden road and north of it the influence of Cobden is stronger than that of Douglas.

Douglas has a population of 450 or 500. It may be considered a linear village on two streets. The reason for the location at this point on the Bonnechere is the fact that the river was easy to dam for power. A large feed mill to-day takes advantage of this power (Illus. 11). The main street of the village descends to the Bonnechere from the top of the Douglas scarp on the north. Most of the stores and other services are located on this street. The other principal street runs eastward, being the road which runs north of the Bonnechere towards Highway No. 17 north of Renfrew. There are a few short side streets as well. Most of the houses are located on these streets.

A C.P.R. line runs through the town on a lower terrace along the north side of the river where the level land made railway construction easy. It is not an important line, merely joining Renfrew and Eganville. A C.N.R. line passes to the south-west of the town. It runs between Renfrew and Parry Sound.

Besides the feed mill the creamery also plays an important part in the agricultural life of the surrounding area. Most of the butter is shipped to Toronto but a small amount is sold locally. The creamery is the only one for quite a wide area round about, the cream coming from as far as Pembroke on the north, and from 40 miles away to the south. An egg grading station and frozen food lockers also serve the area.

Other services in the town include two gas stations, two barbers, a post office, a small bank, a hardware store, a hotel, and three or four small grocery or general stores. There is an auto-wrecking lot south of the town. A small public school is



Illust. 11. Feed mill on north side of Bonnechere River at Douglas. Dam is seen, in part, in left foreground. Douglas scarp rises behind mill.



Illust. 12. Roman Catholic church at Osceola.

located in the village. North of the village there is a Roman Catholic church, convent, and school for primary and secondary school students. Protestant high school students attend Eganville High School or Renfrew Collegiate, being transported by bus to both places.

Most of the people living in the village work outside the immediate area. Employment is provided in Renfrew, at the magnesium plant at Haleys north of Renfrew, and at the military camp at Petawawa.

The centre of Osceola does not serve a very wide area. About the only services are a general store, a church (Illus.12), and a school; but it is not far to Cobden, where other services are obtained. A large proportion of the people living in Osceola are retired farmers.

Cobden, outside the township, must be mentioned in passing, in that it serves the section of the clay plain east of the Dore scarp and also some of the area west of it. It has almost twice the population of Douglas, so that its influence is somewhat more widespread.

Transportation

There are no provincial highways in Bromley. The main roads, however, are hard surfaced. These include the Cobden road which leads westward from Cobden through the middle of the township, the only road to run completely across the township, and a few of the other roads. These are the road running north and south through Douglas, the one running south-east from

Douglas, north of the Bonnechere River, and the one running south from the Cobden road west of the Dore scarp, through the prosperous agricultural area on the clay plain. The road running north and south through Osceola is in the process of being improved.

4. CONCLUSION

We have already decided upon the geographic regions of Bromley township. These are the clay plains, the till plain, the limestone plains, the sand plains, the marsh, and the rock knob uplands.

The most important factors in creating these differences are faulted structure, differential erosion, glaciation, post-glacial inundation by marine waters, and other more recent processes. Man has merely taken over the varied landscape and adapted himself to it.

Owing to the presence of major faults differential erosion has created a clear distinction between the rock uplands and the drift deposits lying in the basins between. Faulting and later erosion have been perhaps the fundamental factors in making for differentiation within the township. Glaciation has also played an important role. The advancing ice sheet had a scouring effect on the ridges, exposing the rock knobs in many places and leaving only a thin mantle of parent material. Thus we have clearly marked zones of poor agricultural land left mainly in forest on the ridges. To a lesser extent the same effect was felt on the limestone ridges. The ice deposited fairly deep till on a section of the lowland to create a distinct region here. Glacial meltwaters deposited sand and gravel to create still another type of region. The Champlain Sea had a profound effect on the township by depositing deep clays on the

lowest-lying section, to create what is to-day the best agricultural land, though the lowest-lying parts of the clay plains are the sites of marsh. From an agricultural point of view the most recent processes at work on the land have been among the most important. These include the influence of climate, which is itself connected with the growth and decay of vegetation and chemical weathering, the slope of the land, and other soil forming influences.

Though agriculture is the basic economic activity of the whole township we see that it is by no means uniform throughout, either in type or in degree of prosperity. We can be fairly safe in saying that the varying features in the physiographic landscape are the fundamental cause of this.

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Fig. 5.

SURFACE DEPOSITS BROMLEY TOWNSHIP

ONE INCH = ONE MILE

- TILL
- TILL OVER PRECAMBRIAN
- OUTWASH
- OUTWASH OVER PRECAMBRIAN
- OUTWASH OVER MARINE
- MARINE
- EROSIONAL REMNANT (MARINE)
- ORGANIC

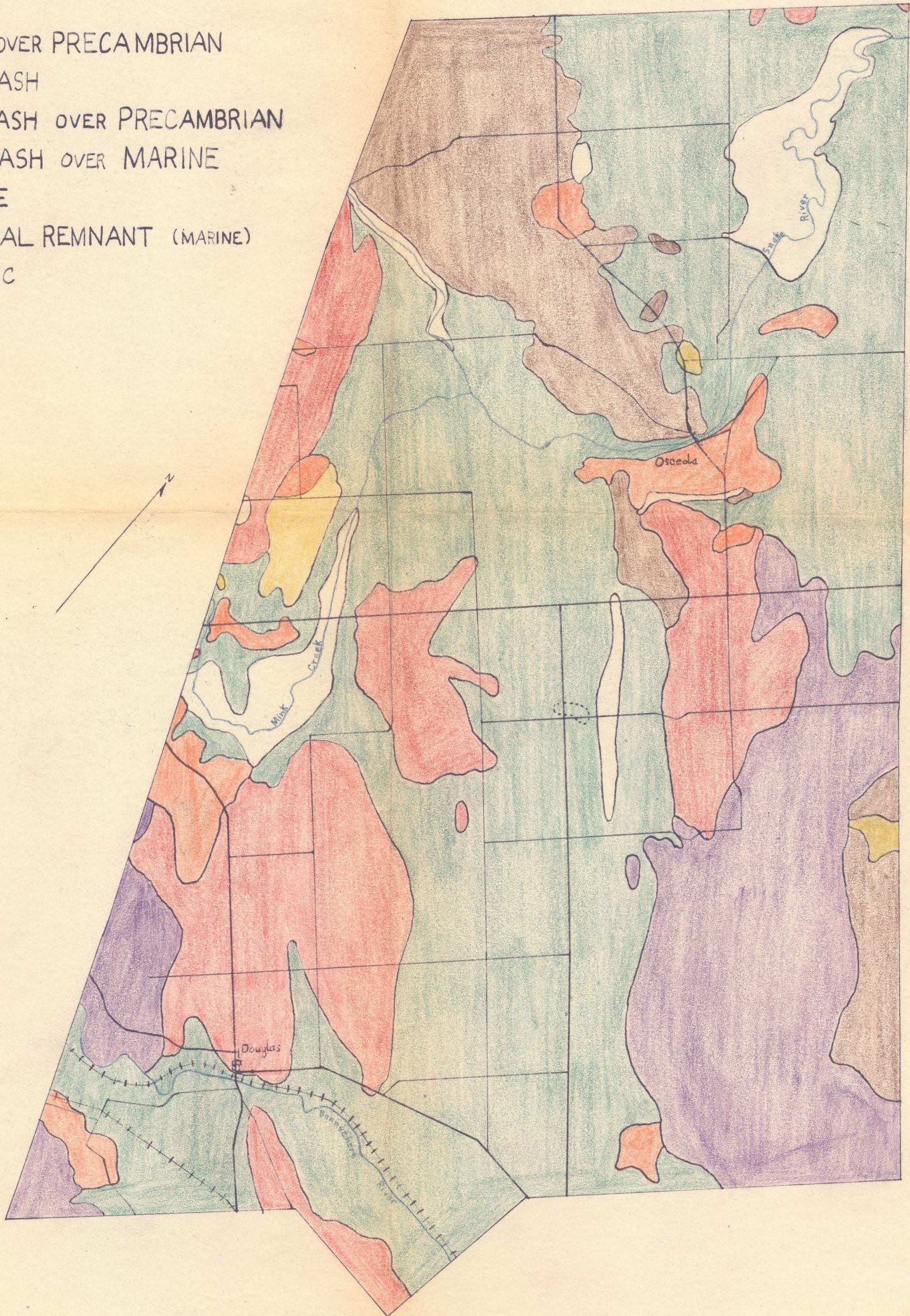









Fig. 6.

PRESENT LAND USE BROMLEY TOWNSHIP

2 INCHES = 1 MILE

CULTIVATED LAND	
ROUGH PASTURE	
CONIFEROUS FOREST	
DECIDUOUS FOREST	
MIXED FOREST	
MARSH AND OTHER IDLE LAND	
URBAN LAND	
FARMSTEADS	