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EAST FLAMBORO TOWNSHIP
BELOW THE NIAGARA ESCARPMENT

A Study of Land Utilization and Settlement

By

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CHAPTER I

LOCATION

A. Political

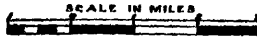
The area under investigation is that part of East Flamboro Township which lies below the Niagara Escarpment. It is a rectangular area fronting on Hamilton Harbour, and extending inland approximately three miles to the steep face of the escarpment. The thesis area^{1.} includes approximately one-fifth of East Flamboro Township which extends southeast-northwest as a narrow block approximately fifteen miles inland from Lake Ontario. Politically, the thesis area is contained within the northernmost township of Wentworth County, the county which circumscribes the head of Lake Ontario. The thesis area is shown in its position within Wentworth County in Figure 1, the Wentworth County map for 1940.

The area under investigation is at the center of the most densely populated area of Ontario. It lies within a radius of fifty miles of such cities as Toronto, Niagara Falls, St. Catharines, Waterloo, Guelph, Kitchener, Galt, and Brantford. Figure 2 shows the location of East Flamboro below the Niagara Escarpment in relation to larger cities and towns of south central Ontario. The thesis area is important primarily for its strategic location with respect to transportation routes of this

1. Because of the length of the title of this thesis, the area under investigation will be referred to as the thesis area.

THE COUNTY OF WENTWORTH

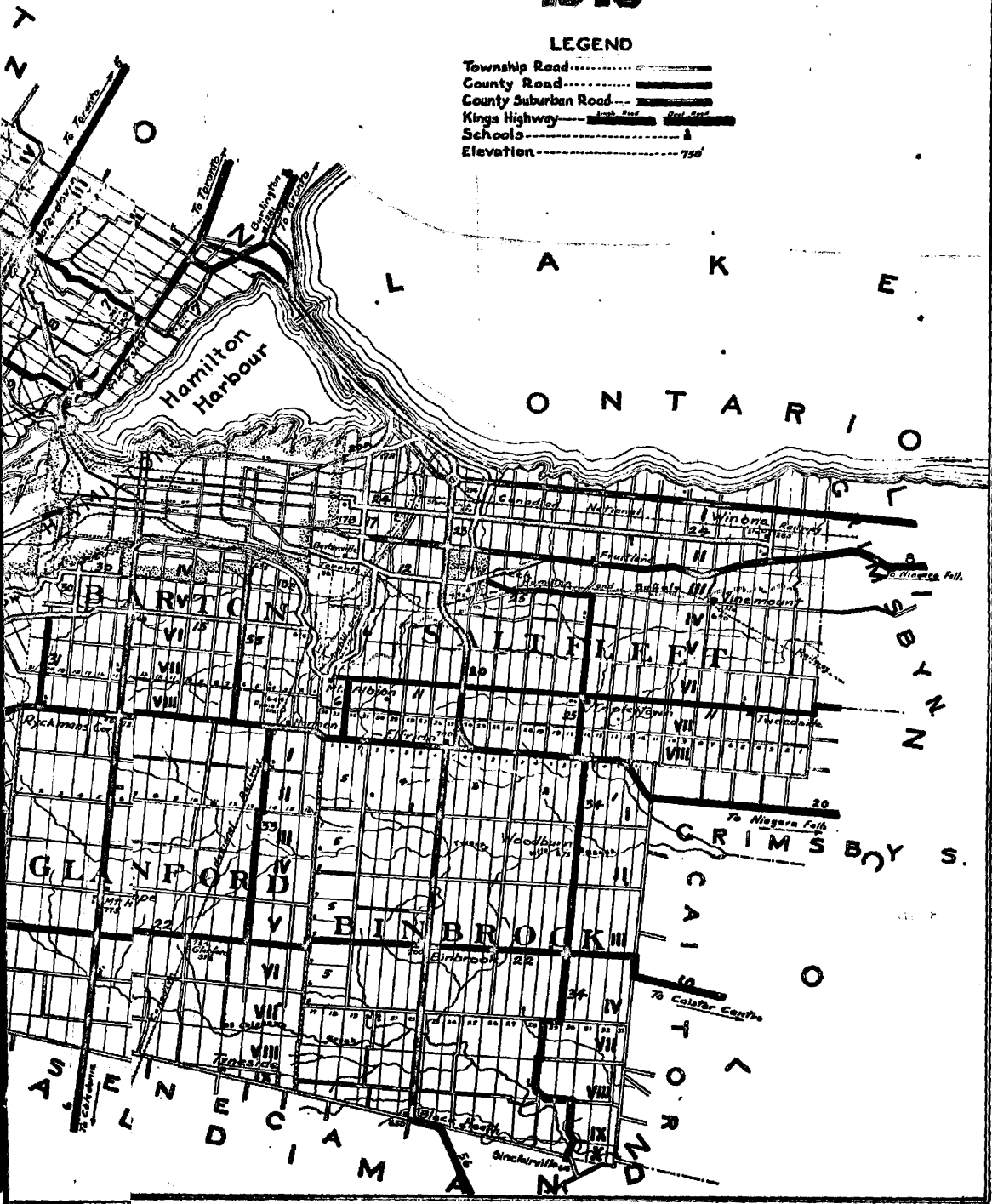
SCALE IN MILES



1940

LEGEND

- Township Road.....
- County Road.....
- County Suburban Road.....
- Kings Highway.....
- Schools.....
- Elevation..... 750'



part of the province. This is true for three reasons. The thesis area lies at the head of the lake and therefore must be traversed by many of the routes between Central Ontario and the Niagara Peninsula. Its position between the Hamilton Bay and the barrier of the Niagara Escarpment has led a marked concentration of routes there as compared with the area above the escarpment. Furthermore, the well-drained, well-graded character of the lake plain led to the early establishment of transportation routes here. Indian trails, pioneer ridge roads and modern highways have rapidly succeeded one another as important ways of transportation.

Today, the area lies within the unland of the city of Hamilton and serves as one of two entrances to Hamilton from the north. Across the East Flamboro lake plain flows the traffic bound for the commercial center of Hamilton and points west. The second entrance way to Hamilton crosses the Hamilton beach strip and carries traffic bound for the heavily industrialized east end of Hamilton as well as through-traffic to the south. The position of the East Flamboro lake plain in this triangle of traffic around Hamilton Harbour may be seen in Figure 3.

Proximity to Hamilton and Toronto markets has been a major stimulus to the development of agriculture and extractive industries. Today, however, these functions are eclipsed in importance as the rich agricultural land is being rapidly pre-empted by residential suburbs of Hamilton and mineral resources are being depleted.

East Flamboro below the Niagara Escarpment is an area roughly three and three-quarter miles from southwest to northeast, and two and one-

quarter miles from southeast to northwest. It has an areal extent of 10.1 square miles. The northwest-southeast boundaries are parallel and bear N45W. The northeast-southwest boundaries are irregular since they follow the steep face of the Niagara Escarpment and the shoreline of Hamilton Harbour.

The thesis area contains a broken front, concession I and II, and a small part of concession III. Longitudinally, the concessions and the broken front are divided into thirteen lots. A small area attached to the broken front and occupied by Woodlawn Cemetery is included in this study, although it is incorporated into the city of Hamilton. Physiographically, it is an integral part of the thesis area, and has always been administered by East Flamboro Township.

B. Physiography

South Central Ontario is a region whose topography is conspicuously glacial in origin as shown in Plate . The great variety of physiographic divisions in the Head of the Lake area is due to the halting retreat of the last glacier toward the northeast. The changing positions of the ice front and the levels of the glacial lakes formed by the meltwater are recorded in the variety of physiographic features which were deposited on the otherwise monotonous monocline of Paleozoic strata found throughout South Central Ontario. Physiographic features deposited directly by the glacier include drumlins, exemplified in the Guelph Drumlin Field, till moraine exemplified in the Horseshoe Moraine, and till plains shown in the South Slope and the Peel Plain. In contrast,



GUELPH
DRUMLIN
FIELD

SOU
SLO

HORSESHOE
MORAINE

FLAMBOROUGH
PLAIN

NORFOLK
SAND PLAIN

HALDIMAND CLAY P...

sands and clays were sorted by the glacial lakes and streams and laid down as level plains and deltas, such as the Haldimand Clay Plain and the Norfolk Sand Plain respectively.

The underlying Paleozoic monocline exhibits one pronounced discontinuity due to the differential erosion of its constituent strata. The resultant cuesta is known as the Niagara Escarpment and makes up the upper or northwestern half of the thesis area.

The area below the Niagara Escarpment in the vicinity of the Head-of-the-Lake is a plain of rather low relief formed as the beach and depositional terrace of glacial Lake Iroquois, the immediate forerunner of Lake Ontario. The Iroquois Plain consists mainly of shaly and sandy material: the shaly material was eroded from the underlying Paleozoic strata by wave action, reworked and deposited in the vicinity; the sandy material was sorted and deposited by longshore currents and by tributary streams on the periphery of the lake. A number of gravel bars have also been formed across indentations in the shore of the lake by longshore currents.

The glacial-lacustrene deposition was at a maximum at the Head-of-the-Lake as a result of two main factors. The more important was the shape of the lake itself which resulted in a westward drift of beach materials along both its northern and southern shores. A second factor was the entrances into the lake of a number of streams into glacial Lake Iroquois (then including Hamilton Bay). The thesis area is that segment of the Head-of-the-Lake which received greater quantities of coarse material as sand and gravel than the adjacent area to the northeast and southeast.

C. Summary

East Flamboro below the Niagara Escarpment lies astride two contrasting physiographic divisions; the clay-shale slopes of the Niagara Escarpment found in the northwest half of the thesis area; and the gravel and sand plain, deposited by the glacial Lake Iroquois found in the southeast half of the thesis area.

The major theme of this thesis is to search for and define the extent to which contrasting physiography has influenced land utilization and the spread of settlement in the thesis area.

CHAPTER II

PHYSICAL GEOGRAPHY

A. Geology

The geologic structure of East Flamboro below the Niagara Escarpment consists of parallel Paleozoic strata resting on a Pre-Cambrian base, the whole of which has been tilted toward the south and covered by glacial debris at a much later date. Although the area experienced all four of the glaciations, only the land forms produced in the final stages of the last glacial age are evident today.

I. Pre-Cambrian

Little is known of the Pre-Cambrian surface upon which the Paleozoic sediments rest. The Pre-Cambrian is the deeply buried edge of the Canadian Shield toward the north. As far as is known, the Pre-Cambrian surface is gently undulating with a regional southerly slope that averages 33 feet a mile. An unconformity exists between the Pre-Cambrian surface and the early Paleozoic (Ordovician) strata, indicating that the Cambrian was removed by a period of erosion.

II. Paleozoic

The Paleozoic rocks found in the thesis area are of two geologic periods--the Ordovician and the Silurian. The material forming these rocks was deposited during the Paleozoic era in a shallow sea which was bordered on the north by the Pre-Cambrian Shield, and on the east by the old continental land mass of Appalachia. Appalachia supplied most

of the sediments found in the Paleozoic nodes of eastern North America. Fluctuations in the elevation of Appalachia as it was uplifted and eroded are recorded in the type of sediments laid down.

Coarse continental debris such as sand and gravel were deposited along the littoral while the finer particles, such as clay brought down by the agents of erosion, were carried farther before being deposited. In yet deeper waters, deposition was calcareous in nature, composed of the accumulated skeletons of marine micro-organisms. Under heat and pressure, sand was changed to sandstone, clay to shale, and calcareous material to limestone. Thus, the sea in its regressions and advances, recorded the fluctuations in elevation of Appalachia in the type of rocks which were formed and their relationship to one another.

a. Ordovician

Approximately 900 feet of early Ordovician strata lies above the Pre-Cambrian surface. These early sediments consist mostly of shales and limestones and outcrop in long regional bands to the east of, and parallel to, the Niagara Escarpment, as it extends between East Flamboro and the Bruce Peninsula.

The Queenston Formation is exposed most conspicuously in the thesis area. The strata consist of brick red, sandy and argillaceous shale which is remarkably uniform in character. The shale is almost everywhere seamed by narrow greenish bands lying vertically along small joint fissures, and horizontally along bedding planes of greater permeability. The greenish colour of these bands is probably due to

bleaching by percolating water charged with organic acids during passage through the soil. The Queenston is approximately 500 feet thick below the foot of the cuesta face or from the base of the Silurian formations.

The red colouring of the Queenston formation is due to the arid climatic conditions prevailing at the time of deposition. In late Ordovician times, a renewed uplift of Appalachia resulted in the rejuvenation of the streams, and their increased erosive power. They were then able to transport increasingly coarser material. Much erosional debris was deposited west of Appalachia forming a slowly widening, gently sloping plain. These alluvial deposits forced a retreat of the interior seas which eventually retreated beyond the region of Niagara Falls. These land-laid sediments were subjected to periods of seasonal dryness during which extensive oxidation of their iron compounds took place, and their characteristic red colour developed.

Queenston shale rapidly breaks down on exposure to the atmosphere, and forms a heavy impervious clay which is inferior for agricultural use. The clay subsoil, however, is in great demand for industrial use and has been the basis for important brick and tile industries in the thesis area.

b. Silurian

Approximately 100 feet of Silurian strata overlies the Queenston shale in the Waterdown area. The strata represent the lower two of the three lithologic Silurian subdivisions.

1. The lower and oldest division includes approximately 10 feet of the sandstones and shales of the Medina formation, which is

overlain by approximately 13 feet of the limestone of the Clinton formation. This, in turn, is overlain by 4 feet of Rochester shale. The alternation of these clastic and calcareous sediments represents the wide fluctuation of the land level in respect to the sea during the period of sedimentation.

2. The middle division of the Silurian includes approximately 25 feet of the famous Niagara or Lockport formation formed in extensive seas of moderate depth.

The Silurian strata outcrop in the thesis area as a narrow band within the face of the Niagara Escarpment. It is the Lockport formation which is responsible for this conspicuous Paleozoic cliff which is found here and which continues into other parts of southern Ontario. The Lockport dolomite forming the escarpment in East Flamboro consists of two members: 1) the lower and weaker DeCew Waterlime member which is an argillaceous dolomitic limestone, and 2) the highly resistant Gasport Dolomite member which is a pure, crenoidal, semicrystalline, magnesian limestone. It is dominantly light grey to blue in colour, and vertically jointed.

It is the Gasport member which acts as the resistant capping rock, overlying the softer strata below and protecting it from erosion. Once this dolomite has been removed, the rock strata below break up rapidly and a scarp face is produced. The Queenston formation is more resistant to the forces of erosion than the intermediate Silurian strata and the impervious red shale weathers to form slopes of approximately 8 degrees.

None of the upper Paleozoic or Mesozoic strata are represented in the East Flamboro District. It is unknown whether these formations were deposited and subsequently removed by erosion, or whether they were never deposited due to the elevation of this area above sea-level during Upper Paleozoic and Mesozoic times.

The general structural features of the Pre-Cambrian and Paleozoic sediments are those of a simple monocline. They are so little deformed as to appear flat lying. Regionally observed, however, they dip gently at an angle of approximately 33 feet per mile towards the south as a part of the Michigan Basin periphery. A part of this dip was present at the time of deposition; however, the major part of this dip is thought to be caused by post-Paleozoic differential uplift. Little faulting has been found here, although a few small faults have been traced in the similar soft sedimentary rocks in Halton County.

III. Pre-Glacial

On this Palaeozoic skeleton, the present topographic features have been built, largely under the influence of the last glacial period. Pre-glacial features of the thesis area, with one known exception, were erased by the four successive glaciations. This exception is a deep re-entrant into the escarpment believed to be formed by the pre-glacial stream erosion and occupied today by Waterdown Creek. Above the excarpment this creek follows an ancient glacial spillway in the vicinity of Lake Medad.

IV. Glacial

East Flamboro experienced all four of the Pleistocene glaciations. However, only the last stages of the fourth, or Wisconsin glaciation, can be traced in that part of the township below the Niagara Escarpment.

All four glaciations widened and deepened a pre-glacial river channel which extended in a northeast-southwest direction along the bottom of the present day Lake Ontario. By their gouging effect, they formed the basin of Lake Ontario. With the melting of the Wisconsin Glacier, a body of water was collected in this Ontario basin at a level considerably higher than that of the present Lake Ontario. The St. Lawrence Valley outlet for this water remained ice blocked for several millenia, and the lake, called Glacial Lake Iroquois, found an outlet only through the elevated Mohawk-Hudson gap into the Atlantic Ocean at the site now occupied by New York City.

Lake Iroquois had a longer existence than most glacial lakes, and at least two of its many stages or water levels are distinctly represented in the thesis area. In addition, the lake had a general levelling effect on its entire basin, an effect which it is impossible to assign to a particular stage. Before Lake Iroquois existed, the basin must have been largely morainic with ridges of till and with poorly drained hollows. This topographic pattern was greatly altered by the currents and waves of the old lake which cut down the hills and ridges and thinned the layer of till overlying the Queenston shale. Thus the slopes here have been denied the better agricultural loams and

(The old pit was mined southeast of the axis of the deposit on the landward slope of the gravel spit. The new pit is being mined on the northwest of the axis of the deposit on the lakeward slope of the shorecliff. The contrast of texture and thickness of the stratum found in these two exposures clearly illustrates the inter-fingering of stratum according to proximity to origin of materials.

At the present time, little remains since most of the original deposit has been eroded away by Waterdown Creek; today, the creek has cut below the level of this deposit and into the Queenston shale which underlies the whole area. Nevertheless, that part of the Iroquois clays which still remains has been extensively utilized for the manufacture of tiles, bricks, etc.

Deposition on the lakeward slope of the Aldershot gravel spit consists of a lakeshore sand apron of brownish Iroquois sand. It was deposited by the long shore currents of Lake Iroquois, and forms the parent material of the valuable Fox Sandy Loam soil found in this area today. The deposit is shaped roughly like an isosceles triangle with its shortest side along the northwest-southeast boundary of the township. The sand apron has always been valuable as an aquifer; until last year it supplied all the water used by homes on its surface.

V. Post-Glacial Erosion

On this Paleozoic, Mesozoic, and Pleistocene foundation, the normal processes of post-glacial erosion have been active. This erosion is not very significant and has been confined largely to lakeshore and streams.

a. Stream erosion

Stream erosion has been confined for the most part, to clay areas. The gravel and sand deposits on the other hand, have been little dissected. Their coarse texture and gentle slope are conducive to good internal drainage and their value as truck garden soils has led to their careful management. The sand apron has not escaped dissection by ravines altogether. A series of short ravines cut landward from the lakeshore; however, only one of these exceeds 1000 yards in length.

The highly impervious nature of the upland clay slopes has led to the establishment of a most complete and extensive system of surface drainage channels. Deep parallel gullies extend from the foot of the Silurian escarpment to Hendrie Valley at intervals of approximately one quarter of a mile. These steep-sided ravines have numerous tributary branches. Because of this extensive gullying, only the relatively small plateau-like surfaces between the gullies are used. Each inter-ravine upland is quite isolated since few bridges or roads span the youthful V-shaped valleys in which downcutting is predominant. With the exception of the Hidden Valley Development on the broad floor of Waterdown Creek, little use has been made of this land. Fortunately, the ravines have been left in natural forest vegetation which aids in the stabilization of the drainage pattern and, in some cases, contributes an advantageous landscape in residential areas.

Approximately two-thirds of the upland clay slope area drains via nine ravines into the Hendrie Valley. The other third drains across the lakeshore sand apron directly to Hamilton Bay. The divide between

The next water level distinctly recorded in the thesis area is approximately 300 feet lower than the level previously discussed. This new level is evidenced by the immense gravel spit which extends in a wide arc from the escarpment to the south of Hamilton, past the point now occupied by the High Level Bridge, and ends at Wolfe Island.^{1.} This spit is referred to in this study as the Hamilton gravel spit.

At the same time, a second spit, the Aldershot gravel spit, similarly composed of sand and gravel, was laid down. It extends south-westerly from a point just north of Aldershot to Woodlawn Cemetary, a distance of 2 to 3 miles. The crest of the ridge is followed for two miles by the Highway No. 2. Various sections of the spit have been utilized for the extraction of gravel.

The formation of the Aldershot gravel spit acted as a blockade to the pre-glacial drainage channel of Waterdown Creek and led to the channeling of a new course behind the gravel spit and parallel to the lakeshore. Waterdown Creek had a larger volume of water at this time and acted as the main current in the lagoonal embayment at the time when the Iroquois clays were being laid down.

In the late stages of the formation of the gravel spits, lacustrine deposition took place on both the landward and lakeward slopes of the Aldershot gravel spit.

The deposit on the landward slope consists of interbedded sands and clays. They are known as Iroquois clays after their final member.

1. The term "Wolfe Island" refers to the northern end of the Hamilton gravel spit which was isolated by the construction of the Desjardins Canal.

The whole deposit does not exceed two miles in length, and is little more than half a mile wide. The deposit consists of two to four members which inter-finger with one another in both southwest-northeast and southeast-northwest directions according to their position within the deposit.

The uppermost stratum consists of waterworked red clay sediment eroded from the Queenston shale. The immediately underlying stratum consists of reddish sands probably washed from the gravel deposit and coloured by red shale sediments. The third stratum consists of red clay, sand and silt, undoubtedly derived in part from the shorecliffs, the gravel spit and the stony calcareous till deposits. A fourth stratum consists of grey sands, also derived from the gravel spit.

The following cross-sections of these deposits were examined:

In the old pit of the National Fireproofing Company, the following section was exposed --

- | | |
|--|-------------------|
| 1. Stiff plastic stratified red clay | 3-4 feet |
| 2. Reddish sand | 1-2 feet |
| 3. Alternating layers of red clay, sand & silt | 4 feet |
| 4. Grey sand below the bottom of the pit | 1 foot |
| 5. Gravels | Thickness unknown |

In the new pit of the National Fireproofing Company the following section was exposed --

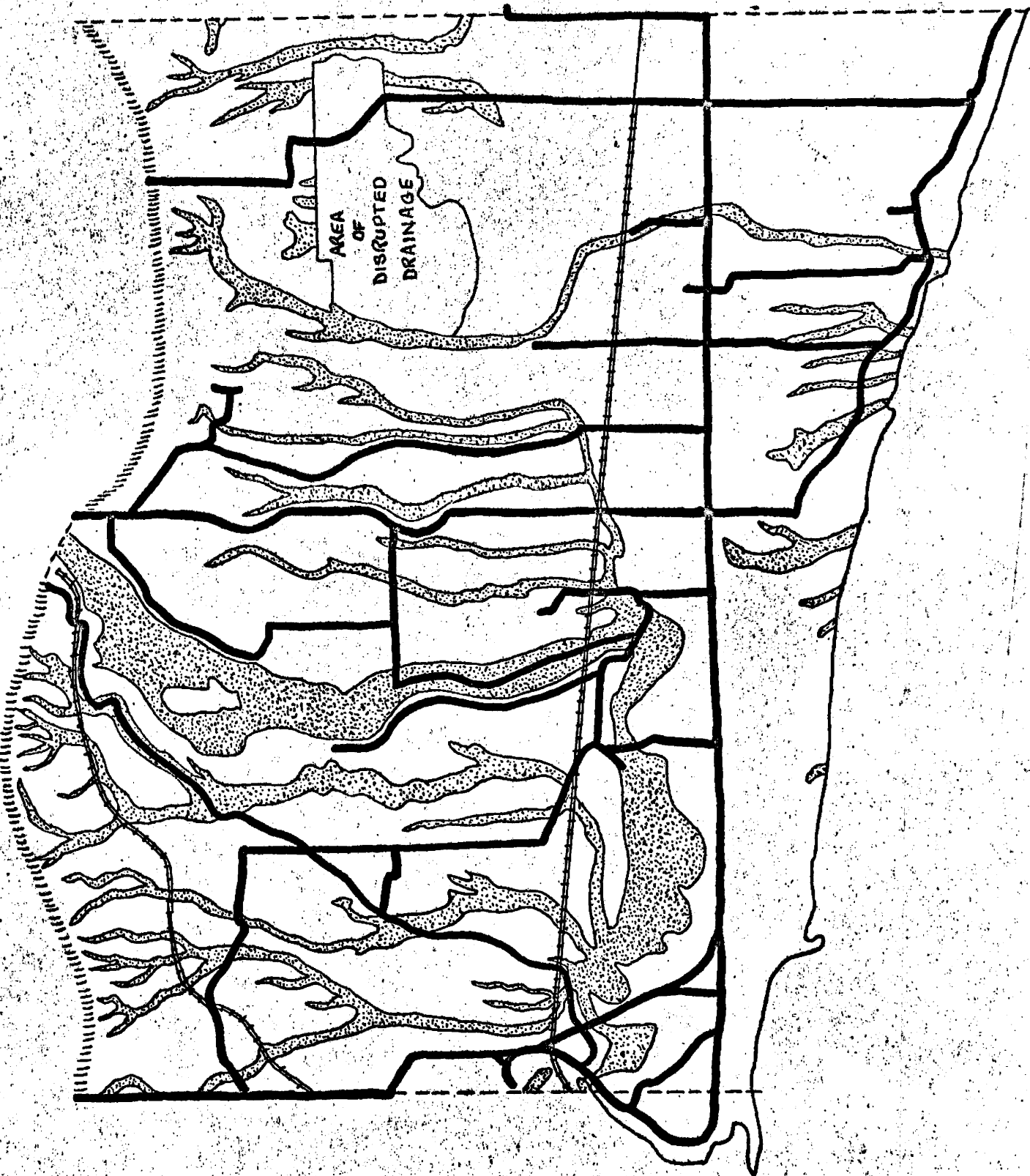
- | | |
|--------------------------------------|-------------------|
| 1. Stiff plastic stratified red clay | 6 feet |
| 2. Reddish brown Iroquois sand | 12 feet |
| 3. Queenston shale | Thickness unknown |

and clay loams which are derived from a thick overburden of glacial drift. Little lacustrine deposition took place at this time on the glacial drift.

The oldest and highest water level of Lake Iroquois distinctly recorded in the thesis area is represented near the brow of the escarpment. A glacial stream flowed from the north and emptied into the lake at the escarpment brow. The existence of this stream is now recorded by the broad valley which is known as the Lake Medad spillway and by the deltaic sands which the stream deposited below the escarpment. Today, these deltaic sands lie as uplands on both sides of the Waterdown Creek Valley. Beneath the sand is a layer of gumbotill which has evidently been protected from erosion since the period of delta formation and which is 10 to 12 feet thick.

On the crest of one knoll within the deltaic sand deposit, a small remnant of an overlying layer of lacustrine clay was found. It is supposed that this stony clay deposit was derived from the glacial till lying above the escarpment and was transported by Glacial Waterdown Creek to be deposited on top of the deltaic sands. The original extent of these lacustrine clay and deltaic sand deposits was probably very much larger, but has been subsequently reduced by erosion. As the down-cutting power of Waterdown Creek was restored by the progressive lowering of Lake Iroquois, the creek cut through its former delta, dividing it into two sections. These deltaic sands provide excellent sites for valuable truck gardens and orchards. In contrast to this, soils on the adjoining clay slopes are of little agricultural value.

Figure : Ravines and Gullies Obstructing Land Use
in East Flamboro Township below the Niagara Escarpment.



The majority of ravines and gullies in the thesis area (stippled area in the above diagram) have been left as woodland. One area of disrupted drainage, the pit of the National Sewer Pipe Company, exists in the northern-most corner; it is probable that this area originally drained by a similar ravine through the Burlington Golf Club.

these two drainage areas is found in Concession 2, lot 5, in the form of a narrow ridge planted in orchard.

The inter-ravine surfaces of the clay slopes have themselves been badly sheet eroded. This is due in part to the slope of the land and in part to their unproductive clay soil which itself is conducive to careless agricultural practices. Much of the inter-ravine surface is slumping rapidly into the heads of the major ravines or their tributary gullies.

b. Lakeshore erosion

Wave erosion has truncated the gravel and sand deposits on their lakeward face and formed shore cliffs. These cliffs are 100 feet high in the gravel deposits of Woodlawn Cemetary and diminish toward the northeast to a height of fifty feet in the vicinity of La Salle Park. From La Salle Park to the northeast boundary of the township, lake cliffs of approximately fifty feet have been broken by the ravines of the sand apron. Much of this area appears as small rolling hills, the steeper slopes of which are wooded.

Lake shore erosion is progressing more rapidly on the northwest shore of Hamilton Bay than on the shores of the city itself. Although no figures are available, it is reported that from 20 to 30 feet of beach below the shore cliffs has been removed during the last ten years in the vicinity of the old powder magazine (lot 10, Broken Front Concession).

The water deepens quite rapidly offshore from the thesis area,

although there is little current in Hamilton Bay. The twenty-five foot depth contour approaches within 500 to 600 feet of the East Flamboro shore while the corresponding distance on the south side of the bay at the Steel Company of Canada is 3700 feet. This depth of water is significant for navigation since it represents the minimum requirements for passage of the largest lake freighter. Since the Hamilton shores are already congested with shipping, any new docking facilities such as might be stimulated by the St. Lawrence Seaway might be located on the shore of the thesis area.

B. Climate

Climatically, the thesis area is a small western extension of the Niagara Fruit Belt, an area with ameliorized temperatures which have encouraged the establishment of orchard and truck garden crops.

Due to its geographic position, the thesis area lies in the path of the cyclonic storms, and experiences a change of weather every two to five days. Skies are cloudy approximately 50% of the time, but the area receives 54% to 55% of the possible bright sunshine. In this respect, the thesis area does not differ significantly from the remainder of Southern Ontario. There are approximately one hundred rainy days per year.

Climate Controls

Three salient physiographic controls are responsible for a local modification of climate as compared with that of the rest of Southern

Ontario. They are the Ontario uplands to the west, the Niagara Escarpment, and Lake Ontario.

1. The Ontario uplands are so situated that they lie athwart the prevailing westerly winds after these winds have passed over the water bodies of the western Great Lakes. Due to their higher elevation, the windward slopes of these high lands are regions of heavy precipitation, while the leeward sides, in the "rainshadows" of these high lands, are areas of lessened precipitation. This effect of rainshadow is experienced by the thesis area, and is further accentuated in summer by the Niagara Escarpment.

2. At Niagara Escarpment the westerly winds, in their flow over the escarpment, down the slope to the lake, fall approximately 500 feet in elevation. This decrease in elevation causes the winds to become slightly warmer according to thermodynamic principles and thereby increases their moisture-holding capacity. The rate of evaporation then is increased in the thesis area, and precipitation during the growing season is less effective. This effect of increased evaporation is very slight and does not mean that there is inadequate precipitation in the area, for critical limits are seldom reached. However, in comparison with the rest of Southern Ontario, a droughty year has more effect here than in areas farther west.

The escarpment also protects the thesis area from the high winds found above the escarpment, and shelters the area from the full

force of storms. Snowfall is always less below the escarpment than above it.

3. The area's most valuable climatic asset is its proximity to Lake Ontario. The influence of the lake is experienced in its moderating effect on temperatures. Both daily and seasonal extremes are less pronounced than those further inland.

Seasonally, the lake's influence is particularly marked during the cold months of December, January and February, when warmer on-shore winds allow the survival of the more tender perennial fruit trees. Extreme low temperatures are infrequent and none have gone below -20° F. in the last fifty years. In the interior to the west, extreme low temperatures have ranged from 25 to 35 below zero during the same period. The lake's influence also retards the coming of spring until a time when young plants run less danger of frost. In the fall, the lake cools more slowly than the land and the shore regions have a warmer climate than areas farther inland allowing the growth of late crops. In summer, the influence of the lake is least marked.

The daily range of temperature is also moderated by the proximity of the lake. The annual mean daily range of temperature for the thesis area as averaged over fifty years, is approximately 17° F. In the interior to the west, the annual mean daily range of temperature averaged over the same period ranged from 19 to 21° F.

Thus the climate of East Flamboro below the escarpment is a more equable phase of the climate of South Central Ontario, due to the modification brought about by these three topographic features. Although the thesis area is usually included within the Niagara Fruit Belt, its climate is not altogether typical of this climatic subregion. The remainder of the Niagara Fruit Belt experiences even less extreme temperatures, a smaller rainfall total and a slightly higher frequency of drought.

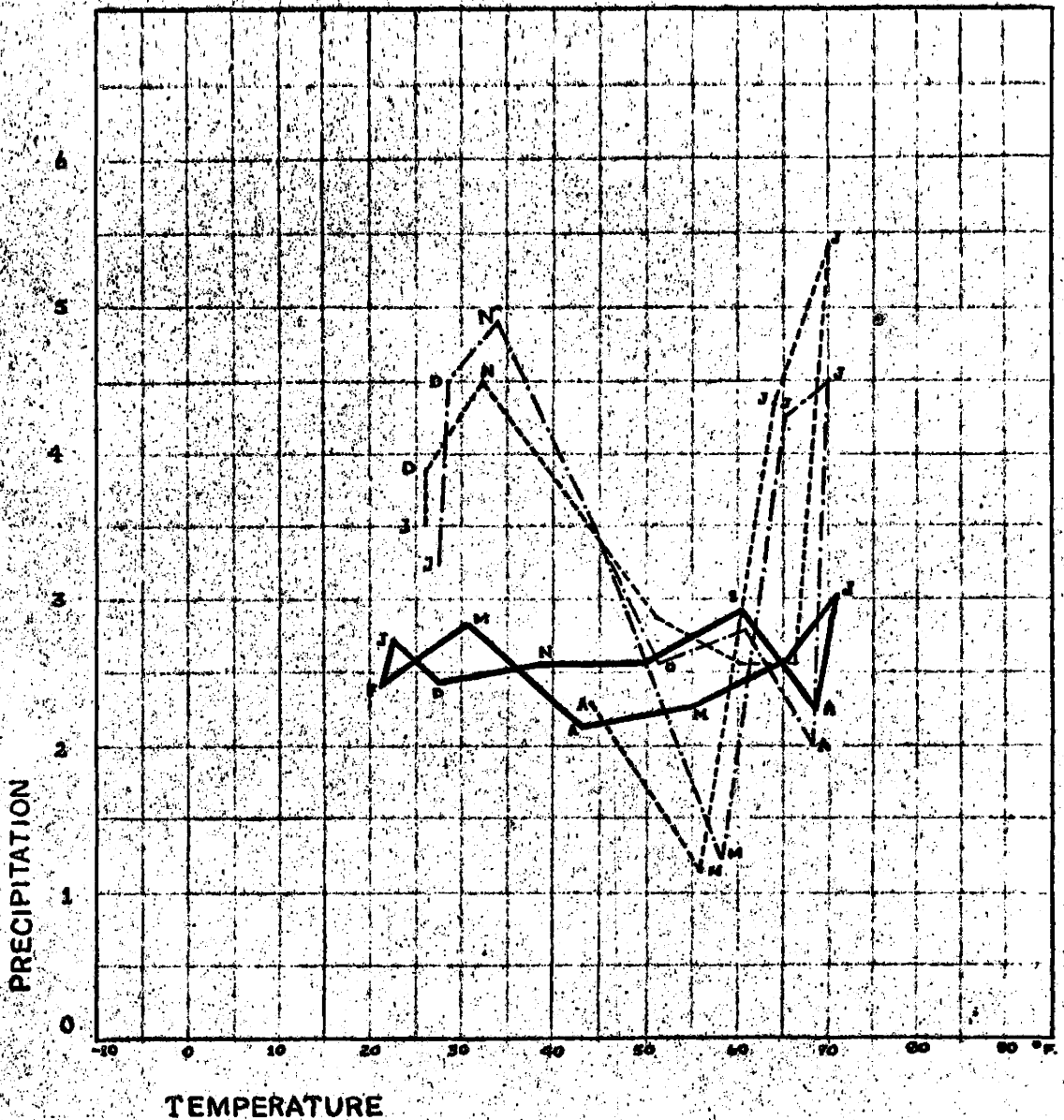
Climatic Statistics

Temperatures experienced in the thesis area are fairly warm for Central South Ontario. The winter months (December to February) have a mean of 23° F., which is well below freezing. The spring months (March to May) are cool with a mean of 43° F. Summer (June to August) is relatively warm with a mean of 68° F., and Fall (September to November) is also warm with a mean of 50° F. The lake influence is distinct in the cool spring and warm autumn temperatures.

Annual precipitation totals approximately 31 inches. Distribution is fairly uniform although the months of spring and late winter receive slightly less rainfall than those of the rest of the year. Approximately 50 inches of snow falls annually in the thesis area.

The official monthly means of temperature and precipitation for Hamilton, as averaged over a 46-year period, are plotted together in a hythergraph in Figure No. . This graphic presentation emphasizes the uniformity of rainfall distribution as well as the moderate range of

Figure 1: HYTHERGRAPH



- Official monthly means of temperature and precipitation for Hamilton as averaged over a 46-year period.
- - - Official observations taken at the Royal Botanical Gardens from April 1951 to March 1952.
- · - Official observations taken at Freeman from April 1951 to March 1952.

The hythergraph is designed to emphasize the uniformity of rainfall distribution as well as the moderate range of temperature which generally characterizes the climate of Hamilton. The plotting of the meteorological data observed during a recent eleven-month period in Hamilton suburbs is designed to point out the similarities to these means as well as the extent of deviations from these means which may occur in the weather.

temperature'. Two new stations have recently been established in the vicinity of the thesis area. One is located at the Rock Garden Lodge, Royal Botanical Gardens, within the thesis area itself, and has recently become the official meteorological observation station for Hamilton--its data are very reliable. The other new station is located at Freeman, Nelson Township, approximately one mile northeast of the East Flamboro Township boundary--its data are fairly reliable. Their observations of the monthly means of temperatures and precipitation occurring from April, 1951, to March, 1952, are also plotted for comparison beside the averages for Hamilton. This comparison is designed to show the similarities to the means as well as the extent of deviations from these means which may occur. The observations taken at the previously-mentioned stations show a range of temperatures similar to the averages for Hamilton. There are considerable differences, however, in distribution of rainfall. This eleven month series of observations in the thesis area showed a heavier concentration of rainfall in the early winter and early summer seasons, and lack of rainfall in late spring. Only the autumn rainfall approximates the Hamilton averages.

The growing season in the thesis area is a relatively long one. The average date of the last frost in spring and the first frost in fall are May 8 and October 8 respectively. The growing season begins in the average year on April 12, and ends on November 4. The approximate length of the growing season is 210 days. A slight concentration of rainfall occurs in the summer months (June to August) as a result of convection showers. This concentration is nullified by the accelerated evaporation

caused by the high summer temperatures.

Climatic statistics for East Flamboro below the Niagara Escarpment are summarized in the table below, taken from The Climate of South West Ontario by Putman and Chapman:

Climate Statistics

Mean Temperature for	January	23° F.
	February	22°
	March	30°
	April	44°
	May	55°
	June	66°
	July	70°
	August	67°
	September	62°
	October	50°
	November	39°
	December	26°
Daily temperature range		17°
Lowest temperature recorded		-20°
Highest temperature recorded		104°
Last spring frost		May 8
First fall frost		October 8
Frost-free period		154 days
Beginning of growing season		April 12
Cease of growing season		November 4
Length of growing season		210 days
Annual precipitation		31"
Average snowfall		50"
Rainfall, April 1 - Oct. 1		17"
Rainfall during June, July, Aug.		8"
Number of summer months with less than 1" of rain in past 50 yrs.		20 months
Percentage of possible bright sunshine which is received during the growing season (April 1 to September 30)		54% to 55%
Number of rainy days per year		100 days

C. Soils

A striking contrast exists in the thesis area between the soils formed on material deposited by Glacial Lake Iroquois, and the soils formed on the thin till veneer of the upper slopes. This contrast in soils is clearly reflected in the land utilization of the area.

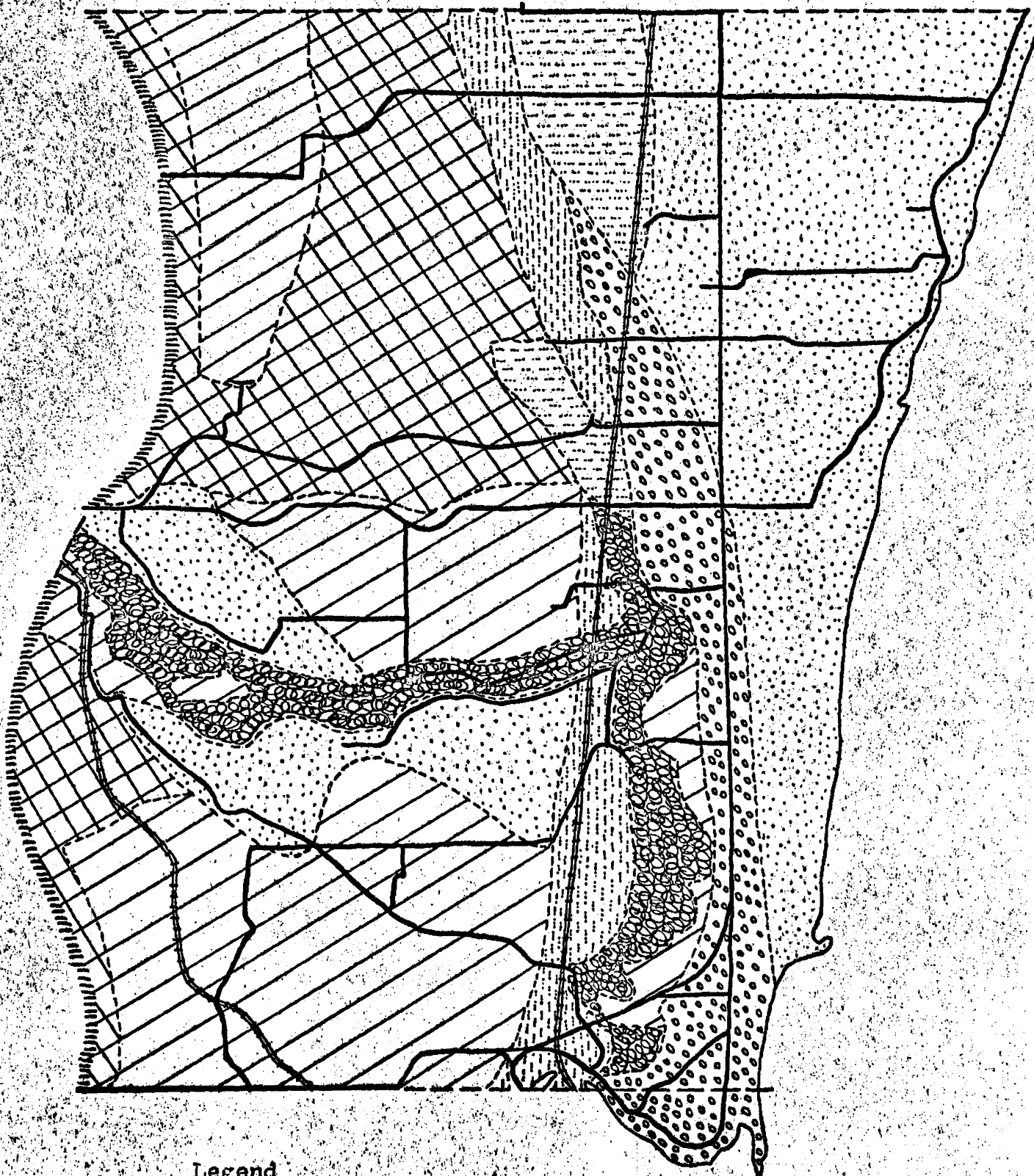
The soils of the thesis area are depicted in Figure No. . This map represents an adaption of soil survey made by the Ontario Soil Survey by the Department of Chemistry, Ontario Agricultural College. Their survey is followed in general outline; a few of the boundaries of the soil types have been modified.

The soils of the thesis area are of four types: Fox Sandy Loam and Gravelly Loam; Lockport Loam and Clay Loam; Napanee Clay Loam and its eroded phase; and Bottom Land and Muck. The Fox and Lockport soils are far more productive than the Napanee soils and are assessed as two to three times as valuable by the Wentworth Assessment Office.


I. Fox Sandy Loam and Gravelly Loam

These two soils are the well-drained members of the Fox Catena. Their profiles are characteristic of the Grey Brown Podzolics, and are represented diagrammatically in Figure No. . These soils are developed on well sorted deposits of sand and fine gravel found in the gravel spit, the sand apron and deltaic sand deposits. Relief in these areas is level to undulating. The soils are naturally well-drained, dry quickly and warm early in the spring. Because of their uniformity, light texture, and friable structure, they are especially well suited to the production of early crops. On the Fox Sandy Loam, early vegetables, small fruits


Distribution of Soil Members
 in East Flamboro Township below the Niagara Escarpment




Legend


 Fox Sandy Loam


 Fox Gravelly Loam

 Lockport Loam

 Lockport Clay Loam

 Muck

 Napanee Clay Loam

 Napanee Clay Loam -
eroded Phase

and tree fruits thrive. The Fox Sandy Loam is better suited for a larger variety of crops than is the Fox Gravelly Loam. Care must be taken in selecting crops for this coarse textured, droughty soil; cherries do very well.

These two soils are the most valuable in the thesis area. However, droughtiness, low fertility levels, and low organic matter content are limitations to optimum crop production. Both the potassium and phosphorus contents are low. Because of the high value of crops grown on the Fox soils, heavy applications of fertilizers are both profitable and desirable. Cover crops, such as fall rye, are usually sown as they help to maintain organic matter and prevent erosion.

Because of their intrinsic value and their geographic location, most of these soils are being used about equally for truck farming and high-priced housing surveys.

II. Napanee Clay Loam and its eroded phase.

These soils are the imperfectly drained members of the St. Clair Catena. Their profiles have general characteristics of the Grey Brown Podzolics; but are on the whole more shallow. This is due to the shallow penetration of ground water as well as to a general truncation of the developed profile by erosion. Their profiles are represented diagrammatically in Figure No. .

These soils are developed on a thin veneer of till which overlies the Queenston shale and on a topography that is undulating to hilly. Napanee soils are poorly drained, tend to puddle and bake in hard clods. Because of their imperviousness and sloping situation, more rainfall is

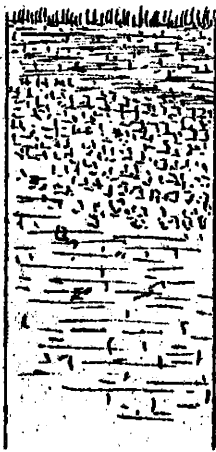
Figure : Soil Profiles of East Flamboro Township
below the Niagara Escarpment.

FOX SANDY LOAM (diagrammatic profile)



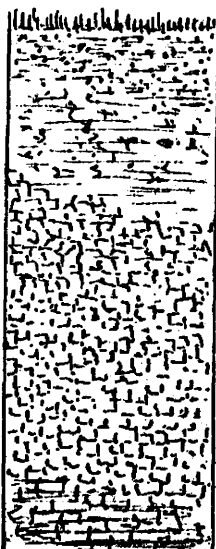
- A₁ - 5 to 6 inches of dark brown sandy loam; medium in organic content; medium crumb structure; very friable consistency; stonefree.
- A₂ - 20 inches of light brown loam; weak platy structure; friable consistency.
- B - 15 inches of reddish-brown sandy clay loam; medium nuciform structure; sticky when wet.

LOCKPORT CLAY LOAM (diagrammatic profile)



- A₁ - 3 inches of dark reddish brown clay; organic content low; granulation well defined.
- A₂ - 5 inches of bright reddish brown clay; small blocky structure.
- B - 10 inches of brownish red clay and partly decomposed shales of the same colour.

NAPANEE CLAY LOAM (diagrammatic profile)



- A₁ - 3 inches of dark brownish grey clay loam; organic content relatively high at top but decreases rapidly; good granular structure; sticky when wet.
- A₂ - 4 to 5 inches of light brownish grey clay loam.
- B - 24 inches of heavy brown impervious clay; massive structure, breaking into blocky aggregates from 1/2 to 2 inches or more in diameter.
- C - brownish-grey till; comparatively stonefree.

lost in runoff than is absorbed. This large runoff is responsible for the prevalent sheet erosion and deep gullying accompanying these soils. Runoff tends to collect in even the slightest hollow, allowing these soils to dry only very late in the spring season. When more than 50% of the original profile has been removed by erosion, the resultant soil is called Napanee Clay Loam, Eroded Phase, and is mapped as a separate soil type. Both soils have limited possibilities. Their impervious quality could be rectified in part by the addition of phosphate, lime, and organic matter; a controlled drainage system would also be beneficial. However, because of their low monetary returns, such measures are not feasible.

The Napanee Clay Loam is well suited to continuous planting of cover crops such as hay (timothy and clover), small grains, and pasture. Some orchards have been established on this soil type, particularly apple orchards. Most areas of Napanee soils, however, are now idle for agricultural purposes.

Careless management has allowed large sections of the Napanee Clay Loam to become severely eroded. In places the overlying till has been removed and the underlying Queenston shale is exposed. Reforestation and intense conservation measures are needed.

Only a very small proportion of Napanee soils are utilized by full-time professional farmers. Much of the land in which these soils are found is now owned by commuting town workers, gentlemen farmers, or part-time farmers.

III. Lockport Loam and Clay Loam

These soils are the moderately poorly-drained members of the Lairdsville-Lockport Catena. Their profiles are characteristic of the Brown Podzolics and are represented diagrammatically in Figure No. .

The Lockport soils are developed from residual materials and reworked residual materials from the Queenston shale. They occur on nearly level to gently sloping relief. They are poorly drained due in part to their smooth relief and in part to their slow internal drainage. When tilled, however, the Lockport soils are considered one of the best Ontario fruit belt soils. Their acid quality makes necessary the application of lime if legumes are to be grown. Organic matter also should be increased by the greater use of cover crops.

At present these soils are largely under agricultural use, although a small part of their extent is idle. Wheat, hay and a small amount of vegetables crops are being produced while the remainder lies under orchard.

IV. Bottom Land and Muck

A very extensive and complete natural drainage system has been established in the thesis area. Erosion is the main geological function of these streams due to the steepness of their courses from the escarpment edge to Hamilton Bay. The streams are primarily concerned with lateral cutting the spring flood season, and with vertical cutting during the rest of the year. Steep-sided ravines have resulted whose floors may be classed as bottom land. No use is made of this area except in the broad valley of Waterdown Creek where a housing survey has been established.

Little deposition of lacustrine material occurs except near the mouth of the Hendrie Valley itself. The muck soil here have a reddish cast due to the sediments of Queenston shale eroded from the banks of the tributary streams. The floor of this valley is flooded at least once during the spring thaw, but by the summer, with the exception of the stream course itself, its flood plains are usually dry and may be used for recreational purposes. Bog gardens are planned for the muck deposits of the Hendrie Valley by the Royal Botanical Gardens.

D. Natural Vegetation

The climatic conditions found in the thesis area are ideal for promoting vigorous growth of mixed forest. The thesis area was densely wooded less than two centuries ago as was most of Southern Ontario. However, the precise distribution of vegetation types is determined mainly by edaphic factors.

The chief vegetation-soil associations found in the area were the following:

- The well-drained sand and gravel deposits of the Iroquois plain were covered mainly by forests of white pine.
- On the clay soils of the shale slopes, a mixed tree growth consisting of white, red and scarlet oaks, hickory and sugar maple was found.

Today, the only areas which still retain their natural vegetation are the deep ravines dissecting this area.

E. Land Type

A land type may be defined as one in which the major physical features such as slope, drainage, soil, etc., are sufficiently homogeneous to justify its being considered as a unit in a discussion of the relationship of land utilization to these features.

East Flamboro below the Niagara Escarpment is generally considered by its inhabitants as consisting of two parts: The Plains, or that area lying below the Iroquois shore cliffs; and the Clay Slopes, on that area lying above the Iroquois shore cliffs. Within each of these two divisions, slope, drainage and land use, vary according to the diverse soils found there. Therefore, the land types of the thesis area closely correspond to its soil divisions. A discussion of land types will correspond to the terminology, the Plains and the Clay Slopes, since these expressions occur throughout the thesis. The boundaries of the Plains and the Clay Slopes, and of the various land types are found in Figure No. .

Land Types of the Clay Slopes

1. Dissected Clay Uplands

This is a broad but discontinuous expanse of rolling to hilly land with heavy clay soils (Napane) which tend to be acid and poorly drained. The area is greatly dissected by steep-sided ravines and their tributary gullies. Since it is of inferior value agriculturally, the area is largely inhabited by commuting city workers and subsistence general farmers. A few farms in this area maintained a specialized and commercially profitable agriculture.

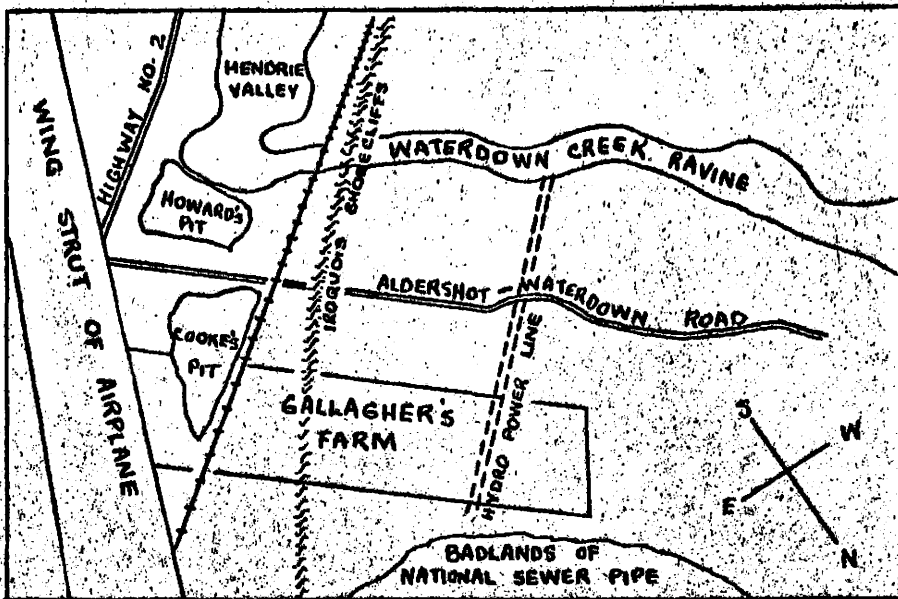


Figure : Looking Southwest towards Aldershot Corners.

The ravines which dissect the clay slopes are strikingly parallel in their channels from the face of the Niagara Escarpment to Hendrie Valley. The ravines restrict land use to belts of farmland extending northwest-southeast on the interravine surfaces. These farms are fairly isolated since few roads cross the youthful V-shaped valleys. Main lines of communication, such as the C.N.R.-C.P.R. railroad and Highway No. 2 are found below the Iroquois shorecliffs on the gently graded gravel spit and sand apron. Companies extracting gravel on a commercial scale from the gravel spit are seen to the south.

Photograph taken in 1950,
courtesy of John Gallagher.

2. Eroded Clay Uplands

This is a continuation of the dissected clay uplands, but has been so badly eroded that it may be classed separately. Soils on its rolling to hilly topography are the truncated profiles of the Napanee. The area is generally uninhabited. A large part of its acreage is owned by an industrial company whose manufacturing processes have necessitated the removal of all weathered horizons down to the underlying Queenston shale. Thus an increasingly large area of land, now badlands, completely devoid of vegetation, has resulted and will remain a problem and eyesore to the community for generations to come. Elsewhere, the eroded clay uplands are dissected by steep-sided ravines and their tributary gullies.

3. Iroquois Deltaic Sands

This is a discontinuous belt of sand deposited in the vicinity of Waterdown Creek. The deposit has given rise to the well-drained Fox Sandy Loam soil on gently undulating topography. The original extent of the deposit has been greatly reduced by ravines; indeed, the deposit was probably bisected by glacial Waterdown Creek ravine soon after its formation. Today parts of this valuable deposit are being removed on all sides by the erosive fingers of gullies. The deposit is the basis for the only truck gardens above the Iroquois shoreline, and is highly prized.

Physiographic Divisions of the Plains

4. Iroquois Gravel Spit

This land type consists of a continuous gravel deposit, extending from Woodlawn Cemetary to a point just north of Aldershot. The gravel

spit is marked by a crest with gently sloping sides. Its topography is flat to gently undulating. The materials of the spit have given rise to Fox Gravelly Loam soils which are extremely well drained, and highly productive when used for particular truck gardening crops. In sections devoted to commercial mining of the underlying gravel deposits, the valuable topsoil has been saved and later replaced some thirty feet or below its original elevation. By virtue of its own physical nature as well as its geographic location, the Iroquois Gravel Spit is the most intensively and diversely used land form of the thesis area.

5. Iroquois Lakeshore Sand Apron

This deposit of brown Iroquois sand is found on the lakeward shoulder of the gravel spit and slopes gently toward the lake. The sand apron has flat to undulating topography, and upon it have developed the valuable Fox Sandy Loam soils. The sand apron is cultivated for a large variety of crops, and because of its proximity to transportation facilities, has been the basis for most of the concentrated truck gardening of the thesis area. Recently however, an increasingly large proportion of the sand apron has been sold for housing surveys.

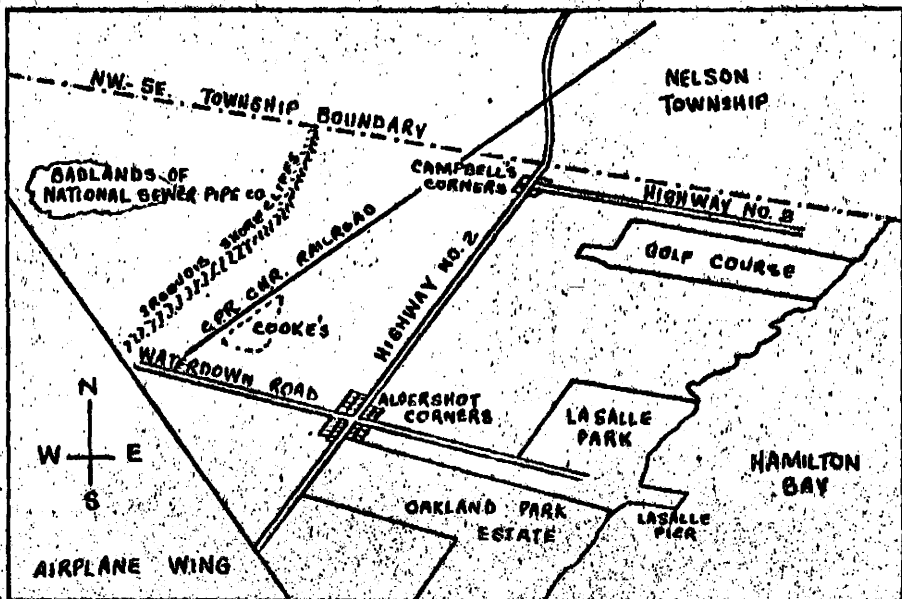


Figure 1: Looking north towards Aldershot Corners.

The sand apron lies on the lakeward slope of the gravel spit (stippled area in the above diagram) and is intensively utilized for residential and agricultural purposes. Many new housing surveys have been established east of Highway No. 2 since this photograph was taken, but the small fragmented fields of truck garden crops and orchards which are typical of the sand apron are well illustrated here. The size of agricultural fields found on the sand apron may be contrasted with that of the fields on the Clay Slopes (west of the Iroquois shorecliffs). The sand apron is dissected by a few short ravines which have been left as woodland and which in many cases add an advantageous landscape feature to housing surveys. Commerce in the thesis area has largely been restricted to frontage along Highway No. 2.

Photograph taken in 1949,
courtesy of John Gallagher.

CHAPTER III

HISTORICAL GEOGRAPHY OF LAND USE

The historical period began for East Flamboro below the Niagara Escarpment on September 24, 1669 when the explorer La Salle crossed the carrying place at the Hamilton Beach strip and landed somewhere in the vicinity of the present day La Salle Park. The wooded hills and the clear water of Hamilton Bay reminded La Salle of Lake Geneva, Switzerland, and he named Hamilton Bay and the thesis area Lake Geneva and Geneva Park respectively. These names were used until 1792.

1783 - 1830

The period 1783 to 1830 was one of pioneer settlement in the thesis area. This was a time of conversion from the life of forts and Indian trading posts to a settled subsistence farming characteristic of pioneers. Settlement was made according to portage sites and Indian trails. The most important trails extended along the well-drained sand and gravel plains in a northeast-southwest direction. One of these crossed Waterdown Creek at its mouth at water level. This route was later called the Valley Inn Road, and remained the main trail into the thesis area until the 1920's. The Indians had two other main trails which led from the shore to their camp sites above the escarpment; the Short Trail, closely paralleled the present day Aldershot-Waterdown Road, and the Long Trail, closely paralleled the northeast boundary of the township.

The area shared in the general stimulus given to settlement in Upper Canada by the American Revolution. David Fonger, the first settler, came into the area in 1783. Immigrants from England and continental Europe, United Empire Loyalists, and soldiers from the ranks of the disbanded British troops came to settle here as well as in other parts of Wentworth County. In response to this influx of people, the Canada Act of 1791 authorized the creation of townships throughout the region, and the first survey of East Flamboro^{1.} was made at this time by Augustus Jones.

It is generally believed that this survey recognized the superlative value of the Iroquois Lake Plain depositions, for the most part included in the Broken Front and First Concession, by subdividing these concessions into thirteen lots while the remaining concessions of the township were divided into seven lots. Supposedly, the survey recognized that in the Broken Front and First Concessions, a smaller parcel of land would be sufficient to support a family than in the interior concessions. This belief is untrue. Settlers of that day knew little or nothing of the maintenance of soil fertility, and the sandy-gravelly soils of the Iroquois Lake Plain were quickly exhausted. At the same time the heavy soils of the Clay Slopes were difficult to work and were equally undesirable. It is true that the gravel and sand deposits of the Iroquois Lake Plain were valued as good aquifers supplying domestic water to the farms, while the securing of water was, and remains today, a problem on the Clay Slopes.

1. East and West Flamboro were surveyed together as one political unit, the township of Flamboro. Not until 1798 was Flamboro Township divided into East and West Flamboro Townships.

The advantageous water supply, however, was not sufficiently important as to influence the original township survey.

The thesis area was one of the less desirable parts of the Head-of-the-Lakes District. The original land grants were extensive, and the ownership^{2.} of the thesis area was concentrated in the hands of less than ten men. Farms were merely small patches of cleared land in the woods. The pioneer period was characterized by hardship and poverty. However, by the time of the War of 1812, luxuries such as stone houses, walnut furniture and purchased commodities were found in the thesis area. Gradually the subsistence level of the pioneers was raised and general farming prevailed.

1820 - 1870

The years from 1820 to 1870 are distinct from the period of pioneer settlement, being marked by the increasing importance of water transportation and trade. This period was initiated by the construction of the Welland Canal (1829) which, in turn, stimulated the construction of a network of small waterways throughout Wentworth County. Examples of these are found in the Desjardins Canal and Burlington Beach Canal, both of which were built in the 1830's. The economy of the thesis area also became closely linked to water transportation; it was centered on an important shipping route developed between Waterdown and Brown's Wharf.

2. The number of tenant farmers, hired men, etc., however, is unknown.

Industry at Waterdown was favoured by the steady flow of Grindstone (Waterdown) Creek, and a seemingly limitless local supply of raw materials. Woollen mills, grist mills, saw mills, barrel and furniture factories were all located at Waterdown. The produce from these mills as well as apples grown below the escarpment were shipped to Upper Canada and the Maritimes via the Short Trail and Brown's Wharf which was built in the 1840's. Later a second road, the present day Aldershot-Waterdown county road was constructed parallel to the Short Trail to facilitate shipping. Brown's Wharf also served as a refuelling station for the wood-burning lake boats. In one year alone 50,000 cords of wood were taken on by vessels at this point. The job of hauling the enormous cordages of wood to Brown's Wharf meant employment for many men, and a bakery and tavern was located on the Waterdown Road to serve them.^{3.}

This period also marked the construction of several turnpikes which exacted tolls from the passing stagecoaches. At this time, three main roads were added to those previously existing. One was the Aldershot-Waterdown County Road; the second was Snake Road, which crossed the dissected clay slopes, and which boasted 125 twists and turns in less than five miles. The third was the Purchase Road along the north-east township boundary. The Purchase Road was obtained from the Mississagua Indians when they sold to the Province of Ontario their reservation lands which now form Halton County.

3. Evidence suggests that this bakery and tavern were located in the second concession and constituted a service center called Bakersville.

The second period was a time of expansion and consolidation as the children and grandchildren of the first settlers populated the area. Church congregations were organized and schools established. By 1843, the crossroads at Aldershot was an established village and consisted of a hotel, a blacksmith shop, a post office-general store and one house. It was at this time that most of the original extensive land grants were subdivided and resold. In 1859 the lands of the thesis area were owned by 35 to 40 men. Only a few of the original estates were held intact while a few other estates were newly assembled.

The thesis area also profited by its position on the main road to York by its access to the most advanced theories abroad in South Central Ontario at that time. This is particularly true of progressive theories concerning agricultural matters, such as the early introduction of improved cattle into the thesis area by the Hon. Adam Fergusson of Water-^{4.}down who bred pedigreed Durham cattle at what is now the McCall farm. A cheese factory was also early established on the estate later called Oakland Park and the produce shipped via Brown's Wharf. This cheese business faded away some years later due to a lack of interest within the family.

In general, the thesis area was cleared of its forest cover during the second period to supply the huge amount of lumber in demand at this time. The mill and village growth also encouraged the clearing of many inland clay slopes for cash crops, particularly wheat. The impermeable clay of the slopes was easily eroded, and this resulted in much of the severe gullying which is found in that area today.

4. Jones, R. L., History of Agriculture in Ontario 1613 - 1880
p. 149.

The Waterdown-Aldershot-Brown's Wharf Economy had its hey-day during the 1850-60's. Railways had become firmly established in the 1850's. Waterdown expected to become the terminus for the new railroad and Waterdown and Aldershot as twin cities were to dominate the head of the lake. These plans failed to materialize. After the depression of the 60's, the revival of trade during the 70's saw the beginnings of a new north-south axis of trade, from the thesis area to Hamilton. The new flow of trade was perpendicular to the old shipping route.

The second period came to a slow painful close, and was somewhat overlapped by the third period. The decline of the Waterdown-Brown's Wharf economy was in part due to the extravagances of its former success. As a result of the earlier ruthless deforestation, there was a decline in stream flow and many mills were forced to close. The sheep population which had supplied woollen mills at Waterdown and a knitting mill at Aldershot decreased in favour of dairy cattle. By 1897 some 15,000-20,000 barrels of apples constituted the main shipment from Brown's Wharf which at that time, was better known as a fishing site.

1870 - 1940

The third period from 1870 to 1940 is characterized by the rise of Hamilton as the dominant commercial center at the head of Lake Ontario, and the inclusion of the thesis area as a part of Hamilton's unland. The prosperity of the 1870's initiated an industrial growth which has been continuous in Hamilton since that time although it has been retarded by occasional economic depressions.

During the period, the role of the thesis area in Hamilton's economy was of a rural, as distinct from suburban, character. Land use remained extensive as the area served Hamilton as a source of fresh fruits and vegetables, as a source of industrial raw materials, as a recreational area, and as right of way for through railroad and motor traffic.

Truck gardening has long been important in the plain section of the thesis area. Even during the early period of general farming there had been some specialization in fruit and vegetable crops as farmers recognized that the sandy soils along the Plains were highly favorable for this type of agriculture. During the 1880's, many of Waterdown's ex-factory hands moved into the thesis area, and attempted to establish orchards and truck gardens throughout. With a few notable exceptions, there has been an increasing concentration of agriculture on the Plains, and an increasing commercialization there of crop types and cultivation methods. Accompanying this specialization has been a reduction in the number of farms on the upper clay slopes which support themselves by actual cultivation of the soil. The clay slopes have gradually come to be devoted to sub-agricultural use, such as inexpensive rural homes for city workers, poultry farms, slaughtering centers, etc.

Hamilton's expansion also furnished a ready market for construction materials. Three of the geological formations found in the thesis area are valuable in construction work: the gravel spit, the Iroquois clays, and the clay derived from the Queenston shale. Early in this period the beginnings of the extensive land holdings of the four big

industrial companies in the thesis area were made and throughout the period additional land was acquired. Brick, tile, gravel, and cement were shipped not only to Hamilton but also to other cities of South Central Ontario.

While the thesis area was located too close to Hamilton to develop an independent economy, the area was sufficiently removed from the city to be considered a recreational site for city workers. A colony of summer cottages was built at Brighton Beach and a ferry service was inaugurated between Bayview, Brown's Wharf, and Hamilton Beach. The ferry boat company acquired a concession from the Oakland Park estate, and an amusement park was established there complete with carousel, refreshment stands, etc. The amusement park was quite profitable and later when the concession at Oakland Park was not renewed, the ferry boat company established the LaSalle Park for use as their terminal. Here the company built the concrete LaSalle Park Pier which is still in use today. Brown's Wharf was allowed to fall away to ruins. Gradually as Hamilton Bay became polluted and as automobiles increased, the radius of man's wanderings, the thesis area was no longer considered fashionable for recreation. The Brighton Beach cottages degenerated into a low grade residential area and while LaSalle Park remained popular for a longer time, it is not well patronized today.

The thesis area became increasingly important as a right of way for north-south traffic. Both railroads and motor roads utilized the gentle grade of the Iroquois Lake Plain as their route from Hamilton to Toronto. The earliest narrow gauge railway to Toronto was laid

about 1852. The route followed is now used by the Canadian National-Canadian Pacific railroads. A spur line to Guelph built in 1911 utilized the Waterdown Creek re-entrant in ascending the escarpment to the town of Waterdown. The road along the gravel spit was paved in 1915. In the early 1920's, this road, together with the Campbells Corners Road, were assumed as the King's Highway Lakeshore Route to Toronto and became Highway No. 2. At the same time, the entrance bridges to Hamilton, the High Level Bridge and the Rock Garden Lodge Bridge were built and the old Valley Inn Road decreased in importance. The lakeshore route to Toronto always carried traffic very much in excess of that on Highway No. 5 which crosses East Flamboro Township above the Niagara Escarpment at Waterdown. During the 1930's, Highway No. 2 was further improved with the construction of the Queen Elizabeth Way which is joined directly with Highway No. 2 at the Burlington cloverleaf by a short stretch of highway known as the Queen Elizabeth extension.

The population during the third period remained fairly static. An increasing number of the residents in the thesis area sought either part or full-time employment in Hamilton or on the railroad. Some farms were sold for the construction materials afforded by their sites. Many farms on the Clay Slopes were bought by "gentleman farmers" who wanted a large acreage in order to keep a few horses. Other farms on the Clay Slopes were used simply as sites for inexpensive residences surrounded by idle land. The small truck farms on the sandy Plains, however, remained in the families of the original owners and became increasingly valuable.

The thesis area was spared that type of low grade housing project which sprang up in the east suburbs of Hamilton toward the end of this period. There were several reasons for this. They were, chiefly, the distance of the thesis area from Hamilton and the high land values of the most accessible areas due to their agricultural productivity. In addition, much land speculation occurred about the period 1907 to post-World War I. This was due to a proposal to construct an electric interurban railway, or so-called radial, across the thesis area between Hamilton, Aldershot and Burlington. Such a transportation line would have made the thesis area extremely accessible,⁵ and land values along the Plains increased to \$1000 an acre during this speculative period. This radial line was never constructed; its proposal, however, helped to stimulate the growth of residential land use in the thesis area. The first surveys were laid out at this time, i.e. the Brighton Beach Survey of 1912, the Inglehaven Survey of 1915, the Glen Haven Survey of 1919, the Filman Survey of 1920, etc. These surveys were generally of a superior class of housing, compared to those laid out in other parts of the Hamilton hinterland.

1940 --

A fourth period in the history of the thesis area has just begun. Since the last war, the residential suburbs for Hamilton's growing population have grown up along Highway No. 2. The high prices offered

5: Transportation to the thesis area at this time might be obtained by the C.N.R.-C.P.R. railroad itself which did much of local distributing work now carried out by trucking or by the radial line which ran across the Hamilton beach strip to Oakville.

recently are attractive enough to buy out the productive truck gardens; the majority of housing surveys found in the thesis area today have been laid out since the last war.

The area is tending toward an increase of residential land use. Not only are the truck gardens diminishing in number, but many of the local industries are becoming increasingly unstable. The original deposits of gravels and clays which were the original *raison d'etre* for these companies are almost worked out. Eventually, with the aid of intense soil rehabilitation measures, the extensive pits of these industries will be sold for residential purposes.

The area is also gaining further importance as a focus for route ways following the base of the Iroquois shorecliffs. A new Super-Highway is planned to run approximately parallel to the railroad. A part of this highway-railroad area is to be zoned for industry, while the rest of the Plains is to be largely devoted to residential use.

CHAPTER IV

HUMAN GEOGRAPHY : RESIDENTIAL LAND USE

I. Introduction

Residential land use is rapidly becoming the most important land use in the thesis area. Housing there is generally of a far higher quality than is found in other Hamilton suburbs. This is largely because of the high price of the most accessible land which is no suitable for truck garden crops. Secondly, the thesis area is more distant from Hamilton's industrial district than other suburbs. Thus, these two factors produced the following result. The thesis area failed to receive the mass of low-grade housing for industrial workers which was built in the 1920's, and which today, characterized the residential area of Hamilton's east end suburbs where the industrial workers settled. Rather, the thesis area received most of its housing during the present day boom and derives most of its residents from the white collar classes of Hamilton's commercial west end. While houses of all ages may be found throughout the entire thesis area, almost all of the new growth has taken place on the accessible Plains. The Clay Slopes will not partake of this housing boom until it is served with the modern conveniences of water and sewage disposal.

II. History of Housing

The oldest house in the thesis area is that built by the first settler, David Fonger, about 1792 and it is now the home of Every . Situated on Highway No. 2, it is of log siding construction plastered with white stucco and because it is so well-kept, its appearance belies its true age.

Houses built during the 19th century are extremely hard to date according to their various periods without extensive searching into historical records. Some massive brick structures, much decorated with gingerbread are clearly Victorian in age. Other extensive fram "mansions" such as the Oakland Park home of that estate and the Brown home now found in the northern corner of LaSalle Park, clearly date from the Brown's Wharf day of about 1840. The oldest houses, however, are found as the nuclear part of an odd mixture of architectural styles. An original cabin was built in the early 1800's and some three to six additions, both laterally and vertically, have been made since that time. Generally, it may be said that 19th century houses are scattered throughout the whole of the thesis area, though the majority have been preserved on the Clay Slopes. Those located on the Plains are the homes of the truck garden farmers who are rapidly selling out to housing surveys and these homes therefore, are being torn down.

It was during the 19th century that the first housing survey was laid out. Peter Carroll subdivided "the park land adjacent to the City of Hamilton" at the time of the building of the Great Trunk Railway in 1855. A survey of present day housing on this site suggests this age.

to be evident in only one house of the 25 lots in the Carroll survey, so it would seem that the survey was not too successful. The site is a badly chosen one for a housing survey since the mantle of till covering the queenston shale is extremely thin here and water supply and drainage are almost impossible to secure. Later this condition so hampered the residents of the Bridgeview Survey (1921) which incorporated the northern third of the Carroll Survey, that housing on the southern third was forbidden by law.^{1.} Its center dead-end road, appropriately called Guelph Road in 1855, was appropriated in the early 1900's by the Dept. of Highways for the right of way as one segment of Highway No. 6 to Guelph.

For the purposes of this thesis, the growth of housing during the 19th century may be considered of the slow general character, typical of a farming population. A few large estates were amassed such as Hendrie's, Carroll's, etc., comparable to the age and structure of Dundurn Castle estate in Hamilton.

The opening of the second housing period was heralded in 1912 by the subdividing of the Brighton Beach Survey which had formerly been a colony of better summer cottages. As Hamilton Bay became polluted, a less select clientele patronized Brighton Beach, cottages were carelessly winterized and an undesirable residential area resulted. This inferior housing was largely cleared away by the post-World War II period and the

1. The remaining third of the Carroll Survey was commercialized with the exception of the iris gardens of the Royal Botanical Gardens and one block of residential property.

survey now contains well-kept better housing. Whether the origins of the Brighton Beach residential survey lay in the proposal of a Hamilton-Aldershot radial is unknown. The individual interurban electric railways were amalgamated in 1907 and a program of expansion undertaken, though not necessarily made public at that time. Certainly, the prospect of the radial inspired much land speculation and housing surveys at a later period. The most important representative of this period is the Inglehaven Survey of 1915 which utilizes not only the picturesque bayfront but also boasted access to the proposed radial which was to run immediately along the waterfront above the shored cliffs. A third survey that of Buena Vista, was possibly inspired at this time. Located on the bayfront in lot, it offered the same advantages as did the Inglehaven Survey.

The boom immediately after World War I witnessed much expansion and general construction. The Hamilton entrance bridges of Highway No. 2 (the High Level, the Wolfe Island and the Rock Garden Lodge bridges) were built and the Valley Inn Road abandoned by interurban traffic. The Carroll estate, instead of being dedicated to McMaster University, was bought by Hamilton for the purposes of a Cemetery (Woodland). Good times, the growth of Hamilton, and the increased use of motor transportation encouraged the use of the thesis area for residential purposes. Many surveys were laid out almost simultaneously: Glenhaven (1919), Filman (sometimes called Wabasso Park) (1920), Bridgeview (1921), Valley View (1921), Plain Dome (1921), Brookcliff (1921), Eddie Whyte (1923), Scheerdale (1923), and County Club Gardens (1923). The sites of the

majority of these surveys were directly accessible to Highway No. 2. The Filman and Glenhaven incorporated the picturesque ravines of the sand apron in their area and the Valley View, Brookcliff, and Eddie Whyte Surveys offered the scenic attractions of waterfrontage on at least part of their sites. All these surveys are intact today with the exception of Scheerdale and Flain Dome. Scheerdale was re-planned and re-registered as the Bevin Park Survey in 1946, and Flain Dome was almost wholly expropriated by the Department of Highways in 1927. With the exception of Glenhaven, Eddie Whyte and Filman, these surveys did not exhibit the best class of planning prevalent today. Their lots are small and the street pattern results in a congested housing arrangement. Only the two least expensive surveys, Bridgeview and Valley View, were filled soon after opening. Located in close proximity to Hamilton city limits, their lots were sold largely to the labouring classes. A survey of housing today suggests that the remaining surveys, though a few of their lots were sold, remained empty for the most part until the present day housing boom.

A restricted number of non-survey houses were also constructed after World War I. They are most apparent along Highway No. 2,-- particularly those large first-class houses opposite the Unsworth Green-houses, the so-called Stanley Mills Survey^{2.} Other non-survey houses were built along the more rural roads. They are, however, limited in number and of a scattered distribution.

New housing during the 1930's was extremely slight until late in the decade. Land so valuable for truck gardening was too highly

2. An unregistered survey.

valued for popular pocketbooks. With the spectre of the first grade houses in Inglehove and adjacent Indian Point (Halton Township) which stood inaccessible empty burdens to their owners during the depression years, prospective owners avoided the high-priced bay/ravine frontages. There were attractively priced sites on the Clay Slopes but those offered none of the modern conveniences except electricity. Therefore, the few houses constructed during this period were located close to Highway No. 2 or they were built within Hamilton city limits. The Hidden Valley Survey was opened in 1937 with government aid, but awaited the post-World War II period for the majority of its homes. It is believed that the two large blocks of rural land on National York Road which were sold for building lots were built up about the late '30's. These houses are of an inferior grade, particularly those above the National Fireproofing Company. The block adjoining Lemonville Road though of fair class housing to start, has been degraded with the permittance of an auto wrecking company to be located on the adjacent property.

The post-World War II period has seen the largest boom of housing in East Flamboro below the Niagara Escarpment. It is a period characterized by soaring prices and homes mushrooming forth almost overnight. Old surveys were filled and numerous new ones laid out: Sunny Plains (1941), Aldershot Glen (1944), Home Garden (1945), Unsworth Heights (1945), Unsworth Gardens (1946), Bevin Part (1946), Easterbrook (1949), Long Acres (1950), Reiss Court (1951), Harbour Heights (1951), North Shore Heights (1951), and their many additions, annexes, extentions, etc., laid out during 1949-1952. Land for these surveys was obtained at the expense of truck

gardening and as many as 16 individual farms were purchased for the area of one survey. Most of the surveys are divided into more spacious lots than those of the post-World War I period, and with the exception of the two Unsworth surveys, all are largely filled. All of these surveys are located in the most accessible section of the thesis area. The majority have immediate access to Highway No. 2. All may obtain water, sewage and electric services. Many of these surveys contain a few lots fronting picturesque ravines and/or the bayshore and/or the golf course. More surveys are being planned every day. Glen Acres was opened up and the plans for Garden View Survey approved in the summer of 1952. Oakland Park, the last of the old estates, was recently sold to a Hamilton construction company and will probably be available for housing the coming spring.

Non-survey housing has been constructed along every through road in the thesis area. The majority of post-World War II housing consists of small frame, one-floor plans which suggest that once their newness wears thin, they will not uphold the general high level of homes now present in the thesis area.

III. Factors Important in Determining House Classification

The brief historical sketch of housing growth makes evident the factors important in generally determining the class of housing found in a particular section of the thesis area. The best known critique of these factors is expressed in monetary value. A site offering a majority of the desirable factors is most coveted. Such a site is obtained by the

first comer or by a very high price at a later date. The most important factors considered by a majority of home owners are those which facilitate an ease of living, i.e. accessibility and the service of modern conveniences. Less important factors include a soil which will allow the cultivation of a home garden and picturesque landscape elements such as a bay and ravine-frontage, etc. A fifth factor important to some prospective home owners is inexpensiveness,--a factor which makes necessary the obmittance of all other desirable factors. Fortunately, inexpensiveness has been the criterion of a minority of residences in the thesis area. Homes in East Flamboro below the Niagara Escarpment are of an extremely high calibre as compared with those of the other Hamilton suburbs.

A. Accessibility

Accessibility is the convenient well-paved approach to a residential area from the main thoroughfares of urban life. Highway No. 2 is the most important approach because not only is it the road common to the majority of the surveys but it also offers access to public transportation facilities, church, schools, and community commercial establishments. Highway 2A and Waterdown Road are also served by public transportation lines, and together with Highway No. 2, may be considered roads of primary accessibility. Other well-paved roads without public transportation include Highway No. 6, Snake Hill Road and North Shore Boulevard.

Paradoxically, the best homes are not found immediately adjoining roads of primary accessibility. Although some first class houses were built on Highway No. 2 in the 1930's, the majority of first class today are built on those lots in a survey located furthest from the main roads.

Thus, these first class homes enjoy the privilege of relative accessibility with the luxury of relative privacy. The opposite condition appears to exist on roads of secondary accessibility. There, houses built immediately adjoining the road are generally of better quality than those found to the interior.

B. Service of Modern Conveniences

Electricity and telephone service is available to the entire thesis area. Water and sewage disposal, however, is a problem for a major part of the area. At present, only residents living between the bay front and the C.N.R.-C.P.R. railroad may buy water from the Burlington Water Commission in adjoining Halton County. A few commercial establishments and Woodland Cemetery are also served by the Commission in order to keep the pipes flushed and water pressure maintained. Residents living beyond the C.N.R.-C.P.R. railroad must depend upon private wells dug in the glacial drift overlying the Queenston Shale, and for storage traps built at the bottom of the deep gullies of the Clay Slopes. Residents immediately below the escarpment are generally assured of a more constant water supply than residents of low elevations. All wells, however, tend to run low in the dry seasons. There is an added danger of digging too deeply and running the fresh water of the glacial drift with salt deposits of the underlying shale. All residents beyond the C.N.R.-C.P.R. railroad are dependent upon septic tanks. Housing has been forbidden on the land along Highway No. 6 opposite the Bridge view Surveys since neither water supply nor septic conditions can be obtained there.

Until the area above the C.N.R.-C.P.R. railroad can be served, housing there on a large scale will never be present. It is believed that the Burlington Water Commission must expand its pumping facilities in the near future since housing is expanding as rapidly in lower Nelson Township as it is in lower East Flamboro and at present the commission is operating near its capacity level. In the event of expansion, East Flamboro may be allowed to buy enough water to serve the entire area below the escarpment. Discussions concerning proper taxation in upper and lower Nelson Township for the expansion of increased pumping facilities now uphold this improvement.

C. Landscape Elements

Sites permitting vistas of Hamilton Harbour from either a high elevation along the escarpment brow or from the bayshore itself generally attract a costly and high grade housing. Elements which preserve the natural vegetation and spacious landscape of unsettled land also command high prices. Lots fronting topographical irregularities such as the ravines in the sand apron and particular land usage such as the Burlington Golf Course are extremely valuable. Some idea of the relative cost of frontage on three of these landscape elements may be gained from a comparison of lot prices in the New Glen Acre Survey. It can be seen that prices range from \$1000 to \$4500, according to distance from Highway No. 2 and the proximity to landscape elements.

Lots advantageously landscaped on the Plains have all been recognized, surveyed and, for the most part, sold. Many advantageous lots on the Clay Slopes remain to be utilized, particularly those along the

the deep wooded ravines. The area immediately below the escarpment which offers a magnificent view of Hamilton Harbour is under large estates, small homes and original farms.

D. Garden Soil

Real estate companies report that the presence of a soil suitable for home gardens is a factor considered by most prospective home owners. Fortunately, the Plains which offer the most conditions of accessibility and modern conveniences and at the same time most suitable for gardens. The Clay Slopes are not so favoured, and while soil type seems a small consideration, this factor may aid in the lowering of grade of homes built there.

E. Inexpensiveness

Inexpensiveness is the converse of accessibility, according to the taxation schedule of Wentworth County. The inexpensive land is found, generally, above the C.N.R.-C.P.R. railway. Inaccessible, with the service of modern conveniences, this area is attractive by virtue of its low selling prices, its low taxes and lesser restrictions on buildings there. The area of the Clay Slopes has therefore, attracted the extremes of housing. Large estates are located there for the purposes of raising horses or other livestock on large inexpensive landholdings, and to a lesser degree for the magnificent view of the harbour obtained below the escarpment brow. Small inexpensive homes without benefit of spacious grounds have located there simply because of low price. This type of housing is fortunately

in the minority in the thesis area.

In the event that water and sewage supply is procured for the Clay Slopes, the majority of this inexpensive area should become highly desirable land for residential use.

CHAPTER VI

INDUSTRIAL LAND USE

A. Introduction

A surprisingly small amount of industry is found in East Flamboro below the Niagara Escarpment. This area has by virtue of its location, immediate access to major rail, road and water transportation routes, and it neighbors Canada's largest steel mills. Yet, the thesis area contains none of the suburban fabricating chemical processing industries characterizing the outskirts of Toronto, etc. which might be expected. What industry is found here is of such minor character as to be hardly worthy to be called industry.

The lack of industry in the thesis area may be largely attributed to two considerations: the topography peculiar to the area and the historical development of land use. Topographically, the thesis area is comprised of the Clay Slopes which are too rough, too dissected to be favorable for modern industrial sites, and the level sandy plain which which presents the optimum condition for industrial growth but has never been developed in this fashion. Historically, the industrial prototypes of the 1850's which formed the nucleus for modern growth, were attracted to the sheltered waters of Hamilton Bay but found the high shorecliffs of East Flamboro to the north unsuitable for landing. Instead, a concentration of industrial and urban growth occurred on the low swampy southern shores at Hamilton. The Hamilton location offered not only easy access

to the Bay, but immediate contact with the railway lines which were constructed along the "back doors" of the water-fronting industries. In the thesis area the railway was also projected across the potentially industrial Plains below the Iroquois shorecliffs, but was less directly accessible to water transportation. A further discouragement to industrialization was that, since 1850, the light adaptable Plains' soils had become increasingly valued for market gardening and land values here rose so high as to preclude most non-agricultural enterprise as long as there remained abundant suitable, low-priced land nearby.

The first type^{1.} of industrial enterprise to locate in the thesis area before World War II were based on the existence of particular geological formations there for the production of construction material. They utilized the valuable sand and gravel of the Aldershot gravel bar and the clay deposits weathered from the Queenston shale. Later, as Hamilton assumed metropolitan proportions, a few small industries serving the city's growing population came to locate in the thesis area. Such industries include gravestone cutting, slaughtering and food manufacturing. Concurrently, truck gardening became increasingly commercialized and one industry, a cold storage plant, was established by the more immediate farming population to improve their marketing efficiency

At present, East Flamboro below the Niagara Escarpment contains seven industrial enterprises. The industries have the appearance of being scattered through the thesis area, as seen in Figure ; in reality,

1. With the exception of the cheese factory at Oakland Park (1840-1850) and the Unsworth Knitting Mill.

however, they are located with respect to raw materials and transportation facilities. All are of local character; they deliver the majority of their goods within a radius of 60-80 miles as shown by their dependence on short haul trucking as a transportation medium. These seven businesses may be discussed according to their *raison d'etre* in the thesis area: industries based on the exploitation of mineral resources, industries serving local agricultural interests, and industries serving the city of Hamilton.

B. Industries Based on the Exploitation of Mineral Resources

There are four industries in the thesis area based on the exploitation of mineral resources. The largest, J. Cooke Cement Block, Limited, is located on the gravel bar and manufactures a finished cement block which it sells to building contractors. Howard Sand and Gravel, Limited, is also located on the gravel bar and sells graded sands and gravels as well as mixed cement ready for pouring. National Fireproofing Company of Canada, Limited, is located on the Iroquois Clay Deposits and manufactures hollow structural tile for building purposes. The smallest, National Sewer Pipe Company, Limited, is located on the upper clay slopes and is merely an extractive center, shipping its clays to Hamilton where sewer pipe is produced. Due to the shallowness of these deposits, the industries are characterized by very extensive landholdings on which they mine their raw materials. In aggregate, they own approximately acres or % of the total land surface of the thesis area.

All of these industries obtained their extensive landholdings

before the first World War in response to the growing needs of Hamilton and other South Central Ontario cities for contractor materials. All were attracted by a high grade of raw material where they originally mined their entire supply. Today, however, no company retains more than 20% of the reserves originally found on its own site. In fact, in one case, these reserves have been completely exhausted. The companies have chosen to solve this problem in different ways. Howard's and Cooke's import gravels from outside the thesis area. National Fireproofing and National Sewer Pipe use some underlying Queenston shale with the high grade clay and manufactures a product slightly inferior as compared to their original one.

The companies, with the exception of National Sewer Pipe, maintain their businesses by virtue of their established equipment and clientele. They may prolong the life of their businesses by utilizing more efficiently the advantages which their proximity to the main transportation routes afford. In the cases of Howard's and Cooke's, a large proportion of their profits is due to the value added by processing at their sites in the thesis area the raw material imported from outlying districts. Cooke's already deals entirely in a finished concrete product, while Howard's can further specialize in Redimix Concrete which at present accounts by value for two-thirds of its business. National Fireproofing is in the unfortunate position of being unable to import raw materials since there are no other deposits of similar clays within the Head-of-the-Lake area. Unless some method of processing the Queenston shale is perfected, National Fireproofing must close down with the depletion of reserves. National Sewer

Pipe is itself a subsidiary source of raw materials for its main plant in Hamilton and it owns much adjacent land in Halton Township. It is still increasing its holdings; at present it is in the process of buying part of a useless ravine adjacent to and northwest of its property.

These industrial companies are of little importance in the economy of the thesis area. All told, they employ approximately 270 full-time workers plus additional summer help. While most of these are local men, they represent a very small number of employees when compared to the huge acreages which these companies control.

These companies are a liability to future suburban development. Their dust and noise are disagreeable with the result that land values of areas adjacent to the industrial properties have been considerably decreased. This is especially true in the case of Howard's and Cooke's which are situated in the midst of a rapidly expanding residential area. While there have been many unfair complaints against the noise and dust of these industries by householders, (who chose their home sites nearby in full knowledge of existing conditions), it is generally agreed that the presence of these companies discourages the establishment of better grade housing.

The chief complaint however, against all of these industries is directed toward their unsightly and dangerous pits. The pits are extensive excavations outlined by cliffs from 10-30 feet in height which mark the original ground levels. The pits are the result of the strip mining methods employed, and generally preclude any other use being made of the land. They contain no cultivable soil either for agricultural or residential purposes. Howard's and National Sewer Pipe painstakingly avoided

destroying the value of all of their land by carefully saving the topsoil stripped from a part of the deposit and by replacing it after mining the underlying layers. While this land has been returned again to cultivation it is only a small proportion of the entire industrial acreage.

The most offensive pit is the northwestern half of the National Sewer Pipe holding. Here vegetation and soils have been completely removed in mining operations and the Queenston shale is exposed. Some acres of badlands have resulted from the erosion of the exposure. This land has been so badly damaged as to be rendered almost entirely useless for the foreseeable future and constitutes a major problem in forthcoming development in the thesis area. The National Sewer Pipe Company would like to sell some of the area but they realize that only with the aid of expensive conservation measures will these badlands ever be made attractive to buyers.

C. Industries Serving Local Agricultural Interests

There are two industries in the thesis area which may be included in this classification. One is a cold storage plant, the Aldershot Cooperative Distributing Company, Limited and the second industry is that of pickle brining, the Gordon Pickle Company. These industries are two of the many outlets for agricultural food stuffs produced in the thesis area.

The Aldershot Distributing Cooperative Company, Limited, was established in 1935 by the joint action of the Dominion Government, the Provincial Government, and by one hundred local agricultural producers in

the surrounding districts. Its location on the railway line was chosen because of the excellent transportation facilities which the site afforded as well as by its accessibility to land used by the farming shareholders. It is a multi-functional organization serving local, provincial and national interests. Locally, it serves agricultural districts as far away as Bronte, Milgrove, and Waterdown as a storage center for local celery, apples, potatoes, etc, which the growers may later sell at higher prices during the off-season. The storage, as it is called locally, may itself buy this produce and sell it off-season in a similar manner. The Storage also offers to members a small number of consumer freezing lockers. Local growers generally make use of the Storage only for produce which is of the highest quality and for which a good market is reasonably assumed. Unregulated excess crops are usually stored by the farmer himself. All local produce is delivered to the Storage by truck.

The Storage also serves provincial and national interests by holding in transit produce from distant areas bound for local markets and by shipping local produce to distant markets. Of this more extensive trade, approximately 70% is transacted outside the province of Ontario, easterly to the Maritimes and westward as far as Winnipeg. The majority of this business is transported by rail,--only 15% being delivered by truck.

The Gordon Pickle Company is located in the thesis area because of the local supply of cucumber, cauliflower and peppers, and because of the excellent transportation and communication facilities provided at its site near Aldershot Station. Its holding is approximately one acre in extent and is used for storage of the big barrels used in the brining

process. At present, the barrels are left open to the weather, but a shelter is scheduled to be constructed early in the summer of 1952.

D. Miscellaneous Industries Serving the City of Hamilton

As one segment of the Hamilton hinterland, the thesis area offers sites for small light industries which require land of low tax value, yet directly accessible to the city's population and markets. These qualities have served to attract three small food manufacturers and two gravestone cutters to the area. It should be stressed, however, that while the existence of these industries may be justified geographically, their location here is due in large part to chance, according to available buildings, building lots, etc.

The three food manufacturers include: the Allen Candy Company which manufactures inexpensive novelty candies such as chocolate cigarettes, jelly beans, etc.; the Aldershot Food Products which manufacture rye biscuits; and a small slaughter-house. The chocolate and biscuit factories are located together in one building beside the railroad line and use both truck and rail for the transportation of their products. The candy company is the only industry in the thesis area which employs women. The slaughter-house is located just north of the Guelph Highway (No. 6), and is directly accessible to the dairy farms above the Escarpment from which it obtains most of its animals. The slaughter-house supplies small Hamilton butcher shops and transports entirely by truck.

The two gravestone cutters are parasitic industries, for while they serve the city's population, it is not they but their neighboring

cemeteries which are attracted by the low-taxed and good accessibility of the thesis area. These two companies, the Bayview Monument Company and the Woodland Monument Company, arrive considerable advertising value from their location adjacent to the holdings of Woodland Cemetery. This was particularly true of the Bayview Company which is also located on the old corner of Highway No. 2. Until last year, the majority of funeral processions not only to Woodland but to the other six cemeteries in the thesis area had, by necessity, to pass the Bayview Company's door. With the construction of the new curve on Highway No. 2 which bypasses the Bayview Company, the advertising value of the site of this company has been reduced to that of the Woodland Company and can reach only those corteges which are bound for Woodland Cemetery. Even so, the value of advertising at Woodland Cemetery is considerable as evidenced by the location of a competitor showroom there, that of the Dundas Monument Company which has its factory at Dundas.

In addition, a small garage for two or three gasoline trucks is located on Highway 2A. Its location, however, is reported to be only a temporary one, though its buildings have a certain permanent air about them. A small factory accessible to the railroad has changed hands many times in recent years. It was used as a warehouse for leather goods, as a factory in the manufacture of T.V. cabinets, and has just been sold.

E. Conclusion

As can be seen, little industry exists in this suburban area relative to the importance of its location in South Central Ontario. Nor

is industrial growth of any size expected in the future. Politically and socially, the atmosphere of the thesis area is most favorable to the location of industrial plants. It is the most progressive part of East Flamboro Township and, in the author's opinion, of Wentworth County. It has maintained a high standard of living conditions throughout. Its local planning board is alert and wishes to attract industry to the area by providing suitable zoned industrial districts. Physically, however, the thesis area lacks the optimum natural resources. Land expanse of any size is available only on the Clay Slopes and, as mentioned before, the division of this area into the steep ravines and isolated interfluxes has been so severe as to preclude industrial use. Today, no industrial sites in the thesis area have an adequate available water supply. Although it would be possible for a large enterprise to obtain water from Hamilton Harbour, the cost of such equipment would be prohibitive for a small firm. At present, industrial and commercial enterprises^{2.} are dependent upon private wells. Waterdown Creek also supplies a small amount of water to the National Fireproofing. Cooke's have obtained the best industrial water supply of the thesis area, in the form of a pump off LaSalle Park pier which they installed in the summer of 1951 without the permission of the Hamilton Harbour Commission. The Commission later approved the measure.

The importance of these detrimental physical features however, is difficult to determine. The efficiency of modern earth-moving equipment has greatly increased in recent years and could conceivably modify the

2. With some exceptions. See page .

the topographic problem. In the processing methods of some industrial establishments, no great amount of water is needed. The greatest advantage to industrial growth which the thesis area can offer is its position astride the main communications of South Central Ontario. Whether this advantage outweighs in importance the two handicapping considerations remains to be seen.

At present, three areas have been considered for potential industrial growth. One area, listed with the Hamilton District Industrial Commissioner, lies adjacent to the Highway No. 6 at its intersection with the T.H. & B. spur rail line to Guelph. This area of 6-8 acres is of good level topography and would have access to excellent transportation service. A second area lies on either side of the C.P.R.-G.N.R. railroad from the cold storage plant to the northeastern boundary of the thesis area. This area is likely to become industrialized more quickly than the other two. A third area has been pointed out by Allan Desson, Consultant Planner to the Interurban Planning Board. This third area consists roughly of the lower half of the holdings of the National Sewer Pipe Company. Since this barren area will not support agricultural activities and does not invite the high level of housing surveys found throughout the rest of the thesis area, it has been suggested for industrial use. The proposed Super-Highway is to bisect the area while the trunk railroad lies along its lower edge. Industries located along the Super-Highway would derive an advertising value similar to that exploited along the Queen Elizabeth Way. Factories such as those fabricating paper goods, assembling wood products which ship by truck, could be located there.

Sites along the railway would be most profitably used for industries manufacturing light metal springs, etc., whose basic material might most profitably be shipped by rail. An excellent example is the Dickson Nail Company, located one half mile from the thesis area.

The areas proposed as potential industrial land areas, are not large. It has been considered unfortunate by some town planners that the entire area between the C.P.R.-C.N.R. railway and Highway No.2 was not zoned for industrial use before World War II, thereby avoiding the aftermath of housing which has occurred there since the war. With five industries already in the vicinity, such a zone might have discouraged some of the better grade residential growth which has recently grown up on the Plains. Town planners wish to attract industry to the area in order to obtain a balanced taxation schedule,^{3.} since residential growth is considered by them a liability rather than an asset to a township. The question of whether the thesis area could better serve its township and the Head-of-the-Lake region as an industrial area than as a residential suburb as it does today, is beyond the scope of this thesis.

3. At present, taxes levied from industrial enterprises in the thesis area account for only 4% as opposed to 40% recommended for a balanced township economy.

CHAPTER VI

HUMAN GEOGRAPHY - COMMERCIAL LAND USE

Access to main transportation routes is the most important factor influencing commercial location since good transporting facilities are a medium representing economic proximity to markets. The main artery of transportation in the thesis area is Highway No. 2, the main thoroughfare between commercial west Hamilton and points north. The Ontario Department of Highways estimates that some 20,000 cars pass over this road daily -- this figure represents both interurban and local traffic.

The historical development of commercial land use in the thesis area unfortunately cannot be traced since record of hotels, taverns, etc. which flourished along the Waterdown-Brown's Wharf shipping route has been lost. Suffice to say is that the axis of trade has shifted since that time. The Flamboro Plain and Moraines which formed the basic hinterland of the Waterdown economy in 1880 proved inadequate and has been absorbed into the larger hinterland of Hamilton. Commercial exchange which previously flowed northwest-southeast, now flows in a diametrically opposite fashion (northeast-southwest) parallel to the lake.

Since 1930 two changes in the geography of this northeast-southwest route, now Highway No. 2 have occurred which have affected commercial sites. In 1938 with the construction of the Queen Elizabeth Way and its extension adjoining Highway No. 2, the official route between Hamilton and Toronto no longer excluded the old segment^{1.} of Highway No. 2

1. This segment of road is henceforth referred to as Highway 2A in the thesis for the purpose of clarity. This is not its official delineation.

between Campbell's Corners and the North Shore Boulevard. In 1951, the dangerous corner of Highway No. 2 at Willowcove was bypassed with the construction of the present long curve. Both of these improvements have left commercial highway frontage which is partially obsolete.

Today, the large majority of commercial establishments are located in discontinuous zones on either side of Highway No. 2. That their trade is largely dependent upon the passing motorists is shown by the parking lots provided by these stores which are directly accessible to the traffic. Commercial establishments not located on Highway No. 2 are fewer in number and scattered throughout the thesis area. They include three enterprises on Highway No. 6 and Highway No. 2A,-- small enterprises in family residences and those enterprises which by the nature of their business are dependent upon extensive landholdings. With few exceptions, the pattern of commercial land use in the thesis area, in both frequency of occurrence and nature of business, is most clearly expressed in the general classifications: commerce along Highway No. 2, commerce not located along Highway No. 2. The exceptions in this rather striking pattern are those enterprises catering to locally employed, which are included in both classifications. The location of commercial establishments may be seen in Figure .

A. Commerce Along Highway No. 2

Sixty-nine of the seventy-nine commercial establishments in the thesis area are located along Highway No. 2. They lie in three discontinuous zones. The first zone lies nearest to Hamilton, extending from the southeastern township boundary to the now obsolete corner of

Highway No. 2 at Willowcove. This zone is a concentration of restaurants, motels, and gas stations and caters predominantly to interurban traffic. It originated as a typical motor service district just outside the city limits. For convenience, this zone may be called the Rock Garden Lodge Zone or the Bridge Zone.

The second zone is the largest and is centered on the crossroads of Aldershot. It probably originated with the building of Waterdown Road by Alex Brown (1840's). It is aided by the break in traffic caused by the traffic light at Aldershot Corners, which encouraged patronage by interurban traffic. This zone is the only community center within the thesis area and retails predominantly to local inhabitants. The smallest but most dynamic of the three commercial zone is at Campbell's Corners at the junction of Highway 2A and the Queen Elizabeth Way extension. This zone originated as a point of slower traffic due to the caution in turning at Campbell's Corner. Today, however, it lies surrounded by the new housing surveys and forms the nucleus of a rapidly growing community center. Campbell's Corner contains a larger vacant highway-frontage than does Aldershot Corners and will probably experience more growth in the future.

Commercial outlets designed to serve interurban traffic passing through the thesis area along Highway No. 2 exceed in number those which cater primarily to residents. Commercial establishments of this category include 16 gas stations and/or garages, 13 restaurants, 6 motels, 7 tourist homes, 5 permanent fruit stands, a pin-ball recreation concession, a golf driving range concession, a window sash company, a real estate agency and 2 automobile salesrooms. These establishments are most

frequent in the Aldershot Corners and Rock Garden Lodge Zones, with a slight concentration of highly competitive restaurants in the latter.

For the stores which retail to locally residing customers, Highway No. 2 serves a main road connecting the scattered housing surveys. Shops of this category found along the Highway include 3 grocery stores, 2 drugstores, 2 hardware stores, a branch bank open one day a week, 2 hairdressers, 2 barber shops, a dry cleaning shop, and a dry goods store. They occur in either the Aldershot or Campbell's Corners Zones. These stores must compete with the larger retail centers of Hamilton, Burlington and to a lesser extent, Waterdown. Their facilities in supplying the daily purchased commodities, however, are very small in comparison with the growing market provided by the rapidly growing suburban population. A number of commodity stores, however, have been built at Campbell's Corners within the last year and it is probable that other stores will be built in the near future.

A few businesses along Highway No. 2 serve a locally employed clientele; for these enterprises, the Highway serves a main road connecting the scattered occupations. Businesses of this type include two wholesale distributors of fruit and vegetables, a grain-feed supply house, and a company which lets for rent earth-moving equipment. They are usually divided between Aldershot and Campbell's Corners. These four enterprises evidence the importance of the local agricultural and construction trades not only in the thesis area but in other parts of East Flamboro and the adjoining Nelson Township. Thus, the agriculturist may buy his feed for his poultry, his machinery for cultivation² — and sell his produce immediately within the thesis area. A local builder* may rent equipment

2. As discussed below.

to dig foundations, may purchase cement, concrete block, weeping tile
2.
septic tanks and window sashes within the thesis area.

The value of frontage along Highway No. 2 for commercial purposes has been realized by the Interurban Planning Board of Burlington. Housing surveys are no longer allowed to encroach on the area, but lots fronting on the Highway must be set aside for future commercial development. An extensive shift in commercial emphasis is expected when the Super-Highway (discussed on page) is constructed. The Super-Highway is designed to carry a non-stop flow of rapid interurban traffic while Highway No. 2 is to be developed as an intersuburban highway devoted to the slower traffic of residential areas. Such a development, together with the continued growth of housing in the thesis area should greatly discourage the present predominance of commerce designed to serve interurban traffic; at that same time, it should enhance the importance of local retail trade. This would not be the result of direct competition since no commercial enterprise will be permitted along the frontage of the Super-Highway. Rather the diversion of much through traffic to this new highway will deprive these commercial enterprises of the greater part of their potential customers. Establishments of local retail trade should rapidly locate themselves along Highway No. 2. Clothing shops, gift and florist shops, and a movie theatre are noticeably absent in the thesis area.

B. Commerce not Located Along Highway No. 2

Commerce located elsewhere than along the Highway No. 2 with two exceptions is either small businesses located in residences or enterprises

of a type which require extensive landholdings. Commerce not located along Highway No. 2 accounts for only fifteen of the eighty-seven commercial establishments in the thesis area. Unfortunately, these businesses are scattered with no focus as a particular hamlet development. The majority however, lie below the Iroquois shorecliffs and therefore directly accessible to Highway No. 2.

Commerce requiring extensive landholdings include an automobile wrecking company, the Federal Salvage Company which is located in the midst of inferior housing area, and four commercial recreation enterprises. These are the Hidden Valley Swimming Pool and concessions, the Burlington Golf and Country Club, LaSalle Park and concessions, a horseback riding academy, two summer cottages at Valley Inn, and a small lawn bowling green on Shadelane Avenue. In aggregate, these establishments control approximately 186 acres or approximately 2 $\frac{1}{2}$ % of the entire land surface of the thesis area. The Burlington Golf Course and the Hidden Valley Pool are made possible by the particular ravined topography. LaSalle Park and the collection of summer cottages at Valley Inn originated in the location of the thesis area on Hamilton Bay but are greatly depressed in value now. The horseback riding academy utilized the low-taxed land of the Clay Slopes for its location. The other commercial enterprises requiring extensive landholdings are of a type usually found in suburban areas accessible by a main highway.

Commerce established in family homes includes a wide assortment of businesses. The most important of these are (1) the Spohn farm which has devoted its barn to the sale of agricultural equipment, septic tanks,

and drainage till, and (2) two homes on Waterdown Road (Robinson and Klodt) which maintain in their barns a wholesale distributing business dealing in fresh fruit and vegetables. The other home businesses are of a vary small scale and include four grocery stores, a gift shop, a gas station, a garage, a harness shop, a hairdresser and a better restaurant (by appointment). A home in the Valley View Survey sells cement products and well tile, and an apple orchard farmer sells apples at his door on the Clay Slopes.

Lastly, two additional commercial establishments are found in the thesis area. One is a showroom displaying gravestone monuments adjacent to Woodland Cemetery and the other, a truck barn constructed in the spring of 1952 by a trucking firm on Highway No. 6.

C. Conclusion

Commerce in the thesis area is characteristic of that found in most suburban areas where the intensity of commercial land use is directly proportional to proximity to the main artery of traffic. Thus, the thesis area may be thought of as consisting of three commercial zones: (1) the most desirable zone located immediately along Highway No. 2 where are located the highly competitive trades dependent upon frequent patronage, (2) the lesser desirable zone comprising the land of the plains surrounding and accessible to Highway No. 2 which contains commercial establishments dependent upon a more restricted patronage, and (3) the relatively inaccessible zone of the entire Clay Slopes which contains few commercial establishments. This pattern is to be expected in an area traversed by a main highway.

The important factor in the future commercial growth of the area is the construction of the Super-Highway and the resultant shift which is to be expected in commercial emphasis. With the siphoning off of interurban traffic from Highway No. 2 accompanied by a continued expansion of residential use of the Plain, commercial emphasis in the thesis area should transfer from that of serving interurban traffic to that of serving locally residing customers.

CHAPTER VII

AGRICULTURAL LAND USE

I. Introduction

Agriculture in East Flamboro Township below the Niagara Escarpment has been of decreasing importance as more and more land is being used for residential purposes. Both on the Plains and on the Clay Slopes, agriculture is in the process of change.

On the Plains, valuable truck garden and orchard farms were established in the 1870's and have continued to increase in intensity of agricultural use, particularly during the period of World War I^I, beginning in 1938 and continuing until 1945. Only since the end of World War II have these sites been sold for housing surveys. As observed today, the Plains have a markedly fragmented appearance. Farms are small, irregular shaped holdings, scattered among residential areas, and contain only a small proportion of idle land.

On the other hand, agriculture on the Clay Slopes, with a few marked exceptions has been declining since the 1870's. Only a few on the general farms characteristic of the Clay Slopes in 1870 remain today. Most of the farmers here either obtained full-time employment in the city or supplemented by non-agricultural activities the income derived from (part-time) farming. Other farms were sold entirely or in part for residential use. The Clay Slopes also include a small number of truck gardens established on the deltaic sands deposits. In general, however, the majority of farms on the Clay Slopes are larger orchards than the

average farm on the Plains, are not self-supporting and are characterized by much idle land.

Considered as a whole, farms in the thesis area are used either for specialized crops or as quasi-agricultural residences. The most important of the specialized crops are tree fruits, small fruits, and vegetables which may be grown for the summer and/or winter markets. Other specialized crops include hay grown for dairy farms above the escarpment and landscape shrubery as well as annual husbandry such as poultry products, honey, fur-bearing animals, and pigs. The residential farms vary greatly both in physical size and in economic prosperity of the owner. They vary from an acre held at a subsistence level to extensive holdings of more than fifty acres owned by "gentleman farmers", men of wealth who can afford to maintain such spacious grounds. There are also three tenant farms in the thesis area. These farms are cultivated on a level of efficiency which will not yield much more than the basic essentials of life.

The distribution of these nine farm types is shown in Diagram . It should be mentioned that farm holdings are only approximated in this map. Many, particularly the truck garden and orchard farms have been inherited by the children or grandchildren of the original owner and are today cultivated by two to four members of the family as an integral unit. Exact boundaries of farms are difficult to determine especially in the large areas of idle land of the upper Clay Slopes.

II. Full-Time Commercial Agriculture

The full-time commercial agriculture found in the thesis area is characteristic of that found in most rural fringes of densely populated districts. It caters directly or indirectly to the large urban markets of South Central Ontario cities and benefits from its position on ^{arterial} ~~arterial~~ highways which serve to further increase its proximity to city markets. The production of fruits and vegetables is particularly favored by the soils of the Plains and the climate. It constitutes the major portion of full-time commercial agriculture within the thesis area and will be discussed in greater detail than the remaining portion. The remaining agricultural enterprises within this category are for the most part, more dependent upon the rural, low-taxed character of their location than upon particular climate and edaphic characteristics. The truck garden and orchard farms are rapidly declining in number since the majority are located on the Plains, now highly desirable for residential use. At the same time, the remainder of full-time commercial agriculture is for the most part located on the less-desirable Clay Slopes, and is therefore, more stable and may remain in the thesis area for some time to come.

A. Greenhouse, Truck Garden and Orchards

The growing of tree fruits, small fruits and vegetable crops is the most characteristic agricultural land use of the thesis area. Most of the farms are small to medium size holdings which have remained in the possession of a single family for two and three generations, and are still cultivated by their owners today. Only a small amount of land is rented.

This includes a few acres owned by the Holy Sepulcher Cemetery and the Hydro Electric Commission and a larger area belonging to the National Sewer Pipe Company and Mr. Willson. Some farm land near Howard's Sand and Gravel Company was rented by the company for the extraction of its underlying gravel formations. The topsoil of these farms was carefully saved and later replaced some thirty feet below its original level. Here, cultivation has now been resumed. There are few year-round hired hands except on the larger holdings. Most of the hired help is seasonal and consists of teenagers employed as pickers during the summer rush.

Production on these farms is characterized by much hand labour which results in top quality condition of the produce. Business is largely dependent upon quality of produce. The reason for this is that none of the fruits and vegetables grown in the thesis area are sold to the nearby canning factories which generally buy the field crops grown on large scale north of Burlington. Crops produced in the thesis area are designed to be sold by the piece in a highly discriminating market. Most of the farmers have consciously kept abreast with the most advanced methods of cultivation, and make use of the best orchard sprays, treated seeds, fertilizers, etc., available. The resultant efficient management is reflected in the high degree of prosperity seen in the majority of these farms; buildings are well kept and homes are equipped with modern conveniences.

Farms of this type are decreasing in number. Farmland on the Plains is being sold for housing at extremely high prices. Many farms operating on the Plains today are being withheld until farm properties sold early for residential use have been completely built up. These farmers

wish the pressing demand for residential sites to be resumed in order that they may receive a still higher price for their holdings. Taxation on agriculture land in the Plains is relatively high since farmland, like residential land is assessed according to its accessibility to communications. In addition there has been a general tendency for the sons of the present farmers to choose other occupations which are less time-consuming and laborious than farming.

Greenhouse truck garden and orchard farms may be discussed according to their agricultural produce: tree fruits or small fruits and vegetables.

1. Tree Fruits

There are approximately farms in the thesis area which specialize in tree fruits or have over 50% of their holdings in orchards. Commercial production of tree fruits here is made possible by the proximity of Lake Ontario. This body of water exerts a moderating effect on the extremes of temperature found along the shores and permits the survival of orchard trees through the winter. Although the thesis area is excluded in the climatic subregion known as the Niagara Fruit Belt, it lies on the northwest or lee shore of the lake and does not experience the same degree of amelioration as do the southwestern or windward shores in the vicinity of St. Catharines. Therefore, the commercial production of only the more hardy tree fruits is feasible in the thesis area. Apples in particular do well here as well as pears, plums, cherries and walnuts. The commercial orchards as well as many small family-size orchards are scattered through the thesis area. Although three of the commercial orchard farms are located directly below the vertical face of the Silurian

formations and experiences a greater degree of wind protection than is found throughout the rest of the thesis area. This shelter cannot be regarded conclusively as a determining factor in the location of orchards since many similar sections have never been used for orchard cultivation. This is significant since commercial horticulture has certainly occupied the most favorable locations throughout the Niagara Peninsula in its development in the past eighty years.

The orchard farms are located throughout the thesis area on a variety of soils. Four are within the Napanee Clay belt, three are within the Fox Sandy Loam belt, and one lies astride the Fox Gravelly Loam, Fox Sandy Loam and Lockport Clay Loam soil belts. Although soils do not determine the location of orchards, edaphic factors do act selectively in determining the type of orchard to be planted. Cherries do well on the droughty Fox Gravelly Loam. Plums, pears and walnuts are generally planted on the well-drained Fox Sandy Loam. Apples are found almost exclusively on the poorly drained Napanee and Lockport soils. Orchards on the flat to gently undulating sandy and gravelly soils are clean cultivated. On the sloping poorly drained clay soils it is a general practice to mulch hay under the fruit in order to improve organic content.

With the exception of apples and walnuts, most of the tree fruits are sold in season through the regular commercial channels (as discussed previously on page). In contrast, the bulk of the apple crop is stored during the winter months in the cold vaults of the Aldershot Cooperative Distributing Company or in privately owned buildings and is sold off-season. A variety of species of apples are grown, each of which can be stored for a particular length of time in peak condition. The varying storage periods

particular to the different species permit the release of apples for sale during the winter in such a way as to maintain an orderly market.

Walnuts also store well and are sold according to market demands.

2. Small Fruits and Vegetable Crops

There are approximately thirty-eight farms in the thesis area which specialize in small fruits and vegetable crops. Of these thirty-eight farms: --

34 raise only outdoor summer crops. Part of the produce is sold on summer market and part is kept in cold storage for the winter markets.

27 of these cultivate cleanly tilled ground crops entirely and represent the dominant type of agriculture in the thesis area.

6 raise both mixed crops of small fruits and vegetables and tree fruits on their farms.

Land under orchard does not total less than 25% or more than 50% of the total area.

2 produce all their crops during the winter in greenhouses and have contracts with chain stores, etc. for outlets for their produce.

4 cultivate both during the winter in greenhouses and during the summer in outdoor fields. Of these, two specialize entirely in small fruits and vegetable crops, and two include a small proportion of orchard.

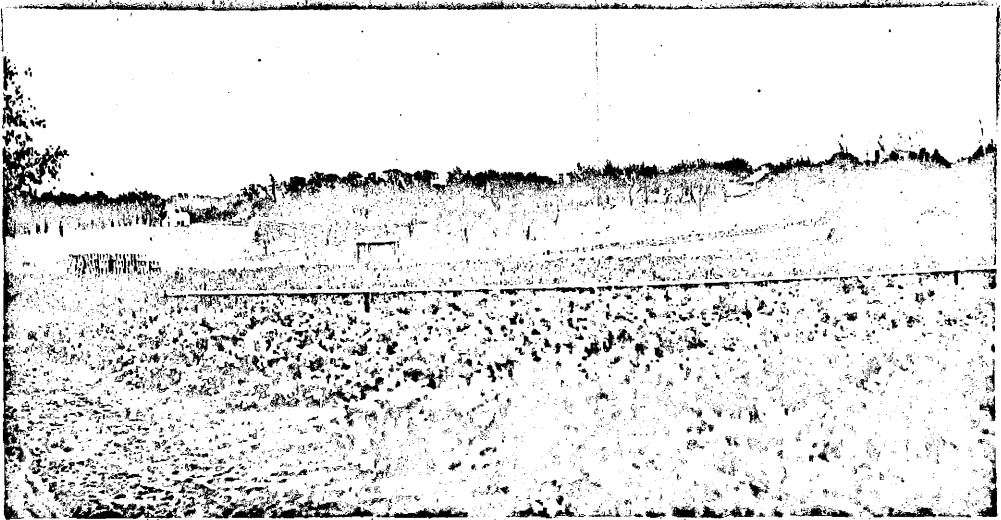
The cultivation of small fruits and vegetables is almost entirely restricted to the well-drained Fox Sandy Loam and Gravelly Loam soils. These light-textured soils dry quickly and warm early in the spring. They

are naturally low in fertility and in organic matter content, but because of the high value of their crops, heavy applications of fertilizer are profitable. In addition, all fields are planted to a winter cover crop of green rye which is plowed under in the spring as green manure. Small fruits and vegetables produced here are affected by pests and diseases common to most of Southern Ontario. Particularly damaging was a musk melon fungus which destroyed the reputation of the thesis area as the main musk melon producing area in South Central Ontario.

Generally, small fruits and vegetables grown in the thesis area must either be irrigated or else must drought resistant species. Musk melons, peppers, and staked tomatoes are grown on the slightly droughty Fox Gravelly Loam, and are usually dependent on naturally occurring rainfall. Crops requiring greater amounts of moisture such as celery, carrots cabbage, etc., are irrigated by aerial pipeline. Irrigation water is obtained from private wells, and springs found in the ravines of the sand apron. None is obtained from the new Burlington Water System.

Small fruits and vegetable crops benefit from the slightly longer growing season characteristic of the thesis area as compared to the length of the growing season found inland. Although spring arrives at a later date than inland away from the lake, the extension of warm temperatures late in the fall permits crops to mature after the first frost occurs above the escarpment.

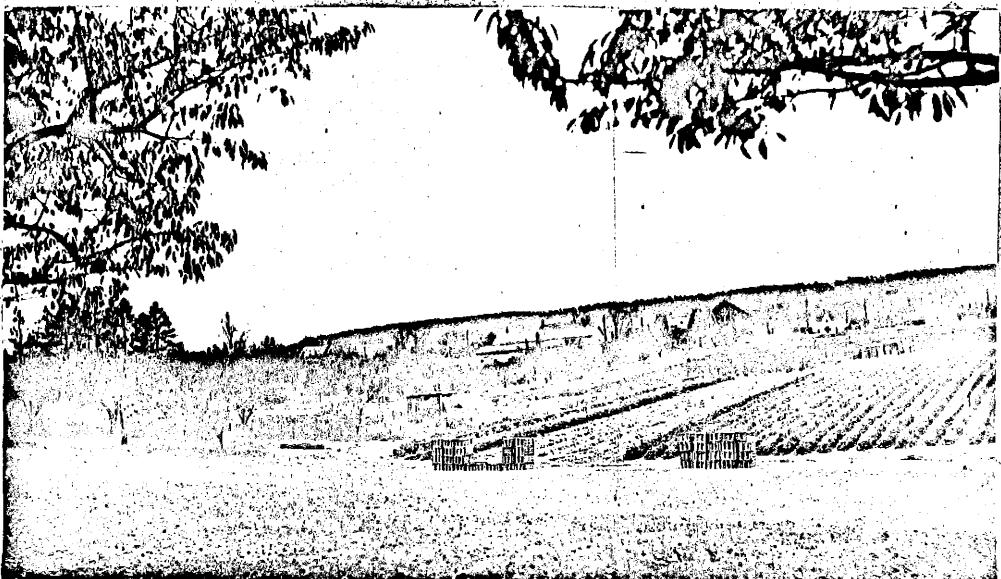
The selection of the various small fruit and vegetable species is carried out by the individual farmer according to the future market. All crops are started from seed in hotbeds and-or greenhouses. Some frost



Photographs taken in early
November, 1951.

Figure : Two views of a farm specializing in small
fruits and vegetables.

In order to spread the harvesting of crops over as long a period as possible, both quick- and slow-maturing varieties are grown, and the planting may take place at any time between mid-April and early June. In these pictures celery is being harvested late in the growing season for the winter market, and will be stored in the Aldershot Cooperative Distributing Company's cold storage plant. Abundant irrigation water is available for this farm since the Queenston shale is fairly close to the surface while stream action has formed a depression in the overlying sand apron. The water table is only two to eight feet below the surface. Although orchards predominate in both pictures, less than 25% of this farm is planted in fruit trees.



resistent species such as head lettuce may be set out as early as mid-April. Some double cropping is practised in which a quickly maturing frost resistant crop is set out early in the year and harvested within six to seven weeks, whereupon, a second crop is planted in the same ground. The major acreage of small fruits and vegetables however, is devoted to more slowly growing crops such as cabbage and tomatoes which require the entire growing season to reach maturity.

B. Marketing of Greenhouse, Truck Garden and Orchard Crops

The marketing, like the growing of truck garden and orchard crops is characterized by a high degree of individual initiative. There is an almost complete absence of cooperation among these specialized farmers, but one important exception is found their united action in establishing the Aldershot Cooperative Distributive Company.

Only crops grown during the winter in greenhouses are sold by contract to the large chain stores. Summer field crops may be marketed in some seven different ways. The farmer may:--

1. rent a stand at the Hamilton Market for approximately \$70 a year and sell his produce there, 3 days a week.
2. sell his produce to passing motorists. He may set up a temporary roadside stand if his property fronts on Highway No. 2, or he may sell his produce to the five families which have established permanent fruit and vegetable stands on Highway No. 2. These families included Bullocks, Burniston, Haggard, Every and Nicholson.
3. sell his produce to one of a number of unorganized truckers who drive from various South Central Ontario cities, particularly

Toronto, to buy produce in neighboring trucking areas.

4. sell his produce to the four local wholesale distributors which are active in the thesis area: De Graaff, Bullocks, Briggs, Klodt and Robinson. Of these, De Graaff is the most important since he takes a part of the produce of at least 50% of the growers in the thesis area. De Graaff transports and sells vegetables and fruits to retail outlets such as chain stores, etc., and for wholesale warehouses which will in turn sell to retail outlets.
5. transport his produce directly to urban wholesale markets, thus eliminating a middle man.
6. sell or store his produce with the Aldershot Cooperative Distributive Company, as discussed on page .
7. if his produce is suitable, sell to the Gordon Pickle Company as discussed on page . The amount of produce disposed of in this way is relatively small.

In general, most of the agricultural produce in the thesis area is sold within a radius of 60 miles. Toronto is a larger outlet than Hamilton not only because it has a larger population to feed but because it is surrounded by a hinterland which is less agriculturally productive than the area surrounding Hamilton. Therefore, Toronto supplies a market for over 50% of the agricultural produce grown in the thesis area. Often produce which will not sell in Hamilton is repacked and shipped to Toronto.

The growing and marketing of truck garden and orchard crops is in large part a gamble. The maturing date of the various crops can only

be approximately estimated, since ripening is largely determined by weather conditions. A brief shower followed by intense sunlight may ripen in six hours crops which were expected to ripen in two days. Even with ideal weather conditions such large quantities of one crop may be produced that the market is flooded and prices are depressed. While chemical solutions have been developed which delay ripening and the formation of mildew, generally the very perishable nature of truck garden and orchard crops presents many problems in selling procedure.

C. Miscellaneous Full-Time Commercial Agriculture

Most of the enterprises falling within this category are of an urban fringe nature and depend on a rural low-taxed location which is accessible to city markets. Friable soil conditions so coveted by the fruit and vegetable growers are of little importance to the majority of these farms.^{1.} Therefore, eight farms of this type are located on the less desirable Clay Slopes, while three are found on the Plains..

Three nurseries are located in the thesis area, two of which specialize in evergreen shrubery and other landscaping bushes while the third specialized in cactus plants. Animal husbandry found here includes the raising of poultry on two farms, pigs on a third farm, and bees on a fourth. Four fur farms are also located here, two of which handle mink and two chinchilla.

Three farms in the thesis area specialize entirely in hay and grain crops which are grown in rotation as feed for dairy cattle. Two farms are connected with dairy farms located above the escarpment and one supplies

1. The term "farm" as used in this thesis includes any plot or tract of land reserved for the raising or artificial cultivation of some form of domesticated life.

the feed for cattle kept by the Notre Dame Convent. These farms clearly evidence the adaptability of these soils to the cultivation of fodder. The author believes that were the Clay Slopes less dissected so as to permit a more extensive continuous cultivation of hay, no form of agriculture on the Clay Slopes could be more financially rewarding and more beneficial to the general state of the land than dairying. The three dairy-feed farms in the thesis area contain many fields of verdant grassy crops and are quite similar in appearance to true dairy farms such as are found in East Flamboro Township above the Niagara Escarpment. When compared with the other farms in the thesis area, these farms illustrate the striking contrast between typical farms above and below the escarpment.

With the exception of the two dairy-feed farms and the pig farms, the miscellaneous commercial farms are characterized by rather small holdings and an intensive use of their land. It is thought that these farms which are located on the Clay Slopes are more enduring than those of the Plains, since the Clay Slopes, offering no water or sewage facilities will not be invaded by extensive residential use for some time to come.

III. Part-Time Quasi Agriculture

Quasi-agricultural farms are valued for their advantages as rural residences rather than for their agricultural returns. They are located on low-taxed, low-priced land and provide a larger home and/or more extensive grounds than would be possible in the city at the same price. However, they suffer the disadvantages common to less accessible locations.

With the exception of electric power and telephone service, they must supply all of their own utilities such as water, sewage, transportation, etc.

Residential farms are of little importance in the light-textured soil belts of the Plains. These quasi-agriculture residences are the predominant farm type on the dissected Clay Slopes, particularly on the heavy clays of the Napanee soil belt. They originated for the most part, as neglected general farms in the 1870-1880's. During this period, farmers found it more profitable to be employed in non-agricultural occupations at least part of the year rather than spend all their time on their unproductive farms.

Today, cultivation has gradually become confined to small vegetable patches and vineyards which supply the family table only. Little produce, if any, is sold commercially. Relics of formerly productive orchards are located on some farms but generally bear a meager inferior yield. Occasionally, owners in this area cultivate crops of wheat and alfalfa for additional income. A long rotation is employed in which the land is left fallow the first year, alfalfa is sown broadcast and harvested the second year, and the land is planted to wheat the third year. There occur small scattered patches of sand within the Napanee Clay belt immediately below the escarpment. These small sand deposits have given rise to a more friable soil and more productive vegetable gardens. However, the occurrence of these sandy patches is so infrequent and of such limited extent that they are of only incidental importance. It is to be remembered that the major part of all residential farms is left as

idle land and that the major source of income on which these farms depend lies in employment in non-agricultural occupations.

Today, most of the residential farms are but small portions of the original farmsteads. Only five of the original farmsteads of 1870 have remained intact. Of the fifty-nine residential farms found today in the thesis area, thirty-nine contain 5 acres or less, while the remaining twenty farms vary from 5 to 60 acres. Of the total acreage of the fifty-nine residential farms which comes to _____ acres, 20 to 30% is cultivated while the remainder is idle land.

Residential farms may be divided into two categories according to financial status: the large estates of wealthy men, called locally "gentleman farmers", and the smaller homes which are less prosperous in appearance. Also classified in the same category of residential farms are a few tenant farms.

A. Estates of "Gentleman Farmers"

The three estates of "gentleman farmers" found in the thesis area occur together at the foot of the steep face of the escarpment. They are characterized by large holdings averaging _____ acres, and well-kept buildings of stylish appearance. Their location in the thesis area is due not so much to inexpensive low-taxed land as to the excellent view across Hamilton Harbour and their unspoiled rural atmosphere. These farms represent, intact the original holdings of the 1870 farmsteads. The bulk of each holding is devoted to grazing land. It is reported that each of the estates was purchased in order to maintain a private riding stable. One farm includes

a private bridle path approximately seven miles long above the escarpment.

B. Small Residential Farms

Small residential farms which are immediately dependent either entirely or in part upon income gained from non-agricultural occupations include a wide range of middle and lower class homes. They are, therefore, the most predominant type of rural residence occurring in the thesis area and account for forty-six of the fifty-nine residential farms. This category includes many gradations between (1) the middle class homes, supported by income derived from white collar jobs, which indulge in some farming as a hobby, and (2) the subsistence class homes, supported by income derived from manual labour, which must by necessity supplement their livelihood with agricultural produce.

Small residential farms vary in size from one to fifty acres.

The majority represent small portions of the original farmsteads which have been sold by ^{MESES?} leaps and bounds;-- in a few cases, the original farms have not been subdivided. The main factor in the location of these farms in the thesis area is the inexpensive, low-taxed land. In general, rural atmosphere and landscape features are of but secondary importance.

Although the largest part of each holding consists of idle land, it is among the category of residential farms that small scale agriculture is most frequent. Small vegetable gardens, vineyard patches and orchard plots are to be found adjacent to most of these homes.

C. Tenant Farms

The three tenant farms located in the thesis area have resulted from legal impasses. Oakland Park and the tenant farm located on Water-down Road are the remains of the unsettled Townsend-Fuller and Brown estates respectively. Both are leased on a long term basis to relatives and/or servants of the former owners. However, little true farming is carried on, the farms being used mainly as places to live. The tenant farm on Highway No. 8 has come into being as a result of a private dispute between partners who originally intended to sell the land as a housing subdivision. The block of land is now leased to three tenants on a short term basis. Feeds crops are grown by most inefficient methods and the tenants live in shacks.

IV. Conclusion

Agriculture in East Flamboro below the Niagara Escarpment typifies that found in rural-urban fringes in regions of dense population. It is directly dependent upon its proximity to large city markets, either in actual distance (e.g. Hamilton) or in time-distance (e.g. Toronto reached by an excellent transportation system).

Agriculture in the thesis area may be divided into two general areas according to the two major physiographic divisions. The first area is the level, much sought-after Plains with its light, adaptable soils. This area is capable of producing tender fruits and vegetables on a highly remunerative basis. The second area is the neglected Clay Slopes characterized by heavy clay soils and a highly dissected surface. This area supports a variety of agricultural endeavors, the most prevalent of which is the residential farm.

The trend from 1870 to the beginning of World War II was toward an increase of intensive cultivation of the Plains accompanied by a dwindling of agricultural land use on the Clay Slopes. This trend had been further promoted by the proximity of the thesis area to the major urban markets of South Central Ontario and by the position of the thesis area on the major routes of communication between these cities.

Since the end of World War II, the great need for residential land for city workers has forced Hamiltonians to build their homes further and further afield and along the arterial highway leading from the city. Since 1945, housing surveys have encroached on the rich sand Plains, both in East Flamboro and the adjacent township of Halton to the north. Thus, agricultural land use, formerly centered around Aldershot and Burlington is now being driven into the shale and sand Plains northeast of Burlington. It is expected that within the next ten years agricultural land on the Aldershot-Burlington sand Plains will be completely bought out for residential purposes.

During this recent period residential land use of the Clay Slopes has not advanced at the rapid rate that is found on the sand Plains. A far more rural atmosphere has been preserved. The Clay Slopes still harbour a miscellaneous assortment of rural agricultural types, particularly those enterprises which demand low-taxed land but do not require favorable soil conditions. Thus, animal husbandry, such as poultry products, etc., have remained undisturbed in their locations while the position of truck farming on the Plains has been seriously undermined. The trend since World War II has been the antithesis of that experienced previously.

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