

The Physical and Agricultural Geography
of
Pelham Township

by
John B. McClellan

Received and passed by the Department, April 1955.

L. G. Reeds.

A thesis presented to the Department of Geography,
McMaster University, in partial fulfillment of the re-
quirements for the degree Bachelor of Arts, April, 1955.

Acknowledgements

The writer wishes to express his appreciation for the aid and advice received from Professor L. G. Reeds, of the Department of Geography at McMaster University, who supervised this study. Mention must also be made of the co-operation received from Mr. A. K. Watt, of the Ontario Department of Mines, whose advice on the physiography of the township was invaluable.

Table of Contents

	<u>Page</u>
Acknowledgements.....	i
Table of Contents.....	ii
List of Photographs.....	iii
List of Maps.....	iv
Preface.....	v
CHAPTER I	
Physical Geography.....	1
(i) Geology.....	1
(ii) Climate.....	21
(iii) Vegetation.....	25
(iv) Soils.....	27
CHAPTER II	
History of Agriculture.....	29
(i) Homesteading or Land Clearing Period.....	29
(ii) General Farming Period.....	32
(iii) Specialized Farming Period.....	33
CHAPTER III	
Land Types.....	36
(i) Ridgeville Land Type.....	38
(ii) Short Hills Land Type.....	48
(iii) Chantler Land Type.....	55
(iv) Types of Farming.....	71
CHAPTER IV	
Summary and Conclusions.....	76
(i) Summary.....	76
(ii) Conclusions.....	78
Bibliography.....	79

List of Photographs

<u>Number</u>	<u>Page</u>
1. Swayze's Falls.....	6
2. Foreset beds of the delta.....	6
3. Shore-cliff on top of the delta.....	14
4. Kames on top of the delta.....	14
5. Southern flank of the delta.....	41
6. Northern flank of the delta.....	41
7. Tomato field in the Ridgeville Land Type.....	42
8. Fonthill Nurseries.....	42
9. Darcy Cropp Canning Factory.....	47
10. Sand and gravel pit.....	47
11. Market garden in the Short Hills.....	51
12. Livestock in the Short Hills.....	51
13. Small park near Effingham.....	53
14. Soil erosion in the Short Hills.....	53
15. Drainage in the Chantler land type.....	60
16. Bottomland along Welland River.....	60
17. Dairy farm in Chantler land type.....	61
18. Small farm on poorly-drained soil.....	61
19. Poultry farm south of Fenwick.....	65
20. Herd of Holstein cattle.....	65
21. Vineyard in Chantler land type.....	68
22. Large apple orchard.....	68

List of Maps

<u>Figure</u>	<u>Page</u>
1. Location map.....	2
2. Index map.....	3
3. Bedrock geology.....	5
4. Physiographic divisions.....	9
5. Soil map.....	28
6. Land types.....	37
7. Land use sample-Ridgeville type.....	39
8. Land use sample-Short Hills type.....	49
9. Land use sample-Chantler type.....	56
10. Land use sample-Chantler type.....	57
11. Land use sample-Chantler type.....	58
12. Land use and farm types.....	72

Preface

This is a geographical study of the physical and agricultural geography of Pelham Township. It is based largely on field work done in the summer and autumn of 1954.

¹
Putman and Chapman have presented an excellent generalized account of the surface features of Southern Ontario. However, in the study of an area as small as Pelham Township, a more detailed account of the physiography is needed. It has been the author's purpose to fulfill this need.

A thorough knowledge of the physical basis is prerequisite to a complete understanding of the agricultural geography of an area. Care must be taken, however, unless the physical factor be overemphasized; other factors, especially the historical and economic factors, must be considered in any explanation of the present land use of an area. It is the author's purpose, in this study, to describe, and account for, the present pattern of land use in Pelham Township.

The study is divided into four chapters. The first two present the physical and historical background

¹ D. F. Putman and L. C. Chapman, The Physiography of Southern Ontario.

of agriculture. They are followed by a chapter on land types and distribution of farm types, and a final chapter of summary and conclusions.

CHAPTER I

PHYSICAL GEOGRAPHY

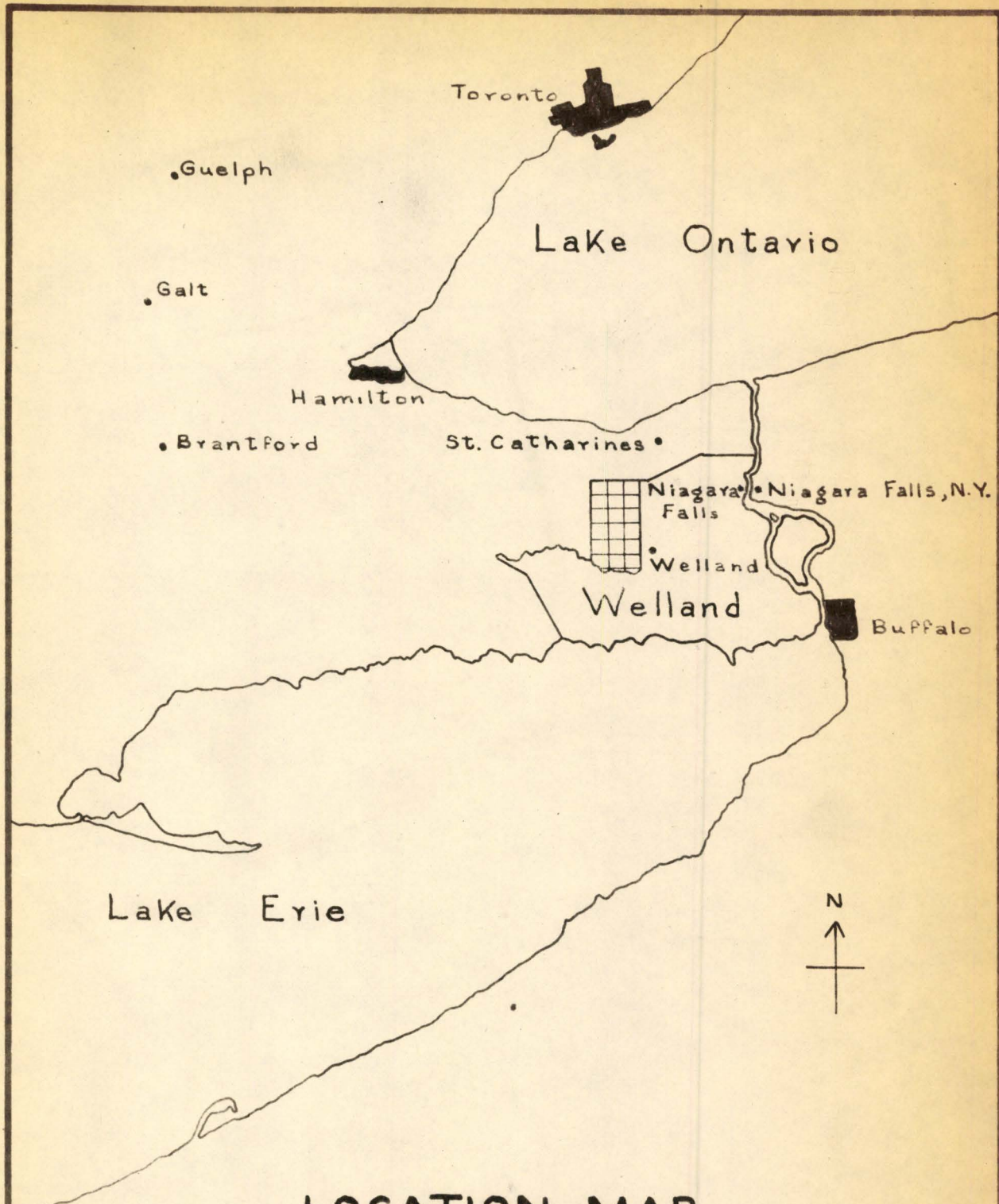
I. PHYSIOGRAPHY

Pelham Township is located in the northwest corner of Welland County, in the eastern section of the Niagara Peninsula. It lies approximately midway between Lake Erie and Lake Ontario, extending from the Welland River in the south almost to the brow of the Niagara Escarpment in the north. (Figure 1)


The township is roughly rectangular in shape, with a width of five miles and a length of nine miles. It has a total area of 28,279 acres, or approximately forty-four square miles.

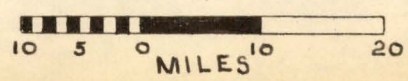
Physiography

Physiography has greatly influenced the agricultural geography of the township. A study of the landforms is basic to an understanding of the agricultural development. The best way to understand the surface features of the township is to study the physiographic history of the area and show how these landforms have originated.

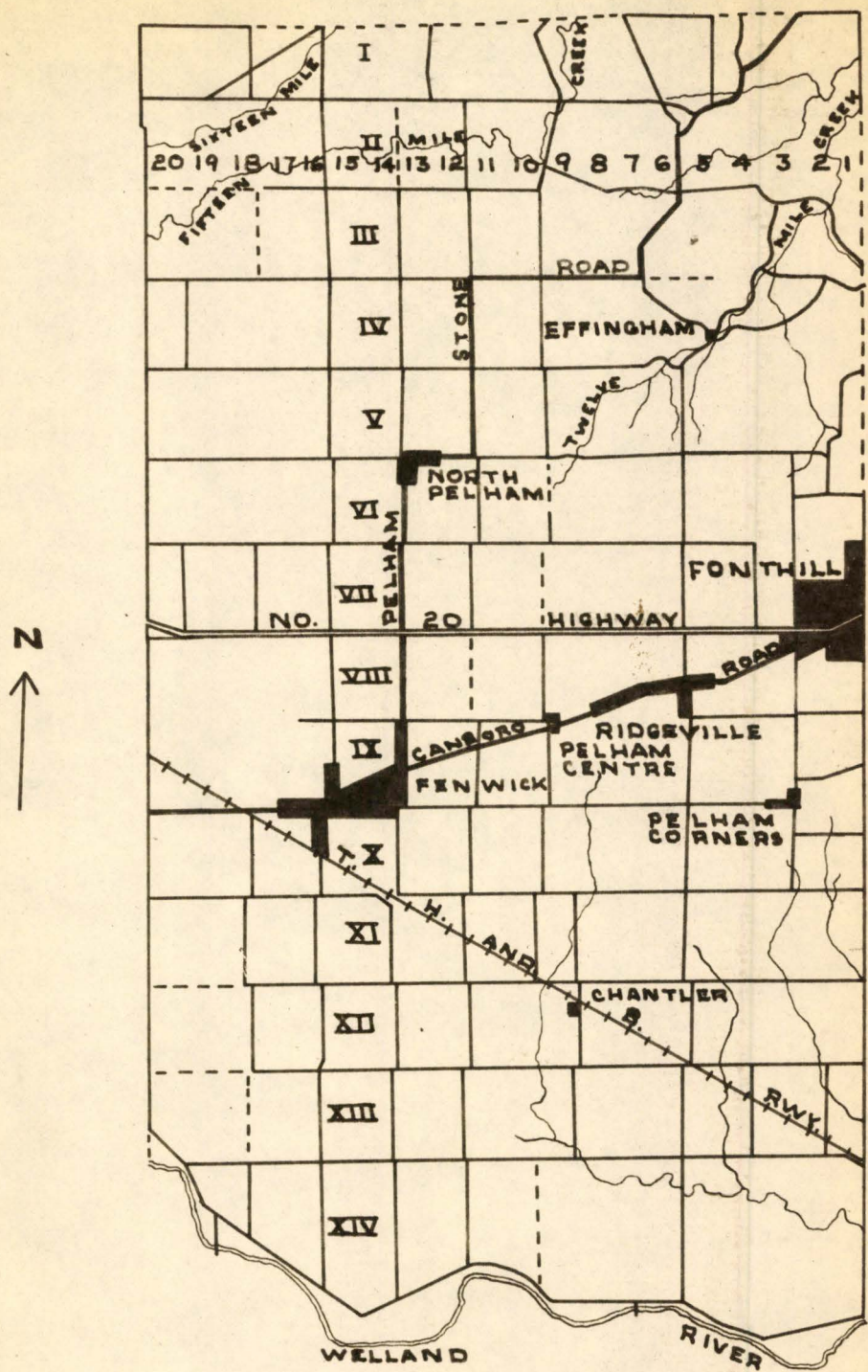


**LOCATION MAP
of
PELHAM TOWNSHIP**

Pelham Township 



INDEX MAP of PELHAM



ROAD	—	STREAM	~
ABANDONED ROAD	---	CONCESSION	I
RAILWAY	—	LOT	2

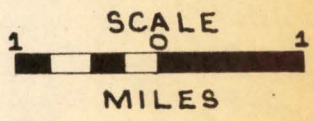
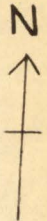
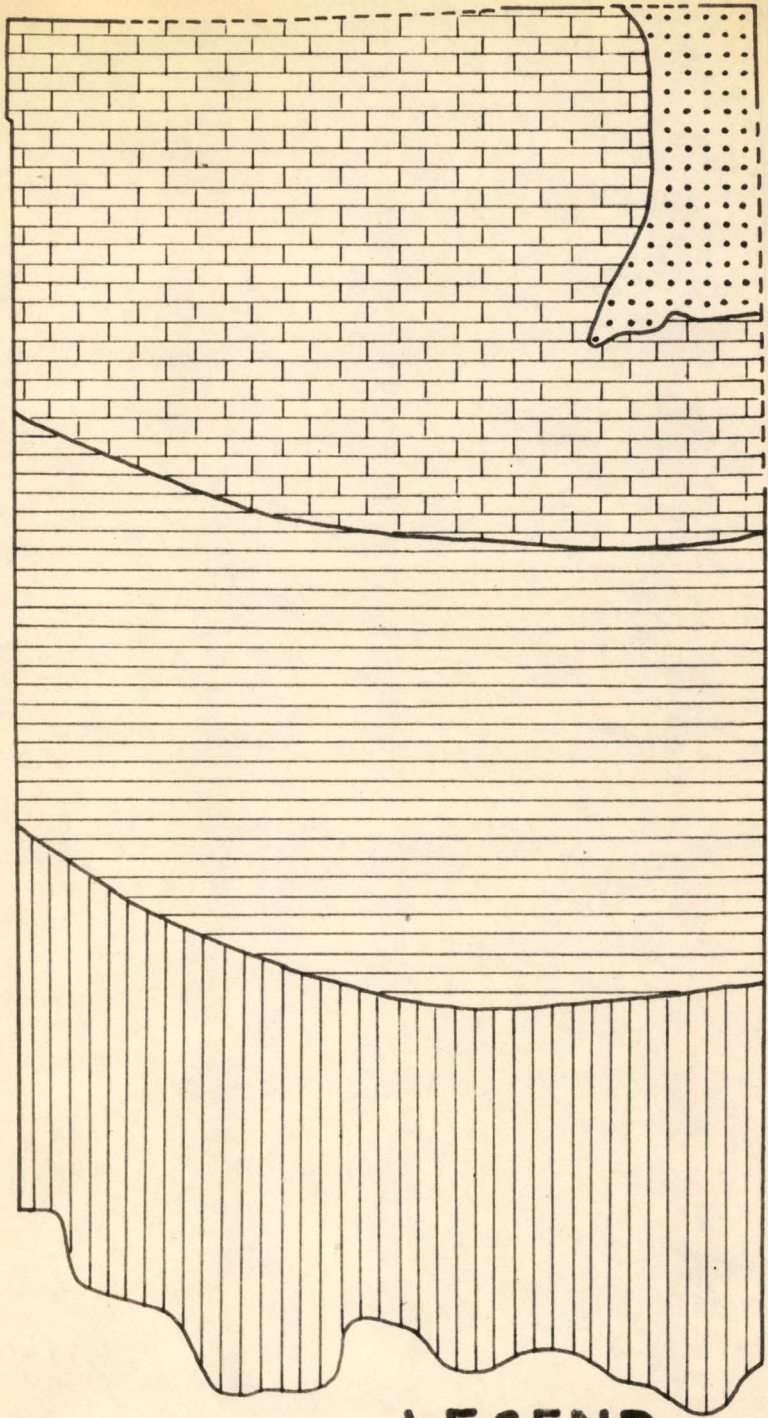
Bedrock geology

The bedrock underlying Pelham Township, although it outcrops in only a few places, strongly influences the surface features of the area. The bedrock consists of Silurian rocks, lying in east-west belts across the township (Figure 3). These belts are formed from gently dipping beds of dolomite (Guelph and Lockport formations) and shale (Salina formation)¹.





These nearly horizontal beds contrast strongly with the dissected beds of the Rochester, Clinton and Medina formations, in the northeast section of the township. In this area stream action has carved out a deep preglacial valley in the bedrock. The streams, forerunners of Twelve Mile Creek, flowing to the north, have cut through the overlying dolomite cap rock into the softer shales and sandstones beneath. Along the sides of the valley there is thus a steep escarpment. Only the west side of the valley wall lies within Pelham Township. This bedrock valley has been called the Power Glen re-entrant in the Niagara Escarpment. It played an important part in the development of the surface features of the township, since it controlled the movement of the glaciers which spread over the area. Outcrops of dolomite occur in several places

¹ J. F. Caley, The Paleozoic Geology of the Toronto-Hamilton Area.

BEDROCK GEOLOGY of PELHAM



LEGEND

- ROCHESTER } FORMATIONS 
- CLINTON }
- MEDINA }
- LOCKPORT FORMATION 
- GUELPH FORMATION 
- SALINA FORMATION 

(AFTER CALEY)

JM/54



Number 1. Swayze's Falls, one mile north of Effingham. A stream flowing across the escarpment has exposed the bedrock. Fifteen feet of dolomite overlies seventy feet of shale in this section.



Number 2. Gravel foreset beds, dipping to the west, are exposed in Moyer's Sand and Gravel Pit, located on the top of the glacial delta.

along the face and brow of the escarpment, where the rock face has been swept bare by advancing glaciers.

The bedrock is also important for its contribution to the soils of the township. The till, which forms the parent material for soils covering fifty-three per cent of the township, is extremely high in limestone and shale derived from the underlying bedrock.

Surface features

The present physiography of the township is, in the main, the result of glaciation during the Pleistocene epoch. Save for the Power Glen bedrock valley, all landforms date from the advent of the Wisconsin ice-sheet. Although earlier ice-sheets undoubtedly covered the area, no evidence of their existence could be found in the field.

The ice-sheet, in its advance over the township, appears to have thronged up the Power Glen valley and spread out over the surrounding uplands. Its movement was controlled by the underlying bedrock. As it moved up this preglacial valley it widened and deepened it, until the valley assumed its present width. The glacier at this time also clogged the valley with till.

The majority of the landforms of the township, however, are associated with the retreat of the ice into the Lake Ontario basin, rather than with its advance. The

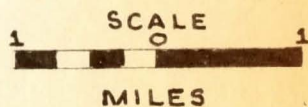
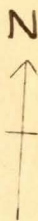
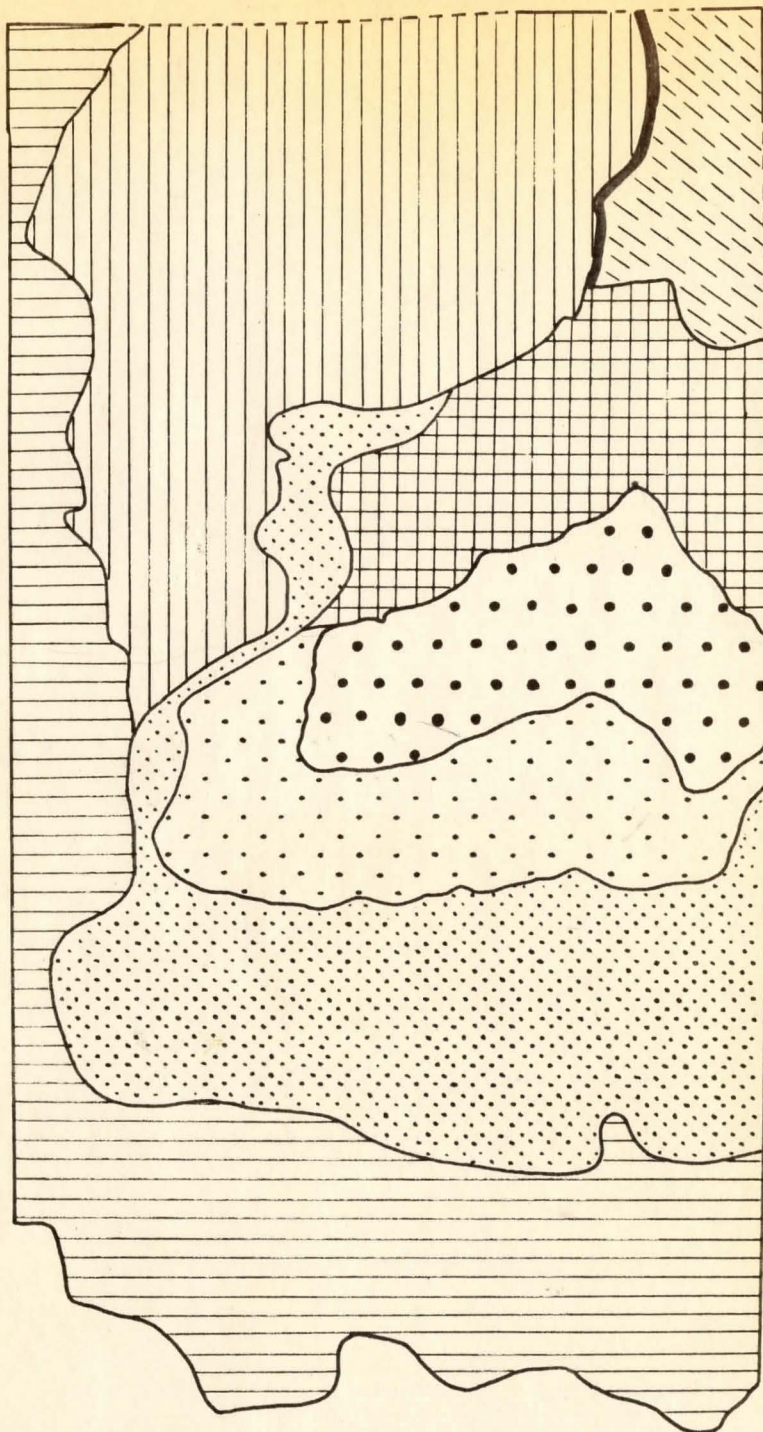
ice appears to have retreated uniformly until a position about one and one-half miles north of Ridgeville was reached. Here it assumed a stationary position at the head of the bedrock valley. At this time a thick lobe of ice lay in the valley, with a thinner covering over the uplands on either side.

In front of the ice was a glacial lake, fed by meltwaters from the glacier and filling the whole Lake Erie Basin. This lake, with its surface at about 850 feet A. S. L., was probably Lake Warren. Putman and Chapman² estimate that at its highest level Lake Warren was about 875 feet A. S. L. It appears that the deposits in the Pelham area were laid down at about the same time as the Niagara Falls moraine to the east was being formed.

With the ice in this stationary position, a large glacial delta was deposited in the Fonthill-Fenwick area by a river flowing in or on top of the ice and emptying into Lake Warren. This delta, about three miles long and one and one-half miles wide, is the most conspicuous landform in the township. It rises 150 feet above the surrounding countryside. It is composed of coarse sands and gravels, to a depth of approximately 300

² D. F. Putman and L. C. Chapman, Physiography of Southern Ontario, p.72.

PHYSIOGRAPHIC DIVISIONS OF PELHAM



LEGEND

GLACIAL DELTA		CLAY PLAIN	
OUTWASH PLAIN		TILL PLAIN	
SAND PLAIN		DISSECTED TILL PLAIN	
KAME MORaine		NIAGARA ESCARPMENT	

feet. Exposures in gravel pits along its top show excellent examples of topset and foreset beds.

In front of the delta were deposited finer outwash sands in a belt approximately one mile wide. Further out from the delta lacustrine clays were laid down on top of the till, in the area shown as clay plain and sand plain on the physiographic map, (Figure 4), south of Number Twenty highway.

Finally the ice lobe began to retreat down the bedrock valley, over deep deposits of till which had clogged the valley at the time of the ice advance. At the same time the level of Lake Warren began to fall, exposing the recently formed glacial delta.

As the ice moved down the valley deposits of sand and gravel, called kame moraine on the physiographic map, (Figure 4), were laid down by stream action at the front of the retreating ice. Due to insufficient length of time well-formed deltas did not develop. These deposits consist of poorly sorted sands and gravels on top of the underlying till. They are thickest immediately behind the delta. Farther north they gradually thin out, until in the northern part of the valley only till is present.

As the ice retreated from the township the landforms were modified by the wave action of receding Lake

Warren. At this time the area shown as till plain, (Figure 4), was uncovered and the till was slightly reworked by the lake waters. Previous to this time lacustrine clays had been deposited in the area to the west of the till plain.

As the level of Lake Warren fell, the glacial delta was modified by wave action. A prominent shore-cliff was cut at the 800 foot contour level. Below this level the top of the delta was flattened. Well-developed shorelines can also be found around the 675 foot level south of Ridgeville. Sands were washed out from the delta and spread over the upper part of the Power Glen valley. A small sand plain was deposited around North Pelham at the same time.

As the lake waters receded further sands were washed out of the outwash plain and laid down over the lacustrine clays forming a wide belt around the outwash plain, from North Pelham to Pelham Corners. This is the area shown as a sand plain on the physiographic map, (Figure 4).

Finally the lake waters dropped below the 550 foot level and the whole of the township was uncovered. At this time the drainage of the township began to assume its present form.

Due to a lower base-level in the Power Glen re-entrant, Twelve Mile Creek and its tributaries quickly began to cut through the kame and till deposits of the bedrock valley until this section has become "one of the most thoroughly dissected areas in Southern Ontario."³

Twelve Mile Creek rises on the northern flank of the delta and empties into Lake Ontario at Port Dalhousie.

Elsewhere, as is the case in most areas of dense clays, the streams are slow and sluggish. The Welland River, or Chippewa Creek as it is commonly called, rises on the flank of the moraine at Ancaster and flows eastwards into the Niagara River at Chippewa. It forms the southern boundary of the township. It is a sluggish river about 200 feet wide with a gradient of two feet per mile, flowing through a narrow valley which is nowhere more than twenty-five feet below the general ground level. Fifteen and Sixteen Mile Creeks are small, sluggish, intermittent streams flowing through the northwest part of the township.

The foregoing has been a study of the physiographic history of the township, i.e., a study of the processes which have been at work in the formation of the

³ D. F. Putman and L. C. Chapman, The Physiography of Southern Ontario, p. 115.

surface features of the area. We may now proceed to a description of the landforms which have resulted from these processes.

Glacial Delta. The glacial delta, covering an area of 1700 acres or approximately six per cent of the total area of the township, is the most conspicuous landform on the dip-slope of the Niagara Escarpment, and dominates the landscape of Pelham. Its top, at an elevation of 850 feet A. S. L., is the highest point in the Niagara Peninsula. It rises over 200 feet above the average ground level of the township.

The delta is roughly triangular in shape. It has a length of three miles and a width of one and one-half miles. It has two arms, one stretching toward Fenwick, the other toward Fonthill. These are possibly due to (i) changes in the course of the river flowing into Lake Warren, or (ii) post-glacial erosion of the central portion around Ridgeville.

The delta slopes off steeply on all sides. The steepest slopes occur on the northern flanks; here they approach twenty-five per cent. These back slopes consist of gravel topset beds which collapsed with the retreat of the ice and now dip sharply to the north. Slopes on the southern flanks of the delta are more gentle. In most



Number 3. A shore-cliff cut by receding Lake Warren at 800 foot contour level on top of the glacial delta.



Number 4. A view of the flat top of the glacial delta. In the background are small kames deposited on top of the delta. The top of the centre kame is the highest point in the Niagara Peninsula.

places they are less than eight per cent. These slopes consist of foreset beds, covered with sands laid down by Lake Warren.

The top of the delta is essentially flat. Below the 800 foot contour level it has been planed off by receding lake waters. Above the 800 foot shoreline is another level plain, save for a few low hummocks which represent small kames dumped on the surface of the delta.

There is a gradation in the texture of the sediments from north to south on the delta, corresponding to the decreasing velocity of the river as it emptied into Lake Warren. The sediments grade from coarse gravel and rounded pebbles at the rear of the delta to fine gravel and medium-textured sand around Ridgeville.

Several small valleys trending in a southwest direction occur on the southern flanks, especially in the Ridgeville and Fenwick areas. These are possibly the result of early post-glacial erosion, while the lake level was still around 675 feet A. S. L.

Outwash plain. The outwash plain covers an area of 2300 acres, or approximately eight per cent of the total area of the township. It extends in a belt about one mile wide on the southern fringe of the delta, from Fenwick to Pelham Corners. (Figure 4)

The plain lies between the 700 and 625 foot elevations. It slopes gently to the south, away from the delta. Slopes of less than two per cent are common throughout the area. It consists of fine outwash sands deposited by the same river which laid down the delta plus sands washed out from that same landform by receding Lake Warren. Water well records show that in places these sands attain depths up to ninety feet.⁴ Belts of swamp trending in an east-west direction throughout the plain mark old shorelines of the glacial lake. In places, especially around Fenwick, the plain has been dissected by post-glacial erosion.

Kame Moraine. Kame moraine covers an area of 2600 acres, or approximately nine per cent of the total area of the township. It lies in the upper valley of Twelve Mile Creek and its tributaries, immediately north of the delta. It consists of poorly sorted sand, gravel and silt deposits laid down at the edge of the retreating ice mass plus deposits of sand washed out of the delta by Twelve Mile Creek in its early stages.

The area has been deeply dissected by this creek and its tributaries. In many places the sands and gravels have been removed by stream action, leaving the underlying

⁴ A. K. Watt, Ground Water in Ontario, 1948, 1949, 1950.

heavy clay till at the surface. The area is one of deeply entrenched streams with rolling uplands in between.

Dissected Till Plain. The dissected till plain covers an area of 1150 acres, or approximately four per cent of the total area of the township. It lies north of the kame moraine in the valley of Twelve Mile Creek, below the escarpment. It consists of heavy clay till, which filled the old bedrock valley at the time of the ice advance. This former till plain has been highly dissected since the retreat of the ice.

The area is in the early mature stage of development. It is characterized by steep slopes with only small area of uplands remaining between the streams. Twelve Mile Creek and its tributaries have entrenched themselves up to 100 feet below the level of the uplands. This area, together with the area of less highly dissected kame moraine to the south, is known locally as the Short Hills.

Niagara Escarpment. The escarpment covers a relatively small area, less than one per cent of the total area of the township. It consists of the western rim of the pre-glacial Power Glen valley, and rises 75 to 100 feet above the upland surface of the dissected till plain.

In some places the face of the escarpment is very steep, with slopes approaching thirty-five per cent. Here the dolomitic cap rock outcrops along the top. In most places, however, the face is obscured by deep thicknesses of drift. The southern rim of the bedrock valley has been deeply covered with drift and is not a prominent landform.

Sand Plain. The sand plain occupies an area of 5700 acres, or approximately twenty per cent of the total area of the township. It covers a belt two miles wide south of the outwash plain and a narrow belt to the north along the margin of the kame moraine.

This area is one of low, undulating sandy knolls overlying clay flats. Nowhere are the thicknesses of sand over three feet. In many places the sand has been removed by erosion, with heavy clay now present at the surface. These sands are fine and compact. They were washed out from the outwash plain and kame moraine by the receding waters of Lake Warren, or possibly Lake Lundy, which may have reached this level.

The area presents a fairly flat appearance; it slopes gently to the south at a rate of approximately fifteen feet to the mile.

Till Plain. The till plain covers an area of 7400 acres, or approximately twenty-six per cent of the total area of the township. It lies in the northern part of the township, between the bedrock valley to the east and the clay plain to the west.

The area is a rolling morainic upland, composed of till which has a high limestone and shale content. It was one of the last areas in the township to be deglaciated and was only slightly affected by receding lake waters. It differs from the adjoining clay plain in the more frequent occurrence of stones and boulders, and the more rolling topography. In the northern section it has been dissected by Fifteen and Sixteen Mile Creeks.

Clay Plain. The clay plain covers an area of 7350 acres or approximately twenty-six per cent of the total area of the township. It lies along the southern and western boundaries of the township.

In the areas away from streams the land is flat and poorly drained, while in the vicinity of these streams, especially the Welland River, the land is more rolling. The plain is composed of heavy reworked till, high in limestone and shale, with a considerable mixture of lacustrine clays laid down in Lake Warren. In general,

clays are found in the depressions while till outcrops on the higher ground.

Climate

The climate of Pelham Township is the second important physical factor which has influenced the land use of the area. In this area it is similar to that found over the whole of the dip-slope of the Niagara Escarpment east of Hamilton. Local variations of climate do exist. These are discussed later under the section on land types, since they are due to variations in relief and exposure.

The township lies in the belt of cyclonic storms; hence the weather changes every two to five days, except in the summer when prolonged periods of clear warm days are common. The area is open to the cold waves of winter that sweep over Southern Ontario; temperatures may fall as low as -22 degrees F. during these periods of cold weather. The climate is also influenced by the proximity of Lake Erie, which acts as a source of moisture to air flowing over it. As distance from the lake increases, the amount of precipitation decreases.

A weather station was established in 1950 on top of the glacial delta approximately one mile north of

Fonthill. Due to its short period of operation and the absence of records for the winter months, few conclusions can be drawn from its data. Weather records have been kept for a longer period of time at Welland, two miles east of the township. These figures may be taken as typical for condition within Pelham Township. Thirty year normal values for Welland are shown in the following table.

	<u>Mean Monthly</u> <u>Temperature</u> (of)	<u>Mean Monthly</u> <u>Precipitation</u> (inches)
January	25	2.90
February	25	2.72
March	33	2.93
April	44	2.92
May	55	2.88
June	66	2.63
July	71	2.98
August	70	2.33
September	63	3.28
October	51	2.70
November	40	2.99
December	29	2.76
Annual	47.7	34.02

The average temperature of three winter months is 26 degrees F. This figure, however, is not as significant as the extreme temperatures recorded, for it is these low temperatures which are responsible for the winter-killing of fruit buds and fall grain. When temperatures below -15 degrees F. occur in late January, February or March the buds of tender fruits such as peaches and cherries are killed. The extreme low temperature recorded at Fonthill is -22 degrees F., in 1943. This resulted in a 100 per cent kill of peach buds in the area.⁵ Such an extreme is very rare; it is noteworthy that since 1943 temperatures have never gone below -12 degrees F. Average temperatures for the three spring months are 44 degrees F., for the three summer months 69 degrees F. and for the three autumn months 51 degrees F.

On an average the growing season in the township is 203 days.⁶ It extends from the fourteenth of April to the third of November. The frost-free period is 163 days, although this figure has varied widely within recent years.

⁵ J. W. Watson, "Mapping a Hundred Years of Change in the Niagara Peninsula," p. 274.

⁶ D. F. Putman and L. C. Chapman, "Climate of Southern Ontario."

Records at Fonthill show that in 1953 the frost-free period was 163 days while in 1951 it was 193 days. The average for the four years, 1950-1953, was 181 days. In general it lasts from the eighth of May until the eighteenth of October. This period provides ample time for the maturation of small fruits and vegetables.

The average annual precipitation at Welland is thirty-four inches. Since the amount of rainfall decreases to the north it is probable that the range within Pelham is from thirty-four inches in the south to thirty inches in the north. The precipitation is distributed uniformly throughout the year. At Welland an average of 2.33 inches falls in the driest month. Moisture deficiencies may occur on the sandy soils in Pelham during periods of drought.

The climate of Pelham Township, as compared with that in the rest of Southern Ontario, is one of warm summers, mild winters and adequate year-round precipitation.

Natural Vegetation

The natural vegetation of a region plays an important role in the development of soils within the area. It is also a source of raw materials for the settlers of the region. In Pelham Township the natural vegetation has largely been removed by man, and is an insignificant feature of the landscape. The woodlands are now used only as pasture, or as a source of fuel in a few places.

Woodlands occupy 2,625 acres, or nine per cent of the total area of the township.⁷ Eight and one-half per cent of the total area, or 2,497 acres remains in swamp, scrub and natural pasture. These areas, covering 5,122 acres, are for the most part, concentrated on the steep slopes of the Twelve Mile Creek valley and the northern slopes of the glacial delta, in the depressional areas of the outwash, sand and clay plains, and on the poorly-drained flats of the Fifteen and Sixteen Mile Creeks.

The township, according to Halliday's classification is composed of sugar maple and beech, together with basswood, red maple, and red, white and bur oaks. Conifers

⁷ Census of Canada, 1951.

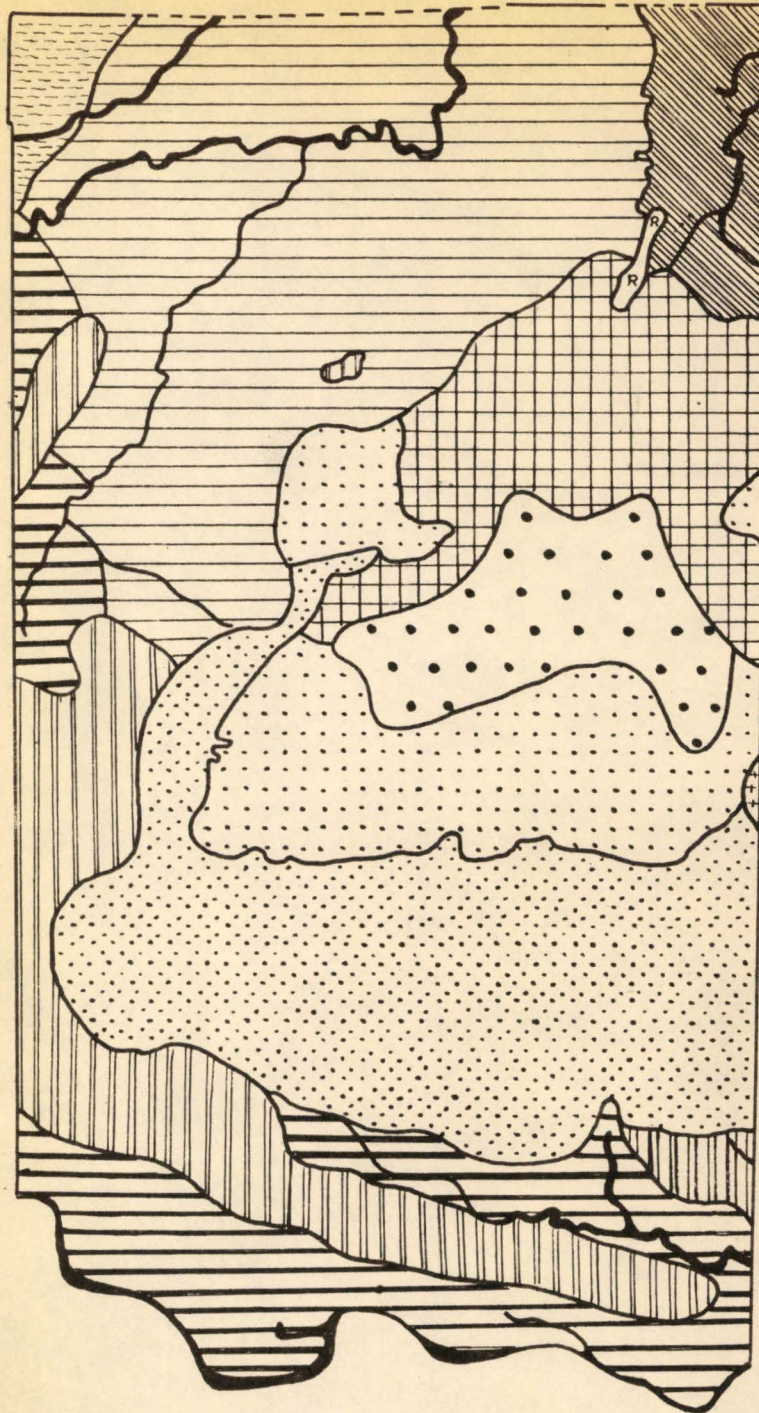
⁸ W. E. D. Halliday, A Forest Classification for Canada.

are not common; hemlock and white pine occur mainly on the lighter sandy soils. Aspen and poplar are found on the borders of the woodlots and in cut-over areas. Various species of willows grow in the low swampy areas.













Soils

The soils of an area play an important part in its agricultural development. In Pelham Township the soils belong to the Grey-brown Podzolic group. They have been formed in a cool humid climate under a deciduous type of vegetation.

Twelve distinct soil types occur in Pelham. Differences among these types are not due to climate and vegetation, which are generally uniform over the area, but are caused by variations in the parent materials, slope and drainage. These soil types are discussed in detail under the section on land types, since land use in this area is closely related to the soil type. The material on soil types has been derived from field observations and from the Welland County soil map, prepared by the Soils Department of the Ontario Agricultural College.



LEGEND

- HALDIMAND CLAY 
- CAISTOR CLAY LOAM 
- ONEIDA CLAY LOAM 
- ONEIDA CLAY LOAM (ERODED PHASE) 
- BRANTFORD SILT LOAM 
- CAISTOR LOAM 
- FONTHILL LOAM 
- PELHAM LOAM 
- PELHAM SANDY LOAM 
- BERRIEN SANDY LOAM 
- BOTTOM LAND 
- ROUGH BROKEN LAND 



SOIL MAP of PELHAM
(AFTER O.A.C. SOIL MAP)



CHAPTER II

HISTORY OF AGRICULTURE IN PELHAM TOWNSHIP

The foregoing chapter has been a study of the physical basis of agriculture in Pelham Township. We must now turn to a consideration of the historical background of agriculture in the area. The history of agriculture is divided into three periods, largely on the basis of material from the Census of Canada, 1851-1951.

Homesteading or Land Clearing Period - 1784-1860

During the homesteading period the land was cleared of forest and farming became the dominant activity. By 1860 the foundations of present-day agriculture in Pelham had been laid.

The first settlers, United Empire Loyalists, came to the district in 1784, and cleared land in the Short Hills. These early settlers looked for access to permanent streams, comparatively open vegetation, and easily worked soils. They found these conditions in the Short Hills and on the glacial delta and its associated outwash plain.

These early farmers were practically self-sufficient. Timber and wheat were the only cash crops. By 1817 five grist mills and three saw mills had been built along Twelve Mile Creek to process these raw materials.

Land clearing operations and settlement continued throughout the first fifty years of the nineteenth century. The policy of free land grants adopted by the government and the construction of the Welland Canal during this period greatly stimulated trade and settlement within the area. Thus by 1851 the population of the township was 2400; in 1951 the total farm population was only 2118. Almost half the township was occupied at this time. One-quarter of it was under cultivation. Wheat was still the main cash crop; almost half of the crop land was planted to it. Settlement was concentrated on the easily-worked sandy loam soils. Much of the till and clay plains remained in forest.

The ten year period ending in 1860 marks the culmination of the land clearing era. Although the population increased by only 246 during this time, the area of land under cultivation almost tripled. The present road network was completed. All parts of the township were occupied.

Thus, by 1861, 28,029 acres of land were occupied, and the amount of land under cultivation had risen to 17,986 acres, with 11,796 acres under crops. These figures are only slightly below the present day figures for the area. Wheat remained the major crop, although the percentage of cropland it occupied had fallen from fifty to twenty-five per cent in ten years, showing the development of a more diversified type of agriculture. Since 1860 the agricultural landscape has changed in only one respect; there is now greater emphasis on specialized types of farming.

By 1860 the township was already noted for the production of fruits and vegetables. The early settlers soon realized the value of the sandy soils for this purpose. A nursery, established at Fonthill in 1837, stimulated the local growth of fruit-farming. Most farms in the Fonthill-Fenwick district had small apple orchards and vegetable gardens. As yet, however, the market for this type of produce was small. In all, there were 758 acres of orchards and gardens in 1861.

General Farming Period 1860-1900

During the remainder of the nineteenth century, general farming prevailed throughout the township. This was a self-sufficient type of agriculture with wheat as the main cash crop. It was due, in large part, to the lack of near-by urban markets.

The economy was based on stock-rearing and grain-growing. The production of fruit and vegetables was secondary. Only on the sandy soils of the Fonthill-Fenwick area was there any specialization; here, winter apples, pears and early potatoes were important cash crops. Page's Directory of 1876 lists wheat, Indian corn, potatoes, apples and butter as the chief products of the Fonthill area.

Thus, in 1891, near the end of the period, 3,617 acres of land were still in wheat. The number of cattle, sheep and swine was approximately 6,000, with each making up one-third of this total. Oats and hay occupied areas of 2,587 and 6,291 acres, respectively. This illustrates the importance of stock-rearing within the economy.

Fruit farming and market gardening grew slowly during this period. Early potatoes and winter apples for export were the main products. This growth was concentrated

along the Canboro Road between Fonthill and Fenwick on the warm sandy loam soils. By 1881 gardens and orchards occupied 1,642 acres, and 518 acres were planted to potatoes. The nursery at Fonthill grew rapidly after 1860, largely because of good management. By 1887 it occupied 400 acres and employed 175 men.

Specialized Farming Period-1900 to the Present

During the twentieth century, important changes have occurred in the agriculture of Pelham Township. The old general farming, with its emphasis upon stock and wheat, is gone. More specialized types have taken its place.

The decline of stock-rearing and grain farming was due to competition from other areas and the emergence of more profitable types of farming within the township. With the turn of the century the influence of the Canadian West was felt. Hence the production of meat and wheat in Pelham declined. Thus, by 1951, the number of beef cattle had fallen to sixty-five, the number of sheep to ninety-three. The acreage of wheat declined, from a high of 4,362 acres in 1881, to 2,032 acres in 1951.

Since 1900 the population of nearby urban centres, such as Welland, St. Catharines and Niagara Falls, has

greatly increased. Specialized types of farming have developed to meet the needs of this large urban market. Numerous dairy farms are now found along the Pelham Stone Road and the Welland River, on the clay soils, supplying St. Catharines and Welland with fluid milk. As the market for eggs and poultry increased, poultry raising assumed greater importance. Thus there was a rise in the number of poultry from 14,938 in 1891 to 50,438 in 1951.

The greatest degree of specialization, however, has occurred on the sandy soils of the glacial delta, outwash plain and kame moraine. Before 1900, although it was known that the sandy soils of this area were well adapted to the production of fruit and vegetables, the market was very limited. With the rise of the urban centres, there was an increased demand for fresh fruits and vegetables. The establishment of canning factories in the area further expanded the market. Thus the acreage of land in fruit, vegetables and nursery stock, increased from 1,642 acres in 1881 to 4,045 acres in 1941, the last year for which figures are available. With the increased emphasis on fruit growing came greater specialization in the type of fruit grown. At first apples were the main fruit. There has since been a concentration on

the more tender types, such as peaches, cherries, pears and plums, which, due to climatic limitations, can be grown successfully only in the Niagara, western Lake Ontario and Lake Erie regions.

CHAPTER III

LAND TYPES

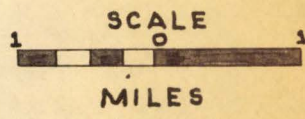
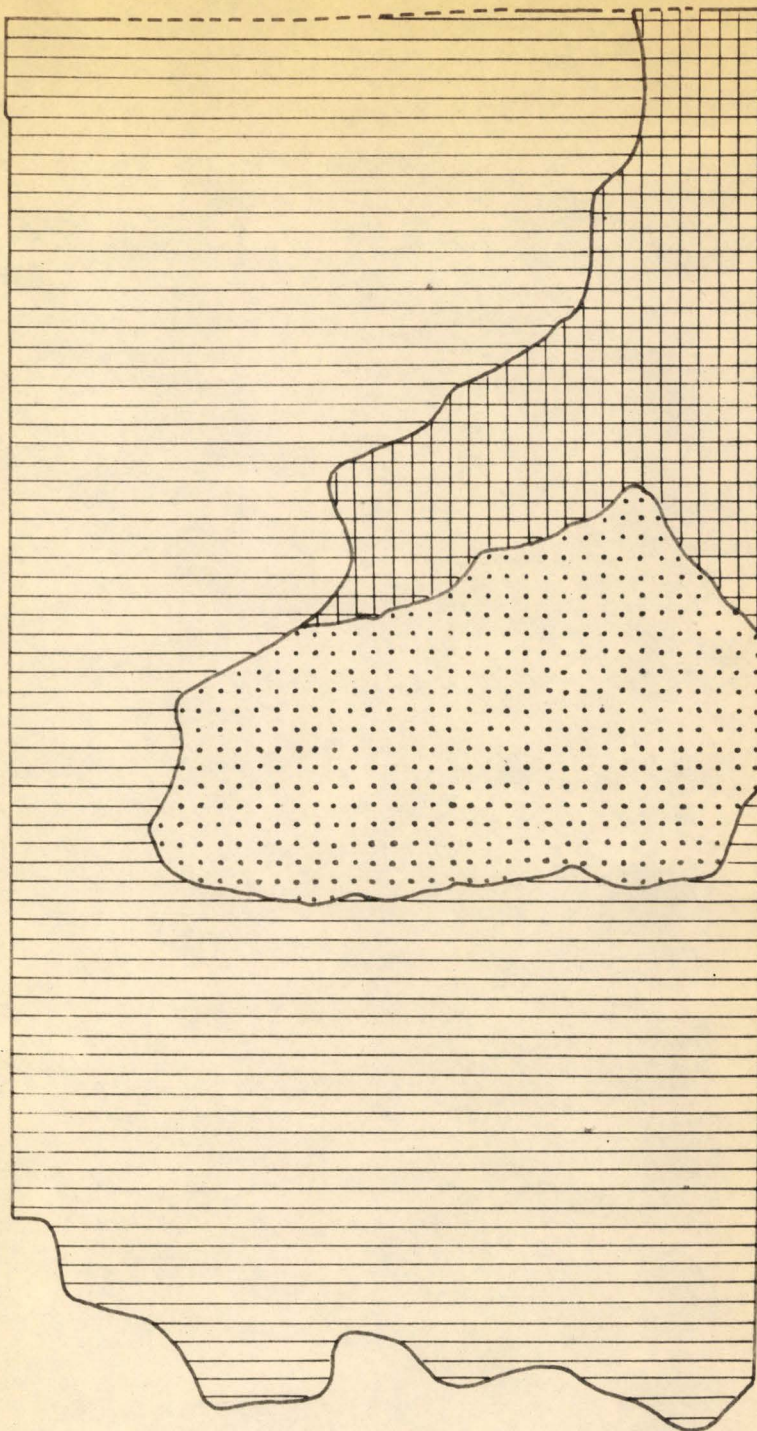
"The land type is a summation of the physical elements of surface, soil, and drainage, together with the natural vegetation related to these conditions, into natural units of classification."¹ It is a division of land which combines the greatest number of natural factors which affect the land use of an area.

Pelham Township has been divided into three land types, primarily on the basis of similar soil types. These are the Ridgeville land type, with an area of 4,800 acres, the Short Hills land type, with an area of 3,700 acres, and the Chantler land type, with an area of 19,800 acres.

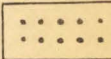
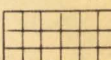
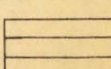
To show the land use within these land types, detail surveys of representative blocks of land have been made. The results of this survey are shown in the maps on pages 39, 49, 56, 57, 58, and the table on page 70. In addition, a farm type survey of the whole township was made; the results are shown on page 72.

¹ National Resources Planning Board - Land Classification in the United States, p. 107.

LAND TYPES of PELHAM



LEGEND

- RIDGEVILLE LAND TYPE 
- SHORT HILLS LAND TYPE 
- CHANTLER LAND TYPE 

Ridgeville Land Type

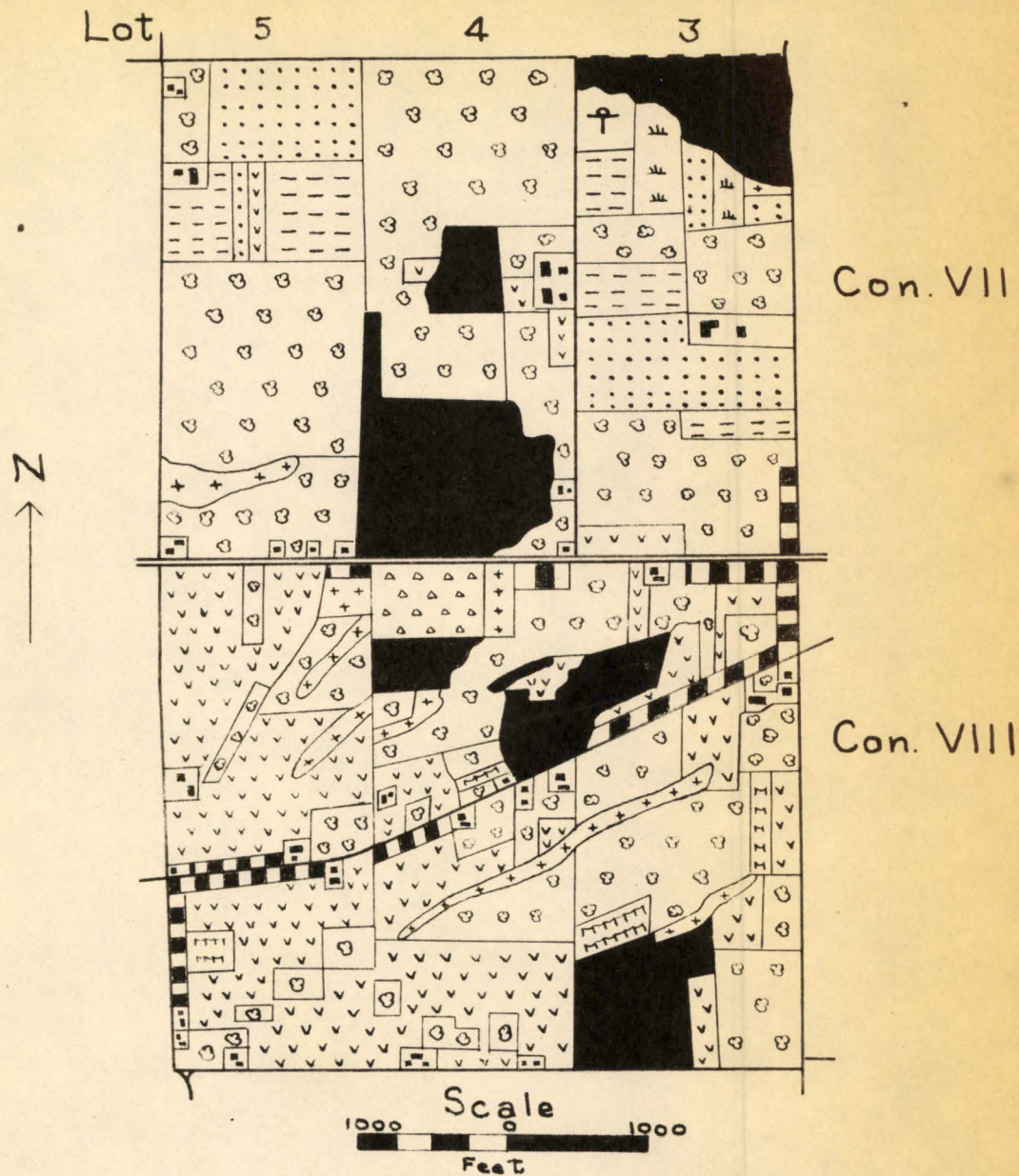
The Ridgeville Land Type covers seventeen per cent of the total area of the township. It comprises the glacial delta and its associated outwash plain. It includes the Fonthill loam and Pelham sandy loam soil types.

The Fonthill loam has developed from the sands and gravels of the top and sides of the delta. These soils consist of brownish gravelly loam over reddish brown compact gravel containing a considerable amount of shale and few stones. A typical profile is:

- A₀ - ½" - leaf and grass litter
- A₁ - 4"-5" - dark brown to black fine sandy loam
- A₂ - 8" - orange brown coarse gravelly loam
- B - 10" - dense, coarse sand, gravel, pebbles,
partially cemented
- C - reddish brown coarse sand and gravel

These soils have good natural drainage and are moderately acid in reaction. They are of low natural fertility, requiring large amounts of lime and organic matter.

LAND USE SAMPLE in the RIDGEVILLE LAND TYPE



LEGEND

Grain.....	...	Idle.....	+++
Orchard.....	⊗	Recreational.....	△ △
Vineyard.....		Urban.....	■ ■
Market Garden.....	v v v	Woodlot.....	■
Hay.....	--	Farm Buildings.....	■ ■
Pasture.....	⋈	Relay Station.....	†
Road.....	—		

The Pelham sandy loam has developed from the outwash sands around the delta. A typical profile is:

- A₀ - 1"-2" - black leaf litter, grass, twigs
- A₁ - 8" - fine dark brown sandy loam
- A₂ - 11" - light brown fine sandy loam
- B - 18" - reddish brown compact sandy loam
- C - - light reddish brown sand

The fertility needs and drainage of these soils are similar to those of the Fonthill loams.

Fruit growing and market gardening are the main types of farming on these soils. Three nurseries also are found in this area. At the rear of the delta are a few mixed farms and one dairy farm. Forty-five per cent of the area of the land type is in orchard. Seventeen per cent is in market gardens, while only seven per cent is in grain and four per cent in hay.

There are several reasons for this concentration on fruit and vegetables. The soils are light, easily worked and well-drained. They warm up early in the spring, especially on the south face of the delta and outwash plain, partly because of the southern exposure. The growing season, therefore, begins ten days earlier than in the Fruit Belt below the Niagara Escarpment. This growing season is long enough for the maturation of



Number 5. A view of the southern flanks of the delta, looking towards Ridgeville from Number 20 highway. Asparagus is grown in the large field in the foreground.



Number 6. A view of the northern flank of the delta. The steep upper slopes are in forest; the middle slope is in hay. Fruit and vegetables are grown near the bottom, on sands washed out from the upper slopes.



Number 7. Tomatoes are an important crop in the Ridgeville land type. Swampy areas in the background mark former levels of Lake Warren.



Number 8. Nursery stock grows well on the sandy soils of the Ridgeville land type. The Fonthill Nurseries are the largest in Canada.

tender fruits and vegetables. Since the land slopes to the south, cold air drains off to the lower hollows of the sand and clay plain. As a result there is an absence of late frosts in the spring. In addition, the proximity of urban markets and canning factories encourages the development of this type of agriculture. The area is thus well adapted to the growth of fruit, vegetables and nursery stock.

On top of the delta the soils are coarser and less easy to work than those of the outwash plain. The emphasis is on fruit growing, with dairying and mixed farming on the steep back slopes. Peaches and cherries are the main fruits; pears are of secondary importance. Most of the fruit is sold to canning factories, with the remainder being sold in Welland and St. Catharines, and at roadside stands along Highway Number 20. The majority of the farms are thirty to sixty acres in size. Farm buildings are generally modern and well-kept.

On the southern slopes of the delta and on the outwash plain, most farms combine fruit growing and market gardening. Farms are smaller, ranging from three to fifty acres in size. Soils are lighter and easier to work than on top of the delta. Thus a slightly more intensive agriculture is practised.

Peaches and cherries are still the main fruits, except on the outer edges of the outwash plain, where the depth of the sand is thinner and drainage is poorer. Here pears and apples predominate. There are only a few vineyards, since grapes do not command as high a price as other varieties of fruit.

In this area a great diversity of small fruits and vegetables is grown. The major emphasis is upon berries, husking corn, tomatoes, asparagus and early potatoes. Considerable quantities of beets, carrots, beans, radishes, cabbages, melons and peppers are also grown. Flowers, such as gladioli and chrysanthemums, are produced for the urban markets. Since a large variety of shrubs and trees can be grown on the Pelham sandy loams, most of the nurseries of Pelham Township are located within this soil type.

Most farms, especially those along the Canboro Road, have greenhouses in which plants are started in February, then transplanted in late May or early June.

The produce of this area is sold mainly at markets in Welland and Port Colborne, at roadside stands along the Canboro Road, and to canning factories.

Seventeen per cent of the land in the Ridgeville Land Type, excluding urban areas, is not under cultivation. These uncultivated sections are found mainly in the steep ravines on the front of the delta and in the swamps south of the Canboro Road which mark former levels of glacial Lake Warren.

The farmer in the Ridgeville Land Type is faced with many problems. First is the high cost of operation. Large amounts of barnyard manure and commercial fertilizer must be added to the soil to maintain its productivity. Much expensive equipment and hand labour is required in the growth and harvesting of fruits and vegetables.

Erosion is also a serious problem, especially on the southern slopes of the delta. After a heavy thunderstorm thicknesses of sand up to one foot deep accumulate on the surface of the Canboro Road. In general, however, no measures have been taken to prevent the loss of the top soil.

A moisture deficiency often occurs on these porous soils during July and August. Where water is available, as in the swamps south of Ridgeville, irrigation is practised. To the north of the Canboro Road there are no swamps or ponds. Here yields are often lower because of this water deficiency.

A lack of markets is often a serious problem. As result of competition from fruit and market gardening districts closer to Hamilton and Toronto, little produce is shipped to these cities. No growers' co-operatives, such as are found below the escarpment, have yet been formed. Often the grower finds himself at the mercy of the canning factories, which are his only buyer.

Despite these disadvantages the farms of this land type are the most prosperous in the township. The soils are the most productive in Pelham. This is borne out by figures obtained from the county assessor, which show that agricultural land in the Fonthill loam soil type is assessed at \$125-200 per acre (\$350 per acre if in fruit.) These assessed values are approximately three times those of land in the clay plain.

At present this agricultural land is threatened from two directions. The presence of sand and gravel in the delta has been responsible for the establishment of several large gravel pits. If the present building boom continues these pits will further expand at the expense of neighbouring orchards. (Figure 10)

Since 1945, the end of the Second World War, there has been much urban expansion in the area, since the sandy well-drained soils provide excellent building



Number 9. Much of the fruit grown in the Ridgeville and Short Hills land types is canned at this canning factory, located north of Ridgeville on Twelve Mile Creek.



Number 10. Large quantities of sand and gravel for the building trades are extracted from the glacial delta. This pit is rapidly expanding at the expense of neighbouring orchards.

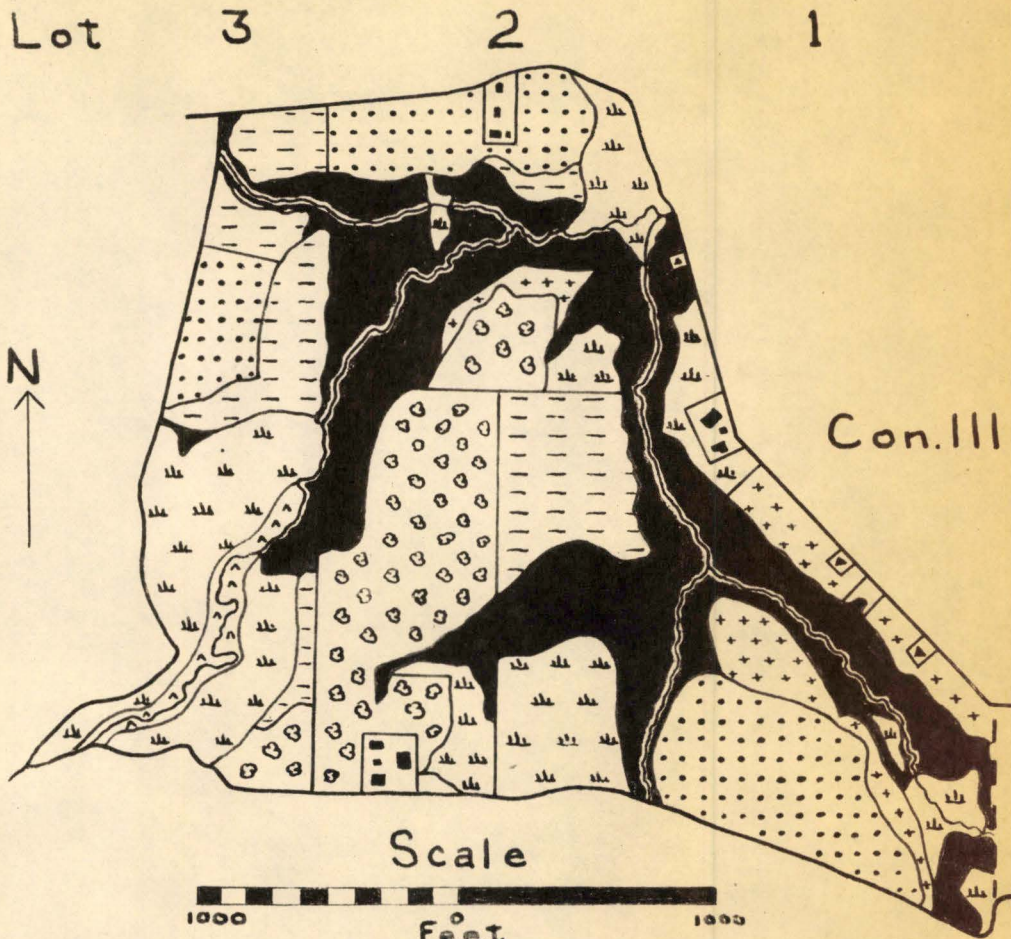
sites. At present urban growth is limited by the scanty nature of the water supply. Due to the great thicknesses of porous sand and gravel the water table is very low. On top of the delta wells must be drilled to a depth of 300 feet before water is reached. The water supply of Fonthill, based on springs at the foot of the delta, is now barely adequate for the village. If, at a later date, water is piped out from the city of Welland, as seems probable, much rich farm land will be lost as urban growth expands. Already at Fonthill a large peach orchard has been destroyed to make room for a new housing subdivision.

Short Hills Land Type

The Short Hills Land Type covers thirteen per cent of the total area of the township. It comprises the kame moraine and dissected till plain, features associated with the retreat of the glacier down the old bedrock valley. It includes the following soil types: Pelham loam, Oneida clay loam (eroded phase), Pelham sandy loam, rough broken land, and bottomland. The land type is characterized by hilly topography and variable soils.

The Pelham loams occur in the upper valley of Twelve Mile Creek. They are derived from kame moraine

LAND USE SAMPLE in the SHORT HILLS LAND TYPE



Grain.....		Park.....	
Orchard.....		Idle.....	
Hay.....		Farm Buildings.....	
Pasture.....		Summer Cottages...	
Wood lot.....		Stream.....	
Road.....			

and clay till, since in some places the kame moraine has been eroded away. These soils are extremely variable in texture, ranging from sandy loam to clay loam. The sandy loams are found immediately north of the delta; farther north they merge gradually into clay loams. Due to the great amount of stream dissection these soils have good natural drainage. Due to the steep slopes, however, they are very susceptible to erosion.

Behind the delta, in the east branch of Twelve Mile Creek, and in the area east of North Pelham deeper thicknesses of sand have been deposited. Pelham sandy loams have developed on these sands; these soils have already been discussed on page

North of the Pelham loams, on the dissected till plain, soils of the Oneida clay loam (eroded phase) type have developed. They consist of grey to light brown clay over grey or reddish brown stony clay, with frequent stones and large boulders. Like the Pelham loams they are subject to severe erosion.

Along the face of the escarpment is a narrow belt where the slope has been too great for the development of mature soils. This area is classified as rough broken land, and has thin stony soils.



Number 11. Market gardening in the Short Hills land type. Several market gardens are found immediately north of the delta, in the valley of the east branch of Twelve Mile Creek, on Pelham sandy loam soils.



Number 12. The only beef cattle and sheep of the township are found in the Short Hills land type. The flats and valley sides of Twelve Mile Creek are used for pasture.

Along the bottom of the Twelve Mile Creek valley bottomland soils have developed. Due to periodic flooding these soils are young and have a variable texture.

The major emphasis in this land type is on mixed farming. Fruit farming is carried on north of the delta on the sandy loam soils, while there are several market gardens on the Pelham sandy loams in Concession VI, Lots 1 and 2. One dairy farm lies along the Pelham Stone Road, at the northern boundary of the land type.

Approximately forty per cent of the area is under crops. Crops are grown only on the fairly level uplands between the stream valleys. The remainder of the land type is in woodlot, pasture and idle land (Figure 8)

Fruit, grain and hay are the main crops. The fruit, mainly peaches and cherries, is concentrated on the sandy loams, but some orchards do occur on the well-drained uplands of the dissected till plain. On the clay loams, grain and livestock assume a greater importance. Many of the valley slopes and bottoms are in pasture. The only herds of beef cattle and flocks of sheep in the township are found in this area. It might be expected that much of the land would be devoted to dairying. Poor road conditions in spring and autumn, however, make this



Number 13. A small park in the valley of Twelve Mile Creek north of Effingham. Fruit, in the background, is grown on the well-drained uplands between streams.



Number 14. Soil erosion is a serious problem within the Short Hills land type. Gullies are common on steep slopes. Large acreages of land are idle within this land type.

development almost impossible. In addition most of the pasture land, occurring on steep slopes, is of a poor, unimproved type.

The size of farms in the area ranges from fifty acres in the south to 150 acres in the north. The largest amounts of level upland occur in the south, while further downstream a much greater percentage of the land is in slope.

The most serious problem in the Short Hills is erosion. Large gullies are prominent on most of the cleared slopes. This was the first area in the township to be settled and, as a result, the problem has had over 150 years in which to develop. Reforestation would appear to be the only solution.

The lowest assessed land values in Pelham Township are found within the Short Hills. Farm land on the Oneida clay loams (eroded phase) is assessed at \$10.-\$35. per acre, because of the high degree of erosion and small area of land which can be cultivated. The rough broken land, which is in woodlot and unimproved pasture, is assessed at fifty cents per acre. The Pelham loams and Pelham sandy loams are assessed at \$75.-\$125. per acre, largely because of their suitability for fruit culture.

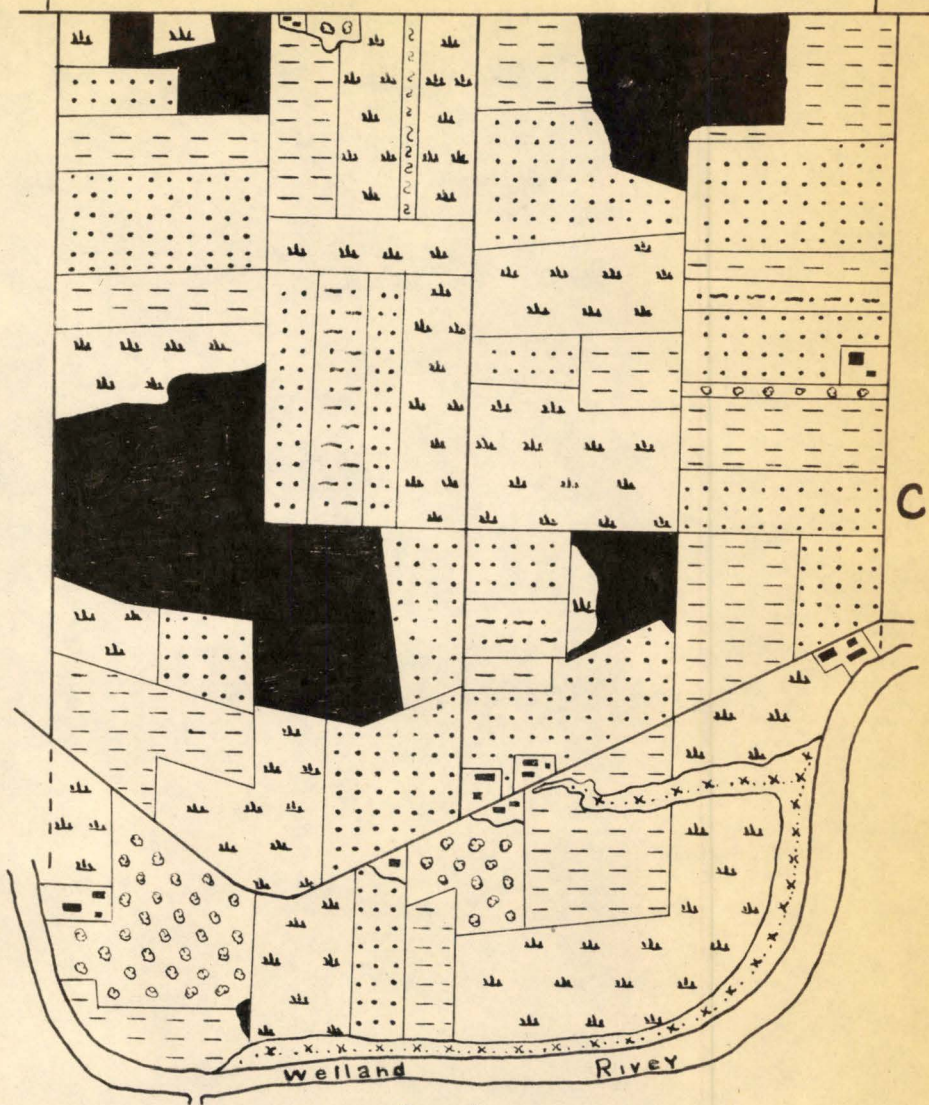
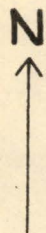
Large sections within this land type are unsuited to cultivation; thirty-seven per cent of the area is in woodland and idle land, with another ten per cent in unimproved pasture. This land, however, possesses great scenic and recreational value. Some of it, along the west branch of Twelve Mile Creek, is already being utilized for this purpose (Figure 8). If the land along the creek were reforested, the whole valley would make an excellent public park.

Chantler Land Type

The Chantler Land Type covers seventy per cent of the total area of Pelham Township. It comprises the sand, clay, and till plains. It includes the following soil types: Berrien sandy loam, Caistor loam, Haldimand clay, Caistor clay loam, Brantford silt loam, Oneida clay loam and bottomland. Four of these types, the Oneida clay loam, Berrien sandy loam, Haldimand clay and Caistor clay loam, occupy over ninety per cent of the area. The Oneida and Berrien types each occupy approximately thirty per cent of the land type. The Haldimand and Caistor types, taken together, also occupy thirty per cent of the area. The reader will undoubtedly question the large number of soil types included within this land type;

LAND USE SAMPLE in the CHANTLER LAND TYPE

Lot 15 14 13 12



Con. XIV

Scale



LEGEND

Grain	...	Hay	---
Row Crop	---	Woodlot	■
Orchard	oo	Swamp	..x..
Vineyard	122	Farm Buildings	■
Pasture	lll	Road	—

JM/54

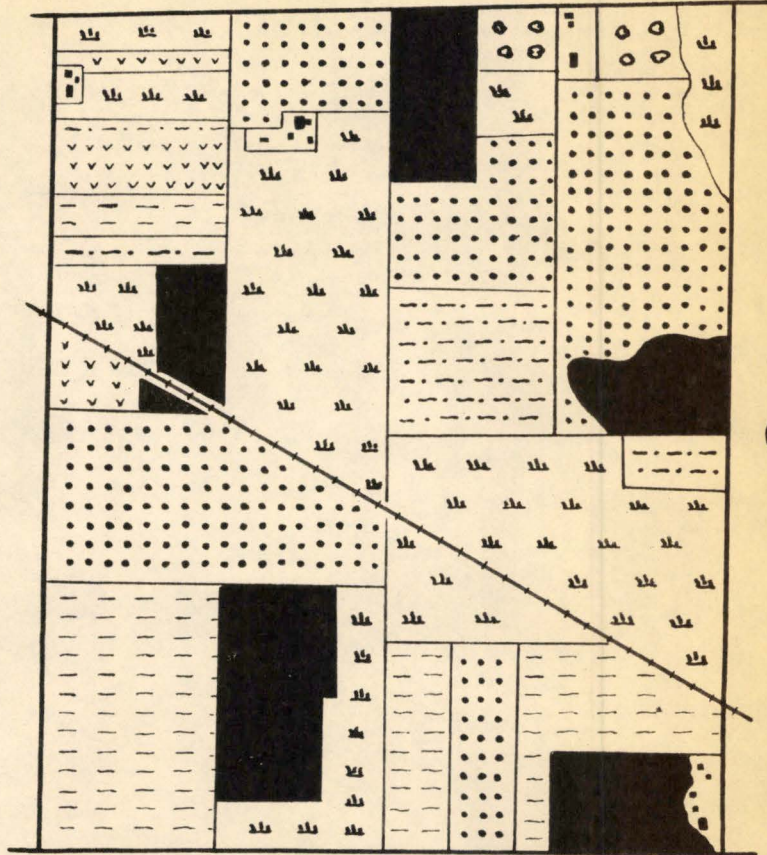
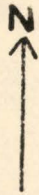
(Figure 9)

LAND USE SAMPLE in the CHANTLER LAND TYPE

Lot

3

2



Con. XIII

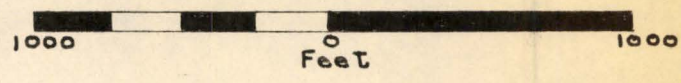
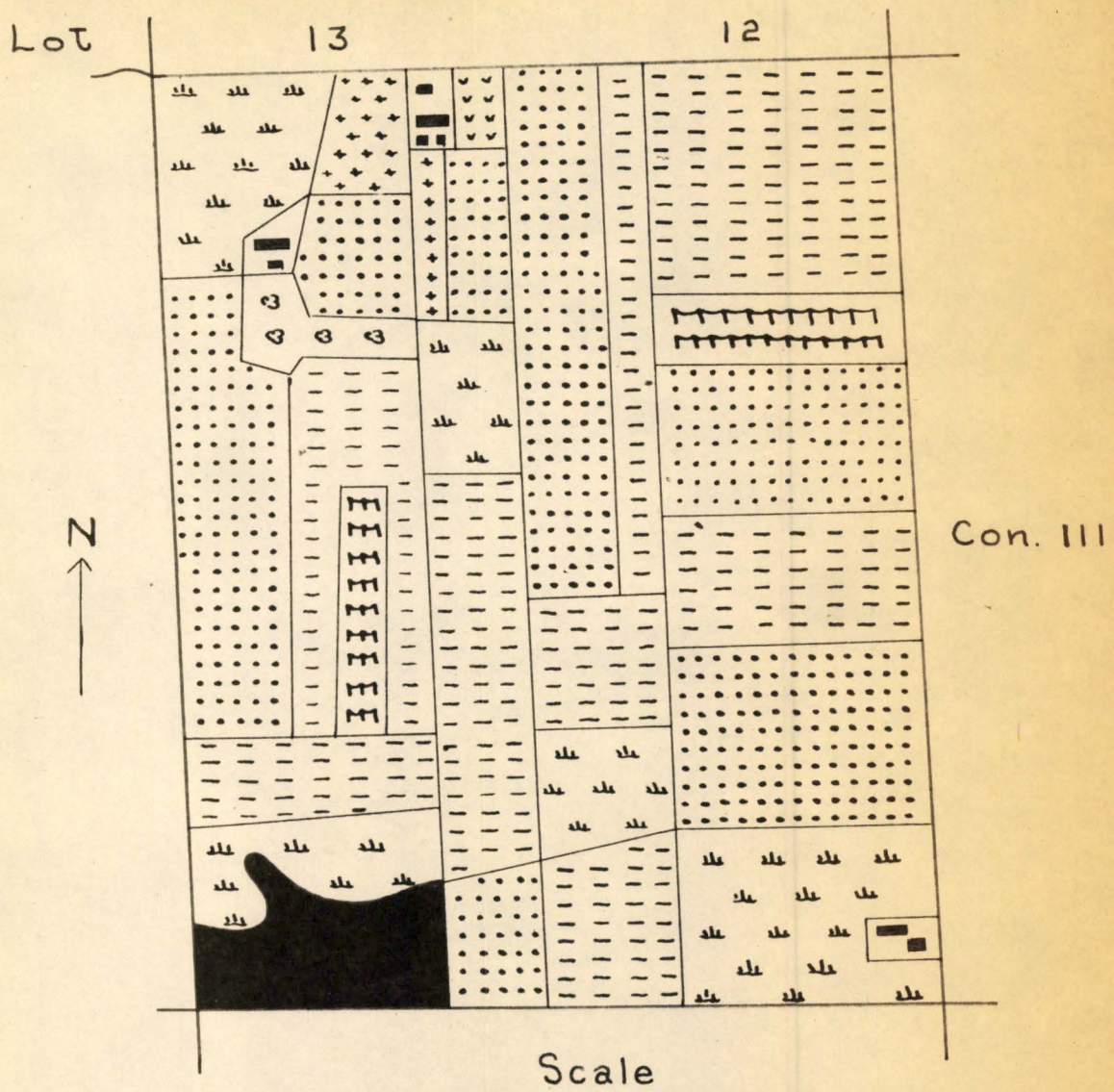
Scale



LEGEND

Grain		Pasture	
Row Crop		Woodlot	
Orchard		Farm Buildings	
Market Garden		Road	
Hay		Railway	

LAND USE SAMPLE in the CHANTLER LAND TYPE



LEGEND

Grain.....		Hay.....	
Orchard.....		Pasture.....	
Market Garden.....		Woodlot.....	
Vineyard.....		Farm Buildings.....	
Idle.....		Road.....	

JM/5A

actually, they are all very similar, as will be shown when each type is discussed in detail. The land type is characterized by flat topography and clay loam soils.

The Berrien sandy loam type has developed from the thin layer of sand washed out from the outwash plain and laid down on the clay plain by receding Lake Warren. It consists of brown sandy loam over yellow and then mottled sand, with clay at two feet or less. These soils are stonefree. A typical profile is:

- A₀ - $\frac{1}{2}$ " - matted grass and leaf litter
- A₁ - 3"-4" - fine dark brown sandy loam
- A₂ - 3"-4" - medium yellow brown sandy loam
- B - 5"-6" - mottled brown compact sand
- C - - mottled sand with dense gritty clay at
two feet or less

In many places the sandy loam is present only on small knolls, and as a result the natural drainage is poor. After a heavy rain, water lies on the surface for several days. In cultivated fields the sands have been removed by erosion. As a result the surface soil is a light clay loam. These soils are low in organic matter, lime, phosphate and potash. In Concession IX, Lot 1, there are a few acres of Caistor loam, similar to the Berrien, but with poorer natural drainage. The soils around North Pelham, where the depth



Number 15. Drainage is a serious problem in the flatter sections of the Chantler land type.



Number 16. Bottomland along the Welland River. This land is flooded each spring. It remains in poor, unimproved pasture.



Number 17. Dairy farms are concentrated on the well-drained soils of the Chantler land type. Farm buildings are generally modern and well-kept.



Number 18. Farms on the poorly-drained soils of the Chantler land type are often rundown. Farm buildings are small and usually unpainted.

of sand is slightly over three feet, are classified as Pelham Sandy Loams. They are better drained but otherwise similar to the Berrien soils.

The Haldimand clay soil type occurs on the clay plain, in the vicinity of streams, where there is good natural drainage. Stream dissection has effected a slightly more rolling topography in these areas. These soils consist of greyish to light brown clay and clay loam over grey or reddish gritty clay, with some silty knolls. A typical profile is:

- A₀ - $\frac{1}{2}$ " - matted grass, leaf litter
- A₁ - 5"-6" - dark brown friable clay loam
- A₂ - 3"-4" - yellowish brown nodular clay loam
- B - 6"-8" - yellowish grey compact clay
- C - grey dense gritty clay, few small stones.

These are good agricultural soils. Where cropped they are low in organic matter, lime and phosphate.

The Caistor clay loams occur in association with the Haldimand clays. They are the poorly drained member of the Haldimand catena. These soils are found away from the streams, on flat poorly-drained land with some swales and pond holes. Their profile is similar to that of the Haldimand clay, but is thinner, due to the poorer drainage.

The Brantford silt loam soil type occurs in the northern section of the clay plain. It is similar to the Haldimand clay, but for a higher concentration of silt in the parent material.

Oneida clay loam has developed from the rolling ground moraine of the till plain. It differs from Haldimand clay in that it has a lower clay content and a greater concentration of stones and boulders. A typical profile is:

- A₀ - $\frac{1}{2}$ " - matted grass
- A₁ - 4"-6" - fine brown clay loam
- A₂ - 4" - light brown silty clay loam
- B - 7" - chocolate brown compact clay loam
- C - grey brown blocky till, occasional stones and boulders.

These soils are well adapted to dairying and mixed farming.

Bottomland soils have developed on the poorly drained flats of Fifteen and Sixteen Mile Creeks, and the Welland River. These soils are subject to annual flooding; thus they remain in woodlot and pasture.

Dairying and mixed farming are the principal types of farming within the Chantler Land Type. The heavy clay soils of the area are well suited to this type

of agriculture. Since, in general, they are heavy, poorly aerated and subject to winter cold and spring heaving, these soils are not suitable for fruit. Only the more hardy types, such as apples and grapes, can be grown. These are found in the well drained areas.

Dairy farms, i.e., farms on which the major source of income is derived from the sale of fluid milk or cream, are concentrated in three sections. Two of these three sections lie along main roads. All of them have developed on well-drained soils. The most important concentration of dairy farms is along the Pelham Stone Road, a paved road leading into St. Catharines, on the Oneida clay loam soil type. Several farms along the Welland River, on the Haldimand clays, supply fluid milk to Welland, which is only a few miles to the east. Highway Number 3A, on the south side of the river, is a main road leading into the city. Three farmers, on a well-drained section of the Berrien sandy loam, have specialized in dairying and ship their milk to St. Catharines. In addition there are six small dairy farms in the northwest part of the township on the till plain.

On an average these dairy farms are 100 acres in size. They may be recognized by their prosperous appearance, by the presence of large barns, silos and often



Number 19. Several large poultry farms are found within the Chantler land type. This one is located south of Fenwick, on the Berrien sandy loam.



Number 20. The largest dairy farms are found along Highway 3A and the Pelham Stone Road. This herd of Holsteins, along Highway 3A, supplies fluid milk to the Welland market.

a small stone storage shed, and by the high percentage of land in improved pasture.

Mixed farms, i.e., farms on which the income is derived from a variety of sources, are found on the poorly drained soils of the land type. They range in size from fifty to 200 acres. Many of these farms are run-down in appearance. Farm buildings are small and unpainted. Large amounts of land are in neglected pasture. In general the farm income is derived from the sale of grain, hay, dairy products, hogs and poultry.

As would be expected the largest percentage of the land within the land type is in grain, hay and pasture. Twenty-three to twenty-seven per cent of the land is in grain, mainly fall wheat and oats. Sixteen to forty per cent is in hay. This wide variation in hay acreages is due to the fact that, on many of the mixed farms, hay is cut in early summer; then in late summer and autumn the same land is used as pasture. Twenty-one to thirty-one per cent of the land is in pasture. Large areas on the poorly drained Caistor Clay Loams and Berrien Sandy Loams are in permanent pasture which is run-down and has a low carrying capacity.

Fruit is largely confined to the well drained areas. There are several apple orchards along the banks

of the Welland River and large vineyards on the rolling uplands of the till plain. On most dairy farms fruit is an important secondary cash crop. A few pear and peach orchards are found on the deeper sands of the Berrien Sandy Loam around Fenwick. Many old, unproductive apple orchards dot the landscape, relics of the period of self-sufficiency before 1900.

Small acreages of canning crops and market garden vegetables are grown, especially on the deeper sands around North Pelham. Small acreages are also devoted to corn, although on the dairy farms grass silage has largely replaced corn.

Soil exhaustion is the most serious problem confronting the farmer in this land type. For many years the land was "mined", i.e., crops were taken off the land but little was put back into it. Consequently the soils are deficient in organic matter, lime and phosphate. In recent years farmers, realizing the errors of the past, have begun to add considerable amounts of commercial fertilizers to their soils.

Poor drainage in the Berrien sandy loam and Caistor clay loam soil types is the second major problem. Often, when wet springs occur, the land cannot be worked till late in May, and large areas of fall wheat and oats



Number 21. Grapes are an important cash crop on many farms in the Chantler land type. Vineyards are concentrated in the northern half of the land type, on well-drained clay loams.



Number 22. Large apple orchards are found along the banks of the Welland River and along the southern border of the Ridgeville land type.

must be replanted. At present much of the poorly drained land is left in pasture and woodlot. Assessed agricultural land values in this land type tend to emphasize the drainage problem. The well-drained soils are assessed at \$40.-\$45. per acre, while the figure for the poorly drained soils is only \$34.-\$40. per acre.

Table Showing Land Use Percentages in The Land Types of
Pelham Township (Based on Land Use Sample Maps)

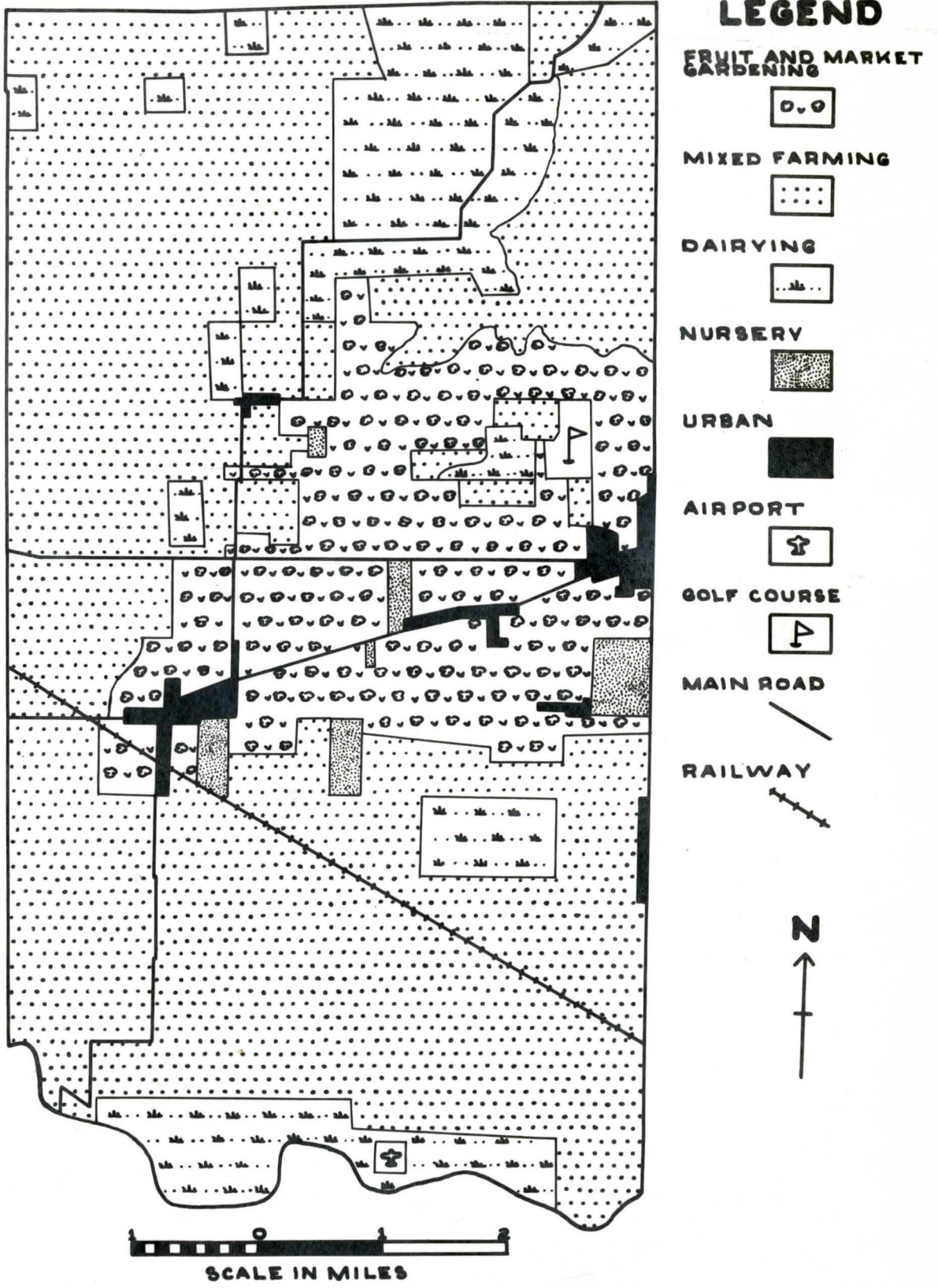
Land Type Location (Figure)	Ridgeville	Short Hills	Chantler		
	7	8	9	10	11
Grain	7.1	14.1	26.8	26.0	23.0
Row Crop	-	-	3.4	6.8	-
Hay	4.4	11.8	20.5	15.8	40.0
Pasture	0.9	18.7	26.2	31.0	21.0
Orchard	45.5	14.8	5.0	1.9	1.6
Vineyard	1.2	-	0.5	-	4.6
Market Garden	16.9	-	-	3.5	0.5
Woodlot	14.5	30.0	14.0	13.5	5.1
Swamp	-	-	2.9	-	-
Idle Land	2.9	6.4	-	-	2.8
Farm Buildings	2.7	1.9	1.1	1.6	1.3
Recreational Areas	1.0	2.1	-	-	-
Urban	2.8	-	-	-	-

Types of Farming in Pelham Township

Pelham Township is an area of diversified farming. Within it there exists a close correlation between the distribution of farm types and the distribution of soil types. Figure 12 shows the results of a farm type survey made during the summer of 1954. These farm types have been determined on the basis of farm income. For example, when over fifty per cent of the total farm income has been derived from the sale of dairy products, then that farm has been classified as a dairy farm.

The survey shows that the fruit farms and market gardens of the township are concentrated on the sandy and gravelly soils of the Ridgeville Land Type, and on the sandy loams of the Short Hills Land Type. Dairying is concentrated on the well drained clay loams of the Chantler Land Type, usually along main roads. The remainder of the township is in mixed farming; in these areas no one crop constitutes fifty per cent of the total farm income.

Pelham is the most productive agricultural township in Welland County, although it is not the largest of the eight townships within the county. In 1951 its total farm value was \$6,876,870. or twenty-two



LAND USE and FARM TYPE SURVEY of PELHAM

(Figure 12)

per cent of the total for the county. This is due to the fact that it is the only part of the county where extensive areas of deep sandy loam soils occur.

Pelham supports a farm population of 2,118, and has a total of 466 farms. The size of these farms is shown in the following table:

Acreage	Number of Farms
Under ten acres	80
10-69 acres	266
70-129 acres	89
over 130 acres	31

All farms under ten acres and the majority of those under seventy are found in the Ridgeville Land Type, where land use is more intensive. Most dairy farms are seventy to 130 acres in size, while those farms over 130 acres are found on the poorly drained clay soils, where large acreages are in poor permanent pasture.

In 1951 there were 23,517 acres of occupied farm land in Pelham Township. 18,052 acres, or seventy-seven per cent of the total occupied land, was improved land. The unimproved land was located in the depressional areas of the Chantler Land Type, and on the steep slopes of the Short Hills Land Type. 12,801 acres, or seventy-one per cent of the improved land was under crops.

Acreages of fruits and vegetables are not included in the 1951 census figures. In 1941, the last year for which figures are available, 3,376 acres were in orchards and vineyards and 669 acres were in small fruits, vegetables and nursery stock. From observation it appears that these acreages are now somewhat smaller, because of urban expansion after World War II. The vineyards are concentrated on the well drained clay loams of the Chantler Land Type, the fruit, vegetables and nursery stock on the light soils of the Ridgeville and Short Hills Land Types.

In 1951 field crops occupied 9,674 acres. Fall wheat and oats, each occupying twenty per cent of the area, are important both as cash crops for sale to mills at Port Colborne, and as feeds for livestock. Cultivated hay and other fodder crops, occupying fifty-one per cent of the area under field crops, are used both as a feed for livestock and as cash crops.

Improved pasture occupied 2,734 acres in 1951. It is concentrated on the dairy farms. Large acreages of unimproved pasture are found on the poorly drained clay soils of the mixed farming area.

Livestock plays an important part in the farm economy in both the Chantler and Short Hills Land Types.

Pelham ranks second among the townships of the county in numbers of dairy cattle and hogs; in 1951 there were 1,412 of the former and 1,809 of the latter. The sale of hogs is an important source of income on the mixed farms. Although concentrated in the mixed farming area, poultry raising is carried on over the whole township. In 1951 the number of poultry was over 50,000.

CHAPTER IV

SUMMARY AND CONCLUSIONS

SUMMARY

Pelham Township is located on the dip slope of the Niagara Escarpment, north of the Welland River. Within the township, which has an area of forty-four square miles, there is a great diversity of landforms. These landforms are, for the most part, a result of four factors: the preglacial erosion of a bedrock valley in the Niagara Escarpment, the advance and retreat of the Wisconsin ice-sheet, the action of receding Lake Warren, and post glacial erosion.

The climate, while not as moderate as that below the Niagara Escarpment in the Fruit Belt, is suitable for the growth of tender fruits and vegetables. There is a variety of soils, ranging from gravelly loams to clay loams.

The township was first settled by United Empire Loyalists in the years before 1800. By 1850 the area was fully settled and by 1860 the acreage of cleared land was only slightly below the present figure. During this period subsistence farming with wheat as a cash crop was carried on. The years 1860 to 1900 marked a period of

mixed farming, with wheat and livestock as the major cash crops. Since 1900, with the improvement in transportation facilities and the growth of urban markets there has been great specialization in fruit farming and market gardening on the sandy soils, and dairying on the well-drained clay soils.

The township may be divided into three distinct land types, largely on the basis of soil types and physiography. Fruit farming and market gardening are the major types of farming on the sandy soils of the Ridgeville Land Type. These warm, easily worked soils are well suited to the growth of specialized crops. Fruit farming on the sandy loams and mixed farming on the clay loams occur in the Short Hills Land Type, where, because of steep slopes, much land is idle, in unimproved pasture and in woodland. Dairying is carried on, along main roads leading into Welland and St. Catharines, on the well drained clay loams of the Chantler Land Type. On the poorly drained soils of this land type, mixed farming, with an emphasis on grain, hay, dairy products, swine and poultry, is practised.

Conclusions

Pelham Township is an area of diversified farming. Differences in types of farming are the results of physical, historical and economic factors. A close correlation exists between the distributions of farm types and soil types. In general, fruit, vegetables, and nursery stock are grown on the deep sandy loams; fluid milk is produced on the well drained clay soils close to urban centres, and mixed farming is carried on, on the poorly drained soils. Specialization has taken place only with the rise of nearby urban centres and improved transportation facilities.

Pelham has become the most productive agricultural township in Welland County. This dominance in agriculture is due, largely, to the fact that it is the only township in the county with extensive areas of deep sandy loam soils.

Bibliography

- Caley, J. F., Palaeozoic Geology of Toronto-Hamilton Area, Canadian Geological Survey, Memoir 224, 1940.
- Chapman, L. J., and Putman, D. J., The Climate of Southern Ontario, Scientific Agriculture, April, 1938.
- Chapman, L. J., and Putman, D. J., The Physiography of Southern Ontario, University of Toronto Press, 1951.
- Dominion Bureau of Statistics, Census of Canada, 1851-1951, King's Printer.
- Halliday, W. E. D., A Forest Classification for Canada, Department of Resources and Development, Bulletin 89.
- National Resources Planning Board, Land Classification in the United States, U. S. Government Printing Office, 1941.
- Smith, W. H., Canada-Past, Present and Future, Maclean, 1851.
- Watson, J. W., Mapping a Hundred Years of Change in the Niagara Peninsula, Canadian Geographical Journal, July, 1946.
- Watt, A. K., Ground Water in Ontario, 1948, 1949 and 1950, Ontario Department of Mines, Bulletin 145.
- Welland County Historical Society, The History of the County of Welland, Welland Tribune Printing House, 1887.