The Corporation of the Town of Milton

Report To:	Council
From:	Barbara Koopmans, Commissioner, Planning and Development
Date:	September 25, 2017
Report No:	PD-048-17
Subject:	Sustainable Halton Lands Update – Land Base Analysis and Subwatershed Study

Recommendation:

THAT Planning Report PD-048-17 entitled "Sustainable Halton Lands Update - Land Base Analysis and Subwatershed Study", be received;

AND THAT the draft Land Base Analysis, prepared by MGP, dated September 2017, be endorsed in principle;

AND THAT staff be directed to work with the Steering Advisory Committee, including external agencies and the Milton Phase 4 Landowners' Group, to address comments received on the draft Land Base Analysis;

AND THAT staff be directed to report back to Council if any substantive changes are made to the draft Land Base Analysis before it is finalized;

AND THAT staff be directed to assess and make recommendations to Council on the progression and phasing of growth in the Sustainable Halton Lands, following the finalization of the Land Base Analysis and Council's endorsement of a forthcoming Fiscal Impact Study.

EXECUTIVE SUMMARY

As part of the approval of Regional Official Plan Amendment (ROPA) No. 38, additional lands were identified in the Town of Milton to accommodate population and employment growth from 2021 through to 2031. Referred to as the 'Sustainable Halton Lands', the lands identified for greenfield growth will serve as the Town of Milton's next urban expansion area and next major Secondary Plan Area(s). These lands are required to meet the minimum density and employment targets that were established in the Province's 2006 Growth Plan for the Greater Golden Horseshoe, as well as the Region of Halton's Official Plan. Comprehensive planning of these lands will enable the Town to achieve the required population target of 238,000 persons and employment target of 114,000 jobs across the Town by 2031.

Before commencing a Secondary Plan program, and in order to gain a better understanding of some of the key opportunities and constraints to developing the Sustainable Halton Lands, the Town of Milton initiated two key background studies, which includes a Subwatershed Study and a Land Base Analysis (LBA).

The LBA was intended to serve as the basis and background for the preparation of future required Secondary Plan studies and it was meant to serve as one of the initial background steps in the Secondary Plan process. The LBA provides a number of recommendations related to the

delineation of Secondary Plan Areas, a high-level community/neighbourhood area structure plan, and criteria for prioritizing the sequencing of each Secondary Plan Area. The LBA also provides recommendations for future studies and considerations related to a number of study sub-components (e.g., servicing, community services, and agriculture). Town staff supports the recommended planning framework presented in the LBA as a basis and guide for future Secondary Planning processes. However, Town staff acknowledges that opportunities exist to further assess and refine some of the findings of this report during a future Secondary Plan process.

REPORT

Background

As part of the approval of Regional Official Plan Amendment (ROPA) No. 38, additional lands were identified in the Town of Milton to accommodate population and employment growth from 2021 through to 2031. Referred to as the 'Sustainable Halton Lands', the lands identified for greenfield growth will serve as the Town of Milton's next urban expansion area and next major Secondary Plan Area(s). The majority of the Sustainable Halton Lands, and the lands that are the subject of this report, are located in the south and eastern portion of the Town of Milton and encompasses approximately 2000 hectares (5000 acres), and is shown on Figure 1.

The Sustainable Halton Lands are required to meet the minimum density and employment targets that were established in the Province's 2006 Growth Plan for the Greater Golden Horseshoe, as well as the Region of Halton's Official Plan. Comprehensive planning of these lands will enable the Town to achieve the required population target of 238,000 persons and employment target of 114,000 jobs across the Town by 2031.

Before commencing a Secondary Plan program, and in order to gain a better understanding of some of the key opportunities and constraints to developing this area, the Town of Milton initiated two key background studies - a Subwatershed Study and a Land Base Analysis (LBA). This report will provide an overview of the work that has been undertaken to-date and, in particular, will discuss the key findings and recommendations of the LBA. As such, the purpose of this report is fourfold:

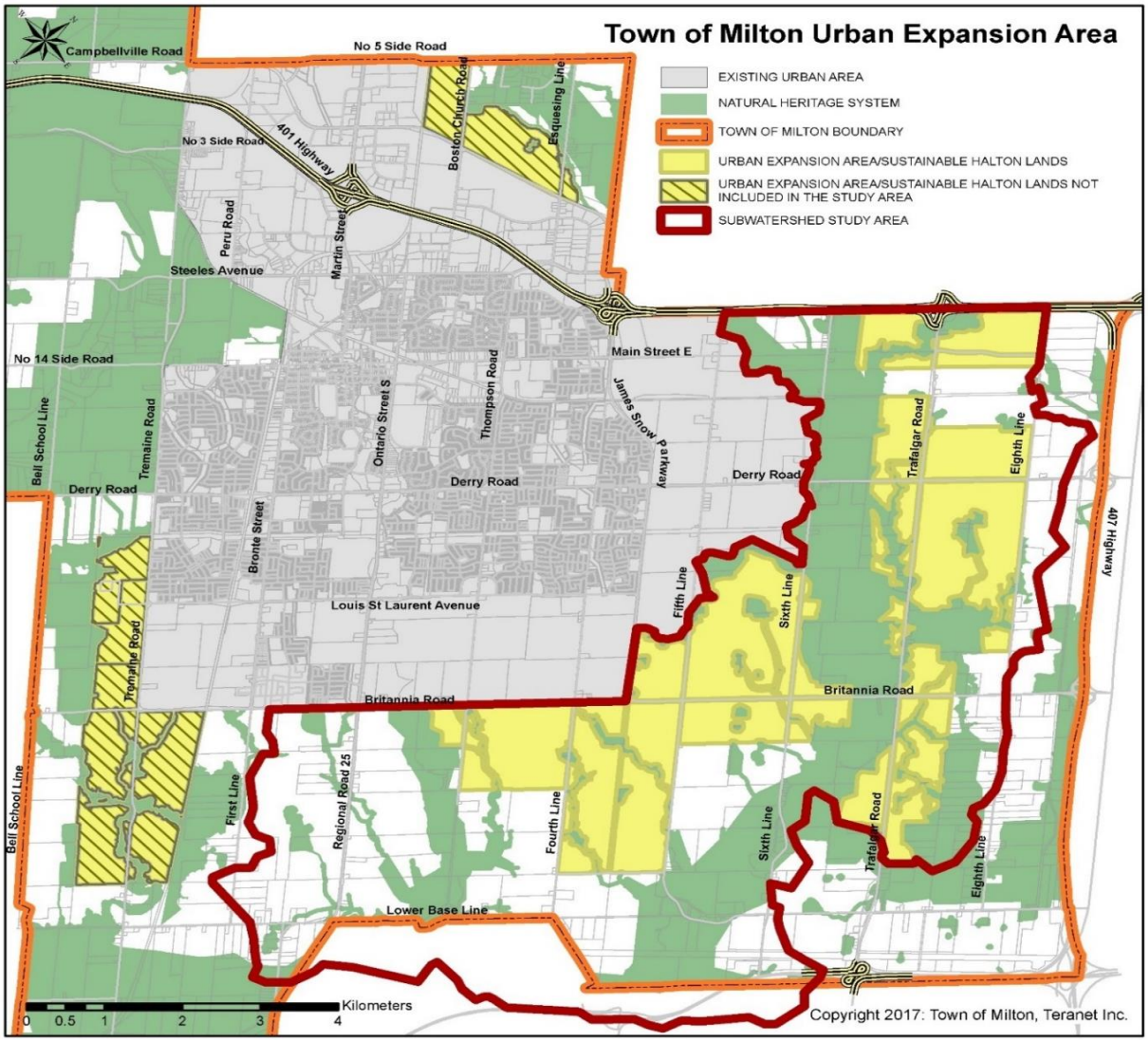
1. to provide an update on the studies that have been undertaken for the Sustainable Halton Lands, namely the Subwatershed Study and LBA;

2. to provide an overview of the key findings and recommendations of the LBA;

3. to outline next steps for the Town as it relates to the Secondary Plan program for the Sustainable Halton Lands; and

4. to seek Town Council's endorsement of the principles presented in the LBA and Town Council's endorsement of the recommendations found in this report.

Figure 1: LBA and Subwatershed Study Areas



Subwatershed Study

The Subwatershed Study commenced in Winter 2016 and is anticipated to take approximately two years to complete. The Study was awarded to Amec Foster Wheeler on January 25, 2016 via Staff Report CORS-006-16 (Proposal Award 15-527).

The Subwatershed Study is intended to assess environmental features and functions within the study area and to provide recommendations for the protection and management these features as part of future planned development. The study area for the Subwatershed Study is show as a red line on Figure 1. The purpose of the Subwatershed Study is to:

- inventory, characterize and assess natural hazard, natural heritage and water resource features and functions within the study area (i.e., constraints to development);
- provide recommendations for the protection, conservation and management of natural hazard, natural heritage and water resource features within the study area;

- provide sufficient detail to support the designation of a Natural Heritage System, through refinement of the Regional Natural Heritage System, as well as identifying areas for future development; and
- provide recommendations for a management strategy, implementation and monitoring plan to be implemented through the Secondary Plans and future site/area specific studies.

A Draft Phase 1: Background Review and Characterization Report was prepared and released at the end of March 2017. Next steps for the Subwatershed Study include analyzing the data collected, as well as developing management strategies and a monitoring program to address potential impacts associated with future development.

The Subwatershed Study is to be completed prior to the approval of any Secondary Plan for the Sustainable Halton Lands. At the conclusion of this Study, the final report(s) are to be adopted by Town Council. The Study must also be accepted by the Region and requires Conservation Halton's technical clearance.

Land Base Analysis

The LBA commenced in late Fall 2016 and was awarded to Malone Given Parsons on September 26, 2016 via Staff Report CORS-0052-16 (Proposal Award 16-568).

The Land Base Analysis is intended to identify the key opportunities and constraints to development, as well as inform and provide direction to the planning process. The purpose of the LBA is to:

- identify key opportunities and constraints to development;
- assess and approximate the amount and distribution of unconstrained land that is available for development;
- assess the feasibility of developing the area including, but not limited to, a preliminary assessment of the potential public infrastructure needed to facilitate development;
- delineate logical and cohesive Secondary Plan Area(s); and
- provide a framework/approach that can be used to guide future studies and phasing for the Secondary Plan process.

The LBA is meant to serve as the basis and background for the preparation of future required Secondary Plan studies. The study is not intended to be a detailed analysis; rather, it is meant to serve as one of the initial background steps in the Secondary Plan process which can be used to provide direction and guidance for future Secondary Planning processes.

The LBA provides a high-level overview and recommendations related to a number of components including, among other things, Transportation, Servicing, Agriculture, Archeology and Cultural Heritage, Parks and Open Space, Institutional uses and Community Facilities, that could impact or be impacted by future development and that need to be considered as part of a future planning process.

The study area for the LBA is primarily centered on the identified urban expansion area, which is shown as yellow on Figure 1; however, some of the background work associated with this

study considers land beyond the urban expansion area (e.g., agriculture component or transportation component).

The LBA has been carried out in three key phases, including: Phase 1 (work plan finalization, background review, study context); Phase 2 (constraints/opportunities, analysis, draft LBA); and Phase 3 (Secondary Plan Area delineation, planning framework, phasing recommendations, final LBA). The LBA is in the final phase and the findings and recommendations in the attached report are discussed in the sections below.

In addition to the above-referenced studies, the Town has also initiated a town-wide Transportation Master Plan (TMP) to assess key transportation requirements within the Town. Information from this study was used to inform the LBA. However, no additional studies were undertaken in this regard. The purpose of the TMP, as it relates to the Sustainable Halton Lands, was to identify the adequacy of existing local and regional infrastructure (transportation/transit, including pedestrian and bicycle paths), as well as major infrastructure requirements (i.e., new or upgraded local and Regional infrastructure) necessary to service the new Secondary Plan Areas. The TMP will provide recommendations about transportation-related studies that will be necessary as part of future Secondary Plan processes.

Land Base Analysis and Subwatershed Study Consultations

Although the LBA and Subwatershed Study have been managed by Town of Milton staff, a number of committees have been formed to provide technical and strategic advice to the Town and its consulting teams on the process and development of both of these studies. The purpose of the committees is to ensure that all of the major stakeholders, including internal departments, external agencies and the Sustainable Halton landowners, in the study area have a forum and opportunity to make their interests known.

A Steering Advisory Committee for both the LBA and Subwatershed Study was formed and has representation from the Town, Town's consultants, Conservation Halton, the Region of Halton and the Milton Phase 4 Landowners' Group. Steering Advisory Committee members served as the liaison between their respective agency/group and each member is responsible for coordinating and representing their group's position. Additional Technical Advisory Committees have also been formed to address specific components of the Subwatershed Study.

The draft LBA was circulated to the Region of Halton, Conservation Halton, School Boards and Milton Phase 4 Landowners' Group for review and comment. At the time of writing this report, Town staff had received comments from the School Boards and Milton Phase 4 Landowners' Group. Once comments are received from the other groups, staff will review and assess all comments collectively. Revisions will be made to the draft LBA, where appropriate, and Town staff will report back to Council if any substantive changes are made to the LBA attached to this staff report.

In addition, Town Planning staff, along with the Town's LBA and SWS consulting teams, hosted a public information session (PIC) on Tuesday, May 16, 2017 at Redhill Church. The purpose of the PIC was to provide information to residents and general community about the planning process, work completed to-date, and next steps. The PIC was well attended by residents and landowners in the catchment area. The PIC format centered around presentation boards to allow attendees to ask questions directly to the Town and its consultants. Materials presented included the purpose of the LBA/Subwatershed Study, study process, preliminary findings, and an

overview of community uses and urban character anticipated for these lands. Information about these studies has also been posted on the Town's website.

Discussion

As noted in the preceding section, the balance of this report will provide an overview of the key findings and recommendations presented in the draft LBA, including:

- recommendations related to the estimated gross and net developable areas, as well as an overall recommended density target;
- findings related to the amount of community uses needed to facilitate development;
- recommendations related to the delineation of Secondary Plan Areas, as well as a high-level community structure plan; and
- recommendations for a framework/approach that can be used to guide future studies and phasing for the Sustainable Halton Lands.

Outlined in the following sub-sections is an overview of the LBAs key findings and recommendations as it relates to the above.

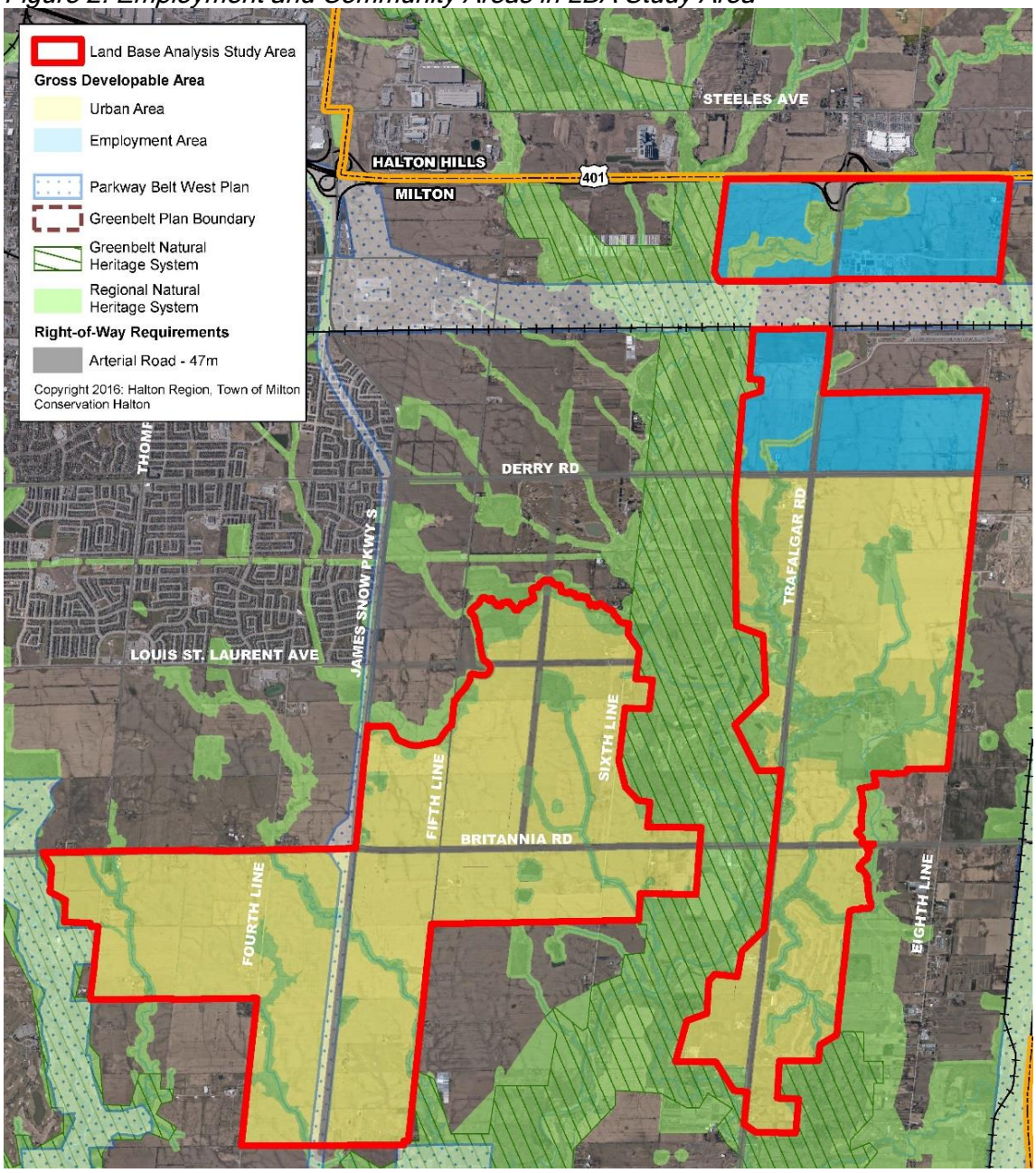
Gross Developable Area

Given that a stated purpose of the LBA was to assess and approximate the amount and distribution of land available for development, a critical first step was to determine both the Gross Developable Area and the Net Developable Area for the lands within the study area. This was to provide the Town with a better understanding of the amount of land that may be available for development, as well as the extent of community uses that will be needed to service the area.

Based on MGPs analysis, the LBA concludes that, after deducting non-developable areas (e.g., Regional Natural Heritage System, lands subject to Provincial Plans, major infrastructure), the resulting Gross Developable Area is 1,635 hectares.

Of the Gross Developable Area, approximately 300 hectares are considered 'Employment Area', as they were previously identified and designated as employment lands through the ROPA No. 38 process. The remaining approximately 1,340 hectares can be considered 'Community Area'. Figure 2 shows the identified Employment Area and Community Area. Table 1 provides a summary of the key findings as it relates to Gross Developable Area.

Figure 2: Employment and Community Areas in LBA Study Area



Source: MGP, 2017

Table 1: Key Findings for Community and Employment Land Gross Developable Area

Land Base Analysis Study Area Components	Area (ha)	Total (%)
Growth Plan Gross Area	**2071**	
Major Highways	18	
LBA Gross Area	**2,053**	**100.0%**
Halton Region Natural Heritage System	414	20.2%
Gross Developable Area	**1,639**	**79.8%**
LBA Employment Area Land Area	298	14.5%
LBA Community Area Land Area	1,341	65.3 %

Source: MGP, 2017

Net Development Area

Following the determination of the Gross Developable Area, it was important to determine the Net Developable Area, so as to understand the area of land that could be available for residential development, as well as have an understanding of the range of community uses that would be needed to build a complete community. The Net Developable Area of the 'Community Area' was calculated by deducting a range of community uses (or "take-outs") from the Gross Developable Area. Community uses such as schools, community centres, libraries, emergency services facilities, and parkland are all uses which are necessary for creating complete communities and that need to be accounted for. There are also a number of other uses that are integral and that need to be considered, including the local road network, stormwater management facilities and commercial land requirements. The resulting Net Developable Area is land remaining and available for residential or employment development. It is also the land area to which development densities are applied. Table 2 provides a summary of the key findings as it relates to the range of potential community uses and net developable area (i.e., housing) for the in the identified 'Community Area'.

Table 2: Key Findings for Net Developable Area

Land Base Analysis Study Area Components	Area (ha)	Area (ac)	Total (%)
Gross Developable Area	**1,639**	**4,050**	**79.8%**
LBA Community Residential Land Area	**1,341**	**3,315**	**65.3%**
Community Area Net Developable Area Breakdown	**1,341**	**3,315**	**100.0%**
Community Use Land Areas	**765**	**1,890**	**57.0%**
Regional Storm Control SWM	161	400	12.0%
Schools (Elementary and Secondary)	54	135	4.0%
Institutional Uses (Community Facilities, Fire and Emergency Services, Library, Places of Worship and Municipal Works)	27	65	2.0%
Commercial Uses	27	65	2.0%
Parkland Uses	134	330	10.0%
Arterial Roads, Collector Roads, Local Roads and Laneways	362	895	27.0%
Net Developable Area for Residential Housing	**576**	**1,425**	**43.0%**

Source: MGP, 2017

The estimation of each community use presented in Table 2 is based on a number of assumptions that are discussed in more detail in the LBA report. The amount of land estimated for each community use is comparable to the composition of the Boyne Secondary Plan Area and other recently planned communities across the Greater Toronto Area. A future Secondary

Plan process will confirm and refine, where necessary, the community uses and Net Developable Area for each Secondary Plan Area. Town staff is of the opinion that it is critical that the amount of land needed for community uses not be underestimated nor should the Net Developable Area be overestimated, as it could have implications for infrastructure and/or community planning, Town capital and/or operating programs, future levels of service, and/or future planning processes.

Density Analysis

Once the exercise of determining the Net Developable Area was completed, a density analysis was undertaken for all of the Town's Designated Greenfield Areas. The purpose was to provide the Town with a recommendation on the minimum density that the lands would need to planned to achieve conformity with the 2006 Growth Plan minimum densities (i.e., 50 residents and jobs per hectare for Halton and 58 residents and jobs per hectare for Milton, as per ROPA #38). The new density targets identified in the 2017 Growth Plan were also to be considered and accounted for in any recommendation put forward by MGP. Based on the analysis, the overall urban expansion area has been recommended to achieve a density target of 70 residents and jobs per hectare. The LBA has revealed that, based on this density target, the area is forecasted to accommodate approximately 80,000 people and 22,000 combined jobs in both the Community and Employment Areas.

Delineation & Structure of Secondary Plan Areas

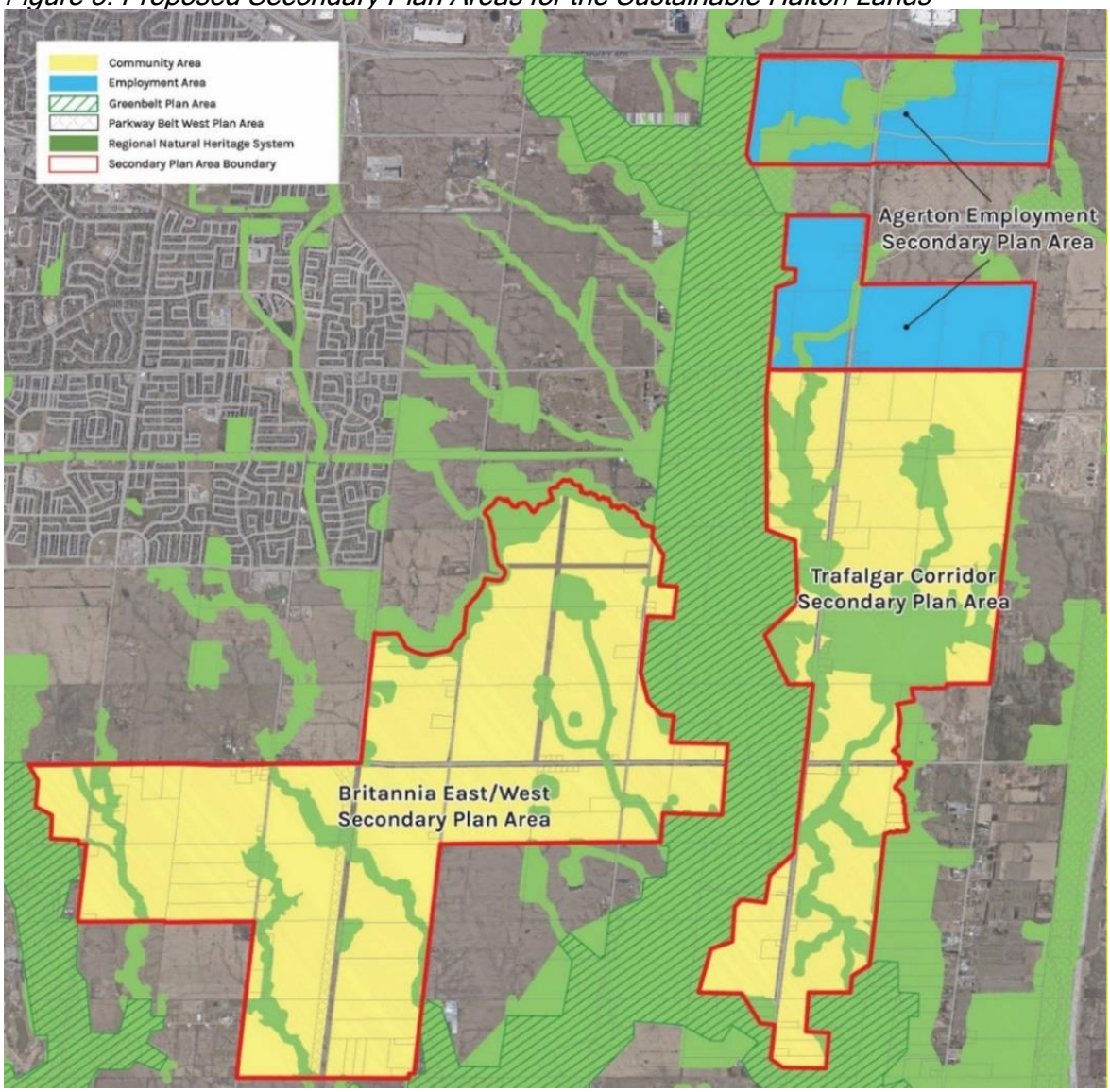
Another deliverable of the LBA was to provide recommendations on the delineation of logical and cohesive Secondary Plan Areas. Consideration was given to ensuring each Secondary Plan Area could be planned to achieve complete, compact, and transit-supportive communities. Based on an analysis of the geography, characteristics and planning policies for the area, as well as feedback received from agencies, landowners, and school boards, it has been recommended that the LBA study area be broken down into three Secondary Plan Areas. Figure 3 depicts the three proposed Secondary Plan areas, which shows two Community Secondary Plan Areas and one Employment Secondary Plan Area. [Note: the proposed names for the proposed Secondary Plan Areas are preliminary and subject to change]

The 'Agerton Employment Secondary Plan Area' is south of the Highway 401/Trafalgar Road interchange and a potential GO Station is located at its centre. This area is recommended to be planned to achieve the employment land requirements outlined in the LBA at 26 jobs per hectare, but opportunities for mixed-use and higher density within 500 metres (a 10-minute walk) of the potential GO station are also recommended.

The 'Trafalgar Corridor Secondary Plan Area' is approximately 466 ha of gross developable area. Building on the potential GO Major Transit Station Area, the Trafalgar Corridor Secondary Plan Area is recommended to be planned with more density, in an urban and transit-supportive manner. This area is recommended to achieve an overall density of 80 residents and jobs per hectare, reflecting the potential to plan for density to support frequent bus service along Trafalgar Road, serving both inter- and intra-regional functions. The highest densities and mix of uses could be within a 250m (a five-minute walk) of potential nodes/transit stops. Overall, the findings of the LBA suggest that this area will accommodate approximately 31,100 people and approximately 12,300 units.

The 'Britannia East/West Secondary Plan Area' is approximately 875 ha of gross developable area and is recommended that it provide development similar in scale and character to that occurring in the existing secondary plans to the north and west. The Britannia East/West Secondary Plan Area is recommended to achieve 67 residents and jobs per hectare, with higher density residential and mixed uses being focused in the corridor and nodes on Britannia Road and the other corridors defined by the north-south arterial roads. While this Secondary Plan area is large enough to be considered two communities, the similarity in planning both communities may make the creation of two secondary plans redundant. Overall, this area could accommodate approximately 49,200 people and approximately 16,800 units. The Britannia East/West Secondary Plan Area could function as an extension of the Boyne Secondary Plan Area, with a compatible neighbourhood character and structure.

Figure 3: Proposed Secondary Plan Areas for the Sustainable Halton Lands



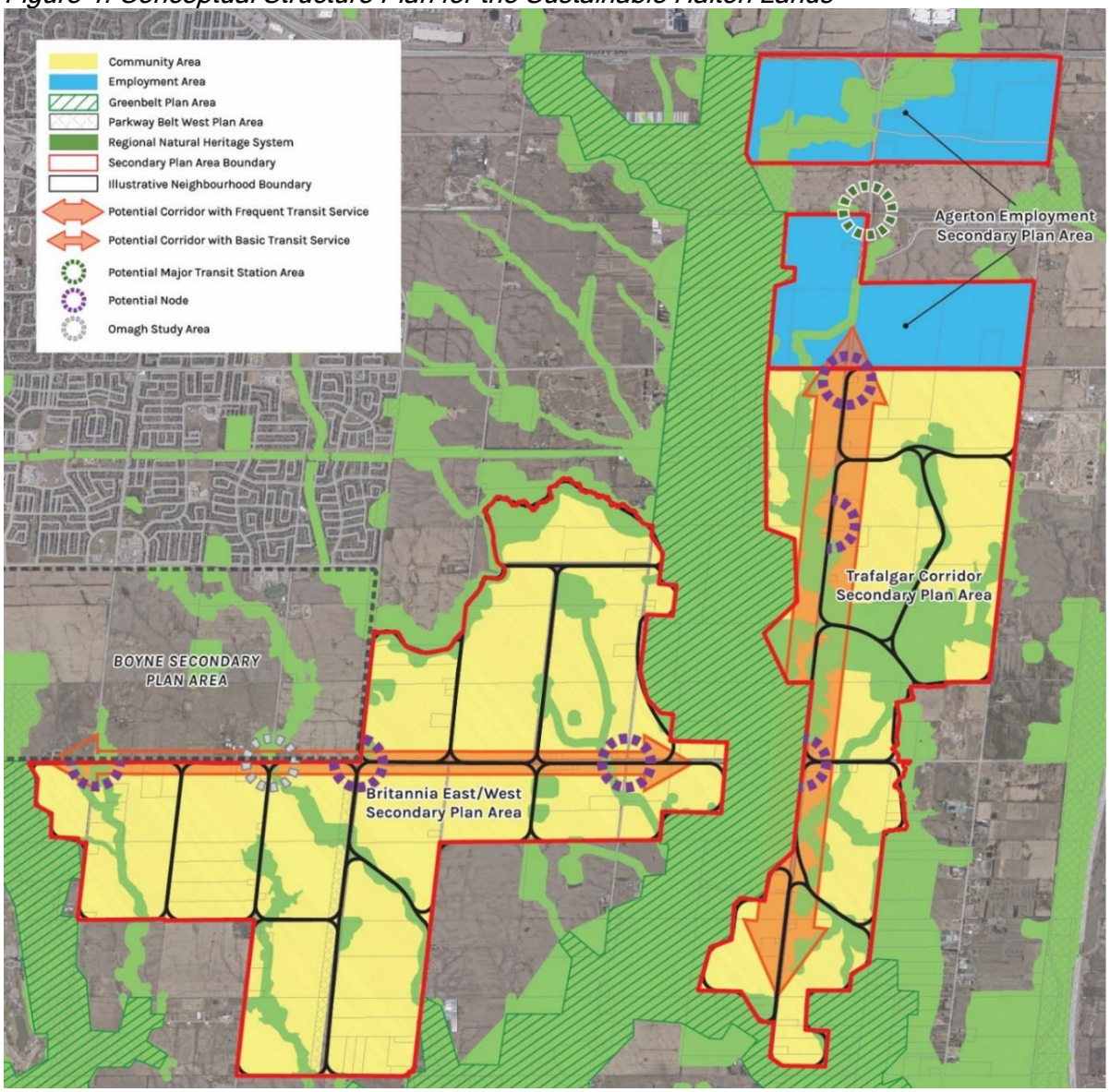
Source: MGP, 2017

The LBA further recommends that each Community Secondary Plan Area (i.e., Trafalgar and Britannia East/West) could be further divided into "neighbourhood" areas. The Secondary Plan process will ultimately delineate neighbourhoods but it is recommended that the delineation be premised on the principle of creating complete communities, and incorporating a building block unit of walkable neighbourhoods to schools, local parks and local commercial shopping. Other considerations such as drainage divides (or subcatchment boundaries) could also be used to identify and delineate neighbourhood boundaries. The Trafalgar Corridor Secondary Plan Area could incorporate approximately 8 neighbourhoods and the Britannia East/West Secondary Plan Area could incorporate approximately 10-11 neighbourhoods. Such neighbourhoods would be typically 5,000-10,000 people in size and could be delimited by surrounding arterial and collector roads. The LBA suggests that the combination of four or five neighbourhoods provides sufficient population to support a secondary school, place of worship, and neighbourhood commercial centre, which all serve as good metrics for creating complete communities.

Figure 4 shows conceptually how each Secondary Plan Area could be divided into neighbourhoods and it also shows a high-level Conceptual Structure Plan, with a basic planning framework that will guide but be refined as part of future Secondary Plan processes. The primary purpose of this plan is to provide a high-level land use structure for the first round of Subwatershed Study analyses and to understand the potential population distribution, employment potential and densities. The basic structure shown on Figure 4 is comprised of potential neighbourhoods, potential corridors with transit terminating at a potential GO station, and potential community nodes.

Given that the overall urban expansion area lands is recommended to be planned to a density of 70 people and jobs per hectare, a range of housing types, including grade-relate housing, stacked, and apartments will be necessary. The overall housing unit mix will be determined as part of a future Secondary Plan process; however, it is anticipated that the unit mix could differ between each of the proposed Community Areas (i.e., the built form in the Trafalgar Corridor Secondary Plan Area could differ from the Britannia East/West Secondary Plan Area). For example, the Trafalgar Corridor Secondary Plan Area could be planned to achieve higher densities that support higher order transit (i.e., more apartments, less grade-related housing). The Britannia East/West Secondary Plan Area could be planned to achieve lower densities (i.e., more grade-related housing, less apartments), which would be more comparable to the character and scale of development seen in other areas of Milton, specifically the Boyne Survey Secondary Plan Area. Table 3 summarizes the key findings for population and jobs, as well as estimated unity yield, in the Community Secondary Plan Areas.

Figure 4: Conceptual Structure Plan for the Sustainable Halton Lands



Source: MGP, 2017

Table 3: Estimated Unit Yield, Population, Jobs and Density by Secondary Plan Area

Community Secondary Plan Area	Housing Unit Yield	People	Jobs	People + Jobs	Density by Land Area
Britannia East/West	15,500	48,700	8,300	57,000	65
Trafalgar Corridor	11,600	31,900	5,500	37,400	80
Total Area	27,100	80,600	13,800	94,400	70

Source: MGP, 2017

Prioritization Criteria for the Secondary Plans

The LBA study team was also tasked with developing a framework to guide future studies and developing criteria to aid in the evaluation of how the Secondary Plan Areas could be phased. Table 4 outlines planning criteria that have been recommended to be considered as part of the determination of the progression of Secondary Plan Areas within the expansion area. Other criteria (e.g., financial) will also be developed and considered as part of the overall determination of phasing for the area; however, those considerations are outside the scope of the LBA and will be assessed in an integrated manner and as part of a subsequent staff report.

Table 4: Prioritization Criteria for Community Area Secondary Plans

Considerations	Prioritization Criteria
Logical Progression of Growth	• Prioritize the contiguous extension of existing urban areas to ensure the logical and sequential progression of growth.
Water and Wastewater Servicing	• Prioritize the delivery of water and wastewater servicing ensuring the logical cost-effective extension of servicing infrastructure into the new Community Area. • Prioritize the timing and delivery of critical Regional Infrastructure based on areas that: • Have servicing infrastructure; • Require additional infrastructure; and • Require more infrastructure prior to development.
Transportation and Transit	• Prioritize the delivery of key transportation links and sustained higher-order transit service along existing and planned transit investments. • Prioritize areas based on the timing of critical Regional and Town Infrastructure. • Prioritize areas that serve interregional functions. • Prioritize areas where there is potential for long-term benefits related to interregional transit (i.e., areas that help justify support/funding for major transit station).
Employment Lands	• Prioritize areas that can expedite servicing delivery to the Employment Secondary Plan Areas and meet employment forecasts.
Population-Related Job Opportunities	• Prioritize areas that can provide significant opportunities for population-related employment (particularly in mixed-use formats) contributing to the municipality's overall employment needs.
Mix of Land Uses	• Prioritize areas with higher potential to achieve a full range and mix of land uses, including higher density forms of residential housing to ensure achievement of the Greenfield Density.
Community Infrastructure	• Prioritize areas that can deliver key community infrastructure (lands for public health, education, recreation, socio-cultural activities, security and safety, and affordable housing) early in the development process.
Agricultural Areas	• Prioritize areas that have the least impact to ongoing agricultural operations for the greatest length of time possible.

Source: MGP, 2017

Based on the recommendations from the Employment Land Needs Assessment (Staff Report PD-040-16), and the results of the LBA, it is recommended that the Employment Secondary Plan Area proceed first and through a separate process from the Community Secondary Plan Areas. However, the LBA also suggests that this would not preclude one or both of the proposed Community Secondary Plan Study Areas from proceeding concurrently.

Additional Considerations for Future Planning Processes

In addition to recommendations discussed in the preceding sections of this report, the LBA also provides recommendations for specific study components. Below are some examples of other factors or studies that are recommended considerations for future Secondary Plan processes. The LBA should be referenced for the comprehensive list of recommendations.

- Employment Land Supply & Need (e.g., prioritize servicing and infrastructure for employment areas with early initiation of Area Servicing Plans; smaller designated areas with supportive servicing and infrastructure should be identified and prioritized through phasing and servicing policies to support smaller businesses and the knowledge based sector industries.)

- Water and Wastewater Servicing Study (e.g., phase development whereby priority areas would be based on: 1) areas that have servicing infrastructure; 2) areas that require additional infrastructure; and 3) areas that require more infrastructure prior to development.)

- Agricultural Assessment (e.g., phase development whereby areas with better soils are developed in later phases, where appropriate; engage in early discussions with the Agricultural community)

- Archaeological Assessment (e.g., complete Stage 2 and Stage 3 assessments for one pioneer cemetery identified within, and two pioneer cemeteries identifies within 50m of the study area; engage in early discussions and/or consultations with Indigenous Communities)

- Parkland (e.g., update the Community Services Master Plan to reflect recent Bill 73 changes as it relates to parkland dedication)

- Institutional Land Needs (e.g., encourage school co-location with neighbourhood parks to facilitate minimum school sizes; engage with all school boards (Public, Catholic and French) through early discussions and/or consultations to determine school needs and general locations)

- Community Centres & Recreation Facilities (e.g., ensure Secondary Plan process includes future studies identifying targeted service levels to determine requirements for future growth within the study area, as well as an inventory of additional facilities not captured in the LBA)

- Public Library Services (e.g., ensure Secondary Plan process includes further study to determine library needs)

- Fire Services (e.g., ensure Secondary Plan process includes a future study to determine fire station/emergency services needs and location to protect newly developed communities in the Urban Expansion Area lands).

Conclusions & Next Steps

The LBA provides a number of recommendations related to the delineation of Secondary Plan Areas, and a high-level community/neighbourhood area structure plan, as well as criteria for prioritizing the sequencing of each Secondary Plan Area. The LBA also provides recommendations for future studies and considerations related to a number of study sub-components including, Transportation, Servicing, Agriculture, Archeology and Cultural Heritage, Parks and Open Space, Institutional uses and Community Facilities. Town staff supports the principles and recommendations presented in the LBA, as the proposed approach supports the Town's goals and objectives to create complete, healthy and sustainable communities.

The LBA was intended to serve as the basis and background for the preparation of future required Secondary Plan studies and it was meant to serve as one of the initial background steps in the Secondary Plan process. Town staff supports the recommended planning framework presented in the LBA as a basis and guide for future Secondary Planning processes. As noted in an earlier section of this report, Town staff is of the opinion that it is prudent that the LBA err on the conservative side, particularly as it relates to estimating the amount of land needed for community uses and the amount of land available for development. However, staff acknowledges that opportunities exist to further assess and refine some of the findings of this report during a future Secondary Plan process.

Ultimately, the Secondary Plans will establish a more detailed planning framework for the Sustainable Halton lands, building upon the general framework provided for in the Town and Region's Official Plan. The Secondary Plans will establish policies that will result in complete, healthy, and sustainable communities. They will also establish the detailed land use structure, a road network, transit and servicing networks, housing unit mix, an open space system and major community facility requirements. Finally, the Secondary Plans will implement the Natural Heritage System and management framework established via the Subwatershed Study.

Town staff will prepare a subsequent report(s) that integrates and assesses all factors necessary for determining the progression and management of growth in the Sustainable Halton Lands (e.g., fiscal, community services and planning factors). At that time, staff will present Council with recommendations about how future growth should be managed, planned, and sequenced for the Sustainable Halton Lands. Following Council endorsement, staff will finalize Secondary Plan Terms of Reference for the area. Staff will also prepare a separate report in the coming months to report on any advancements related to the Subwatershed Study and Transportation Master Plan.

Financial Impact

None arising from this report.

Respectfully submitted,

Barbara Koopmans, BES, MCIP, RPP, CMO
Commissioner, Planning and Development

For questions, please contact: Kellie McCormack, MCIP, RPP Ext. 2332

Attachments
ATTACHMENT 1 – Draft Land Base Analysis, prepared by Malone Given Parsons, dated September 2017

CAO Approval
William Mann, MCIP, RPP, OALA, CSLA, MCIF, RPF
Chief Administrative Officer

ATTACHMENT 1
PD-048-17

MILTON

DRAFT LAND BASE ANALYSIS

Land Base Assumptions, Key Findings &
Secondary Planning Framework

MALONE GIVEN PARSONS LTD.

September 2017

Town of Milton

Draft Land Base Analysis

Land Base Assumptions, Key Findings and Secondary Planning Framework

Prepared for:

Town of Milton

Prepared by:

Malone Given Parsons Ltd.
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Markham, Ontario
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September, 2017

16-2536

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Appendix B: *Agricultural Assessment Review for the Land Base Analysis Area Located in the Town of Milton, Halton Region* – Prepared by AgPlan Limited

Appendix C: *Stage 1 Archaeological Assessment for the Milton Land Base Analysis* – Prepared by Archeoworks Inc.

Appendix D: *Public Information Centre Presentation Boards* - Dated May 16th, 2017

1.0
Introduction & Purpose

The Town of Milton is undertaking a Land Base Analysis (LBA) for the next urban expansion area as one of the first steps in the Secondary Plan process for these lands. Intended to identify key opportunities and constraints to development, the LBA is a high-level study that will establish a framework and inform future Secondary Plan Areas and will provide input into other concurrent background studies, including a Subwatershed Study and a town-wide Transportation Master Plan. Using a comprehensive planning approach in collaboration with the Town of Milton, Halton Region, Conservation Halton and the Landowners Group, the LBA will deliver a sustainable development framework that provides the basis for an environmentally, socially, economically and culturally responsible approach to planning future Secondary Plan Areas.

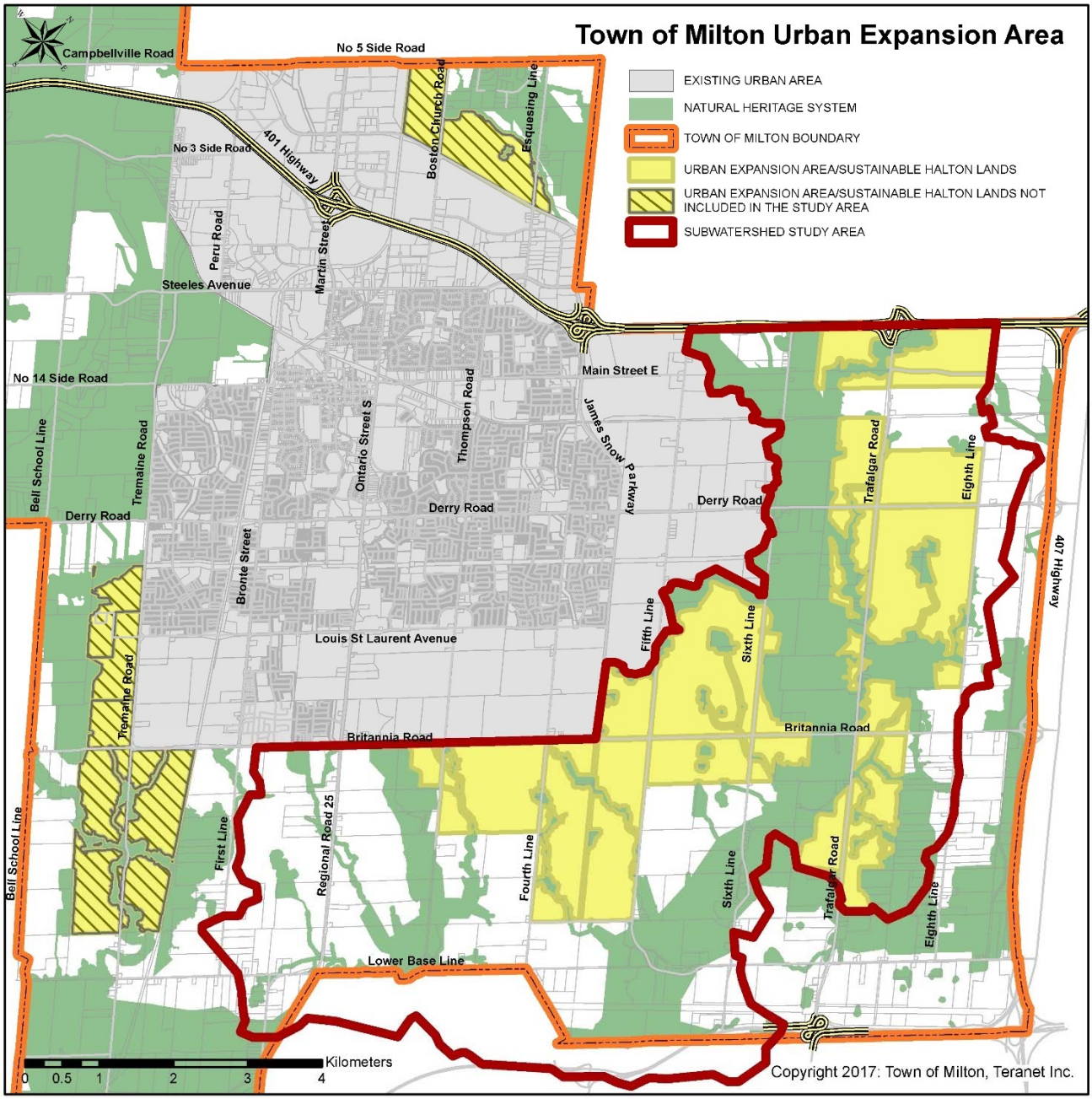
1.1 Land Base Analysis for the Town's Urban Expansion Area

As part of Halton Region's growth management conformity exercise with the *Growth Plan for the Greater Golden Horseshoe, 2006* ("2006 Growth Plan"), the "Sustainable Halton Lands" were identified to serve as the Town's next urban expansion area, comprising of both new community areas and new employment areas. Located in the southern and eastern portions of the Town of Milton, these lands referred to as "Urban Expansion Area" lands encompass approximately 2,000 gross hectares of land (Figure 1), and are to be planned comprehensively through a Secondary Planning process(es).

Through the adoption of *Regional Official Plan Amendment 38* ("ROPA #38"), the Town of Milton is to be planned to accommodate approximately 238,000 people and 114,000 jobs throughout the built-up area and designated greenfield areas by 2031. ROPA #38 requires that Milton's existing designated greenfield areas achieve a minimum development density of 58 residents and jobs combined per hectare in order to conform with the 2006 Growth Plan. Halton Region has initiated a Municipal Comprehensive Review ("MCR") of its Official Plan, a conformity exercise that is mandated by the newly released *Growth Plan for the Greater Golden Horseshoe, 2017* ("2017 Growth Plan). The Region's MCR must be complete by 2022 and implement 2017 Growth Plan policies. Until the MCR is complete, existing designated greenfield areas in Halton Region are to continue to be planned to achieve a density target consistent with the 2006 Growth Plan.

Currently in Phase 3 of a three-phase study, this "*Draft Land Base Analysis – Land Base Assumptions, Key Findings and Secondary Planning Framework"* provides an overview of the broader planning policy context, technical background reports, land base assumptions for the Urban Expansion Area, and key findings as determined through a density analysis of the Town's designated greenfield areas. To further assist the Secondary Plan process, the Draft Land Base Analysis identifies planning and phasing criteria for delineating Secondary Plan Areas, and establishes an overarching conceptual structural framework to inform future planning.

Figure 1: Land Base Analysis Study Area – Urban Expansion Area



Source: Town of Milton, 2017

1.2 Purpose of the Draft Land Base Analysis

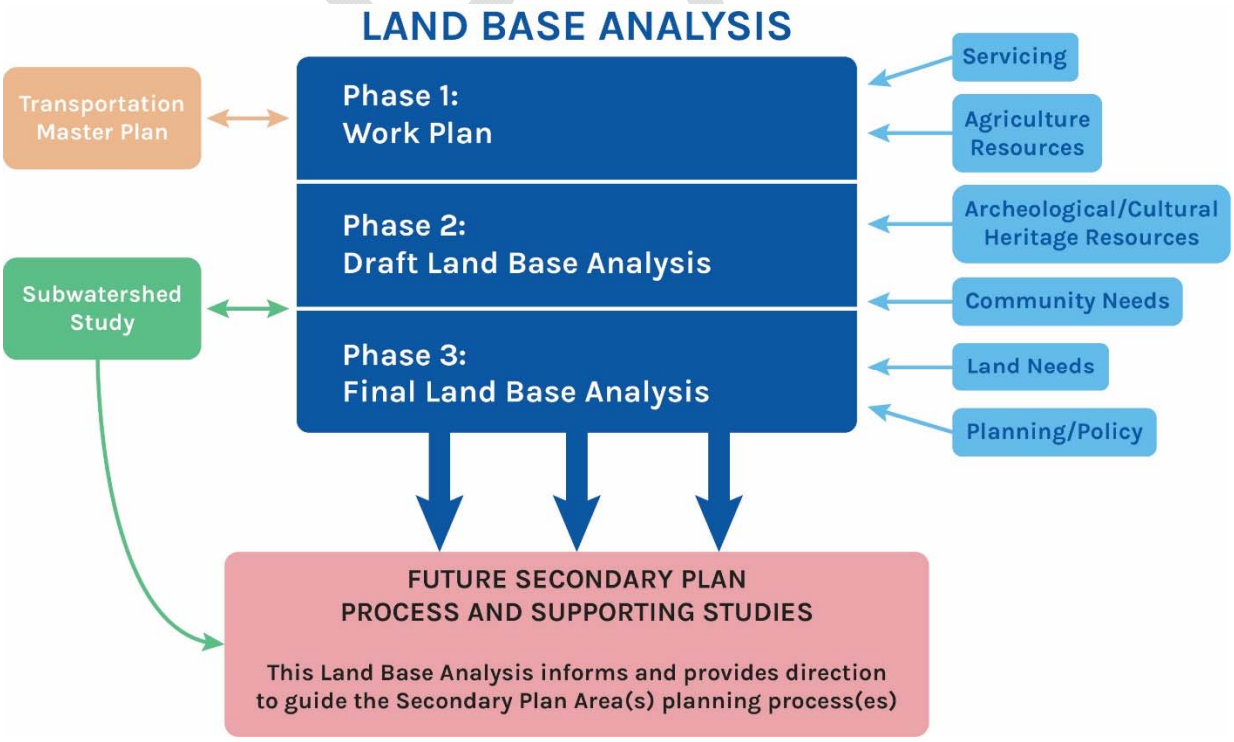
This Draft Land Base Analysis (the "LBA") serves as the initial step and background for the preparation of future required Secondary Plans. Intended as a high-level analysis that precedes the more detailed Secondary Plan(s), the LBA will provide planning direction and guidance for the Urban Expansion Area lands in a manner that is logical, based on good planning and in the best interest of the Town.

The purpose of the LBA is to achieve the following:

- Identify key opportunities and constraints to development;
- Assess and approximate the amount and distribution of unconstrained land that is available for development;
- Assess the feasibility of developing the area, including, but not limited to, a preliminary assessment of the potential public infrastructure needed to facilitate development;
- Delineate logical and cohesive Secondary Plan Area(s); and,
- Provide a framework approach that can be used to guide future studies and phasing for the Secondary Plan process(es).

Figure 2 graphically depicts the LBA inputs including various study components such as the planning policy framework, water and wastewater servicing, community use needs and distribution, land needs to accommodate forecasted population and jobs, transportation infrastructure, as well as archaeological and agricultural considerations. Further, the LBA informs the Subwatershed Study, both of which will ultimately provide guidance to future Secondary Plan process(es).

Figure 2: Land Base Analysis Inputs and Outputs



Source: Town of Milton, 2017

1.3 LBA Process

The Town's Official Plan and the Halton Region's Official Plan identify the requirements for the preparation of Secondary Plans / Area Specific Plans for major growth areas, as well as requirements for the Secondary Plan process. Following the direction outlined in these plans, the Town initiated the planning process for the Urban Expansion Area lands (UEA) through two key studies, this LBA and a Subwatershed Study (SWS).

The LBA workplan identifies three phases:

- Phase 1 – Work Plan and Background Review
- Phase 2 – Preparation of the Draft Land Base Analysis
- Phase 3 – Preparation of the Final Land Base Analysis

Phase 1 included a background review of each of the study area components, namely land needs, policy review and context, servicing, agricultural resources, community needs and archeological / cultural heritage resources. The purpose was to gain an understanding of the context and work currently underway by other consulting teams such as the SWS study, confirm the study scope and establish a detailed work plan including deliverables and timelines.

Phase 2 involved an analysis of the background review, conducted by each of the various study component disciplines. The findings of this analysis provide the framework for developing the Urban Expansion Area lands, and culminates in the preparation of proposed secondary plan area(s) and guiding principles to support the delineation of these areas. In establishing the basis for developing these lands, a number of criteria considered in determining the benefits of proceeding with one secondary plan area or multiple secondary areas, combining the employment lands and community area lands into a secondary plan area, land use and community needs considerations, servicing capacity, transportation considerations, and fiscal considerations.

A density target for the UEA lands was a critical but absent input from the available data. A density analysis for the Town's designated greenfield areas was completed to ensure the UEA lands will be developed in accordance with Halton Region's current Official Plan requirements.

Phase 3, the current phase, includes the preparation of preferred delineated secondary plan areas, a conceptual structural framework to inform future secondary planning, and key recommendations for phasing the UEA lands. A presentation on the key findings and recommendations will be made to council in September 2017.

1.4 LBA Management & Consultation

1.4.1 LBA Management and LBA Consultant Team

The LBA is being managed by Town of Milton staff and Malone Given Parsons Ltd (MGP) on behalf of the consulting team which is comprised of the following team members:

- SCS Consulting Ltd. – servicing
- AgPlan – agricultural
- Archeoworks – archeological

The Town is currently undertaking three additional and concurrent studies, namely a Subwatershed Study, a Transportation Study, and a Fiscal Impact Study, all of which have provided inputs into the LBA study. The LBA consultant team also involves peer reviewers Dillon Consulting (environmental) and Stantec (transportation), where required.

1.4.2 Consultation

The LBA is intended to be conducted using a comprehensive planning approach which encourages consultation and collaboration with relevant stakeholders and the public. Throughout the LBA process, stakeholder engagement and public consultation played an integral role to gain valuable advice and direction on how best to proceed with planning for the UEA lands. A number of committees have been formed in order to provide technical and strategic advice to the Town and its consulting team on the process and development of the LBA. The LBA Steering Advisory Committee (SAC) has been established as part of this process and has provided ongoing input on key deliverables throughout the LBA as well as guidance, direction, technical and strategic advice to the Town and MGP on the process and development of the LBA. LBA SAC members are responsible for coordinating and representing their agency's position and serve as the liaison between their respective agency and the SAC.

The LBA SAC is chaired by the Town and has representation from the following key stakeholders:

- Town of Milton;
- Malone Given Parsons Ltd.;
- Halton Region;
- Conservation Halton; and
- Landowners' Group consultant.

Public consultation is also a key component of the LBA study. On May 16th, 2017, a Public Information Centre was hosted by the Town, the LBA and SWS teams, and was held at Redhill Church. It was very well attended by residents and landowners who own land in the UEA catchment area, as well as residents in the immediate and surrounding areas. The PIC format centred around presentation boards to allow attendees to ask questions directly to the Town and its consultants. Materials presented included the purpose of the LBA/SWS study, study process, preliminary findings, and an overview of community uses and urban character of these lands (Appendix D).

1.5 Town Initiated Studies

1.5.1 Subwatershed Study

The Town of Milton initiated a *Subwatershed Study* (SWS) in January 2016, a comprehensive study that is anticipated to take approximately two years to complete. The associated background review and fieldwork are currently underway. It should be noted the study area for the SWS extends beyond the identified UEA lands and includes subcatchments of the main, east and west branches of Sixteen Mile Creek (see Figure 1).

The SWS will assess environmental features and heritage functions within the study area, and will ultimately provide inputs to future Secondary Plans and/or supporting studies and recommendations for the protection and management of these features as part of future planned development in the Urban Expansion Area.

The purpose of the Subwatershed Study is to:

- inventory, characterize and assess natural hazard, natural heritage and water resource features and functions within the study area (i.e., constraints to development);
- provide recommendations for the protection, conservation and management of natural hazard, natural heritage and water resource features within the study area;
- provide sufficient detail to support the designation of Natural Heritage System, through refinement of the Regional Natural Heritage System, as well as identifying areas for future development; and
- provide recommendations for a management strategy, implementation and monitoring plan to be implemented through the Secondary Plans and future site/area specific studies.

Akin to the LBA, the Subwatershed Study is to be carried out prior to and as part of a Secondary Plan process for the Urban Expansion Area. Further, it will establish the necessary technical support for Secondary Planning process(es), outlining preferred strategies for stormwater management and environmental management in the Urban Expansion Area.

1.5.2 Transportation Master Plan

In conjunction with Halton Region, the Town of Milton is currently developing a town-wide *Transportation Master Plan* (TMP). The TMP will define the arterial road structure required to support the anticipated growth in the Urban Expansion Area. In addition to the structuring framework, the TMP will also establish the basis for an integrated network of walking, cycling, transit routes and streets that are safe and efficient for the movement of people and goods. This network will serve varying ages and abilities, connecting neighbouring community areas, municipalities and the greater surrounding region.

The TMP will provide recommendations about transportation-related studies that will be necessary as part of future Secondary Plan processes.

2.0
Planning Policy Framework

This section of the report provides the planning policy context under which the Urban Expansion Area was established by Halton Region's growth management work with regard to population, employment, housing and land requirements through to 2031.

2.1 Provincial Policy

2.1.1 Provincial Policy Statement, 2014

The *Provincial Policy Statement 2014* ("PPS") is issued under Section 3 of the *Planning Act* and offers policy direction on land use planning, development and other related matters of provincial interest. The goals identified in the PPS provide a framework for long-term policy directives and are to be complemented by regional and municipal plans to achieve comprehensive, integrated planning. The PPS aims to promote efficient land development, the protection and management of natural resources, public health and safety and to improve the quality of both the natural and built environment within Ontario. The PPS recognizes the complex inter-relationships among economic, environmental and social factors in planning and embodies principles of good planning for the creation of complete, healthy, and liveable communities. All land use decisions (provincial and municipal) must be consistent with the PPS.

In particular, it is the intent of the PPS in Section 1.1 to ensure development occurs in a manner that is cost- and land-efficient, and environmentally sensitive. It emphasizes the importance of accommodating growth through intensification to promote healthy, economically diverse and environmentally sensitive communities and to provide for an appropriate range and mix of housing types and densities to meet projected requirements of future growth (Section 1.1.1, Section 1.1.3.3 and Section 1.4

2.1.2 Growth Plan for the Greater Golden Horseshoe

Places to Growth Act, 2005

On June 13, 2005, the Provincial Government passed the *Places to Grow Act*, which was enacted to help the Province plan for growth in a coordinated and strategic way. It gives the Province authority to, among other things, designate any geographic region of the province as a growth plan area and develop growth plans in any part of Ontario.

Growth Plan (2006)

The *Growth Plan for the Greater Golden Horseshoe, 2006* ("2006 Growth Plan") provides a framework for managing growth in the region to achieve the Province's vision for stronger, more prosperous communities. The 2006 Growth Plan provides direction related to land use and infrastructure planning, transportation, housing and natural heritage and resource protection. Further, it emphasizes the need to minimize the rate at which land is consumed for development, to efficiently use the land already designated for future development and to encourage cities to develop as complete communities offering a range and mix of housing types (Section 2.2.2.1).

"Schedule 3" assigns population and employment forecasts for all upper- and single-tier municipalities. Halton Region is forecasted to accommodate 780,000 people and 390,000 jobs by 2031. To accommodate this growth, the 2006 Growth Plan requires a minimum intensification target for the Built-Up Area, and a minimum density target for all Designated Greenfield Areas ("DGA") which must be planned to achieve an average minimum density target of 50 residents and jobs per hectare combined (section 2.2.7.2) across the entire Region. This density target is measured over the entirety of the Region's DGA including the Urban Expansion Area lands, and excludes natural heritage and hydrological features "take-outs" (Section 2.2.7.3). In 2013, *Amendment 2 to the Growth Plan for the Greater Golden Horseshoe, 2006* amended Schedule 3, with Halton Region forecasted to accommodate 1,000,000 people and 470,000 jobs by 2041.

Growth Plan (2017)

The *Growth Plan for the Greater Golden Horseshoe, 2017* ("2017 Growth Plan") was released on May 18, 2017 and came into effect on July 1, 2017, replacing the 2006 Growth Plan.

The 2017 Growth Plan establishes a new DGA density target of 80 residents and jobs combined per hectare (Policy 2.2.7.2), a target that is to be measured over the entire DGA. Policy 2.2.7.4.a) makes transition provisions for DGA identified in official plans approved and in effect as of July 1, 2017. This transition policy applies to the UEA lands studied as part of this LBA. As a result, the UEA lands are subject to a regional-wide density target of 50 residents and jobs combined per hectare. Following the Region's next municipal comprehensive review, the regional density target for these lands will be no less than 60 residents and jobs combined per hectare, measured according to Policy 2.2.7.3 whereby `take-outs` or exclusions can include employment areas. As mandated by the 2017 Growth Plan, Halton Region must complete its municipal comprehensive review by 2022.

The LBA imbeds density target calculations that conform with the 2017 Growth Plan transition policies and will be going forward as such, recognizing that further opportunities may exist for increased densities in appropriate transit-supportive locations and future major transit station area(s).

Figure 3: Graphic Depiction of 2017 Growth Plan Policies for Designated Greenfield Areas & Intensification

Planning Horizon	2017	Next MCR (2022)	2031-41
Intensification	**40%** of all Residential development to occur within the Delineated Built-up Area See Policy 2.2.2.3	**50%** of all Residential development to occur within the Delineated Built-up Area See Policy 2.2.2.2	**60%** of all Residential development to occur within the Delineated Built-up Area See Policy 2.2.2.1
Designated Greenfield Areas	**50 R+J/ha** or current minimum density target in effect as of July 1, 2017 to remain until the next Municipal Comprehensive Review See Policy 2.2.7.4a	**60 R+J/ha** or higher, as determined through a Municipal Comprehensive Review See Policy 2.2.7.4b	**80 R+J/ha** minimum density target for Designated Greenfield Areas See Policy 2.2.7.2

Source: Malone Given Parsons, 2017

New Policy: Housing Strategy

The 2017 Growth Plan requires all upper- and single-tier municipalities, in consultation with lower-tier municipalities, to prepare a housing strategy that support the achievement of intensification and density targets as well as forecasted growth (section 2.2.6.1). The housing strategy should identify a diverse range and mix of housing, and establish affordable housing targets.

New Policy: Employment Area Strategy

Although employment areas are now a permitted take-out for DGA density calculations following a municipal comprehensive review, the 2017 Growth Plan requires upper- and single-tier municipalities to develop an employment strategy that establishes a minimum employment area density target as established through a municipal comprehensive review (section 2.2.5.5).

2.1.3 Greenbelt Plan

Greenbelt Act (2005)

The Greenbelt Act, 2005 provided the authority for the creation of the Greenbelt Area and the Greenbelt Plan. The Act sets out the main elements and objectives for the Greenbelt, which are addressed in the Plan, permanently protecting approximately 1.8 million acres of environmentally sensitive and agricultural land in the Greater Golden Horseshoe from urban development and sprawl. It includes and builds on about 800,000 acres of land within the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan. The Greenbelt Act, 2005 requires decisions made under the Ontario Planning and Development Act, 1994, the Planning Act, and the Condominium Act, 1998 conform to the Greenbelt Plan.

Greenbelt Plan (2005)

The *Greenbelt Plan 2005* identifies where urbanization should not occur to provide protection to the agricultural land base and ecological features and functions on the landscape within the Greater Golden Horseshoe. In addition to protecting natural heritage and water resource systems, the Greenbelt Plan supports the conservation of cultural heritage resources and provides a range of publicly accessible lands for recreation and tourism development.

Greenbelt Plan (2017)

The *Greenbelt Plan 2017* was released on May 18, 2017 and came into effect on July 1, 2017. The Province introduced changes to the 2017 Greenbelt Plan including policy changes related to agriculture/agricultural system, natural heritage and water, climate change and the urban river valley designation. The changes are intended to maintain the interconnections and diversity of natural features and areas, and to ensure that water quality and water quantity is maintained across the Greater Golden Horseshoe. Further, the 2017 Greenbelt Plan places greater emphasis on planning at a watershed and subwatershed scale, as well as provides increased flexibility for agricultural, recreational (parks) and municipal land uses within the Greenbelt Plan area.

2.2 Regional Policy

2.2.1 Regional Official Plan / Regional Growth Management (ROPA #38)

The Regional Official Plan ("ROP") is Halton's guiding document for land use planning. It contains Council's goals, objectives, and policies for managing growth and development and for directing physical change affecting the social, economic and natural environment of the Region. The ROP provides policies related to a wide range of topics including, but not limited to the following:

- The setting of urban area boundaries to accommodate growth and to protect farmland;
- The protection of environmentally-sensitive areas and promotion of land stewardship;
- The promotion of economic development;
- The delivery of urban services such as water supply and wastewater treatment, transportation, energy and utilities; and
- The building of healthy, complete and sustainable communities.

The ROP is reviewed periodically to ensure that it remains responsive to Halton's needs and the vision of Regional Council. The last review, referred to as 'Sustainable Halton', was undertaken to update the Halton Region Official Plan (2006). It concluded on December 16, 2009 with Regional Council unanimously adopting Regional Official Plan Amendment No. 38 ("ROPA #38"). In 2011, the Province modified and approved ROPA #38. This decision was subsequently appealed in its entirety to the Ontario Municipal Board (OMB). The OMB hearing process to address the appeals began in mid-2012 and is currently ongoing. ROPA #38 policies are mostly now approved and in-force as of the date set out in the OMB Order, subject to site specific or area specific matters. The new September 28, 2015 Interim Office Consolidation has been prepared to show those policies that are

approved and in-force, as well as those policies that remain under appeal. For those policies that remain under appeal, the concurrent policies of the ROP (2006) continue to apply.

ROPA #38 was adopted by Regional Council in December 2009. The purpose of the amendment was to update the Regional Official Plan and bring it into conformity with the Provincial Policy Statement (2005), the Greenbelt Plan (2005), the Growth Plan (2006) and other relevant Provincial plans and policies.

ROPA #38, identified additional lands in the Town of Milton that are to accommodate population and employment growth from 2021 through to 2031. The lands identified for growth serve as Milton's next Urban Expansion Area and next major Secondary Plan Areas. As such, the Town is required to plan for the Sustainable Halton Lands comprehensively.

ROPA #38 distributes population and employment targets to all local municipalities through to the 2031 planning horizon. The Town of Milton has a target population of 238,000 people and an employment target of 114,000 jobs by 2031 (Table 1).

Table 1: Excerpt of ROPA #38, Table 1 - Population and Employment Distribution

	Population[1]		Employment	
	2006	2031	2006	2031
Halton Region[2]	**456,000**	**780,000**	**218,000**	**390,000**
Burlington	171,000	193,000	88,000	106,000
Oakville	172,000	255,000	82,000	127,000
Milton	56,000	238,000	28,000	114,000
Halton Hills	58,000	94,000	20,000	43,000

Notes:

1. *Population numbers are "total population" including approximately 4% undercoverage from the official Census Population numbers reported by Statistics Canada.*
2. *Totals for Region may not add up due to rounding.*

Source: Halton Regional Official Plan, Interim Office Consolidation Based on Amendment 38, Table 1; Page 17

As part of the conformity exercise, the Region identified intensification and density targets for each municipality to achieve the minimum targets identified in the Growth Plan. Between 2015 and 2031, the Town of Milton is forecast to accommodate 5,300 new residential units within the Built-Up Area and must achieve a minimum density target of 58 residents and jobs per hectare for all Designated Greenfield Areas, which includes the Urban Expansion Area lands (refer to Table 2).

Table 2: Excerpt of ROPA #38, Table 2 - Intensification and Density Targets

	Minimum Number of New Housing Units to be added to the *Built-Up Area* Between 2015 to 2031	Minimum of Overall Development Density in Designated Greenfield Area (residents + jobs combined per hectare)[1]
Halton Region	**32,200[2]**	**50**
Burlington	8,300	45
Oakville	13,500	46
Milton	5,300	58
Halton Hills	5,100	39

Notes:
1. *In the measurement of these densities, the area of the Regional Natural Heritage System is excluded.*
2. *This number represents 40 per cent of the new housing units occurring in Halton Region between 2015 and 2031*

Source: Halton Regional Official Plan, Interim Office Consolidation Based on Amendment 38, Table 2; Page 18

2.2.2 Regional Development Phasing to 2031 (ROPA #39)

Regional Official Plan Amendment No. 39 ("ROPA #39") was adopted by Regional Council on July 13, 2011 and was subsequently appealed to the Ontario Municipal Board. The purpose of the amendment was to update the phasing of growth (and new urban lands) to aid the Region in achieving its distribution of population and employment to 2031 as required by Schedule 3 of the Growth Plan.

Table 2a of ROPA #39, identifies the phasing to be achieved throughout the Region and each municipality every five years between the Built-Up Area and the Designated Greenfield Areas. ROPA #39 includes Milton's Urban Expansion Area lands as *Urban Area with Regional Phasing between 2021 and 2031.* Between 2021 and 2031 Milton's Built-Up Area is forecast to accommodate 5,322 residential units, the Designated Greenfield Area (DGA) is forecast to accommodate 19,201 residential units (14,465 low-density units and 4,736 medium- and high-density units) and in total the Town is forecast to accommodate 33,224 jobs. Regional phasing allocation is as per Table 3 below.

Table 3: Excerpt of ROPA #39, Table 2a - Growth Phasing to 2031 for the Town of Milton

	2012-2016	2017-2021	2022-2026	2027-2031
Units in Designated Greenfield Area	10,644	10,175	10,075	9,126
Low Density Units	7,030	6,991	7,067	7,398
Medium & High Density Units	3,614	3,184	3,008	1,726
Units Inside Built Boundary	1,910	3,502	2,558	2,764
Employment	18,102	18,552	15,525	17,699

Source: Halton Region - Amendment No. 39 to the Regional Plan (2009); Table 2a, Page 9

2.2.3 Regional Official Plan Review (Phase 1 Directions Report)

The Region of Halton initiated a review of its ROP in 2014, to align with provincial policy changes in the Provincial Policy Statement 2014 and the pending amendments to the Provincial Plans resulting from the Government's Co-ordinated land use planning review. The first phase of the Regional Official Plan Review is now complete, with Regional Council's endorsement of the Directions Report, dated October 2016 which identifies key land use matters and directions for consideration through the review. Although the Phase 1 report is not a binding policy document it analyzes current and emerging policy approaches, demographic and economic trends/projections to 2041, and land use trends.

The directions report provided an analysis on the average persons per unit ("PPU") by unit type between the 2006 and 2011 Census. This analysis indicated a general increase in PPU for low- and medium-density housing types, with a decrease in PPU for high-density unit types. The PPU's for Halton Region and the municipalities is summarized in Table 4. PPU data is used to help calculate an estimated population yield and unit mix requirement to achieve growth targets, and is a critical input to the Town`s fiscal assessment. In the last 10 years, significant changes to the demographic profile of the community have occurred, resulting in PPU assumptions for the LBA that differ from those assumed by the Town and Region in prior growth management work. PPU assumptions for the LBA will be confirmed through a demographic analysis prepared by Watson & Associates Economists. Ltd as part of the Fiscal Impact Study.

Table 4: PPU Assumptions by Dwelling Type, 2006 and 2011

	Town of Milton PPUs		Halton Region PPUs	
	2006	2011	2006	2011
Low-Density	3.07	3.55	3.37	3.45
Medium-Density	2.39	2.69	2.45	2.47
High-Density	1.79	1.48	1.62	1.51

Source: Figure A.3 to A.5 – Regional Official Plan Review Phase 1 – Directions Report, October 2016

2.3 Local Policy

2.3.1 Town of Milton Official Plan / Growth Management Policies (OPA #31)

The Official Plan describes Council's priorities and policies on how land should be planned and developed in the Town of Milton. The Official Plan establishes a framework for addressing how the Town will ensure this future planning and development will meet the specific needs of the community.

The Town's current Official Plan is based upon a planning horizon of 2021 and provides direction to manage growth within that timeframe. The Official Plan incorporated lands for urban expansion determined through the Halton Urban Structure Plan (HUSP) exercise, which was undertaken in the late 1990's. The Official Plan was last consolidated in August, 2008 and includes all amendments approved to that date. The Town is in the process of amending its Official Plan, via Official Plan

Amendment No. 31 ("OPA #31"), to bring the Official Plan into conformity with upper tier planning documents.

OPA #31 was adopted by Council on June 14, 2010, and subsequently submitted to the Region for approval. Town and Regional staff are working to advance OPA #31 to bring the Town's Official Plan into conformity with the Growth Plan and the Sustainable Halton Plan (i.e., ROPA #38), as well as to ensure that the appropriate policy framework is in place to advance the planning of the UEA.

The Town's Official Plan establishes policies related to Secondary Plan process and it also outlines the detailed studies which are required in support of a Secondary Plan, which includes requirements for a SWS (refer to Sections 5.4 and 2.6.3.37). All Secondary Plans and detailed studies are to be prepared for newly developed/urban expansion areas and are to be carried out by the Town. Secondary Plans are policy plans which address, land use, urban form and design, transportation, servicing, and development guidelines, in more detail than the Official Plan. Secondary Plans are adopted as amendments to the Official Plan.

OPA #31 implements population (238,000) and employment (114,000) targets for Milton to 2031, and incorporates the applicable urban boundary expansions established through the Sustainable Halton Planning exercise to accommodate that projected population and employment growth.

Within the Sustainable Halton Designated Greenfield Area, the ROP requires a minimum density target to conform with Growth Plan policies. Further, the Town also establishes an annual housing mix target which aims to achieve 50 per cent of all new units being townhouses or multi-storey buildings and 30 per cent of all new units being affordable housing (Policy 2.7.3.1).

In order to achieve the overall DGA, growth targets and the Town's housing mix targets, a full range of residential uses and densities are permitted within the DGA however, a higher distribution of Medium Density II and High Density residential uses are encouraged particularly along nodes and corridors (Policy 3.2.1.7).

3.0 Review of Background Technical Reports

This section of the report reviews background reports and studies that identify Milton`s current land supply, land need requirements and provision/service levels including those related to employment lands, retail/commercial lands, residential, institutional and community services land needs. These land requirements will provide a basis for estimating the land use distribution within the Gross Developable Area for the land base analysis and assumptions.

3.1 Employment Land Supply & Need

In October 2016, MHBC and Watson & Associates Economists Ltd. prepared an *Employment Land Needs Assessment Study* to evaluate the Town of Milton's planning framework and employment land needs to the 2041 planning horizon. The study was intended to guide the designation and future development of urban employment lands.

Existing Supply

The Town of Milton's employment land supply consists of existing designated and built-out lands, planned employment areas (within greenfield areas) and Future Strategic Employment Areas. As of 2015, the Town had 668 net hectares (1,650 acres) of developed employment lands, approximately 462 net hectares (1,142 net acres) of developable, designated vacant employment lands and roughly 1,400 gross hectares of Future Strategic Employment Area.

Future Employment Land Need

The study found that over the 2016 to 2031 planning horizon, Milton is forecast to add a total of approximately 27,745 jobs on employment lands of which 26,360 needs to be accommodated on vacant employment lands; resulting in a total employment land demand of 892 net hectares (2,203 net acres).

Table 5: Town of Milton Employment Land Demand Forecast 2016 to 2041

Growth Period	Total Employment on Employment Lands	Intensification on Employment Lands	Total Employment on Employment Lands Adjusted for Intensification	Employment Density (jobs/ net ha)	Total Employment Land Demand (net ha)	Annual Employment Absorption (net ha)
2016-2021	4,200	210	3,990	21	190	38
2016-2026	13,285	665	12,620	26	488	49
2016-2031	27,745	1,385	26,360	30	892	59
2016-2036	38,645	1,930	36,715	31	1,196	60
2016-2041	49,010	2,450	46,560	32	1,478	59

Source: Figure 3-11 – Watson & Associates Economists Ltd. (October 13, 2016)

Table 6: Town of Milton Employment Land Need to 2041 Based on Designated Employment Land Supply

	2016-2021	2016-2026	2016-2031	2016-2036	2016-2041
Net Employment Land Demand (ha)	190	488	892	1,196	1,478
Net Employment Land Supply (Designated) (ha)	462	462	462	462	462
Net Employment Land Surplus/(Shortfall) (ha)	272	(26)	(430)	(734)	(1,016)

Source: Figure 3-12 – Watson & Associates Economists Ltd. (October 13, 2016)

Based on the existing supply of designated, vacant employment lands (462 net hectares) and the long-term demand (892 net hectares), Milton does not have a sufficient supply of designated employment lands to accommodate forecasted growth to 2031. As of 2031, a net deficit of 430 hectares has been identified.

Given the shortfall of the Town's employment land supply, it is expected the Town's planned employment growth areas will be needed in their entirety within the 20-year planning horizon. Utilizing all of the planned employment areas would result in roughly a 95-net hectare surplus of employment lands at the end of the 2031 planning horizon, as summarized in Table 7 below.

Table 7: Surplus of Employment Lands Through to the 2031 Planning Horizon

	2016-2021	2016-2026	2016-2031	2016-2036	2016-2041
Net Employment Land Demand (ha)	190	488	892	1,196	1,478
Net Employment Land Supply (Designated + Planned Growth Areas) (ha)	987	987	987	987	987
Net Employment Land Surplus/(Shortfall) (ha)	797	499	95	(209)	(491)

Source: Figure 3-13 – Watson & Associates Economists Ltd. (October 13, 2016)

The study concluded the Town of Milton will need to advance the planning of the current designated and planned employment land supply to accommodate forecast growth within the planning horizon as all of the lands will be required. To meet employment land needs to 2041 the Town will need 1,478 net hectares of employment lands. The Town currently has 987 hectares of designated and planned growth areas, representing a shortfall of 209 ha between 2016 and 2036 and an overall shortfall of 491 ha between 2016 and 2041. In order to meet demand, the Town will require 35% of the roughly 1,400 gross hectares identified Future Strategic Employment Areas.

Employment Density

According to the study, the existing average employment land density in Milton is approximately 16 jobs per net hectare (7 jobs per net acre). The relatively low employment density is strongly influenced by the large share of employment that is within the warehousing and logistics sector which is typically characterized by large, land consumptive uses with relatively low employment yields.

As the employment trends in the Town shift away from large-scale developments and wholesale trade, future employment densities are targeted to increase to approximately 34 jobs per net hectare (14 jobs per net acre) by 2031. This target is similar to the employment density identified by Hemson Consulting in their April 2009 report (*Accommodating Growth to 2031* – SHP Report 3.07) prepared for Halton Region as input to the Sustainable Halton Plan, which identified a target employment land employment density of 37.5 employees per net hectare. The Hemson report also identified the following target densities for other employment types:

- Employment Land Employment 37.5 employees/net ha
- Major Office Employment 250 employees/net ha
- Population Related Employment 75 employees/net ha
- Total/overall 45 employees/net ha

At present, the Town of Milton has been challenged to achieve these employment densities. As such, for the purposes of the LBA, a more conservative approach is recommended for the UEA lands at a density of 26 employees per hectare.

LBA Area Employment Lands

The Trafalgar/Derry Lands is a future employment area identified in the study by the Region for employment uses. The Trafalgar/Derry Lands are located south of Highway 401, north of Derry Road and are centred around the Trafalgar Road corridor within the LBA Area. The lands represent the next phase of planned employment area under ROPA #38. These lands are identified in the employment land needs study as planned employment land area and are anticipated to accommodate employment growth within the 2031 planning horizon.

These lands are located north and east of the Derry Green Corporate Business Park at the only undeveloped Highway 401 interchange in the GTA, and include the lands along the Trafalgar Road corridor. The Trafalgar/Derry lands affords prime access to a range of major transit infrastructure including Highways 401 and 407, direct rail access, proximity to Milton CP Expressway and the potential future GO transit station. For these reasons, these lands are well suited to promote higher employment densities near and/or adjacent to the Trafalgar Corridor. It should also be noted that given the presence of an extensive natural heritage system that creates fragmentation of development lands, it is recommended that the Town consider this as part of Secondary Plan planning and include future studies.

Recommendations for Town's Consideration

Based on the *Employment Land Needs Assessment Study*, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Update employment forecasts to 2041 to advance the planning of currently designated and planned employment land supply, and ensuring lands are serviced to maintain demand for the logistics and warehousing sectors for which Milton has a strong competitive market.
- Create a tiered hierarchy for Milton's employment areas and defining the Town's Prime Employment and General Employment areas. Further, focus on creating new locations for concentrated employment such as employment nodes/districts with a full range of supportive uses.
- Redevelopment and intensification in the Town's non-employment, mixed use areas to maintain and create new jobs.
- Prioritize servicing and infrastructure for employment areas with early initiation of Area Servicing Plans, in place of the traditional approach whereby employment areas are serviced through the last phases of Secondary Plan development as they are often located at the periphery due to expansive land needs.
- Smaller designated areas with supportive servicing and infrastructure need to be identified and prioritized through phasing and servicing policies to support smaller businesses and the knowledge based sector industries.
- Ensure Secondary Plan process implements *Milton's First Principles of Growth*.

3.2 Water and Wastewater Servicing Study

SCS Consulting Group Ltd. conducted a *Water and Wastewater Servicing Summary* relating to the Urban Expansion Area (Appendix A). The analysis was based on review of the following information:

- Sustainable Halton Water and Wastewater Management Plan (AECOM, 2011)
- Halton Region 2017 Development Charges Background Study (December 2016)
- Halton Region 2017 Development Charge Water/Wastewater Technical Report (GM Blueplan Engineering, September 2016)
- Memo from Urbantech (February 2017) – Town of Milton Phase 4 Lands Municipal Infrastructure Works

SCS confirmed the Urban Expansion Area lands have been included as part of the serviced areas in the water and wastewater servicing strategies that have been developed, and the works required to implement the servicing strategies have been considered in the Region's 2017 Development Charge Background Study and the 2017-2031 Water/Wastewater Capital Implementation Plan.

Recommendations for Town's Consideration

Based on the *Water and Wastewater Servicing Summary*, preliminary recommendations for the Town's consideration in future planning of the UEA lands include:

- Preparing a more detailed, area specific servicing study, in conjunction with an environmental management study for each Secondary Plan Area.
- Phasing of development whereby priority areas would be based on areas:
    1. That have servicing infrastructure;
    2. That require additional infrastructure;
    3. That require more infrastructure prior to development.
- Ensure Secondary Plan process implements *Milton's First Principles of Growth.*

3.3 Agricultural Assessment

AgPlan Limited conducted an *Agricultural Assessment Review for the Urban Expansion Area* (Appendix B). The assessment is based on current conditions as well as an estimate of future conditions. The assessment considers the agricultural characteristics on and off site, how the agricultural characteristics have changed within the Urban Expansion Area lands over the last 30 years and mitigation measures available to reduce urban/rural conflicts.

AgPlan's assessment identifies the Urban Expansion Area lands as predominantly Class 1 through 3 soils that produce common field crops. The lands do not meet the requirements for a specialty crop area nor do they have high potential for specialty crops. It was recommended that the timing of development should be based on differences of soil potential and soil capability, leaving the better soils from a capability and potential perspective in agriculture longer.

AgPlan concluded that over the last 30 years the number of census farms and census farm areas have been decreasing in Halton Region and the Town of Milton. Given this rate of decrease AgPlan concluded that at the time of Secondary Plan, plan of subdivision or urban development there will likely be minimal agricultural impacts. It was also recommended that to reduce urban/rural conflicts specific Minimum Distance Separation calculations be conducted at the time of the Secondary Plan process.

Recommendations for Town's Consideration

Based on the *Agricultural Assessment Review for the Urban Expansion Area*, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Augment Secondary Plans by including existing and/or future studies to inform future planning, such as:
    1. Prepare an assessment of agricultural land use, livestock and barns;
    2. Identify possible locations for compatible land uses such as parks and open space;
    3. Identify potential mitigation measures and success (or lack thereof) of such measures, as it relates to buffering agricultural uses from urban uses.
    4. Phase development whereby areas with better soils are developed in later phases, where appropriate;
- Town to engage in early discussions with the Agricultural community, where appropriate.

3.4 Archaeological Assessment

Archeoworks Inc. conducted a *Stage 1 Archeological Assessment of the Urban Expansion Area* (Appendix C). The background research identified elevated potential for the recovery of archaeologically significant materials within the study area based on the Region of Halton's archaeological management plan, as well as the proximity of registered archaeological sites, primary and secondary water sources, historic settlements, historic transportation routes, pioneer cemeteries and designated structures.

In some instances, sites of potential archaeological significance were identified that have previously been subjected to Stage 1, Stage 2, Stage 3 and/or Stage 4 survey (refer to Map 13 of the Archaeological Assessment in Appendix C). Archeoworks indicated that where such sites have been previously cleared of further archaeological concern they should be exempt from further assessment.

Archeoworks recommended a visual field inspection be required for sites identified as having no or low archaeological potential and/or deep or extensive disturbances to determine whether any archaeological potential remains.

The Stage 1 Assessment identified one pioneer cemetery within the study area and two pioneer cemeteries within 50 metres of the study area. Should proposed work occur within or immediately adjacent to (within 10 metres of) any cemetery, following the Stage 2 archaeological investigation of this area, should no archaeological resources be encountered, a Stage 3 investigation involving mechanical topsoil removal will be required in all undisturbed areas that fall within 10-metres of the cemetery limits, to confirm the presence or absence of any grave shafts.

The remainder of the study area lands, consisting of primarily agricultural fields and open grasslands were considered to retain archeological potential. The ploughed agricultural fields will need to be

assessed via pedestrian survey at 5 metre transects. In areas where ploughing is not viable the lands will be subject to test pit survey at 5 metre intervals.

Recommendations for Town's Consideration

Based on the *Stage 1 Archeological Assessment of the Urban Expansion Area*, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Exempt sites from further assessment that have been previously subjected to Stage 1, Stage 2, Stage 3, and/or Stage 4 survey and have been cleared of further archaeological concern.
- Complete visual field inspections for sites identifies as having no or low archaeological potential and/or deep or extensive disturbances.
- Complete Stage 2 and Stage 3 assessments for one pioneer cemetery identified within, and two pioneer cemeteries identifies within 50m of the Urban Expansion Area lands.
- Town to engage in early discussions and/or consultations with Indigenous Communities.

3.5 Parkland

Parkland Dedication

The general parkland dedication requirements as per the maximums provided in the Planning Act are up to 1 hectare per 300 units for medium- and high-density residential areas, 2% of the land for industrial and commercial designated lands and 5% for all other areas, excluding environmental areas constrained by development.

New neighbourhoods in the UEA lands will be planned as "complete" communities, the character of which will include ground-oriented housing forms as well as stacked, mid-rise and high-rise housing forms, where appropriate. The result of more densely populated communities reinforces the need for parks and open space to support active and healthy lifestyles. The Town will continue to prefer dedication in land rather than cash-in-lieu to ensure new communities in the UEA have an adequate provision of parkland, a viewpoint that will be reiterated particularly for higher density areas.

Parkland Requirements

The current Town of Milton Official Plan identifies a general parkland provision target of 4 hectares of tableland per 1,000 population that may be provided on the following basis as per Section 2.5.3.5 (refer to Table 8).

Table 8: Town of Milton Official Plan Parkland Requirements

Type	Service Level Standard
Community Park	1 ha per 1,000 population
District Park & Urban Square	2 ha per 1,000 population
Neighbourhood Park & Village Square	1 ha per 1,000 population

Source: Town of Milton Official Plan

The Town of Milton's *Community Services Master Plan Update (2015)* ("CSMP") provides a number of recommendations to revise the Town's current parkland provisions; including a revised parkland hierarchy and service level target. The proposed parkland hierarchy is summarized in Table 9, for which the hierarchy introduces two new park typologies *Linear Park* and *Passive Open Space*, intended to facilitate connectivity between built and natural areas with a more limited recreational focus (i.e. conservation, active transportation).

The revised service level target focuses on the provision of *active parkland* by identifying a parkland service level of 2.5 hectares of *active parkland* per 1,000 population instead of the current target which includes both active and passive parkland typologies. These target service levels are applied in guiding the provision of parkland in the Urban Expansion Area lands.

Table 9: Proposed Parkland Hierarchy

Park Classification	Minimum Size (ha)	Catchment Area	Target Service Level (ha per 1,000)
Community Park	20	Town-wide	0.4
District Park	6	1+ planning districts	1.0
Neighbourhood Park	3 to 4	Neighbourhoods	1.0
Village Square	0.5	Neighbourhoods	0.1
Linear Park	Variable	n/a	n/a
Passive Open Space	Variable	n/a	n/a
Sub-total Core Parkland			**2.5**
Sub-total Adjunct Parkland			**undefined**
Total Core & Adjunct Typologies			**2.5 to 4.0**

Source: Appendix G – Town of Milton Community Services Master Plan Update, 2015

Existing Parkland Supply

As of 2015, the Town of Milton had 626.5 hectares of parkland and passive open space. Under the proposed revised parkland hierarchy and service level standard an additional 184.6 hectares in passive/adjunct open space associated with the escarpment view lands is recognized over and above the core supply of parkland but is not counted in the service level calculation until such a time they are redeveloped to accommodate a range of active recreational uses.

Future Parkland Needs

The CSMP identified that in order to achieve the target service level to the year 2018, the Town needs to provide 348.25 hectares of core parkland (Community, District, Neighbourhood and Village Square typologies). The Town currently has 250.5 hectares of core parkland, necessitating the need for an additional 98.25 hectares of core parkland. The majority of this quantum (79 hectares) can be accommodated through parkland already received through conveyed parkland associated with proposed developments in Sherwood, Boyne, and Derry Green Secondary Plan areas.

The CSMP also noted that the Escarpment View Lands are roughly 64 hectares in size and are intended to be used in future to achieve its overall parkland objectives. If the park uses currently proposed on these lands cannot be achieved, alternative arrangements must be made including municipal purchase of additional land, financial negotiations and intensification of existing parkland.

Recommendations for Town's Consideration

Based on future parkland needs, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Update the CSMP to reflect recent Bill 73 changes as it relates to parkland dedication.
- Ensure Secondary Plan process implements *Milton's First Principles of Growth* in the planning of passive and active recreation areas.

3.6 Institutional Land Needs

The following sections provide a review of various institutional land needs including schools, community centres/recreation facilities, library and fire and emergency services.

Additional institutional uses that should be considered but have not been reviewed include government offices, heath care facilities, police and places of worship, these requirements will be determined in consultation with Town staff and external commenting agencies.

3.6.1 Schools

Watson & Associates Economists Ltd. prepared the *Halton District School Board (HDSB) and Halton Catholic District School Board (HCDSB) Education Development Charge (EDC) Background Study* in April 2013. The EDC Background Study uses population and housing forecasting to generate pupil yields and estimates for elementary and secondary school requirements in the Region of Halton.

Future School Needs

The EDC analysis predicts that within the next 15 years (by 2027/2028) an additional 11 elementary school and 2 secondary schools will be required in the Town of Milton.

The calculation of net-growth related pupil place requirements ultimately determines the number of necessary school sites. Within the rural east area of the Town of Milton, which includes the LBA Area, approximately 4,666 HDSB students and 2,694 HCDSB students will need to be accommodated by 2028 as shown in Table 10 below.

Table 10: Pupil Place Requirements for Review Areas that Encompass the Urban Expansion Area

	Net Growth-Related Pupil Place Requirements (to 2027/2028)
Total Halton District School Board	**4,666**
Elementary Review Area (ERA122)	2,927
Secondary Review Area (SRA105)	1,739
Total Halton Catholic District School Board	**2,694**
Elementary Review Area (CEM3A)	1,391
Secondary Review Area (CS04)	1,303

Source: Appendix A – EDC Background Study Watson & Associates Economists Ltd. April, 2013

Ontario Regulation 20/98 Education Development Charges – General provides maximum school site sizes based on the number of students the school built on the site is planned to accommodate. Maximum school site sizes are detailed in Table 11. It should be noted, school sites located adjacent to a neighbourhood park, typically require a reduced site size requirement.

Table 11: Maximum School Site Size Requirements

Number of Pupils	Maximum School Site Size
Elementary Schools	
1 to 400	1.62 ha (4 ac)
401 to 500	2.02 ha (5 ac)
501 to 600	2.43 ha (6 ac)
601 to 700	2.83 ha (7 ac)
701 or more	3.24 ha (8 ac)
Secondary Schools	
1 to 1000	4.86 ha (12 ac)
1001 to 1100	5.26 ha (13 ac)
1101 to 1200	5.67 ha (14 ac)
1201 to 1300	6.07 ha (15 ac)
1301 to 1400	6.47 ha (16 ac)
1401 to 1500	6.88 ha (17 ac)
1501 or more	7.28 ha (18 ac)

Source: O. Reg. 20/89, s.2 (5)

The HDSB typically plans elementary schools to accommodate 752 pupils on 3.24 hectare sites, 2.83 hectares if co-located with a neighbourhood park) and secondary schools to accommodate 1200 pupils on 5.67 hectare sites.

Locational Criteria

In general, the following locational criteria should apply when determining the location of new school sites for both HDSB and HCDSB schools:

- Sites should be located centrally to the catchment area they are intended to serve;
- Locating sites adjacent to active municipal neighbourhood parks is preferred;
- Elementary schools are preferred at corner blocks, and should not be on curves or adjacent to roundabouts;
- Secondary schools are preferred to have multiple street frontages;
- Minimum road frontage should be 150 metres for HDSB elementary schools, preferably on collector roads (145 metres for HCDSB);
- Minimum road frontage should be 210 metres for secondary schools, preferably on arterial roads (220 metres for HCDSB);
- Topography should generally be free of woodlots, ponds, creeks, stormwater management areas and irregular terrain.

Student Yields

Watson & Associates applied residential unit growth forecasts as the basis for estimating future enrolment projections from growth. Each forecast residential unit by type (low, medium and high density) is multiplied by a factor to predict the number of school aged children that will come from the projected number of units. The pupil yield factors applied to growth in the Town of Milton for both HDSB and HCDSB are detailed in Table 12.

Table 12: HDSB and HCDSB Pupil Yields in the Town of Milton

Dwelling Type	Elementary Pupil Yield	Secondary Pupil Yield
Total Halton District School Board	**0.2250**	**0.0697**
Low Density	0.3239	0.0847
Medium Density	0.1028	0.0663
High Density	0.0156	0.0137
Total Halton Catholic District School Board	**0.1006**	**0.0343**
Low Density	0.1518	0.0417
Medium Density	0.0285	0.0326
High Density	0.0068	0.0063

Source: HDSB & HCDSB EDC Background Study, Watsons & Associates Economists Ltd. April 30, 2013

Recommendations for Town's Consideration

Based on future school needs, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Encourage school co-location with neighbourhood parks to facilitate minimum school sizes, thereby promoting efficient use of land as new communities are becoming increasingly densely populated.
- Ensure Secondary Plan process engages all school boards (Public, Catholic and French) through early discussions and/or consultations, to determine elementary and secondary school needs and general locations within the Urban Expansion Area lands.

3.6.2 Community Centres & Recreation Facilities

As identified in Section 3.5, the CSMP identifies the scope of community programs, services, facilities and parks that are presently provided in the Town of Milton. The CSMP focuses on specific direction and actions needed to serve the needs of the community to the year 2018. The CSMP assesses current supply and anticipated demand for various community services and facilities and defines target service provision levels for each service. The Plan encourages the strategic co-location of community services within mixed-use areas to help address the future scarcity of vacant lands.

Community Centre/Recreation Facilities Supply

The Town of Milton currently operates three multi-use community recreation centres (Milton Leisure Centre, the Mattamy National Cycling Centre and Milton Sports Centre) and one multi-use cultural centre (Milton Centre for the Arts). The Town is also served by several singular-focused facilities such as the Milton Indoor Turf Centre, the Milton Seniors Activity Centre, and a few community halls.

An indoor facility assessment was undertaken and showed a need for a number of new facility components over the next five years, most pressing and capitally intensive needs are for ice pads and an indoor aquatic centre. To meet these needs, a new community centre is required during the update period and is recommended to be located at the Sherwood District Park. Another multi-use community centre is anticipated to be required in the Boyne community shortly after the update planning period (i.e. beyond 2018).

An assessment was also undertaken for outdoor recreation facilities, which identified the growing pressure of finding lands sufficient to accommodate sports fields required to service growth-related needs. To meet sports field needs over the update period and beyond, the Master Plan recommends the Town investigate options such as exploring partnerships with the local school boards to implement artificial turf fields and increase access to their existing natural turf fields, as well as developing a sports field complex.

Table 13: Summary of Recreation Facility Service Level Targets

Facility	Service Area (km)	Service Level	
		Existing	Target
Multi-Use Community Centre	2.0	n/a	n/a
Arenas	2.0	1: 17,000	1:800 registered participants
Indoor Aquatics Centres	2.0	1:33,500	1:35,000
Spray Pads	0.8 to 1.0	1:7,800 residents (1:857 Children 0-9yrs)	1:4,000 children (0 to 14 yrs)
Gymnasiums	2.0	1:25,500	1:40,000
Multi-Purpose Activity Rooms	2.0	1:4,200	1:5,000
Outdoor Soccer Fields	0.5 to 1.0	1:1,700	1:90 registered participants
Ball Diamonds	0.5 to 1.0	1:2,900	1:100 registrants
Tennis Courts	0.8	1:5,300	1:10,000 new residents
Basketball & Multi-Use Courts	0.8	1:6,300	1:900 youth (10 to 19 yrs)
Skateboard Parks	n/a	1:101,270	1:5,000 youth (10 to 19 yrs)
Playgrounds	0.5	1:1,800	1:500 metres

Source: Appendix F – Town of Milton Community Services Master Plan Update, 2015

Given that the CSMP did not consider the Sustainable Halton Lands, the Town will need to consider initiating an update to the CSMP, including an assessment of service level targets for new growth areas and across the Town.

Recommendations for Town's Consideration

Based on community centres and recreation facilities needs, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Initiate an update of the CSMP to include an assessment of service level targets for the UEA and other new growth areas throughout the Town;
- Ensure Secondary Plan process includes future studies identifying targeted service levels to determine requirements for future growth within the Urban Expansion Area lands.
- Ensure Secondary Plan process includes future studies outlining an inventory of additional facilities not captured in Table 13, including but not limited to outdoor ice rinks, stand-alone community halls, youth/adult activity rooms, and indoor turf.

3.6.3 Public Library Services

The Town of Milton Public Library Master Plan, adopted in 2015, identifies key pressures and opportunities influencing the Library and establishes future directions for library service and facility provisions. It contains a set of policies and goals for managing the anticipated demands and requirements of future residents.

Existing Supply

Milton is currently served by two public library facilities. The Main Library (29,586 gsf) is located in the Milton Centre for the Arts on one for the gateway approaches to Milton. The Beaty Branch (11,251 gsf), located in the Bristol Survey, is the second library. The Milton Public Library's objective is to provide facilities in the appropriate location based on the needs of present and future residents. This provision is based on the Town's residential phasing, which consists of Bristol Survey (Phase 1), Sherwood Survey (Phase 2) and Boyne Survey (Phase 3). The current focus of future library planning is on the Sherwood and Boyne Surveys, as well as expanding existing services in areas of need.

Future Library Needs

The recommended target of library space is currently 0.55 square feet of library space per capita. In order to achieve the target, Milton currently requires an additional 14,862 square feet. This shortfall is expected to increase with continued population growth. Therefore, additional library space will need to be built as planned, in order to meet service demands.

The Master Plan proposes the following library facility development, subject to the timing of residential growth and funding availability:

1. Sherwood Library: This library is expected to be completed in 2018, and improve accessibility for rural residents in north and west Milton. The estimated population for this community (by 2025) is 32,500 justifying a target of 14,000 square feet.
2. Main Library Expansion: This facility is undersized in relation to the fast-growing community it is located in. An expansion of 15,000 square feet is being contemplated for the next phase of development, which would increase the floor space to a total of 45,000 square feet.
3. Boyne Library: This branch may be initiated in 2022, depending on residential growth in this community. A minimum of 17,000 square feet of library space is the target.

Recommendations for Town's Consideration

Based on future library needs, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Ensure Secondary Plan process includes further study to determine library needs to meet the provisional target of approximately 30,000 additional square feet, as required within Urban Expansion Area lands.

3.6.4 Fire Services

The Town of Milton's Fire Master Plan, adopted in 2008, was prepared by Dillion Consulting to re-examine and enhance municipal fire services within the context of future growth. It contains a set of policies for managing growth and demands on the current system of public fire protection (to the year 2018) and guides decisions on a range of issues including the location of existing and potential fire stations.

The Milton Fire Department currently operates with four fire stations dispersed throughout both the urban and rural areas. Station 1 (Central Station) is the headquarters station housing the administration office, communication center, as well as public education and training. Station 3 is located on Derry Road and Station 2 is located in rural Campbellville. Since the completion of the Fire Master Plan, the Milton Fire Department has opened and operates from a fourth fire station. A fifth station is slated for construction anticipated to commence within the next year at Louis St. Laurent and Diefenbaker Street.

The Fire Department decides where to locate stations based off of a service standard set by the authoritative National Fire Protection Association (NFPA) and the Office of the Fire Marshal (OFM). The service standard measures first response, getting there quickly; and depth of response, getting the appropriate resources there in a timely manner. The challenge for the Milton Fire Department is to position itself to achieve first response with a staff of four within four minutes 90% of the time (first response standard) and to respond with ten firefighters within ten minutes 90% of the time (depth of response standard).

The Master Plan assesses four options to help increase the Fire Departments' current service in order to accommodate the Towns future population growth. The options and results are as following:

1. Option 1 is based on the existing conditions resulting in a 42.2% coverage for the NFPA First Response standard and 37.9% for the OFM 10 in-10 Depth of Coverage performance measure.
2. Option 2 evaluates the coverage that would result in 2010 if currently approved changes were made, such as the construction of a fourth station near the intersection of James Snow Parkway and Waldie Avenue, in addition to all three existing stations operating in the same manner as Scenario 1. This scenario results in 58.7% coverage for the NFPA First Response standard and 31.8% from the OFM 10-in-10 Depth of Coverage performance measure.
3. Option 3 evaluates the coverage that would result if no changes were made to Option 2 and population growth was to continue as forecasted. The four stations would result in 63.1% coverage for the NFPA First Response standard and 21.8% from the OFM 10-in-10 Depth of Coverage performance measure.
4. Option 4, which demonstrates the best overall results, evaluates the coverage that would result if Station 1 and 2 are kept in their current location, Station 3 was relocated to the intersection of Bronte Road and Derry Road, Station 4 was kept and locating one additional station in the urban area. This would result in 89.3% coverage for the NFPA First Response standard and 88.8% from the OFM 10-in-10 Depth of Coverage performance measure.

The station location assessment presents evidence to support a future need for four urban fire stations, in addition to the rural Campbellville station (for a total of five stations). Option 4 helps achieve optimal coverage of the existing and future built up areas by relocating Station 3 and building two new stations.

Based on future growth and development projections, a need has been identified for three additional stations to service the Town, two of which would likely be located within the Urban Expansion Area lands.

Recommendations for Town's Consideration

Based on future fire station/emergency needs, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Ensure Secondary Plan process includes a future study to determine fire station/emergency services needs and locations to protect newly developed communities in the Urban Expansion Area lands.

4.0
Non-Developable Land – Calculating Gross Developable Area

This section of the report reviews identifies constrained lands that are considered "Non-Developable". These areas include the Greenbelt Plan, the Regional Natural Heritage System, the Parkway Belt West Plan, as well as major infrastructure rights-of-ways.

4.1 Land Budget for the LBA Area

A land budget is a vital tool in determining how much of the Urban Expansion Area is available for development. The total *Gross Area* of the LBA is approximately 2,071 hectares however some of this land cannot be developed and is otherwise referred to as "Non-Developable". These constraints to development include environmental features such as the Reginal Natural Heritage Systems, lands subject to Provincial Plans, major infrastructure and regional roads. After discounting approximately 432 hectares of Non-Developable land, the *Gross Area* becomes 1,639 hectares of *Gross Developable Area*.

Table 14: Calculation of Gross Area to Gross Developable Area for the LBA

Land Base Analysis Study Area Components	Area (ha)	Total (%)
Growth Plan Gross Area	2,071	
Major Highways	18	
LBA Gross Area	**2,053**	**100.0%**
Halton Region Natural Heritage System	414	20.2%
LBA Gross Developable Area	**1,639**	**79.8%**

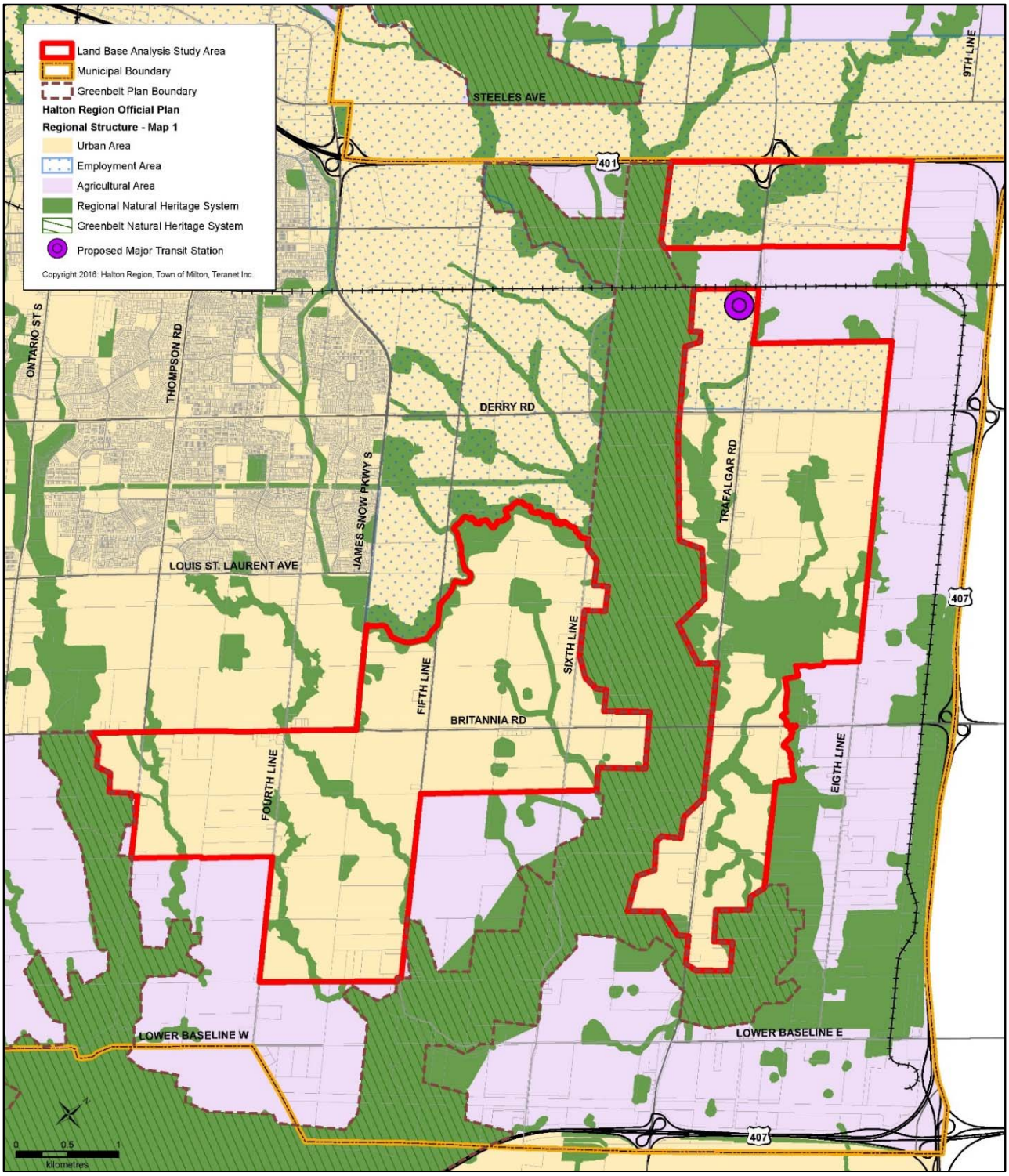
Source: Malone Given Parsons Ltd., 2017

4.2 Regional Natural Heritage System

For the purposes of this study, Halton's Regional Natural Heritage System is considered a constraint to development and has been included as a take-out, totalling approximately 414 hectares, from the UEA (refer to Figure 4). Refinements to the Natural Heritage System will occur as part of the

Subwatershed Study and Secondary Plan processes, and during ground-truth exercises to be conducted during future development approval processes.

Figure 4: Halton's Regional Natural Heritage System



Source: Halton Regional Official Plan, Map 1 – Regional Structure

The overarching vision articulated in ROPA #38 is, in large part, that of an "environment-first" philosophy. In line with the Provincial Policy Statement (2014), and building off of the Province's Greenbelt Plan (2005), ROPA #38 established a Regional Natural Heritage System ("Regional NHS") with the goal of protecting and enhancing the Region's natural features, functions and areas for the long-term.

The key components of the Regional NHS include:

- Provincial Greenbelt Natural Heritage System;
- Niagara Escarpment Plan – Escarpment Natural Areas and Escarpment Protection Areas;
- Natural Heritage Features and Functions within Existing Urban Areas;
- Core Areas;
- Core Area Enhancements;
- Centres for Biodiversity;
- Watercourses, Surface Water Features and Floodplains;
- Linkages; and,
- Buffers.

In support of the development of the Region's NHS, North-South Environmental Inc. was retained to prepare the *Natural Heritage System Definition and Implementation Report* ("NHS Implementation Report") dated April 7, 2009. This report provides further explanation on how the Regional NHS, as depicted in ROPA #38, was identified, developed, and how it is intended to provide a framework to guide the implementation of the NHS in the future. The NHS Implementation Report also acknowledges that more detailed studies are required to identify the boundaries of the Regional NHS through ground-truthing of natural features and analysis of ecological functions, as part of more detailed environmental studies including, but not limited to a subwatershed study.

ROPA #38 further establishes that local municipalities are required to carry out a SWS, prior to or as part of a Secondary Plan process. The requirements for a SWS are set out in ROPA #38 and, in general, it is intended to provide a more detailed assessment of the existing natural heritage and water resource features, functions and areas that make up the Region's NHS in a given area, as well as identify potential impacts of future growth and development on the NHS. ROPA#38 allows for the refinements of the NHS but it can only be done in the context of a comprehensive environmental study, such a SWS. Further, the ROP requires that the SWS be accepted by the Region.

The Subwatershed Study currently underway is one such study that will generate this detailed characterization of features, to aid in the determination of more refined boundaries. The completion of this study and subsequent detailed environmental studies completed as part of the secondary planning and development application processes will result in further refinements to this NHS system.

4.3 Provincial Plans

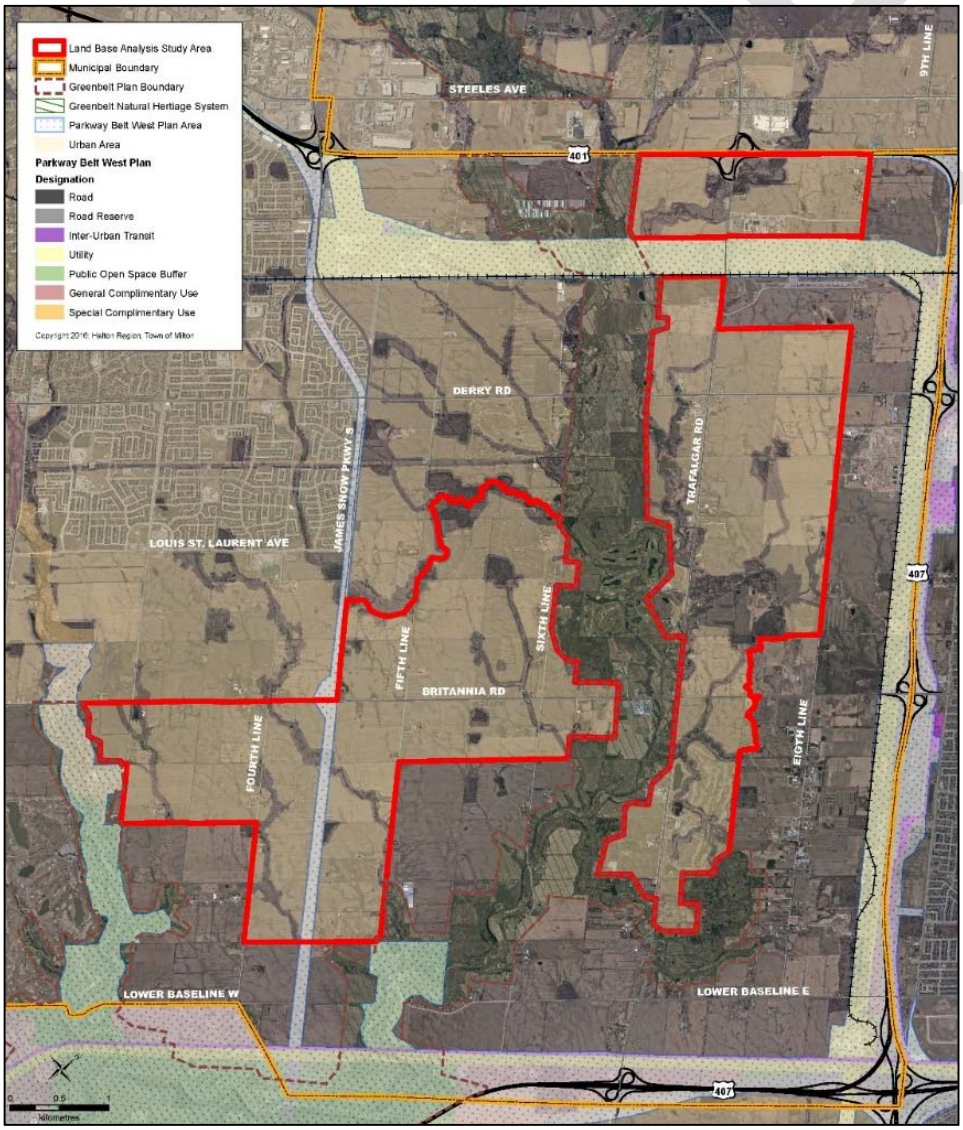
4.3.1 Greenbelt Plan, 2017

As depicted in Figure 4, lands identified within the 2017 Greenbelt Plan Area have already been excluded from the UEA Study Area boundary. As such, there are no additional Greenbelt Plan area take-outs for the purposes of calculating the GDA.

4.3.2 Parkway Belt West

The Parkway Belt West Plan ("PBWP") was implemented for the purposes of creating a multi-purpose utility corridor, urban separator and linked open space system, as well as to provide a land reserve for future infrastructure such as highways, electric power transmission corridors and pipelines. The PBWP is divided into two general land use categories *Public Use Areas* and *Complementary Use Areas*.

Figure 5: Parkway Belt West Plan



Source: Malone Given Parsons Ltd., April 2017

The PBWP identifies a number of *Public Use Areas*, generally along Highway 401 and 407, and the existing railway as areas for electricity power facilities, roads, utility corridors, inter-urban transit. The LBA boundary has been delineated to exclude the majority of the lands within the PBWP (refer to Figure 5) with the exception of a planned extension to the James Snow Parkway which remains within the Study Area boundary.

4.4 Major Infrastructure

Additional requirements for major infrastructure may need to be considered in the planning of the UEA lands. Moreover, these standards will likely be more applicable at the Secondary Plan stage of planning. The Town of Milton Comprehensive Urban Area Zoning By-law No. 016-2014 establishes setback standards from components of major infrastructure and the associated rights-of-way ("ROW") such as roads, railways and pipelines. Other take-outs may also include major hydro corridors, existing cemeteries and other existing municipal/regional facilities.

Natural Gas Transmission Pipeline (By-law Section 4.22.1)

- A permanent building or structure must be setback 7.0 metres from the pipeline ROW;
- An accessory structure must be setback 3.0 metres from the pipeline ROW;
- No building or structure is permitted within 3.0 metes of the ROW.

Railways (By-law Section 4.22.3)

- No portion of any building or structure containing residential, commercial, institutional, employment and business park uses shall be closer than 30 metres from the railway ROW
- No portion of any building or structure containing industrial and warehouse/distribution uses shall be located within 15 metres of the railway ROW

Provincial Highways

The Town of Milton Zoning By-law indicates that all lands, buildings and structures within a Provincial Highway ROW are subject to all regulations by the Ministry of Transportation and where required must obtain a building or land use permit for the use, erection, construction or alteration of any land, building or structure (By-law section 4.22.2).

The Ministry of Transportation's (MTO) Building and Land Use Policy, dated June 2, 2009, establishes a 14 metre setback standard for all buildings and structures from Class 1, 2 and 400 series highways. These lands are not intended for development uses outside of provincial infrastructure, and are therefore considered constrained lands.

Roadway Rights-of-Ways

The Regional Transportation Master Plan (TMP) identifies rights-of-way (ROW) requirements for the majority of Regional arterial roads in and throughout the Urban Expansion Area lands. The planned ROWs are excluded from the GDA calculation, of which the following list identifies planned ROWs for regional roads:

- James Snow Parkway 47.0 metres
- Derry Road 47.0 metres
- Trafalgar Road 47.0 metres
- Britannia Road 47.0 metres
- Sixth Line 47.0 metres

Through the Town-led Transportation Master Plan ("TMP"), Halton Region and the Town of Milton are contemplating additional east-west and north-south roads to increase capacity with planned ROWs as per below:

- 5 ½ Line 47.0 metres
- Louis St. Laurent Avenue Extension 47.0 metres

For the purposes of road capacity, it is assumed that 5 ½ Line will continue north from Britannia Road through to the full extent of the Urban Expansion Area lands and up to Highway 401.

The Town's TMP will evaluate the existing transportation network conditions, and establish a vision for future transportation network improvements to facilitate the efficient movement of people and goods. Future ROW adjustments may be identified through the TMP, presenting a potential opportunity to further refine the LBA *Gross Developable Area* calculation.

Recommendations for Town's Consideration

Based on the future road network, the following are preliminary recommendations for the Town's consideration in future planning of the Urban Expansion Area lands:

- Ensure Secondary Plan process includes a more detailed transportation study for the UEA lands.

4.5 Community Area and Employment Area Lands

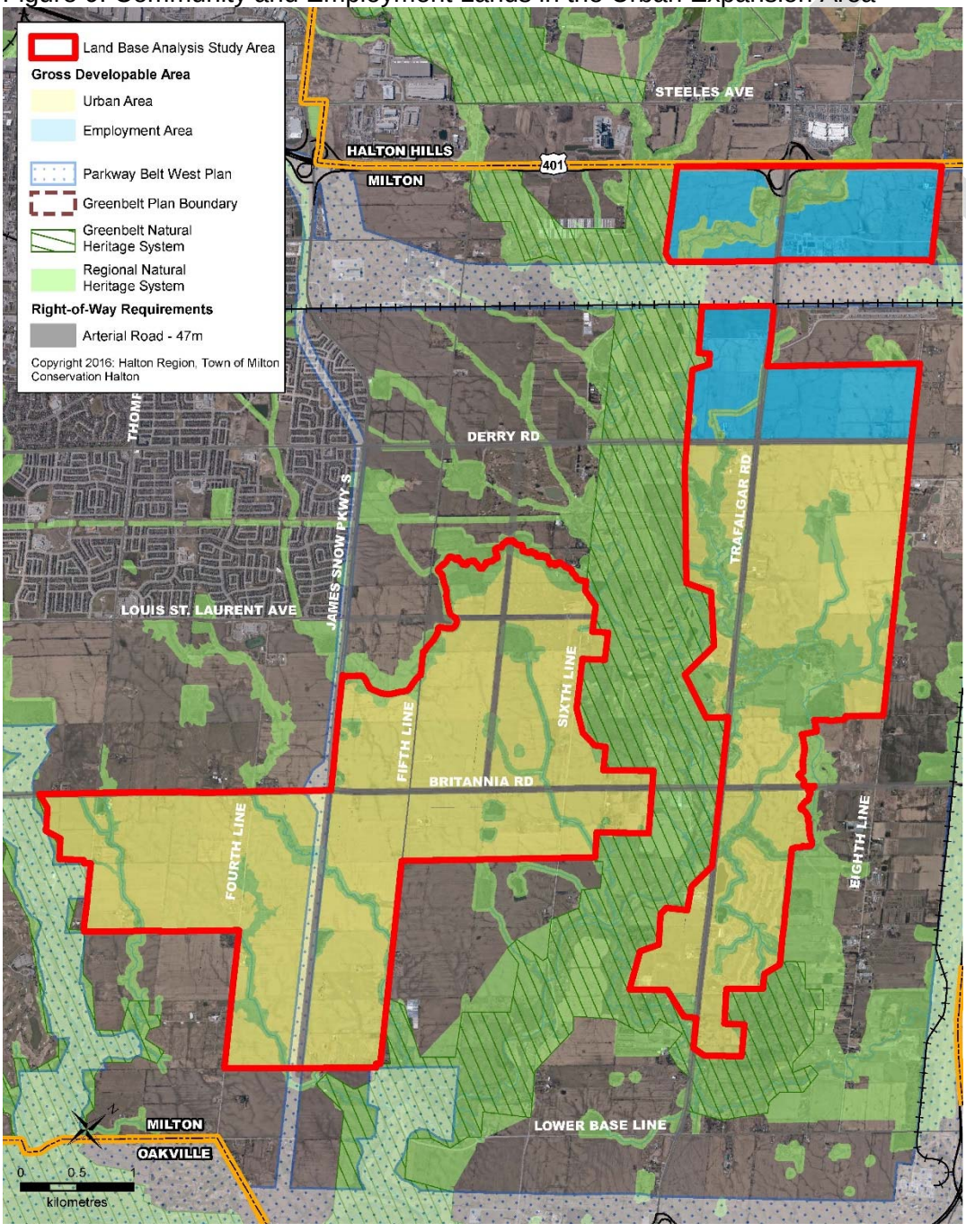
Of the remaining 1,639 hectares of *Gross Developable Area*, approximately 1,341 hectares will be developed as Community Area and approximately 298 hectares will be developed as Employment Area (Table 15 on the following page). As land use designations have been designated through ROPA #38, this LBA only serves to quantify *Gross Developable Area* for each Community Area and Employment Area designations, for the purposes of forecasting population and employment relative to the Urban Expansion Area lands. These designations are illustrated in Figure 6 on the following page.

Table 15: Community and Employment Lands Gross Developable Area

Land Base Analysis Study Area Components	Area (ha)	Total (%)
LBA Gross Area	**2,053**	**100.0%**
Halton Region Natural Heritage System	414	20.2%
Gross Developable Area	**1,639**	**79.8%**
LBA Employment Area Land Area	**298**	**14.5%**
LBA Community Area Land Area	**1,341**	**65.3%**

Source: Malone Given Parsons Ltd., 2017

Figure *6*: Community and Employment Lands in the Urban Expansion Area



Source: Malone Given Parsons Ltd., April 2017

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5.0 Land Base Analysis Guiding Principles and Study Assumptions

The following section provides a summary of land budget assumptions that have been established on the basis of an extensive background review of community use needs for the Urban Expansion Area lands. These guiding principles and study assumptions have been developed in consultation with Town of Milton staff. The LBA SAC reviewed and provided comments on the guiding principles and assumptions which were considered in the finalization of the LBA assumptions.

5.1 Community Uses Requirements

Over the 1,341 hectares of Gross Developable Area for Community Area lands, additional take-outs are necessary to create a "complete community". These *Community Use* components include stormwater management facilities, schools, parks, commercial needs, roads and a comprehensive range of institutional community facilities to support new communities. Once all these community uses are accounted for 576 net hectares of land may be available for residential uses.

5.2 Net Developable Area Land Requirements

The *Net Developable Area* is the *Gross Developable Area* less a comprehensive range of community uses necessary to support the creation of create complete communities. The resulting *Net Developable Area* is land remaining for residential or employment development, and is the land area to which development densities are applied (refer to Table 16).

As detailed in Section 3.0, there are a number of community uses that need to be accounted for within the community areas including schools, community centres, libraries, emergency services facilities, and parkland. In addition to these community uses, there are other community uses that are integral to a community and need to be considered including the local road network, stormwater management facilities and commercial land requirements. The provision of stormwater management

facilities in the Urban Expansion Area will be identified through the ongoing Subwatershed Study and further refined through the Secondary Plan process.

Table 16: Estimation of Net Developable Area for the Urban Expansion Area

Land Base Analysis Study Area Components	Area (ha)	Area (ac)	Total (%)
Growth Plan Gross Area	**1,639**	**4,050**	**79.8%**
LBA Community Residential Land Area	**1,341**	**3,315**	**65.3%**
Community Area Net Developable Area Breakdown	**1,341**	**3,315**	**100.0%**
Community Use Land Areas	**765**	**1,890**	**57.0%**
Regional Storm Control SWM	161	**400**	12.0%
Schools [1] – Elementary and Secondary	54	**135**	4.0%
Institutional Uses – Community Facilities[2], Fire and Emergency Services, Library, Places of Worship and Municipal Works	27	**65**	2.0%
Commercial Uses	27	**65**	2.0%
Parkland Uses[3]	134	**330**	10.0%
Arterial Roads, Collector Roads, Local Roads and Laneways	362	**895**	27.0%
Net Developable Area for Residential Housing	**576**	**1,425**	**43.0%**

Notes:

1. *Alternative provision of schools yields 4% land area if calculated using "Student Generation Rate - HDSB & HCDSB EDC Background Study" (Sources: Watsons & Associates Economists Ltd. April 30, 2013); elementary school sites @ 2.83 ha with avg capacity of 752 students; secondary school sites @ 5.67 ha with avg capacity of 1,200 students.*
2. *Community facilities include ice pads, indoor pools, gymnasiums, splash pads, ball diamonds, soccer fields, basketball courts, skate parks, tennis courts*
3. *Provision of parkland calculated using the following: low density @ 5% of land area; medium & high density @ 1/300 units; employment area @ 2% of land area (Source: Parkland Provision Rates - Planning Act R.S.O. 1990, CHAPTER P.13, s.51.1 (1)*
4. *Land area values are rounded to the nearest 5 and may not add due to rounding.*

Source: Malone Given Parsons Ltd., 2017

5.2.1 Stormwater Management

Approximate locations and sizes of stormwater management facilities will be identified as part of the Subwatershed Study. In planning the Urban Expansion Area and given the extensive watershed, these lands are assumed to require regional storm controls which can account for up to 10%-12% of the land area. This is a conservative estimate which will be confirmed and refined as part of the Subwatershed Study and future Secondary Plan process(es).

5.2.2 Parkland Uses

The parkland land base assumption accounts for the land areas associated with parkland dedication requirements of the *Planning Act*. Based on 70 people and jobs per hectare, the maximum *Planning Act* parkland requirements are as follows:

- 1 hectare per 300 for medium and high-density residential;
- 2% for commercial;
- 5% for remainder

Parkland requirements account for approximately 10% of developable area however, this will need to be confirmed in a future study as part of the Secondary Plan process(es). While the land budget continues to assume a need for 10% of gross developable land for parkland to ensure sufficient land is provided to meet the Town's active parkland requirements within the LBA, parkland and community recreational needs will be more clearly defined through the Secondary Plans.

5.2.3 Institutional Uses

Institutional uses include those required to support the recreational, cultural and other social pursuits of residents living and working in these new community and employment areas. These include schools, community centres, emergency response facilities, libraries, places of worship as well as a broad range of sports/playing fields and various other community use type facilities. The school requirement as calculated by the school board's generation rates is approximately 4% of land required for schools. Other institutional use land requirements are estimated at approximately 2%. The provision of institutional uses is determined by population and as such, the land area assumption is based on the projected population for the Urban Expansion Area lands and the resulting land area needs for the provision of the various uses.

It is assumed that school sites will function as community hub locations. Further, encouraging the co-location for schools and parks facilitate each component to be sized using minimum standards rather than maximum standards. Should each component be sized using maximum land area requirements, it is likely that the requirement for school uses alone could be higher based on the estimated population and the school boards generation rates. Co-location of facilities will help to minimize land area requirements, freeing up sufficient land to accommodate additional uses such as places of worship, police and fire stations. The potential to co-locate park, community facilities and school sites should be confirmed through the Secondary Plan process.

Combined with 10% parkland, the total other institutional and parkland accounts for approximately 12% of the gross developable area. This level of service provides a significant contribution of land to meet the Town's active parkland service level of 2.5 ha / 1,000 population. The LBA assumptions for both parkland and institutional uses are conservative land areas and additional land for parks will likely be required beyond what can be obtained under the Planning Act. This will need to be confirmed in a future study, and as part of the Secondary Plan process.

5.2.4 Commercial Land Requirements

Commercial uses are required to support the daily shopping needs of residents living and working in these new community and employment areas. Commercial/Retail land requirements are estimated at approximately 2%, which anticipates the minimum area required for stand-alone local commercial land, and assumes additional retail and commercial requirements will be provided in a mixed-use format in transit-supportive community areas and prestige employment areas. However, this will need to be confirmed in a future study, and as part of the Secondary Plan process.

In general, commercial lands will be provided in accordance with the following hierarchy as detailed in the commercial area policy section of OPA #31 (section 3.4.1):

- Secondary Mixed-use Node; and,
- Local Commercial

5.2.5 Road Network

The road network LBA assumptions account for land areas associated with collector roads, local roads and laneways typical for communities designed with a well-connected grid road pattern. In general, residential areas should be planned to take on an urban "modified grid" road configuration, and assumed to account for approximately 27% of the land base. In contrast, given the larger lot sizes of employment-type uses, Employment Areas typically require less land area at approximately 20% for roads. However, this will need to be confirmed in a future study, and as part of the Secondary Plan process.

6.0
Preliminary LBA Findings

A Density Analysis for all of the Town's Designated Greenfield Area was completed to ascertain what minimum density the Urban Expansion Area lands must plan to achieve, to conform with the 2006 Growth Plan minimum density for Designated Greenfield Areas of 50 residents and jobs per hectare for Halton. The Urban Expansion Area must plan to achieve 70 residents and jobs per hectare, and is forecasted to accommodate approximately 80,000 people and 22,000 combined jobs in both the Community and Employment Areas. Further, the LBA has also given consideration to and conforms with the Provincial Designated Greenfield Area density target requirements.

6.1 Designated Greenfield Area Density Analysis Methodology

The following methodology was applied to complete a Designated Greenfield Area density analysis for the Town of Milton's Designated Greenfield Areas.

Step 1: Calculate the Gross Developable Area

Land use designations as identified by the Halton Region Official Plan and Town of Milton Official Plan land use maps were georeferenced and digitized into ArcGIS. These land use designations were used, in conjunction with additional data layers from the Province and other data providers, as base mapping for the analysis. The 2006 Built Boundary as established by the Growth Plan, was overlaid to determine the precise limits of the Settlement Area and Designated Greenfield Area.

Non-developable land uses including the Regional Natural Heritage System and major highways were excluded from the *Gross Area* to calculate the *Gross Developable Area* of the Town's Designated Greenfield Areas. The Region's land use designations were then used to classify Designated Greenfield Areas into two categories, namely Employment and Community Areas.

Step 2: Calculate Residents and Jobs in Community Areas

2A. Committed Greenfield Areas

The Committed portion of the analysis is based on the number of units that were built, under construction, draft approved/registered, and/or are currently in the planning approvals process between 2006 and as of December 2016. These numbers were based on two main sources:

- Subdivision Status Reports provided by the Town of Milton; and,
- Totalling the number of lots by unit type through ArcGIS using the Town of Milton's 2015 parcel fabric (this applies to areas that were built since 2006 but had no Planning Act applications available at the time of research).

For medium- and high-density residential blocks that provided a range of unit yields, average density assumptions were used. For blocks that did not have a unit yield, a density was applied based on the proposed use.

The forecast is divided into four dwellings types: single detached, semi-detached, townhouses and apartments. The apartment category includes both low-rise and high-rise apartment units as well as duplex units.

To determine the population within the Committed Area, Persons Per Unit (PPU) assumptions as detailed in the Town of Milton's Development Charges Background Study (Addendum 2) were applied, and a 3.38% population undercount was included to the total population.

Population-related employment was calculated at a rate of 0.15 jobs per person. Employment Area lands assume a density of 26 jobs per hectare.

Table 17 below summarizes the Committed Greenfield Areas, unit counts, forecasted population by unit type and population-related employment.

Table 17: Committed Greenfield Area – Residential Units, Population and Population-related Employment

Neighbourhood		Boyne Survey	Bristol Survey	Derry Green Business Park	401 Industrial & Business Park	Sherwood Survey	TOTAL
Committed Greenfield Developable Area (ha)	Community Area	400	200	-	-	600	**1,300**
	Employment Area	-	-	100	200	-	**400**
	Total Area	**400**	**200**	**100**	**200**	**600**	**1,700**
Community Area	**Total Units**	**8,500**	**5,000**	**-**	**-**	**10,800**	**24,300**
	Total Population	**27,700**	**16,800**	**-**	**-**	**37,900**	**82,300**
Population-Related Employment and Work at Home		**4,200**	**2,500**	**-**	**-**	**5,700**	**12,300**
Employment Area Jobs(@ 26 jobs/ha)		**-**	**-**	**3,800**	**5,400**	**200**	**9,400**
Total People & Jobs		**31,800**	**19,300**	**3,800**	**5,400**	**43,800**	**104,100**
Total People & Jobs Per Hectare		**73**	**79**	**26**	**26**	**70**	**62**

Note: Numbers may not add up due to rounding.
Source: Malone Given Parsons, 2017

2B. Vacant Greenfield Areas

The Vacant portion of the analysis was completed by applying a density to the remaining vacant land based on the associated land use designation as per the Official Plan/Secondary Plan policies. Each land use designation was reviewed to extract any density minimums and maximums from the policies as well as general notes about the permitted uses. In order to determine the appropriate density for each land use designation, the following assumptions were applied.

Where there was a minimum and maximum density, the median of the density range was applied, however in instances where there was only a minimum or maximum density, that respective density was applied. It should be noted that discretion was used for certain land use designations based on our understanding of the relevant policies.

In order to convert from units per net hectare to units per gross hectare for residential designated land, it was assumed that take-outs would amount to approximately 50% of the gross land area (i.e. 40 units per net hectare is equal to 20 units per gross hectare). Based on the number of generated units (as a product of the density and land area), units were distributed according to the permitted uses of each respective land use designation.

Population and population-related employment for the Vacant Greenfield Areas was estimated using the same methodology as the Committed Greenfield Area analysis described above. Table 18 summarizes the Vacant Greenfield Areas, unit counts, estimated population by unit type and population-related employment. Table 19 below summarizes the statistics for the total Greenfield Area, combining Committed and Vacant Greenfield Area statistics for units by type, population and population-related employment.

Table 18: Vacant Greenfield Area – Residential Units, Population and Population-related Employment

Neighbourhood		Boyne Survey	Bristol Survey	Derry Green Business Park	401 Industrial & Business Park	Sherwood Survey	TOTAL
Vacant Greenfield Developable Area (ha)	Community Area	400	-	-	-	-	**400**
	Employment Area	-	-	400	100	-	**400**
	Total Area	**400**	**-**	**400**	**100**	**-**	**800**
Community Area	**Total Units**	**8,800**	**700**	**-**	**-**	**400**	**9,900**
	Total Population	**26,200**	**1,700**	**-**	**-**	**1,200**	**29,200**
Population-Related Employment and Work at Home		**3,900**	**300**	**-**	**-**	**200**	**4,400**
Employment Area Jobs(@ 26 jobs/ha)		**-**	**-**	**9,600**	**1,600**	**-**	**11,200**
Total People & Jobs		**30,200**	**2,000**	**9,600**	**1,600**	**1,400**	**44,700**
Total People & Jobs Per Hectare		**84**	**91**	**26**	**26**	**69**	**54**

Table 19: Committed and Vacant Greenfield Area - Residential Units, Population and Population-related Employment

Neighbourhood		Boyne Survey	Bristol Survey	Derry Green Business Park	401 Industrial & Business Park	Sherwood Survey	TOTAL
Total Greenfield Developable Area (ha)	Community Area	800	300	-	-	600	**1,700**
	Employment Area	-	-	500	300	-	**800**
	Total Area	**800**	**300**	**500**	**300**	**700**	**2,500**
Community Area	**Total Units**	**17,200**	**5,700**	**-**	**-**	**11,200**	**34,200**
	Total Population	**53,900**	**18,500**	**-**	**-**	**39,100**	**111,500**
Population-Related Employment and Work at Home		**8,100**	**2,800**	**-**	**-**	**5,900**	**16,700**
Employment Area Jobs(@ 26 jobs/ha)		**-**	**-**	**13,400**	**7,000**	**200**	**20,600**
Total People & Jobs		**62,000**	**21,200**	**13,400**	**7,000**	**45,200**	**148,800**
Total People & Jobs Per Hectare		**78**	**80**	**26**	**26**	**69**	**60**

Note: Numbers may not add up due to rounding
Source: Malone Given Parsons, 2017

Step 3: Calculate Jobs in Employment Areas

A standard employment land density assumption, a rate of 26 jobs per net hectare was applied to the total developable employment area (calculated in Step 1). The totals are incorporated into Table 19.

Step 4: Calculate Designated Greenfield Area Density

The overall density for the Designated Greenfield Area was calculated by totalling the population, population-related employment and employment area jobs and dividing it by the developable area of the Designated Greenfield Area (refer to Table 19 above).

6.2 Designated Greenfield Area Density Analysis

A density analysis was completed for the Town of Milton's Designated Greenfield Areas in order to ascertain the planned density target for the Urban Expansion Area lands. The basis for determining unit counts and population for all of Milton's Designated Greenfield Areas relies on the *Density Analysis Methodology* as described in the following section.

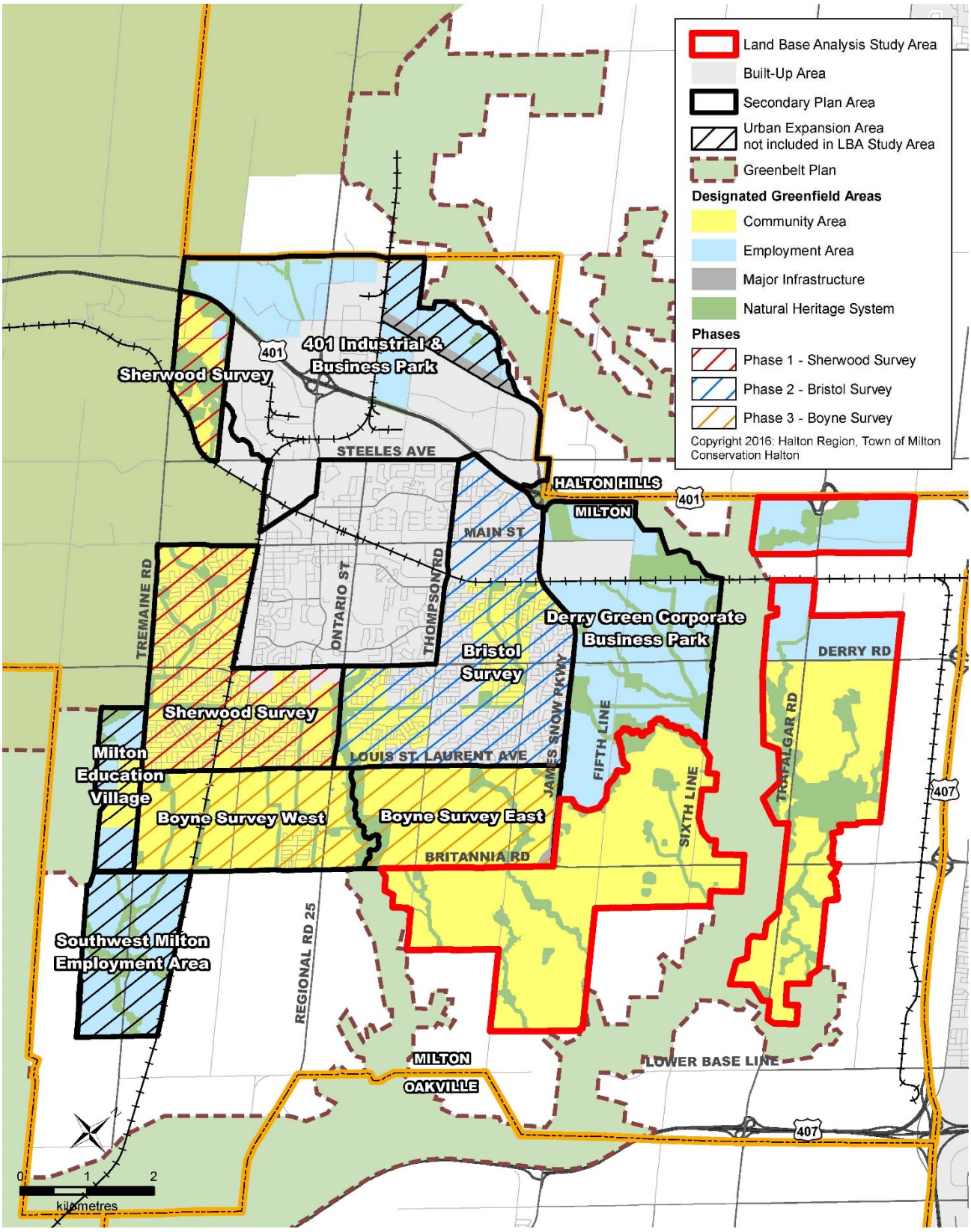
As summarized in Table 20, based on the density of Designated Greenfield Areas (Sherwood Survey, Bristol Survey and Boyne Survey), the UEA Community Areas must plan to achieve 70 residents and jobs per hectare in order for the Town to achieve its Designated Greenfield Area density target as per ROPA #38. The Town's Designated Greenfield Areas are identified in Figure 7 on the following page.

Table 20: Preliminary Designated Greenfield Area Density Analysis for the Town of Milton

	Community Area Density		Employment Area Density		Overall	
	Area	Density	Area	Density	Area	Density
Designated Greenfield Area (Phase 1,2,3)	**1,700**	**75**	**790**	**26**	**2,500**	**60**
Boyne Survey	800	156	-	-	800	78
Bristol Survey	270	80	-	-	270	80
Sherwood Survey	640	70	-	26	650	69
Derry Green Corporate Business Park	-	-	510	26	510	26
401 Industrial and Business Park	-	-	270	26	270	26
Milton Education Village	**50**	**125**	**90**	**43**	**140**	**73**
401 Industrial and Business Park	**-**	**-**	**130**	**26**	**130**	**26**
Southwest Milton Employment Area	**-**	**-**	**270**	**26**	**270**	**26**
Urban Expansion Area	**1,340**	**70**	**300**	**26**	**1,640**	**62**
Total	**3,100**	**74**	**1,570**	**27**	**4,670**	**58**

Note: Numbers may not add up due to rounding
Source: Malone Given Parsons, 2017

Figure 7: Town of Milton Designated Greenfield



Source: Malone Given Parsons Ltd., 2017

The basis for estimating the required population and employment forecast for the UEA lands is determined by calculating density outputs of other DGA lands (Phases 1, 2 and 3 lands) using the following methodology:

- Boyne Survey - Subdivision Status Reports provided by the Town of Milton and projections based on land use designations, permitted densities, and overall unit mix as per the Boyne Secondary Plan
- Sherwood Survey - Subdivision Status Reports provided by the Town of Milton and counted unit totals using the Town of Milton's 2015 parcel fabric
- Derry Green Corporate Business Park – Applies a maximum employment density of 26 jobs per hectare (source: Watson & Associates)
- Milton Education Village – Density calculated using the population projection provided by Watson & Associates
- 401 Industrial and Business Park & Southwest Milton Employment Area – Applies a maximum employment density of 26 jobs per hectare (source: Watson & Associates)

The LBA Urban Expansion Area applies 70 people and jobs per hectare on Community Area lands and 26 jobs per hectare on Employment Area lands.

The estimated population and employment forecast for the Urban Expansion Area lands is approximately 80,000 residents and 14,000 population-related jobs in Community Areas, and approximately 8,000 jobs in Employment Areas (refer to Table 21).

Table 21: Preliminary Population and Employment Forecasts for Milton's Designated Greenfield Areas

	People	PR Jobs	Total	ELE Jobs	Total People & Jobs
Designated Greenfield Area (Phase 1,2,3)	**117,000**	**17,700**	**128,000**	**21,000**	**149,000**
Boyne Survey	54,000	8,000	62,000	-	62,000
Bristol Survey	18,000	3,000	21,000	-	21,000
Sherwood Survey	39,000	6,000	45,000	-	45,000
Derry Green Corporate Business Park	-	-	-	13,000	13,000
401 Industrial and Business Park	-	-	-	7,000	7,000
Milton Education Village	**6,000**	**1,000**	**7,000**	**4,000**	**11,000**
401 Industrial and Business Park	**-**	**-**	**-**	**3,000**	**3,000**
Southwest Milton Employment Area	**-**	**-**	**-**	**7,000**	**7,000**
Urban Expansion Area	**80,000**	**14,000**	**94,000**	**8,000**	**102,000**

Note: Numbers may not add up due to rounding
Source: Malone Given Parsons, 2017

Following a review of planning policies that apply to designated greenfield areas, a range of densities is permitted that could result in the density of existing greenfields being higher than estimated in this report with the 2031 timeframe. Furthermore, the overall density of the Community Area DGA is 16% higher than the minimum 60 resident and jobs per hectare density target of the 2017 Growth Plan that will be implemented through the Region's next municipal comprehensive review. This differential is the same that exists today for the Town of Milton 58 residents and jobs per hectare for the Town relative to the 50 residents and jobs per hectare density for the Region.

In terms of community building, a density of 70 residents and jobs per hectare is also appropriate in planning for growth in the LBA Community areas. This overall density will facilitate higher densities (for example, 80 residents and jobs per hectare) in the Trafalgar Corridor, delivering transit-supportive density and a mix of uses along a potential higher-order transit line, while also enabling other areas in the LBA better suited for more traditional forms of housing, be planned and developed at a density that achieves a compatible community character.

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7.0 Secondary Plan Area Planning Framework

The following section provides a summary of the Secondary Plan process requirements as detailed in the Town's Official Plan, a set of criteria for determining the delineation of secondary plan areas as well as preliminary Secondary Plan areas for the Urban Expansion Area lands.

7.1 Land Base Analysis vs. Secondary Planning Process

The Land Base Analysis Study is intended to be a high-level study as compared to the future Secondary Plan process for the Urban Expansion Area lands, as identified in the table below.

Table 22: Key Distinctions between the Land Base Analysis Study and Future Secondary Plan Process(es)

Land Base Analysis	Secondary Planning Process
Establishes an overall density target for the Urban Expansion Area lands to conform with the current Growth Plan and Regional requirements.	Conforms with Planning Act, Growth Plan, Regional and Local requirements.
Informs and provides direction to guide the Secondary Plan Area(s) process(es).	Implements the Regional NHS and a management framework established by the Subwatershed Study.
Establishes growth management criteria to delineated logical Secondary Plan Area(s).	Establishes policies to create complete, healthy and complete communities.
Establishes phasing and servicing criteria to guide the process(es) for Secondary Plan Area(s) including the feasibility of public infrastructure required for the development of the Urban Expansion Area lands.	Functional Stormwater and Environmental Management Strategy (FSEMS) in support of a phasing and servicing strategy for each Secondary Plan Area.
Establishes the overall community structure for the Urban Expansion Area lands, including approximate land area, population and employment forecasts for each Secondary Plan Area.	Establishes the detailed land use structure, a road network, transit and servicing networks, an open space system and major community facility requirements for each Secondary Plan Area.
Establish a high-level framework in support of transit-supportive goals and objectives set forth by Halton Region and the Town of Milton.	Establish a detailed land use and community structure to implement transit-supportive goals and objectives.

7.2 Identification Criteria for Secondary Plan Areas

The following criteria are recommended to direct the identification and delineation of Secondary Plan areas for the UEA lands. These criteria are not intended to pre-determine phasing but rather reflects best planning principles.

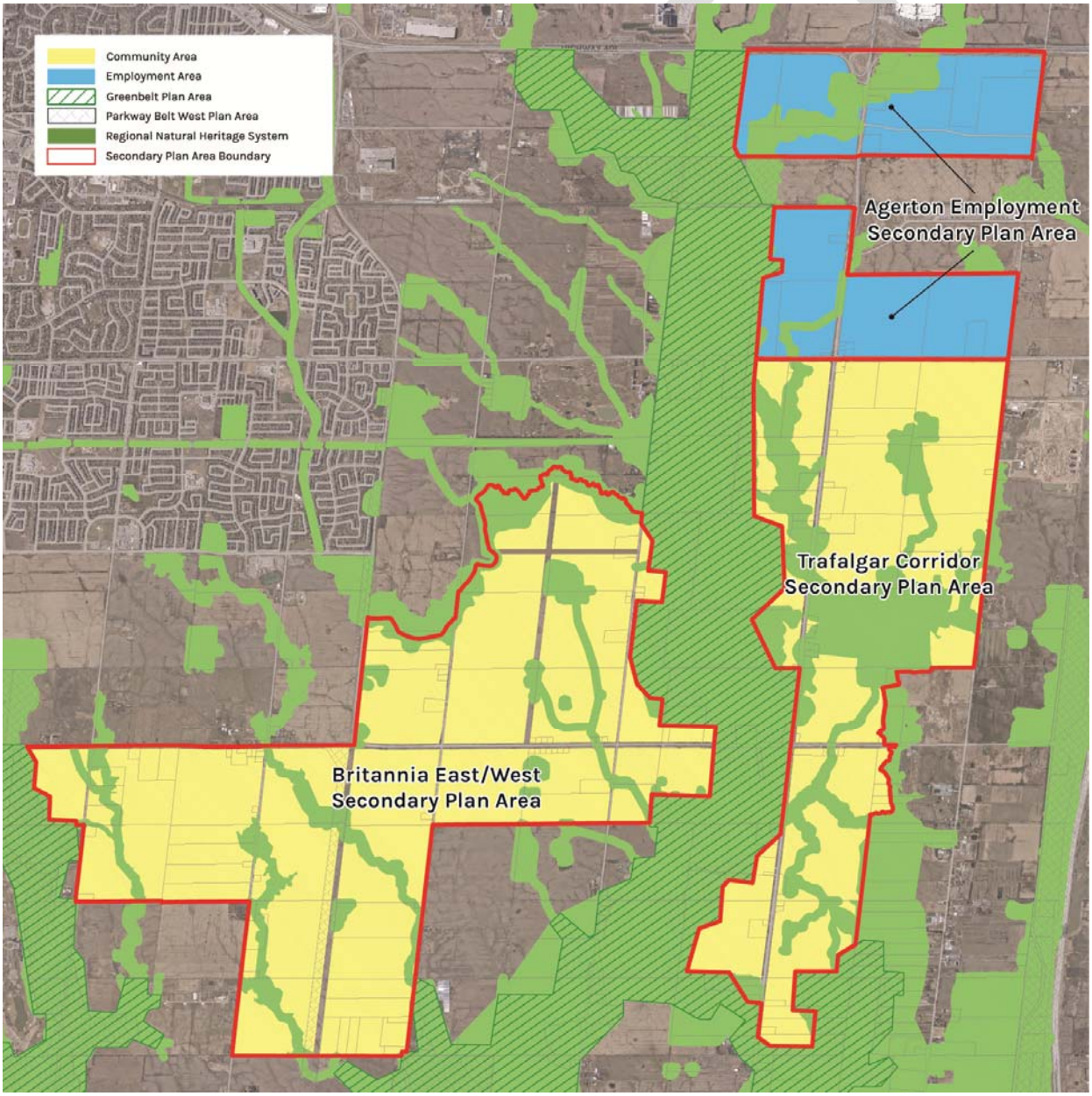
Table 23: Secondary Plan Identification Criteria

Criteria	Explanation
Distinct Employment and Community Area Secondary Plans	To permit the independent development of employment and residential lands in keeping with policy 77 (16) of the ROP, Employment Areas and Community Areas should be in separate Secondary Plans, which may also be easier for landowner agreements given different issues and interests.
Appropriate Size	Community Area secondary plans sized appropriately to accommodate multiple neighbourhoods which together form one community area (approximately 25,000-30,000 people and jobs).
Complete, Compact and Transit-Supportive Communities	Each secondary plan to identify targets to plan to achieve the overall urban structure and deliver appropriate lands for: • a range and mix of housing and jobs • daily and weekly shopping, entertainment, social, and personal service needs • worship • required primary and secondary education as determined in consultation with School Boards • parkland to accommodate community facilities and meet local and neighbourhood-scale recreation uses, • other community facilities, including police, firefighting, emergency and medical facilities • transportation (including active transportation) and transit network and facilities. These targets may vary amongst secondary plans to reflect the urban structure, while ensuring that each area contributes to achieving the minimum overall density for Designated Greenfield Areas as required according to Provincial and Regional policy.
Secondary Plan Boundary Delineation	Boundaries to generally coincide with natural and artificial features that are physical separators which impede walkability and active transportation and connectivity in the urban fabric. These features include large natural heritage system corridors/areas, arterial roads and highways, and major infrastructure. Small isolated parcels of land are to be included within nearby secondary plan areas.

7.3 Preliminary Secondary Plan Areas

Based on the criteria outlined above, preliminary Secondary Plan Areas (SPA) have been identified for the UEA lands of which there are two Community Area SPAs and one Employment Area SPA comprised of two discrete land areas between Highway 401 and Derry Road (Figure 8). A preliminary depiction of Secondary Plan Areas was presented to the LBA SAC in April 2016. Committee members provided valuable feedback which was considered by the Town and its consultants. Revisions have been incorporated to reflect some of the comments received, resulting in changes to the number of Secondary Plan Areas as well as the boundary delineation. Figure 8 represents the outcome of these comments and incorporated revisions.

Figure 8: Preliminary Secondary Plan Areas for the Urban Expansion Area Lands



Source: Malone Given Parsons Ltd., 2017

7.3.1 Employment Area Secondary Plan Area

The **Agerton Employment Secondary Plan Area** ("Agerton Employment SPA") is generally bound by Highway 401 to the north, Eighth Line to the east, Derry Road to the South and the Greenbelt Plan Area along Sixth Line to the west. Trafalgar Road runs north-south through the centre of Agerton Employment SPA and the Highway 401/Trafalgar Road interchange and a potential GO Station is located at its centre. Additional existing employment lands are generally located along Highway 401 to the west of the property. This SPA should be planned to achieve the employment land requirements in the LBA at 26 jobs per hectare, with opportunities for mixed-use and higher density being planned within 500m (a 10-minute walk) of the potential GO station.

7.3.2 Community Area Secondary Plan Areas

The **Trafalgar Corridor Secondary Plan Area** ("Trafalgar Corridor SPA") is approximately 466 ha of gross developable area that is south of Derry Road, west of Eighth Line, east of the Greenbelt Plan Area and otherwise follows the LBA Area boundary. The Trafalgar Corridor SPA is south of the proposed Agerton Employment SPA and east of the proposed Britannia East/West Secondary Plan Areas. It expected that this SPA will be planned at a higher density than neighbouring Britannia East/West SPA in support of planned and future potential transit infrastructure. As such, the Trafalgar Corridor SPA should be planned to achieve an overall density of 80 residents and jobs per hectare, reflecting the potential to plan for density to support frequent bus service along Trafalgar Road, serving both inter- and intra-regional functions. To better support this level of transit, higher densities and mix of uses should be within a 250m (a five-minute walk) of potential nodes/transit stops. The forthcoming Secondary Plan process should define approximately 8 neighbourhoods in this area, where the planning of isolated parcels of land west of Trafalgar Road could be included within adjacent neighbourhoods east of Trafalgar.

The **Britannia East/West Secondary Plan Area** ("Britannia East/West SPA") is approximately 875 ha of gross developable area defined by Britannia Road as a primary mixed-use potential transit corridor running east-west through the area. This SPA is immediately south of the Boyne Secondary Plan area within the Town of Milton Urban Area and is expected to provide development similar in scale and character to that occurring in the community areas north and west.

While Britannia East/West SPA is large enough to be considered two distinct communities, the similarity in planning both communities may make the establishment of two secondary plans redundant. As such, it is recommended the entire area be planned as one Secondary Plan Area, with approximately 11 neighbourhoods to be defined by the forthcoming secondary plan process. This area should be planned to achieve an overall minimum density of 65 residents and jobs per hectare, with higher density residential and mixed uses being focussed along Britannia Road, the extension of James Snow Parkway, and key nodes.

7.4 Phasing Criteria for Secondary Plan Areas

The follow criteria are recommended to be used in determining the progression of Secondary Plan Areas within the UEA. Based on the recommendations from the Employment Land Needs Assessment, it is recommended that the Employment Secondary Plan Area proceed immediately and through a separate process from the Community Secondary Plan Areas. This does not preclude one or both of the proposed Community Secondary Plan Study Areas from proceeding concurrently. In evaluating how Secondary Plan Areas should be advanced, it is recommended that development be sequenced and prioritized by considering planning-related criteria listed below. It is recognized that other criteria (e.g., financial) will also need to be considered as part of the overall determination of phasing for the area, however these considerations are outside the scope of this study.

Table 24: Prioritization Criteria for Community Area Secondary Plans

Logical Progression of Growth	Prioritize the contiguous extension of existing urban areas to ensure the logical and sequential progression of growth.
Water and Wastewater Servicing	Prioritize the delivery of water and wastewater servicing ensuring the logical cost-effective extension of servicing infrastructure into the new Community Area. Prioritize the timing and delivery of critical Regional Infrastructure based on areas that: 1. Have servicing infrastructure; 2. Require additional infrastructure; and 3. Require more infrastructure prior to development.
Transportation and Transit	Prioritize the delivery of key transportation links and sustained higher-order transit service along existing and planned transit investments. Prioritize areas based on the timing of critical Regional Infrastructure. Prioritize areas based on the timing of critical Town infrastructure. Prioritize areas that serve interregional functions. Prioritize areas where there is potential for long-term benefits related to interregional transit (eg: areas that support funding for major transit station areas).
Employment Lands	Prioritize areas that can expedite servicing delivery to the Employment Secondary Plan Areas and meet employment forecasts.
Population-Related Job Opportunities	Prioritize areas that can provide significant opportunities for population-related employment (particularly in mixed use formats) contributing to the municipality's overall employment needs.

Mix of Land Uses	Prioritize areas with higher potential to achieve a full range and mix of land uses, including higher density forms of residential housing to ensure achievement of the Greenfield Density.
Community Infrastructure	Prioritize areas that can deliver key community infrastructure (lands for public health, education, recreation, socio-cultural activities, security and safety, and affordable housing) early in the development process.

7.5 Secondary Plan Requirements

Secondary Plans adopt and implement the objectives, policies, land use designations and overall planning approach of the Town's Official Plan to fit with local contexts, establishing local development policies that are unique to the specific area in the municipality, to guide growth and change in that particular area.

The Town of Milton Official Plan requires that secondary plans shall be adopted as amendments for all lands in the Town's Urban Expansion Area (policy 5.4.3.2). In accordance with policy 5.4.3.4 Secondary Plans are required to include the following:

5.4.3.4 Secondary Plans shall include, but not be limited to:

a. *A general statement of the intended character of the area along with detailed objectives for the development of the area;*
b. *A conceptual plan for the area which establishes the boundaries of the area, and a land use and transportation framework for the lands, together with a description of the concept and desired future for the area;*
c. *Policies establishing a strategy for the provision of housing, employment, community facilities, open space, commercial services and other land uses matters including location, form and intensity of development for such uses, desired forms of housing, range of housing densities and unit types and opportunities for modestly priced housing;*
d. *Detailed urban design policies and directions;*
e. *A detailed transportation plan, including pedestrian and bicycle paths and transit routes in accordance with the policies of Section C.1.2 of this Plan;*
f. *Detailed strategy for the protection of the natural environment including the preservation of natural areas, woodlots and vistas and the maintenance or enhancement of water quality, and establishment of an open space system and recreation facilities;*
g. *Servicing strategy;*
h. *Population capacity and employment targets, the location, types and density of proposed land uses, and the proposed phasing, servicing and financing of development; and,*
i. *Other implementation measures including leisure design policies, environmental/servicing design policies and heritage and archaeological requirements.*

5.4.3.3 The Town shall require that Secondary Plans and additional detailed studies be carried out by the Town at the cost of the major landowners in each area. These additional studies and plans may include, but shall not be limited to:

a. *Stormwater Management or Subwatershed Management Plans (Dependent upon the scale of development. Subwatershed studies will be conducted in accordance with the requirements of the Regional Plan (1995) Part IV - A3b5);*
b. *Integrated Transportation Plans;*
c. *Environmental Assessment/Impact Studies;*
d. *Servicing Studies;*
e. *Neighbourhood Urban Design/Master Plans;*
f. *Market Analysis where commercial development in excess of 9,300 square metres of gross floor area is being proposed;*
g. *Development Charges Studies;*
h. *Development Phasing Studies;*
i. *Fiscal Impact Studies;*
j. *Parks Concept Plan;*
k. *Archaeological Assessments;*
l. *Heritage Resource Assessment; and,*
m. *Community Facilities/Human Services Impact Analysis*
n. *Agricultural Impact Assessment*
o. *Air Quality Impact Assessment*

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8.0
Conceptual Structure Plan

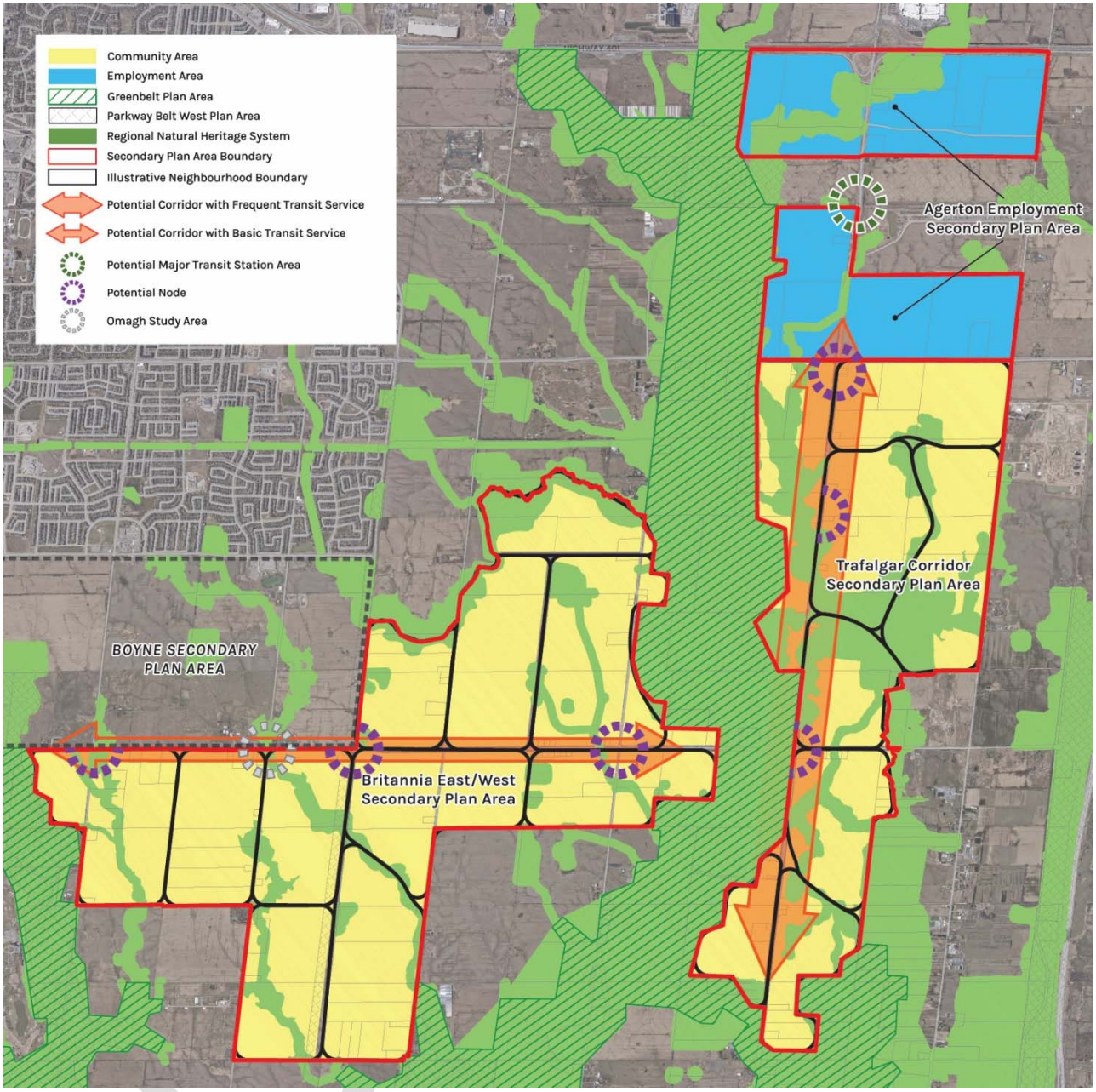
The following section provides an overview of a high-level Conceptual Structure Plan for the Urban Expansion Area lands following first principles of planning and creating complete communities.

8.1 Conceptual Structural Plan

A high-level Conceptual Structure Plan provides the basic planning structuring framework for Secondary Plan Areas in the LBA (refer to Figure 9). While the main purpose of the Secondary Plan process is to designate future land use designations for these lands, it is important for the LBA to define the intended and overarching structure for which to plan. As such, the Conceptual Structure Plan is preliminary and will be refined as part of future Secondary Plan processes. The primary purpose of this more "detailed" plan is to provide a high-level land use structure for the first round of SWS impact analyses, and to understand the potential population distribution, employment potential and housing mix.

The basic structure of the Conceptual Structure Plan is comprised of neighbourhoods, potential corridors with transit terminating at a potential GO station, potential community nodes, and the Omagh Study Area. As discussed in the previous section, the two Community Area Secondary Plan Areas (SPA) are intended to have different complexions and character. Building on the potential GO Major Transit Station Area, the Trafalgar Corridor SPA should be planned with more density, in an urban and transit-supportive manner. This density will be challenged by the extensive Natural Heritage System present along this corridor, an issue to be addressed through the conclusion of the SWS and Secondary Plan process. Likewise, the Britannia East/West SPA should be planned as an extension of the Boyne Secondary Plan Area, with a compatible neighbourhood character and structure.

Figure 9 - Conceptual Structure Plan



Notes:

(1) Preliminary Conceptual Structure Plan is intended for discussion purposes only.

(2) Neighbourhood boundaries are illustrative and should be refined as part of the Secondary Plan process.

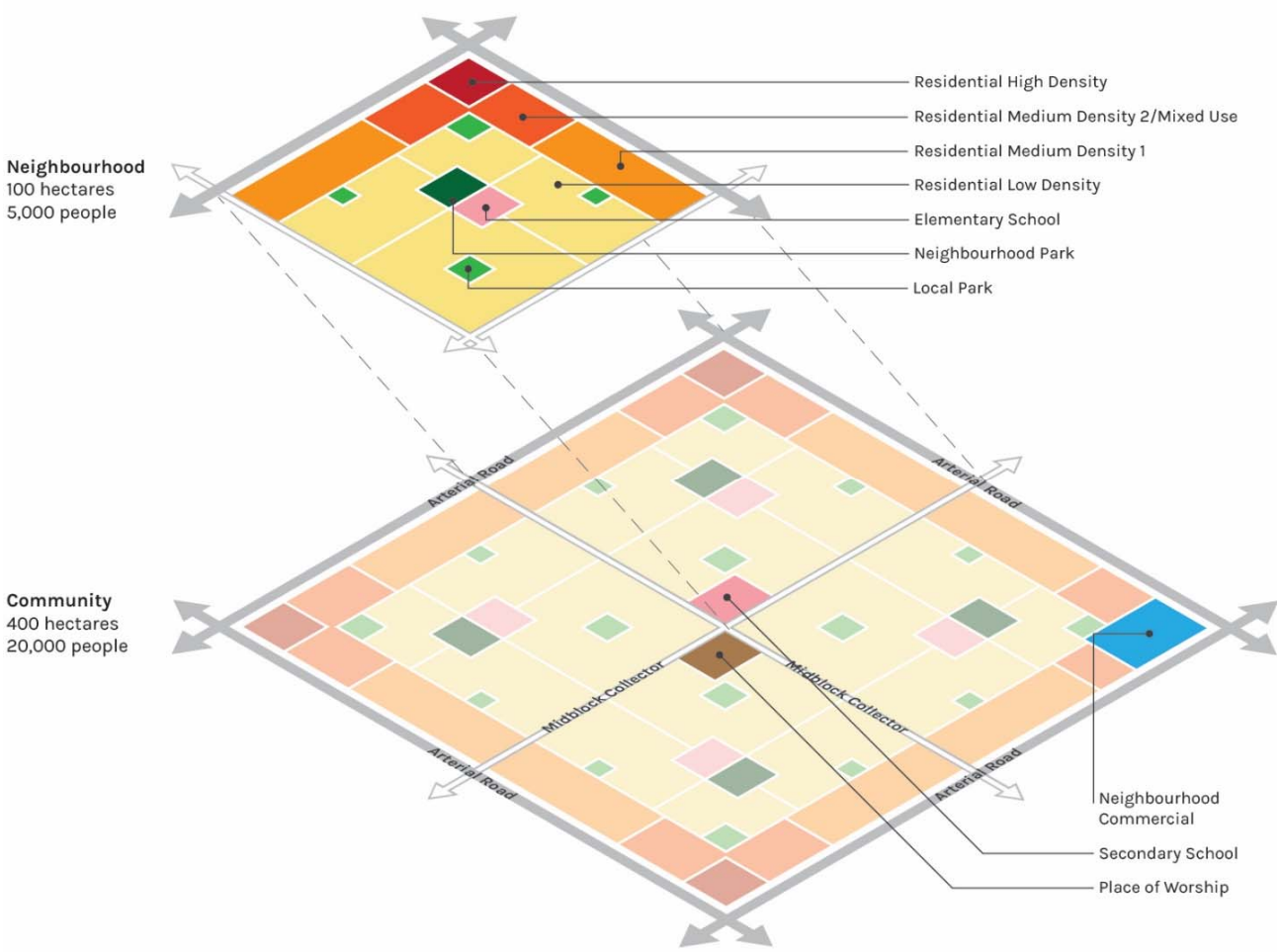
(3) "Potential" corridors, nodes and Major Transit Station Area are conceptual and should be refined as part of the Secondary Plan process.

Source: Malone Given Parsons Ltd., 2017

8.2 Create Complete Communities

The delineation of Community Area Secondary Plan Areas is premised on the principle of creating complete communities, incorporating a building block unit of walkable "neighbourhoods" to schools, local parks and local commercial shopping. Incorporating these notional building block units creates a neighbourhood structure and planning framework for each SPA. The Trafalgar Corridor SPA may be comprised of approximately 8 neighbourhoods, and the Britannia East/West SPA may be comprised of approximately 11 neighbourhoods. These neighbourhoods are generally delineated by surrounding arterial and collector roads, and typically 5,000-10,000. The combination of four or five neighbourhoods provides sufficient population to support a secondary school, place of worship, and neighbourhood commercial centre. This forms a reasonable metric for the creation of complete communities and is a fundamental consideration in delineating the Secondary Plan Areas.

Figure 10 - Conceptual Neighbourhood Structure



Source: Malone Given Parsons Ltd., 2017

While useful as a general organizing structure and guide to the delineation of neighbourhoods, this conceptual model must be adapted to be relevant to the LBA area. As such, while example neighbourhood limits are shown on the figure above, it is expected that the Secondary Plan process will delineate neighbourhoods in keeping with the general structuring shown above and based on the principles for building complete communities.

8.3 Housing Mix

The UEA lands must be planned to a density of 70 people and jobs per hectare to achieve the Town's overall density target for Designated Greenfield Areas. On that basis, a reasonable unit mix is proposed for the Urban Expansion Area lands overall, to offer a range of housing types including grade-relate housing, stacked and apartments. The Secondary Plan process will need to define a housing mix for each Secondary Plan Area, such that it enables the Town to achieve its overall density and population targets. Table 25 below provides an example of how the planning for each SPA is contingent upon each other in achieving the overall density target, thereby enabling the Town to conform with Growth Plan population and job forecasts. Given the potential transit infrastructure anticipated for the Trafalgar Corridor SPA and corresponding need for a land use structure that supports higher order transit (ie: higher density forms of housing), the anticipated housing mix may likely differ from that of the Britannia East/West SPA which may likely have a higher proportion of low-density housing with a character more comparable to the Boyne Survey Secondary Plan Area.

Table 25: Estimated Unit Yield, Population, Jobs and Density by Secondary Plan Area

Secondary Plan Area	Estimated Unit Yield[1]	Estimated Population[2]	Estimated Jobs[3]	People + Jobs / ha	Minimum Density
Britannia East/West Secondary Plan Area	15,500	48,700	8,300	57,000	65
Trafalgar Corridor Secondary Plan Area	11,600	31,900	5,500	37,400	80
TOTAL Urban Expansion Area Lands	**27,100**	**80,600**	**13,800**	**94,400**	**70**

Notes:

1. *Units rounded to the nearest 100 and are approximate only. Final unit count & mix will be determined through the Secondary Plan process.*
2. *Population rounded to the nearest 100.*
3. *Jobs rounded to the nearest 100. Assumes a rate of 0.17 jobs per person for Urban Expansion Area Lands.*

Source: Malone Given Parsons Ltd., 2017

9.0
Conclusions and Next Steps

This section includes a consolidation of all recommendations found in the LBA for the Town of Milton's consideration, conclusions and next steps for planning the UEA Secondary Plan Areas.

9.1 Recommendations for the Town's Consideration

The following summary of recommendations are for the Town's consideration in future planning of the Urban Expansion Area lands.

9.1.1 Recommendations for the LBA Secondary Plan Process

- Ensure Secondary Plan process for all LBA lands implements *Milton's First Principles of Growth*.
- Ensure consideration be given to Prioritization Criteria presented in Table 24.

9.1.2 Recommendations for Employment Lands

- Update employment forecasts to 2041 to advance the planning of currently designated and planned employment land supply, and ensuring lands are serviced to maintain demand for the logistics and warehousing sectors for which Milton has a strong competitive market.
- Create a tiered hierarchy for Milton's employment areas and defining the Town's Prime Employment and General Employment areas. Further, focus on creating new locations for concentrated employment such as employment nodes/districts with a full range of supportive uses.
- Redevelopment and intensification in the Town's non-employment, mixed use areas to maintain and create new jobs.
- Prioritize servicing and infrastructure for employment areas with early initiation of Area Servicing Plans, in place of the traditional approach whereby employment areas are serviced through the last phases of Secondary Plan development as they are often located at the periphery due to expansive land needs.
- Smaller designated areas with supportive servicing and infrastructure need to be identified and prioritized through phasing and servicing policies to support smaller businesses and the knowledge based sector industries.

9.1.3 Recommendations for Water and Wastewater Servicing

- Preparing a more detailed, area specific servicing study, in conjunction with an environmental management study for each Secondary Plan Area.
- Phasing of development whereby priority areas would be based on areas:
    1. That have servicing infrastructure;
    2. That require additional infrastructure;
    3. That require more infrastructure prior to development.

9.1.4 Recommendations for Agricultural Resources

- Augment Secondary Plans by including existing and/or future studies to inform future planning, such as:
    1. Prepare an assessment of agricultural land use, livestock and barns;
    2. Identify possible locations for compatible land uses such as parks and open space; and
    3. Identify potential mitigation measures and success (or lack thereof) of such measures, as it relates to buffering agricultural uses from urban uses.
- Town to engage in early discussions with the Agricultural community, where appropriate.

9.1.5 Recommendations for Archaeological Resources

- Exempt sites from further assessment that have been previously subjected to Stage 1, Stage 2, Stage 3, and/or Stage 4 survey and have been cleared of further archaeological concern.
- Complete visual field inspections for sites identifies as having no or low archaeological potential and/or deep or extensive disturbances.
- Complete Stage 2 and Stage 3 assessments for one pioneer cemetery identified within, and two pioneer cemeteries identifies within 50m of the Urban Expansion Area lands.
- Town to engage in early discussions and/or consultations with Indigenous Communities.

9.1.6 Recommendations for Parkland Dedication

- Update the CSMP to reflect recent Bill 73 changes as it relates to parkland dedication.
- Ensure Secondary Plan process identifies an overall open space strategy for the LBA which includes a comprehensive range of passive and active recreation areas.

9.1.7 Recommendations for School Requirements

- Encourage school co-location with neighbourhood parks to facilitate minimum school sizes, thereby promoting efficient use of land as new communities are becoming increasingly densely populated.
- Ensure Secondary Plan process engages all school boards (Public, Catholic and French) through early discussions and/or consultations, to determine elementary and secondary school needs and general locations within the Urban Expansion Area lands.

9.1.8 Recommendations for Community Facility Requirements

- Initiate an update of the CSMP to include an assessment of service level targets for the UEA and other new growth areas throughout the Town;
- Ensure Secondary Plan process includes future studies identifying targeted service levels to determine requirements for future growth within the Urban Expansion Area lands.
- Ensure Secondary Plan process includes future studies outlining an inventory of additional facilities including but not limited to outdoor ice rinks, stand-alone community halls, youth/adult activity rooms, and indoor turf.

9.1.9 Recommendations for Fire / Emergency Requirements

- Ensure Secondary Plan process includes a future study to determine fire station/emergency services needs, appropriately located to protect newly developed communities in the UEA lands.

9.1.10 Recommendations for Transportation Planning

- Ensure Secondary Plan process includes a more detailed transportation study for the UEA lands, building off of the recommendations of the Town-wide TMP.
- Ensure Secondary Plan process includes a more detailed determination of land area required for road infrastructure in each of the Community Areas and Employment Areas.

9.1.11 Recommendations for Policy Planning

- Ensure Secondary Plan Areas achieve a minimum density of 70 residents and jobs per hectare across all LBA Community Area lands.

9.1.12 Recommendations for SWS Planning

- Ensure Secondary Plans carry out the Town's management strategy, implementation and monitoring plans as identified through the SWS Study.
- Ensure Secondary Plan process confirms and refines the Natural Heritage System to protection and enhancement of natural features and functions.
- Ensure Secondary Plan process establishes the necessary technical support, outlining preferred strategies for stormwater management and environmental management.

9.1.13 Recommendations for Creating Complete Communities

- Ensure the Land Use Structure for each Secondary Plan Area is generally consistent with the Conceptual Structure Plan, locating higher density uses appropriately to facilitate a transit-supportive development pattern.
- Ensure each Secondary Plan Area delineates and identifies discrete neighbourhoods in keeping with the intent of the Conceptual Neighbourhood Structure and principles for building complete communities.
- Ensure Secondary Plan process identifies phasing and sequencing of both Community Area and Employment Area lands, with consideration given to the financial impact of development.

9.1.14 Recommendations for an Overall Housing Mix

- Ensure Secondary Plan Areas define an appropriate housing mix that supports the achievement of an overall density of 70 resident and jobs per hectare across the LBA lands.
- Ensure each Secondary Plan Area defines an appropriate housing mix that corresponds to higher density land uses and planned/ potential transit infrastructure.
- Ensure the proposed housing mix offers a range of housing types including ground-oriented housing, stacked and apartments.
- Ensure the housing mix contributes to an overall strategy for housing affordability.

APPENDIX A

Water and Wastewater Servicing Summary

scs consulting group ltd

File #: 1884
Date: April 4, 2017

Mr. Matthew Cory
Malone Given Parsons
140 Renfrew Drive, Suite 201
Markham, ON, L3R 6B3

Dear Mr. Cory:

Re: **Water and Wastewater Servicing Summary**
Milton Land Base Analysis

We are pleased to provide the following summary of water and wastewater servicing information related to the future urban expansion areas within the Sustainable Halton lands in the Town of Milton.

Our analysis is based on the following background information:

- Sustainable Halton Water and Wastewater Master Plan (Aecom, 2011)
- Halton Region 2017 Development Charge Background Study (December 2016)
- Halton Region 2017 Development Charge Water/Wastewater Technical Report (GM Blueplan Engineering, September 2016)
- Memo from Urbantech (February 2017) – Town of Milton Phase 4 Lands Municipal Infrastructure Works (refer to **Attachment 3**)

1.0 Sustainable Halton Water and Wastewater Master Plan (2011)

The Sustainable Halton Water and Wastewater Master Plan provides comprehensive documentation of the development, evaluation and selection of the preferred water and wastewater servicing strategies to meet the growth needs of Halton Region to year 2031.

The service area population and employment projections for the Town of Milton were established based on the Halton Region Best Planning Estimate (BPE) Data June 2011 and includes a service area population projection of 221,450 and a service area employment projection of 112,251 to 2031.

The urban growth areas within the Sustainable Halton lands were included as part of the serviced areas in the water and wastewater servicing strategies developed through the Sustainable Halton Water and Wastewater Master Plan.

Below is a summary of the preferred water and wastewater servicing strategies related to the Milton area.

1.1 Water Servicing

Lake Ontario is the source of water for Halton Region's Lake Based System. The Lake Based System is supplied by three water purification plant (WPP) facilities: Burlington WPP, Oakville WPP and Burloak WPP. Pumping Stations and Storage Facilities are connected to trunk feedermains to supply water for the different pressure zones in the system and feed the smaller local distribution watermains.

The Milton lake-based service area includes existing areas outside the central core of the community and is services by Zone M4L and M5L. The future growth areas within Milton will be serviced by the lake-based water supply system.

The Region identified the following key components of the water servicing strategy for the Milton lake-based service area:

- Implement a second spine up the Trafalgar Road alignment and a third spine along Neyagawa Boulevard
- Implement a new Zone 4/5 boundary
- Switchover strategic areas from groundwater supply to lake-based supply
- Stage Oakville/Milton infrastructure upgrades to maximize use of existing capacity
- Provide additional Zone 4/5 storage
- Provide additional water supply capacity (expansions) at Burloak WPP and Oakville WPP
- This strategy provides security of supply to Milton and integrates Zone M4L and Zone M5L infrastructure.

A map depicting the preferred water servicing strategy is provided in **Attachment 1**.

1.2 Wastewater Servicing

The core area of Milton is serviced by the existing Milton wastewater treatment plant (WWTP) located southwest of Ontario Street South and Main Street East, which treats the wastewater and discharges clean effluent to the Sixteen Mile Creek. The Milton WWTP currently only has sufficient capacity to service the core area of Milton. The Milton WWTP will remain in service and continue to service a confined service area.

The balance of the Milton service areas, including the newer growth areas in south and east Milton, will convey flows south to the Mid-Halton WWTP located on the north side of the Queen Elizabeth Way, west of Third Line in the Town of Oakville.

The Region identified the following key components of the wastewater servicing strategy for the study area lands within the Milton lake-based service area:

- Provide new trunk infrastructure for east Milton that will convey wastewater down Trafalgar Road, along Britannia Road and to Lower Baseline Road
- Provide phasing opportunity for the post 2021 flows along Britannia Road
- Continue to convey flows to the Hwy 25 trunk sewer

- New Highway 25 trunk sewer from south of Boyne WWPS to the Third Line trunk sewer
- Provide additional capacity at the Mid-Halton WWTP.

A map depicting the preferred wastewater servicing strategy is provided in **Attachment 1**.

2.0 2017 Development Charges Water and Wastewater Technical Report

As part of the 2017 Development Charge (DC) update process, the 2017 Development Charges Water and Wastewater Technical Report (Technical Report) was prepared by GM Blue Plan Engineering which provided the basis for the development of costs and implementation timing of water and wastewater projects required to service population and employment growth in Halton Region between 2017 and 2031, according to the 2011 Best Planning Estimates (BPEs). The project costs and implementation timing set out in the Technical Report are based on work undertaken as part of the Sustainable Halton Water and Wastewater Master Plan as well as more recent technical studies undertaken in specific areas. This report incorporates the most up to date water and wastewater system information, including additional technical infrastructure review and analysis which has been completed since the 2011 Master Plan updates. This report identifies Halton's water and wastewater infrastructure requirements to service anticipated growth during the period between 2017 and 2031.

The 2016 and 2031 population and employment projections for the Town of Milton, based on the BPEs are summarized in **Table 1** below:

Table 1: Best Planning Estimates Population and Employment Projections (2016 to 2031)

	2016	2031
Total Population	124,645	228,084
Total Employment	62,553	114,330

A technical review of the water and wastewater system and capital projects identified in the 2011 Master Plan was undertaken and the outcomes are summarized below:

- The water and wastewater per capita design criteria were updated
- The BPEs and updated design criteria were used to update the water and wastewater capital implementation plans
- Revisions to the water and wastewater servicing strategy related to Milton were identified as follows:
  - Wastewater flow diversion from the Milton WWTP to the Mid-Halton WWTP
  - Realignment of water pressure zone boundaries in the Town of Milton and the Town of Oakville (Zones 3, 4 and 5) to optimize customer water pressure in these areas
- Capital project cost estimations were updated

2.1 Water Servicing

Since the completion of the 2011 Master Plan, the Zone 4 feedermain to Milton has been constructed and

commissioned. Subsequently, extensive analysis was undertaken by the Region to investigate optimization of the lake based pressure zones within North Oakville and Milton. The preferred servicing solution that was developed consisted of a modification to the Zone O3, O4, M4L and M5L boundaries as shown in Figure 2 of the Technical Report (**Attachment 2**).

In order to implement this strategy, new pressure zones will be created and existing pressure zone boundaries will be adjusted. The new pressure zones are currently identified by their proposed Top Water Level (TWL). A brief description of the zone boundary changes in Milton is as follows:

- Existing Zone M4L (TWL 236 m): Zone M4L eliminated; existing serviced area now part of new Zone 250
- New Zone TWL 250: New zone within Milton and part of North Oakville. This zone makes up the majority of the lake based service area within Milton and will be the major growth area to 2031
- Existing Zone M5L (TWL 267 m): Lower boundary of Zone M5L shifted to north – zone size reduced; remainder transferred to new Zone TWL 250

Below is a list of significant water projects related to Milton which have been identified for implementation over the next 15 years:

- Oakville/Milton Water Pressure Zone Realignment (Zones 3,4, 5) and alterations to Eighth Line, Fourth Line and Neyagawa Pumping Stations
- Boyne East Britannia Trunk Watermain
- Burloak Water Purification Plant – Phase II Expansion
- Zone 4 Reservoir Expansion
- Burloak Booster Pumping Station and Feedermain (Zone 2)
- Wyecroft Zone 2 Interconnecting Trunk Watermain
- Kitchen Booster Pumping Station Expansion
- Neyagawa Booster Pumping Station Expansion

The water development capital implementation plan is represented graphically within Figure 4 and the future water zones are delineated on Figure 2 of the Technical Report (**Attachment 2**).

2.2 Wastewater Servicing

After the 2011 Master Plan, an additional study was undertaken to review the long term strategy for the Milton WWTP. Currently, the Milton WWTP services areas generally in central and north Milton. The WWTP has the ability to pump flows in excess of its current rated capacity to the south into the Mid-Halton WWTP catchment area. The study concluded that the most cost effective and technically viable long term solution for wastewater servicing in the area was to decommission the Milton WWTP and send all wastewater flows to Mid-Halton WWTP.

The future Wastewater drainage areas are identified by their downstream WWTP and are depicted in Figure 5 of the Technical Report (**Attachment 2**). The urban growth areas within the Sustainable Halton lands are included in the catchment area to the Mid-Halton WWTP.

Below is a list of significant wastewater projects related to Milton which have been identified for implementation over the next 15 years:

- Mid-Halton Wastewater Treatment Plant – Phase VI / VII Expansion
- Britannia Road Wastewater Pumping Station, Twinned Forcemain, East Trunk Sewer
- Mid-Halton Wastewater Treatment Plant – Phase VIII / IX Expansion (Design only) and Wastewater Pumping Station Expansion at Mid-Halton Wastewater Treatment Plant
- South Milton Fourth and Fifth Line Trunk Sewers
- Lower Baseline Wastewater Pumping Station and Twinned Forcemain

The wastewater development capital implementation plan is represented graphically on Figure 6 of the Technical Report (**Attachment 2**).

3.0 Summary

In summary, the urban growth areas within the Sustainable Halton lands have been included as part of the serviced areas in the water and wastewater servicing strategies that have been developed, and the works required to implement the servicing strategies have been considered in the Region's 2017 Development Charge Background Study and the 2017-2031 Water/Wastewater Capital Implementation Plan.

Please contact the undersigned if you have any questions or require any additional information.

Sincerely,

SCS Consulting Group Ltd.

Sarah Kurtz, P. Eng.
skurtz@scsconsultinggroup.com

Attachments: Attachment 1 – 2011 Master Plan Preferred Water and Wastewater Servicing Strategy Figures
Attachment 2 – 2017 Development Charges Water and Wastewater Technical Report Figures
Attachment 3 – Memo from Urbantech (February 2017) – Town of Milton Phase 4 Lands Municipal Infrastructure Works

P:\1884 Milton Land Base Analysis\Correspondence\Letters\MGP-Servicing Summary-04Apr17.docx

ATTACHMENT 1

2011 MASTER PLAN PREFERRED WATER AND WASTEWATER SERVICING STRATEGY FIGURES

SCS consulting group ltd

Legend

Existing Infrastructure

- Water Pumping Station
- Water Well
- Water Standpipe
- Water Reservoir
- Water Purification Plant
- Elevated Water Tower
- Existing Watermain
- Watermain

Previously Approved Infrastructure

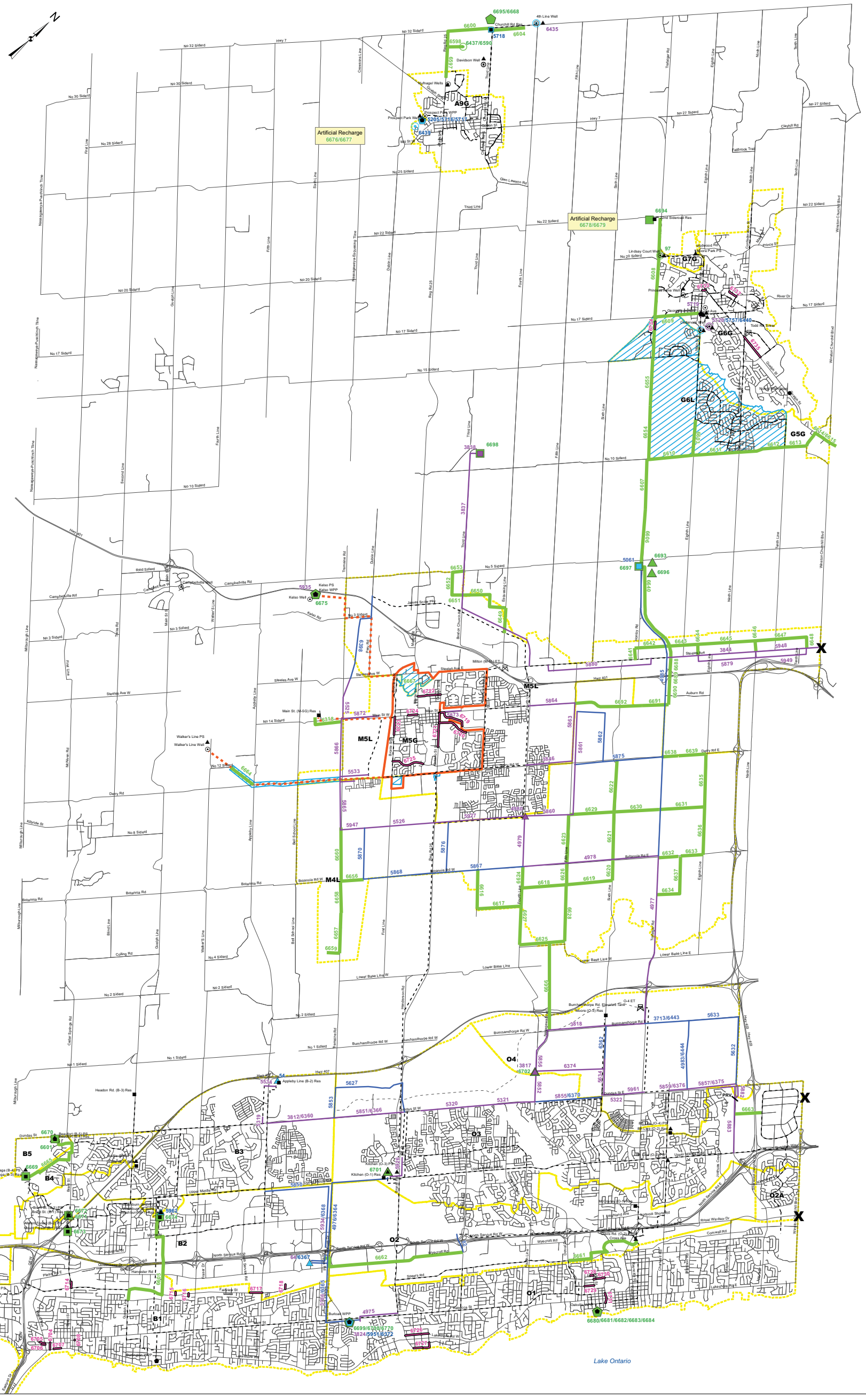
- Water Pumping Station
- Water Well
- Water Purification Plant
- Water Reservoir

Proposed/Upgrade Infrastructure

- Water Pumping Station
- Water Well
- Water Purification Plant
- Water Reservoir
- Watermain
- Distribution-Built Boundary Watermain

Funded Infrastructure

- Water Pumping Station
- Water Reservoir
- Funded Project - Watermain (2008 MP Projects)
- Existing Interregional connections
- Existing Milton Groundwater Servicing
- Existing Central Milton Groundwater Service Area Boundary
- Water Pressure Zones
- Proposed Lake Base Service Area



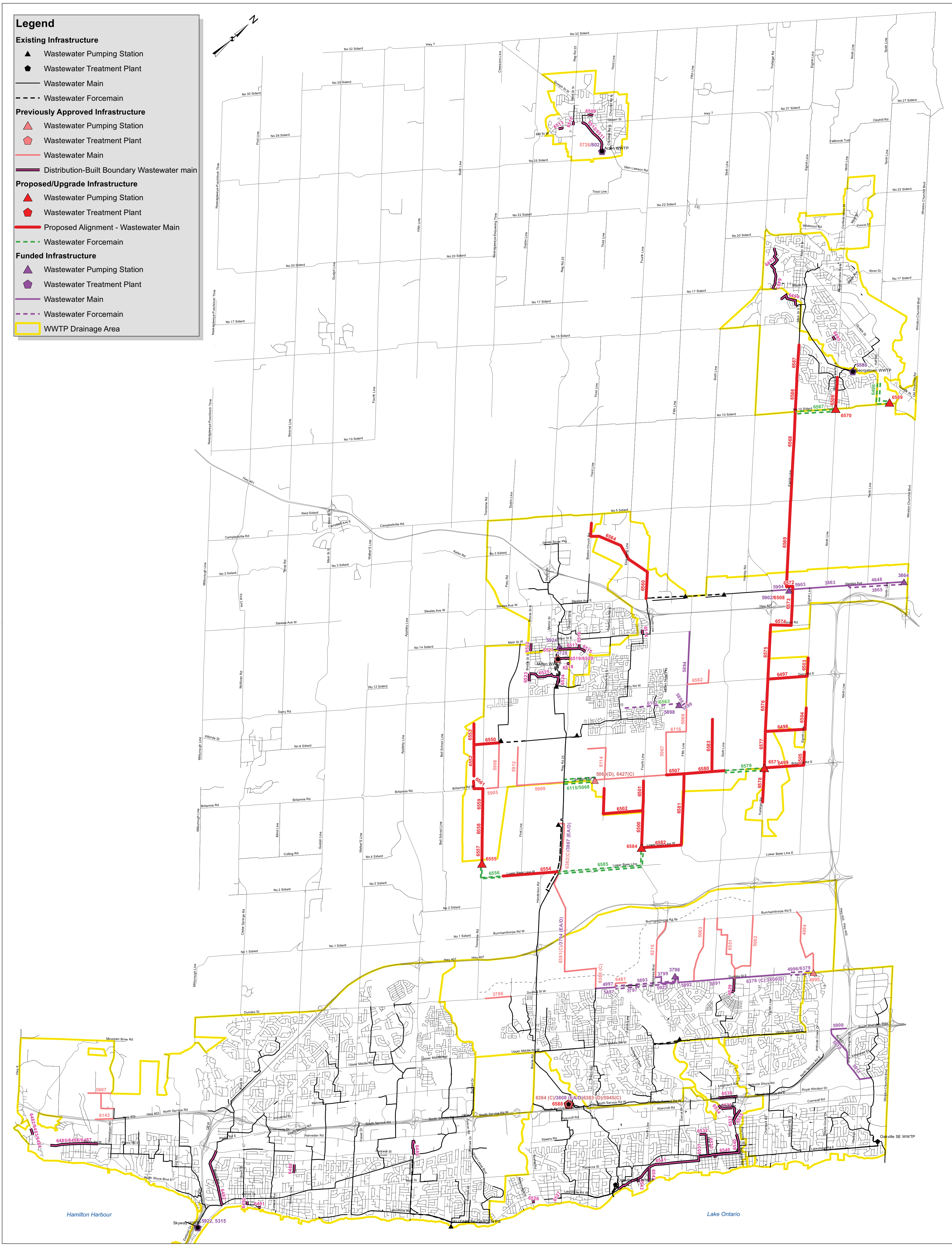
Halton REGION

Sustainable Halton
Water and Wastewater Master Plan
Executive Summary

Preferred Water Servicing Strategy

AECOM

September, 2011
1:40,000
601140562-363-W



Sustainable Halton
Water and Wastewater Master Plan
Executive Summary

Preferred Wastewater Servicing Strategy

September, 2011
1:40,000
60114062-362-WW

ATTACHMENT 2

2017 DEVELOPMENT CHARGES WATER AND WASTEWATER TECHNICAL REPORT FIGURES

Legend

Water Pressure Zone

- A9G
- B1
- B1A
- B1B
- B2
- B2A
- B3
- B3A
- B3B
- B4
- B4A
- B5A
- B5
- C7G
- G6G
- G7G
- G5G
- G6L
- O1
- O2
- O2A
- O2B
- O3
- M5G
- TWL = 211m
- TWL = 223.5m
- TWL = 250m
- TWL = 267m

Other

- Booster/Pumping Station (PS)
- Reservoir (RES)
- Water Purification Plant (WPP)
- Pressure Reducing Valve (PRV)
- Well Field (WELL)
- Elevated Water Storage Tank (TANK)
- Roads
- Municipal Boundary

THIRD LINE RES
PROSPECT PARK WPP
A9G
HIGHWAY 7
SIXTH LINE
NO 22 SIDE ROAD
22ND SIDEROAD RES (GW)
LAKE BASED RES
G7G
MOORE PARK PS
G6G
NO 17 SIDE ROAD
GEORGETOWN WPP
TODD ROAD TANK
NORVAL TANK
G6L
G5G
NO 15 SIDE ROAD
FIRST LINE
GUELPH LINE
ZONE 5 RES
FOURTH LINE
FIFTH LINE
SIXTH LINE
ZONE 4 RES
ZONE 6 PS
EIGHTH LINE
TENTH LINE
WINSTON CHURCHILL BOULEVARD
HIGHWAY 401
C7G
KELSO WPP AND WELL
JAMES SNOW PARKWAY
TWL = 267m
TREMAINE ROAD
MILTON TANK
HIGHWAY 407
STEELES AVENUE
MAIN STREET RES
M5G
DERRY ROAD
THOMPSON ROAD
JAMES SNOW PARKWAY
FOURTH LINE PS
TWL = 250m
BRITTANIA ROAD
TWL= 223.5m
REGIONAL ROAD 25
FOURTH LINE
FIFTH LINE
SIXTH LINE
TRAFALGAR ROAD
EIGHTH LINE
HIGHWAY 407
MOORE RES
TWL = 223.5m
O3
NEYAGAWA BOULEVARD
NEYAGAWA PS
WILLIAM HALTON PARKWAY
TWL = 211m
EIGHTH LINE 223.5m PS
EIGHTH LINE RES
NINTH LINE
ZONE 3 PS
HIGHWAY 407
APPLEBY LINE RES AND PS
HEADON RES
KITCHEN RES AND PS
UPPER MIDDLE ROAD
TRAFALGAR ROAD
O2B
O2A
BEAUFORT RES AND PS
B5
B4
B3
B3A
BAILIE RES AND PS
WALKERS LINE
APPLEBY LINE
NORTH ALDERSHOT RES
B5A
B4A
B3B
B1B
TYANDAGA RES AND PS
BRANT STREET RES AND PS
B2A
WASHBURN RES AND PS
UPPER MIDDLE ROAD
THIRD LINE
NOTTINGHILL GATE
O2
McCRANEY RES
O2
DAVIS ROAD PS
WATERDOWN ROAD RES AND PS
MOUNT FOREST RES AND PS
GUELPH LINE
B2
QUEEN ELIZABETH WAY
BURLOAK PS
EIGHTH LINE
O1
HARVESTER ROAD
B1A
PLAINS ROAD
FAIRVIEW STREET
BURLOAK DRIVE
FOURTH LINE
LAKESHORE ROAD
OAKVILLE WPP
KINGSWAY PS
QUEEN ELIZABETH WAY
BRANT STREET
B1
NEW STREET
REBECCA STREET
BURLOAK WPP
BURLINGTON WPP
LAKESHORE ROAD
Lake Ontario

GIS & Information Management
Public Works Department

Figure 2: Halton Region
Future Water Pressure Zones

0 0.75 1.5 3 4.5 6 Km

August 2016

R:\Infrastructure Management\Infrastructure Data\Projects\Development Capital Update\Madga Bielawski Request

Legend

Existing Infrastructure

- Existing Pumping Station (PS)
- Existing Reservoir (RES)
- Existing Water Purification Plant (WPP)
- Existing Standpipe
- Existing Well Field (Well)
- Existing Elevated Tower (ET)
- Existing Watermain

Pumping Station

- DC Project - Pumping Station
- Project Constructed/Imminent/Funded - Pumping Station

Water Treatment Plant

- DC Project - WPP
- Project Constructed/Imminent/Funded - WPP

Reservoir

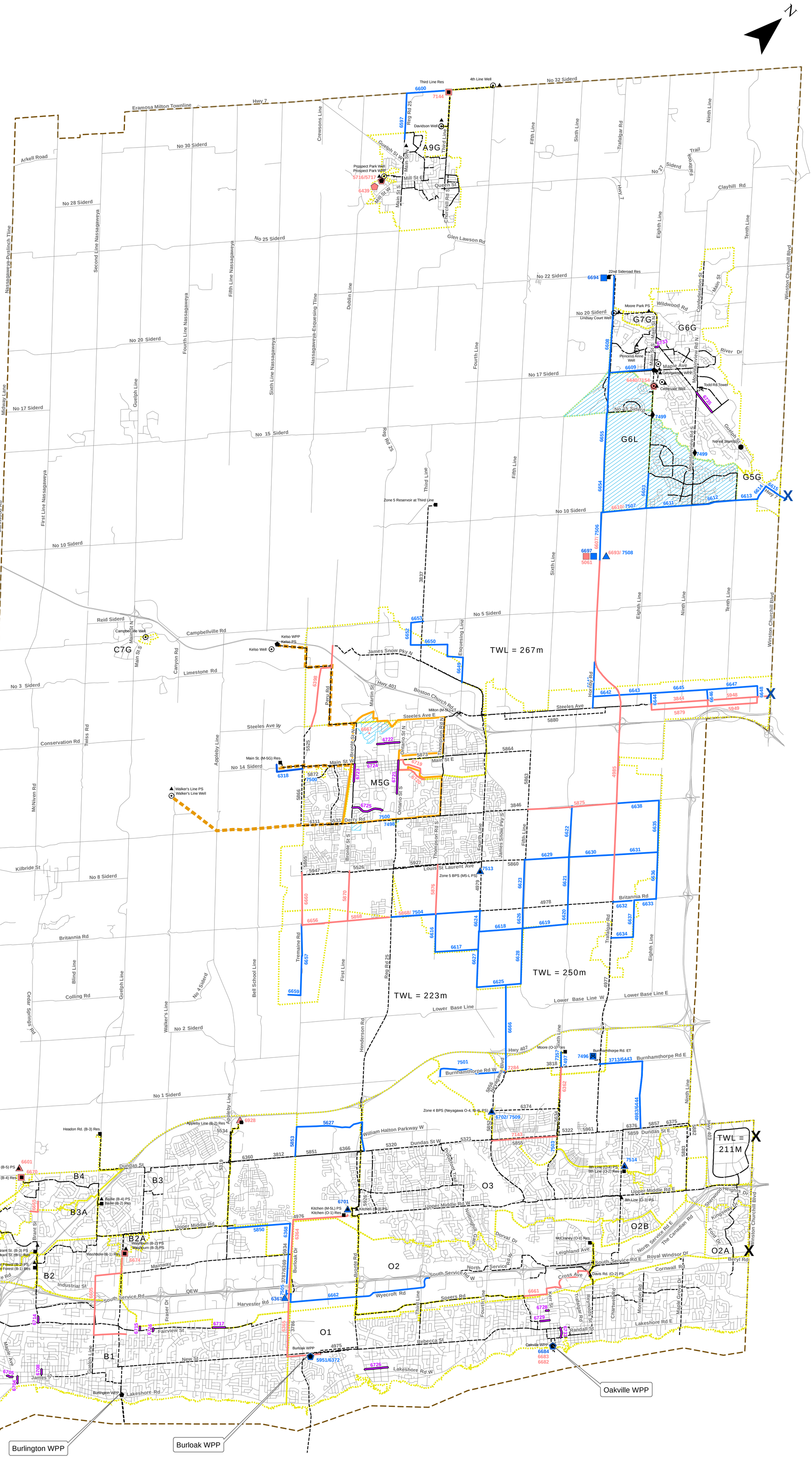
- DC Project - Storage
- Project Constructed/Imminent/Funded - Storage

Well

- Project Constructed/Imminent/Funded - Well

Linear

- DC Project - Linear
- Project Constructed/Imminent/Funded - Linear
- Intensification Project
- 5320 Previous IPFS number for existing watermain
- Existing Interregional connections
- New Interregional connections
- Water Pressure Zone
- Existing Central Milton Groundwater Service Area Boundary
- Lakebased Service Area Transfer



Halton REGION

2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Water Development Capital Implementation Plan (2017-2031)
Figure 4

BluePlan ENGINEERING

715027-9-W
October, 2016
Data Source: Halton Region
Scale: 1:55,134 | NAD 1983 UTM Zone 17N

Legend

- Skyway WWTP
- Mid-Halton WWTP
- Oakville SE WWTP
- Oakville SW WWTP
- Milton WWTP Decommission and Transfer to Mid-Halton WWTP
- Acton WWTP
- Georgetown WWTP
- Georgetown Transfer Area to Mid-Halton WWTP
- Regional Boundary
- Waterbody

N

Acton WWTP

Georgetown WWTP

Milton WWTP

Mid-Halton WWTP

Oakville SE WWTP

Oakville SW WWTP

Skyway WWTP

Halton REGION

2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Future Wastewater Drainage Areas
Figure 5

BluePlan ENGINEERING

715027-41-WW
June 2016
Data Source: Halton Region
Scale: 1:55,000 | NAD 1983 UTM Zone 17N

Legend

Existing Wastewater Infrastructure

- Wastewater Pumping Station (WWPS)
- Wastewater Treatmentl Plant (WWTP)
- GravitySewer
- Forcemain

DC Projects

Linear

- DC Project - Sewer
- DC Project - Forcemain
- Project Constructed/Imminent/Funded - Sewer
- Project Constructed/Imminent/Funded - Forcemain
- Intensification Project - Sewer

Pumping Station

- DC Project - WWPS
- Project Constructed/Imminent/Funded - WWPS
- Intensification - WWPS

Plant

- DC Project - WWTP
- Project Constructed/Imminent/Funded - WWTP
- WWTP Drainage Area
- Lakebased Service Area Transfer
- Regional Boundary

N

Acton WWTP

Georgetown WWTP

Milton WWTP

Mid-Halton WWTP

Oakville SE WWTP

Oakville SW WWTP

Skyway WWTP

Halton REGION

2017 Development Charges
Water and Wastewater
Technical Report

Halton Region
Wastewater Development Capital Implementation Plan (2017-2031)
Figure 6

BluePlan ENGINEERING

715027-8-WW
September, 2016
Data Source: Halton Region
Scale: 1:55,000 | NAD 1983 UTM Zone 17N

ATTACHMENT 3

MEMO FROM URBANTECH (FEBRUARY 2017) – TOWN OF MILTON PHASE 4 LANDS MUNICIPAL INFRASTRUCTURE WORKS

urbantech
west

February 13, 2017

Ms. Barbara Koopmans, BES,MCIP, RPP,CMO
Commissioner, Planning and Development
Town of Milton
150 Mary Street
Milton, ON
L9T 6Z5

Re: Town of Milton, Phase 4 Lands
Municipal Infrastructure Works

Dear Ms. Koopmans,

Further to our meeting of January 25, 2017 we are writing to you regarding Municipal Infrastructure as it relates to the Milton Phase 4 Secondary Plan Area.

As discussed at our meeting, Urbantech (we) have been retained by the Milton Phase 4 Landowners Group (Landowners Group) as Group Engineer. We look forward to working with the Town and its team of consultants on this significant assignment.

The Town has commenced a series of studies that will ultimately inform the creation, endorsement, approval and implementation of the Milton Phase 4 Secondary Plan. One of the studies being completed is a Land Base Analysis (LBA). A component of the LBA is an infrastructure analysis (Potable Water, Wastewater and Road Infrastructure). We understand SCS Consulting has been retained by The Town for the Infrastructure component of the LBA.

On behalf of the Landowners Group we have referenced, reviewed and completed significant municipal infrastructure investigations and analysis throughout the Town of Milton and Halton Region as they relate both to the the Milton Phase 4 Lands and the larger Regional ROPA 38 Lands.

On behalf of the Landowners Group we are pleased to provide The Town and SCS (at the Town's discretion) with the attached figures depicting Potable Water, Wastewater and Roads Infrastructure for reference and use to support the LBA.

Urbantech West, A Division of Leighton-Zec West Ltd.
2030 Bristol Circle Suite 201 Oakville, Ontario L6H 0H2
TEL: 905.829.8818
www.urbantech.com

OVERVIEW

Following is an overview of the attached figures.

REFERENCES

The following documents/reports were referenced, reviewed and utilized in creating the attached figures.

- Town of Milton 2015 Development Charge Background Study
- Town of Milton 2015 Development Charge Background Study Addendum
- Town of Milton 2015 Development Charge Background Study Addendum #2
- Town of Milton 2013 – 2017 Transit Master Plan
- Sustainable Halton Water and Wastewater Master Plan, 2011
- Halton Region Transportation Master Plan to 2031
- Halton Region 2011 Best Planning Estimates
- Halton Region 2012 Water, Wastewater & Transportation Allocation Program
- Halton Region 2017 Development Charge Background Study
- Halton Region 2017 Development Charge Water/Wastewater Technical Report
- Halton Region 2017 -2031 Water/Wastewater Capital Implementation Plan
- Halton Region 2017 Development Charge Transportation Technical Report
- Halton Region Transportation Master Plan to 2031
- Halton Region Northeast Milton Scoped Transportation Study (ongoing)

WATER

Potable water information from the above referenced documents/reports has been utilized in creating the attached Figure 1 – Water Servicing. Infrastructure provided on this figure includes pressure zone boundaries, pressure zone numbers, water treatment plants, booster pumping stations, reservoir locations and existing, under construction and proposed trunk watermains.

For ease of reference all water capital projects (DC eligible) located throughout the Milton Phase 4 lands (pressure zone M4L) have been cross referenced with Halton's Master Plan Project tables and each project number has been labelled on the drawings. The status of each project is also color coded for convenience.

WASTEWATER

Similar to the above, wastewater information from the above referenced documents/reports has been utilized in creating the attached Figure 2 – Wastewater Servicing. Infrastructure provided on this figure includes pumping stations (existing and proposed), forcemains (existing and proposed) and existing, under construction and proposed trunk wastewater mains.

For ease of reference all wastewater capital projects (DC eligible) located throughout the Milton Phase 4 lands have been cross referenced with Halton's Master Plan Project tables and each project number, including pipe diameter, has been labelled on the drawings. The status of each project is also color coded for convenience.

ROAD INFRASTRUCTURE

Road Infrastructure information from the above reference documents/reports has been utilized in creating the attached Figure 3 – Road Infrastructure. Infrastructure provided on this figure includes number of lanes (staged in accordance with Master Plan), years of construction (staged in accordance with Master Plan) for both Town and Regional roads.

For ease of reference all capital projects (DC eligible) located throughout the Town have been cross referenced with the Town and the Region's Master Plan Project tables and the status of each project has been color coded for convenience.

CONCLUSION

Based on our collective experiences in working throughout previous Secondary Plan Areas in the Town (Bristol, Sherwood and Boyne Survey's) we understand and appreciate the significant work that is ahead of us in bringing the Secondary Plan to the implementation stage.

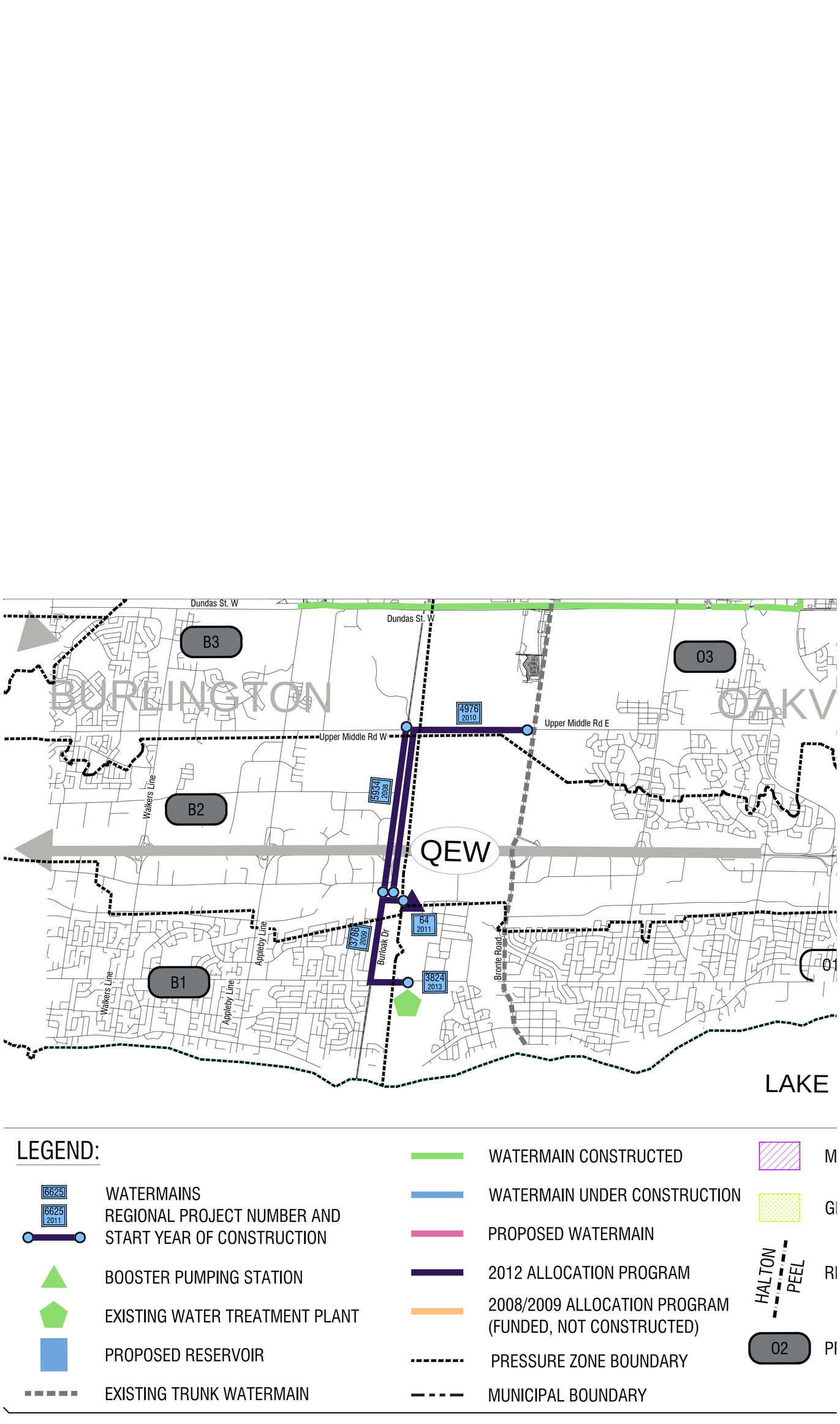
In our opinion, the information provided in the documents/reports and attached figures demonstrates to us that timely and coordinated communication between the Town, the Region, Conservation Halton, the Landowners and team consultants will be crucial to a timely and successful work plan.

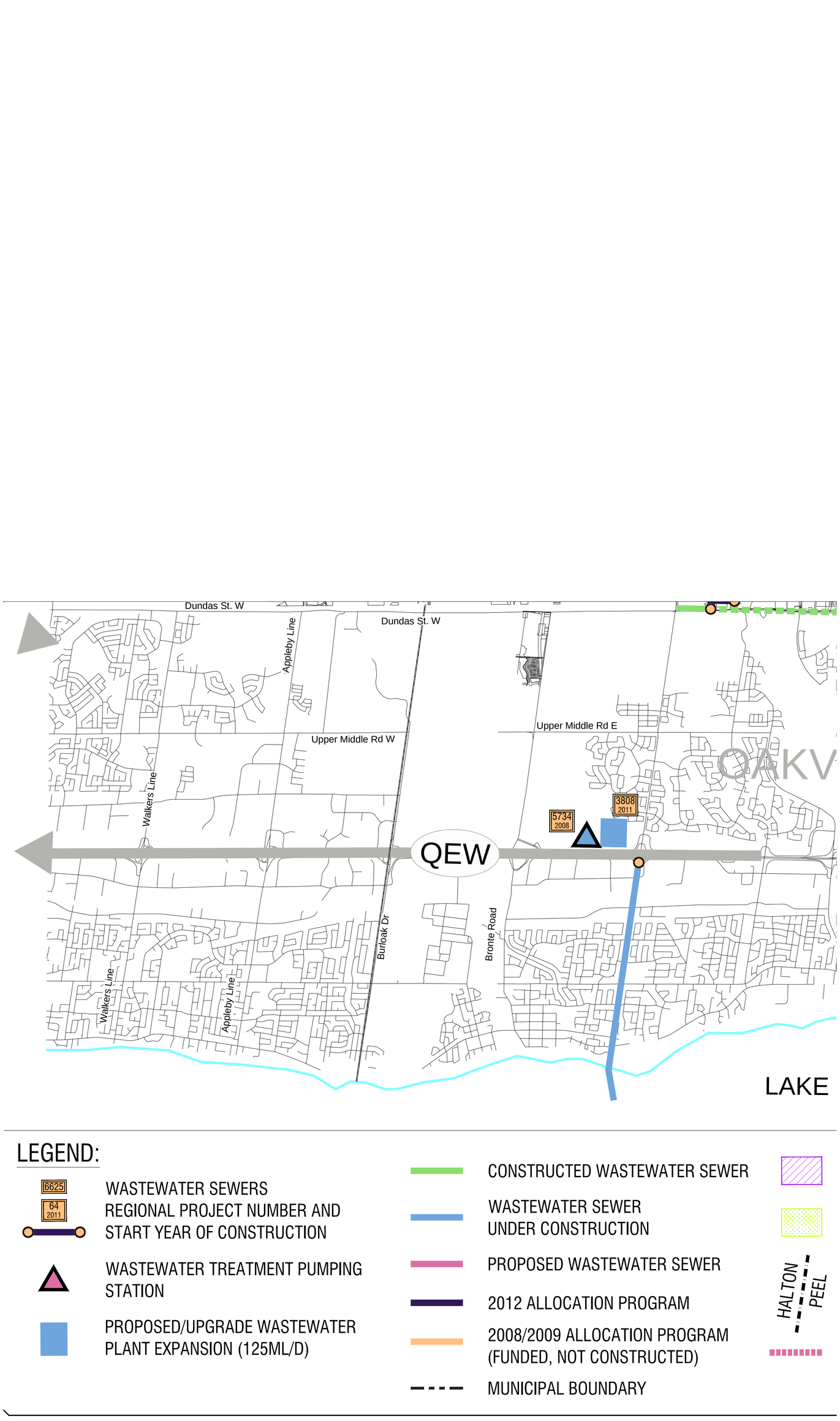
We thank the Town for the opportunity to submit this letter and accompanying figures and at the Town's discretion, would be pleased to meet with you, the Region and SCS consulting to share any other information that you may deem valuable to the ongoing LBA work plan.

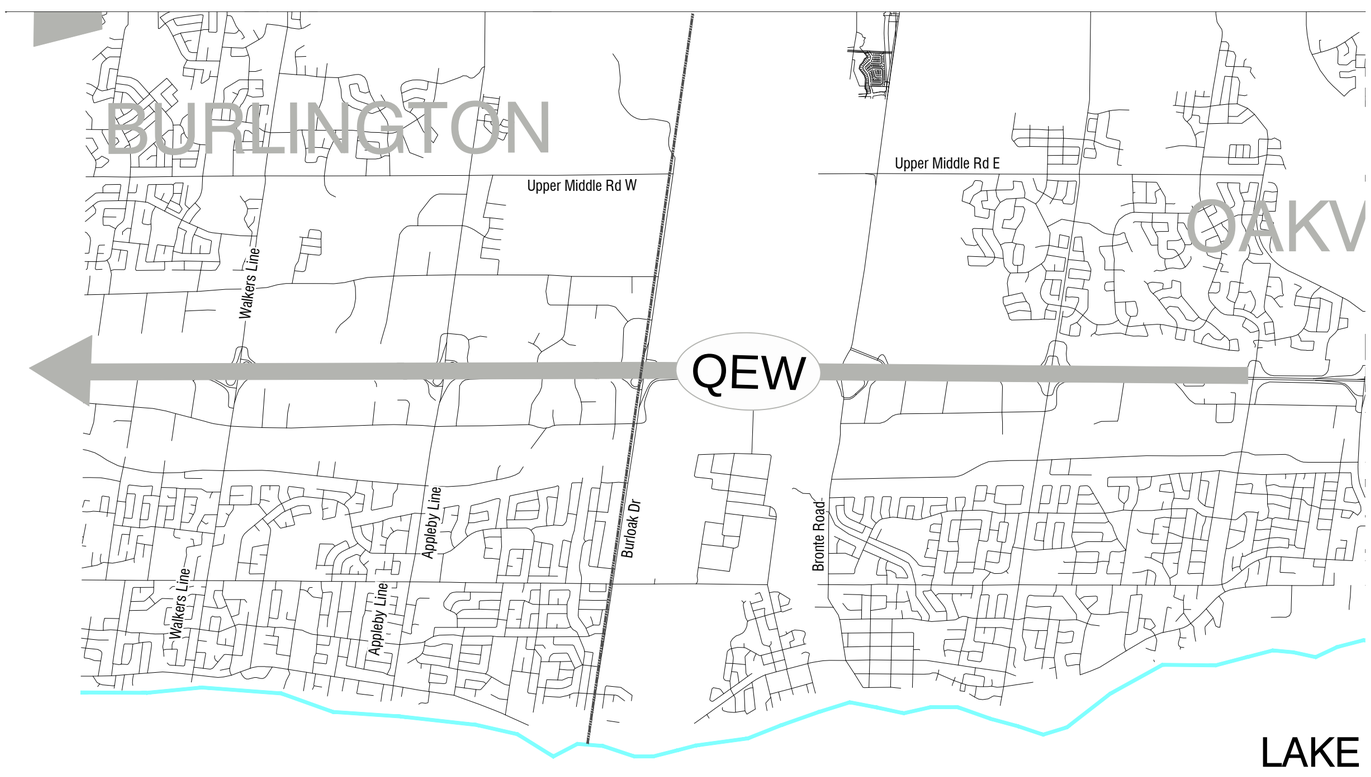
Respectfully,

Urbantech West

Paul Brown
Senior Associate


Dundas St. W
Dundas St. W
B3
03
BURLINGTON
OAKV
4976
2010
Upper Middle Rd E
Upper Middle Rd W
5934
2008
Walkers Line
B2
QEW
3786
2009
Burloak Dr
64
2011
Appleby Line
Bronte Road
3824
2013
Walkers Line
Appleby Line
B1
01
LAKE
LEGEND:
6625
6625
2011
WATERMAINS
REGIONAL PROJECT NUMBER AND
START YEAR OF CONSTRUCTION
BOOSTER PUMPING STATION
EXISTING WATER TREATMENT PLANT
PROPOSED RESERVOIR
EXISTING TRUNK WATERMAIN
WATERMAIN CONSTRUCTED
WATERMAIN UNDER CONSTRUCTION
PROPOSED WATERMAIN
2012 ALLOCATION PROGRAM
2008/2009 ALLOCATION PROGRAM
(FUNDED, NOT CONSTRUCTED)
PRESSURE ZONE BOUNDARY
MUNICIPAL BOUNDARY
M
GI
RI
HALTON
PEEL
02
PI


Dundas St. W
Dundas St. W
Appleby Line
Upper Middle Rd E
Upper Middle Rd W
Walkers Line
5734
2008
3808
2011
QEW
Burloak Dr
Bronte Road
Walkers Line
Appleby Line
LAKE
LEGEND:
6625
64
2011
WASTEWATER SEWERS
REGIONAL PROJECT NUMBER AND
START YEAR OF CONSTRUCTION
WASTEWATER TREATMENT PUMPING
STATION
PROPOSED/UPGRADE WASTEWATER
PLANT EXPANSION (125ML/D)
CONSTRUCTED WASTEWATER SEWER
WASTEWATER SEWER
UNDER CONSTRUCTION
PROPOSED WASTEWATER SEWER
2012 ALLOCATION PROGRAM
2008/2009 ALLOCATION PROGRAM
(FUNDED, NOT CONSTRUCTED)
MUNICIPAL BOUNDARY
HALTON
PEEL



LEGEND:

2031
2-4 LANES 2018
4-6 LANES 2028
REGIONAL ROADS
ANTICIPATED CONSTRUCTION DATE/
ROAD WIDENING FORECAST

2025
2 LANES 2022
2-4 LANES 2025
LOCAL ROADS
ANTICIPATED CONSTRUCTION DATE/
ROAD WIDENING FORECAST

ROAD CONSTRUCTED

ROAD UNDER CONSTRUCTION

PROPOSED ROAD

FUTURE ROAD WIDENING

MUNICIPAL BOUNDARY

M

G

HALTON
PEEL
R

APPENDIX B

Agricultural Assessment Review for the Land Base Analysis Area Located in the Town of Milton, Halton Region

DRAFT

AGRICULTURAL ASSESSMENT REVIEW FOR THE LAND BASE ANALYSIS AREA LOCATED IN THE TOWN OF MILTON, HALTON REGION

Prepared for:
The Town of Milton

By:
AgPlan Limited

May 5, 2017.

TABLE OF CONTENTS

List of Appendices

List of Tables

List of Figures

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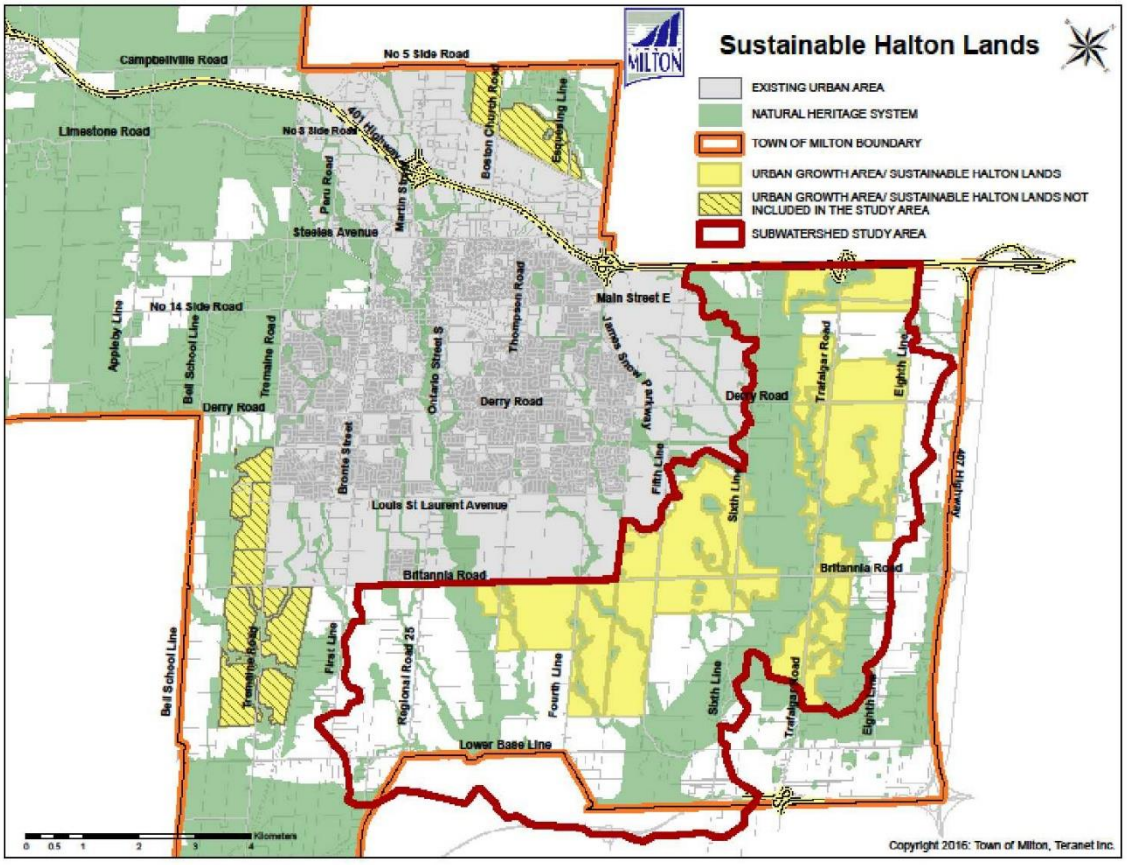
1.0 STUDY OBJECTIVES

1.1 Introduction

Halton Region has chosen areas for urban expansion in Milton and Halton Hills. One of these areas, located in the Town of Milton, called the Land Base Analysis (LBA) study area (Maps 1 and 2), is the subject of this agricultural report which addresses possible agricultural impacts prior to the secondary plan stage. There is a need for an agricultural assessment because the lands planned for urban development in the Land Base Analysis Study Area have the potential to affect agricultural/rural uses remaining within the Town of Milton.

MAP 1 STUDY AREA LOCATION

Map 1: Town of Milton Urban Growth Area 2021-2031 (Sustainable Halton lands)

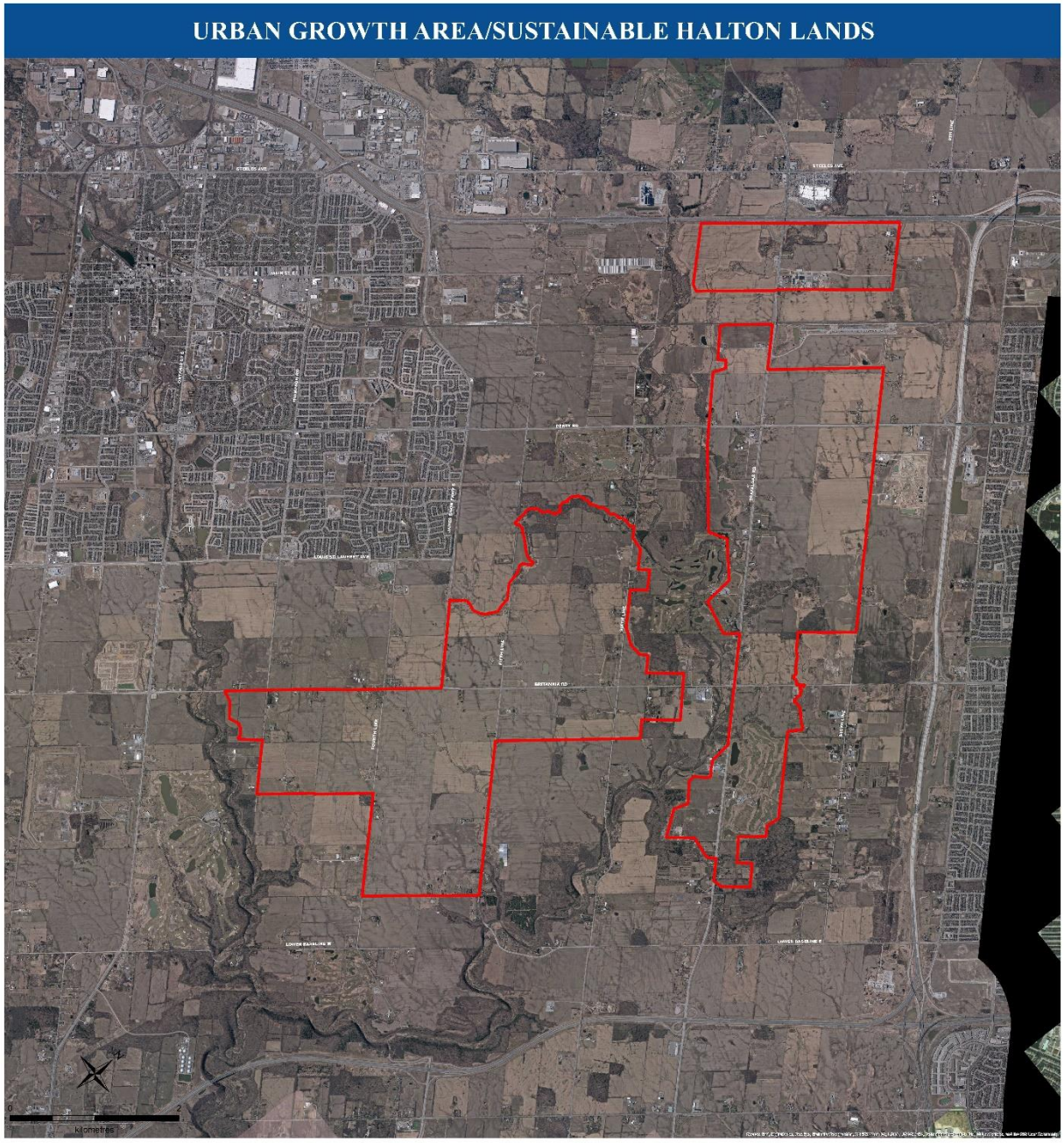


The terms of reference provided by the Request for Proposal (RFP) indicate that the agricultural assessment would include:

> *a preliminary review of the conditions and features within and adjacent to the Sustainable Halton lands (e.g., soils, climate, topography, drainage, agricultural operations, character of area) and identify constraints to development, as it relates to agriculture/agricultural system; information from the Region's Agricultural Impact Assessment Guidelines, as well as the*

Minimum Distance Separation Formulae should, among other plans and studies, be used to guide this analysis [note: it is anticipated that a more detailed analysis related to the potential impacts of development on surrounding agricultural operations/agricultural system will be undertaken as part of a future Secondary Plan study].

MAP 2 STUDY AREA BOUNDARY AERIAL VIEW



Therefore, following the RFP, the contents of this report is framed by policy as well as guidelines and addresses several agricultural characteristics of the study area, Milton,

and Halton Region, given the agricultural context of southern Ontario. As a result, this agricultural assessment is based on current conditions as well as on an estimate of future conditions and was completed to answer three questions as follows:

- What are the characteristics of the agricultural environment on and off-site?
- How have the agricultural characteristics within the study area changed over the past 30 years?
- What mitigation measures related to possible urban/rural conflict are available for the reduction of impacts to agriculture *to the extent feasible*?

The use of past conditions to project/estimate future conditions is subject to the extrapolation of existing measurements and therefore to the general limitations associated with extrapolation (as outlined in many statistics texts and described within Wikipedia). The phrase "The Land Base Analysis Study Area Secondary Plan Area" is used synonymously with the words "study area" and "site" within this report.

The land base analysis planning process includes reports from a number of different disciplines. Therefore, this agricultural assessment information should be supplemented with other reports prepared for the The Land Base Analysis Study Area Secondary Plan Area with specific reference to the planning analysis prepared by Malone Given Parsons. As well, the contents of this agricultural report may be changed by the author as a result of information and questions provided within external reviews.

The report uses four phrases which are defined as follows:

- **Soil Capability Class** - This term is the one most often used in rating agricultural soils and is defined as part of the *Canada Land Inventory Soil Capability Classification for Agriculture* - Soil Capability for Common Field Crops. It is an interpretive classification of the soils maps produced within Canada where soils are identified by texture, drainage class, layers (diagnostic horizons) etc. following the Canadian System of Soil Classification (1978, third edition 1989 http://sis.agr.gc.ca/cansis/references/1998sc_a.html). The soil capability rating is a seven-class system consisting of a class number (1 (best) – 7 (poorest)) and a subclass limitation such as stoniness, slope, or erosion (represented by an alphabetic code P, T, E, etc.). The best soils with no limitations for production of common field crops are ranked as class I and soils unsuitable for agriculture are rated as class 7. This information concerning capability classes and subclass limitations is provided as part of the relational database included with the soil mapping digitized by OMAFRA and provided by LIO/MNR (Land Information Ontario/Ministry of Natural Resources).
- **Soil Productivity Index** - The original soil capability classification classes one through seven have been converted from an ordinal to a ratio scale on the basis of crop yields. For common field crops, such as grain corn, oats and barley, a relationship was measured to demonstrate that if class I land was assigned the soil productivity index value 1.00, then class 2 would be 0.80 and class 3 would be 0.64 etc. The use of the ratio scale allows for a mathematically acceptable measurement of mean value. Therefore, a given study area can have a single average value of a soil productivity index. When comparing different site alternatives, the use of the soil productivity index allows comparison of the

alternatives using a single value. The use of the soil productivity index also provides a way to deal with soil complexes - where a soil complex is represented by a single polygon (in the past this was called a map unit) where there are two or more soil series/types present and mapped and where there is some likelihood to be a combination of soil capability classes such as 60% class I and 40% class 2T, for example.

- **Soil Potential Index** - Like the aforementioned Soil Productivity Index, the Soil Potential Index provides an "average" (single value) soil potential for agricultural production for a given area when that area contains more than one soil potential rank or rating. The Soil Potential Index is based on ranks which are part of an ordinal scale and provide a potential rating for the production of fruit and vegetable crops.
- **Agricultural Performance** - Agricultural performance is a single relative comparative measure that combines many agricultural characteristics of a given area in comparison to another given area (for example, one Region or County relative to another Region or County). The scoring, ranking or relative difference is quantitative. Agricultural performance includes economic, socio-cultural and physical variables and is described in more detail in in the method section following.

1.3 Methods

The findings described in the following section are based on published literature, which is listed in the references section, and aerial photo interpretation. Much of the information relates to the use of statistics from Statistics Canada and the Ontario Ministry of Agriculture, Food and Rural Affairs and is subject to the limitations of the surveys completed by these government groups.

Single factor analysis as well as the use of multi-attribute data analysis was used to compare the agricultural performance of Halton and Milton relative to other sub-tier municipalities in Halton Region. The multi-attribute data analyses were completed using two methods; simple additive weighted, and concordance which are described in more detail in Appendix 4.

There are several different methods available to rank agricultural areas given provincial agricultural policy. In all cases, more than one agricultural attribute is used to differentiate the better from the poorer agricultural lands so as to designate the better lands as prime. Hence, all agricultural land evaluation related to the PPS must be multi-attribute analysis. Any multi-attribute analysis may have different results based on:

- the number and kind of variables considered,
- the scale and therefore precision at which the agricultural information is available,
- the accuracy of the information,
- the analysis method,
- the weights applied to the variables,
- whether the data was standardized, and
- whether all of the data was presented consistently to mean that a high number is intended to indicate a high importance value.

A review of the literature did not present information suggesting that a particular single multi-attribute analysis method is the best method. Even the wording employed for the quantitative methods used to combine information varies. The University of Redlands and the Spatial Decision Support Consortium (2012) have prepared a summary of the language and definitions associated with Multi-Criteria Decision Analysis (MCDA). Some of the work described by the University of Redlands is based on work by Malczewski (2006). Multi-attribute Combination Methods is a subset of MCDA having subcategories of Analytical Hierarchy Process, Concordance Methods, Fuzzy Aggregation Operation, Ideal/Reference Point Method, Value/Utility Function Method and Weighted Linear Combination. Therefore, there is a need to consider more than one agricultural metric and more than one analysis method when evaluating agricultural land.

The Ontario Ministry of Agriculture, Food and Rural Affairs suggests using a Land Evaluation and Area Review (LEAR) method to evaluate agricultural lands. The rationale for this recommendation is not available. A LEAR analysis fits in to the subcategory of Weighted Linear Combination which is described on the Redlands website as "the most often used technique for tackling spatial multi-attribute decision making".

There are several other methods that could be used to show similarity/dissimilarity amongst the combined variables defining agricultural value of the lands within Ontario. The LEAR analysis is linear and other methods available to differentiate the better from the poorer agricultural lands can be used to emphasize differences by squaring those differences - thus, looking at differences based on an exponential relationship. A cluster analysis is based on a sum of squares technique and has been used to measure similarity/dissimilarity. Alternatively, Massam (1993) has used Concordance to complete spatial analyses rating different land areas. Concordance is an additive method which emphasizes the weights assigned to variables more so than the actual range of numerical difference when comparing those variables.

Regardless, there are several decisions that must be made when evaluating agricultural land given the guidance provided by the PPS and these decisions include, but are not limited to, the:

- multi-attribute analysis method(s),
- agricultural indicators/variables used in the analysis,
- evaluation unit size,
- weighting/importance rating,
- minimum area designated, and,
- point at which differences are sufficient to place lands in specialty crop, agricultural or rural designations.

The agricultural multi-attribute analyses results presented within this report are the “weighted linear combination” method such as the LEAR described by OMAFRA.

Agricultural census data for Milton (or the other sub-tier municipalities in Halton Region) are sometimes subject to suppression for reasons of confidentiality. However, the data can be imputed. Several different methods are available to impute missing information.

In this report, the total value, for example, an area or total number of animals reported in Halton Region not accounted for in the data supplied for the sub-tier municipalities, was assigned to the sub-tier municipalities, having suppressed information, based on the number of farms reporting the agricultural information and lacking the area or animal data.

2.0 FINDINGS

2.1 Planning Context

General agricultural assessment requirements at, or prior to the Secondary Plan stage have not been specifically described by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA). In addition, there are no standards or guidelines related to Agricultural Impact Assessment (AIA) produced by the Province of Ontario. The work summarized in this report relates to three sections of the Provincial Policy Statement (PPS, 2014) as follows:

> PPS 1.7.1 (h) *Long term economic prosperity should be supported by providing opportunities to support local food, and promoting the sustainability of agri-food and agri-product businesses by protecting agricultural resources, and minimizing land use conflicts.*
>
> *2.3.3.3 New land uses, including the creation of lots, and new or expanding livestock facilities shall comply with the minimum distance separation formulae.*
>
> *2.3.6.2 Impacts from any new or expanding non-agricultural uses on surrounding agricultural operations and lands should be mitigated to the extent feasible.*

With respect to protecting agricultural resources, Halton Region in its Regional Official Plan Amendment (ROPA) 38 has identified the Land Base Analysis study area as an area of urban settlement. Milton is required to bring its Official Plan into conformity with ROPA 38 and has prepared OPA 31, which is currently pending approval by Halton Region, and which identifies the Land Base Analysis study area as urban. Given that the site lands are identified as urban, a reasonable interpretation can be made that:

- the agricultural resource has been protected given the requirements of the Provincial Policy Statement and the Greenbelt Plan;
- Minimum Distance Separation is not required within the Land Base Analysis study area based on Guideline 10 in OMAFRA's *The Minimum Distance Separation (MDS) Document* (2017). However, because mitigation can include urban land use kind, design, locations and features at the secondary plan and plan of subdivision stages to accommodate separation distance, MDS will be discussed further later in this report.

The need for mitigation measures, as described within the PPS (2014), is a result of possible conflict between urban and rural inhabitants. This potential conflict has been summarized by Pasato (2001) as follows:

A) Conflict from the Farm Perspective

The encroachment of residential development on agricultural land and practices can be viewed with much hostility from a farm perspective. Some broad issues that can cause conflict include:

- *economic instability caused by urbanization and changing land values,*
- *trespassing by hikers, cyclists, school children, hunters, dogs, off-road vehicles,*
- *damage to equipment, fencing, irrigation and crops,*
- *theft of crops,*
- *crop and irrigation spraying limitations due to urban encroachment,*
- *development affecting recharge or groundwater,*
- *flooding and/or soil erosion from urban development and storm water runoff,*
- *safety concerns related to slow moving farm equipment, hydro, transmission lines and gas lines,*
- *movements of farm vehicles restricted by physical barriers, urban road patterns, and traffic.*

B) Conflict from the Non-Farm Perspective

New residential development can take issue with farms and their practices. These issues could include:

- *noise and vibration from farm equipment, animals, fans, bird-scaring machines, night harvesting, early morning activities,*
- *odours,*
- *chemical spray drift,*
- *dust from the fields,*
- *light. from greenhouse operation,*
- *animals straying,*
- *pollution of groundwater,*
- *intensive farming operations,*
- *farm traffic causing congestion and concerns for safety,*
- *extended hours of operation.*

The types of agriculture that are often perceived as the most offensive include intensive livestock operations (manure, smell, noise), and mushroom farming (composting process - smell).

OMAFRA, in its publication *Guidelines on Permitted Uses in Ontario's Prime Agricultural Areas* (2016), summarizes possible impacts to agriculture as follows:

Impacts can be short- or long-term and may affect agricultural production, infrastructure, operations or farmers' flexibility in carrying out their farming business. Examples of potential impacts include:

- *loss of agricultural land,*
- *increased traffic and safety risks for slow-moving farm equipment operators and people in passing vehicles,*
- *nuisance complaints by new residents related to normal farm practices (may depend on wind direction, landforms, vegetation, etc.),*

- *farmer concern over lighting, noise, dust and other changes in settlement areas that are incompatible with agriculture (also dependent on physical site attributes),*
- *new or increased minimum distance separation requirements that may restrict future development or expansion of livestock facilities,*
- *trespassing, vandalism, pets at large and litter/garbage disposal on farm properties,*
- *change in water quality or quantity,*
- *increased growth pressure on remaining agricultural lands.*

Mitigation in the form of urban design guidelines as well as in the use of buffers will be discussed more fully in section 2.7 of this report.

Map 3 summarizes the land use designations surrounding the study area. Agricultural designations remaining within Milton and immediately adjacent to the East and West portions of the LBA study area tend to be:

- segmented by Natural Heritage System designations,
- having urban development from Milton on a minimum of 2 sides, and,
- are already influenced by the urbanization of Mississauga and Oakville.

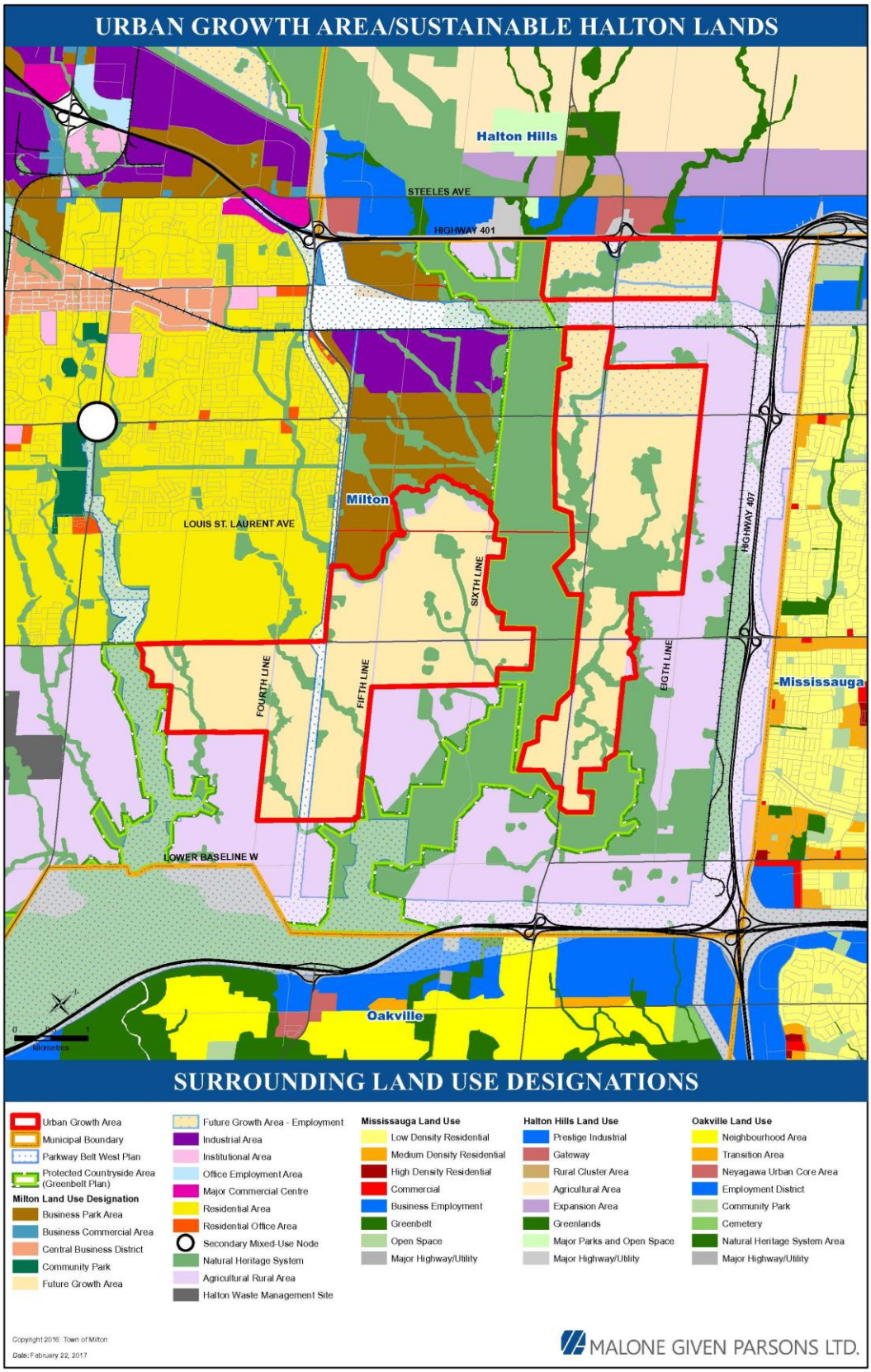
2.2 Agricultural Context, Trends and Evaluation

A comprehensive examination of agricultural single factors as well as multi-attribute analysis has been completed and the results summarized graphically in Appendix 1. The single factor evaluations are based directly on information gathered as part of the Agricultural Census for Canada over a 30-year timeframe from 1981 to 2011. In some cases, the single factor analyses required a calculation. For example, net income was derived by subtracting farm expenses from gross income because net income wasn't originally part of the census information.

Multi-attribute analysis can be completed using different methods, databases and importance ranking (weighting) as described previously. Several different databases were used which have been identified using a single descriptor such as "fruits and vegetables", "yield", "economic" and "food production". All the multi-attribute analyses presented graphically in Appendix 1 have each database variable with the same weight (unit weight) and only one economic database inverts some of the original census information. The results of several different multi-attribute analyses have been included to demonstrate that the highest scored 5 Counties/Regions and the lowest scored 5 Counties/Regions tend to be similar irrespective of the database.

The information provided in Appendix 1 up to and including Figure 33 is summarized under subheadings in the following paragraphs. Figures 34 through to 50 are described in the land use section following of this report. Figures 51 to 57 are dressed in the section on livestock.

MAP 3


URBAN GROWTH AREA/SUSTAINABLE HALTON LANDS
Halton Hills
STEELES AVE
HIGHWAY 401
Milton
LOUIS ST. LAURENT AVE
SIXTH LINE
HIGHWAY 407
FOURTH LINE
FIFTH LINE
EIGTH LINE
Mississauga
LOWER BASELINE W
Oakville
SURROUNDING LAND USE DESIGNATIONS
Urban Growth Area
Municipal Boundary
Parkway Belt West Plan
Protected Countryside Area (Greenbelt Plan)
Milton Land Use Designation
Business Park Area
Business Commercial Area
Central Business District
Community Park
Future Growth Area
Future Growth Area - Employment
Industrial Area
Institutional Area
Office Employment Area
Major Commercial Centre
Residential Area
Residential Office Area
Secondary Mixed-Use Node
Natural Heritage System
Agricultural Rural Area
Halton Waste Management Site
Mississauga Land Use
Low Density Residential
Medium Density Residential
High Density Residential
Commercial
Business Employment
Greenbelt
Open Space
Major Highway/Utility
Halton Hills Land Use
Prestige Industrial
Gateway
Rural Cluster Area
Agricultural Area
Expansion Area
Greenlands
Major Parks and Open Space
Major Highway/Utility
Oakville Land Use
Neighbourhood Area
Transition Area
Neyagawa Urban Core Area
Employment District
Community Park
Cemetery
Natural Heritage System Area
Major Highway/Utility
Copyright 2016: Town of Milton
Date: February 22, 2017
MALONE GIVEN PARSONS LTD.

Census Farm Number and Area

Figures 1 through 4 indicate That from 1981 to 2011:

- census farm number and census farm area have been decreasing in Halton and Milton,
- Milton's proportion of Halton Region's total census farm area has decreased and stands at approximately 35% in 2011, and,
- Halton's proportion of Ontario's total census farm area is less than 1% and in 2011 has decreased to approximately 0.62%.

Area in Greenhouses

Figures 5 through 8 indicate that:

- the number of farms reporting greenhouses in Halton has decreased between 1981 and 2011,
- in 1981 Halton ranked 11th with respect to farm number reporting greenhouses for southern Ontario and in 2011 Halton ranked 14th,
- in 1981 Halton ranked 6th in total square metres of greenhouses relative to other Counties/Regions in southern Ontario,
- in 2011 Halton ranked 11th in total square metres of greenhouses relative to other Counties/Regions in southern Ontario, and
- Halton's total area of greenhouses increased between 1981 and 2011 but not as much as for Essex County and Niagara Region, for example.

Farm Operation Size

- Figure 9 indicates that Halton's average farm operation size is smaller than that for Ontario and is 1 of the lowest in southern Ontario.

Farm Operator Age

Farm operators in Ontario tend to be relatively older as they are in Halton Region. Figures 10 and 11 indicate that:

- farm operators less than 35 years of age comprise less than 5% of farm operators in Halton,
- Halton has fewer young farmers than most Counties/Regions in southern Ontario where Halton ranks 2nd to last in the number of young farmers,
- middle-aged farmers in the age range 35 to 54 years comprise approximately 36% of farmers - the lowest proportion of Counties/Regions in southern Ontario.

Economics and Financial

Figures 12 to 22 provide context for several economic and financial indicators as follows:

- on-farm net operating average income does not surpass off farm income until the revenue category $100,000-$249,999 is reached,
- over 80% of farm operators have more off farm income than on farm operating income in Ontario,
- total farm capital is highest in Peel Region followed by Halton Region but most of this income is derived from the total value of land and buildings and it is likely that the land value is not based on its value as farmland (2011 census),

- Halton ranks 12th out of 35 for its gross farm receipts per census farm but ranks 16th for net income per census farm (2011 census),
- on the basis of gross farm receipts per census farm acre, Halton does better and ranks 7th in this improves to the rank of 6 for net income per census farm acre (2011 census),
- looking at trends in gross farm receipts and net on-farm income is difficult because the farm expense categories have changed over time. However farm expense categories have been the same for 2001, 2006 and 2011 as summarized in Table 1. Gross farm receipts and net on farm income per farm have increased in Halton Region from 2001 to 2011 as they have in Milton,

TABLE 1

STATISTICS CANADA CENSUS FARM EXPENSE CATEGORIES (2001, 2006, 2011)
Fertilizer and lime purchases
Purchases of herbicides, insecticides, fungicides, etc.
Seed and plant purchases (excluding materials purchased for resale)
Total feed, supplements and hay purchases
Total feed, supplements and hay purchases
Livestock and poultry purchases
Veterinary services, drugs, semen, breeding fees, etc.
Custom work, contract work and hired trucking
Total wages and salaries $
Wages and salaries paid to family members $
Wages and salaries paid to all other persons $
All fuel expenses (diesel, gasoline, oil, wood, natural gas, propane, etc.)
Repairs and maintenance to farm machinery, equipment and vehicles
Repairs and maintenance to farm buildings and fences
Rental and leasing of land and buildings
Rental and leasing of farm machinery, equipment and vehicles
Electricity, telephone and all other telecommunication services
Farm interest expenses
All other expenses (excluding depreciation and capital cost allowance)

- total balance of trade (export dollar value minus import dollar value) has been decreasing, that is, more dollars are being spent on imported agricultural goods than are derived from exported agricultural goods) from 2002 to 2016. Positive balance of trade has occurred with respect to live animals,
- Ontario average farm value (dollars gross per acre) is greater ($1000-$8000) for fruits and vegetables of the type predominantly grown in Halton Region (apples, sweet corn, pumpkins and squash) than for common field crops such as soybeans winter wheat and hay (less than $1000),
- average farm value for crops has increased from 1981 to 2016,
- gross income per hectare for greenhouse vegetables (tomatoes, cucumbers and peppers) is much higher (approximately $800,000-$1 million).

Multi-Attribute Analyses

Figures 23 to 33 compare the relative production per unit area and/or per unit farm of 35 Counties/Regions in southern Ontario as follows:

- the proportion number of farms reporting and the number of livestock and area in crops when combined results in a relatively lower rank (25th out of 35) for Halton Region,
- when livestock number and area alone is compared proportionately (to account for overall size of a given County or Region), Halton Region is still in the lower half but ranks as 19th out of 35, for crop production area and livestock number,
- comparative economic data is better for Halton Region has the Region ranks in the upper half and for some databases is in the top 10,
- using the data available for crop yields, places Halton as 30th out of 35 Counties/Regions in southern Ontario,
- Halton's production of fruits and/or vegetables is relatively poor in the context of southern Ontario, and in the context of Ontario's entire production of fruit and vegetables,

2.3 Agricultural Soil Capability and Soil Potential

The predominant soils within the LBA study area are part of the Oneida Catena consisting of the soil series Oneida, Chingacousy and Jeddo series which are well, imperfectly and poorly drained respectively. These soils are predominantly prime lands in soil capability classes 1 through 3. Some newer soil surveys (see Kingston and Presant, 1989, Niagara Region) have downgraded the Oneida and Chingacousy series from class 1 to soil capability class 2 (because of clay content) when slopes are less than or equal to 5%. Other soil series such as Berrien sandy loam and Tuscola silt loam are less predominant within the study area and are also prime lands. The sandy soils found in this part of Halton Region tend to be associated with river and creek valley systems and are outside of the LBA study area. Additional description for soil classification and soil capability are outlined in Appendix 3.

Soils and soil capability information could be used at the secondary plan stage to:

- identify soils that provide a better base for parks and playing fields and/or
- provide a rationale for the timing at the such that the better agricultural lands are developed last.

However, the application/utility of the soils and soil capability information will depend on the rate at which urban development needs or does occur and the relative aerial extent of different kinds of urban use. Neither the rate or extent of proposed urban use are currently known.

Soils within the study area have some soil potential for the production of fruit and vegetable crops. The soil capability classification does not include fruit and vegetable crops. Thus, various classifications on the potential of various soils to produce fruits and vegetables have been published more recently for some Regions/Counties in southern Ontario. Specialty crop classification systems are described more fully and summarized in tabular form in Appendix 2. Niagara Region does have soil potential ratings for fruits and vegetables and these have been adapted within this report. There are 20 crop groupings in this specialty crop rating system as shown in Table 2 - 9

groups for fruits and 11 groups for vegetables. The crop groups A and B and E are rated as unsuitable (rank 7) due to climate. These crops could have been grown in the area adjacent to Lake Ontario in Oakville but that area is now developed for urban uses.

Table 2 summarizes soil potential ratings for the predominant soils within the study area. The soil potential rating assumes that tile drainage and irrigation are applied as required. Only two soil series, Oneida and Chingacousy with a slope ranging between 0.5 and 2%, have an average soil potential rating of 3. The remaining soils have an average rating of 4 and 5. Notwithstanding the average rating, Oneida and Chingacousy soils have relatively good potential for the production of labrusca grapes, apples, currants, gooseberries, cole crops (broccoli, Brussels sprouts, cauliflower), eggplant, peppers, cucumbers, tomatoes, sweet corn pumpkins and squash.

TABLE 2 SOIL POTENTIAL RATINGS

					FRUITS									VEGETABLES												Total Score	Average Soil Potential Rating
SOIL_NAME1	SLOPE1	CLASS1	STONINESS	DRAINAGE1	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T		
ONEIDA	1.0	B	0	MW	7	7	7	2	7	2	1	3	1	2	6	5	2	2	3	4	1	2	3	2	69	3
ONEIDA	3.5	C,c	0	MW	7	7	7	2	7	2	1	3	1	3	7	6	3	2	3	4	2	3	3	2	75	4
ONEIDA	7.0	D	0	MW	7	7	7	3	7	2	1	4	2	3	7	6	3	3	4	7	2	3	4	3	85	4
CHINGUACOUSY	1.0	B	0	I	7	7	7	2	7	2	1	3	1	2	5	5	2	3	4	5	2	3	3	3	62	3
CHINGUACOUSY	3.5	c	0	I	7	7	7	2	7	2	1	3	1	3	6	6	3	3	4	5	3	4	3	3	80	4
JEDDO	1.0	B	0	P	7	7	7	4	7	4	3	4	3	3	5	5	3	4	5	5	3	3	3	4	80	4
JEDDO	3.5	C	0	P	7	7	7	4	7	4	3	4	3	4	6	6	4	4	5	5	4	4	3	4	95	5

Crops Used:	
Tree Fruits, Grapes and Small Fruits:	
A	Peaches, Apricots, Nectarines
B	Sweet Cherries
C	Sour Cherries
D	Labrusca Grapes
E	Vinifera Grapes
F	Apples
G	Pears, Plums
H	Strawberries, Raspberries
I	Currants, Gooseberries
Vegetable Crops:	
J	Broccoli, Brussel Sprouts, Cauliflower
K	Bulb Onions, Garlic
L	Green (Bunching) Onions
M	Eggplant, Peppers
N	Cucumbers
O	Muskmelon
P	Potatoes
Q	Tomatoes
R	Sweet Corn
S	Celery, Lettuce
T	Pumpkins, Squash

The fruit and vegetable crops that can be grown in Halton and the study area are not unique in the context of the Province or of the Greater Toronto Area. The amounts of different specialty crops and trends in their relative area of production are outlined more fully in the following section.

2.3 Agricultural Land Use

Agricultural land use within the study area can be ascertained based on area photo interpretation as well as by reference to the published literature. The Land Base Analysis Study Area lands are predominantly used for common field crop production as can be seen by interpreting the aerial photo base on Map 2. Woodland (including wetlands) areas are the 2nd most predominant land use (based on areal measurement). These observations are supported by Statistics Canada census information which is summarized in Figures 34 to 50 and under subheadings in the following.

Crop Production

- in 2011, 77% of census farm area was used for crop production in Halton and, in the same census year, Milton had 74% of its census farm land in crops,
- 10% of the census farm area was in Christmas trees, woodlands and wetlands in Halton and 12% in Milton in 2011,
- in 2011, the greatest area of cropland was in soybeans (32%), followed by corn (22%), and alfalfa and alfalfa mixtures (17%) in Halton Region; Milton had the same field crop predominance with slight differences in the percentage of total area,
- fruits and vegetables comprised approximately 1% each of the crop area in Halton as well as Milton in 2011,
- from 1981 to 2011 fruit and vegetable production areas and farms reporting fruits and vegetables have diminished in Halton Region as well as in Milton,
- when calculated as a proportion of the total area of all census farms, Milton had more farms reporting fruits and vegetables from 1981 to 2011,
- the proportionate measure of area in fruits and vegetables peaked in 1986 for vegetables and in 2011 for fruits, berries and nuts,
- Halton Region's fruit, berries and nuts as well as vegetable production measured as farms reporting and area has diminished as a proportion of the production in Ontario from 1981 to 2011,
- from 1981 to 2011 farms reporting greenhouses in Halton and Milton have diminished,
- Halton's total area of greenhouses peaked in 1996 and that total area peaked in 2006 in Milton,
- the proportion of census farms reporting greenhouses peaked in Halton Region in 2006 and in Milton in 2001,
- the proportion of census farm area occupied by greenhouses peaked in Milton in 2006 as it did in Halton.

2.5 Climate

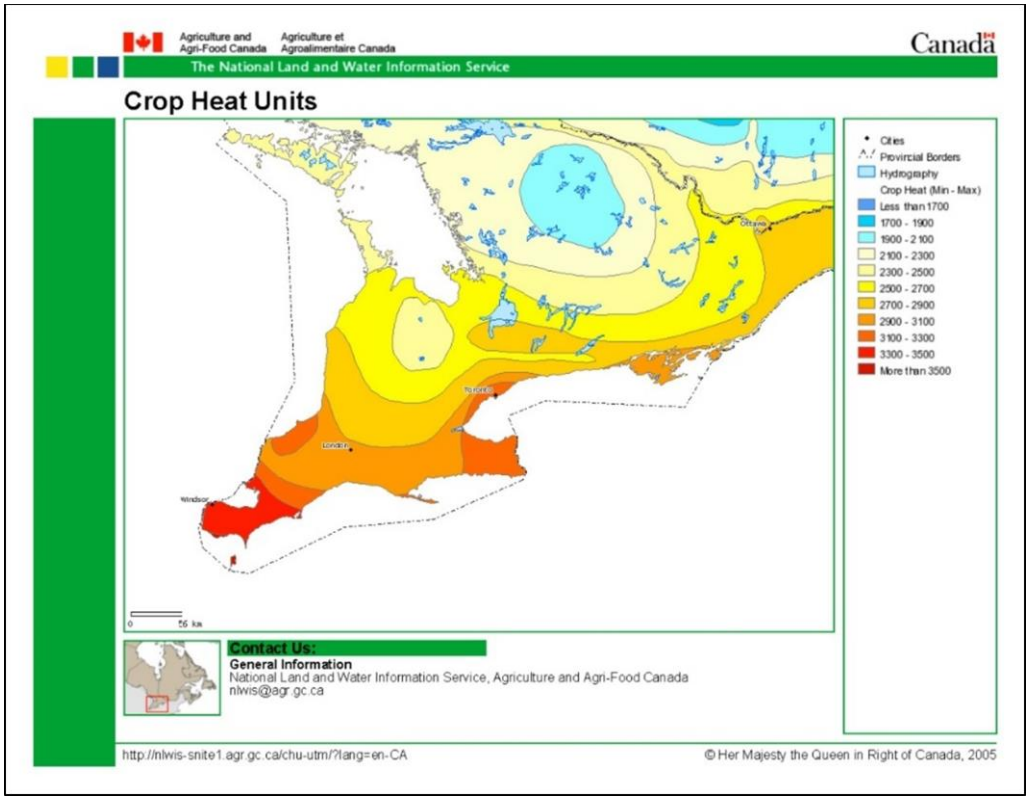
There are no readily available regional maps that integrate the various components of climate such as crop heat units, precipitation during the growing season, depth to water table, availability of water for irrigation, sunshine days and other climate risk factors into

a single potential rating similar to soil capability. However, several broad scale, recent as well as historical climate information maps, are available from Agriculture and Agri-Food Canada at the national and provincial levels.

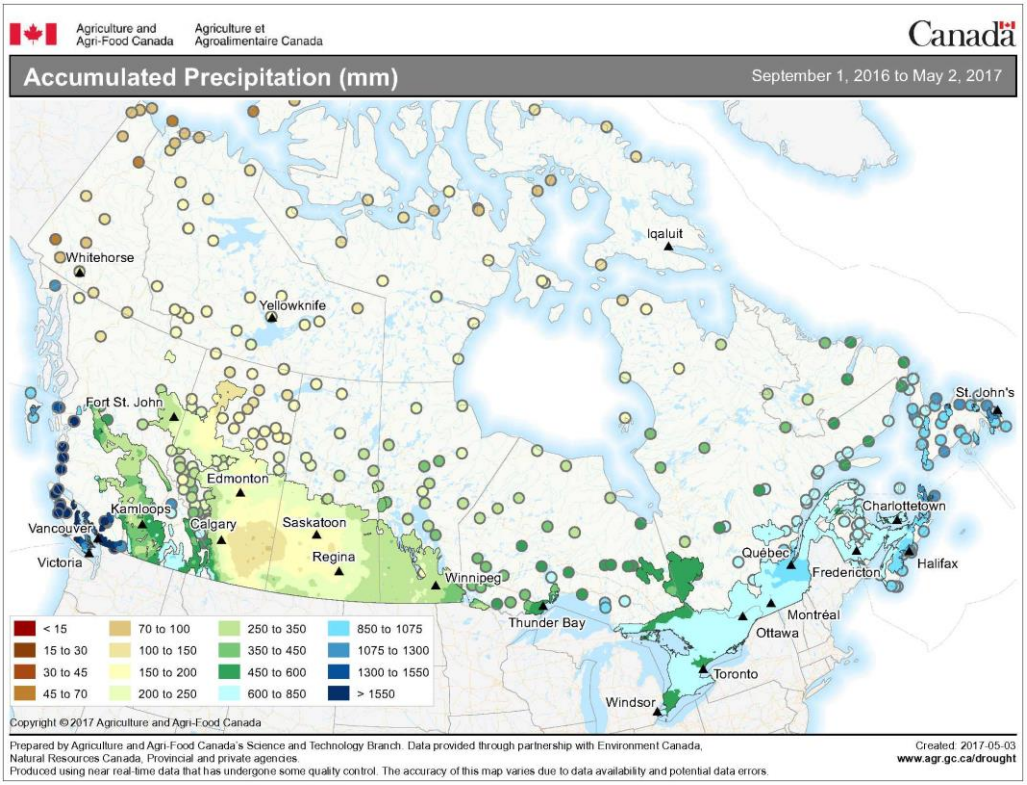
Map 4 indicates that much of the study area is in the area receiving 2700-2900 crop heat units. The higher crop heat units of 3100 to 3500 in southern Ontario drives plant growth but heat units must be considered together with other elements that will affect sensitive higher value crops such as fruits and vegetables. These additional elements of climate which include moderating adjacent water bodies, elevation, cold air drainage and aspect, at a sub-tier municipal scale to a specific farm scale, are not reflected in Map 4.

There are also broad-scale maps available for other climate characteristics such as precipitation (its intensity, frequency, and/or at what time of year it occurs). For example, the time over which precipitation is measured has the potential to produce different mapping. Map 5, summarizes accumulated precipitation from September 1, 2016 to May 2, 2017 and indicates that in the context of Ontario, Halton has received reasonable levels of precipitation. However, when precipitation mapping is produced for the growing season (Map 6, April to October 2016), Halton and Milton had historically low levels of precipitation as did much of southern Ontario. The map also indicates that Halton fared better for rain that did areas north and east of Toronto but received historically less rainfall than did Essex County, for example. Regardless of the fluctuations in weather, climate in Halton and Milton is good for agricultural production but is not unique in the context of southern Ontario.

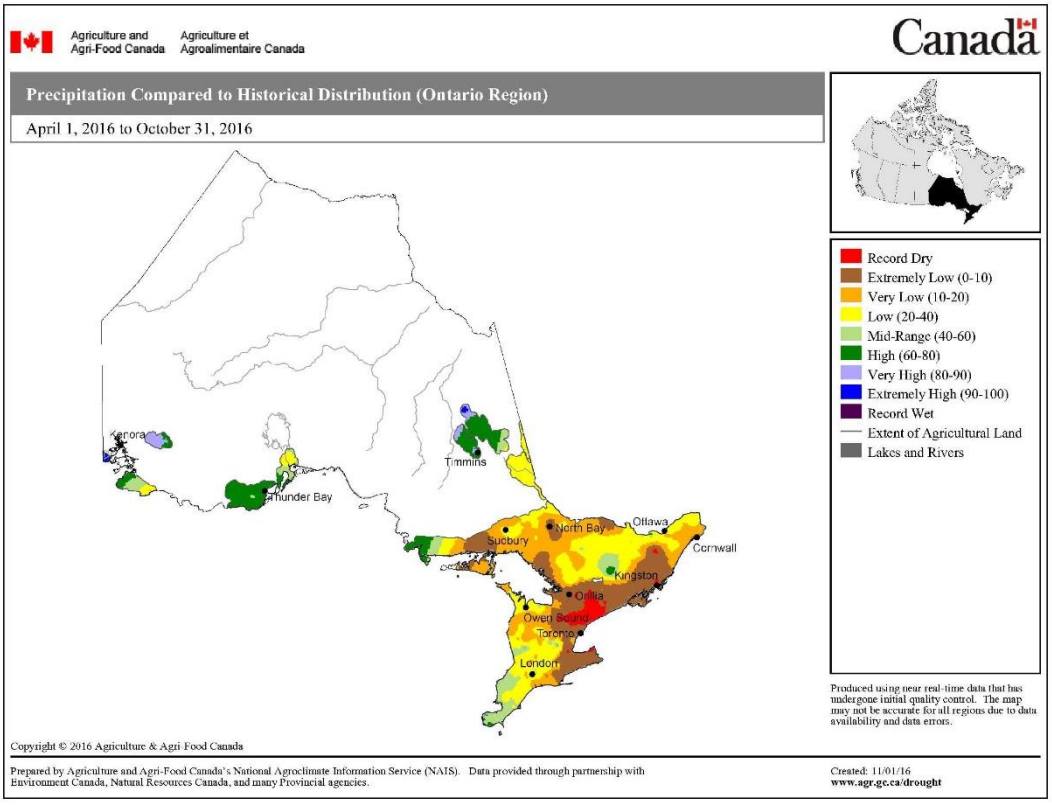
MAP 4



MAP 5


Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Canada
Accumulated Precipitation (mm)
September 1, 2016 to May 2, 2017
Whitehorse
Yellowknife
Iqaluit
Fort St. John
Edmonton
Kamloops
Vancouver
Victoria
Calgary
Saskatoon
Regina
Winnipeg
Thunder Bay
Québec
Fredericton
Halifax
Charlottetown
St. John's
Montréal
Ottawa
Toronto
Windsor
< 15
15 to 30
30 to 45
45 to 70
70 to 100
100 to 150
150 to 200
200 to 250
250 to 350
350 to 450
450 to 600
600 to 850
850 to 1075
1075 to 1300
1300 to 1550
> 1550
Copyright © 2017 Agriculture and Agri-Food Canada
Prepared by Agriculture and Agri-Food Canada's Science and Technology Branch. Data provided through partnership with Environment Canada, Natural Resources Canada, Provincial and private agencies.
Produced using near real-time data that has undergone some quality control. The accuracy of this map varies due to data availability and potential data errors.
Created: 2017-05-03
www.agr.gc.ca/drought

MAP 6


Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Canada
Precipitation Compared to Historical Distribution (Ontario Region)
April 1, 2016 to October 31, 2016
Kenora
Thunder Bay
Timmins
Sudbury
North Bay
Ottawa
Cornwall
Kingston
Owen Sound
Toronto
London
Record Dry
Extremely Low (0-10)
Very Low (10-20)
Low (20-40)
Mid-Range (40-60)
High (60-80)
Very High (80-90)
Extremely High (90-100)
Record Wet
Extent of Agricultural Land
Lakes and Rivers
Produced using near real-time data that has undergone initial quality control. The map may not be accurate for all regions due to data availability and data errors.
Copyright © 2016 Agriculture & Agri-Food Canada
Prepared by Agriculture and Agri-Food Canada's National Agroclimate Information Service (NAIS). Data provided through partnership with Environment Canada, Natural Resources Canada, and many Provincial agencies.
Created: 11/01/16
www.agr.gc.ca/drought

2.6 Livestock and Manure Production

Several data sources have been used at various scales to characterize livestock use. For example, impediments to the construction of new livestock buildings are to be found in government regulation such as the Nutrient Management Act (NMA, 2002) and the Act's associated Regulation (2005), in addition to the costs associated with the livestock business.

These costs include:

- The requirements of compliance with the NMA. Costs are significant and vary with agricultural industry and are outlined in the paper by Brethour et al. (2004). The poultry business is in a relatively good position to expense those costs.
- Costs for entering supply controlled agricultural industry such as dairy or poultry (which are the livestock industries with a good expectation of high net returns) is high. Combe (2000) estimated that the capital investment (excluding land costs) related to 30,000 units of chicken broiler quota was $1.609 million. Therefore, the capital investment (excluding land) for the 30,000 units of chicken broiler quota would be in excess of $1.6 million at current prices.

Given the level of liability, costs of compliance, hard work and uncertainty associated with livestock production, that production may become a less desirable farming option. For example, livestock farming may not be the favoured choice for an agricultural operation because of externally imposed requirements related to nutrient management, animal welfare, diseases such as BSE and avian flu in addition to the cost of quota associated with supply controlled industries (chicken, eggs and dairy). This perspective is supported by information that indicates that less livestock is being produced within Halton Region. Statistics Canada information, which tracks changes every five years, shows diminishing levels of nutrient units (formerly animal units) and manure production (Figures 51 to 57) as follows:

- total nutrient units per unit area have diminished in Halton Region and Milton after peaking in 1991 based on data recorded between 1981 and 2011; whereas, total nutrient units per unit area have increased in Canada and have been relatively constant in Ontario,
- total nutrient units averaged per census farm have diminished overall in Halton and Milton between 1981 and 2011 but have increased in Ontario and Canada,
- Halton's total nutrient units as a proportion of Ontario's total nutrient units is relatively low and has decreased between 1981 and 2011,
- Milton's total nutrient units as a proportion of Halton Region's total nutrient units have increased with a peak in 2011,
- when total nutrient units are multiplied by the odour factor (an "unpleasantness" rating), Halton's and Milton's levels have decreased between 1981 and 2011,
- total nutrients times the odour factor averaged per census farm shows an overall decrease for Halton as well as Milton,
- in 2011, cattle followed by horses and ponies accounted for the greatest amount of the nutrient units reported in Halton and Milton.

2.7 Mitigation

There is much qualitative literature describing possible conflict between agriculture and urban uses where that conflict is related to dust, pesticides, noise, light, transportation,

odour, trespass, vandalism, farm management, animal care and other matters related to life in, and expectations associated with, agricultural versus urban areas. Is not the intent of this report to review that literature extensively. OMAFRA does not have documents that describe mitigation measures and their efficacy but have provided information prepared by some municipalities within southern Ontario (London, Mississippi Mills) and to government papers available for British Columbia (OMAFRA, 2016). The literature from British Columbia is more extensive. Published literature generally provides information with respect to subdivision design and other recommendations intended to reduce urban/rural conflict.

- Roads at the boundary between agricultural and urban areas should be designed to accommodate large, wide, slow-moving farm machinery (by use of wider road surfaces including paved shoulders; by placement of road markers, signage, mail boxes, away from the road edge, for example).
- Visual barriers provided by tree plantings within the agricultural and urban areas would potentially reduce some impacts related to light and noise.
- Choose areas of lower agricultural importance/priority for non-agricultural development where that proposed non-agricultural development has a boundary adjacent to relatively lower priority agricultural lands.

The literature shows that mitigation can take the form of:

- physical separation (buffer strips),
- berms,
- fencing,
- screening through use of vegetation,
- insertion of low-density uses between high-density urban uses and farm land,
- specialized zoning of buffer strips to prevent structures, storage, and removal of vegetation,
- clauses attached to land title which warn that adjacent uses include farm land where normal farm practices are protected and where those practices include the production of dust, vibration, odours, light, noise etc. and the use of fertilizers and pesticides,
- any combination of the aforementioned.

The need for, as well as the form or characteristics of, that mitigation can depend on several factors such as:

- the relative importance of the farmland as defined by planning policy;
- the kind and scale/size of agricultural operations (livestock versus fruit production, for example) probably affected by new urban development;
- the probability of impacts to agriculture and the severity of those impacts if they should occur;
- the probability that mitigation in any, or of specific form, can significantly reduce probable impacts;
- the relative positive impacts of residential development adjacent to farm land compared to negative impacts associated with the juxtaposition of residential and agricultural development.

The literature tends to emphasize the negative interactions at the urban/agricultural interface. However, there are some positive impacts and these are outlined by Sokolow (Chapter 12, no date).

> *The common generalization from several studies is that urban proximity can provide profit-making opportunities as well as problems for farmers, considering the potential for direct marketing, other forms of access to urban consumers, and off-farm income for operators. (Edelman, et al., 1999). But only certain kinds of intensely-cultivated farms, including vegetable producers, seem to benefit from such locations (Larson, et al., 2001). A USDA review of the available information on farms in metropolitan areas characterizes them as smaller, producing more per acre, more diverse, and more focused on high-value production than farms in non-metropolitan areas (U.S. Department of Agriculture, 2001).*

Mitigation must also consider the fact that agriculture includes a diversity of farm types and farm management. Agriculture includes the production of nursery crops which can be a source for "horticultural plantings" and some "invasive plants" relative to other kinds of agricultural production. Regardless, there is currently no requirement for buffer areas between farms producing nursery crops and other types of farms within prime agricultural areas.

The mitigation options available are based on several sources of literature. Much of the Canadian literature is from the province of British Columbia and has been put in place relative to their Agricultural Land Reserve (ALR). Landscaped buffer specifications (Agricultural Land Commission, 1993) start with a minimum buffer width of 3 m. Other specifications suggest that berms may be added to the buffer. Because of the slopes on the proposed urban properties adjacent to UCCF and which continue downslope on UCCF, a berm was not recommended. The addition of the berm would increase slope gradient thereby increasing the probability of soil erosion by water.
Different fencing types are described as part of Agricultural Land Commission buffer specifications. Specialized zoning and a restrictive covenant are present because of discussions in papers such as those by the British Columbia Ministry of Agriculture, Fisheries and Food (1996) and Curran (2005).

All of the literature search related to buffers at the agriculture/urban interface provided very little quantitative information and this viewpoint is expressed by Sokolow et al. (2010):

> *It* [edge conflict] *appears in many other parts of the nation where urbanization extends into commercial agricultural areas (Jackson-Smith and Sharp 2008; Abdalla and Kelsey 1996; Larson et al. 2001; Van Driesche et al. 1987). These accounts are usually anecdotal or prescriptive in nature, lacking a systematic examination of the causes and effects of agricultural-residential conflicts, especially one that builds on a comparison of different edge situations*.

Sokolow concludes his research with the question:

What is the relative effectiveness of various public policy measures - such as grievance procedures, right–to-farm ordinances, required buffers for new development and zoning - in avoiding or reducing edge conflicts?

Englund (2003) evaluated 27 buffers in British Columbia by use of survey research. Buffers varied in their length (40 m to 900 m), width (1 m to 350 m), density (20% to 95%) and species composition. As well, the positive and negative elements of the vegetated buffers were viewed differently. For example, some survey respondents classified the shade provided as a positive element while others saw it as negative. The fact that the buffer provided habitat for wildlife as well as provided for the screening of views was also viewed both positively and negatively by respondents to the survey.
the sample size of 27 buffers, given the variation in the characteristics of the buffers, as well as in the characteristics of the survey respondents, renders any form of conclusion with respect to the study as tentative.

Finally, there has recently been an impetus for agricultural production within urban areas. For example, the Ontario planning Journal (Volume 26 (4), 2011) provides information that urban agriculture is being studied at York and Queens Universities as well as the Universities of Toronto and Guelph. OMAFRA provides information related to urban agriculture on several websites (OMAFRA 2014, 2015a) and includes discussions on livestock production within urban areas. OMAFRA does mention the use of Minimum Distance Separation (MDS) in urban areas but, within its own MDS Guidelines (2006), leaves any requirement for the application of MDS within the urban settlement areas up to individual upper and/or lower tier municipalities.

In the review of the literature, no requirement for buffers between agricultural uses and urban uses within urban settlement areas was mentioned. This fact is a contradiction. Urban areas are actively seeking to accommodate or are accommodating agriculture within their boundaries without requirements related to buffering and/or separation, but, separation and buffering is required or recommended at the urban agricultural interface in some jurisdictions.

3.0 SUMMARY/CONCLUSIONS/RECOMMENDATIONS

The findings of the AgPlan analyses and mitigation review are summarized under subheadings in the following paragraphs.

Land Base Analysis Study Area

- The study area does not meet the requirements for a *specialty crop area* as defined within the PPS.
- The area does not have a high average potential for the production of specialty crops (fruits and vegetables).
- There are differences in soil potential and different areas can be prioritized based on that potential.
- Lands are predominantly in soil capability classes 1 through 3.
- There are differences in soil capability and different areas can be prioritized on the basis of that capability.
- Common field crops are predominantly grown.

- Soils have different drainage classes and textures.

Recommendation 1
Based on differences of soil potential and soil capability, a recommendation associated with the timing of development can be made to leave the better soils from a capability and potential perspective in agriculture longer. This recommendation is dependent on how quickly the area is likely to be developed. If the recommendation is followed, then work related to soil mapping and soil interpretation for potential for fruit and vegetables will need to be completed.

Recommendation 2
Based on differences of soil potential, soil capability soil drainage class and texture, it is recommended that existing soil mapping be used to assist in identifying areas that have soils better suited to community gardens, parks and/or playing fields.

Census Farm Number and Area

- Census farm number and area is diminishing over time and will likely continue as nonagricultural development occurs in Halton and Milton.
- Halton's census farm number and area is decreasing faster than that for the province of Ontario.

Recommendation 3
The decrease in census farm number and area may occur at a rate that, at the time that the secondary plan, plan of subdivision or subsequently urban development occurs, agricultural impacts will be minimal because agricultural use has diminished. Therefore, it is recommended that agricultural use be studied and mapped for its kind and extent prior to finalizing a secondary plan and/or plan of subdivision.

Ontario Agricultural Economics and Financial Characteristics

- The majority of farms have more off-farm income than non-farm income.
- There are significant differences in gross and net incomes associated with common field crops versus fruits and vegetables versus greenhouse crops.
- Halton and Milton have a relatively high total farm capital in the context of Ontario where most of that capital is in land and buildings.
- Total gross farm receipts and net on-farm income have increased in Milton between 2001 and 2011.

Recommendation 4
If the maintenance of high gross income and relatively high net income are important, then it is recommended that areas producing fruits and vegetables and/or having greenhouses be developed for non-agricultural uses last (assuming that those producing fruits and vegetables or owning greenhouses are interested in continuing to farm).

Multi-attribute Measurements of Agricultural Performance in Southern Ontario

- At a Regional/County scale, multi-attribute analyses rate Halton's performance as middling to poor except in the instance of economic comparisons. Halton's gross income and total capital value are relatively high in the context of other Counties/Regions in southern Ontario.

Recommendation 5
Multi-attribute as well as trends associated with agricultural land use and livestock/manure are based on information provided by Statistics Canada and the most recent data available at the time of the writing of this report is for 2011. Agricultural census information for 2016 will be available shortly. It is recommended that data associated with livestock and land-use, at minimum, for the census year 2016 be evaluated as part of the secondary plan process.

Agricultural Land Use Trends in Milton and Halton Region

- Land-use on census farms in Halton and Milton is predominantly in crop production.
- Common field crop production predominates in Halton and Milton.
- Farms producing fruits and vegetables and the area in fruits and vegetables have diminished between 1981 and 2011.

Recommendation 6
Agricultural land use has been changing in Halton Region and Milton. Therefore, it is recommended that current agricultural land use should be updated as part of the secondary plan process. The land use should include barn locations and type of livestock.

Agricultural Livestock/Manure Trends in Milton and Halton Region

- Nutrient (formerly animal) units are diminishing within Milton and Halton.
- Nutrient units times odour factor is also diminishing within Milton and Halton.

Recommendation 7
Because the timeframe of non-agricultural development in the study area is not precisely known, and livestock/manure production is decreasing, specific calculations of Minimum Distance Separation are recommended at the time of the secondary plan process or at the time of the production of a plan of subdivision.

Mitigation

- The mitigation literature review provided no information concerning the success of any applied mitigation measure except by a limited opinion survey completed in British Columbia. The survey results included the fact that there were both negative as well as positive elements associated buffer strips, vegetative screening, fencing, etc. However, no data was analysed to indicate if one, or a combination of mitigation measures, reduce the frequency of complaint against farms and farmers.
- The literature does not link mitigation with:
  - the relative importance of the farmland as defined by planning policy;
  - the kind and scale/size of agricultural operations (livestock versus fruit production, for example) probably affected by new urban development;
  - the probability of impacts to agriculture and the severity of those impacts if they should occur;
  - the probability that mitigation in any, or of specific form, can significantly reduce probable impacts and/or complaints.

Recommendation 8
Because of the trend to loss of agricultural land in Milton and the study area, in addition to the fact that the success of mitigation has been inadequately evaluated, it is recommended that the published literature should be checked at the secondary plan or plan of subdivision stage for any new papers evaluating the success of mitigation. It is also recommended that the information on the success of mitigation also include discussions on the ownership, costs and maintenance of the lands and the screens, berms, fencing and other attributes related to the mitigation.

AgPlan Limited

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Agricultural Analyst

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APPENDIX 1
FINDINGS - DATA GRAPHS

FIGURE 1

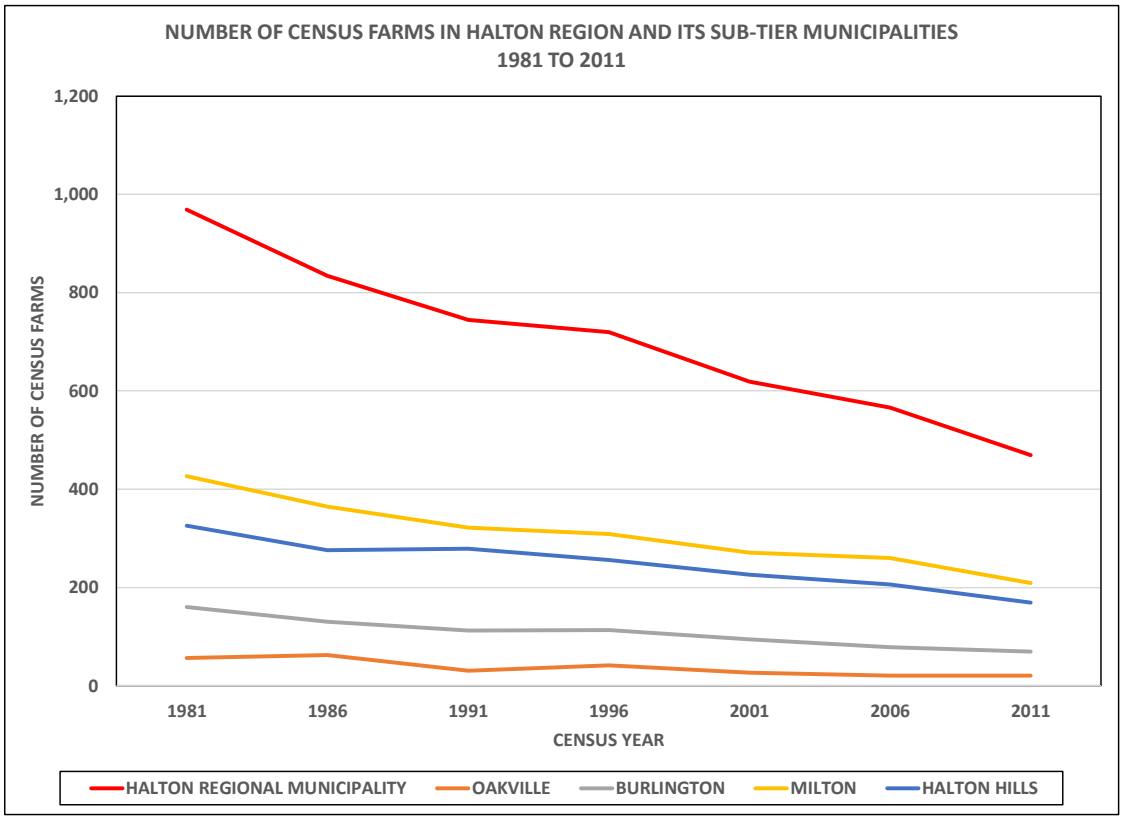
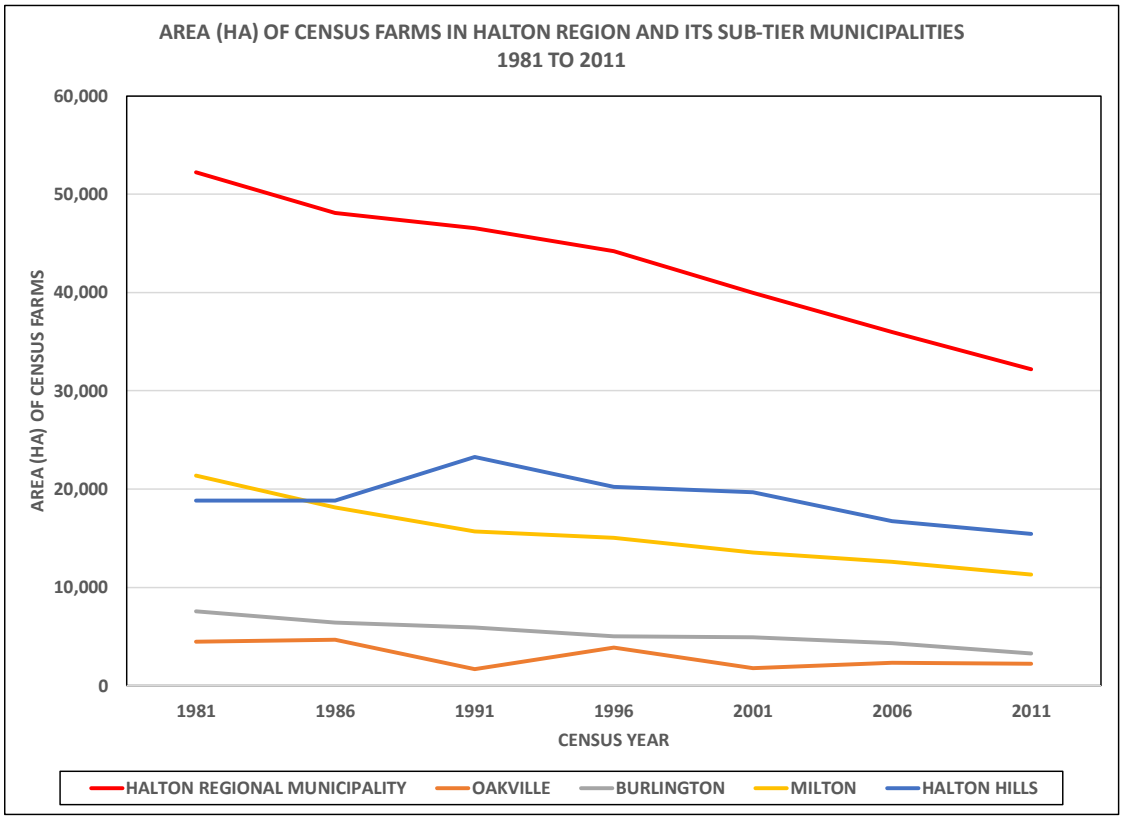


FIGURE 2



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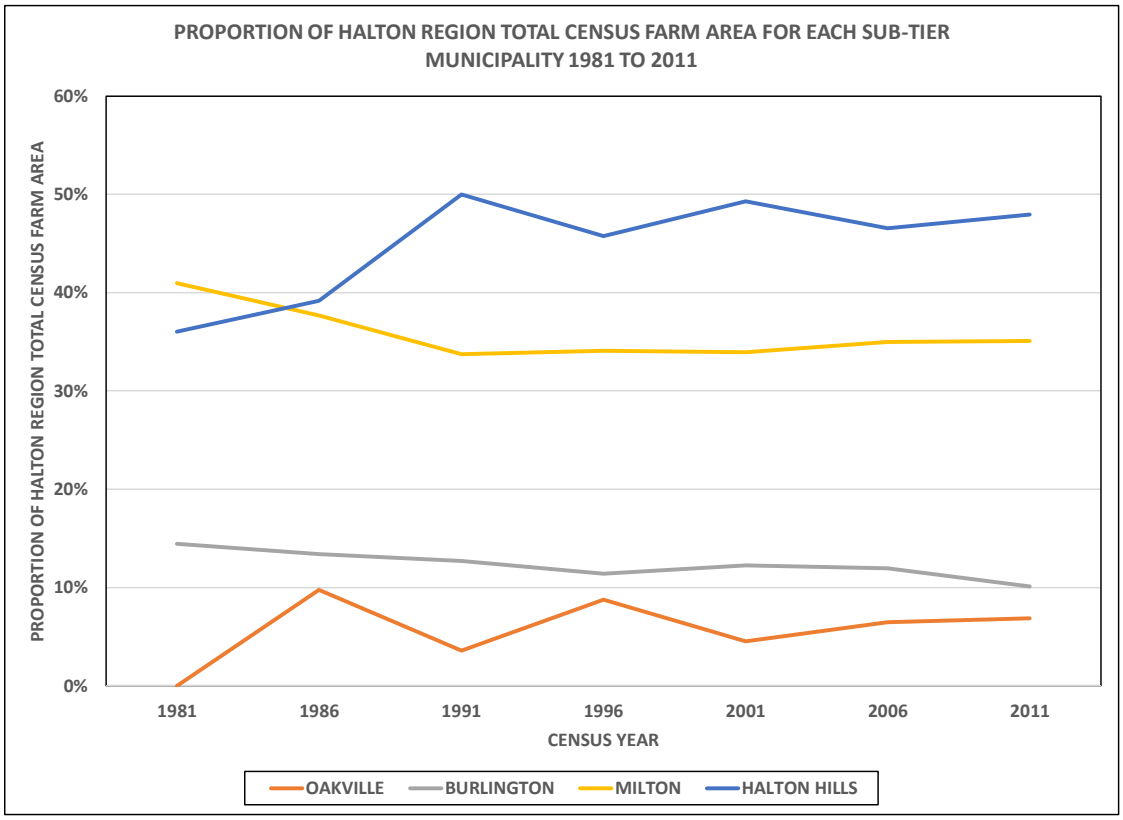

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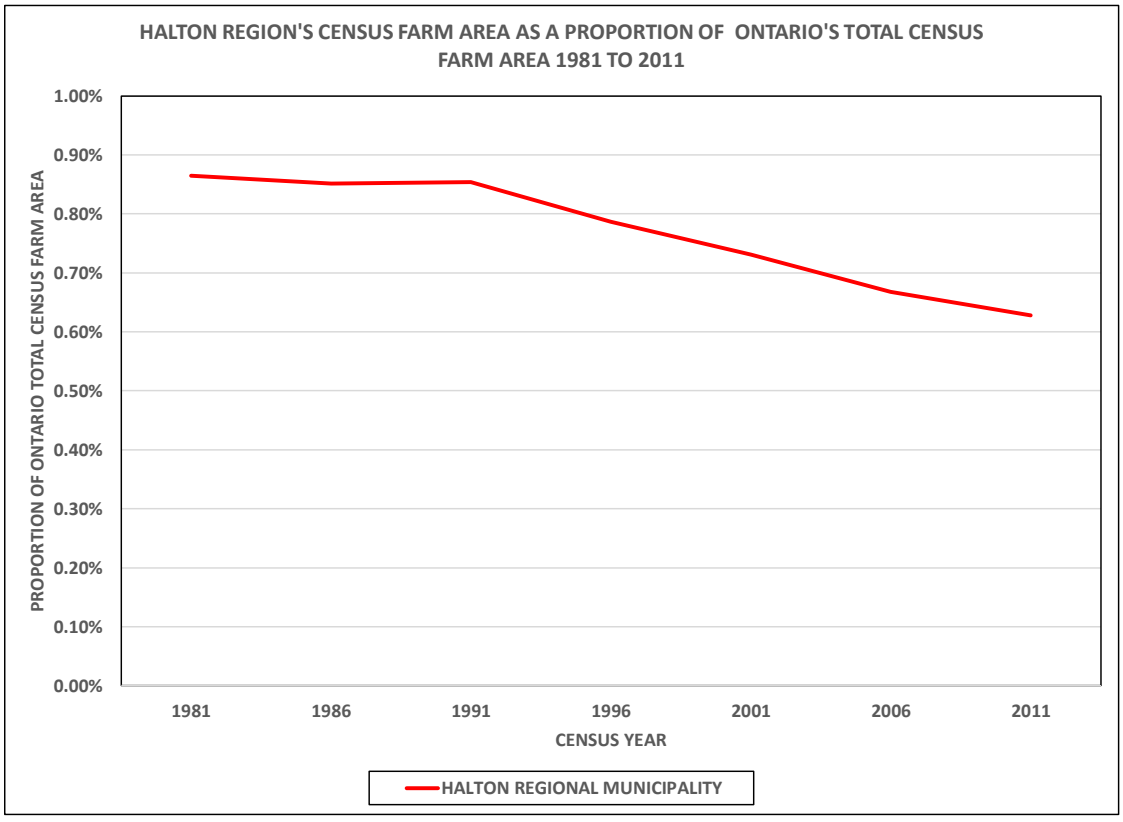
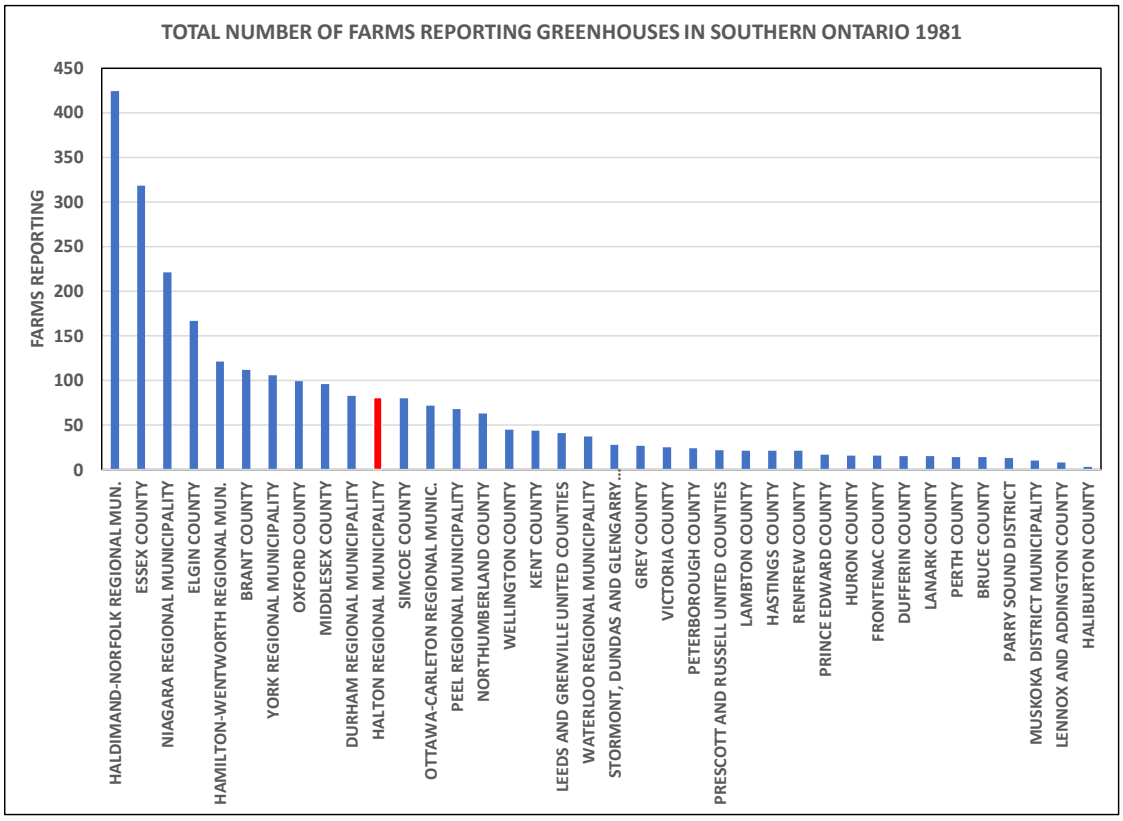


FIGURE 5



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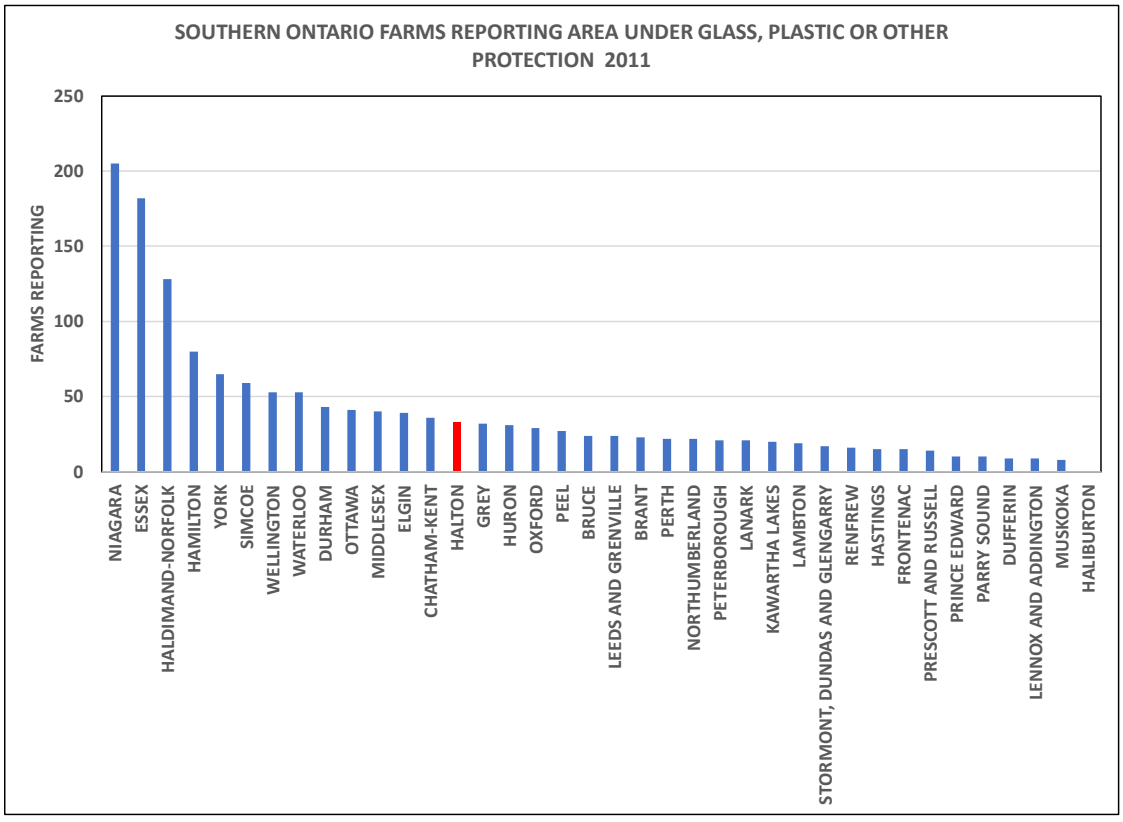

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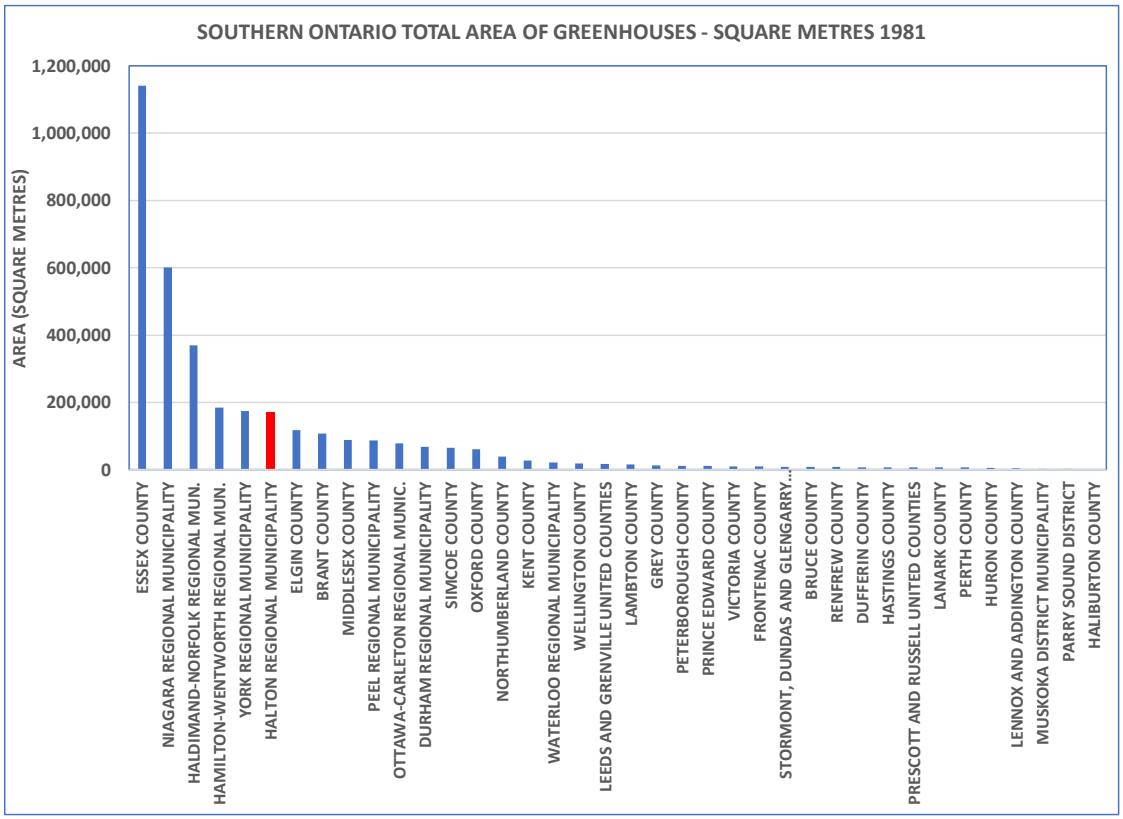

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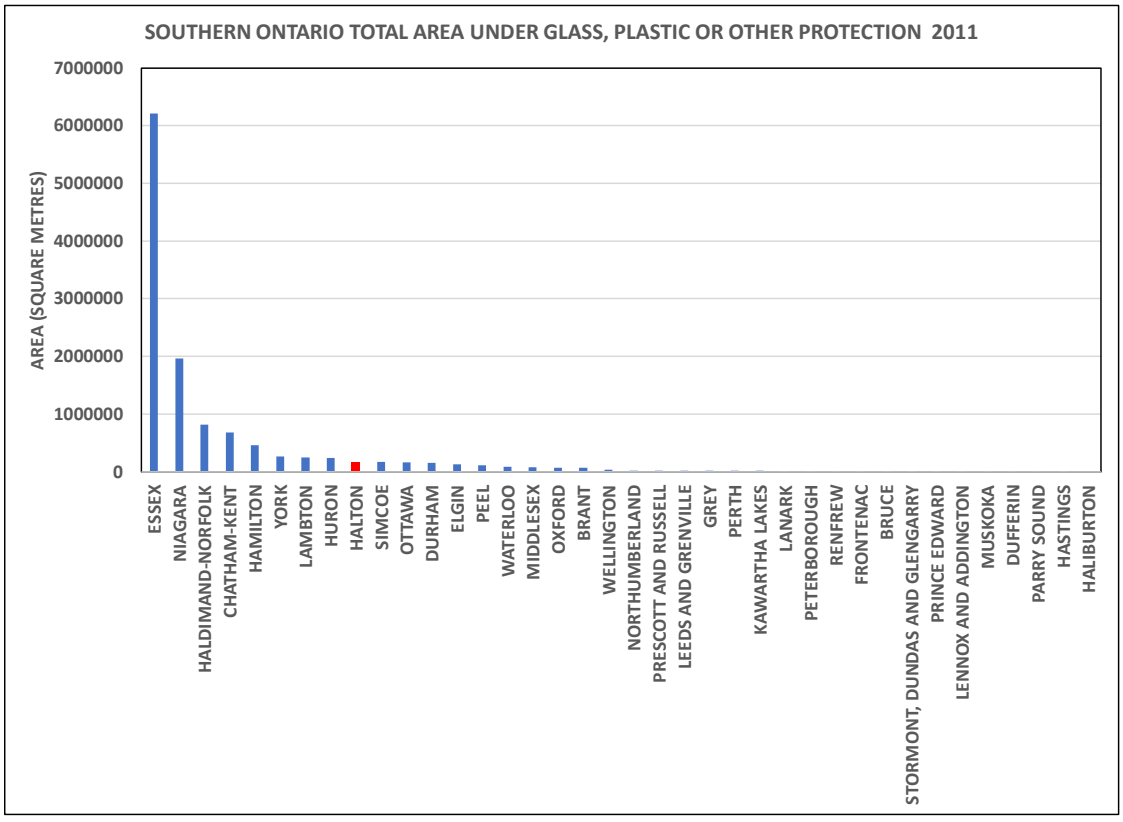

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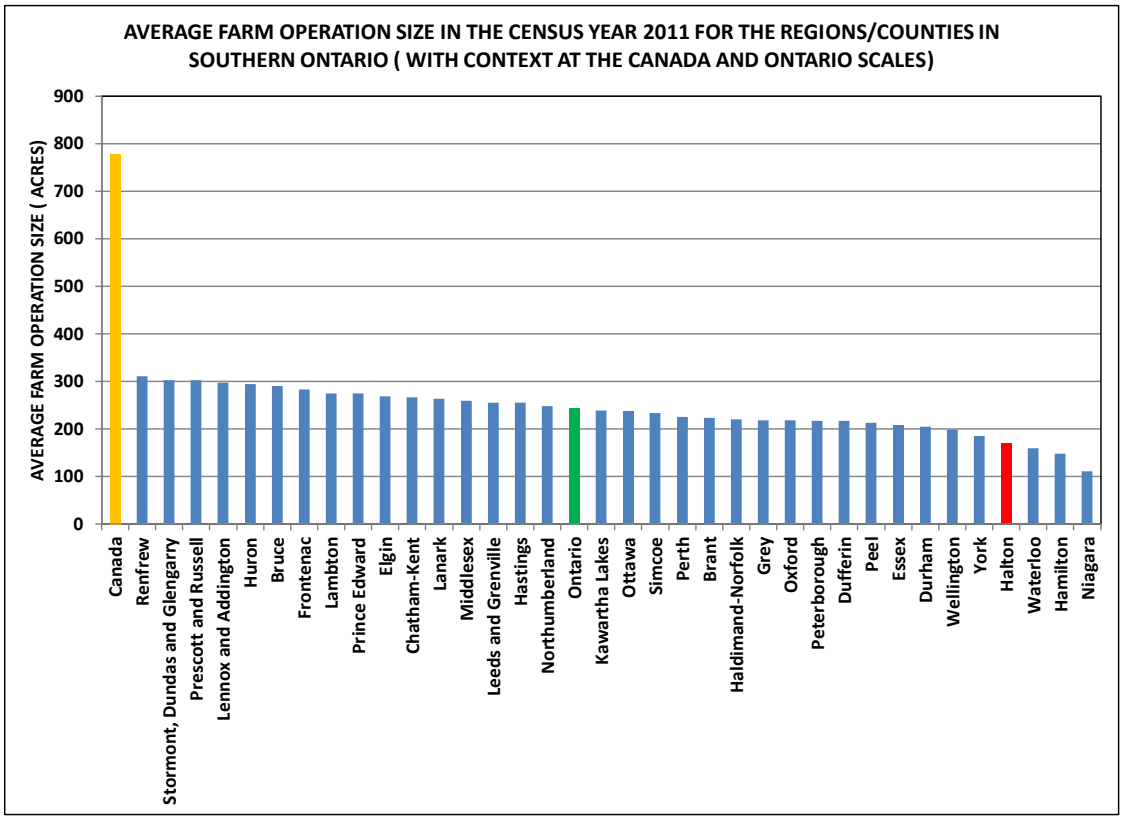

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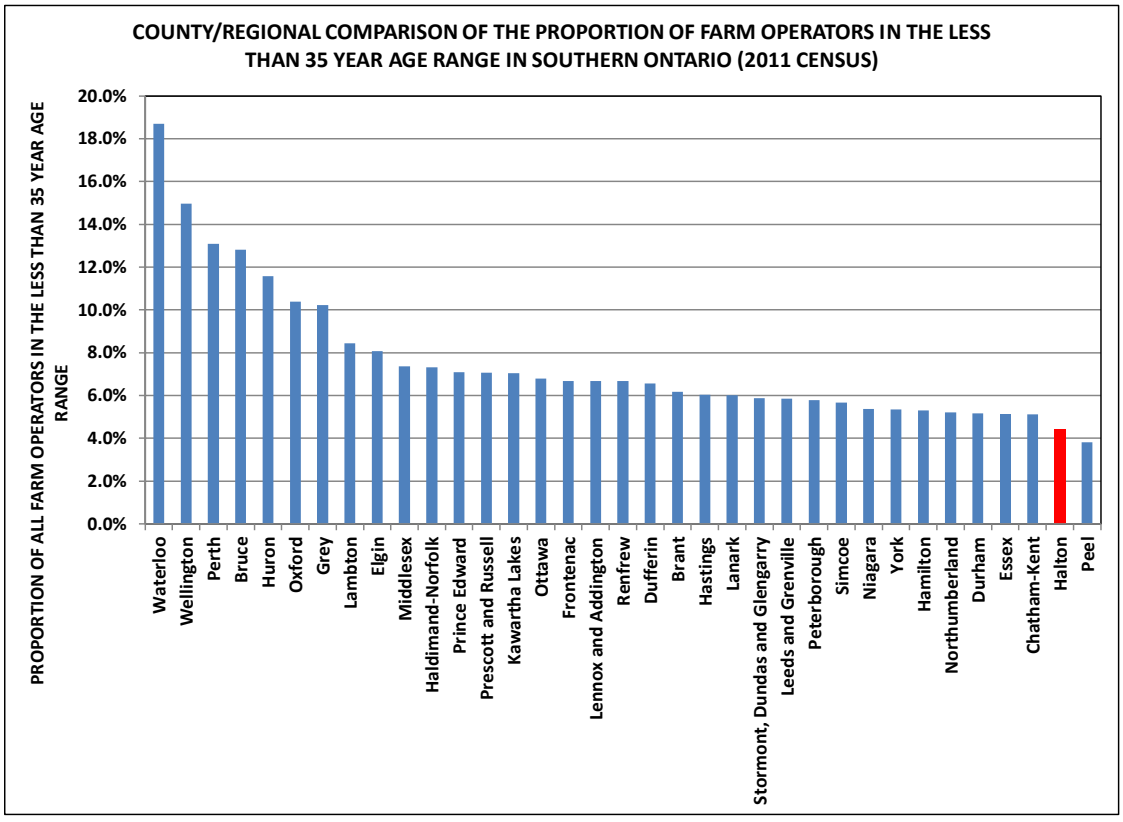

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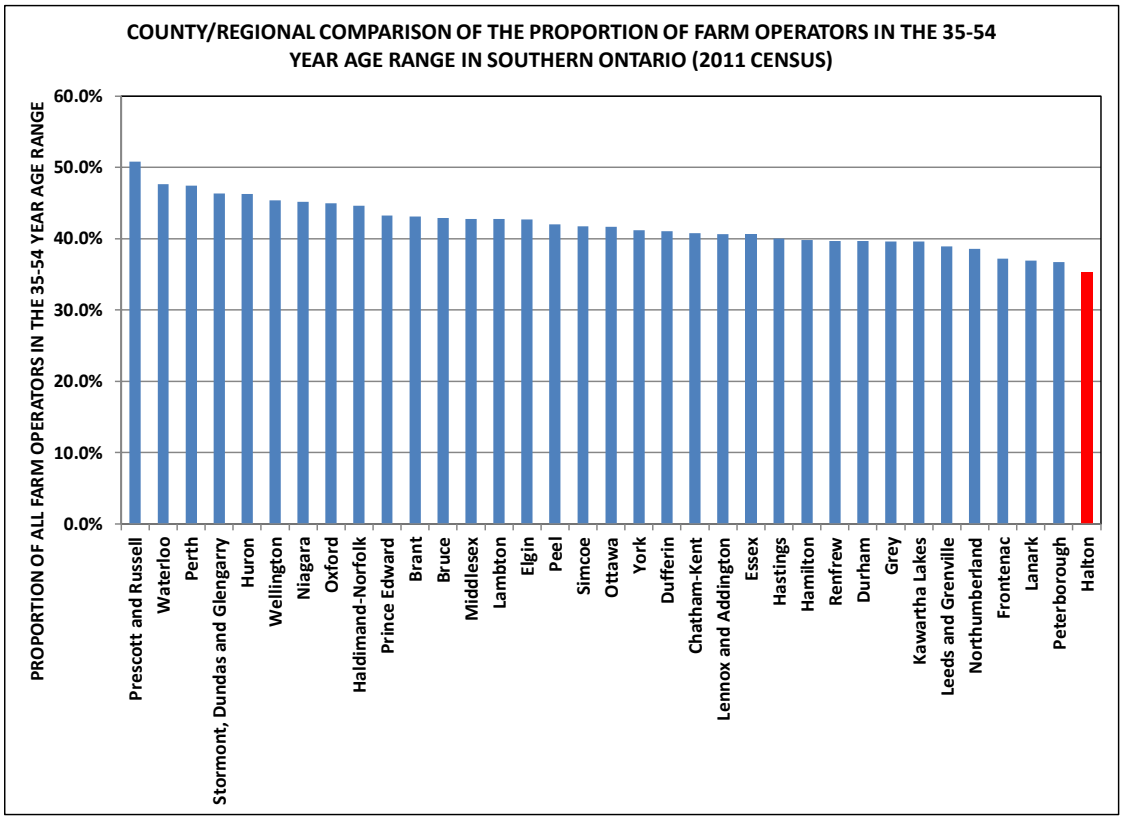

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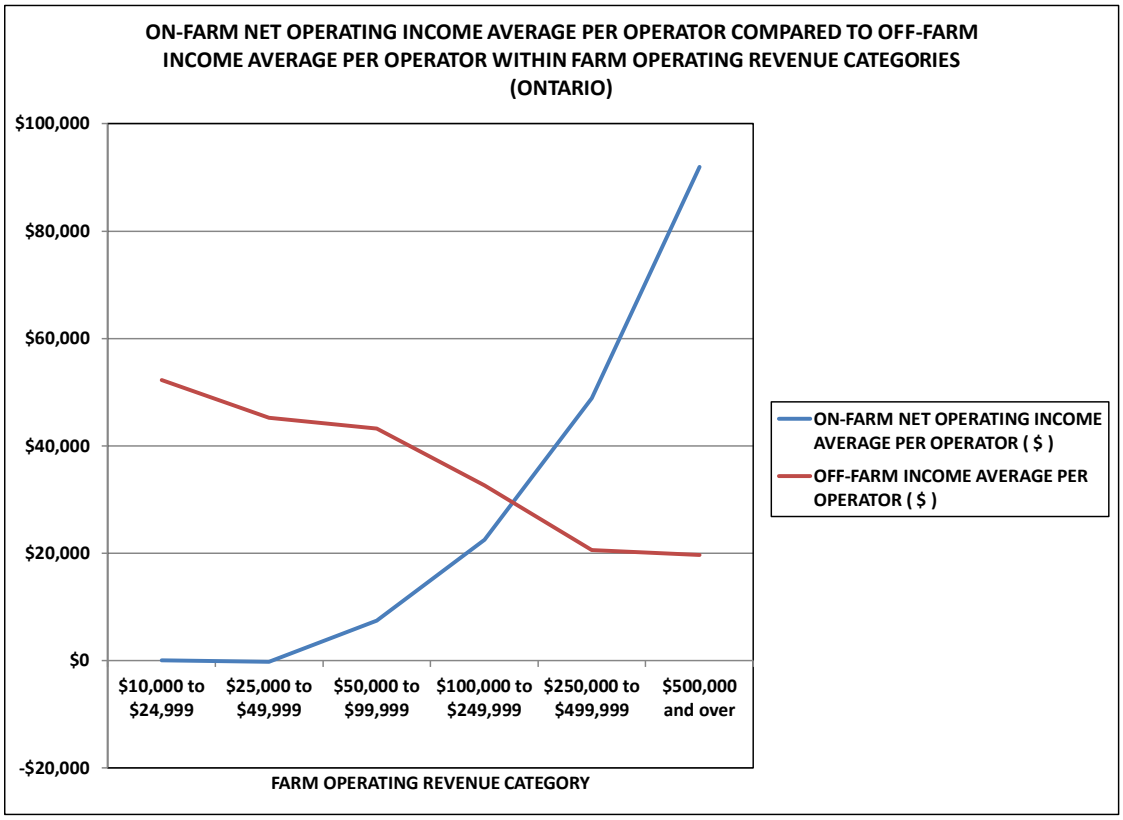

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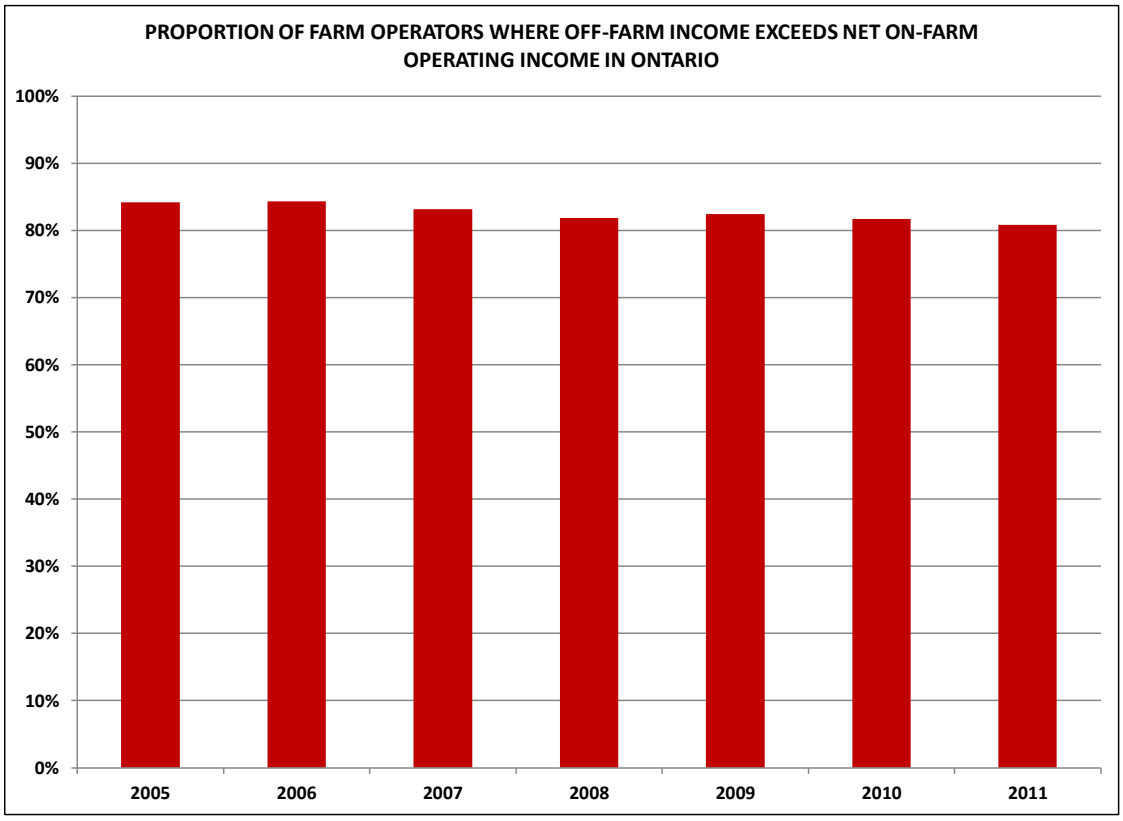

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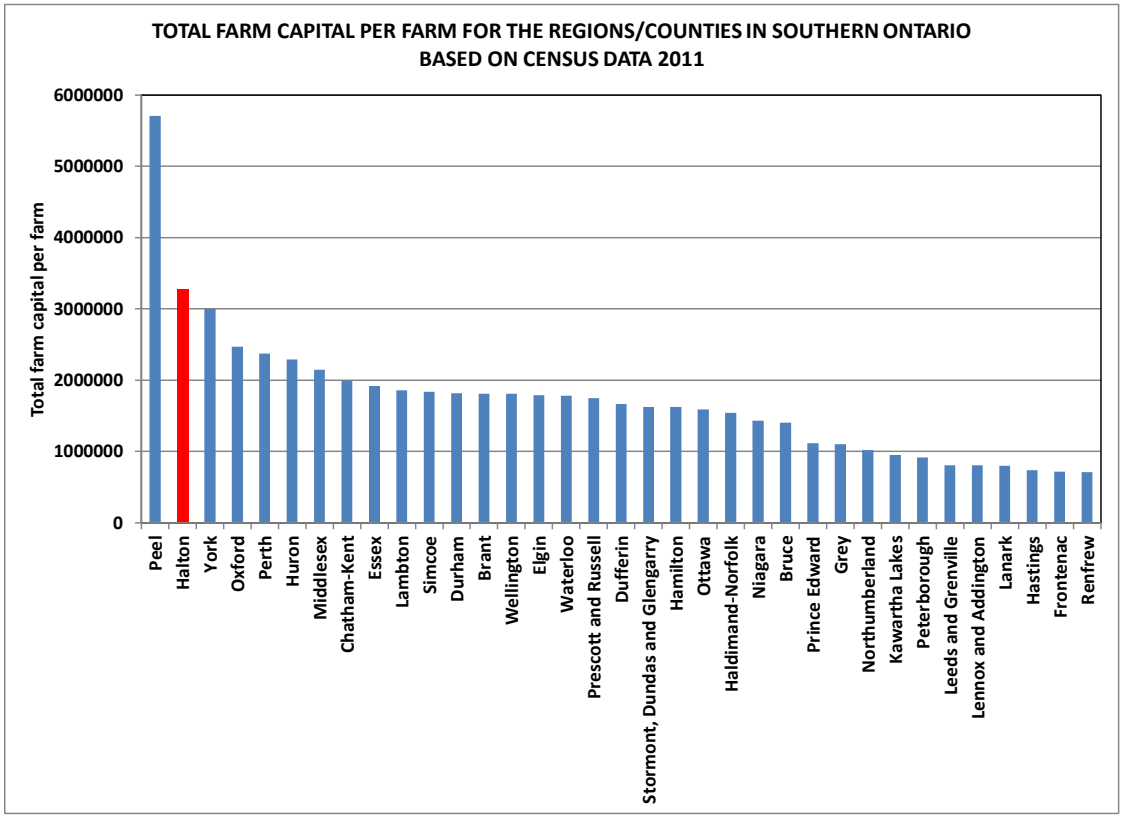

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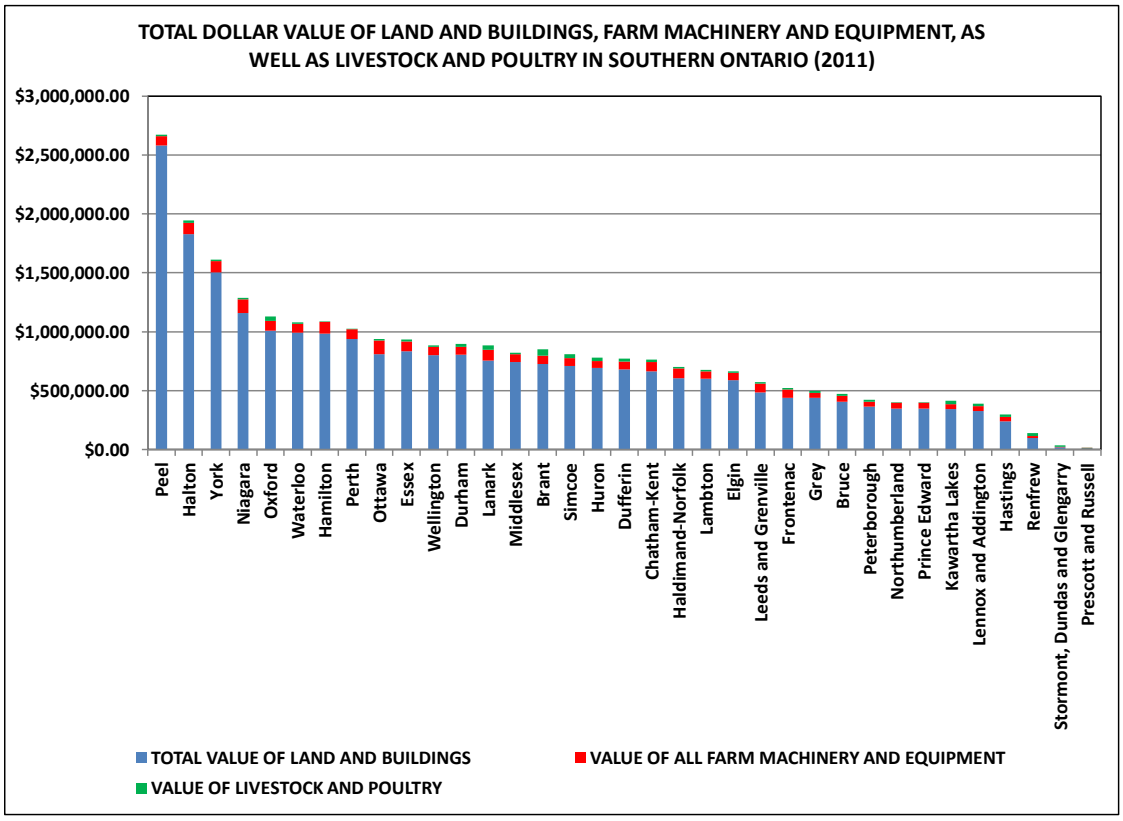

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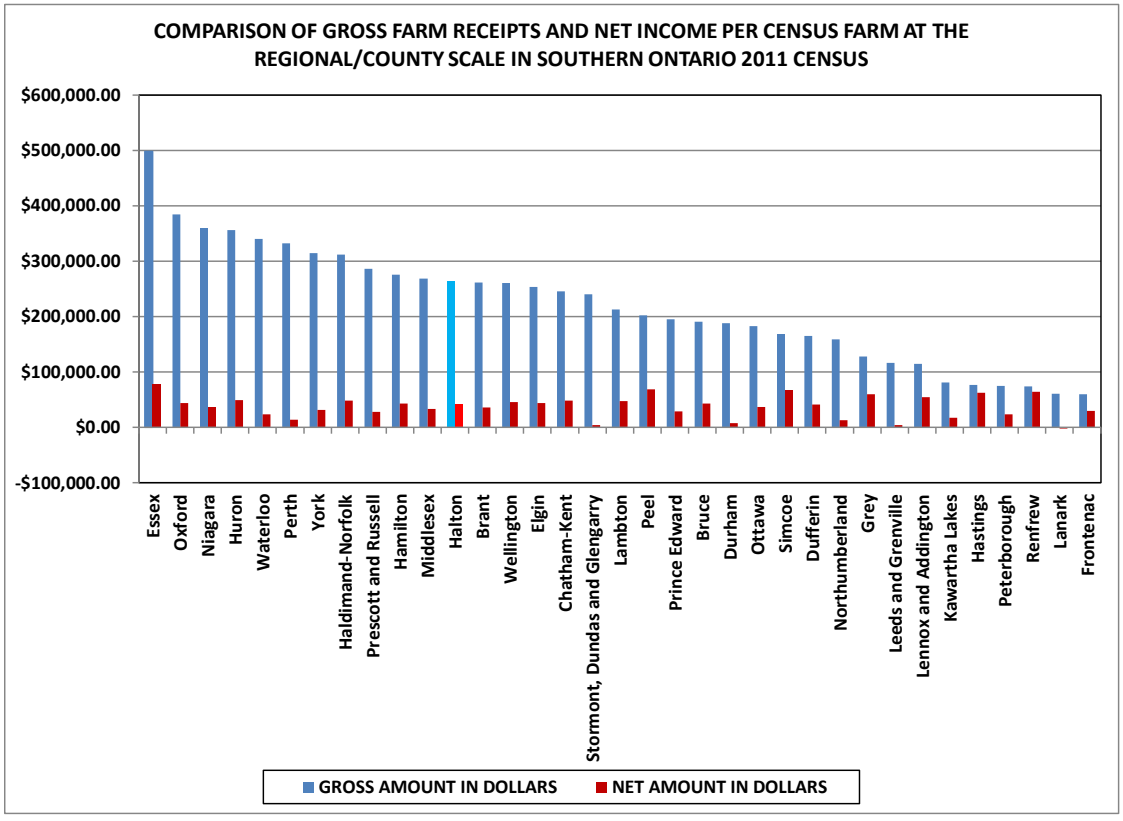

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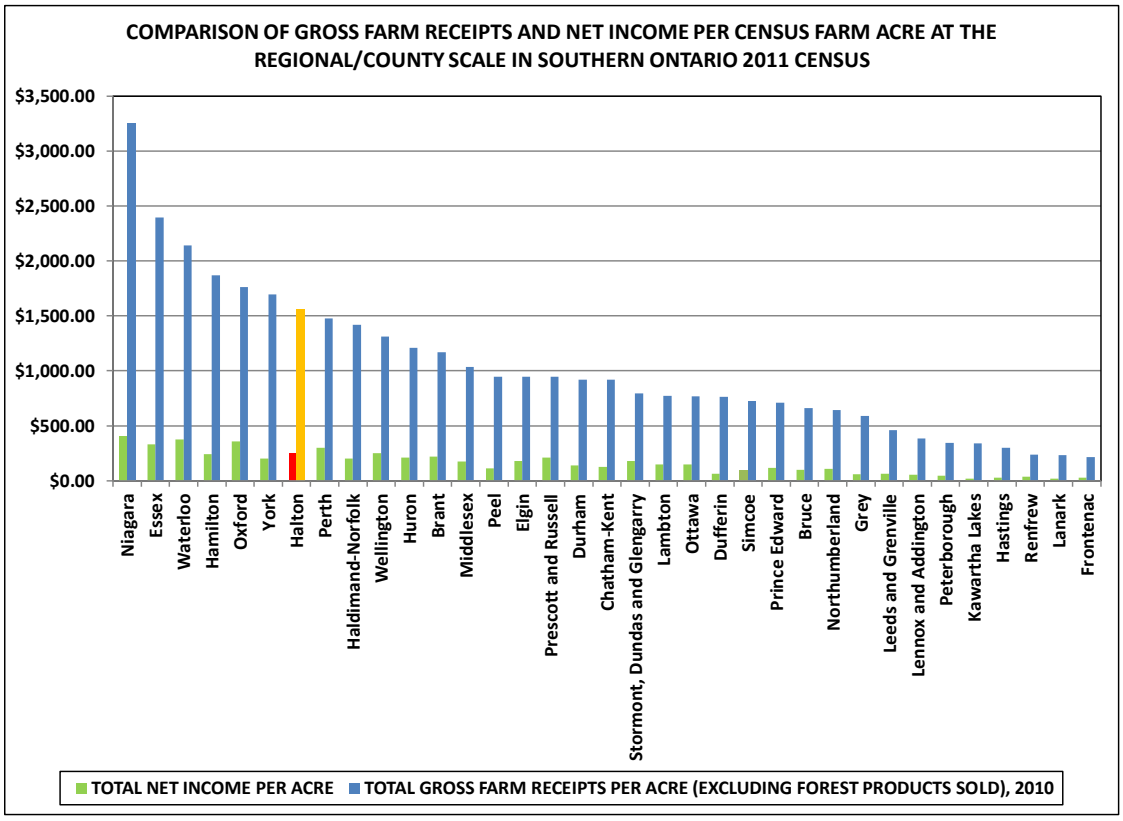

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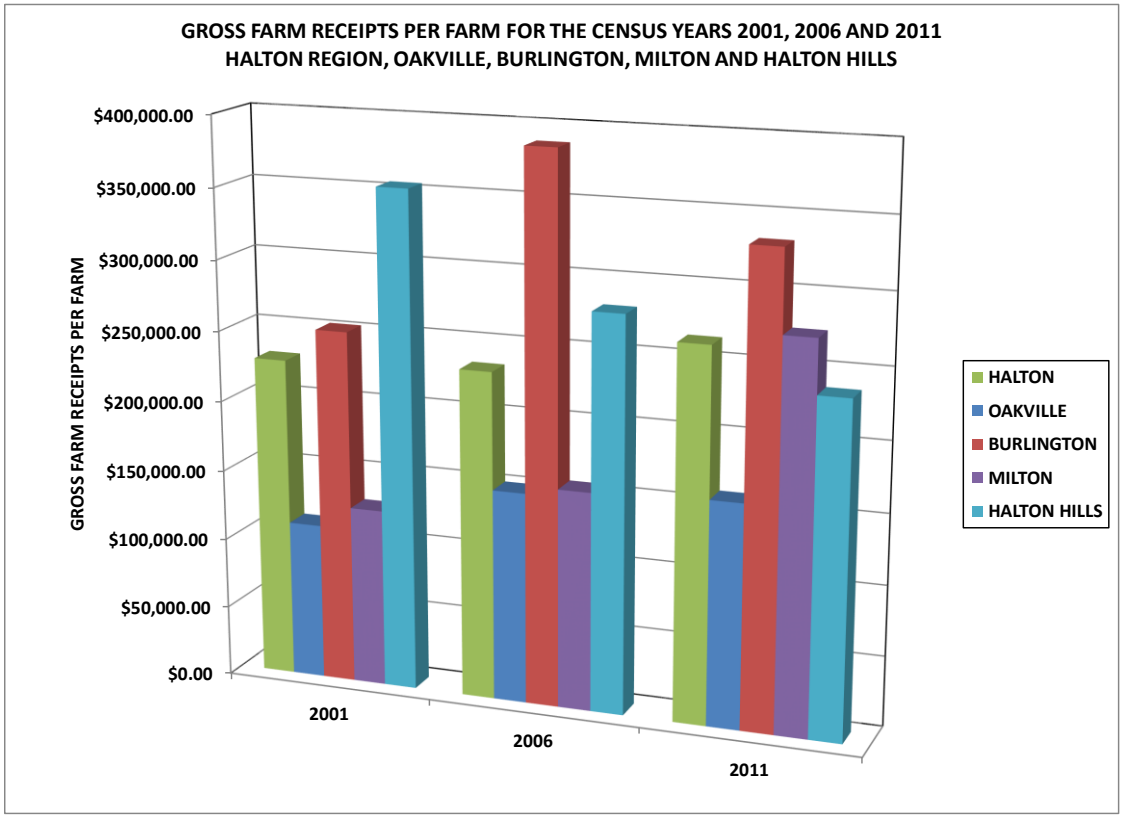

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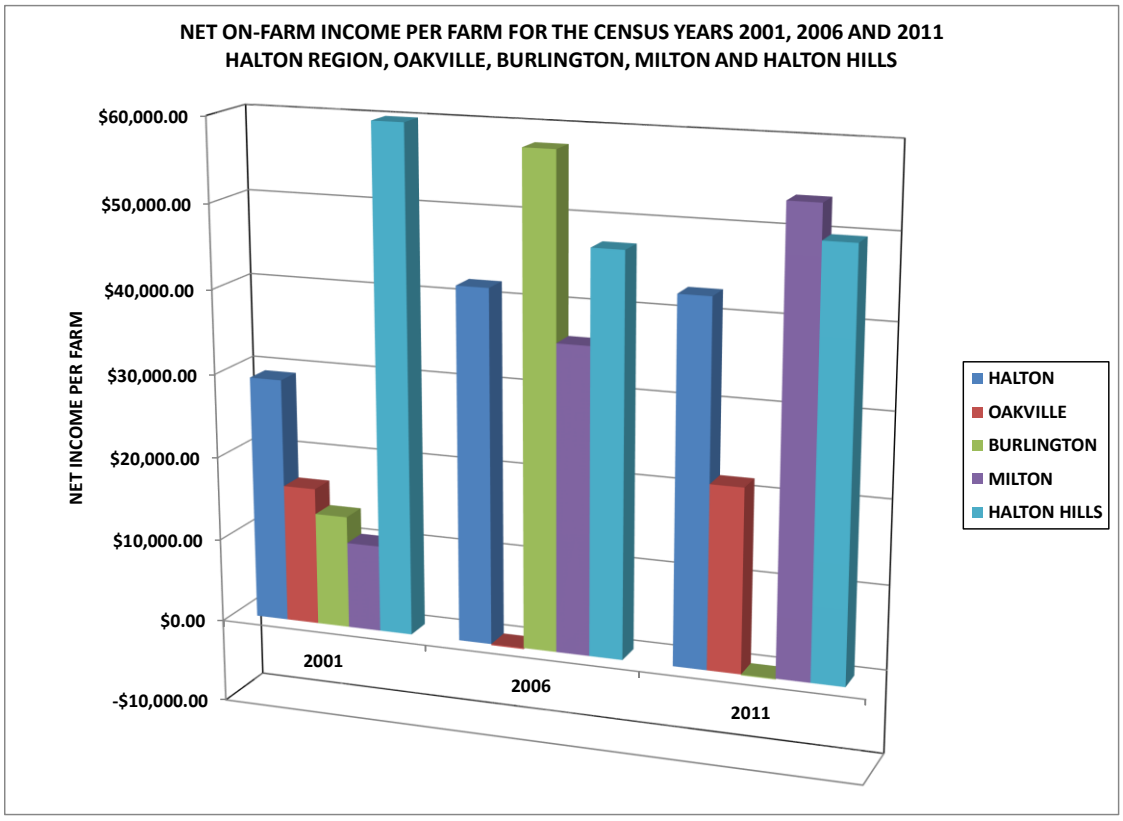

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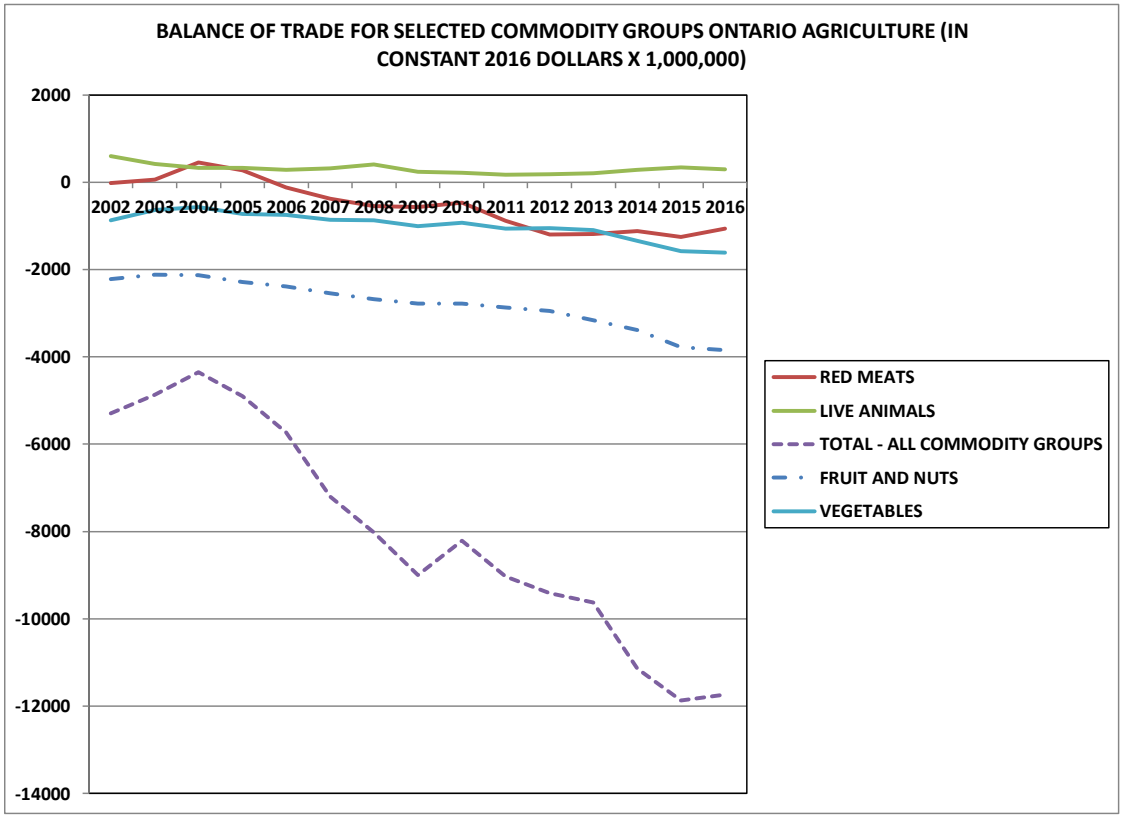

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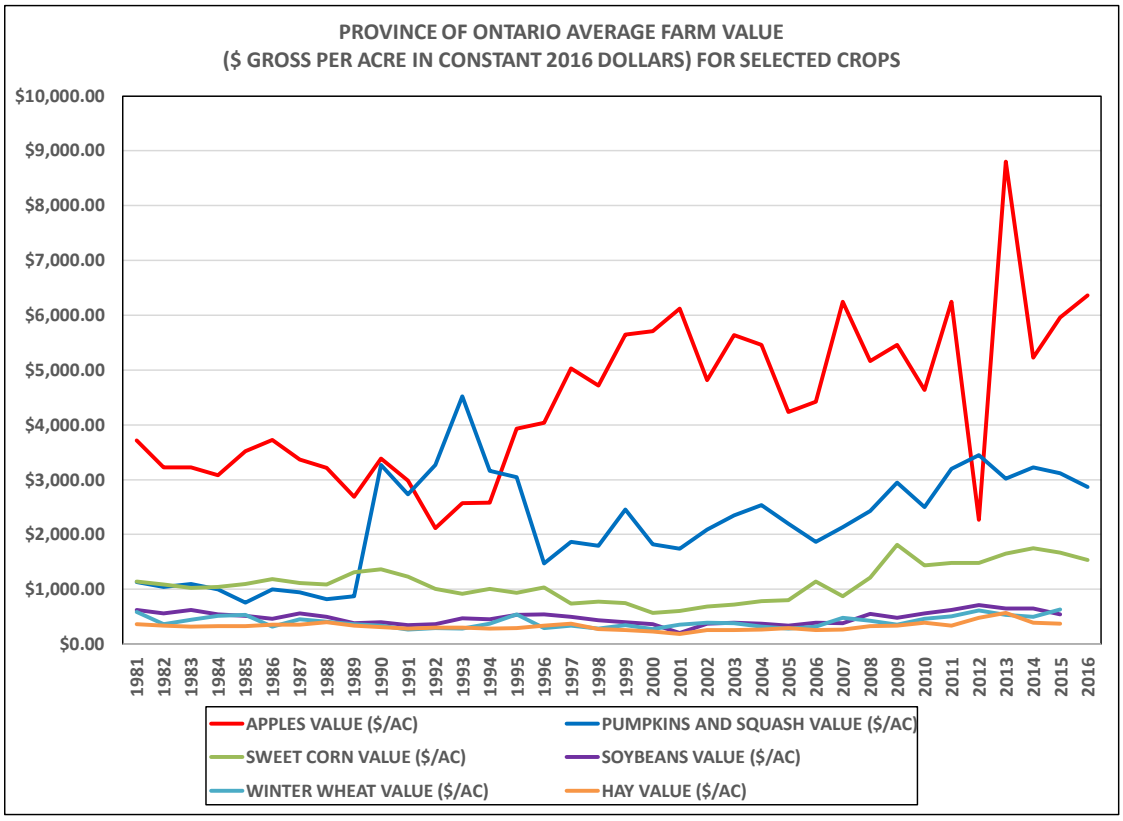

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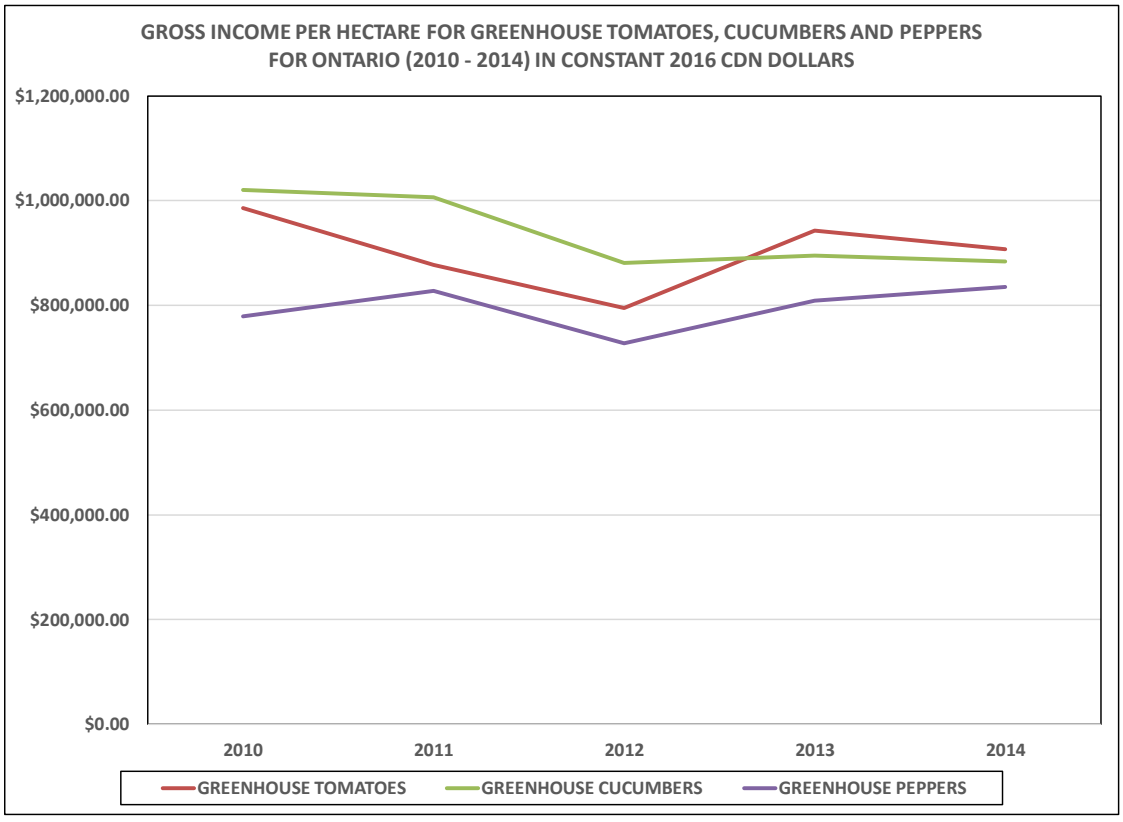

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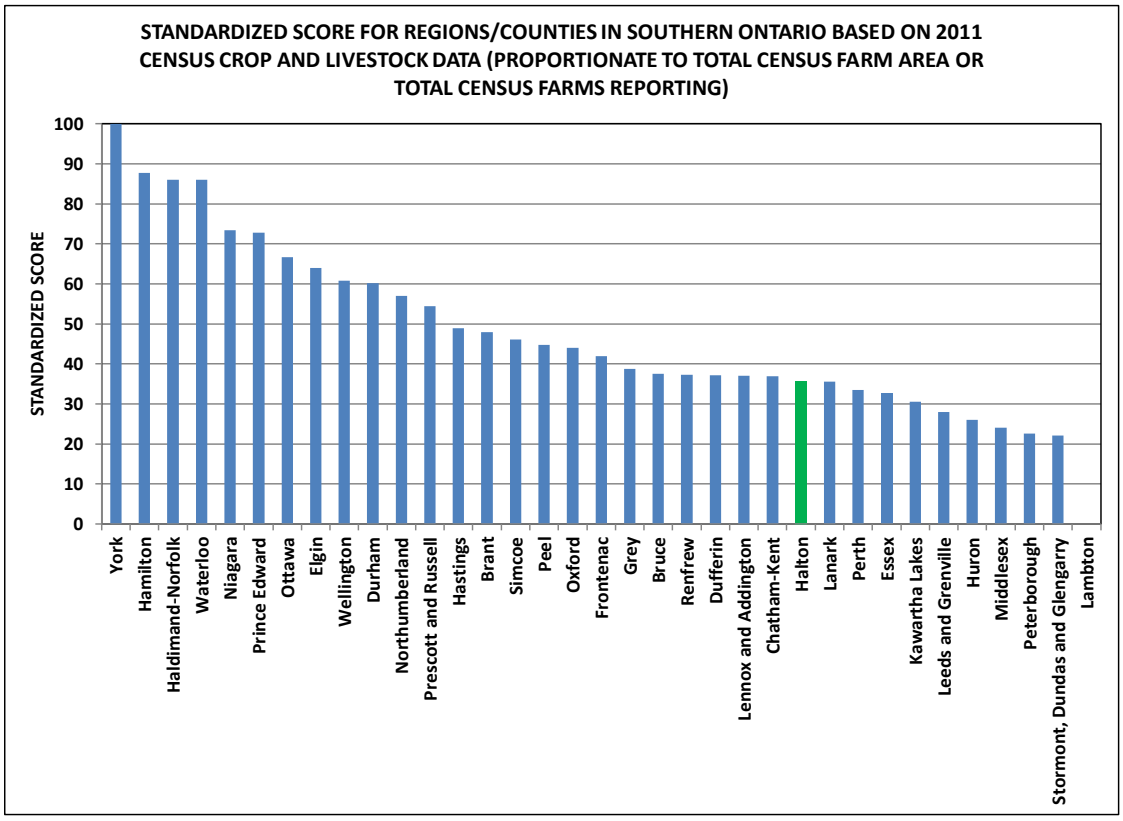

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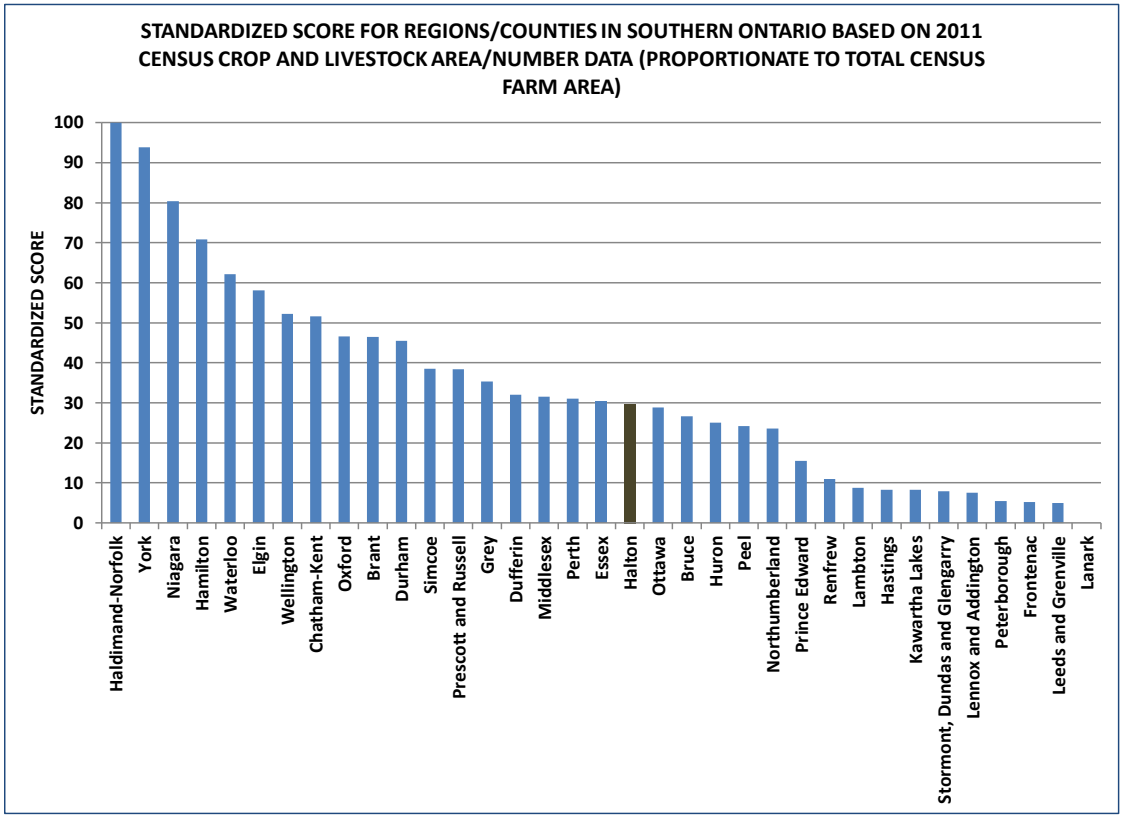
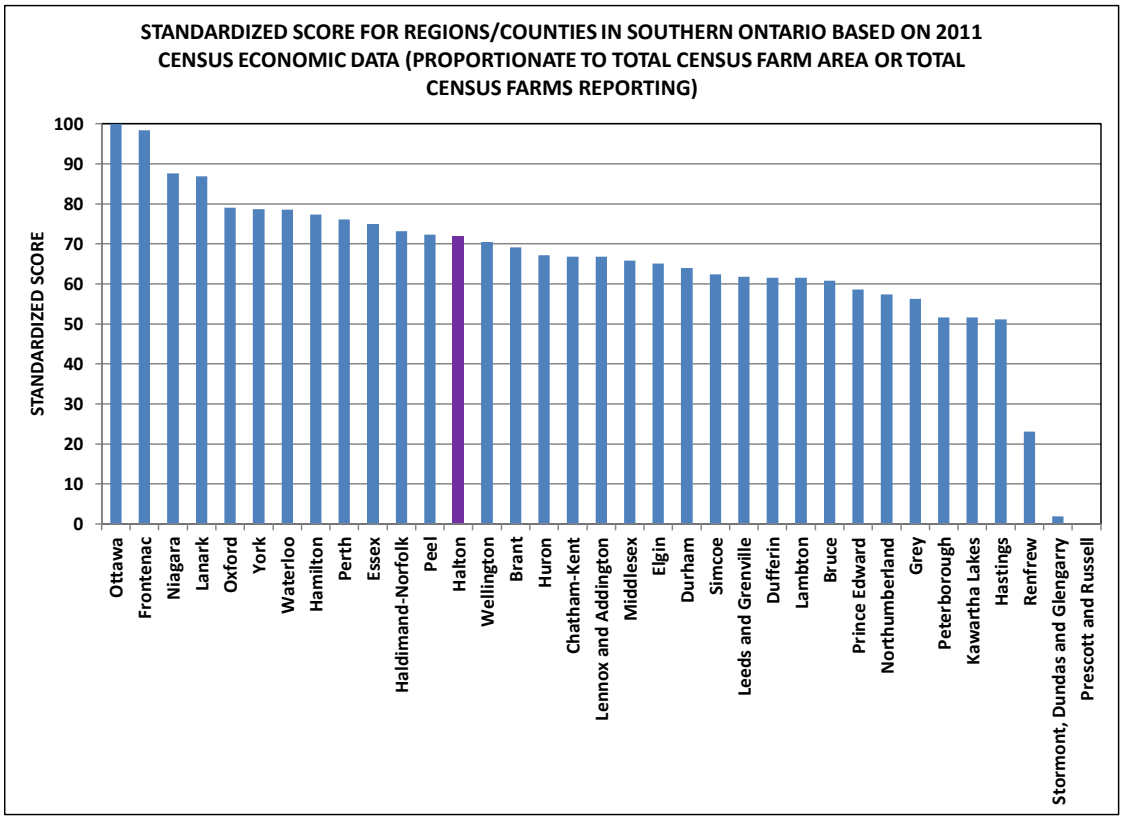


FIGURE 25



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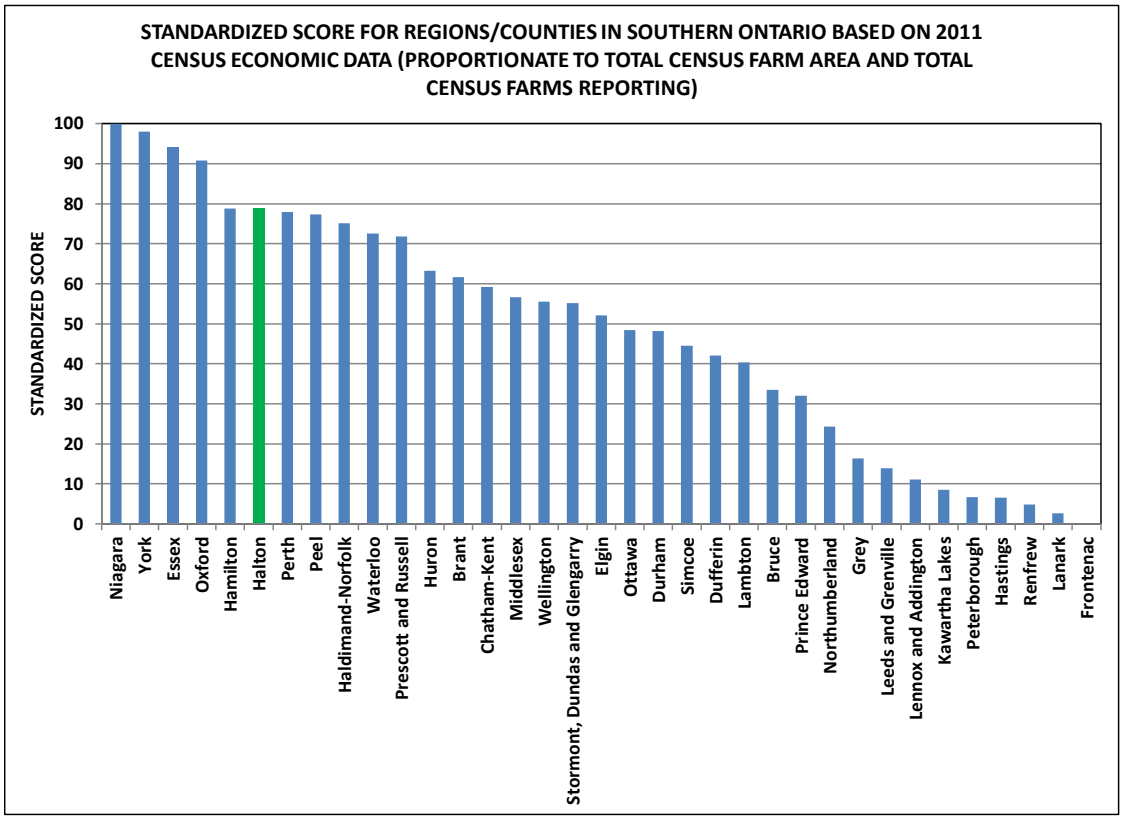

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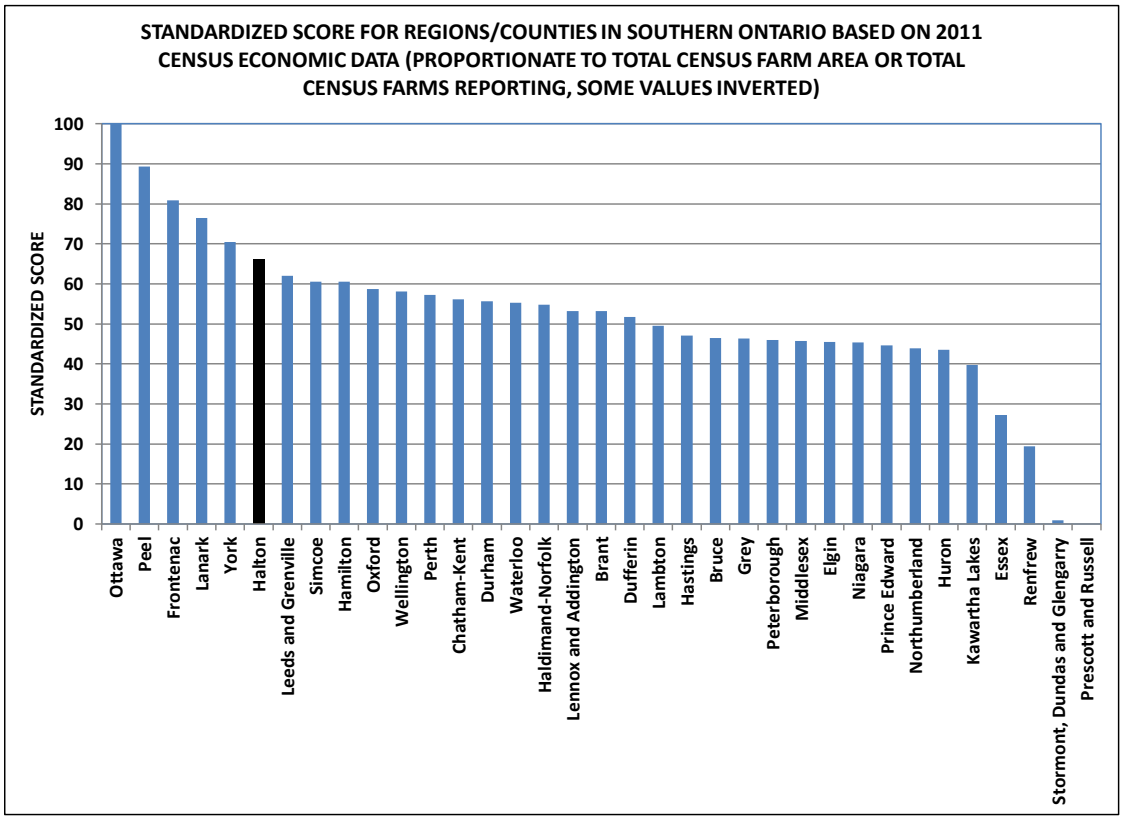

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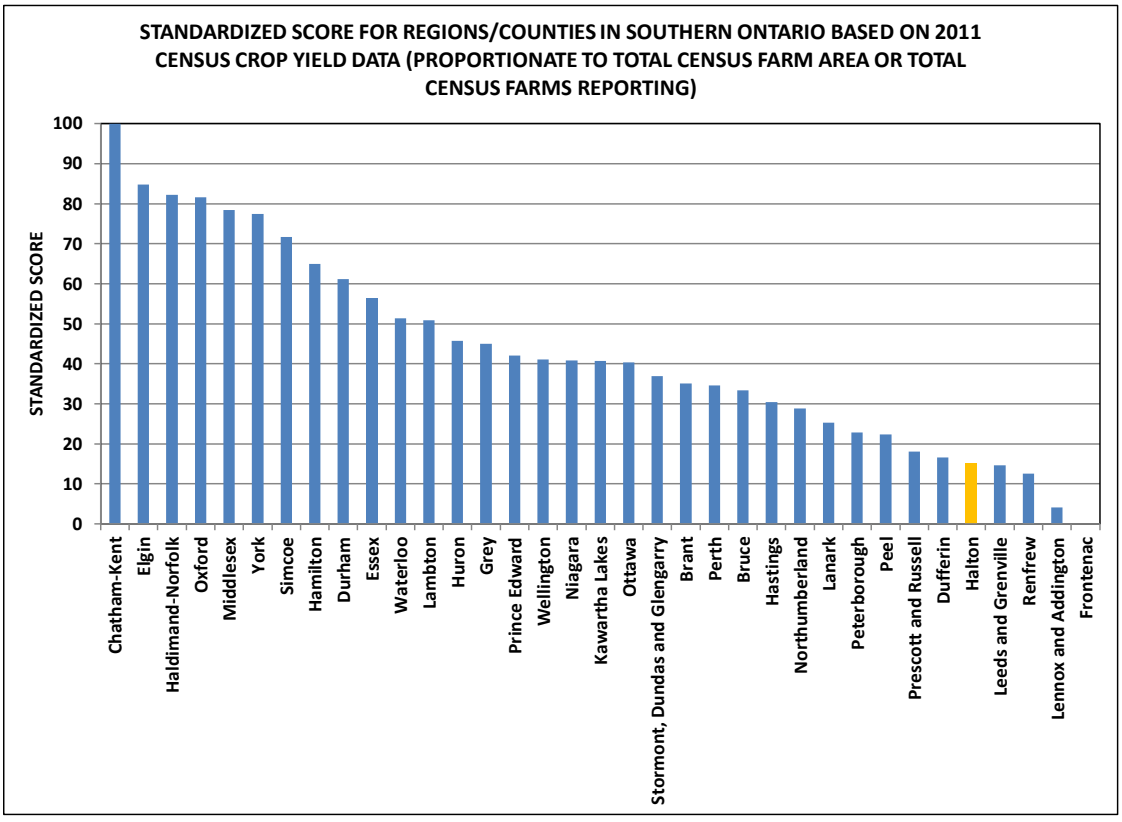

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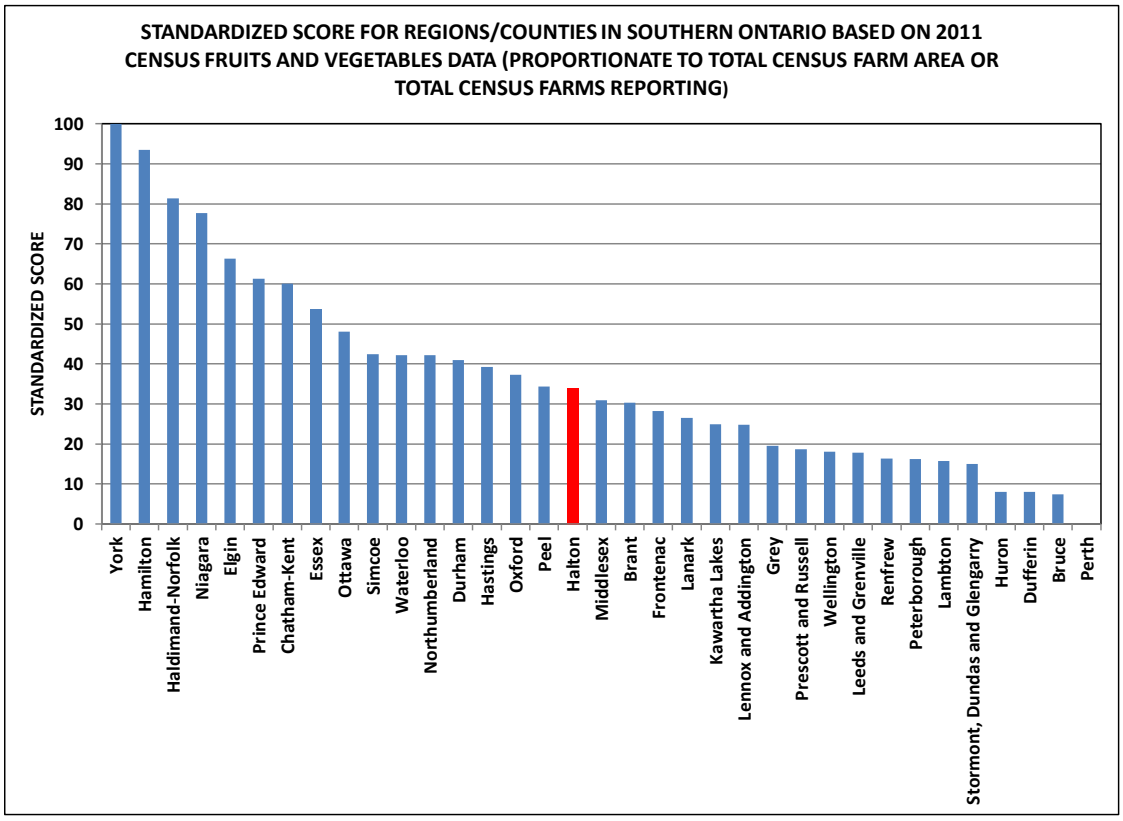


FIGURE 30

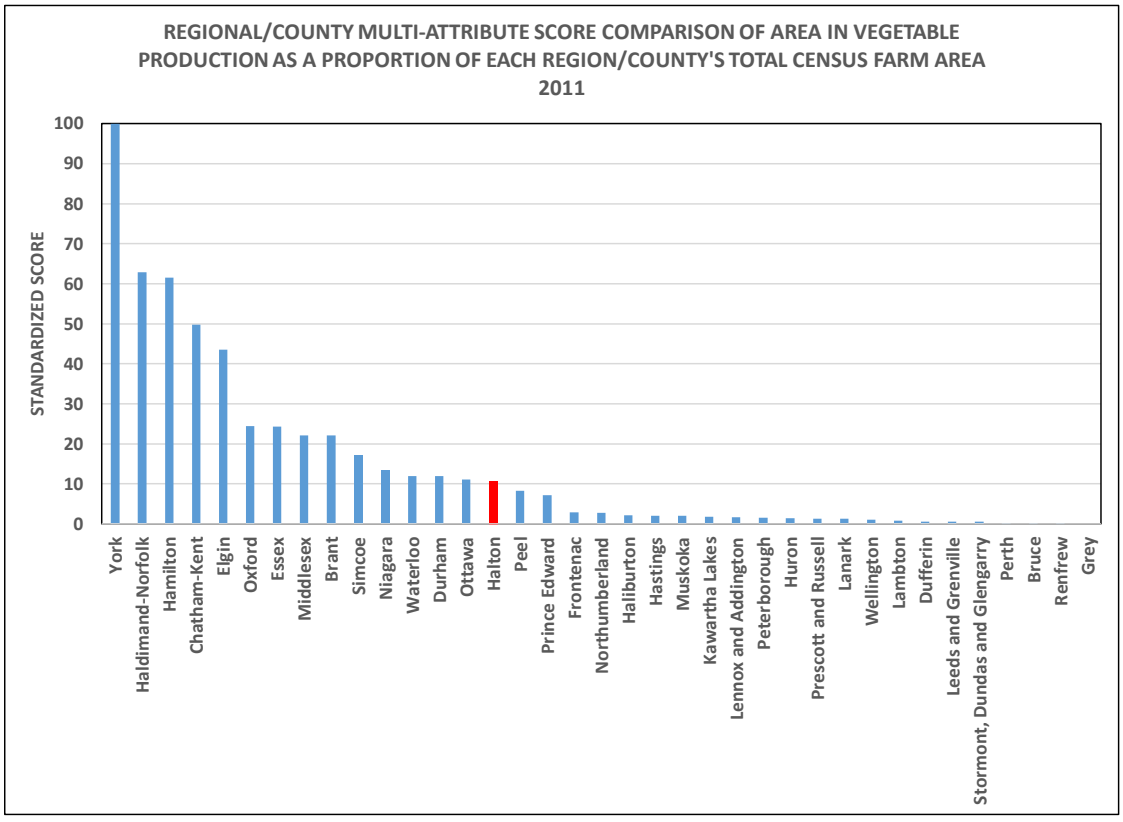


FIGURE 31

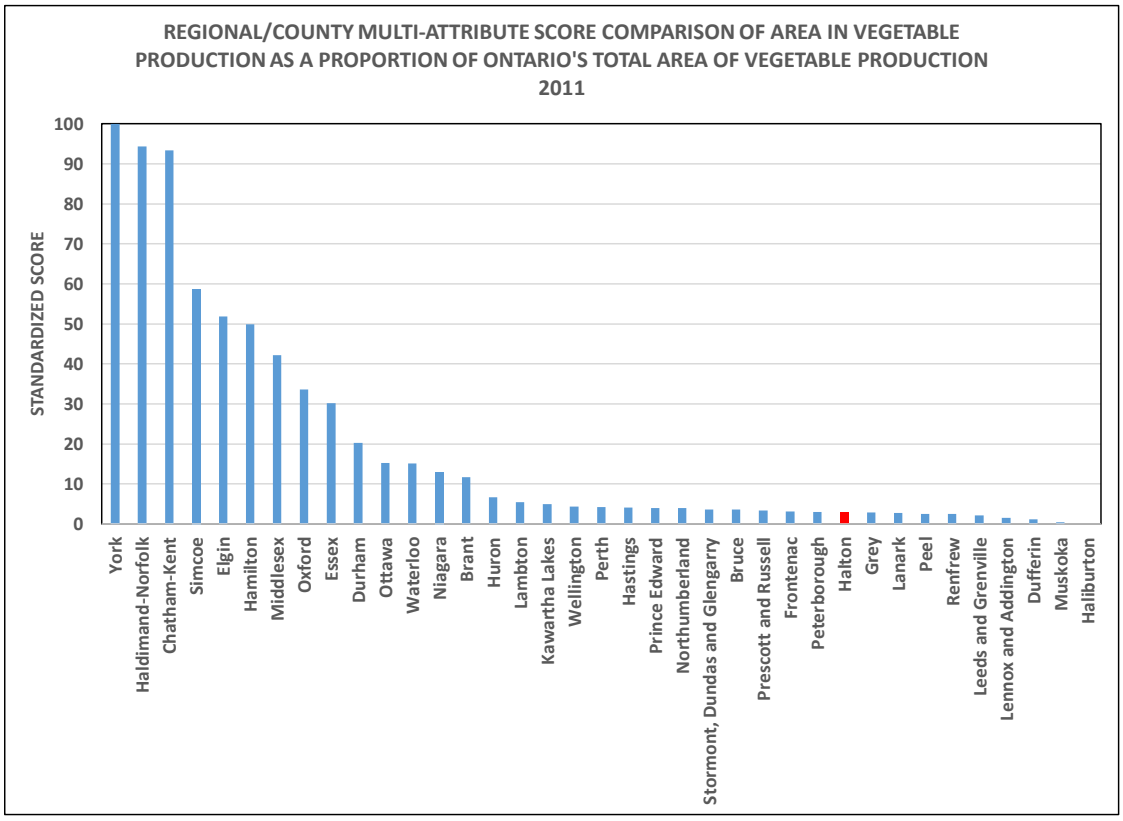


FIGURE 32

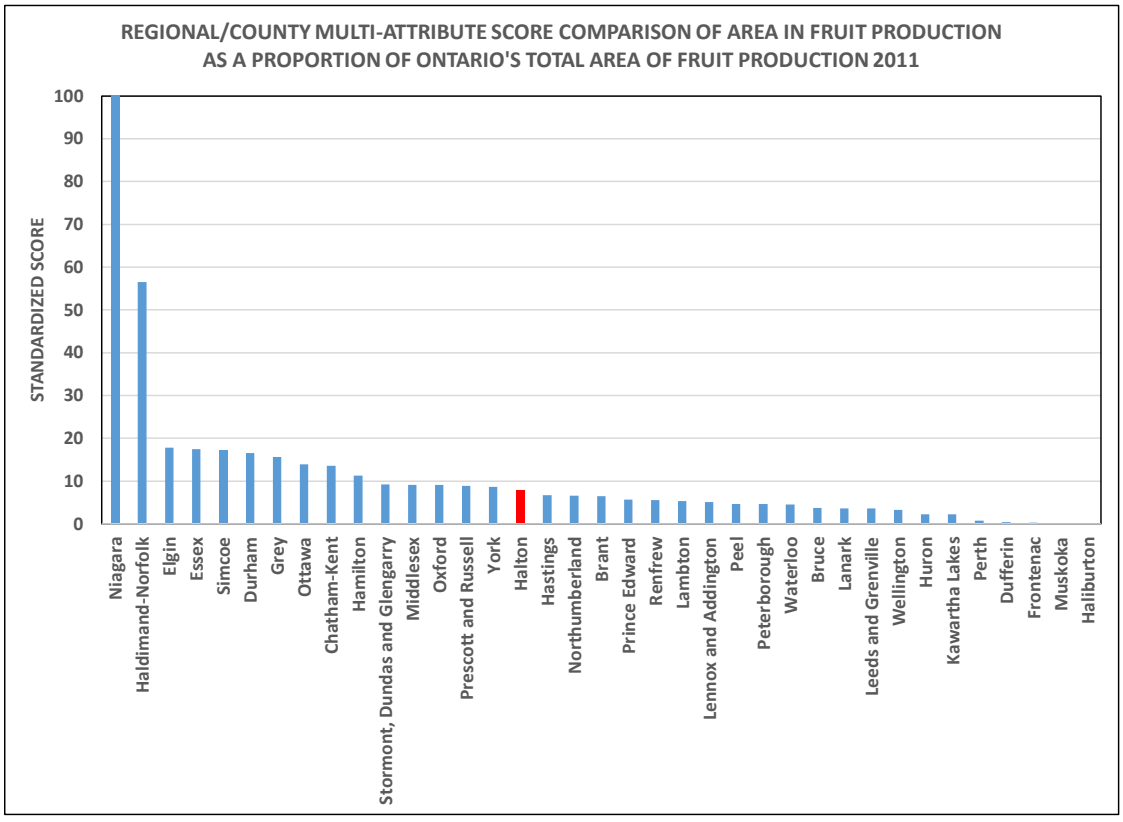


FIGURE 33

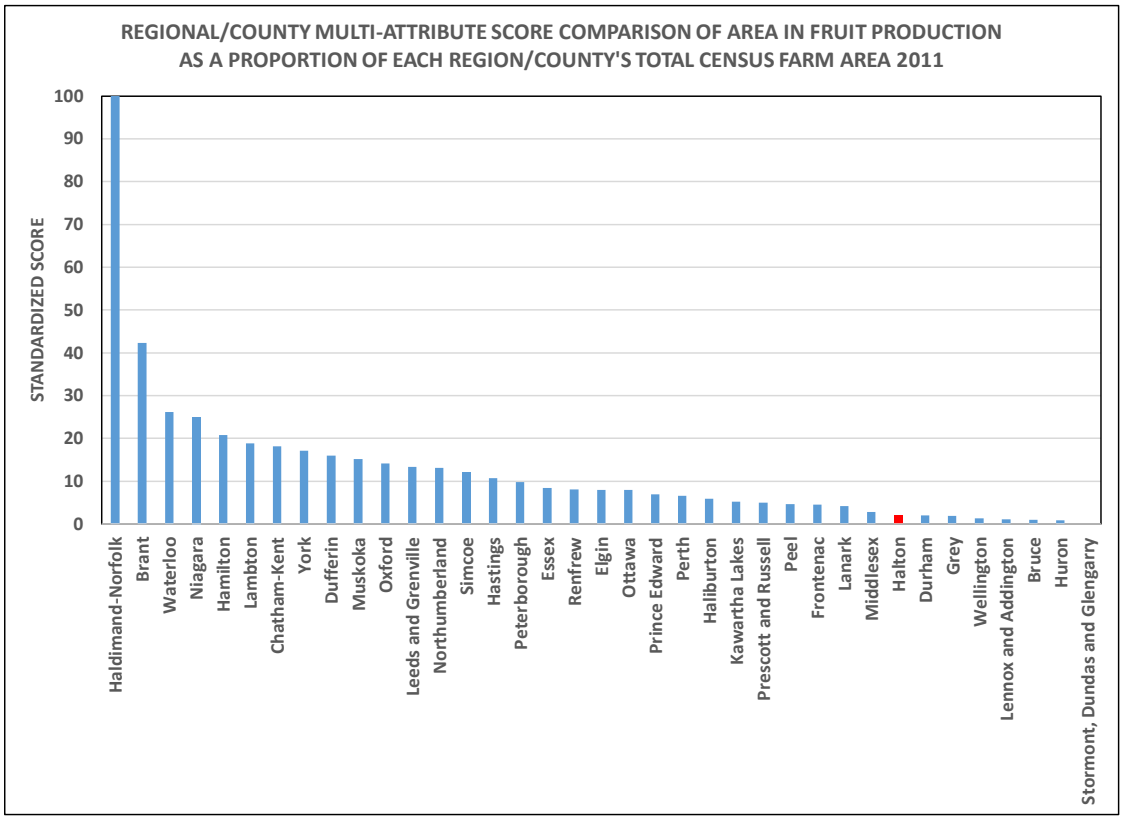


FIGURE 34

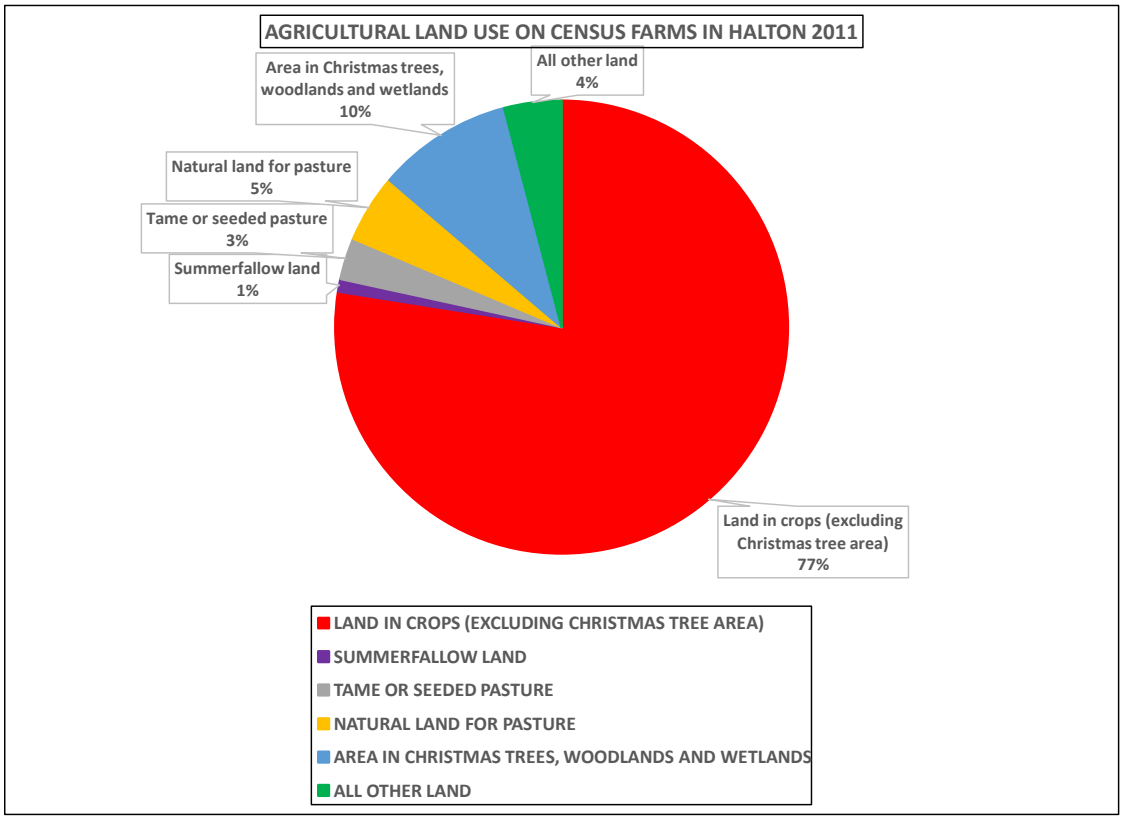


FIGURE 35

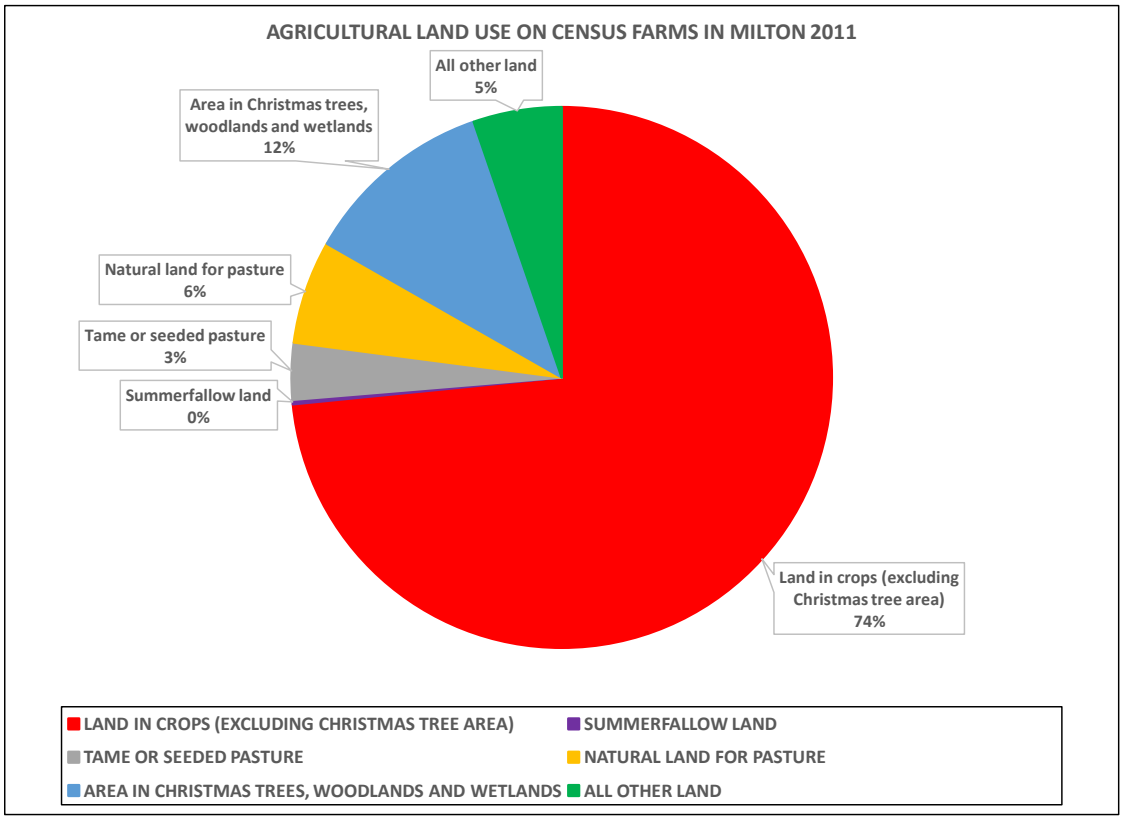


FIGURE 36

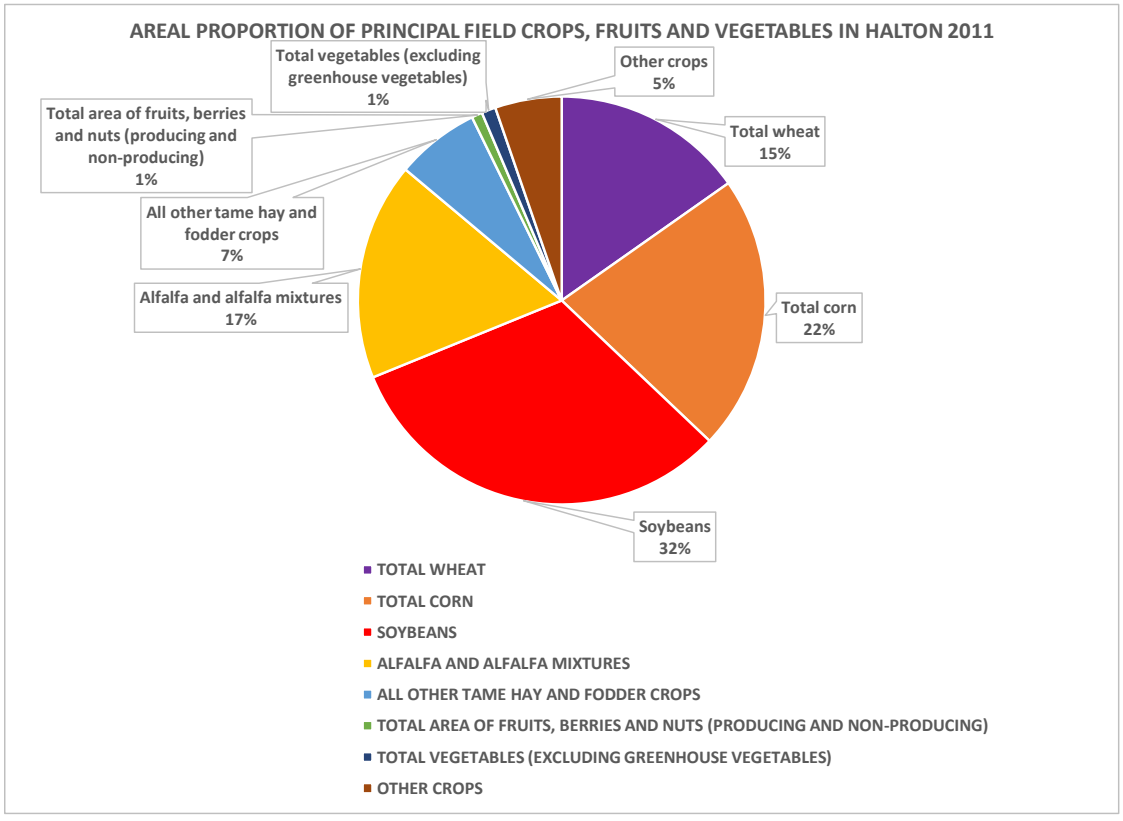


FIGURE 37

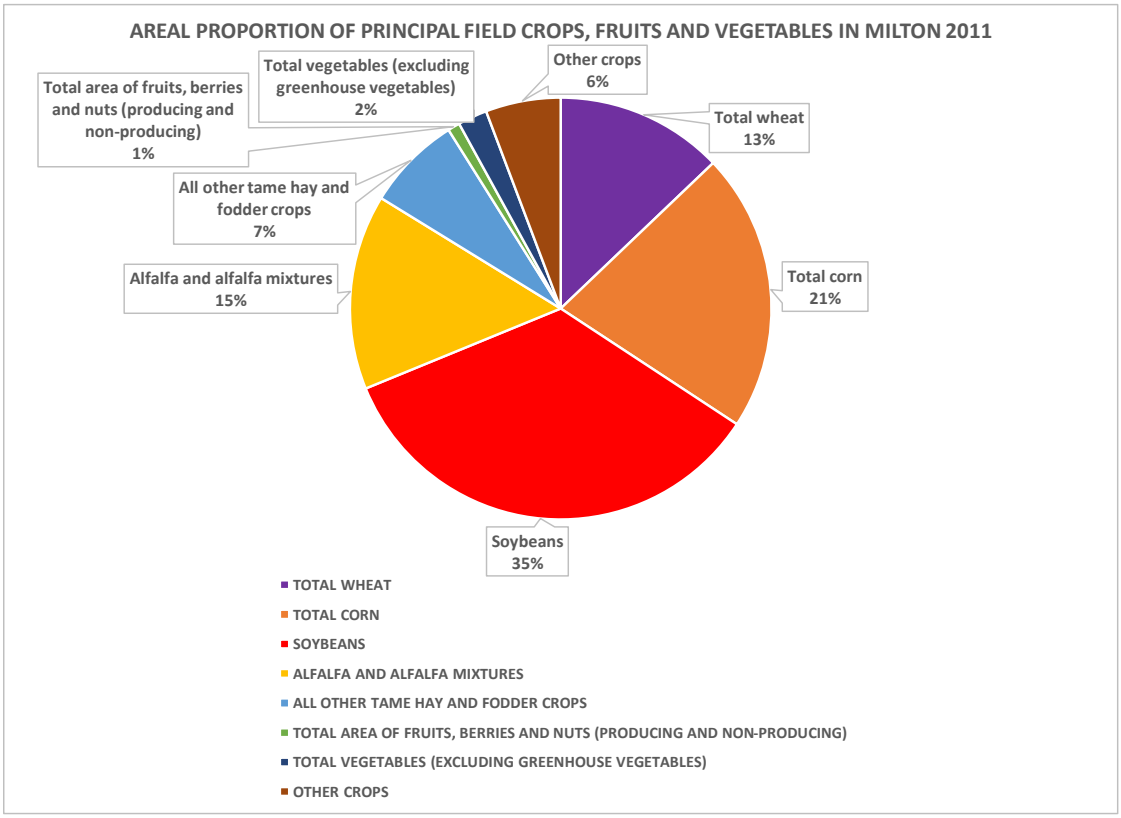


FIGURE 38

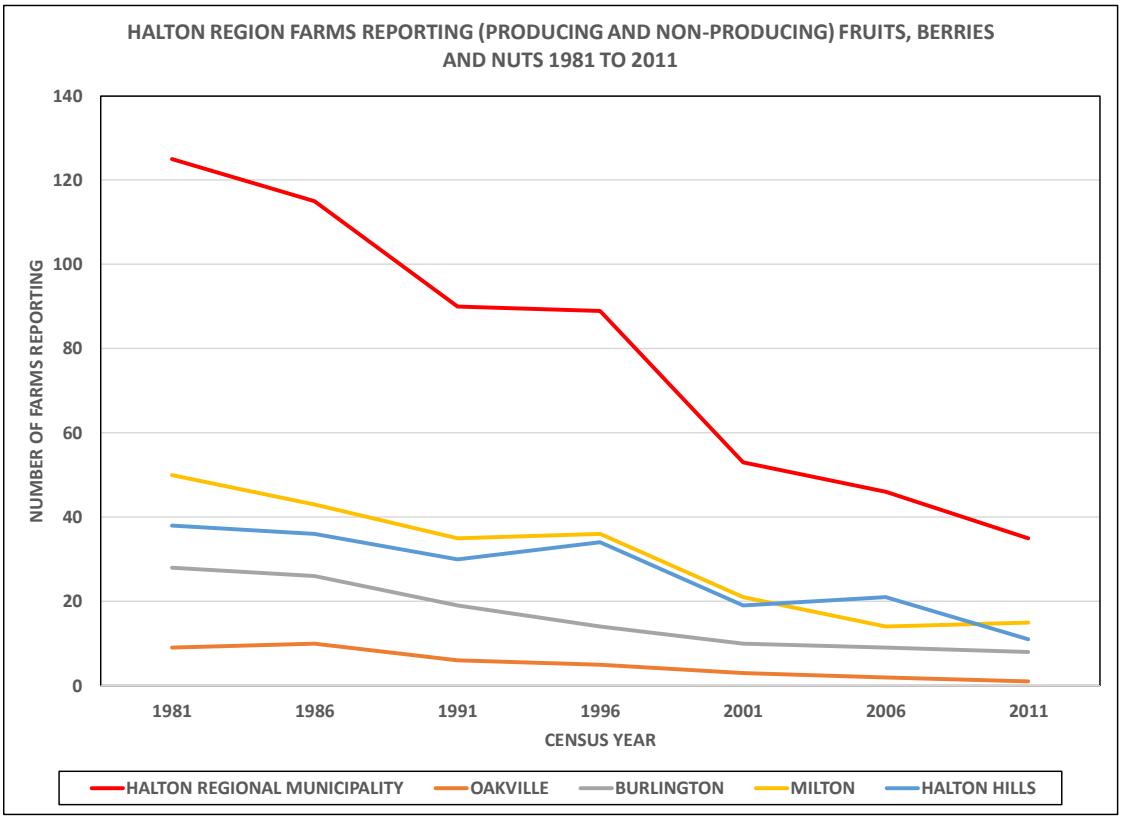


FIGURE 39

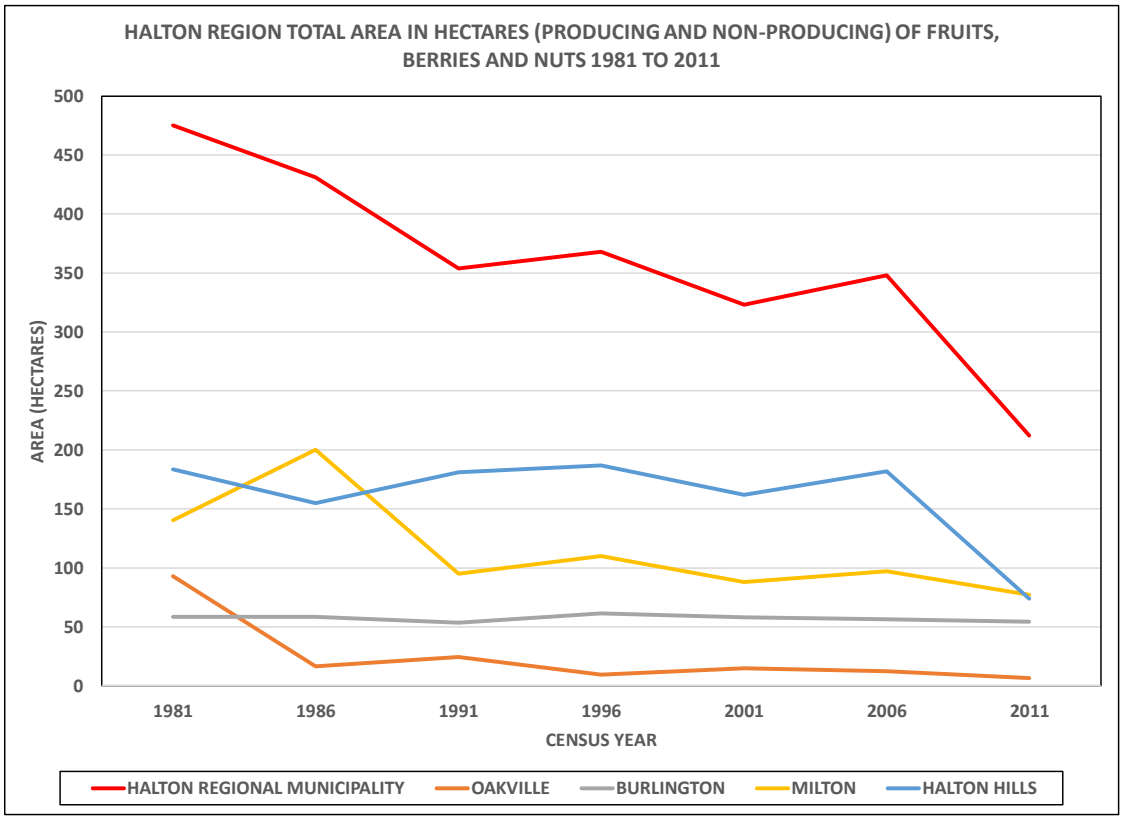


FIGURE 40

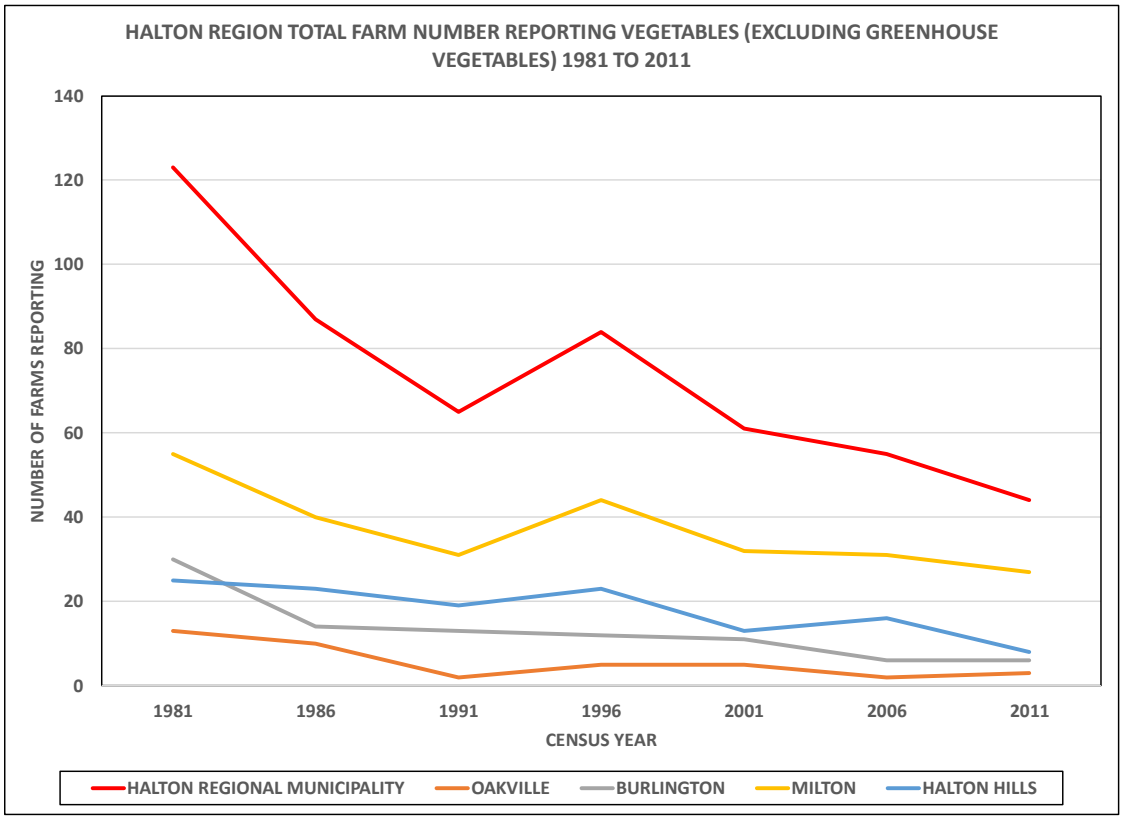


FIGURE 41

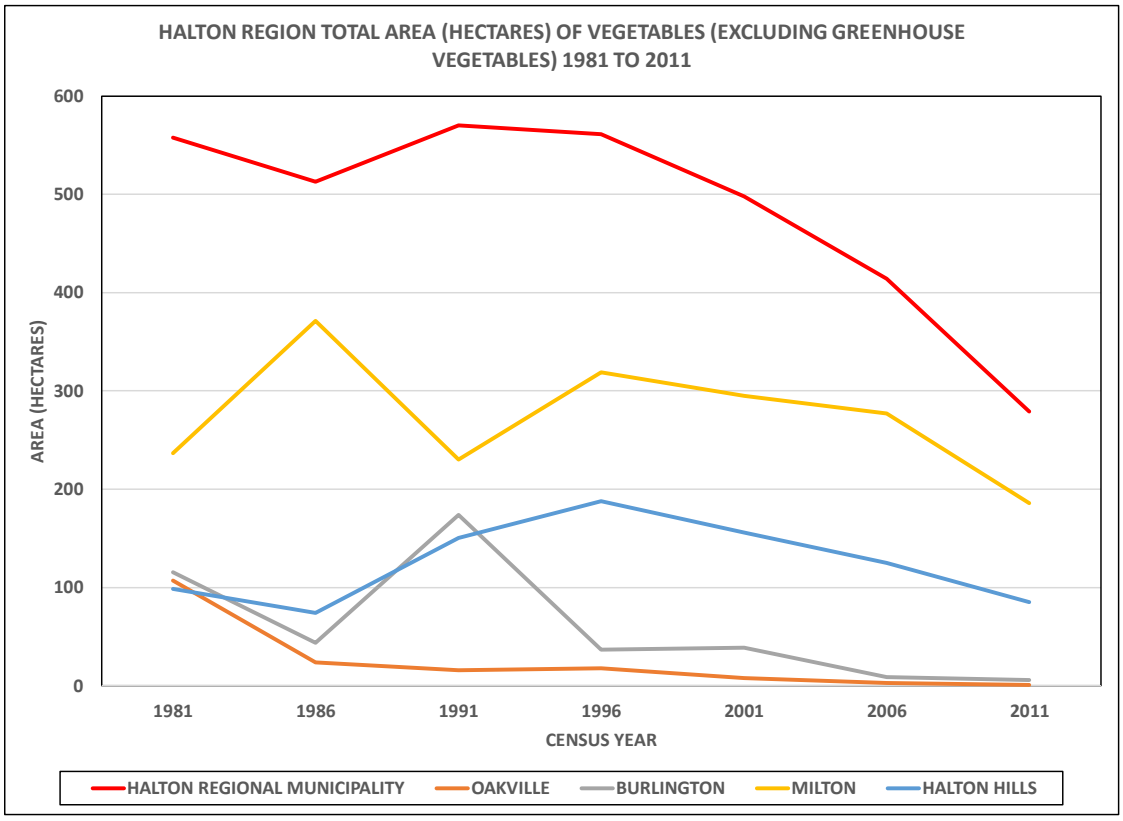


FIGURE 42

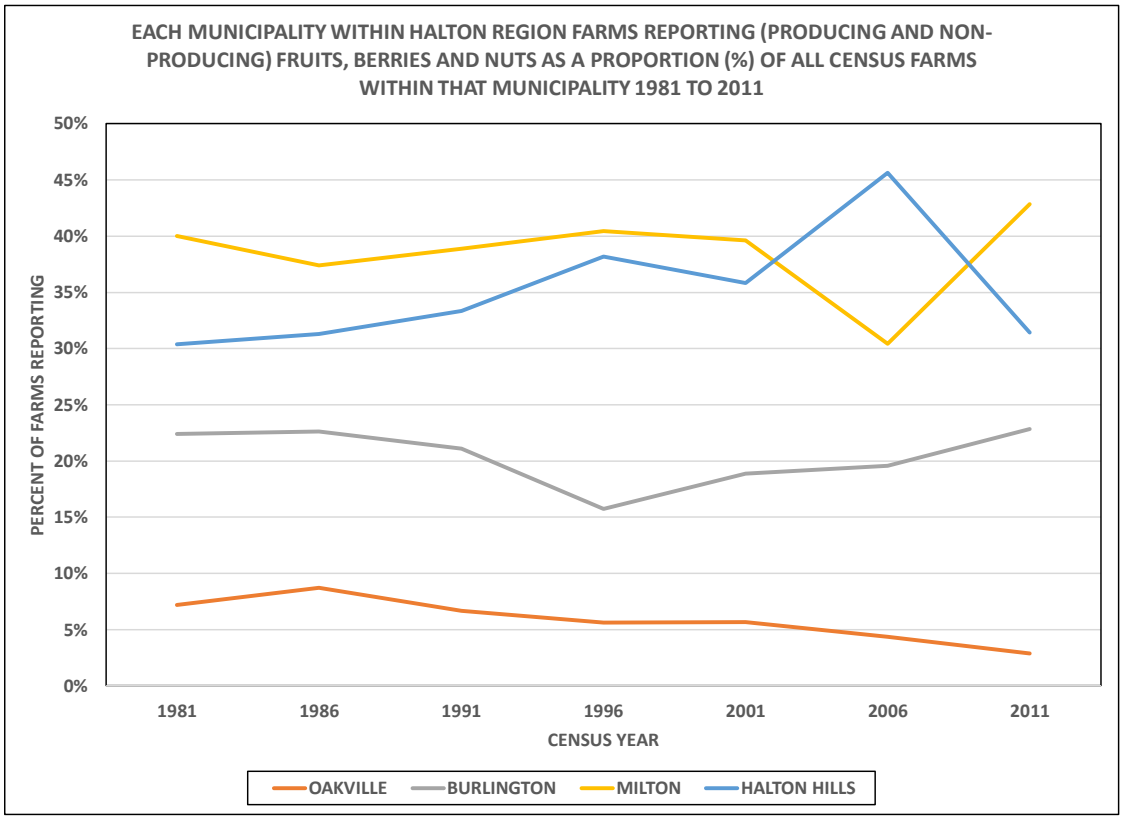


FIGURE 43

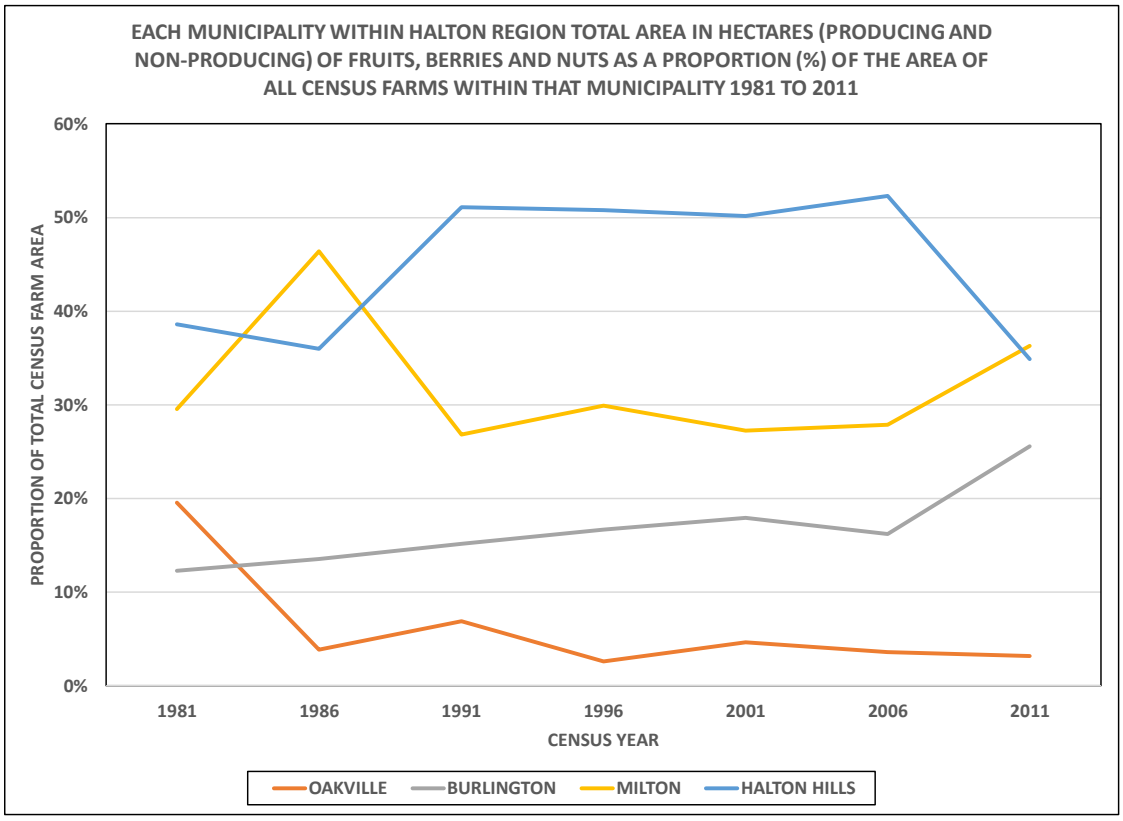


FIGURE 44

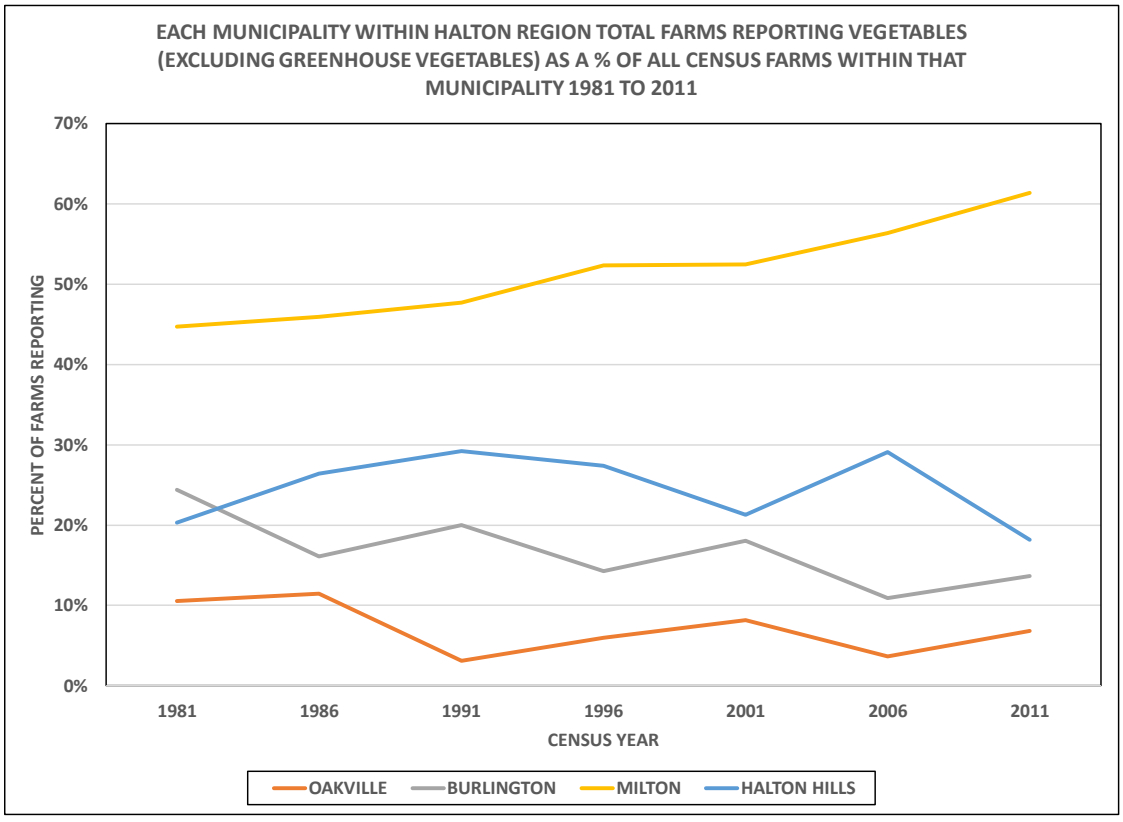


FIGURE 45

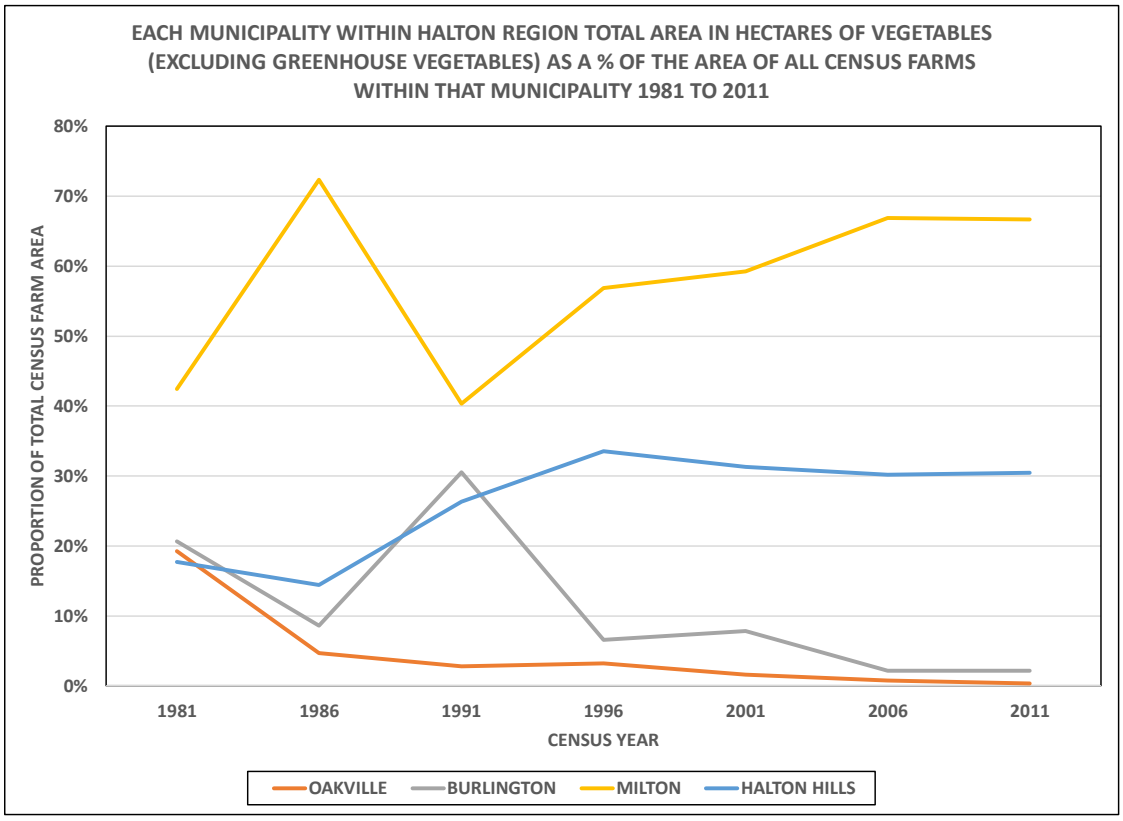


FIGURE 46

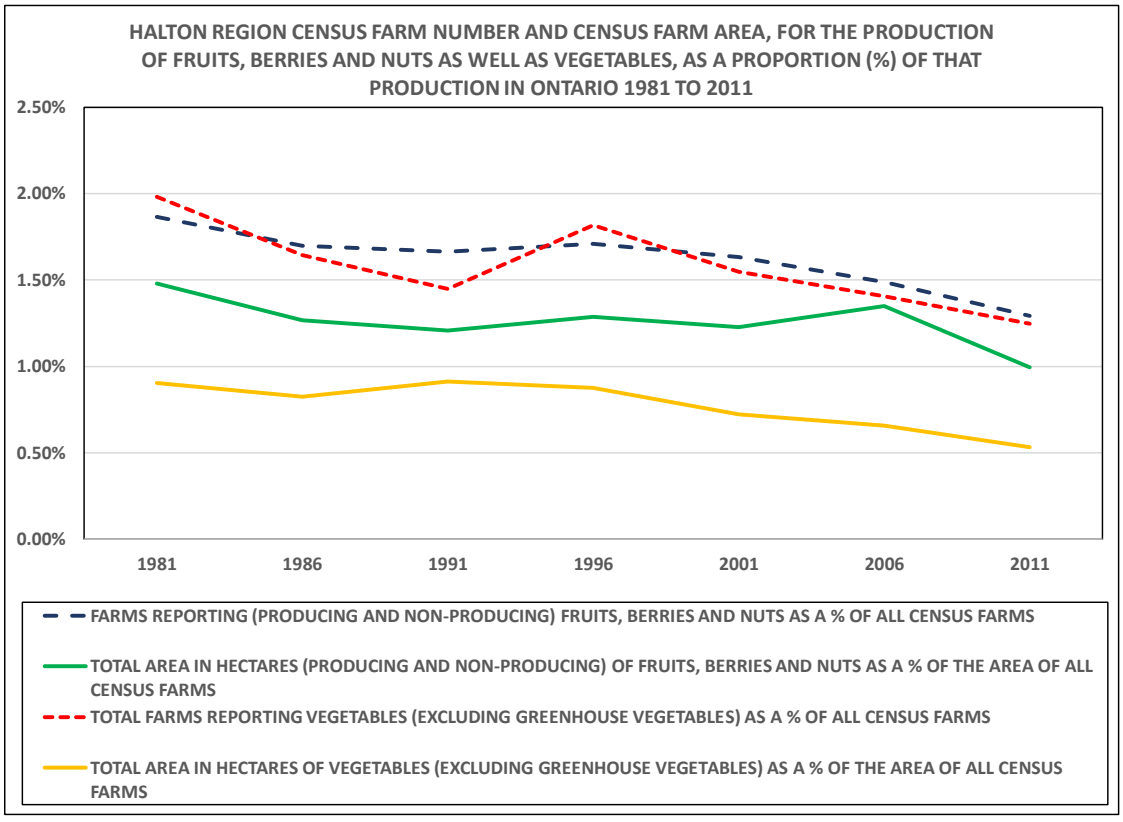


FIGURE 47

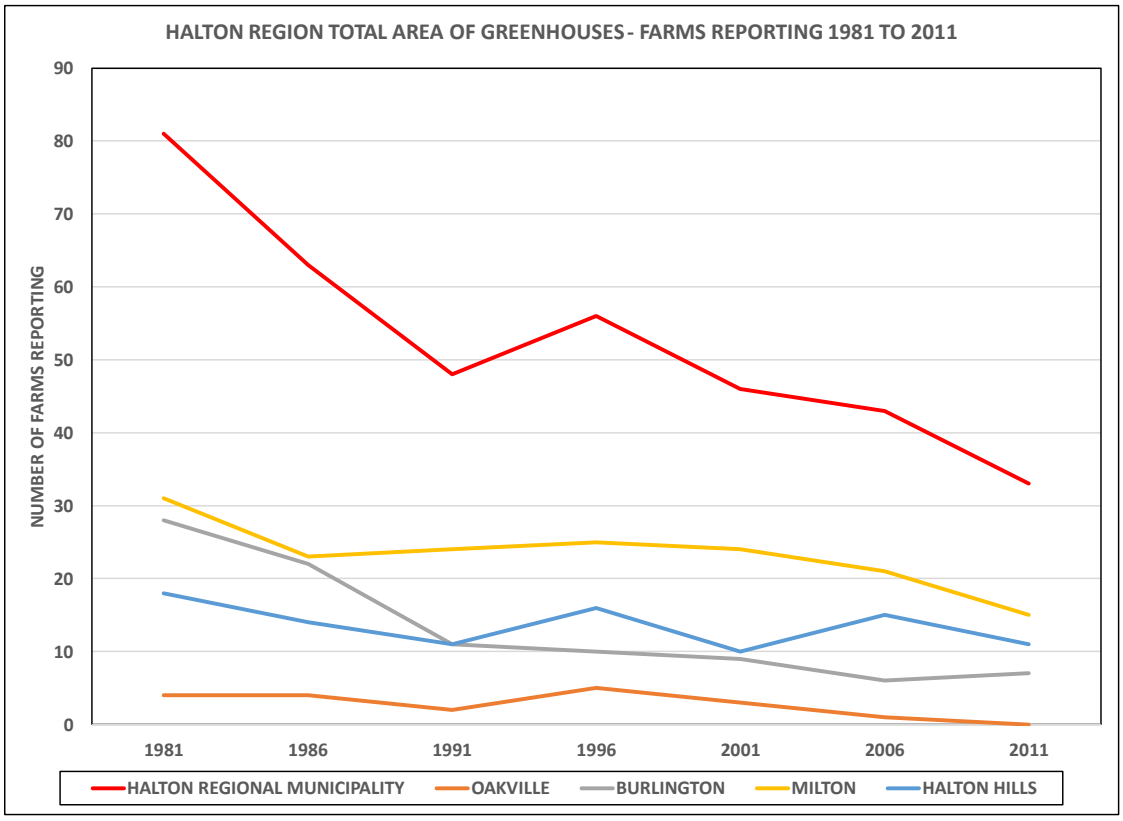


FIGURE 48

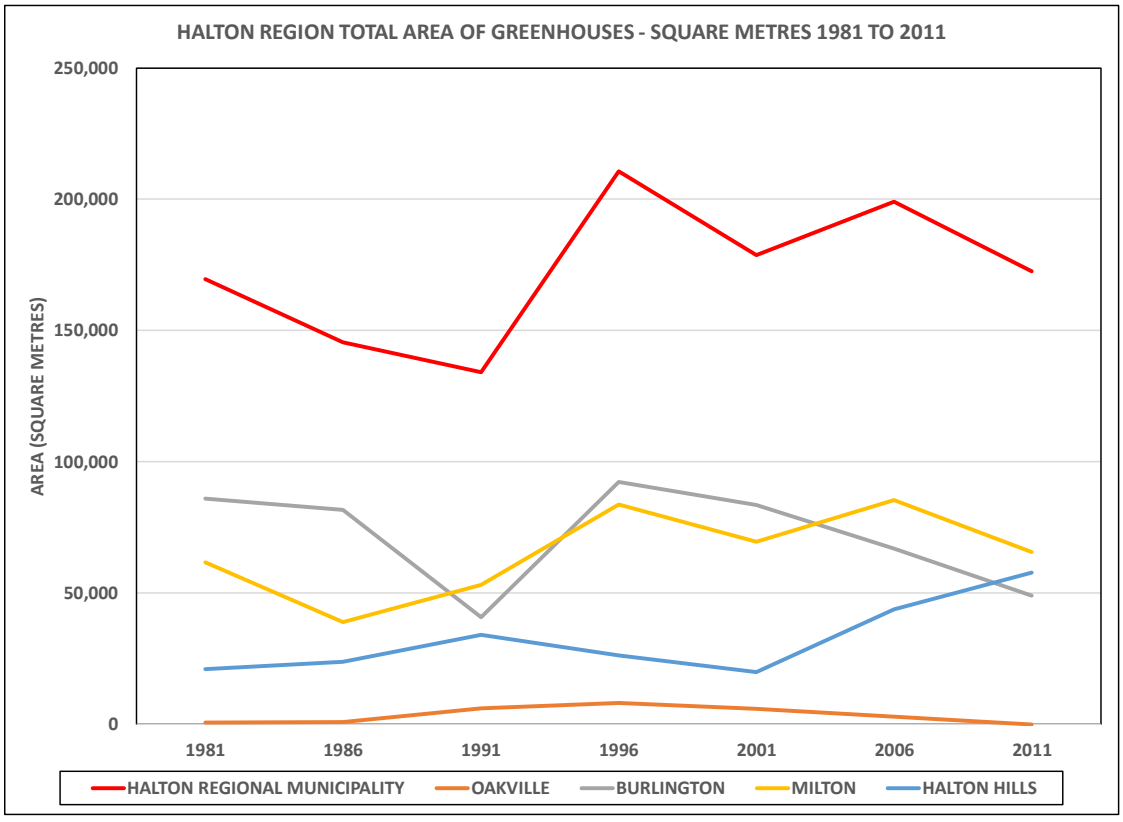


FIGURE 49

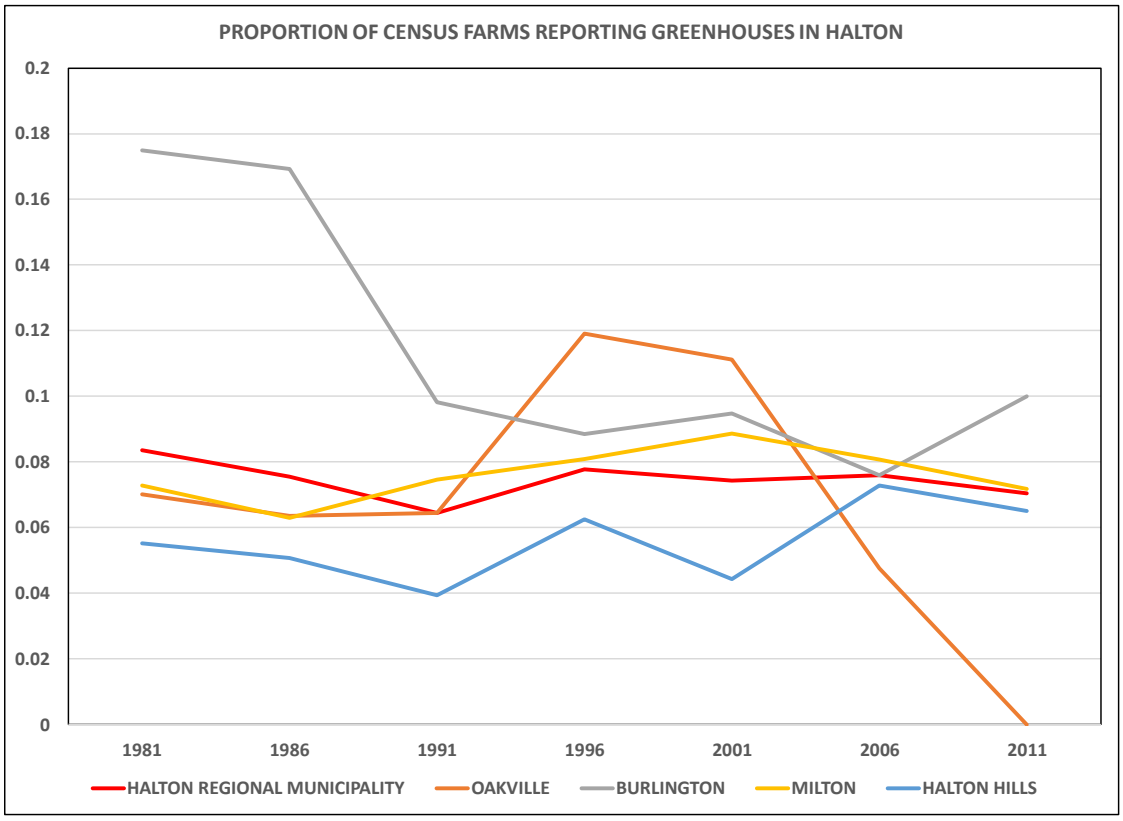


FIGURE 50

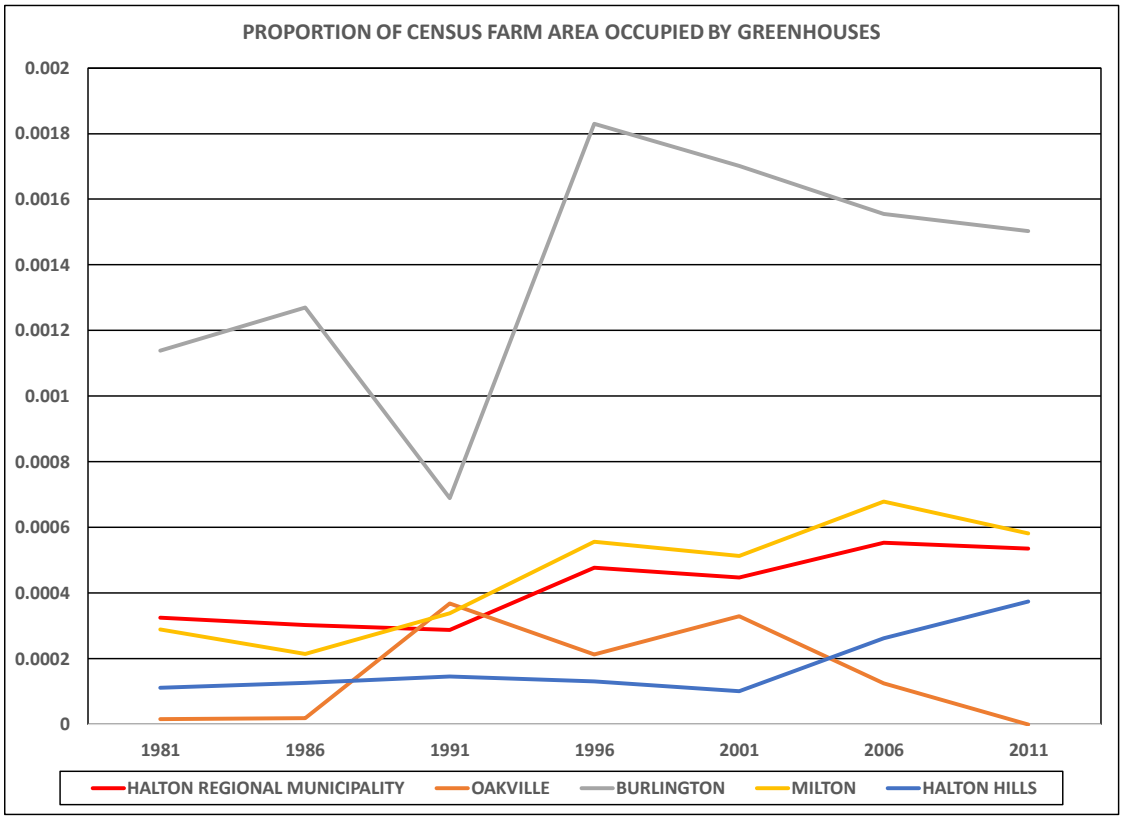


FIGURE 51

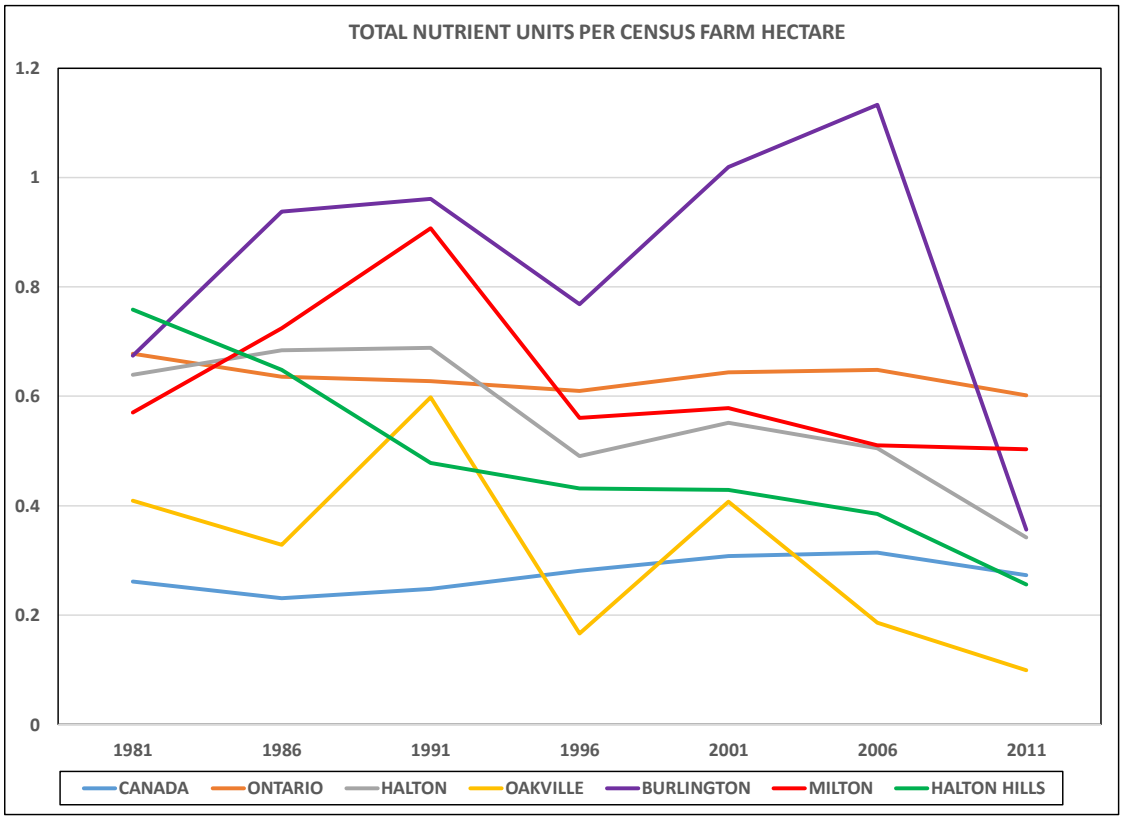


FIGURE 52

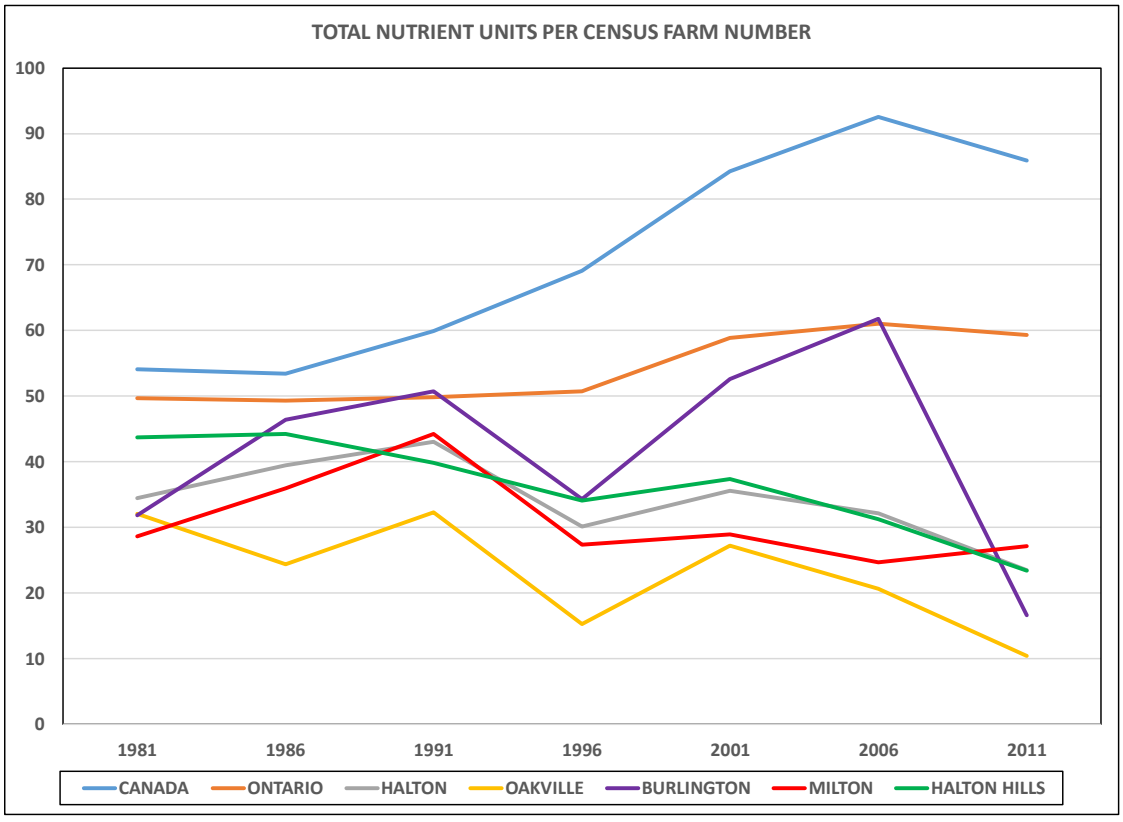


FIGURE 53

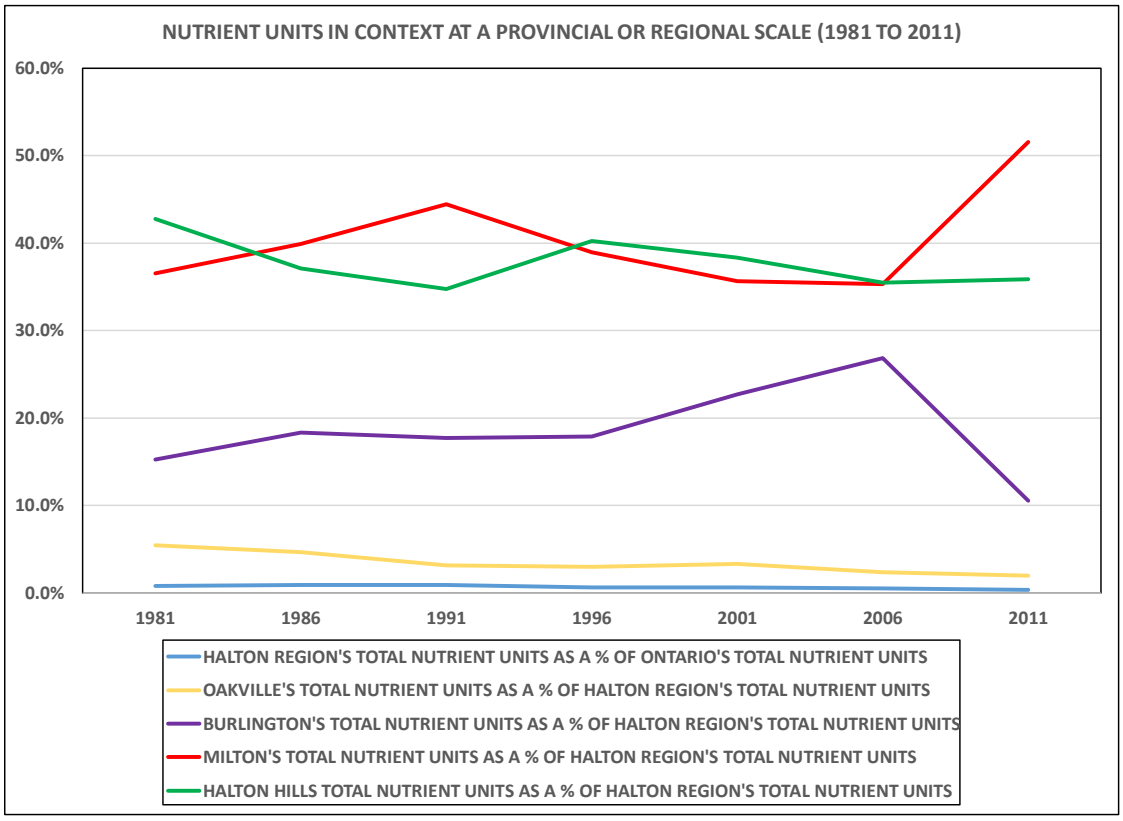


FIGURE 54

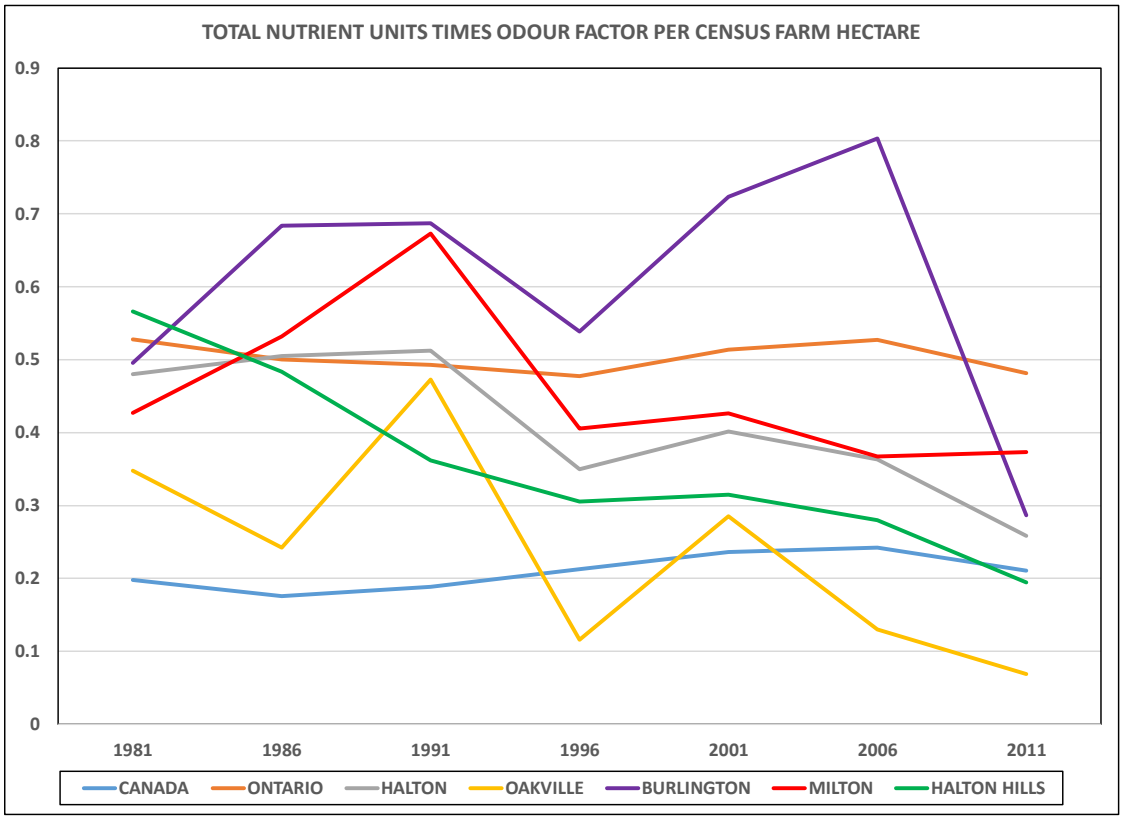


FIGURE 55

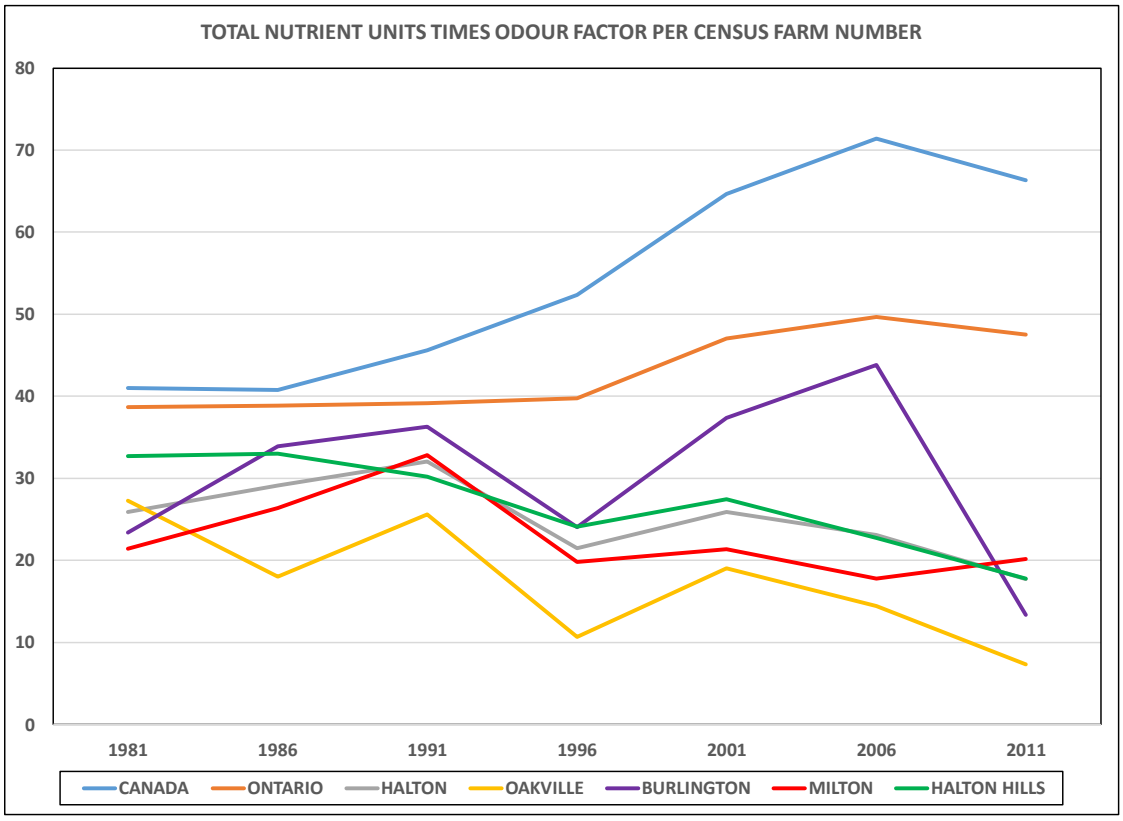


FIGURE 56

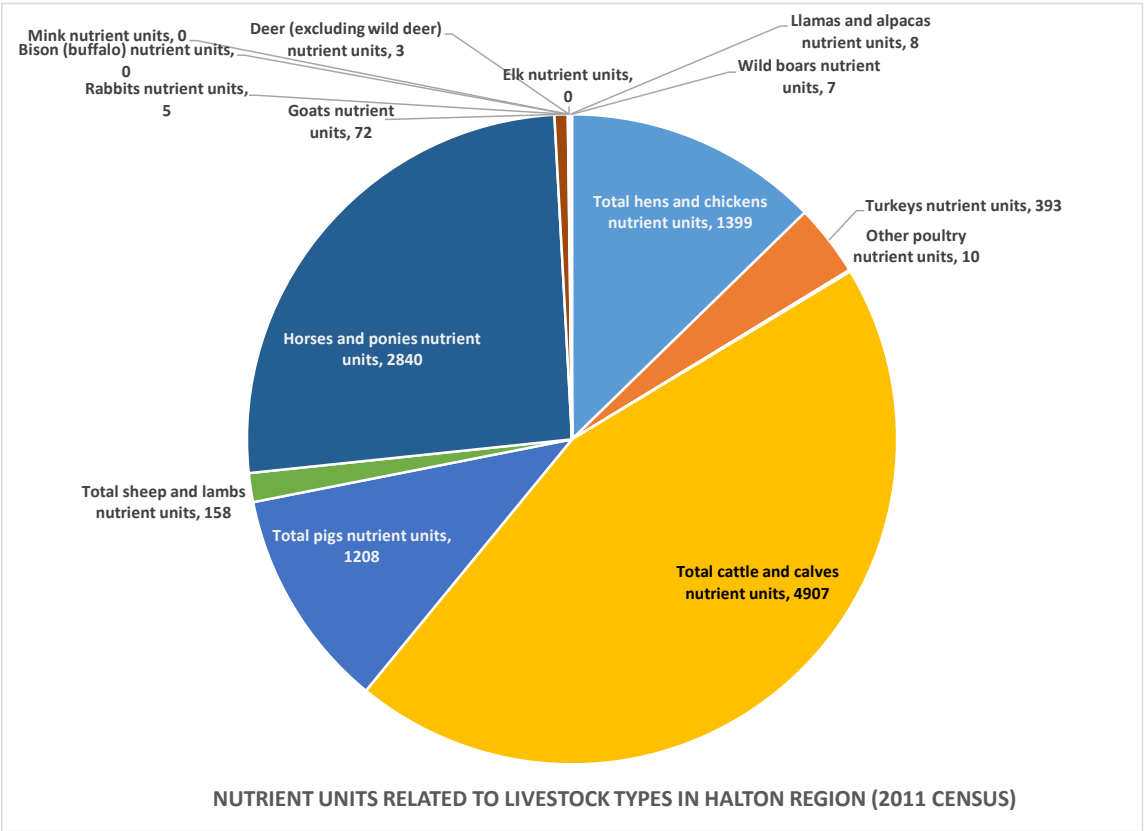
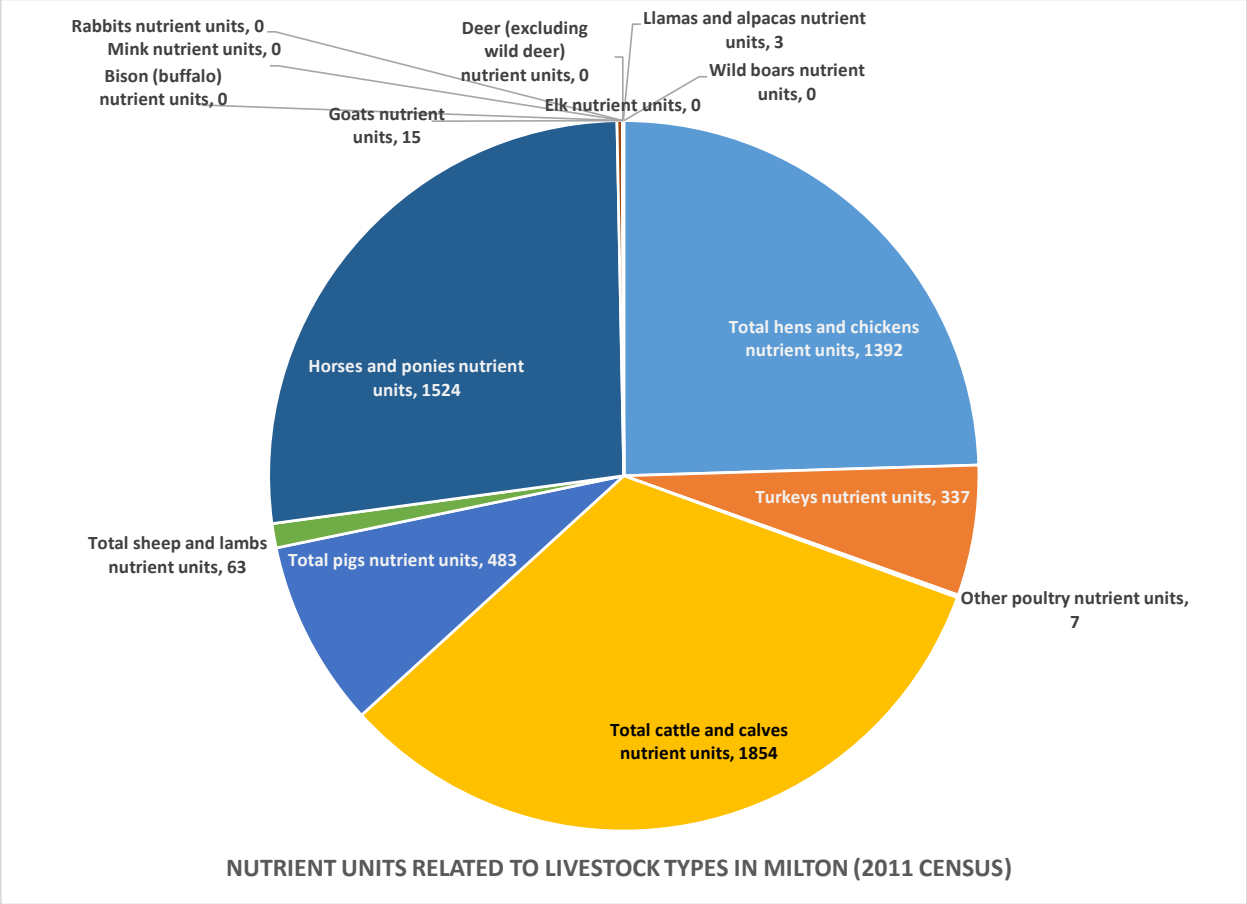


FIGURE 57


Rabbits nutrient units, 0
Mink nutrient units, 0
Bison (buffalo) nutrient units, 0
Deer (excluding wild deer) nutrient units, 0
Goats nutrient units, 15
Llamas and alpacas nutrient units, 3
Wild boars nutrient units, 0
Elk nutrient units, 0
Total hens and chickens nutrient units, 1392
Horses and ponies nutrient units, 1524
Turkeys nutrient units, 337
Total sheep and lambs nutrient units, 63
Total pigs nutrient units, 483
Other poultry nutrient units, 7
Total cattle and calves nutrient units, 1854
NUTRIENT UNITS RELATED TO LIVESTOCK TYPES IN MILTON (2011 CENSUS)

APPENDIX 2
SOIL PRODUCTIVITY INDEX and SOIL POTENTIAL INDEX CALCULATION

Soil potential ratings for fruits and vegetables have data limitations associated with soil rating systems and climate as described in the following paragraphs. All the databases evaluated have limitations associated with scale, data availability or alternatively, data suppression. For example, a soil rating system for specialty crops was developed by Hoffman and Cressman in 1984 for Ontario Hydro (Ecologistics and Smith, Hoffman, 1984). This is a three-class system – good, fair or poor which uses crop groupings but has not been applied on a broad scale to the Province. The Ontario Institute of Pedology and subsequently the Ontario Center for Soil Resource Evaluation has compiled specialty crop capability systems for some areas within Ontario. However, the Province has not a single specialty crop soil potential rating for all of Ontario. Given this lack of comprehensive soil potential information for specialty crops, it is not possible to reasonably differentiate which soils are most unique for specialty crop production within the Province.

However, some soil potential ratings for fruit and vegetables have been produced for Haldimand-Norfolk, Niagara, Elgin, Middlesex and Brant. Unfortunately, the fruit and vegetable crop groupings used in different soil surveys are dissimilar in number as well as in the kinds of fruits or vegetables included in each group. For example, Niagara has 20 crop groupings (9 for fruits and 11 for vegetables) whereas Haldimand-Norfolk has 15 groups that do not always separate fruit and vegetables into separate categories. More details about the soil potential ratings for specialty crops are outlined in a summary in the table following in this Appendix. In addition, both five as well as seven class soil potential rating systems have been used in published soil survey reports in Ontario.

As a second example of information limitations, climate data is limited due to scale and a lack of integration. Several single factor maps produced on a broad scale are available for crop heat units, plant hardiness zones, temperature minima and maxima as well as precipitation. More specific maps such as the map for *Site Selection for Grapes in the Niagara Peninsula* (Fisher and Slingerland, 2002) are not available for the province of Ontario. Additionally, specific studies on irrigation such as that done for Niagara Region (Stantec, 2007) are not available for southern Ontario.

ONTARIO SPECIALTY CROP SOIL CLASSIFICATIONS SUMMARY

Crop Grouping Description 1	Niagara Crop Grouping	Crop Grouping Description 2	Haldimand-Norfolk Crop Grouping	Crop Grouping Description 3	Middlesex and Elgin Crop Grouping	Crop Grouping Description 4	Brant Crop Grouping
	Seven Class System		Seven Class System		Five Class System		Seven Class System
Tree Fruits, Grapes and Small Fruits:	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**	**Tree Fruits, Grapes and Small Fruits:**
Peaches, Apricots, Nectarines	A	Apricots, Sour Cherries, Sweet Cherries,	D1				

Crop Grouping Description 1	Niagara Crop Grouping	Crop Grouping Description 2	Haldimand-Norfolk Crop Grouping	Crop Grouping Description 3	Middlesex and Elgin Crop Grouping	Crop Grouping Description 4	Brant Crop Grouping
		Peaches					
Sweet Cherries	B						
Sour Cherries	C						
Labrusca Grapes	D	Hybrid and Vinifera Grapes, Labrusca Grapes	D3				
Vinifera Grapes	E						
Apples	F	Apples	D4	Apples	2	Apples	D1
Pears, Plums	G	Pears, Plums	D2	Pears, Plums	3		
Strawberries, Raspberries	H	Peppers, Raspberries, Rhubarb, Strawberries	B3	Raspberries, Strawberries	1	Strawberries	B3
Currants, Gooseberries	I						
				Rutabagas	3		
		Peanuts	A2	Peanuts	2		
				Heart Nuts, Filbert Nuts	3		
				Walnuts	2		
Vegetable Crops:	**Vegetable Crops:**	**Vegetable Crops:**	**Vegetable Crops:**	**Vegetable Crops:**	**Vegetable Crops:**	**Vegetable Crops:**	**Vegetable Crops:**
Crop Grouping Description 1	Niagara Crop Grouping	Crop Grouping Description 2	Haldimand-Norfolk Crop Grouping	Crop Grouping Description 3	Middlesex and Elgin Crop Grouping	Crop Grouping Description 4	Brant Crop Grouping
Broccoli, Brussels Sprouts, Cauliflower	J	Cabbage, Cauliflower, Canola, Sweet Corn, Tomatoes, Turnips	C3	Brussels Sprouts, Cauliflower, Cabbage	8	Cabbage, Cauliflower	C2
Bulb Onions, Garlic	K	Onions, Beets, Carrots	B1				
Green (Bunching) Onions	L						
Eggplant, Peppers	M	Peppers, Raspberries, Rhubarb, Strawberries	B3	Peppers	6	Peppers	B2
Cucumbers	N			Cucumbers	4		
Muskmelon	O	Ginseng, Muskmelon, Watermelon	B2			Ginseng	B1
Potatoes	P	Potatoes	A3	Irish Potatoes	3	Potatoes	A1
Tomatoes	Q					Tomatoes	C2
Sweet Corn	R			Sweet corn	7	Sweet Corn	C2
Celery, Lettuce	S	Cucumber, Lettuce, Radish	C4				
Pumpkins, Squash	T	Green Beans, Peas, Pumpkins, Squash	C2				
		Asparagus	A1	Asparagus	1		
		Fava Beans, Soybeans, White Beans	C1	Soybeans	4	Beans	C1
				Sweet Potatoes	2		
				White beans	5		

SOIL PRODUCTIVITY INDEX CALCULATION

The soil productivity index is an arithmetic mean that expresses the relative occurrence of soil capability classes 1 to 7 on selected properties or within specified boundaries. The index is most often based on soil productivity ratings (Hoffman, 1973). Areas with the highest soil capability index will have mainly class 1 land. Areas with a low index will consist of lower soil capabilities. The productivity index method has been used because it provides a single number derived from a listing, by proportion, of the soil capability classes 1 through 7 which allows for direct comparison among different areas or sites. Impacts on soil capability will generally be greatest on an area with a high soil capability index; that is, impacts will be highest when good (higher capability land) is lost to development.

Method

Soil Productivity Index = *(proportion of area of class 1 soils x 1.0) + (proportion of area of class 2 soils x 0.8) + (proportion of area of class 3 soils x 0.64) + (proportion of area of class 4 soils x 0.49) + (proportion of area of class 5 soils x 0.33) + (proportion of area of class 6 soils x 0.17) + (proportion of area of class 7 soils x 0.02)*

The area of each soil map unit was measured and areas of similar soil capability were summed for CLI classes 1 to 7 lands. The area was calculated for each CLI class and subsequently multiplied by a productivity index corresponding to each soil class. The productivity index is specific to each capability class. The proportion of each area occupied by each soil capability class was multiplied by the corresponding soil productivity value (following Hoffman, 1973) and products were subsequently summed to obtain a soil productivity index for lands affected by or potentially affected by development.

SOIL POTENTIAL RATING FOR FRUITS AND VEGETABLES

Soil potential ratings are based on crop groupings and classes described for Brant County by Acton (1989) and for Niagara Region by Kingston and Presant (1989). Crop suitability class descriptors in the original Kingston and Presant's report have been placed in an ordinal scale for soil potential as outlined in the following:

- Good (G) – 1
- Fair to Good (F-G) – 2
- Fair (F) – 3
- Poor to Fair (P-F) – 4
- Poor (P) – 5
- Very Poor (VP) – 6
- Unsuitable (U) - 7

A matrix is created having rows which are the different soils found within a given area in the columns are for the crop groupings. The highest or best rating is class 1 and those soils that are unsuitable rated lowest as class 7. Climate has been assumed to limit the production of peaches, nectarines, apricots, cherries and vinifera grapes within some Counties/Regions and the soil potential rating has been modified to class 7 (unsuitable)

based on that climate limitation. An average specialty crop soil potential rating was calculated by adding the classes for the separate crops or crop groupings and dividing it by the total number of those crop groups (8 crop groupings following Acton and 20 crop groupings following Kingston and Presant).

The application of this average soil potential rating is limited to comparisons at a provincial and regional/county scale at its broadest extent but depending on variations in climate may only be suitable as a relative rating at the municipal or township level.
It should also be noted that the soil potential rating is an average and that there may be individual crops that will grow very well on a particular soil. In other words, a soil with an average specialty crop potential class 4 rating may actually contain one or two crop groupings with soil potential ratings at a higher level - that is, soil potential subclass 2, for example.

Soil Potential Index

The average soil potential index is an arithmetic mean that expresses the relative occurrence of soil potential ratings 1 to 7 on selected properties or within specified boundaries. Areas with the highest soil potential index will have mainly rating 1 land. Areas with a low index will consist of lower soil potential (5-7) for specialty crops. The potential index method has been used because it provides a single number derived from a listing, by proportion, of the soil potential ratings 1 through 7 in a given area which allows for direct comparison among different areas or sites.

Method

Soil Potential Index = *(proportion of area of rating 1 soils x 1) + (proportion of area of rating 2 soils x 2) + (proportion of area of rating 3 soils x 3) + (proportion of area of rating 4 soils x 4) + (proportion of area of reading 5 soils x 5) + (proportion of area of rating 6 soils x 6) + (proportion of area of class 7 soils x 7)*

The area of each soil map unit was measured using GIS and areas of similar soil potential were summed for potential ratings 1 to 7 lands. The soil productivity index and the soil potential index both tend to correlate with soil capability class.

APPENDIX 3
SOIL CLASSIFICATION AND SOIL SURVEY

Ontario's published soil surveys follow a hierarchical system of soil classification to represent a three-dimensional area called a pedon (see http://www.pedosphere.ca/resources/CSSC3rd/chapter02.cfm). This three-dimensional area is intended to be represented as a two-dimensional map polygon usually shown as the soil series on soil maps in Ontario. Soil characteristics such as texture and particle size are a part of a continuum and the soil map also must present a landscape continuum as part of a discrete map polygon. In short, soils are represented as discrete units on a map even though the soils themselves are not discrete. As a result, there can be, and there have been, different ways of representing changes in soils that have been mapped within Ontario and within parts of the rest of the world. Not surprisingly, the opportunity to represent soils in different ways has resulted in significant changes in the approach to mapping soils over the time within which soil surveys have been published in Ontario. The older soil surveys tend to lump large areas into soil map polygons, whereas newer soil surveys have smaller more detailed polygons. Newer soil surveys also tend to have complexes (which are soil map polygons containing 2 or more soil series and/or two a more soil capability classes and subclass limitations). Examples of more recent soil surveys include Niagara, Haldimand-Norfolk, Brant, Kent, Middlesex, Ottawa urban fringe, Ottawa-Carlton and the soils component within the report titled *State of the Resources for the Duffin-Rouge Agricultural Preserve*. A review of older as well as newer Ontario soil reports indicates the following:

- soil series with the same name may not have the same characteristics between Counties and/or Regions,
- some soil series identified in detailed field studies are not always represented in the County/Regional published soil survey within which the detailed work is being completed; and,
- not all the soil capabilities assigned to a particular soil series are consistent from one soil report to another soil report.

The significance of the difference between old mapping styles and newer ones can be illustrated by using an old soil report and comparing the old soil map to a newer map. Both maps were produced by government staff. Within Durham Region, as well as a part of York Region, an area identified as an Agricultural Preserve was remapped (Schut *et al*) at a scale of 1: 20,000 in 1994 relative to two maps produced in 1956 (Olding et al.) and 1955 (Hoffman and Richards) both at a scale of 1: 63,360. A review of these older and newer maps shows that:

- there are differences in the number and size of soil polygons and the differences in the soil polygons represent differences in soil series and soil phases, and
- soil capability values assigned to each of the soil polygons are different from older map to newer map.

When the soil capability information is calculated as a productivity index, the old map assigned a productivity index of 0.91 (equivalent to capability class 1 soils) to that part of the Agricultural Preserve located within Durham Region whereas the new map has a productivity index of 0.66 that is relatively equivalent to capability class 3 (0.64). This information demonstrates that the soil productivity within the Preserve is significantly lower than the original mapping by Olding *et al.* (1956) would indicate. Given that some of the soils mapped in the Preserve by Schut et al. (1994, OMAF) require tile drainage,

this tile drainage would need to be in place to reach the average productivity index value of 0.66.

RATING FOR COMMON FIELD CROPS

The original soil capability classification is part of the Canada Land Inventory (CLI) and used an ordinal scale having the numbers 1 through 7. (A discussion of the definition of different scales is available in many mathematics texts. Siegel (1956) outlines a good summary matrix of the definitions for different scales that can be related to statistical tests). Alternatively, Velleman and Wilkinson (1993) describe mathematical scales as part of a continuum and argue that the use of specific statistical tests for specific scales is inappropriate. Irrespective of scale, the CLI capability interpretation was derived based on "*research data, recorded observations, and experience*" and was not intended for use as an indicator of the "*most profitable use of land*".

The class, the broadest category in the capability classification, is a grouping of subclasses that have the same relative degree of limitation or hazard. The limitation or hazard becomes progressively greater from class 1 to class 7. The class indicates the general suitability of the soils for agricultural use.

Class 1 - Soils in this class have no significant limitations in use for crops.

Class 2 - Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.

Class 3 - Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices or both.

Class 4 - Soils in this class have severe limitations that restrict the range of crops or require special conservation practices or both.

Class 5 - Soils in this class have very severe limitations that restrict their capability of producing perennial forage crops, and improvement practices are feasible.

Class 6 - Soils in this class are capable only of producing perennial forage crops and improvement practices are not feasible.

Class 7 - Soils in this class have no capability for arable agriculture or permanent pasture.

Agricultural soils information is currently available in old-style printed format as well as in digital format. The original information with all presented as soil survey reports with accompanying soil maps. Some more recent soil survey publications include a separate interpretive map for soil capability following the rules outlined in the Canada Land Inventory Soil Capability Classification for Agriculture. However, most reports contain a section that has a matrix summarizing soil capability classes for different soil series and phases relative to slope class. The very early soil reports prior to the 1960s tend to have a descriptive summary of the relative merits of different soil series for common field crop production - a precursor to the CLI soil capability classification. When the CLI soil capability classification work was started, a list of all the soil series was compiled and a soil capability class assigned to each soil series having a given set of limitation such as slope class and stoniness class. This information served as a base and blueprint maps, produced by projecting soil polygon/map unit boundaries on to topographic maps at a scale of 1 to 50,000, summarized capability on a County basis. When the County work was being done, additional detailed soil surveys were completed in several smaller

sample areas to assist in assigning soil capability classes to the soils/soil polygons found within the County. The blueprint maps served (without edit) as the base for the production of generalized 1: 250,000 scale soil capability maps by the Federal Government in Ottawa. The same blueprint maps were also used as a data source when the soil surveys for Ontario were digitized by OMAFRA. The digitizing included matching soil polygon series and soil capability information at the boundaries between Counties/Regions. Additionally, several more detailed soil surveys have been completed and the soil capabilities outlined in these published reports do not always match the soil capability values assigned on the blueprint maps. Thus, soil capability values can come from several different sources as follows:

- the unpublished summary of capability classes assigned to all of the soil series present as a result of mapping up to the 1960s;
- the blueprint map soil capability classes;
- the separate County summary data prepared as the base for the blueprint maps;
- the soil capability classes assigned within published soil reports after the 1960s some of which result because of published scientific information about the effects of soil characteristics such as density on soil capability.

Other soil capabilities have been derived because of the identification of new soil series, new soil phases and differing opinions about the capability of different soils

Subsequently, research by Hoffman (1973) indicated that soil capability class was an indicator of common field crop yields and productivity (yield) indices could be derived based on those yields. The indices, described more specifically in Appendix 1, are used as an “average” for three crops: oats, barley, and corn.

The soil capability class ordinal scale could then be converted into an interval scale using Hoffman’s (1973) data. The data used to create the interval scale are based on older soil surveys and the soil capability class summaries associated with the older surveys are summarized by Hoffman and Noble (1975). New surveys have been completed for Regions such as Middlesex, Elgin and Niagara. In these new surveys, because of work by McBride (1983), the soil capability classes for some soils have been changed to a lower class, particularly for soils with a high clay content. While McBride’s work has been related to average yield data, on a County or Regional basis, no site-specific yield data has been used to confirm that the newer changes to soil capability class is supported by specific yields as was completed in Hoffman’s (1973) research. Therefore, the capability classes used in the newer soil surveys, such as the one for Niagara, might better be described as being part of an ordinal scale.

Regardless of the difference of opinion concerning arithmetic scale, yield data, and productivity indices, both data sources and methods have been investigated as part of the work described in this report.

The original soil capability rating report (Environment Canada, 1972) has assumptions which have been applied to the interpretation of soil capability. Two of these assumptions (Environment Canada, 1972) are germane to a discussion on the capability of the subject lands and are as follows:

- *Good soil management practices that are feasible and practical under a largely mechanized system of agriculture are assumed.*
- *Soils considered feasible for improvement by draining, by irrigating, by removing stones, by altering soil structure, or by protecting from overflow, are classified*

according to their continuing limitations or hazards in use after the improvements have been made. The term "feasible" implies that it is within present day economic possibility for the farmer to make such improvements and it does not require a major reclamation project to do so. Where such major projects have been installed, the soils are grouped according to the soil and climatic limitations that continue to exist. A general guide as to what is considered a major reclamation project is that such projects require co-operative action among farmers or between farmers and governments. (Minor dams, small dykes, or field conservation measures are not included).

Therefore, these assumptions have been considered in the evaluation of soils in this specialty crop study. Soil capability mapping has been based on the original soil map which is now available in digital format from LIO based on information originally supplied by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

As discussed previously, the Canada Land Inventory (CLI) originally assumed that soil management that could be applied by a farmer would occur. Therefore, improvements such as irrigation and adequate drainage (both surface and subsurface) were already assumed to be applied in the rating of soils into capability classes.

Tile Drainage

As noted previously, soil capability and therefore productivity makes assumptions about tile drainage (that is, that tile drainage is applied where it is needed and that capability class ratings reflect the fact that the drainage is already assumed to be in place). There are some differences of opinion about which soil drainage classes would benefit from tile drainage. However, it is likely that imperfectly and poorly drained soils would show improved yields when tiles had been installed. There is no doubt that poorly drained soils have better yields when tile drained. As well, it is likely that the imperfectly drained soils would benefit from tile drainage. Unfortunately, the newer soil surveys do not indicate how soil capability class levels would change if imperfectly drained soils are not tiled.

Some information is available to assist in estimating how productivity is diminished in areas requiring tile drainage. For example, yield data collected over 20 years and that were summarized and evaluated by Irwin (1999) indicate that, because of tile drainage, average yields have improved within a range where the least improvement was a 10 percent increase for coloured beans in contrast to a high increase of 38 percent for wheat. The summary by Irwin (1999) did not differentiate by soil series, soil drainage class, or by location in the Province. Based on a general interpretation of the data from Irwin (1999), it can be estimated that imperfectly drained soils in an undrained state could be poorer by a single capability class. However, the installation of tile drainage on the imperfectly drained soils is less likely than installation on poorly and very poorly drained soils.

APPENDIX 4
MULTI-ATTRIBUTE ANALYSIS AND AGRICULTURAL PERFORMANCE

MULTI-ATTRIBUTE ANALYSIS

Any multi-attribute analysis, including a LEAR analysis, may have different results based on:

- the number and kind of variables considered,
- the analysis method,
- the weights applied to the variables,
- whether the data was standardized, and
- whether all the data was presented consistently to mean that a high number is intended to indicate a high importance value.

A review of the literature did not present information suggesting that a single multi-attribute analysis method is the best method. Even the wording employed for the quantitative methods used to combine information varies. The University of Redlands and the Spatial Decision Support Consortium (2012) have prepared a summary of the language and definitions associated with Multi-Criteria Decision Analysis (MCDA). Some of the work described by the University of Redlands is based on work by Malczewski (2006). Multi-attribute Combination Methods is a subset of MCDA having subcategories of Analytical Hierarchy Process, Concordance Methods, Fuzzy Aggregation Operation, Ideal/Reference Point Method, Value/Utility Function Method and Weighted Linear Combination. A LEAR analysis fits in to the subcategory of Weighted Linear Combination which is described on the Redlands website as "the most often used technique for tackling spatial multi-attribute decision making".

AgPlan Limited and Michael Hoffman have carried out various multi-criteria decision analyses at different scales throughout the Province of Ontario. The following paragraphs briefly describe the methods used to evaluate agricultural performance within different Regions or Counties in central to southwestern Ontario. Most of the variables used in the regional scale analyses are outlined in the Agricultural Census for Ontario. Additional variables for soil productivity and crop yields are available through OMAF(RA) for the years used in the analyses. The early census years had relatively few variables (in the order of 30) while later census years used many variables (in the range of hundreds). Some environmental variables used in the later analyses first appeared in 1996. There is the potential for an infinite number of ways to modify the data using the three ways described. Therefore, individual databases were designed to include some relatively different measures of agricultural performance/achievement.

Regional Comparison

At the regional scale for example, environmental, economic, and production viewpoints were separated for some databases. In other instances, a modified characterization within a single category such as production was completed. For example, production was characterized as using total production values (volumetric or gravimetric) for some data sets and as production per unit area (yield) in other data sets. Multiple characterisations were used to represent different perspectives as well as different values associated with the agricultural indicators/metrics. Therefore, for example, total production values were included because they give a relative indication of a County's contribution to the total food production that occurred within a given year within southern to central Ontario. However, this production indicator tends to be correlated with the area of the County. Therefore, yield data was included and/or emphasized to minimize

any effect associated with a Region/County's size on that Region/County's performance rating. As well, each of the data sets was modified using different weighting schemes to represent disparate views about which indicators are better predictors of agricultural performance.

Different agricultural variables were grouped into databases to emphasize different parts of each year's agricultural indicators. In general terms, one database was prepared for fruits and vegetables and the second database produced so that the area and farm number data from the first a database was proportional to the total census farm area or total number of census farms.

Methods and Standardization

The combination of different variables to produce a single value has traditionally presented problems and colloquially is known as the "combining apples and oranges" problem. The problem of combination has been reduced by choosing methods that compare indicators using a standardized quantitative scale. As described previously, each data set could be analysed using two different methods as follows:

(1) Simple additive weighting (SAW);
(2) Concordance (CCD); and

For the simple additive weighting and concordance methods, the data were standardized based on the maximum and minimum indicator values for each variable. Standardization used the following formula:

$$\textit{Standardized Score} = 100 \times \frac{\textit{(Raw Data Value) - (Minimum Raw Data Value)}}{\textit{(Maximum Raw Data Value) - (Minimum Raw Data Value}}$$

Therefore, all scores range between the values 0 and 100.

In addition to different data sets, and different agglomeration analysis methods, different weights were considered. However, in this instance all variables were given equal/unit weight. The agricultural analysis methods were also set up to allow for the calculation of the inverse of any variable.

APPENDIX C

Stage 1 Archaeological Assessment for the Milton

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the Milton Land Base Analysis In the Geographic Township of Trafalgar (North) Former County of Halton Now the Town of Milton Regional Municipality of Halton Ontario

Project #: 028-MI1709-16
Licensee (#): Jessica Marr (P334)
PIF#: P334-0288-2017

Original Report

March 10th, 2017

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EXECUTIVE SUMMARY

As part of the approval of the Regional Official Plan Amendment (ROPA) #38, additional lands were identified in the Town of Milton to accommodate population and employment growth from 2021 through to 2031. The lands identified for growth will serve as Milton's next urban expansion area and next major Secondary Plan Area(s) (i.e., Sustainable Halton urban area lands phased for growth between 2021 and 2031). These lands are to be planned comprehensively and are to meet minimum density and employment targets established in the Greater Golden Horseshoe Growth Plan, as well as the Region of Halton and Town of Milton's growth strategy. Comprehensive planning of these lands will enable the Town to achieve the required population target of 238,000 persons and employment target of 114,000 jobs by 2031.

As one of the first steps in the Secondary Plan process, the Town of Milton intends to undertake a Land Base Analysis (LBA). The purpose of the LBA is to identify the key opportunities and constraints to development, as well as inform and provide direction to the Secondary Plan process. The LBA is intended to be a high-level study, wherein a preliminary land use concept, showing broad land use categories, as well as a framework for future studies will be produced to inform early phases of other studies.

To facilitate this LBA study, *Archeoworks Inc*. was retained by *Malone Given Parsons Ltd.* to conduct a Stage 1 AA of the study area which is situated within parts of Lot 5, Concession 3 New Survey; Lots 4-5, Concession 4 New Survey; Lots 2-9, Concession 5 New Survey; Lots 5-9, Concession 6 New Survey; Lots 2-14, Concession 7 New Survey; and Lots 2-14, Concession 8 New Survey, in the Geographic Township of Trafalgar (North), former County of Halton, now in the Town of Milton, Regional Municipality of Halton.

Stage 1 background research identified elevated potential for the recovery of archaeologically significant materials within the study area based on the Regional Municipality of Halton's archaeological management plan, as well as the plan proximity (within 300 metres) of: registered archaeological sites, primary and secondary water sources, historic settlements, historic transportation routes, pioneer cemeteries, and designated structures.

Based on the established archaeological potential, it is recommended that:

1. For those portions of the study area that have been cleared of archaeological concerns through previous archaeological assessments, no Stage 2 AA is required.

2. For lands that were subjected to previous Stage 1-2 AAs, Stage 3 AA, and/ or Stage 4 survey, prior to any intrusive activity within these lands, a copy of the appropriate reports must be reviewed to determine if there are any further archaeological concerns associated with these lands.

3. AjGw-20, AjGw-50, and AjGw-56: Given these sites were discovered in the late-1970s (reports are not available), and they are presently located within undeveloped lands, it is presumed that these sites are still intact. It is recommended that these locations be subject to appropriate Stage 2 AA methods to relocate these sites and determine if further Stage 3 AA is required. If the revisit does not result in the recovery of any additional artifacts, a recommendation will be made to free the site of further archaeological concern.

4. As per *Section 1.4.1, Standard 1.f* and *Section 1.4.2* of the *2011 S&G,* areas that exhibit disturbed conditions, need to be confirmed through an on-site property inspection during a Stage 2 AA.

5. As per *Section 2.1, Standard 2.a* of the *2011 S&G,* lands evaluated as having no or low potential need to be confirmed through an on-site property inspection during a Stage 2 AA.

6. All identified areas which retain archaeological potential must be subjected to a Stage 2 AA. The ploughed agricultural fields must be subjected to pedestrian survey at five metre transects in accordance with *Section 2.1.1* of the *2011 S&G*. All areas where ploughing is not possible or viable must be subjected to test pit survey at five metre intervals in accordance with *Section 2.1.2* of the *2011 S&G*.

7. Should proposed work occur within or immediately adjacent to (within 10 metres of) any pioneer cemetery, a Stage 3 investigation involving mechanical topsoil removal will be required in the area to be impacted, including a 10-metre buffer, to confirm the presence or absence of any grave shafts.

No construction activities shall take place within the study area prior to the *Ministry of Tourism, Culture and Sport* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

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PROJECT PERSONNEL

Project Director ..... Jessica Marr – MTCS licence P334

Report Preparation ..... Nimal Nithiyanantham – MTCS licence P390

Report Review ..... Jessica Marr – MTCS licence P334

Historical Research ..... Lee Templeton – MTCS licence R454

Graphics ..... Lee Templeton – MTCS licence R454

1.0 PROJECT CONTEXT

1.1 Objective

The objectives of a Stage 1 Archaeological Assessment (AA), as outlined by the 2011 *Standards and Guidelines for Consultant Archaeologists* (‘*2011 S&G’*) published by the *Ministry of Tourism, Culture, and Sport* (*MTCS*) (2011), are as follows:

- To provide information about the property’s geography, history, previous archaeological fieldwork and current land condition;
- To evaluate in detail the property’s archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

1.2 Development Context

As part of the approval of the Regional Official Plan Amendment (ROPA) #38, additional lands were identified in the Town of Milton to accommodate population and employment growth from 2021 through to 2031. The lands identified for growth will serve as Milton’s next urban expansion area and next major Secondary Plan Area(s) (i.e., Sustainable Halton urban area lands phased for growth between 2021 and 2031). These lands are to be planned comprehensively and are to meet minimum density and employment targets established in the Greater Golden Horseshoe Growth Plan, as well as the Region of Halton and Town of Milton’s growth strategy. Comprehensive planning of these lands will enable the Town to achieve the required population target of 238,000 persons and employment target of 114,000 jobs by 2031.

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The Regional Municipality of Halton has an archaeological management plan (AMP) that is founded on the principles of archaeological potential modeling. Archaeological site potential

modeling incorporates a variety of sources, such as history, human geography, settlement archaeology, ecological archaeology, and paleoecology, in an attempt to reconstruct past land use patterns. The predictive model employs two approaches, using known site locations and attempts to predict site locations on the basis of expected behavioural patterns, such as access to water for travel and subsistence (ASI, 2009a). According to the Region of Halton, the entire study area is identified as having archaeological potential (ASI, 2009a).

This study was triggered by the *Environmental Assessment Act*. This Stage 1 AA was conducted under the project direction of Ms. Jessica Marr, under the archaeological consultant licence number P334, in accordance with the *Ontario Heritage Act* (2009). Permission to investigate the study area was granted by *Malone Given Parsons Ltd.* on September 30th, 2016.

1.3 Historical Context

To establish the historical context and archaeological potential of the study area, *Archeoworks Inc.* conducted a comprehensive review of Aboriginal and Euro-Canadian settlement history, and a review of available historic mapping.

The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research**.

1.3.1 Pre-Contact Period

1.3.1.1 The Paleoindian Period (ca. 11,000 to 7,500 B.C.)

The region in which the study area is situated was first inhabited after the final retreat of the North American Laurentide ice sheet 15,000 years ago (or 13,000 B.C.) (Stewart, 2013, p.24). Initial vegetation of the majority of Southern Ontario was tundra-like. As the average climatic temperature began to warm, small groups of Paleoindians entered Ontario (Karrow and Warner, 1990, p.22; Stewart, 2013, p.28). Generally, Paleoindians are thought to have been small groups of nomadic hunter-gatherers who depended on naturally available foodstuffs such as game or wild plants (Ellis and Deller, 1990, p.38). For much of the year, Paleoindians "hunted in small family groups; these would periodically gather into a larger grouping or bands during a favourable period in their hunting cycle, such as the annual caribou migration" (Wright, 1994, p.25).

Paleoindian sites are extraordinarily rare and consist of "stone tools clustered in an area of less than 200-300 metres" (Ellis, 2013, p.35). These sites appear to have been campsites used during travel episodes and can be found on well-drained soils in elevated situations, which would have provided a more comfortable location in which to camp and view the surrounding territory (Ellis and Deller, 1990, p.50). Traditionally, Paleoindian sites have been located primarily along abandoned glacial lake strandlines or beaches. However, this view is biased as these are only areas in which archaeologists have searched for sites, due to the current understanding of the region's geological history (Ellis and Deller, 1990, p.50; Ellis, 2013, p.37). In areas where attention has been paid to non-strandline areas and to older strandlines, sites are much less concentrated and more ephemeral (Ellis and Deller, 1990, p.51).

Artifact assemblages from this period are characterized by fluted and lanceolate stone points, scrapers, and small projectile points produced from specific chert types (Ellis and Deller, 1990). Distinctive dart heads were used to kill game, and knives were used for butchering and other tasks (Wright, 1994, p.24). These items were created and transported over great distances while following migratory animals within a massive territory.

1.3.1.2 The Archaic Period (ca. 7,800 to 500 B.C.)

As the climate continued to warm and the post-glacial environment began to normalize, deciduous trees slowly began to permeate throughout Ontario, creating mixed deciduous and coniferous forests (Karrow and Warner, 1990, p.30). The "Archaic peoples are the direct descendants of Paleoindian ancestors" having adapted to meet new environmental and social conditions (Ellis, 2013, p.41; Wright, 1994, p.25). The Archaic period is divided chronologically, and cultural groups are divided geographically and sequentially. Archaic Aboriginals lived in "hunter-gatherer bands whose social and economic organization was probably characterized by openness and flexibility" (Ellis et al., 1990, p.123). This fluidity creates 'traditions' and 'phases' which encompasses large groups of Archaic Aboriginals (Ellis et al., 1990, p.123).

Few Archaic sites have faunal and floral preservation; hence lithic scatters are often the most commonly encountered Archaic Aboriginal site type (Ellis et al., 1990, p.123). House structures have "left no trace" due to the high acidic content of Ontario soils (Wright, 1994, p.27). Burial/grave goods and ritual items appear, although very rarely. By the Late Archaic, multiple individuals were interred together suggesting semi-permanent communities were in existence (Ellis, 2013, p.46). Ceremonial and decorative items also appear on Archaic Aboriginal sites through widespread trade networks, such as conch shells from the Atlantic coast and galena from New York (Ellis, 2013, p.41). Through trade with the northern Archaic Aboriginals situated around Lake Superior, native copper was initially utilized to make hooks and knives but gradually became used for decorative and ritual items (Ellis, 2013, p.42).

During the Archaic period, stone points were reformed from fluted and lanceolate points to stone points with notched bases to be attached to a wooden shaft (Ellis, 2013, p.41). The artifact assemblages from this period are characterized by a reliance on a wide range of raw lithic materials in order to make stone artifacts, the presence of stone tools shaped by grinding and polishing, and an increase in the use of polished stone axes and adzes as wood-working tools (Ellis et al., 1990, p.65; Wright, 1994, p.26). Ground-stone tools were also produced from hard stones and reformed into tools and throwing weapons (Ellis, 2013, p.41). The bow and arrow was first used during the Archaic period (Ellis, 2013, p.42).

1.3.1.3 The Early Woodland Period (ca. 800 to 0 B.C.)

Early Woodland cultures evolved out of the Late Archaic period (Ferris and Spence, 1995, p.89; Spence et al., 1990, p.168). The Early Woodland period is divided into two complexes: the Meadowood complex and the Middlesex complex. The Middlesex complex appears to be restricted to Eastern Ontario, particularly along the St. Lawrence River while Meadowood materials depict a broad extent of occupation in southwestern Ontario (Spence et al., 1990, p.134, 141). The distinguishing characteristic of the Early Woodland period is the introduction of

pottery (ceramics). The earliest forms were coil-formed, "thick, friable and often under fired, and must have been only limited to utility usage" (Ferris and Spence, 1995, p.89; Williamson, 2013, p.48).

Cache Blades, a formal chipped stone technology, and side-notched Meadowood points, were commonly employed tools that were often recycled into a number of other tool forms such as end scrapers (Spence et al., 1990, p.128; Ferris and Spence, 1995, p.93). These tools were primarily formed from Onondaga chert (Spence et al., 1990, p.128). Meadowood sites have produced a distinctive material culture that functioned in both domestic and ritual spheres (Ferris and Spence, 1995, p.90; Spence et al., 1990, p.128). This allows correlations to be made between habitations and mortuary sites, creating a well-rounded view of Meadowood culture (Ferris and Spence, 1995, p.90; Spence et al., 1990, p.128). However, their settlement-subsistence system is poorly understood as only a "few settlement types have been adequately investigated, and not all of these are from the same physiographic regions" (Ferris and Spence, 1995, p.93; Spence et al., 1990, p.136). Generally, Meadowood sites are in association with the Point Peninsula and Saugeen complexes which "then eventually changed or were absorbed into the Point Peninsula complex" (Wright, 1994, pp.29-30).

1.3.1.4 The Middle Woodland Period (ca. 200 B.C. to A.D. 900)

During the Middle Woodland period, three primary cultural complexes developed in Southern Ontario. The Point Peninsula complex was "distributed throughout south-central and eastern Southern Ontario, the southern margins of the Canadian Shield, the St. Lawrence River down river to Quebec City, most of southeastern Quebec, along the Richelieu River into Lake Champlain" (Spence et al., 1990, p.157; Wright, 1999, p.633). The Saugeen complex occupied "southwestern Southern Ontario from the Bruce Peninsula on Georgian Bay to the north shore of Lake Erie to the west of Toronto" (Wright, 1999, p.629; Wright, 1994, p.30). The Couture complex was located in the southwestern-most part of Ontario (Spence et al., 1990, p.143).

The Saugeen and Point Peninsula cultures appear to have shared Southern Ontario but the borders between these three cultural complexes are not well defined, and many academics believe that the Niagara Escarpment formed a frontier between the Saugeen complex and the Point Peninsula complex (Spence et al., 1990, p.143; Wright, 1999, p.629; Ferris and Spence, 1995, p.98). Consequently, the dynamics of hunter-gatherer societies shifted territorial boundaries resulting in regional clusters throughout southwestern Southern Ontario that have been variously assigned to Saugeen, Point Peninsula, or independent complexes (Spence et al., 1990, p.148; Wright, 1999, p.649).

Middle Woodland pottery share a preference for stamped, scallop-edged or tooth-like decoration, but each cultural complex had distinct pottery forms (such as globular pots), finishes, and zones of decoration (Williamson, 2013, p.49; Ferris and Spence, 1995, p.97; Spence et al., 1990, p.143). Major changes in settlement-subsistence systems occurred during the Middle Woodland period, particularly the introduction of large 'house' structures and substantial middens associated with these structures (Spence et al., 1990, p.167; Ferris and Spence, 1995, p.99). The larger sites likely indicate a prolonged period of macroband settlement and a more

consistent return to the same site, rather than an increase in band size (Spence et al., 1990, p.168). Environmental constraints in different parts of Southern Ontario all produced a common implication of increased sedentism caused by the intensified exploitation of local resources (Ferris and Spence, 1995, p.100). Burial offerings became more ornate and encompassed many material mediums, including antler, whetstones, copper, and pan pipes (Ferris and Spence, 1995, p.99). Burial sites during this time were set away from occupation sites and remains were interred at time of death; secondary burials were not common (Ferris and Spence, 1995, p.101). Small numbers of burial mounds are present and both exotic and utilitarian items were left as grave goods (Williamson, 2013, p.51; Ferris and Spence, 1995, p.102).

1.3.1.5 The Late Woodland Period (ca. A.D. 900 to 1600)

At the onset of the Late Woodland Period, the transitional Princess Point complex arrived in Ontario. Sites attributed to the Princess Point complex exhibit few continuities from earlier developments. These sites appear to have arisen suddenly and suggest a well-developed state with no apparent predecessors. It is hypothesized that this complex migrated into Ontario, possibly from the southwest. The material culture includes 'Princess Point Ware' vessels that are collarless, with everted rims and semi-conical bases. Decorations include horizontal lines with an encircling row of circular exterior punctates. Smoking pipes and ground stone tools are rare. Triangular arrow points predominate the lithic assemblage, where some exhibit weakly notched bases. Subsistence patterns include the hunting of deer, bear, squirrels and fish, with the gathering of berries. Corn horticulture has been attributed to the Princess Point complex. Little is known about the settlement patterns, but it has been suggested that they followed a pattern of warm season macroband and cold season microband dispersal (Fox, 1990, pp.174-179).

During the Late Woodland Period, multiple sub-stages, and complexes have been assigned, which are divided spatially and chronologically (Fox, 1990; Williamson, 1990; Dodd et al., 1990; Warrick, 2000). Although several migration theories have been suggested explaining the Ontario Iroquoian origins, an "available date from Southern Ontario strongly suggests continuity (*in situ*) from the Middle-Late Woodland Transitional Princess Point complex and Late Woodland cultural groups" (Ferris and Spence, 1995, p.105; Smith, 1990, p.283).

1.3.1.6 The Early Ontario Iroquois Stage (ca. A.D. 900 to 1300)

Two primary cultural groups have been assigned to the Early Ontario Iroquois Period and were located in Southern Ontario. The Glen Meyer cultural group was located primarily in southwestern Ontario, whose territory "encompassed a portion of southwestern Ontario extending from Long Point on the north shore of Lake Erie to the southeastern shore of Lake Huron" (Williamson, 1990, p.304). The Pickering cultural group is "thought to be much larger encompassing all of the region north of Lake Ontario to Georgian Bay and Lake Nipissing" (Williamson, 1990, p.304). Regional clusters of these groups appear within riverine or lacustrine environments with a preference for sandy soils.

The material culture of Early Iroquois consisted of well-made and thin-walled clay vessels that were more globular in shape with rounded bottoms. These vessels were produced by modelling rather than coil-forming. Decorative stamping, incising, and punctation along the exterior and

interior rim region of the vessels were favoured. Material cultural remains also included crudely made smoking pipes, gaming discs, triangular-shaped concave projectile chert points, and worked bone and antlers. House structures gradually became larger, longer, and wider, but variations depended on settlement type and season of occupation. Subsistence patterns indicate a quick adoption of a greater variety of harvest products. Burial practices during this period saw an evolution to ossuary burials; however burial patterns are still not well understood (Williamson, 1990, pp.304-311).

1.3.1.7 The Middle Ontario Iroquois Stage (ca. A.D. 1300 to 1400)

The Middle Ontario Iroquois began "with the fusion of [Glen Meyer and Pickering] caused by the conquest and absorption of Glen Meyer by Pickering" (Dodd et al., 1990, p.321). This fusion resulted in two cultural horizons located throughout most of Southern Ontario and lasting approximately 100 years. Within these 100 years, two cultural groups were present and divided chronologically into two 50-year timespans: the Uren sub-stage (A.D. 1300-1350) and the Middleport sub-stage (A.D. 1350-1400). The chronology of this stage has been contested and reflects a probable overlap with earlier stages. It is theorized that the Uren sub-stage represents a fusion of Glen Meyer and Pickering branches of the Early Ontario Iroquois while the Middleport sub-stage gave rise to the Huron, Petun, and Neutral groups of the Late Ontario Iroquois stage (Dodd et al., 1990, pp.321, 356).

Uren sites are distributed throughout much of southwestern and southcentral Ontario, and generally coincide with Early Ontario Iroquoian Stage sites. Middleport sites generally correlate with Uren sites, representing a continuation of local cultural sequences. The material culture of the Uren sub-stage includes rolled rim clay vessels with horizontal indentation on the exterior of the vessel; pipes that gradually improve in structure; gaming discs; and projectile points that favour triangular points. The material culture of Middleport sub-stage includes collared vessels decorated with oblique and horizontal indentation; a well-developed clay pipe complex that includes effigy pipes; and a marked increase in notched projectile points (Dodd et al., 1990, pp. 330-342).

Settlement patterns of the Uren sub-stage reflect a preference for sand plains and do not appear to have had defensive palisades surrounding clusters of small longhouses. Subsistence patterns indicate an increasing reliance on corn cultivation, suggesting villages were occupied in the winter and campsites were occupied during the spring to fall. Settlement patterns of the Middleport sub-stage reflect a preference for drumlinized till plains. Small villages are present where palisades first appear, and longhouses are larger than those found in the Uren sub-stage. Subsistence patterns reflect an increasing reliance on corn and beans with intensive exploitation of locally available land and water species. Burial patterns graduate to ossuaries by the Middleport sub-stage (Dodd et al., 1990, pp.342-356).

1.3.1.8 The Late Ontario Iroquois Stage (ca. A.D. 1400 to1600)

During the Late Ontario Iroquoian Stage, the Iroquoian-speaking linguistic and cultural groups developed. Prior to European Contact, neighbouring Iroquois-speaking communities united to form several confederacies known as the Huron (Huron-Wendat or Wyandot), Neutral (called

Attiewandaron by the Huron-Wendat), Petun (Tionnontaté or Khionontateronon) in Ontario, and the Five Nations (later Six Nations) of the Iroquois (Haudenosaunee) of upper New York State (Birch, 2010, p.31; Warrick, 2013, p.71). These groups are located primarily in south and central Ontario. Each group was distinct but shared a similar pattern of life already established by the 16th century (Trigger, 1994, p.42).

The geographic distribution of pre-contact Ontario Iroquoian sites describes two major groups east and west of the Niagara Escarpment: the ancestral Neutral Natives to the west, and the ancestral Huron-Wendat to the east. The western boundary of the Huron-Wendat territory is often contested, where a number of sites between the Niagara Escarpment and the Humber River were occupied by a mixed Neutral-Huron-Wendat population. It has been theorized that the Credit River valley may have functioned as a boundary marker between ancestral Neutral Natives and ancestral Huron-Wendat peoples. It remains unclear if this area was home to frontier Neutral Natives communities or primarily Huron-Wendat that had experienced profound cultural change as a result of exchange and intermarriage with neighbouring Neutral Natives people (Warrick, 2000, p.446; Warrick, 2008, p.15).

Ancestral Huron-Wendat villages have been located as far east as the Trent River watershed, where "concentrations of sites occur in the areas of the Humber River valley, the Rouge and Duffin Creek valleys, the lower Trent valley, Lake Scugog, the upper Trent River and Simcoe County" (Ramsden, 1990, p.363). Ancestral Neutral Natives sites are found clustered around the western end of Lake Ontario and eastward across the Niagara Peninsula, "but are also distributed over a much larger area to the west" (Lennox and Fitzgerald, 1990, p.437). These sites "suggest a migration of peoples from the west into Historic Neutralia" or the Niagara Peninsula (Lennox and Fitzgerald, 1990, p.437). The Town of Milton likely formed the eastern border of the Neutral Natives territorial lands with sites found along Mount Nemo.

Huron-Wendat settlement types included longhouse, whose sizes depended on the size of the extended family that inhabited it (Heidenreich, 1978, p.366). Village size gradually enlarged as horticulture began to take on a more central importance in subsistence patterns, particularly the farming of maize, squash, and beans, supplemented by fishing, hunting, and gathering (Heidenreich, 1978, p.377). Sites were chosen for their proximity to sources of "water, arable soils, available firewood, [and] a young secondary forest, [as well as] a defendable position" (Heidenreich, 1978, p.375). Consequently, as horticulture became the primary mode of subsistence, pre-contact native groups gradually relocated from the northern shores of Lake Ontario to further inland, likely as a result of depleting resources and growing aggression between native communities.

Neutral Natives settlement patterns consist of a varying range of settlement types. Village clusters are generally found on sandy loam soils of high agricultural capability and "are rarely found along the banks of major rivers or lakeshores, except for smaller, seasonal hunting and fishing camps. Instead, larger settlements tend to be located along smaller creeks, at headwater springs and around marshlands" (Lennox and Fitzgerald, 1990, p.440). Later villages are enclosed within some form of a palisade and longhouses are of varying configurations covered in bark. The

Neutral Natives subsistence patterns reflect a diet dependent on a combination of hunting, farming, fishing, and gathering as their territory provided a diverse and rich array of subsistence resources (Lennox and Fitzgerald, 1990, pp.439-441, 450; Trigger, 1994, p.43; Bricker, 1934, p.58).

1.3.2 Contact Period (ca. A.D. 1600 to 1650)

At the time of European Contact, the area "south of Lake Simcoe and along the north shore of Lake Ontario remained a no-man's land, with no permanent settlements and traversed only by raiding parties from the north or from the south" (Robinson, 1965, p.11). The Huron-Wendat villages were located north of Lake Simcoe, but their territorial hunting grounds stretched roughly between the Canadian Shield, Lake Ontario and the Niagara Escarpment (Warrick, 2008, p.12). The Neutral Native villages were clustered in the Niagara Peninsula, but their territorial hunting grounds stretched from the "Niagara River on the east, Lake Erie on the south, Lake St. Clair on the west, and a hazy Huron-Wendat-Neutral frontier on the north" (Hunt, 1940, p.50; White, 1978, p.407). The Credit River valley may have continued to form a frontier boundary between both groups homelands (Warrick, 2008, p.15). The Haudenosaunee were primarily located south of Lake Ontario but hunted in the lands north of Lake Ontario.

Records left by explorers, Jesuit missionaries, and fur traders provide a history of Euro-Canadian involvement in territory identified as Huron-Wendat. By 1609, Samuel de Champlain had encountered the Huron-Wendat north of Lake Simcoe, and desiring greater quantities of furs, the French initiated a trading relationship with the Huron-Wendat (Trigger, 1994, p.68; Heidenreich, 1978, p.386). By mid-1620, the Huron-Wendat had exhausted all available pelts in their own hunting territories and opted to trade European goods for tobacco and furs from their neighbours (Trigger, 1994, pp.49-50). During the 1630s, Jesuit missionaries attempted to convert the entire Huron-Wendat Confederacy to Christianity as the initial phase of a missionary endeavour to convert all native people in Southern Ontario (Trigger, 1994, p.51). However, the Jesuits' presence in the region had become precarious after a series of major epidemics of European diseases that killed nearly two-thirds of the Huron-Wendat population (Warrick 2008, p.245; Heidenreich, 1978, p.369).

There is limited historical records' documenting European contact with the Neutral Native territory. The Huron-Wendat and Haudenosaunee called those within the territory of the Niagara Peninsula the Attiewandaron Nation (also spelled Attiwondaronks and Atiquandaronk). Samuel de Champlain first referred to the Attiewandaron as *la Nation neutre* due to their apparent neutrality during the Iroquoian conflicts. By 1640, both Récollet (or Recollect) missionaries and Jesuit missionaries had traveled to the Attiewandaron territory in an attempt to instruct them in the principals of Christian religion. Additionally, no direct trade relationship was ever formed between the French and Attiewandaron. This allowed the Huron-Wendat to continue to act as middle-men in trading partnerships. Famine also affected the Attiewandaron and had become so severe by 1639 that many Attiewandaron fled to neighbouring tribes pale and disfigured (Warrick, 2008, p.80; Jury, 1974, p.4; White, 1978, p.407; Brown, 2009, pp.26-27).

By 1645, having grown dependent on European goods and with their territory no longer yielding enough animal pelts, the Haudenosaunee became increasingly aggressive towards the Huron-Wendat Confederacy (Trigger, 1994, p.53). Armed with Dutch guns and ammunition, the Haudenosaunee engaged in warfare with the Huron-Wendat Confederacy and brutally attacked and destroyed several Huron-Wendat villages throughout Southern Ontario (Trigger, 1994, p.53). After the massacres of 1649-50, the small groups that remained of the Huron-Wendat Confederacy became widely dispersed throughout the Great Lakes region, ultimately resettling in Quebec (Schmalz, 1991, p.17). Many Huron-Wendat groups sought refuge and protection within the Attiewandaron, until the Haudenosaunee attacked in the 1650s (Warrick, 2008, p.208; Trigger, 1994, p.56). Many were captured and incorporated into the Haudenosaunee, or sought refuge within other tribes (Trigger, 1994, 57; Lennox and Fitzgerald, 1990, p.410). The last mention of the Attiewandaron in French writing was in 1671 (Noble, 2012). After the massacres of 1649-50, and "for the next forty years, the Haudenosaunee used present-day Ontario to secure furs with the Dutch, then with the English" (Smith, 2013, p.19; Schmalz, 1991, p.17; Coyne, 1895, p.20).

1.3.3 Post Contact Period (ca. A.D. 1650 – 1800)

Although their homeland was located south of the lower Great Lakes, the Haudenosaunee controlled most of Southern Ontario after the 1660s, occupying at "least half a dozen villages along the north shore of Lake Ontario and into the interior" (Schmalz, 1991, p.17; Williamson, 2013, p.60). The Haudenosaunee established "settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. Their settlements were on canoe-and-portage routes that linked Lake Ontario to Georgian Bay and the upper Great Lakes" (Williamson, 2013, p.60). The Haudenosaunee, particularly the Seneca, had established a number of villages including one at the mouth of the Rouge River, one at a bend near the mouth of the Humber River, and along the Niagara River (Robinson, 1965, pp.15-16; Schmalz, 1991, p.29).

At this time, several Algonquin-speaking linguistic and cultural groups within the Anishinaabeg (or Anishinaabe) began to challenge the Haudenosaunee dominance in the region (Johnston, 2004, pp.9-10; Gibson, 2006, p.36). Before contact with the Europeans, the Ojibwa territorial homeland was situated inland from the north shore of Lake Huron (MNCFN, ND, p.3). The English referred to those Algonquin-speaking linguistic and cultural groups that settled in the area bounded by Lakes Ontario, Erie, and Huron as Chippewas or Ojibwas (Smith, 2002, p.107). In 1640, the Jesuit fathers had recorded the name "*oumisagai*, or Mississaugas, as the name of an Algonquin group near the Mississagi River on the northwestern shore of Lake Huron. The French, and later English, applied this same designation to all Algonquian [-speaking groups] settling on the north shore of Lake Ontario" (Smith, 2002, p. 107; Smith, 2013, pp.19-20). "The term 'Mississauga' perplexed the Algonquins, or Ojibwas, on the north shore of Lake Ontario, who knew themselves as the Anishinaabeg" (Smith, 2013, p.20).

Following a major smallpox epidemic combined with the capture of New Netherland by the English, access to guns and powder became increasingly restricted for the Haudenosaunee. After a series of successful attacks against the Haudenosaunee by groups within the Anishinaabeg, the Haudenosaunee dominance in the region began to fail. By the 1690s, Haudenosaunee

settlements along the northern shores of Lake Ontario were abandoned. By 1701, the Haudenosaunee were defeated and the Anishinaabeg replaced the Haudenosaunee in Southern Ontario (Warrick, 2008, p.242; Williamson, 2013, p.60; Gibson, 2006, p.37; Schmalz, 1991, pp.20, 27, 29; Coyne, 1895, p.28).

In 1701, representatives of several groups within the Anishinaabeg and the Haudenosaunee, collectively known as the First Nations, assembled in Montreal to participate in Great Peace negotiations, sponsored by the French (Johnston, 2004, p.10; Trigger, 2004, p.58). The Mississaugas were granted possession of the territory along and extending northward of Lake Ontario and Lake Erie (Hathaway, 1930, p.433). The Credit River, known to the Mississauga as the Missinnihe, translated to "trusting creek," became the favoured location of European traders who would trade with the Mississauga and provide them with 'credit' for the following year (Smith, 2013, p.21). The Mississauga who settled along the west shore of Lake Ontario became known as the Credit River Indians (Smith, 2013, p.21). Subsistence patterns include a primary focus on hunting, fishing and gathering with little emphasis on agriculture (McMillian and Yellowhorn, 2004, p. 110). Temporary and moveable house structures were utilized which were easy to construct and disassemble, allowing swift travel throughout their territory (McMillian and Yellowhorn, 2004, p.111). Consequently, little archaeological material was left behind.

The Seven Years War brought warfare between the French and British in North America. In 1763, the Royal Proclamation declared the Seven Years War over, giving the British control of New France. The British did not earn the respect of the Anishinaabeg, as the British did not honour fair trade nor the Anishinaabeg occupancy of the land as the French had. Consequently, the Pontiac Uprising, also known as the Beaver Wars, began that same year (Schmalz, 1991, p.70; Johnston, 2004, pp.13-14). This uprising involved both groups within the Haudenosaunee and groups within the Anishinaabeg. After numerous attacks on the British, the Pontiac Uprising was over by 1766 when a peace agreement was concluded with Sir William Johnson, the Superintendent of Indian Affairs (Schmalz, 1991, p.81). The fur-trade continued throughout Southern Ontario until the beginning of British colonization.

1.3.4 Euro-Canadian Settlement Period (A.D. 1800 to present)

After the American Revolutionary War, a large number of United Empire Loyalists and American immigrants began to move into Southern Ontario to avoid persecution from the American Government. This put greater demand on the amount of available lands for Euro-Canadian and American immigrant settlement within Upper Canada. By this time, the Mississaugas claimed the County of Halton. On behalf of the British Crown, William Claus, Deputy Superintendent of Indian Affairs, entered into negotiations with the Mississauga in 1805, to surrender 35,000 acres of the Mississauga Tract at the head of Lake Ontario. This tract included lands "reaching from the Etobicoke Creek on the East for twenty-six miles westward to the outlet of Burlington Bay, these lands stretching back from the Lake shore line for from five to six miles to what we now know as the Second Concession North of Dundas (or Eglinton Avenue)" (Fix, 1967, p.13). Additionally, one mile on either side of the Credit River and the 'flat lands' bordering the Etobicoke Creek were to remain property of the Mississaugas. The Mississauga obtained £1000 worth of goods and the right to retain their fishery sites at the mouths of the Credit River, Sixteen Mile Creek, and Twelve

Mile Creek. This treaty included lands in the southern parts of the Township of Toronto in Peel County and Trafalgar and Nelson Townships in Halton County. A confirmatory surrender was issued in 1806. (Surtees, 1994, pp.94, 110; N.A., 1891, p.lv; Loverseed, 1987, p.21; Government of Ontario, 2016).

After the War of 1812, immigration from the Unites States came to a halt as a change in British policy discouraged Americans from taking residence in Canada and encouraged immigration from the British Isles. To accommodate this influx of European settlers, the remainder of the Mississauga Tract, within what is now Halton Region, was purchased by William Claus in 1818. The Mississauga continued to use the lands around the mouth of Twelve Mile creek for hunting and fishing purposes. The area belonged to the Credit River Mississauga who, despite efforts from the Indian Department officials to protect them, found themselves victim to encroachment on their lands and fisheries by Euro-Canadian settlers. Ajetance, chief of the Credit River Mississauga, settled for goods in the value of £522.10 shilling annually per person in exchange for 648,000 acres of land. This second purchase surrendered those lands within what would encompass "the northern section of Trafalgar, and Nelson Townships, and all of Esquesing and Nassagaweya Townships" (McDonald, 2011, p.71; Surtees, 1994, pp.116-117; N.A., 1891, p.lv; Government of Ontario, 2016).

The southern portion of the Township of Trafalgar, within Home District, was surveyed by Mr. Samuel L. Wilmot in 1807 and included two concessions north and four concessions south of Dundas Street (Halton Images, 2013). The 'new' survey of Halton utilized the 'double-front' survey technique, creating wider 200 acre lots between each concession (McDonald, 2011, p.71). "In the double-front system the common unit of concession, the half-lot, was almost square 100 acres in size… each half of a 200-acre lot fronted on different concession-line roads" (Harris and Warkentin, 2000, p.123). Settlement began in 1819. Settlers were predominately from the British Isles and focused on agriculture as their primary means of subsistence after the land was cleared of timber resources. Wheat was the principal agricultural crop grown in the Township of Trafalgar (Unterman McPhail Associates, 2010, p.9). Some parts produced excellent quality building stone (Walker & Miles, 1877, p.55). However, the Fourteen Mile Creek and Sixteen Mile Creek and their tributaries proved to be a more successful source of wealth for settlers through the construction of multiple mills along the entire length of the creeks (Walker & Miles, 1877, p.59). By 1850, 4,513 individuals resided in the Township of Trafalgar and it contained three grist mills and 19 saw mills (Smith, 1851, p.261).

The community of Omagh is located partially within the study area at the intersection of Britannia Road and Fourth Line. Omagh is named after the capital of County Tyrone, Northern Ireland in the 1850s by John White, Halton's Member of the Legislature for Canada West (McDonald, 2011, p.208). The Omagh Post Office was established in 1853 (Library and Archives Canada, 2014). By 1877, Omagh was a small village, "containing about 100 inhabitants…three churches, Methodist, Church of England and Disciples, a two-story drill-shed and a Temperance Hall" (Walker & Miles, 1877, p. 59).

The community of Drumquin is located partially within the study area at the intersection of Trafalgar Road and Britannia Road. Initially the community was named as Camp Hollow, and was known to be an area where Natives would camp during the summer months. Drumquin was named after the former home of Thomas Patterson, a tavern owner, in Ireland. This community developed in 1820 after Joseph Howes constructed a grist mill on Sixteen Mile Creek. The following year, a saw mill was added to the site. Trafalgar Road became a busy thoroughfare where wheat and lumber were hauled from the north to the ports in Oakville. By 1877, a post office (opened in 1851), a store, a blacksmith shop and an inn were located within the community. The post office serviced the community until 1914 when it moved to Hornby (McDonald, 2011, p.140; Walker & Miles, 1877, p.59).

The community of Auburn (now Agerton) is located within the study area at the intersection of Derry Road and Trafalgar Road. Originally called Auburn, the community was renamed Agerton after a post office was established in 1892. A blacksmith shop and temperance hall were located within the community by 1860, and a hotel was added a decade later. A feed mill and threshing machine manufacturer was also located within the community and was torn down in 2005 (McDonald, 2011, p.102; Walker & Miles, 1877, p.59; Milton Historical Society, 2017a).

1.3.5 Past Land Use

To further assess the study area's potential for the recovery of historic pre-1900 remains, several documents were reviewed to gain an understanding of the land use history. Specifically, a review of the 1858 *Tremaine's Map of the County of Halton* and the 1877 *Illustrated Historical Atlas of the County of Halton*.

The 1858 *Tremaine's Map* depicts two historic structures (homesteads), three churches, and an inn within the study area. A post office, blacksmith shop and a school house is depicted within 300 metres of the study area (***see Table 1, Maps 2-3***). Additionally, the study area encompasses the community of Auburn and parts of the communities of Drumquin and Omagh. Sixteen Mile Creek and its tributaries are also depicted within the study area.

Table 1: Historic Structures within the Study Area in the 1858 Tremaine's Map of the County of Halton

Con.	Lot	Occupant/Owner	Structure(s)
3	5, northeast part	Thomas Crozier	No structure(s)
3	5, southeast part	Jas. Johnson	No structure(s)
4	4, west half	Jas. Johnson	No structure(s)
4	4, east half	Thos. Brownridge	No structure(s)
4	5, west half	John Johnson	No structure(s)
4	5, east half	John Beatty	Church
5	2, west half	John Evans	No structure(s)
5	2, northeast part	John Dickson	No structure(s)
5	2, southeast part	Jos. Clements	No structure(s)
5	3, west half	John Evans	No structure(s)
5	3, east half	John Dickson	No structure(s)
5	4, west half	John Chisholm	No structure(s)
5	4, east half	Wm. Beatty	No structure(s)

Con.	Lot	Occupant/Owner	Structure(s)
5	5, west half	Wm. McLean	Church
5	5, east half	Andrew McLean	No structure(s)
5	6, east half	John Reid	No structure(s)
5	7, east half	Stewart Beatty	No structure(s)
5	9, east half	Wm. Beatty	No structure(s)
6	5, west half	Jas. C. Earl	No structure(s)
6	5, east half	Robt. Leslie	No structure(s)
6	6, west half	Robert Bigger	No structure(s)
6	6, east half	Sand D. Kennedy	Church
6	7, west half	Wm. Robinson	No structure(s)
6	7, east half	Jas. Downs	No structure(s)
6	8, west half	Frank Reid	No structure(s)
6	8, east half	Thos. T. Dent	No structure(s)
6	9, southwest part	Wm. Maddon	No structure(s)
6	9, southeast part	Wm. Maddon	No structure(s)
6	9, north half	Thos. T. Dent	No structure(s)
7	2, northeast part	J. Fetherston	No structure(s)
7	3, east half	Wm. Downs	No structure(s)
7	4, east half	Saml. Anderson	No structure(s)
7	5, west part	Heirs of J. Fetherston	No structure(s)
7	5, east part	Mrs. E. Cunningham	No structure(s)
7	6, west part	Heirs of J. Fetherston	No structure(s)
7	6, east part	Robert Wise	No structure(s)
7	7, south part	John Fetherston	No structure(s)
7	7, northwest part	Unlisted	No structure(s)
7	7, northeast part	Dan. Howe	No structure(s)
7	8, west part	Robert Howes	No structure(s)
7	8, northeast part	Wm. Howe	No structure(s)
7	8, northwest part	Dan. Howe	No structure(s)
7	9, east half	Thos. Jackson	No structure(s)
7	10, east half	Dick	No structure(s)
7	11, east half	Jas. Montgomery	One structure
7	12, all	Matt. Donoughon	No structure(s)
7	13, all	Wm. Robertson	No structure(s)
7	14, west half	Wm. Irvin	No structure(s)
7	14, east half	Jacob Dolmage	No structure(s)
8	2, west half	Geo. Coyne	No structure(s)
8	3, west half	Josh Hall	No structure(s)
8	4, northwest part	John Hall	No structure(s)
8	4, southwest part	Christ. Hall	No structure(s)
8	5, northwest part	T. H. Patterson	Inn
8	5, southwest part	Wm. Bell	No structure(s)
8	5, northeast part	Wm. Elliott	No structure(s)
8	5, southeast part	David Mason	No structure(s)
8	6, west half	Wm. Hood	No structure(s)
8	6, east half	John Kentney	No structure(s)
8	7, west half	Immerson Fetherston	No structure(s)
8	7, east half	P. McC.	No structure(s)
8	8, west half	Jonathan Howes	No structure(s)

Con.	Lot	Occupant/Owner	Structure(s)
8	8, northeast part	Patrick McCarten	No structure(s)
8	8, southeast part	P. Mc.C	No structure(s)
8	9, west half	John Bussel	No structure(s)
8	9, northeast part	Patrick McCarten	No structure(s)
8	9, southeast part	Patrick McCarten	No structure(s)
8	10, west half	Wm. Leslie – Auburn Farm	No structure(s)
8	10, east half	Albert Hall	No structure(s)
8	11, west half	Arch. McCardy	One structure
8	11, east half	Hiram Thirston	No structure(s)
8	12, south half	Jas. Montgomery	No structure(s)
8	13, all	James Reid	No structure(s)
8	14, northwest part	Jno. Rusk	No structure(s)
8	14, northeast part	Robt. Rusk	No structure(s)
8	14, east half	Jas. Lindsay	No structure(s)

The 1877 *Illustrated Atlas* identifies 67 historic structure (homesteads and their associated orchards) and three churches within the study area. Fourty-eight additional historic structures, two churches, one cemetery, and two post offices are depicted within 300 metres of the study area (***see Maps 2-5; Tables 1-2***). Additionally, the study area still encompasses the community of Auburn and parts of the communities of Drumquin and Omagh. Sixteen Mile Creek and its tributaries are also depicted within the study area.

Table 2: Historic Structures within the Study Area in the 1877 Illustrated Historical Atlas of the County of Halton

Con.	Lot	Occupant/Owner	Structure(s)
3	5, northeast part	Thomas Crozier	No structures
3	5, southeast part	Est. of Jas. Johnson	One structure
4	4, west half	Irwin Berelin	One structure
4	4, east half	Thos. Brummerly	One structure
4	5, west half	Geo. Back	Two structures
4	5, northeast part	Alex. Patterson	Two structures & church
4	5, southeast part	Mrs. L. Robinson	Two structures
5	2, west half	R. H. Evans	One structure & church
5	2, northeast part	Est. of A. Bigger	No structures
5	2, southeast part	Benj. Johnson	One structure
5	3, west half	John D. Evans	One structure
5	3, east half	Est. A. Bigger	Two structures
5	4, west half	Msr. John Chisholm	One structure
5	4, east half	Wm. & Robt. Beaty	Two structures
5	5, west half	Wm. McLean	One structure & church
5	5, west of west part	Wm. Ford	One structure
5	5, east of west part	A.Ford	No structure(s)
5	6, east half	Norvald Johnson	One structure
5	7, east half	Est. of S. Beaty	One structure
5	9, east half	W. C. Beaty	No structures
6	5, west half	Jas. C. Earl	One structure
6	5, east half	John Leslie	Two structures

Con.	Lot	Occupant/Owner	Structure(s)
6	6, west half	Robt. Bigger	One structure
6	6, east half	D.R. Kenney	Two structures
6	7, west half	Est. of Wm. Robinson	One structure
6	7, east half	Jas. Downs	One structure
6	8, west half	W. Dent	One structure
6	8, east half	Thos. Dent	One structure
6	9, north half	Thos. Dent	No structures
6	9, south half	Wm. Smith	No structures
7	2, northeast part	Jos. Featherson	No structures
7	3, east half	E. Waterson	One structure
7	4, east half	S. Anderson	One structure
7	5, west part	Wm. Mayne	One structure
7	5, east part	Thos. H. Patterson	No structures
7	6, west part	David Featherston	No structures
7	6, east part	Wm. Tolson	One structure
7	7, northwest part	Robert Howe	No structures
7	7, northeast part	Wm. Howes	No structures
7	7, south part	David Featherston	No structures
7	8, west part	Robert Howe	Two structures
7	8, east part	Wm. Howes	One structure
7	9, east half	I.Featherston	One structure
7	10, east half	Adam Dick	One structure
7	11, east half	John Montgomery	Two structures
7	12, all	John White, Esq.	One structure
7	13, all	Alex. Robinson	One structure
7	14, west half	Wm. Irvine	No structures
7	14, east half	Jacob Dartmagh	Two structures
8	2, west half	Geo. Coyne	One structure
8	3, all	Jas. Hall	One structure
8	4, northwest part	J. R. Hall	One structure
8	4, southwest part	John Featherton	One structure
8	5, west half	Wm. Bell	One structure & hamlet of Drumquin
8	5, east half	Wm. Cunningham	No structures
8	6, west half	Wm. Hood	One structure & hamlet of Drumquin
8	6, east half	John Kentner	No structures
8	7, west half	Emerson Featherston	One structure
8	7, east half	Wm. McConnell	Two structures
8	8, west half	J. Howes	One structure
8	8, northeast part	Edward Mc Carten	One structure
8	8, southeast part	Wm. McConnell (N.R.)	No structures
8	9, west half	Wm. Mason	One structure
8	9, east half	Edward Mc Carten	One structure
8	10, west half	Wm. Leslie	One structure
8	10, east half	Albert Hall	One structure
8	11, west half	Samuel Orr	One structure & hamlet of Auburn
8	11, east half	Geo. B. Hall	One structure
8	12, south half	Samuel Orr	No structures
8	13, north half	Robt. A. Neelands	One structure
8	14, northwest part	Jas. Lindsay	One structure

Con.	Lot	Occupant/Owner	Structure(s)
8	14, northeast part	Robt. A. Neelands	One structure
8	14, east half	John W. Lindsay (N.R.)	One structure

Additionally, the study area encompasses part of present day Thompson Road, Fourth (4th) Line, Fifth (5th) Line, Sixth (6th) Line, Trafalgar Road, Eighth (8th) Line, Lower Base Line, Britannia Road, and Derry Road which were originally laid out during the survey of the Township of Trafalgar. Additionally, the study area is located along the Credit Valley Railway (now the CP Railway). In Southern Ontario, the *2011 S&G* considers areas of early Euro-Canadian settlements (e.g., pioneer homesteads, isolated cabins, farmstead complexes, early wharf or dock complexes, pioneer churches, and early cemeteries), early historic transportation routes (e.g., trails, passes, roads, railways, portage routes), and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations, to be of elevated archaeological potential (per *Section 1.3.1* of the *2011 S&G*). Therefore, based on the close proximity of both early Euro-Canadian settlements and historic transportation routes, there is elevated potential for the location of Euro-Canadian archaeological resources (pre-1900) within portions of the study area which lie within 300 metres and 100 metres, respectively, of these historic features.

1.3.6 Present Land Use

According to the Town of Milton's "Official Plan – Schedule A: Land Use Plan" (2008), the present land use of the study area can be categorized as 'Agricultural Area' and 'Greenlands A Area.'

1.4 Archaeological Context

To establish the archaeological context and archaeological potential of the study area, Archeoworks Inc. conducted a comprehensive review of designated and listed heritage properties, and commemorative markers. Furthermore, an examination of registered archaeological sites and previous AAs within proximity to its limits, and a review of the physiography of the study area were performed.

The results of this background research are documented below and summarized in ***Appendix B – Summary of Background Research.***

1.4.1 Designated and Listed Cultural Heritage Resources

According to *Section 1.3.1* of the *2011 S&G*, property listed on a municipal register or designated under the *Ontario Heritage Act* or that is a federal, provincial, or municipal historic landmark or site, are considered to have elevated potential.

The online inventory entitled 'Town of Milton Heritage List – approved November 2016' (Town of Milton, 2016) records municipal properties identified by the Town of Milton Council that are of historic of architectural value or interest to the Town of Milton. This inventory includes properties that have been formally designated under the Ontario Heritage Act and those

properties of limited (or listed) cultural heritage value or interest to the city that are not formally designated. This inventory confirmed the presence of numerous heritage properties located within and in proximity to (within 300 metres) the study area (***see Tables 3-4***).

Additionally, the Heritage Planner at the Town of Milton was contacted to obtain a more detailed description of each heritage property along with its heritage status (Templeton, 2017a). Those details have been included in **Tables 3-4**.

Table 3: Heritage Properties within the Study Area

Address	Description	Heritage Status
7524 Auburn Road	Art deco/art modern CBC building	Listed
7594 Auburn Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
9830 Britannia Road	The Omagh Ball Park, the old Omagh School bell and replica cupola	Listed
9850 Britannia Road	Omagh Church of Christ Cemetery	Listed
9950 Britannia Road	The old Omagh Methodist Church Manse	Listed
10080 Britannia Road	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
10720 Britannia Road	A heritage landscape comprising of two farmhouses and barns in a traditional farmstead setting	Listed
12805 Derry Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
13008 Derry Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
13761 Derry Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6692 Eighth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5244 Fifth Line	The old Thomas Galbraith farmstead comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5368 Fifth Line	The old Jessie Biggar farmstead comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5514 Fifth Line	The Robert Beaty farmstead comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5691 Fifth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6063 Fifth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6086 Fifth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5429 Fourth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
5752 Fourth Line	The remains of the old Devlin farmstead	Listed
1027 Lower Base Line W	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
6114 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed

Address	Description	Heritage Status
6218 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
6426 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
1635 Thompson Road	A heritage landscape comprising of a brick Georgian house and barns in a traditional farmstead setting. This also includes the air strip where the Canadian astronaut Chris Hatfield learned to fly	Listed
1937 Thompson Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5418 Trafalgar Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5527 Trafalgar Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5558 Trafalgar Road	A heritage landscape that includes a farmhouse	Listed
5592 Trafalgar Road	A heritage landscape that includes a farmhouse	Listed
6007 Trafalgar Road	The old blacksmith shop for the village of Drumquin	Listed
6119 Trafalgar Road	A heritage house	Listed
6463 Trafalgar Road	A heritage house	Listed
6472 Trafalgar Road	A heritage house	Listed
6499 Trafalgar Road	A heritage house	Listed
6583 Trafalgar Road	A heritage house	Listed
7053 Trafalgar Road	An old farm/commercial building	Listed
7529 Trafalgar Road	A heritage house	Listed
7548 Trafalgar Road	A heritage house	Listed

Table 4: Heritage Properties within 300 metres of the Study Area

Address	Description	Heritage Status
8815 Britannia Road	Omagh Presbyterian Church and Cemetery	Listed
9815 Britannia Road	The McCann Farm is a heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
9905 Britannia Road	-	Listed
9965 Britannia Road	-	Listed
10025 Britannia Road	The old Omagh store and hotel	Listed
10095 Britannia Road	Location of old Omagh school. The school cupola is situated in the front garden and the house is built using bricks from the old school building	Listed
13875 Britannia Road	-	Listed
14212 Derry Road	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6115 Eighth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6259 Eighth Line	-	Listed
6277-6299 Eighth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6603 Eighth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
6689 Eighth Line	A heritage landscape that includes a farmhouse in a traditional farmstead setting	Listed

Address	Description	Heritage Status
1501 Fourth Line	-	Listed
1595 Fourth Line	-	Listed
5093 Fourth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5274 Fourth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5403 Fifth Line	The Fox family farmstead comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5446 Fourth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5520 Sixth Line	A heritage landscape comprising of a farmhouse and barns in a traditional farmstead setting	Listed
5570 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
6516 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
6566 Sixth Line	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
1487 Thompson Road South	A heritage landscape comprising of a farmhouse in a traditional farmstead setting	Listed
5140 Trafalgar Road	A heritage landscape that includes a farmhouse	Listed
6018 Trafalgar Road	A heritage house	Listed
6150-6170 Trafalgar Road	Bethel United Church and Cemetery	Listed

Therefore, based on presence of numerous heritage resource within and within 300 metres of the study area, there is elevated archaeological potential within portions of the study area that lie within 300 metres of these heritage properties.

1.4.2 Heritage Conservation Districts

A Heritage Conservation District (HCD) includes areas that have been protected under Part V of the *Ontario Heritage Act*. An HCD can be found in both urban and rural environments and may include residential, commercial, and industrial areas, rural landscapes or entire villages or hamlets with features or land patterns that contribute to a cohesive sense of time or place and to an understanding and appreciation of the cultural identity of a local community, region, province, or nation. An HCD may comprise an area with a group or complex of buildings, or a large area with many buildings and properties, and often extends beyond its built heritage, structures, streets, landscape and other physical and spatial elements, to include important vistas and views between and towards buildings and spaces within the district (MTCS, 2006, p.5). An HCD area contains valuable cultural heritage and must be taken into consideration during municipal planning to ensure that they are conserved.

According to *Section 1.3.1* of the *2011 S&G*, heritage resources listed on a municipal register or designated under the *Ontario Heritage Act*, or a federal, provincial, or municipal historic landmark or site, are considered to have elevated archaeological potential. To determine if the study area is located within or in proximity to (within 300 metres of) an HCD, the Town of Milton's

Heritage Planner was contacted and confirmed the absence of an official HCD within or in proximity to (within 300 metres of) the study area (Templeton, 2017a). However, the community of Omagh, situated around the intersection of Britannia Road and Fourth Line, is included in a Heritage Conservation District Study that is currently being undertaken. Therefore, this feature further elevates the archaeological potential within portions of the study area that fall within 300 metres of this HCD.

1.4.3 Commemorative Plaques or Monuments

According to *Section 1.3.1* of the *2011 S&G,* commemorative markers of Aboriginal and Euro-Canadian settlements, which may include their history, local, provincial, or federal monuments, cairns or plaques, or heritage parks, are considered to have elevated archaeological potential. To determine if any historical plaques are present, the Ontario Historical Plaques inventory was reviewed, which contains a catalogue of federal Historic Sites and Monuments Board of Canada plaques, the provincial Ontario Heritage Trust plaques, plaques identified by various historical societies, and other published plaques located in Ontario (Ontario Historical Plaques, 2017). This review confirmed the absence of commemorative plaques within and in proximity to (within 300 metres) the study area. Additionally, the Milton Historical Societies webpage entitled, "Plaqued Historic Homes and Buildings" (Milton Historical Society, 2017b), confirmed the absence of commemorative plaques within and within 300 metres of the study area. Therefore, this feature does not further elevate the archaeological potential within the study area.

1.4.4 Pioneer/Historic Cemeteries

Background research identified one pioneer cemetey within the study area and two pioneer cemeteries adjacent to (within 50 metres) of the study area. The Omagh Church of Christ Cemetery at 9850 Britannia Road in the community of Omagh is located within the study area. The congregation initially worshipped at the Beaty Family home, then moved to a local school and in 1850, land was donated by James Beaty to construct a church. The building was designed by James Beaty and constructed under the direction of his brother, W.C. Beaty, who would become the first preacher for the church. Originally, the church denomination was the Disciples of Christ and the building was called a 'Meeting House' and the cemetery surrounded the Meeting House. Only a few of the early graves along the west side remain (Ye Olde Bone Yards of Halton, Peel, York & Simcoe, 2011; OGS, 2017a).

The Bethel United Church and Cemetery at 6150 Trafalgar Road in the community of Drumquin is located within 50 metres of the study area. The first Methodist church was a dual church/school wood frame building and was constructed across Seventh Line (present-day Trafalgar Road) from the present-day church property. By 1848, a new wood frame building was constructed on the site of the present church grounds. By 1914, the construction of a new brick church began and was completed shortly afterwards. The cemetery is located between the new brick church and the site of the previous wood frame church building constructed in 1848 (Trafalgar Township Historical Society Digital Collections, 2017; OGS, 2017b).

Omagh Presbyterian Cemetery, located at 2077 Britannia Road and within the community of Omagh, is located within 50 metres of the study area. The congregation was founded in 1838 and

originally named for a town in Ireland. A one-acre parcel of land was purchased from Richard Moore in 1838, and the first white wooden building was constructed on this property. This white wooden building stood along the eastern side of the cemetery. By 1909, the present church was constructed of red brick (Omagh Presbyterian Church, 2017; OGS, 2017c)

1.4.5 Registered Archaeological Sites

In order provide a summary of registered or known archaeological sites within a minimum one-kilometre distance from the study area limits, as per *Section 1.1, Standard 1* and *Section 7.5.8, Standard 1* of the *2011 S&G*, the *Ontario Archaeological Sites Database* (OASD) maintained by the *MTCS* was consulted (MTCS, 2016). Every archaeological site is registered according to the Borden System, which is a numbering system used throughout Canada to track archaeological sites and their artifacts.

According to the MTCS (2017), 99 archaeological sites have been registered within one-kilometre of the study area; 34 archaeological sites are located within the study area; five archaeological sites are located within 50 metres of the study area; and 25 archaeological sites are located within 300 metres of the study area (***see Table 5***).

Table 5: Registered Archaeological Sites within One Kilometre of the Study area

Borden #	Name	Cultural Affiliation	Type
Registered sites located within the study area			
AiGw-554	McLean I	Post-contact	Homestead
AiGw-555	McLean II	Other	Unknown
AiGw-556	Chisholm	Post-contact	Homestead
AiGw-557	Benty	Post-contact	Homestead
AiGw-558	Two Stream Knolls	Pre-contact	Camp/campsite
AjGw-20	Bradley	Archaic	Other- camp/campsite
AjGw-50	Nursey 1	-	-
AjGw-56	-	-	-
AjGw-60	-	Euro-Canadian	-
AjGw-264	Hall I	Post-contact	Other-building, outbuilding
AjGw-320	Hall II	Post-contact	Midden; other-privy, homestead
AjGw-321	Gruehl I	Pre-contact	Other- camp/campsite
AjGw-322	Gruehl II	Pre-contact	Scatter
AjGw-323	Gruehl III	Late Archaic (Normanskill)	Findspot
AjGw-392	York I	-	-
AjGw-393	York II	-	-
AjGw-397	-	Pre-contact	Other- camp/campsite
AjGw-398	-	Other	Other- camp/campsite
AjGw-399	-	Late Archaic (Glacial Kame)	Other- camp/campsite
AjGw-400	-	Pre-contact	Other- camp/campsite
AjGw-401	-	Pre-contact	Other- camp/campsite
AjGw-402	-	Pre-contact	Other- camp/campsite
AjGw-403	-	Pre-contact	Other- camp/campsite
AjGw-404	-	Late Paleo-Indian	Other- camp/campsite
AjGw-405	-	Pre-contact	Other- camp/campsite
AjGw-410	-	-	-

Borden #	Name	Cultural Affiliation	Type
AjGw-417	Britannia Farms Loc. 1	Pre-contact	Other- camp/campsite
AjGw-419	-	Pre-contact	Other- camp/campsite
AjGw-418	-	Post-contact	Homestead
AjGw-422	-	-	-
AjGw-446	Location 4	Pre-contact	Other- camp/campsite
AjGw-447	Renaissance	Woodland	Camp/campsite
AjGw-450	-	Pre-contact	Other- camp/campsite
AjGw-451	-	Late Archaic (Glacial Kame)	Findspot
Registered sites located within 50 metres of the study area			
AiGw-560	AiGw-560 - P1	Middle Archaic	Findspot
AjGw-19	Neilsen	Late Archaic; Early Woodland	Other- camp/campsite
AjGw-22	Robert Orr	Late Archaic	Other- camp/campsite
AjGw-51	Nursey 2	-	-
AjGw-58	-	Late Archaic	Unknown
AiGw-390	Umiak #3	Pre-contact	Other- camp/campsite
Registered sites located within 300 metres of the study area			
AiGw-388	Umiak #1	Pre-contact	Other- camp/campsite
AiGw-389	Umiak #2	Late Archaic	Other- camp/campsite
AiGw-391	Umiak #4	Late Archaic	Other- camp/campsite
AiGw-392	Umiak #5	Pre-contact	Other- camp/campsite
AiGw-393	Umiak #6	Late Archaic	Findspot
AiGw-394	Umiak #7	Pre-contact	Scatter
AiGw-561	AiGw-561 – P2	-	-
AiGw-563	Chew (AiGw-563)	-	-
AjGw-52	-	-	-
AjGw-55	-	-	-
AjGw-57	-	-	-
AjGw-59	-	-	-
AjGw-159	Thomas Robson	Post-contact	Homestead
AjGw-406	-	-	-
AjGw-407	-	-	-
AjGw-476	FS1.001	Pre-contact	Findspot
AjGw-448	-	Post-contact	House
AjGw-449	-	Post-contact	House
AjGw-509	Omagh	Pre-contact	Other- camp/campsite
AjGw-510	Omagh II	Pre-contact	-
AjGw-511	Omagh III	Pre-contact	-
AjGw-527	Parkway 3	-	-
AjGw-528	Parkway 4	-	-
AjGw-529	Parkway 5	-	-
Registered sites located within one-kilometre of the study area			
AiGw-233	-	-	-
AiGw-292	-	Early Archaic	Findspot
AiGw-293	-	Pre-contact	Scatter
AiGw-533	-	-	-
AiGw-534	Towers I	-	-
AiGw-535	Towers II	-	-
AiGw-537	-	Late Archaic; Pre-Contact	Findspot; findspot
AiGw-538	-	Middle Archaic; Pre-Contact	Findspot; findspot

Borden #	Name	Cultural Affiliation	Type
AiGw-562	AiGw-562 - P3	Archaic, Late	Findspot
AiGw-565	Boyne H2 site	Post-contact	Homestead
AjGx-19	-	-	-
AjGw-21	Noble	-	-
AjGw-47	-	-	-
AjGw-48	-	Post-contact	House; mill
AjGw-49	-	-	-
AjGw-53	-	-	-
AjGw-54	-	-	-
AjGw-61	Ronald Plant	Middle Archaic	Other: camp/campsite
AjGw-302	-	Early Archaic	Findspot
AjGw-303	-	Paleo-Indian	Findspot
AjGw-309	Beatty	Early Archaic; Post-contact	Findspot; Homestead
AjGw-356	Manor Park	Pre-contact	Findspot
AjGw-408	-	-	-
AjGw-409	-	-	-
AjGw-471	Eighth Line Methodist Chapel Site	Post-contact	Homestead
AjGw-474	Hornby Village Site	Post-contact	Homestead
AjGw-477	FS 1.001	Pre-contact	Findspot
AjGw-478	FS1.001	Pre-contact	Findspot
AjGw-491	Halton Hills Pipeline	Post-contact	-
AjGw-520	Parkway 1	Early Archaic; Post-contact	Unknown; scatter
AjGw-521	Parkway 2	Early Archaic	Scatter
AjGw-530	Parkway 6	Late Archaic	-
AjGw-533	Robinson (AjGw-533)	Post-contact	Other: Homestead
AjGw-537	IF #3	Early Woodland	Findspot
AjGw-540	Parkway West Location 1	Pre-contact	Camp/campsite

"-" denotes no information provided by the MTCS

The *2011 S&G* considers previously registered archaeological sites to be of elevated archaeological potential. Therefore, given that several registered archaeological sites are located within and within 300 metres of the study area, this feature further elevates archaeological potential within portions of the study area that fall within 300 metres of these registered archaeological sites.

Having noted the presence of these sites in relation to the study area, it is useful to place them in proper context by reviewing the cultural history of occupation in Southern Ontario provided in **Table 6**. This data provides an understanding of the potential cultural activity that may have occurred within the study area (Ferris, 2013, p.13).

Table 6: History of Occupation in Southern Ontario

Period	Archaeological Culture	Date Range	Attributes
PALEO-INDIAN			
Early	Gainey, Barnes, Crowfield	>11000-8500 BC	Big game hunters. Fluted projectile points

Period	Archaeological Culture	Date Range	Attributes
Late	Holcombe, Hi-Lo, Lanceolate	8500-7500 BC	Small nomadic hunter-gatherer bands. Lanceolate projectile points
ARCHAIC			
Early	Side-notched, corner notched, bifurcate-base	7800-6000 BC	Small nomadic hunter-gatherer bands; first notched and stemmed points, and ground stone celts.
Middle	Otter Creek, Brewerton	6000-2000 BC	Transition to territorial settlements
Late	Narrow, Broad and Small Points Normanskill, Lamoka, Genesee, Adder Orchard etc.	2500-500 BC	More numerous territorial hunter-gatherer bands; increasing use of exotic materials and artistic items for grave offerings; regional trade networks
WOODLAND			
Early	Meadowood, Middlesex	800BC-0BC	Introduction of pottery, burial ceremonialism; panregional trade networks
Middle	Point Peninsula, Saugeen, Jack's Reef Corner Notched	200 BC-AD 900	Cultural and ideological influences from Ohio Valley complex societies; incipient horticulture
Late	Algonquian, Iroquoian, Western Basin	AD 900-1250	Transition to village life and agriculture
	Algonquian, Iroquoian, Western Basin	AD 1250-1400	Establishment of large palisaded villages
	Algonquian, Iroquoian	AD 1400-1600	Tribal differentiation and warfare
HISTORIC			
Early	Huron, Neutral, Petun, Odawa, Ojibwa, Five Nations Iroquois	AD 1600 – 1650	Tribal displacements
Late	Six Nations Iroquois, Ojibwa, Mississauga	AD 1650 – 1800s	Migrations and resettlement
	Euro-Canadian	AD 1780 - present	European immigrant settlements

1.4.6 Previous Archaeological Assessments

In order to further establish the archaeological context of the study area, a review of previous AAs carried out within the limits of, or immediately adjacent (i.e., within 50 metres) to the study area (as documented by all available reports) was undertaken. 63 reports have been identified (***see Table 7; Map 13***):

Table 7: Previous Archaeological Assessments

Company	Stage of Work	Relation to Current Study Area	Recommendation
A.M. Archaeological Associates, 2007	Stage 1-2 AA	Within 50 metres of the study area	Located at 13722 Steeles Avenue, 7935 Trafalgar Road and 7957 Trafalgar Road. Six pre-contact lithic artifacts were recovered at three locations and have been registered as AjGw-476, AjGw-477 and AjGw-478. An isolated single ceramic sherd was also

Company	Stage of Work	Relation to Current Study Area	Recommendation
			discovered. Due to the isolated nature of these sites, no further archaeological work is recommended for the property.
AMICK Consultants Ltd., 2013	Stage 1-2AA	Within and within 50 metres of the study area	Located at 6390-6400 and 6548 Fifth Line consisting of 99.84 hectares (246.7 acres). No archaeological resources were encountered and no further archaeological assessment of the study area is required.
AMICK Consultants Ltd., 2015a	Stage 1-2AA	Within the study area	Consisting of four parcels located at: 1) 178350 Fourth Line (measuring 27.1 acres); 2) 1336 Britannia Road West and 5553 Fourth Line (measuring 204.1 acres); 3) 5213 Fourth Line (measuring 101 acres); 4) 5514 Fifth Line (measuring 103.4 acres). During the AA, one isolated First Nation findspot, and one First Nation lithic site (Two Streams Knoll Site (AiGw-558) were discovered. No further work was recommended on the First Nation findspot and Stage 3 AA is recommended on the First Nation lithic site. Four Euro-Canadian sites were discovered: the McLean I (AiGw-554), the McLean II (AiGw-555), Chisholm (AiGw-556), and Benty (AiGw-557). Stage 3 AA was recommended on all four Euro-Canadian sites.
AMICK Consultants Ltd., 2016a	Stage 3 AA	Within the study area	Documenting the Stage 3 AA of the McLean Site I (AiGw-554) and the McLean Site II (AiGw-555). A total of 40 test units were excavated at the McLean I (AiGw-554) site. A total of 48 Euro-Canadian artifacts were recovered during the CSP and an additional 5,042 Euro-Canadian artifacts were recovered from the test unit excavation. One subsurface feature was encountered. The artifact analysis produced a date range of the second half of the 19th century and archival research suggests it is tied to the McLean family A total of 16 test units were excavated at the McLean II (AiGw-555) site. A total of 27 Euro-Canadian artifacts were recovered from the CSP and an additional 315 Euro-Canadian artifacts were recovered from the test unit excavation. No subsurface features were encountered. The artifact analysis could not

Company	Stage of Work	Relation to Current Study Area	Recommendation
			produce a definitive date range but is likely associated with the McLean I (AiGw-554) site. Stage 4 mitigation is recommended on both McLean (AiGw-554) and McLean II (AiGw-555) sites.
AMICK Consultants Ltd., 2016b	Stage 3 AA	Within the study area	Documenting the Stage 3 AA of the Chisholm Site (AiGw-556). A total of 38 test units were excavated. A total of 97 artifacts were recovered during the CSP and 3,113 artifacts were recovered from the test unit excavation. One subsurface feature was discovered. The artifact analysis dates the site from 1830-1860 and archival research suggests it is likely associated with Sarah P. Chisholm. Stage 4 mitigation is recommended.
AMICK Consultants Ltd., 2016c	Stage 3 AA	Within the study area	Documenting the Stage 3 AA of the Benty Site (AiGw-557). A total of 20 test units were excavated. A total of 31 artifacts were recovered during the CSP and 30 artifacts were recovered from the test unit excavation. No subsurface features were discovered. The artifact analysis dates the site from 1832-1860 and archival research suggests it is likely associated to Robert Benty. Stage 4 mitigation is recommended.
AMICK Consultants Ltd., 2016d	Stage 3 AA	Within the study area	Documenting the Stage 3 AA of the Two Streams Knoll Site (AiGw-558). A total of 12 test units were excavated. A total of five artifacts were recovered during the CSP and one artifact was recovered from the test unit excavation. No subsurface features were discovered. The artifact analysis suggests the site likely represents an Archaic Period campsite. No further work is recommended on the Two Streams Knoll Site (AiGw-558).
AMICK Consultants Ltd., 2016e	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of the McLean II Site (AiGw-555). 18 test units were excavated around high count Stage 3 test units followed by the mechanical removal of topsoil. A total of nine possible subsurface cultural features were exposed and were later excavated and determined to contain no cultural deposits and were not cultural in nature. A total of 3,016 artifacts were recovered during the Stage 4 excavations. The high content of brick suggests this site was likely an outbuilding associated with the McLean I Site (AiGw-554). No further

Company	Stage of Work	Relation to Current Study Area	Recommendation
			archaeological studies for the McLean II Site (AiGw-555) were recommended and no further concerns exist for the area of the McLean Site II Site.
AMICK Consultants Ltd., 2016f	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of the Benty Site (AiGw-557). 12 test units were excavated followed by the mechanical removal of topsoil. No subsurface cultural features were exposed during the Stage. A total of 11 artifacts were recovered during the Stage 4. The Benty Site (AiGw-557) represents a single component Euro-Canadian deposit that dates to 1832-1860 and the activities which are responsibly for the site creation are unknown. The Benty Site (AiGw-557) has been fully excavated and has no further cultural heritage value or interest.
AMICK Consultants Ltd., 2017	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of the McLean I Site (AiGw-554). 50 test units were excavated around high count Stage 3 test units followed by the mechanical removal of topsoil. A total of 31 possible subsurface cultural features were exposed and 27 were later excavated to contain no cultural deposits and were not cultural in nature. The remaining four were cultural in nature. A total of 12,853 artifacts were recovered during the Stage 4. The high content of brick suggests this site was likely the McLean homestead dated to 1830-1893. No further archaeological studies for the McLean I Site (AiGw-554) were recommended and no further concerns exist for the area of the McLean Site I Site.
AMICK Consultants Ltd., 2015b	Stage 1-2 AA	Within the study area	Located at 5200 5th Line and 1059 Lower Base Line. During the Stage 2 AA, no archaeological resources were encountered within the study area. No further archaeological assessment of the study area is warranted and the proposed undertaking is clear of any archaeological concern.
AMICK Consultants Ltd., 2016g	Stage 1-2 AA	Within the study area	Consisting of four parcels located at: 1) 13008 Derry Road; 2) 13258 Derry Road; 3) 6692 Eighth Line and; 4) No municipal address within Lot 10, Concession 8. During the Stage 2 AA, no archaeological resources were encountered within the study area. No further archaeological assessment of

Company	Stage of Work	Relation to Current Study Area	Recommendation
			the study area is warranted and the area is clear of any archaeological concern.
AMICK Consultants Ltd., N.D.	Stage 4 Mitigation	Within the study area	The Stage 4 Mitigation of Chisholm Site (AiGw-556). A copy of this report has been requested from the MTCS; however, it has not been entered into the Public Register and cannot be released at this time (Templeton, 2017b)
Archaeological Research Associates Ltd., 2013a	Stage 1 AA	Within the study area	Located within Part of Lots 9-12, Concessions 8-9. One previously identified site, the Thomas Robson Site (AjGw-159) was located within the study area. Stage 2 AA was recommended on parts of the project lands that retain archaeological potential.
Archaeological Research Associates Ltd., 2013b	Stage 2 AA	Within 50 metres of the study area	Located at 6603 8th Line, 6621 8th Line and 6689 8th Line. During the Stage 2, seven locations of archaeological materials were discovered: Pre-contact artifacts were identified at Findspots 11-13, and Euro-Canadian artifacts and/or features were found at Findspot 10, 14-16. Findspot 14 was the relocated Thomas Robson Site (AjGw-159). Findspot 10 was renamed Parkway 3 (AjGw-527); Findspot 11 and 13 were isolated findspots; Findspot 12 was renamed Parkway 6 (AjGw-530); Findspot 14 was renamed the Thomas Robson Site (AjGw-159); Findspot 15 was renamed Parkway 4 (AjGw-528); and Findspot 16 was renamed Parkway 5 (AjGw-529). No further work was recommended on Findspots 11, 12 and 13. Further Stage 3 AA is recommended on Findspots 10, 14, 15 and 16. All these sites are located greater than 100 metres away from the project area and will not be impacted by the current development.
Archaeological Research Associates Ltd., 2007	Stage 2 AA	Within the study area	Located along Derry Road from James Snow Parkway to Highway 407 at a width varying between 2 and 10 metres. During the Stage 2, two locations, Findspot 1 and Findspot 2, were noted to contain archaeological remains. No further work was recommended on these two findspots due to their limited number of artifacts. No further archaeological study of these lands would be productive. One property located east of 6th Line did not grant permission to enter (PTE). Stage 2 AA remains outstanding on this parcel.

Company	Stage of Work	Relation to Current Study Area	Recommendation
Archaeological Assessments Ltd., 2001	Stage 1-2 AA	Within the study area	Located south of Britannia Road and east of Trafalgar Road. During the Stage 2, a total of 13 archaeological sites were discovered, including the previously registered Hall I Site (AjGw-264). The 13 sites include two 19th century Euro-Canadian homesteads, two indeterminate pre-contact campsites, one Late Archaic findspot and eight indeterminate pre-contact findspots. Of the 12 new sites found, four were registered: Hall II site (AjGw-320); the Gruehl I Site (AjGw-321); the Gruehl II Site (AjGw-322); and the Gruehl III Site (AjGw-323). Stage 4 mitigation is recommended for the Hall I Site (AjGw-264) and Hall II Site (AjGw-320). Stage 3 AA is recommended on the Gruehl I Site (AjGw-321); the Gruehl II Site (AjGw-322). No further work is recommended on the Gruehl III Site (AjGw-323). The remaining eight sites consisting of isolated, undiagnostic artifacts, are not considered to be a planning concern and do no require additional archaeological investigation.
Archaeological Assessments Ltd., 2007a	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of the Hall Site (AjGw-264) and the Featherston Site (AjGw-320). The Hall Site (AjGw-264), which was subjected to Stage 3 AA in 1996 by Leslie Currie and Associates, proceeded directly to mechanical topsoil stripping. A total of four subsurface cultural features were exposed. A total of 99 artifacts were recovered during the Stage 4. This site likely represents the small homestead occupied by John Robert Hall and his family from the 1850s to the 1870s. Stage 4 Mitigation is complete and this site is no longer a planning concern. At the Featherston Site (AjGw-320), excavations proceeded directly to mechanical topsoil stripping which exposed a total of 18 cultural features. A total of 8,420 artifacts were recovered from the site during the Stage 2-3, and 4 investigations. This site likely represents the homestead occupied by John Featherston and his family from the 1860s to the 1870s. Stage 4 Mitigation is complete and is no longer a planning concern.

Company	Stage of Work	Relation to Current Study Area	Recommendation
Archaeological Assessments Ltd., 2005	Stage 1-3 AA	Within the study area	Located on the east side of Trafalgar Road, consisting of 40.5 hectares of land. During the Stage 2, a total of three archaeological sites were discovered: York I (AjGw-392), York II (AjGw-393) and one indeterminate precontact findspot. During the Stage 3 AA of York I (AjGw-392), a total of 134 chipped stone artifacts were recovered from 15 test units. The site represents an indeterminate precontact camp. Further Stage 4 mitigation was recommended. During the Stage 3 AA of the York II (AjGw-393), a total of eight chipped stone artifacts were covered from seven test units. The site represents an indeterminate precontact camp. No further work is recommended.
Archaeological Assessments Ltd., 2007b	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of the York I Site (AjGw-392). 93 block test units were excavated and a total of two subsurface cultural features were exposed during the block excavation. A total of 2,169 artifacts were recovered during the Stage 4. No diagnostic artifacts were recovered and therefore, no inferences of the date, period of occupation or site function could be determined. It appears that the site was a short-term campsite.
Archaeological Assessments Ltd., 2015	Stage 1-3 AA	Within 50 metres of the study area	Located at the northeast corner of 4th Line and Britannia Road. During the Stage 2 AA, a total of eight archaeological sites were discovered, including three indeterminate aboriginal campsites and five indeterminate aboriginal findspots. The three aboriginal campsites were registered at Omagh (AjGw-509), Omagh II (AjGw-510) and Omagh III (AjGw-511). Omagh II (AjGw-510), Omagh III (AjGw-511) and the five findspots are not a planning concern and did not require any further investigation. Further Stage 3 AA was recommended on Omagh (AjGw-509) and concluded the Omagh (AjGw-509) is a significant indeterminate aboriginal campsite and must be subjected to Stage 4 mitigation. However, the Omagh Site (AjGw-509) is located greater than 100 metres away from the project area and will not be impacted by the current development.

Company	Stage of Work	Relation to Current Study Area	Recommendation
Archeoworks Inc. 2015a	Stage 1 AA	Within the study area	Located along Britannia Road West and Thompson Street within their existing ROW. Stage 2 AA recommended on those areas that retain archaeological potential.
Archeoworks Inc. 2015b	Stage 3 AA	Within 50 metres of the study area	Documents the cemetery investigations immediately northeast and adjacent to the Omagh Presbyterian Church Cemetery. Despite careful scrutiny, no grave shafts, human remains, or archaeological resources were encountered. The study area can be considered free of further archaeological concern.
Archaeological Services Inc., 2002	Stage 1 AA	Within the study area	Located along Derry Road between 5th Line and 9th Line. Stage 2 AA recommended.
Archaeological Services Inc., 2009b	Stage 1 AA	Within 50 metres of the study area	Located within Lots 6 and 7 and part of Lot 8, Concession 1-5. Further Stage 2 AA recommended.
Archaeological Services Inc., 2012	Stage 1 AA	Within the study area	Located along Britannia Road from Tremaine Road to Highway 407. Further work is not recommended on the Britannia Road ROW. Lands beyond the Britannia Road ROW exhibit archaeological potential and must be subjected to Stage 2 AA. A cemetery investigation is required for the ROW in front of the Church of Christ Church (9850 Britannia Road) and Omagh Presbyterian Church (2077 Britannia Road) should the proposed project impact those ROW lands.
Archaeological Services Inc., 2013	Stage 1-2 AA	Within 50 metres of the study area	Located at the northwest corner of Britannia Road and Thompson Road. During the Stage 2 AA, three pre-contact lithic findspots [Site AiGw-560 (P1), Site AiGw-561 (P2) and the AiGw-562(P3)] and two historical Euro-Canadian sites [the Chew Site (AiGw-563) and the Robinson Site (AjGw-533)] were encountered. No further work was recommended on AiGw-560 (P1), Site AiGw-561 (P2) and the AiGw-562(P3). Further Stage 3 AA is recommended on the Chew Site (AiGw-563) and the Robinson Site (AjGw-533). Further Stage 3 is recommended on the northeast limits abutting the Omagh Presbyterian Cemetery grounds.
Archaeological Services Inc., 2016	Stage 3 AA	Within 50 metres of the study area	Documents the cemetery investigations immediately northwest of the Omagh Presbyterian Church Cemetery. No grave shafts or other features of any kind were

Company	Stage of Work	Relation to Current Study Area	Recommendation
			encountered. Therefore, it is recommended that no further archaeological assessment of the study area is required.
Museum of Ontario Archaeology, 2004	Stage 1-2 AA	Within 50 metres of the study area	Located along Britannia Road, adjacent to the east banks of Sixteen Mile Creek. During the Stage 2 AA, artifacts were found at a total of 13 locations, seven were registered: AiGw-388 to AiGw-394. The other six locations (findspots) yielded insignificant material. Stage 3 AA was recommended on AiGw-388, AiGw-389, AiGw-390, AiGw-391 and AiGw-392. It was noted that the western edge of the property contains the valley of the Sixteen Mile Creek and a forested area within and along the top-of-bank of the valley. Those lands were excluded from the assessment.
Golder Associates Ltd., 2009	Stage 3 AA	Within the study area	Documenting the Stage 3 AA of Location 4 (AjGw-446), Location 5 (AjGw-447), Location 9 (AjGw-450), and Location 10 (AjGw-451). All four sites were determined to be temporary campsites. Location 4 (AjGw-446) and Location 9 (AjGw-450) are of unknown cultural affiliation. Location 5 (AjGw-447) was dated to the Woodland (950B.D. to 1650 A.D.) and Location 10 (AjGw-451) was dated to the Terminal Archaic (1200 B.C. to 1000 B.C.). No further work was recommended for Location 4 (AjGw-446), Location 9 (AjGw-450), or Location 10 (AjGw-451). Further Stage 4 Mitigation is recommended on Location 5 (AjGw-447).
Golder Associates Ltd., 2016	Stage 4 Mitigation	Within the study area	Documenting the Stage 4 Mitigation of Site AjGw-447. The Stage 4 proceeded directly to mechanical topsoil stripping. No subsurface features were identified. Based on the Stage 2 and Stage 3 artifacts, this site may represent a Woodland Period “pot drop” where a single ceramic vessel is left in an area, or the site represents the remains of a short term campsite. AjGw-447 has now been fully mitigated and no additional assessment or mitigation is required.
New Directions Archaeology Ltd., 2004	Stage 1 AA	Within 50 metres of the study area	Located along Highway 401 from Trafalgar Road to the Halton Region boundary. The existing ROW from Appleby Line to Trafalgar Road is completely disturbed and will not

Company	Stage of Work	Relation to Current Study Area	Recommendation
			require any further assessment. Construction within the corridor can proceed as planned.
New Directions Archaeology Ltd., 2014	Stage 1 AA	Within the study area	Located along Fifth (5th) Line from Derry Road to Britannia Road. The area within the ROW is completely disturbed by previous roadway construction and therefore requires no further assessment. If the proposed Fifth Line improvements extend beyond the current ROW, further Stage 2 AA is recommended.
Archaeologix Inc., multiple years	Stage 1-2 AA	Within the study area	Reports P001-272, P084-010-2006, P084-019-2006, P084-031-2006, P084-054-2006. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion
Archaeologix Inc., multiple years	Stage 3 AA	Within the study area	Reports: P084-002-2006 and P084-073-2006 documenting AjGw-397, AjGw-398, AjGw-399, AjGw-400, AjGw-401, AjGw-402, AjGw-403, AjGw-404, AjGw-405, AjGw-417, AjGw-418, AjGw-419, AjGw-422. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion.
Archaeologix Inc., multiple years	Stage 4 Mitigation	Within the study area	Report P084-080-2006 documenting AjGw-400, AjGw-401, AjGw-402, AjGw-403, AjGw-404, AjGw-405. A copy of this report has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion.
Stantec Consulting Ltd., multiple years	Stage 1-2 AA	Within the study area	Reports: P001-273, P084-011-2006. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion
Stantec Consulting Ltd., N.D.	Stage 1 AA	Possibly within the study area	Report P001-083-2006. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion.
Stantec Consulting Ltd., 2015	Stage 2	Possibly within the study area	Report P256-0380-2015. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion.

Company	Stage of Work	Relation to Current Study Area	Recommendation
Stantec Consulting Ltd., multiple years	Stage 4 Mitigation	Within the study area	Report P084-040-2006 and P084-186-2009 documenting AjGw-410, AjGw-417, AjGw-418 and AjGw-419. A copy of these reports has been requested from the consultant firm and from the MTCS (Templeton, 2017c; Templeton, 2017j). No report has been granted by report completion.
Golder Associates Ltd., 2014	Stage 2 AA	Possibly within the study area	A copy of this report has been requested from the consultant firm (Templeton, 2017d). No report has been granted by report completion.
Archaeological Services Inc., N.D.	Stage 1 AA	Possibly within the study area	A copy of this report has been requested from the consultant firm (Templeton, 2017e; Templeton, 2017i). No report has been granted by report completion.
AECOM, 2010	Stage 1 AA	Possibly within the study area	A copy of this report has been requested from the consultant firm (Templeton, 2017f). No report has been granted by report completion.
Timmins Martelle Heritage Consultants Inc., N.D.	Stage 1-2 AA	Possibly within the study area	A copy of this report has been requested from the consultant firm (Templeton, 2017g). No report has been granted by report completion.
Museum of Ontario Archaeology, 2000	Unknown	Possibly within the study area	A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.
Christopher G. Neill, 2012	Stage 1 AA	Possibly within the study area.	A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.
Leslie Currie, 1995	Stage 1-2 AA	Within the study area	Along Trafalgar Road. A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.
Leslie Currie, 1996	Stage 3 AA	Within the study area	Documenting AjGw-294. A copy of this report has been requested from the MTCS (Templeton, 2017i). No report has been granted by report completion.
Mayer, Pihl and Poulton, 1991	Stage 1-2 (equivalent)	Within the study area.	A report documenting AjGw-60. A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion. However, based on the site form comments, the site was surveyed and fully mitigated.
Unknown, 1976	Stage 1-2 (equivalent)	Within the study area	Documenting the discovery of AjGw-19 and AjGw-20. A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.

Company	Stage of Work	Relation to Current Study Area	Recommendation
A. Roberts, 1979	Stage 1-2 (equivalent)	Within and within 50 metres of the study area	Documenting the discovery of AjGw-50, AjGw-51, AjGw-56, AjGw-58, and AjGw-60. A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.
A. Roberts, 1976	Stage 1-2 (equivalent)	Within the study area	Documenting the discovery of AjGw-22. A copy of this report has been requested from the MTCS (Templeton, 2017h; Templeton, 2017i). No report has been granted by report completion.

1.4.7 Physical Features

An investigation of the study area's physical features was conducted to aid in the development of an argument for archaeological potential based on the environmental conditions of the study area. Environmental factors such as close proximity to water, soil type, and nature of the terrain, for example, can be used as predictors to determine where human occupation may have occurred in the past.

The study area is located within the Peel Plain physiographic region of Southern Ontario. The Peel Plain is described as a level-to-undulating region of clay soils, with a gradual and fairly uniform slope toward Lake Ontario. Till containing large amounts of shale and limestone underlies clay that is generally heavy in texture, this clay having been presumably brought by meltwater from the predominantly limestone regions to the north and east. Some well-drained soils are found within the Peel Plain, but the most dominant soil is Peel clay, an imperfectly drained, dark brown, stone-free clay often underlain by dull brownish grey, calcareous clay till or stone-free clay. With the underlying shales not being able to retain water well, compounded by the almost complete deforestation of the region which results in a high degree of evaporation, the Peel Plain has somewhat of a water supply problem. Practically all utilized for agriculture until 1940, the land within much of the region has been urbanized, now occupying two-thirds of the Peel Plain and taking more than 50,000 hectares of good farmland out of production (Chapman & Putnam, 1984, pp. 174-176).

A few native soil types are found within the study area: Berrien sandy loam, Brady sandy loam, Burford loam, Chinguacousy clay loam, Fox sandy loam, Jeddo clay loam, Oneida clay loam and Bottom Land. The majority of the study area is located in Chinguacousy clay loam while Brady sandy loam, Burford loam, Fox sandy loam, Jeddo clay loam, and Oneida clay loam are located scattered throughout the study area. Bottom Land is situated alongside the Sixteen Mile Creek, and is within the study area. A description of their characteristics may be found in **Table 8** and depicted in **Map 6** (Ontario Agricultural College, 1971). The great variety in soil types further highlights the mixed landscape that the study area encompasses and supports the mixed nature of past subsistence practices and changing industries of early settlers in these areas. Soils more conducive to agriculture, such as good drainage and stonefree, have the potential for past

settlement, support greater population density and subsequently elevated archaeological potential.

Table 8: Study Area Soil Types

Soil Series and Type	Great Soil Group	Parent Materials	Drainage	Topography and Stoniness
Berrien sandy loam	Gray Brown Luvisol	Medium sand over clay	Imperfect drained	2% slope, simple topography. Stone free
Brady sandy loam	Gray Brown Luvisol	Medium sandy	Imperfect drained	0.5% slope, simple topography. Stone free
Burford loam	Gray Brown Luvisol	Outwash gravel	Well drained	5% slope, simple topography. Moderately stony.
Chinguacousy clay loam	Gray Brown Luvisol	Clay loam till	Imperfect drained	5% slope, simple topography. Slightly stony.
Fox sandy loam	Gray Brown Luvisol	Outwash medium sand	Well drained	9% slope, simple topography. Stone free.
Jeddo clay loam	Humic Gleysol	Clay loam till	Poorly drained	2% slope, simple topography. Slightly to moderately stony.
Oneida clay loam	Gray Brown Luvisol	Clay loam till	Well drained	9-15% slope, simple topography; 0.5%, multiple slopes. Stone free to moderately stony.
Bottom Land	Regosol	Recent aulluvial	Variable	No data

In terms of archaeological potential, potable water is a highly important resource necessary for any extended human occupation or settlement. As water sources have remained relatively stable in Ontario since post-glacial times, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location. A watershed is an area drained by a river and its tributaries. As surface water collects and joins a collective water body, it picks up nutrients, sediment and pollutants, which may altogether affect ecological processes along the way. Hydrological features such as primary water sources (i.e. lakes, rivers, creeks, streams) and secondary water sources (i.e. intermittent streams and creeks, springs, marshes, swamps) would have helped supply plant and food resources to the surrounding area and are indicators of archaeological potential (per *Section 1.3.1* of the *2011 S&G*).

The Sixteen Mile Creek watershed and its tributaries are located within the study area. Therefore, these features elevate archaeological potential within portions of the study area that fall within 300 metres of their limits.

1.4.8 Current Land Conditions

The study area is situated primarily within a rural/agricultural area of the Town of Milton. The study area encompasses open agricultural fields, woodlots, part of three golf courses (Piper Heath Golf Club, Royal Ontario Golf Club and Wyldewood Golf and Country Club), an industrial development on the south side of Auburn Road along Trafalgar Road, abuts the CP Railway, and part of the Sixteen Mile Creek and its tributaries. The topography within the study area gradually decreases from north to south, with the elevation measuring between approximately 180 to 200 metres above sea level.

1.4.9 Date of Review

A desktop review of field conditions using historical aerial photography and current satellite imagery obtained through the Google Earth application was undertaken on February 24th, 2017.

1.5 Confirmation of Archaeological Potential

Based on the information gathered from the background research documented in the preceding sections, elevated archaeological potential has been established within the study area boundaries. Features contributing to archaeological potential are summarized in **Appendix B.**

2.0 ANALYSIS AND CONCLUSIONS

In combination with data gathered from background research (***see Sections 1.3 and 1.4***) and an inspection of satellite imagery and aerial photography, an evaluation of archaeological potential was performed.

2.1 Historical Imagery

Data gathered from background research (***see Sections 1.3 and 1.4***) was used to perform an assessment of archaeological potential. Additionally, a detailed review of aerial photographs taken from 1954 (***see Maps 7-8***), and satellite imagery taken from 2005 and 2016 (***see Maps 9-12***), reveals that the study area has undergone minor changes since 1954.

The 1954 aerial photographs show that the study area consisted primarily of ploughed agricultural fields, woodlots and several farmsteads fronting Thompson Road, Fourth (4th) Line, Fifth (5th) Line, Sixth (6th) Line, Trafalgar Road, Eighth (8th) Line), Lower Baseline, Britannia Road and Derry Road. Additionally, the communities of Omagh, Drumquin and Agerton (Auburn) are present in the aerial (***see Maps 7-8***).

A satellite image from 2005 revealed the study area still consisted of active ploughed agricultural fields and woodlots (***see Maps 9-10***). Additionally, an industrial development is located along the south side of Auburn Road and Trafalgar Road. By 2016, three golf courses had been established within the study area along Trafalgar Road while the remaining portion of the study area remained unchanged from 2005 ***(see Maps 11-12***).

2.2 Previous Archaeological Assessments

Lands encompassed within the study area limits which have already been subjected to Stage 2, Stage 3 and/or Stage 4 survey, and cleared of further archaeological concern (***see Section 1.4.6***) are recommended to be exempt from further assessment (***see Maps 13-14***).

Archeologix Inc. (2006a, 2006b, n.d.), Archaeological Assessments Ltd. (2001), Currie (1995), AMICK Consultants Ltd. (2015a), previously conducted Stage 1-2 AAs within the study area wherein the following sites were identified: AiGw-556, AjGw-264, AjGw-320, AjGw-321, AjGw-322,AjGw-323, AjGw-397, AjGw-398, AjGw-399, AjGw-400, AjGw-401, AjGw-402, AjGw-403, AjGw-404, AjGw-405, AjGw-410, AjGw-417, AjGw-418, AjGw-419, AjGw-422, AjGw-446, AjGw-447, AjGw-450, and AjGw-451. The results of the above Stage 1-2 AAs are unknown as the reports were not provided at the time of report completion. Furthermore, some sites have been subjected to Stage 3 and/or Stage 4 survey, for which reports were not granted at the time of report completion. Therefore, prior to any intrusive activity within the above lands that were subjected to Stage 1-2 AAs, Stage 3 AA, and/ or Stage 4 survey, a copy of the appropriate reports

must be reviewed to determine if there are any further archaeological concerns associated with these lands.

Given that the AjGw-20, AjGw-50, and AjGw-56, sites were discovered in the late-1970s (reports are not available), and are presently located within undeveloped lands, it is presumed that these sites are still intact. It is recommended that these locations be subject to appropriate Stage 2 AA methods to relocate these sites and determine if further Stage 3 AA is required. If the revisit does not result in the recovery of any additional artifacts, a recommendation will be made to free the site of further archaeological concern.

2.3 Identified Deep and Extensive Disturbances

The study area was evaluated for extensive disturbances that have removed archaeological potential. Disturbances may include but are not limited to: grading below topsoil, quarrying, building footprints, or sewage and infrastructure development. *Section 1.3.2* of the *2011 S&G* considers infrastructure development among those "features indicating that archaeological potential has been removed."

Specifically, within the study area, obvious disturbances include the various roads and their right-of-way, a railway corridor, and existing structures (***see Map 14***). The construction of these features would have resulted in severe damage to the integrity of any archaeological resources which may have been present within their footprints. However, the areas of deep and extensive disturbances should only be considered as *likely* not requiring Stage 2 survey (***see Map 14***). A visual inspection is still required to provide on-site confirmation and documentation of the actual condition and exact extent of the disturbance.

2.4 Physiographic Features of No or Low Archaeological Potential

The study area was evaluated for physical features of no or low archaeological potential. These usually include but are not limited to: permanently wet areas, exposed bedrock, and steep slopes (greater than 20°) except in locations likely to contain pictographs or petroglyphs, as per *Section 2.1, Standard 2.a.* of the 2011 *S&G.*

Specifically, within the study area, physical features of low or no archaeological potential include permanently wet areas associate with the various watercourses that bisect the study area (***see Map 14***). However, the areas of no or low archaeological potential should only be considered as *likely* not requiring Stage 2 survey (***see Map 14***). A visual inspection is still required to provide on-site confirmation and documentation of the actual condition and exact extent of the disturbance.

2.5 Pioneer/Historic Cemeteries

Background research identified one pioneer cemetery within the study area (Omagh Church of Christ Cemetery) and two pioneer cemeteries adjacent to (within 50 metres of) the study area

(Bethel United Church and Cemetery and Omagh Presbyterian Cemetery) (***see Map 14***). Burials in nineteenth century historic cemeteries were not highly regulated; these burials often employing markers of little substance and have since disappeared. Therefore, should proposed work occur within or immediately adjacent to (within 10 metres of) any cemetery, following the Stage 2 archaeological investigation of this area, should no archaeological resources be encountered, a Stage 3 investigation involving mechanical topsoil removal will be required in all undisturbed areas that fall within 10-metres of the cemetery limits, to confirm the presence or absence of any grave shafts.

2.6 Identified Areas of Archaeological Potential

The remaining balance of the study area, consisting of agricultural fields, open grasslands, grassed frontages or wooded areas are considered to retain archaeological potential (***see Map 14***). The ploughed agricultural fields must be subjected to pedestrian survey at five metre transects in accordance with *Section 2.1.1* of the *2011 S&G*. All areas where ploughing is not possible or viable must be subjected to test pit survey at five metre intervals in accordance with *Section 2.1.2* of the *2011 S&G*.

3.0 RECOMMENDATIONS

Considering the findings detailed in the preceding sections, the following recommendations are presented:

1. For those portions of the study area that have been cleared of archaeological concerns through previous archaeological assessments, no Stage 2 AA is required.

2. For lands that were subjected to previous Stage 1-2 AAs, Stage 3 AA, and/ or Stage 4 survey, prior to any intrusive activity within these lands, a copy of the appropriate reports must be reviewed to determine if there are any further archaeological concerns associated with these lands.

3. AjGw-20, AjGw-50, and AjGw-56: Given these sites were discovered in the late-1970s (reports are not available), and are presently located within undeveloped lands, it is presumed that these sites are still intact. It is recommended that these locations be subject to appropriate Stage 2 AA methods to relocate these sites and determine if further Stage 3 AA is required. If the revisit does not result in the recovery of any additional artifacts, a recommendation will be made to free the site of further archaeological concern.

4. As per *Section 1.4.1, Standard 1.f* and *Section 1.4.2* of the *2011 S&G,* areas that exhibit disturbed conditions, need to be confirmed through an on-site property inspection during a Stage 2 AA.

5. As per *Section 2.1, Standard 2.a* of the *2011 S&G,* lands evaluated as having no or low potential need to be confirmed through an on-site property inspection during a Stage 2 AA.

6. All identified areas which retain archaeological potential must be subjected to a Stage 2 AA. The ploughed agricultural fields must be subjected to pedestrian survey at five metre transects in accordance with *Section 2.1.1* of the *2011 S&G*. All areas where ploughing is not possible or viable must be subjected to test pit survey at five metre intervals in accordance with *Section 2.1.2* of the *2011 S&G*.

7. Should proposed work occur within or immediately adjacent to (within 10 metres of) any pioneer cemetery, a Stage 3 investigation involving mechanical topsoil removal will be required in the area to be impacted, including a 10-metre buffer, to confirm the presence or absence of any grave shafts.

No construction activities shall take place within the study area prior to the *MTCS* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

1. This report is submitted to the *MTCS* as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the *MTCS*, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

2. It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

3. Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

4. The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the *Ministry of Consumer Services*.

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Wright, J.V. (1999). *A History of the Native People of Canada: Volume II (1,000B.C. – A.D. 500)*. Hull, Quebec: Museum of Civilization.

Ye Olde Bone Yards of Halton, Peel, York & Simcoe. (2011). *Church of Christ, Milton*. [Online]. Available at: http://lostcemeteries.blogspot.ca/2011/07/church-of-christ-cemetery-milton.html. [Accessed 23 February 2017]

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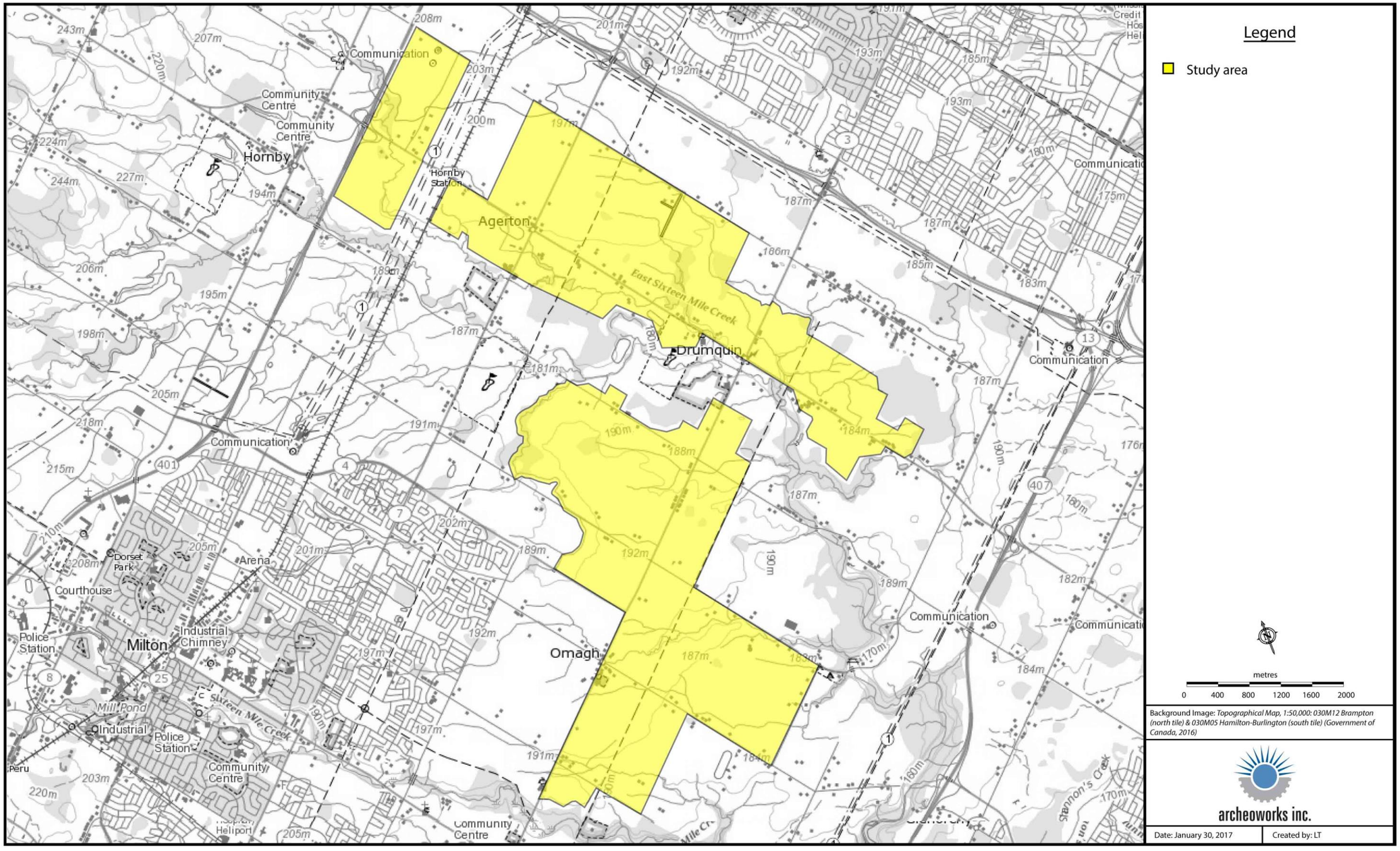
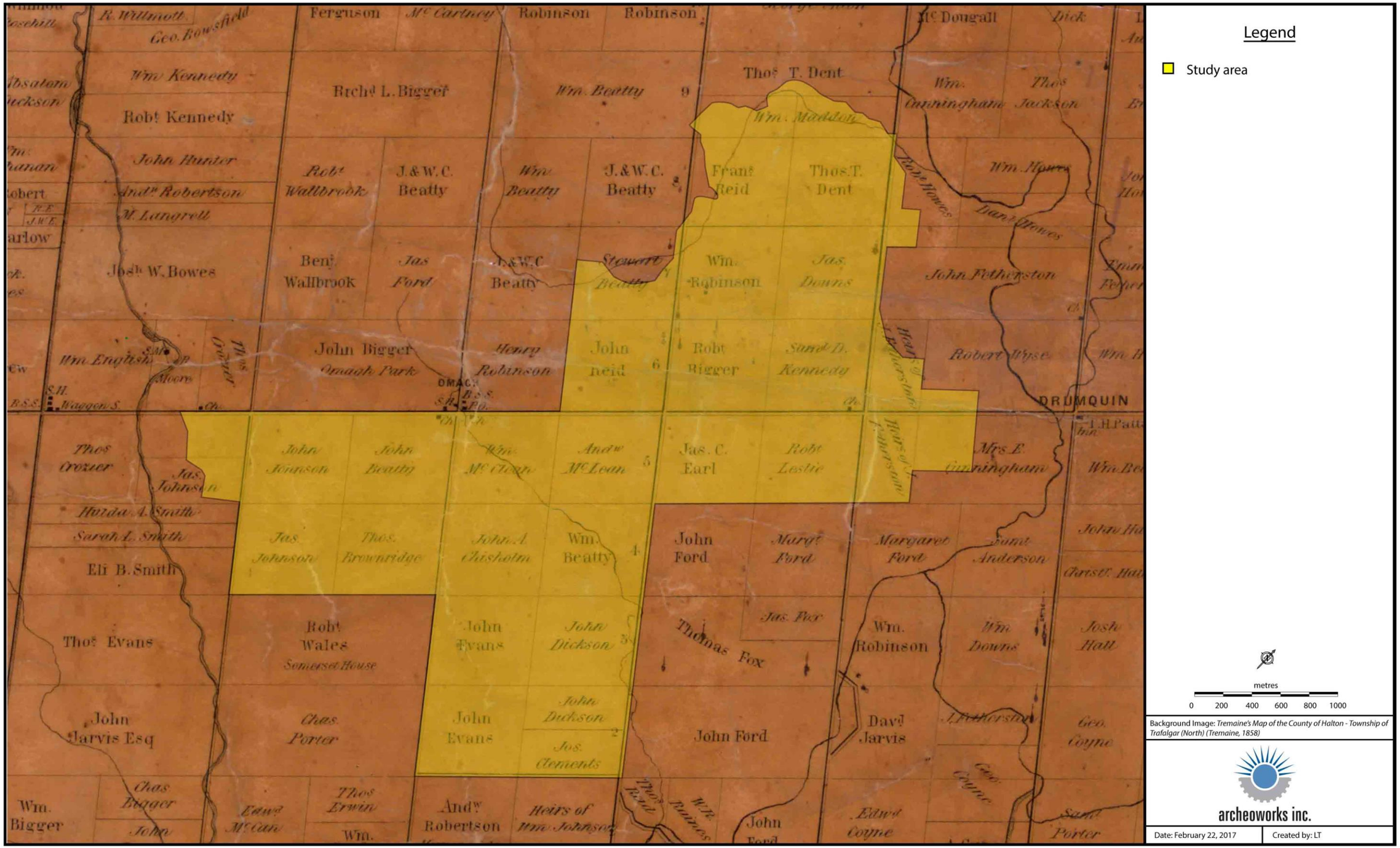
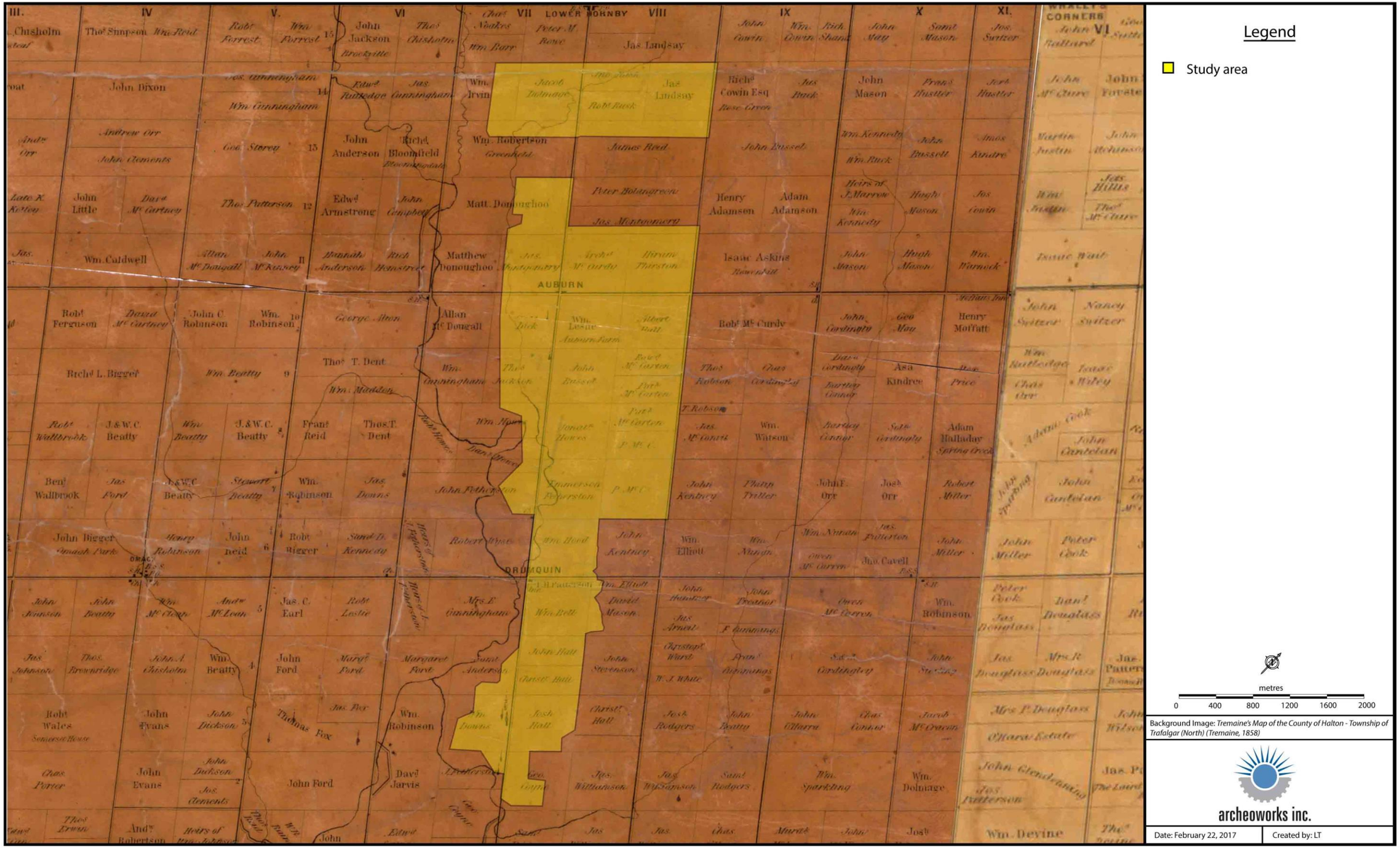
APPENDICES



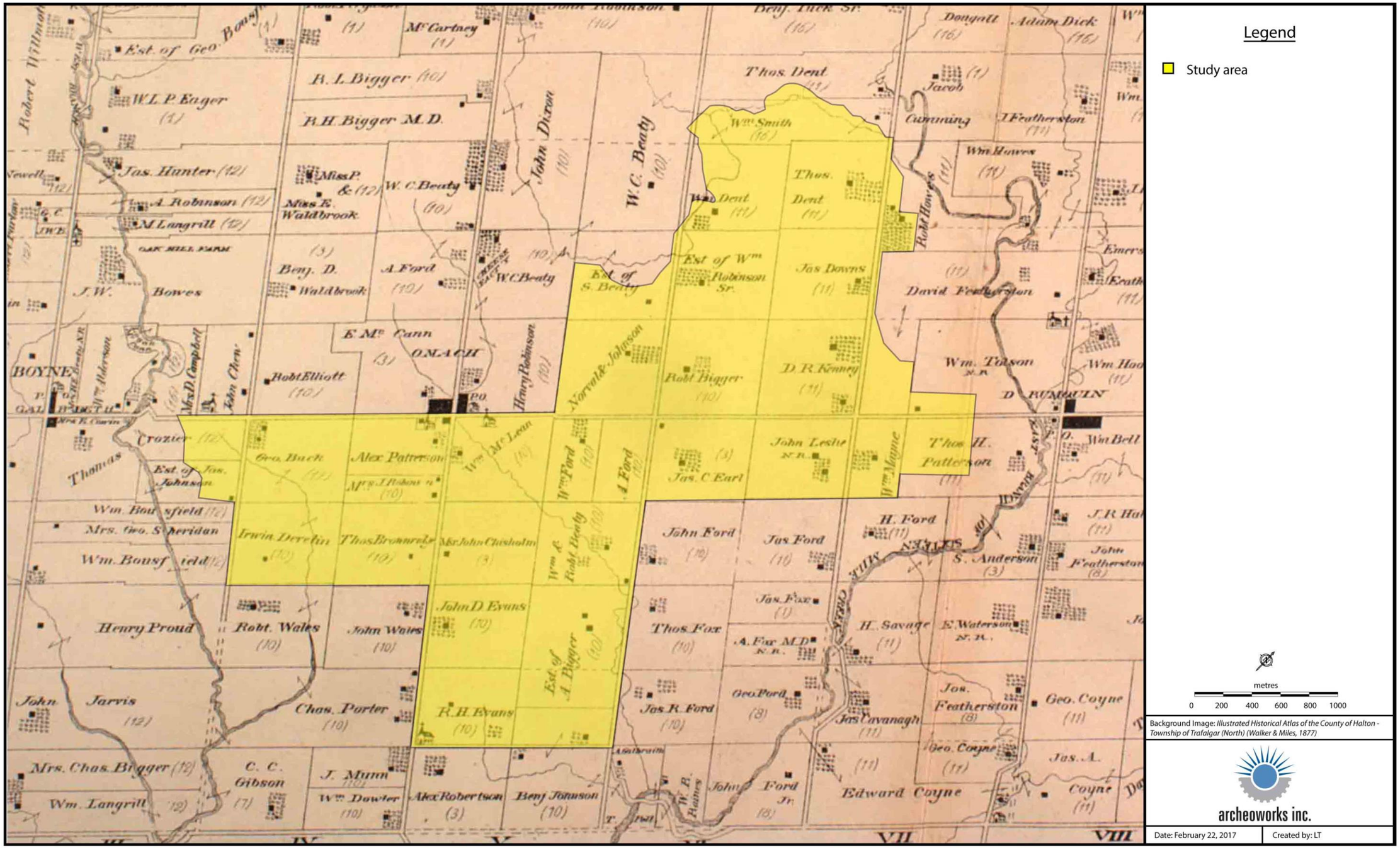
Map 1: Topographical map 1:30000, NTS Brampton 030M12 (north tile) and Hamilton-Burlington 030M05 (south tile) (Government of Canada, 2016) identifying the Stage 1 AA study area.



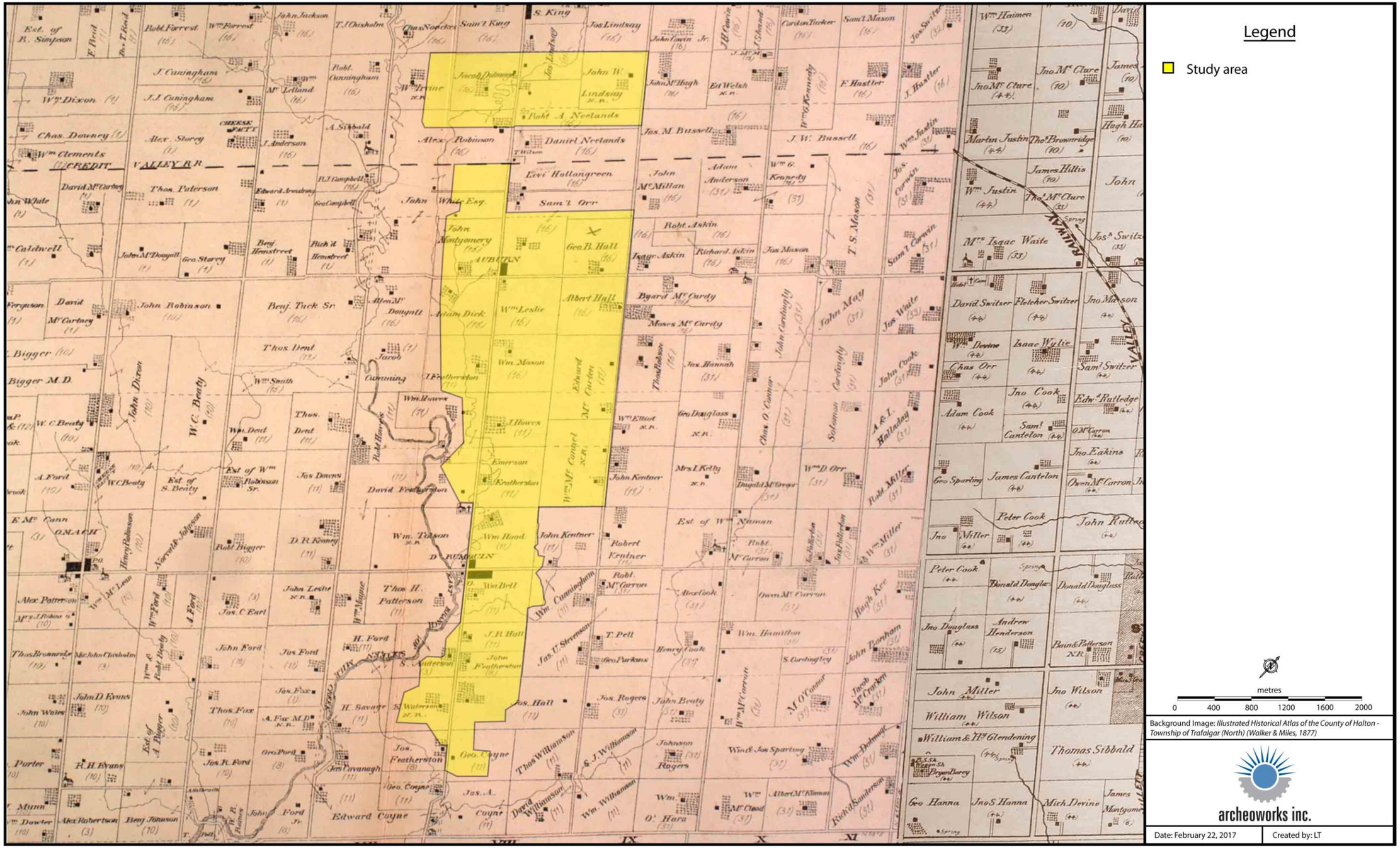
Map 2: West part of the Stage 1 AA study area within the 1858 Tremaine's Map of the County of Halton – Township of Trafalgar (Tremaine, 1858).



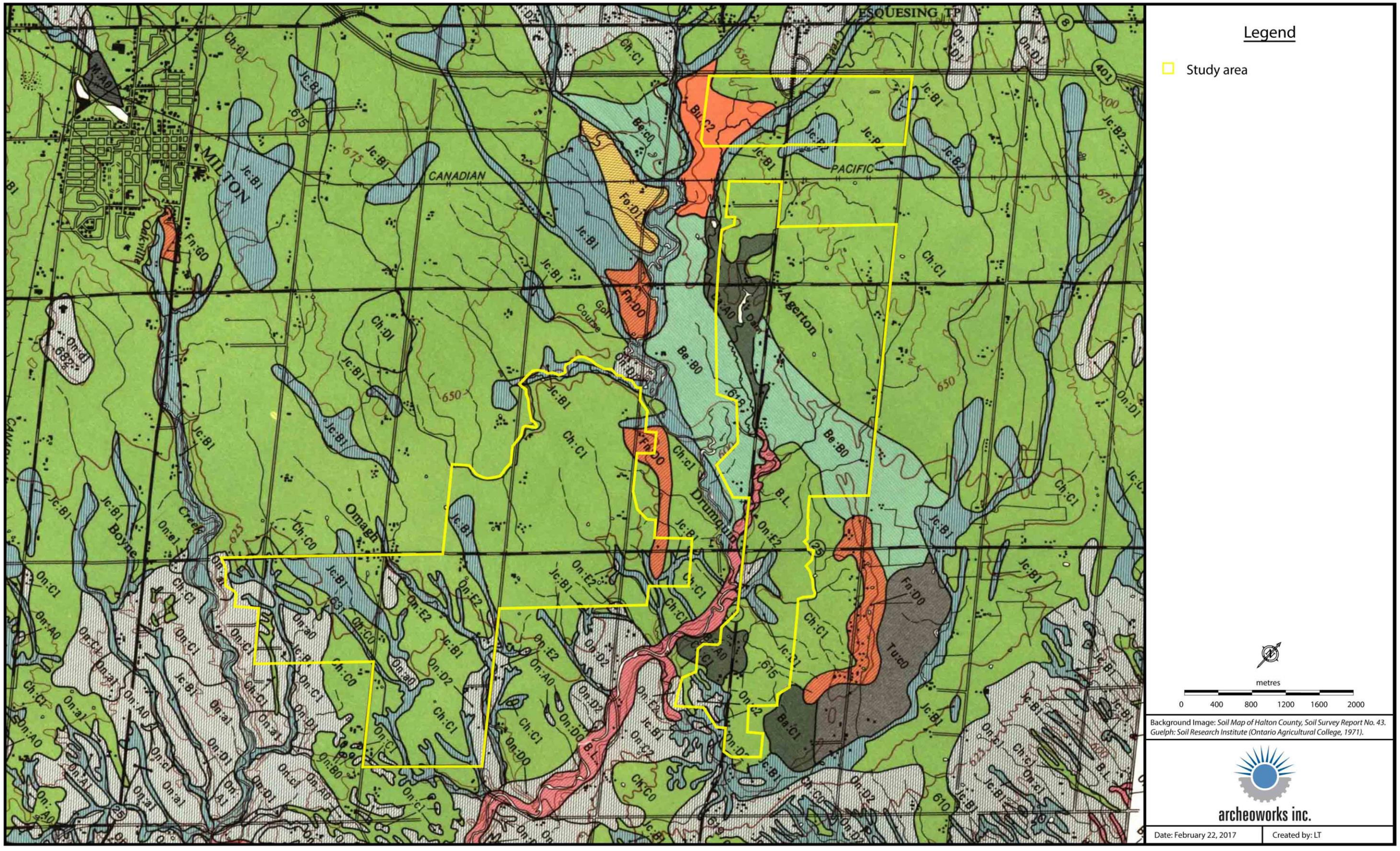
Map 3: East part of the Stage 1 AA study area within the 1858 Tremaine's Map of the County of Halton – Township of Trafalgar (Tremaine, 1858).



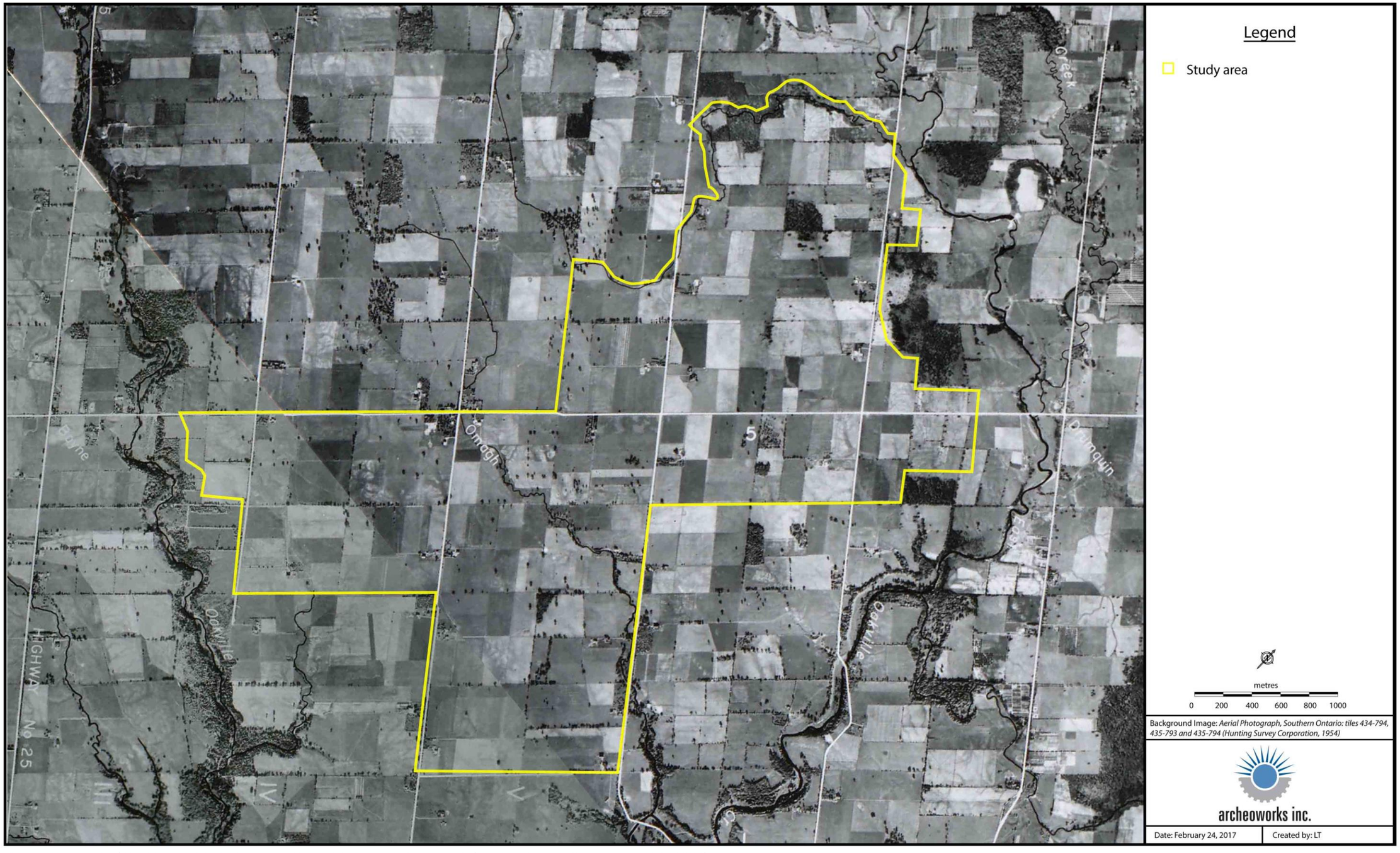
Map 4: West part of the Stage 1 AA study area within the Illustrated Atlas of the Country of Halton – Township of Trafalgar (Walker & Miles, 1877).



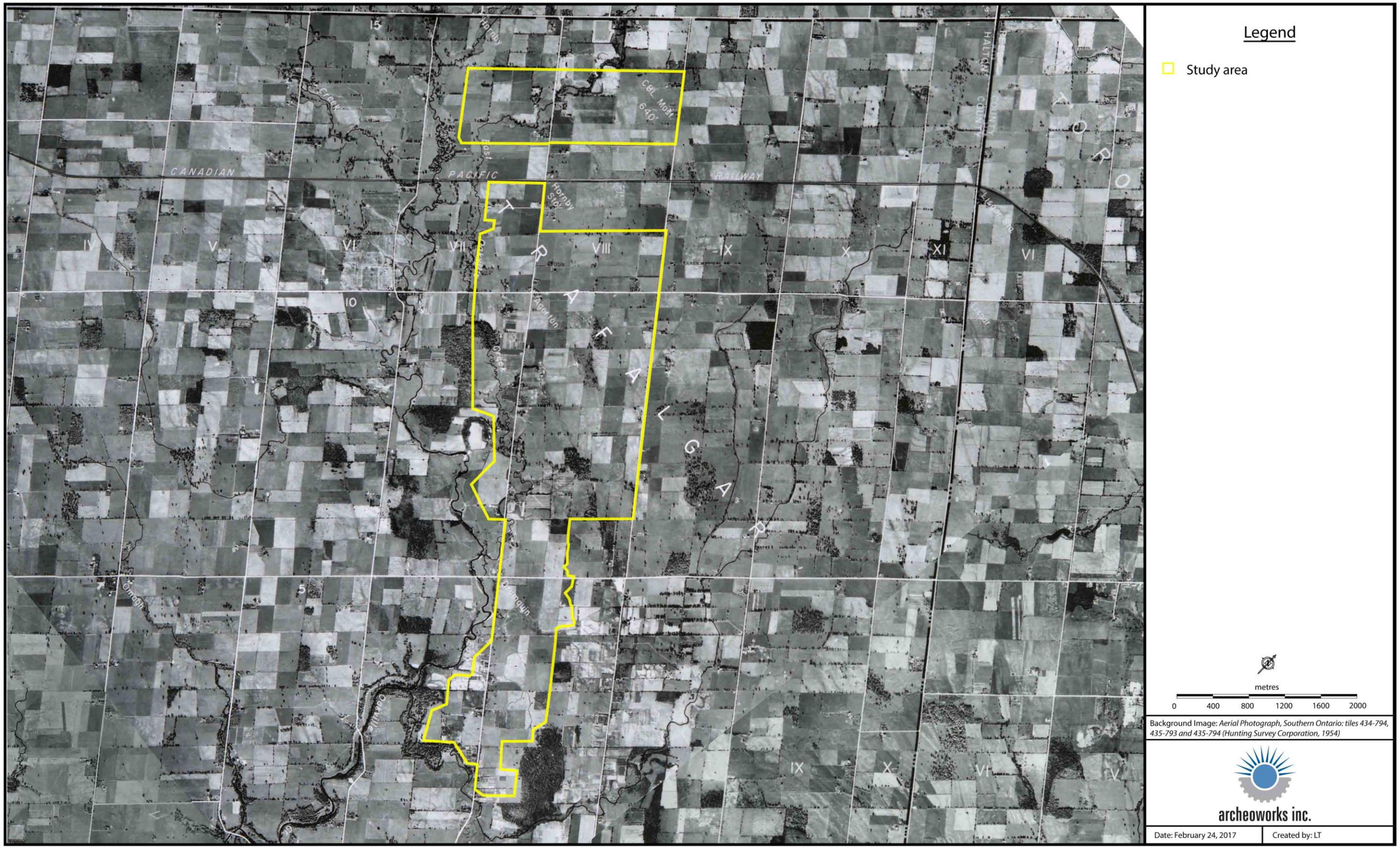
Map 5: East part of the Stage 1 AA study area within the Illustrated Atlas of the Country of Halton – Township of Trafalgar (Walker & Miles, 1877).



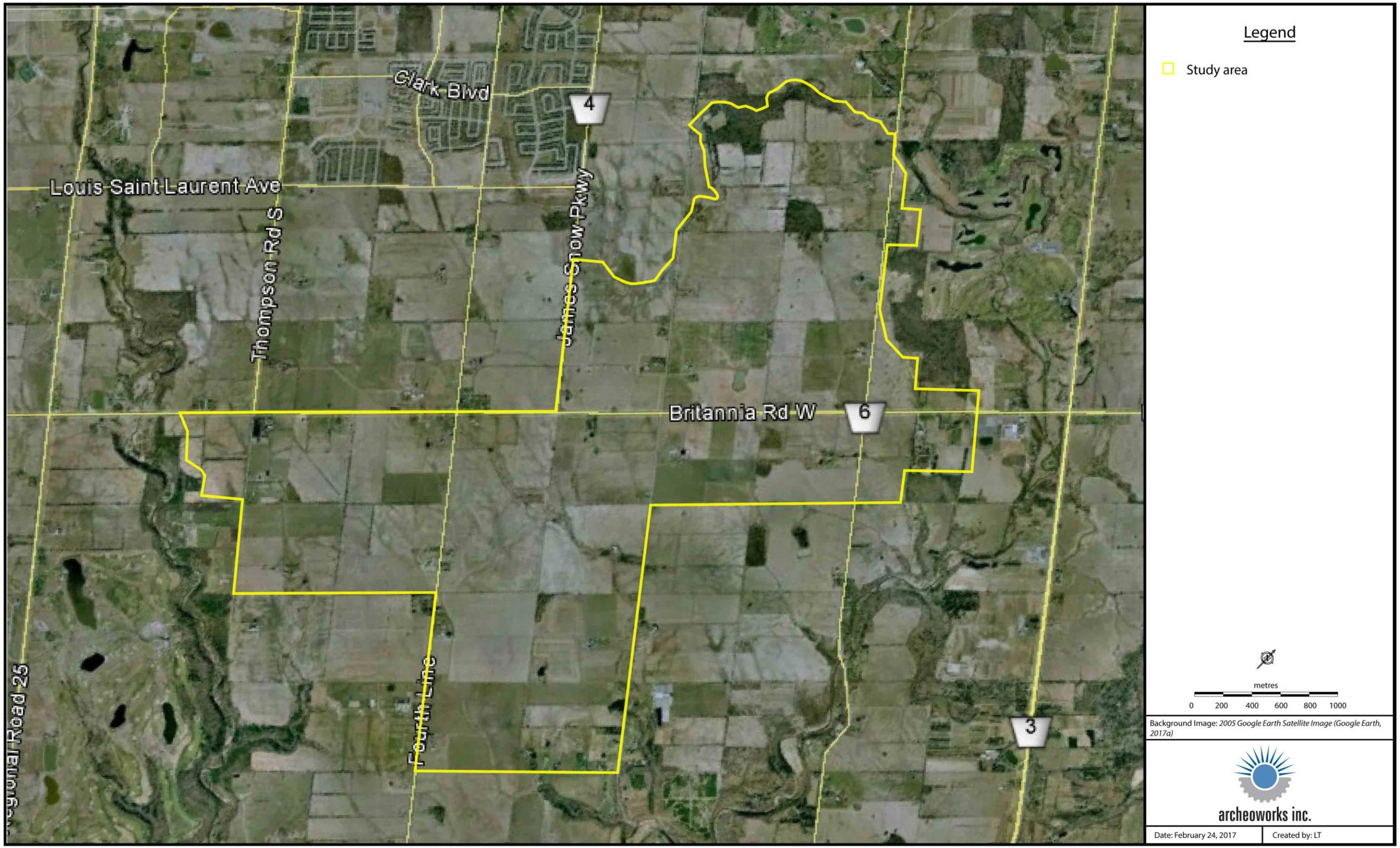
Map 6: Stage 1 AA study area within the Soil Map of Halton County (Ontario Agricultural College, 1971)



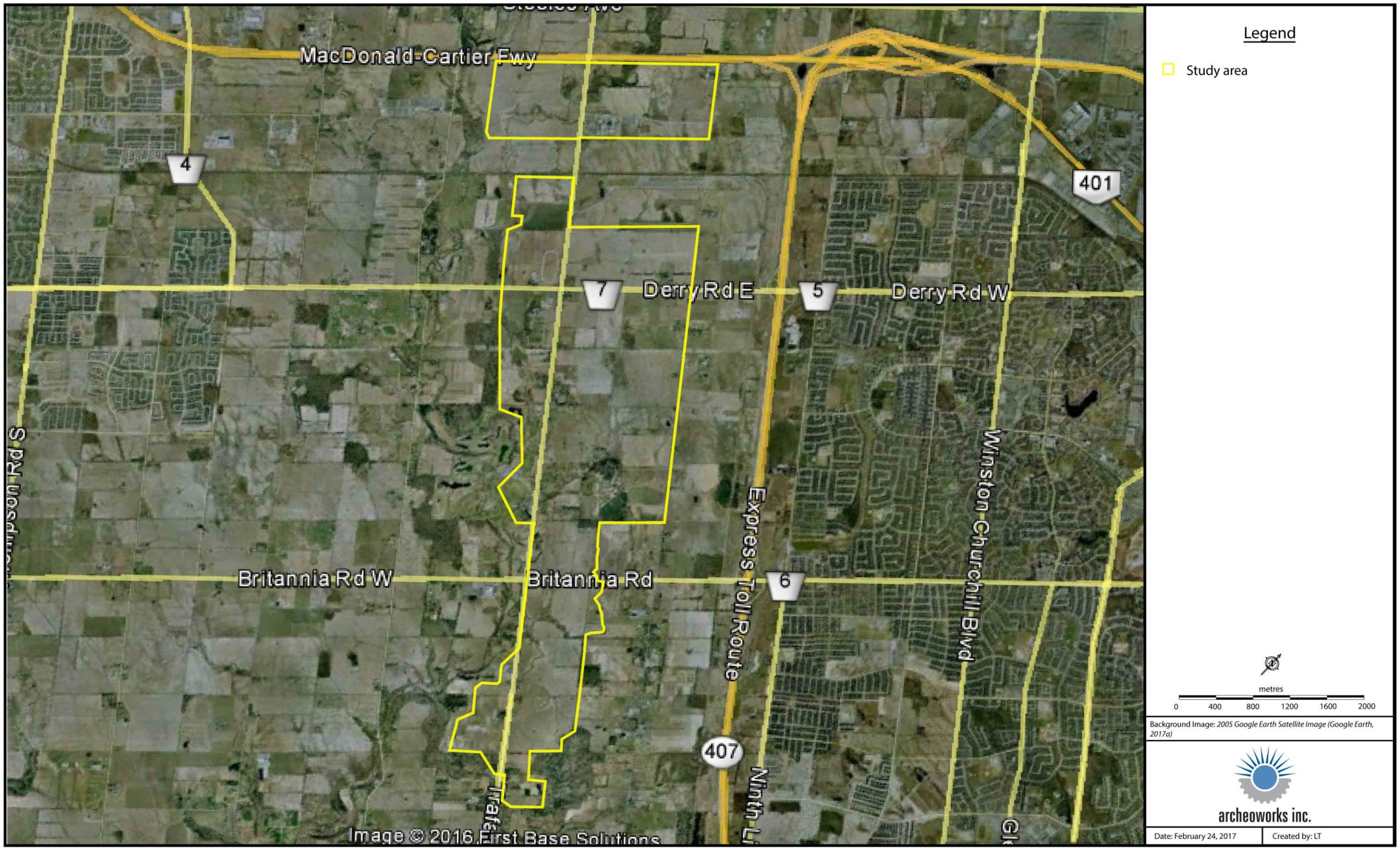
Map 7: West part of the Stage 1 AA study area within a 1954 aerial photograph (Hunting Survey Corporation Ltd., 1954).



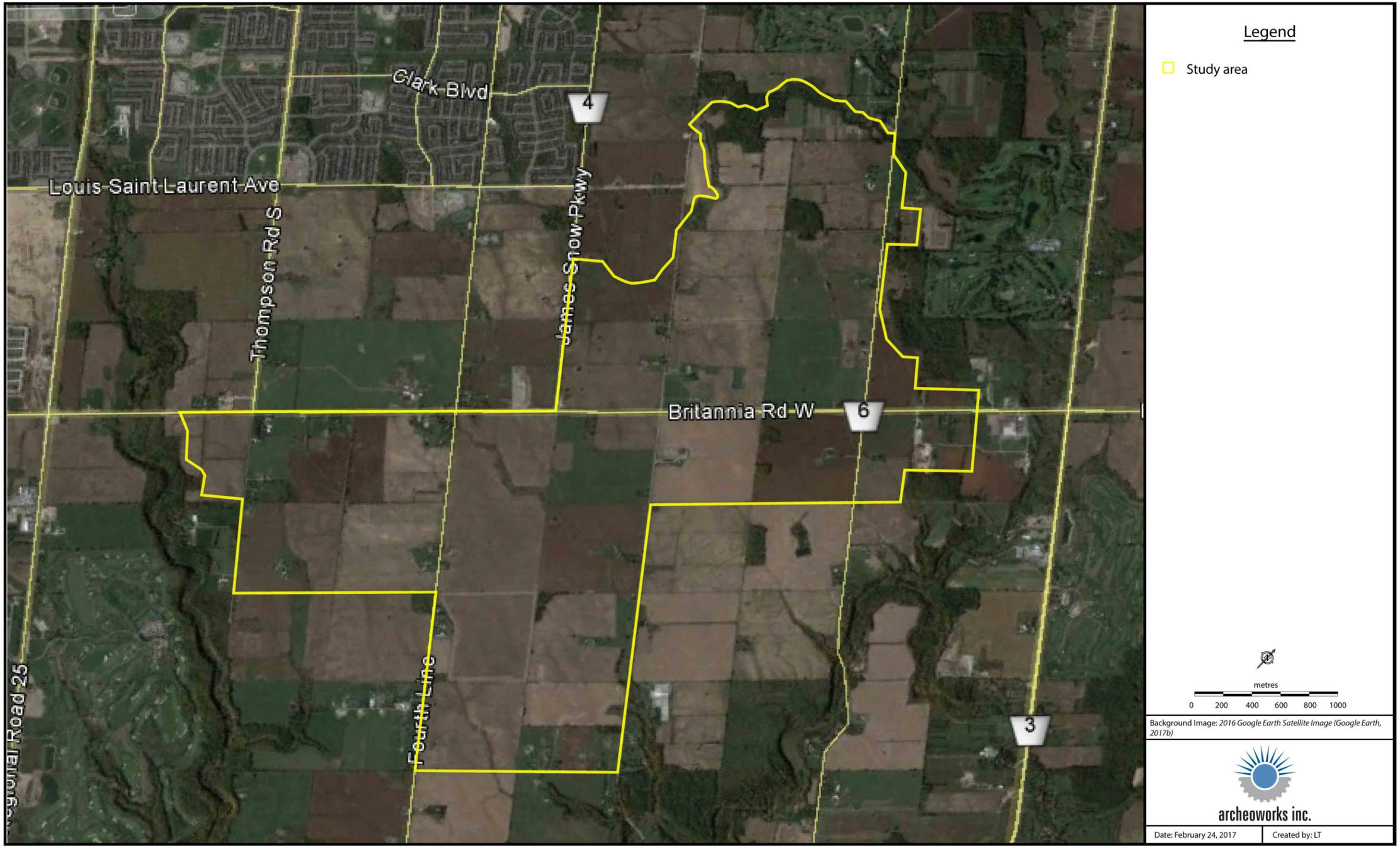
Map 8: East part of the Stage 1 AA study area within a 1954 aerial photograph (Hunting Survey Corporation Ltd., 1954).



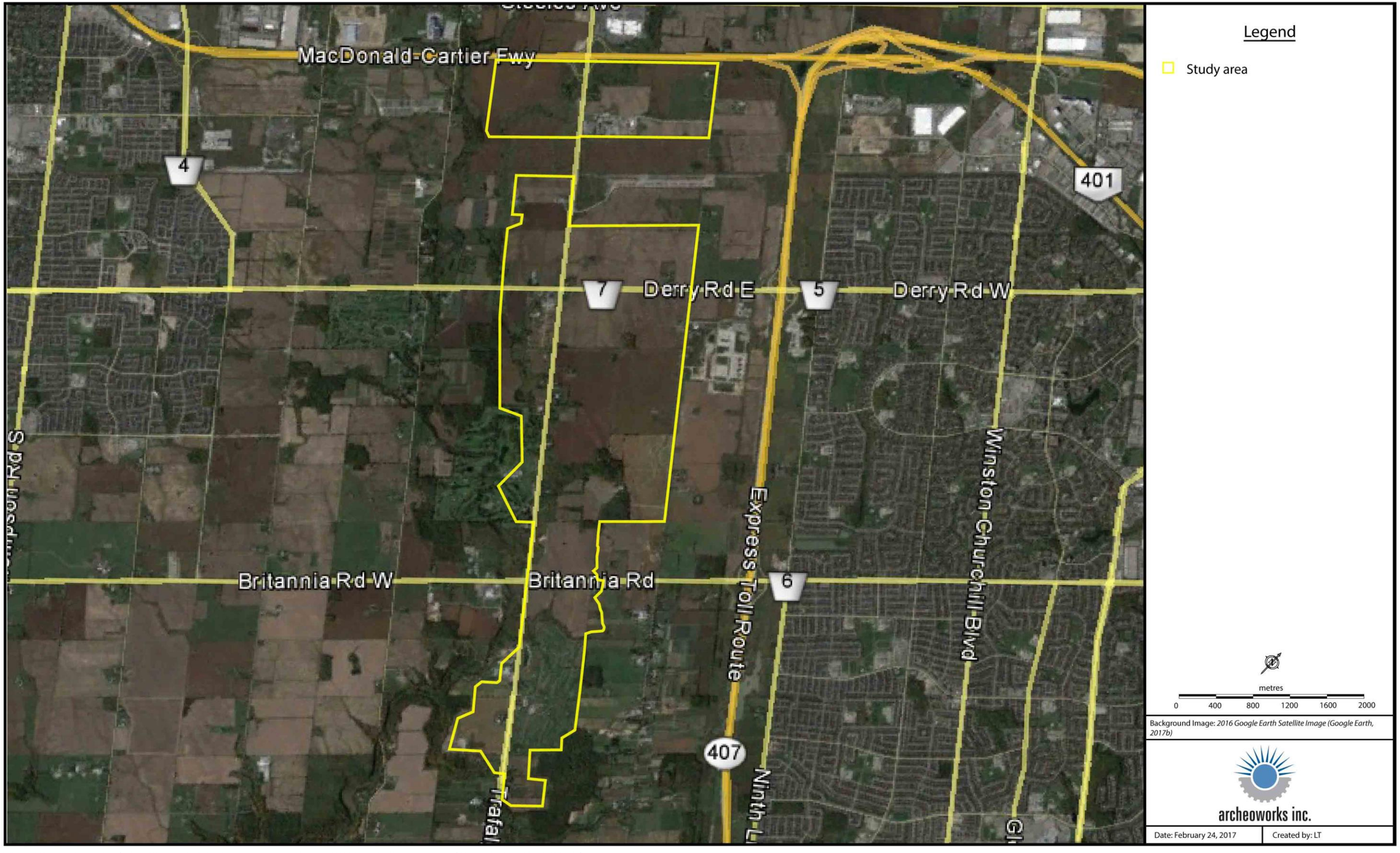
Map 9: West part of the Stage 1 AA study area within a 2005 satellite image (Google Earth, 2017a).



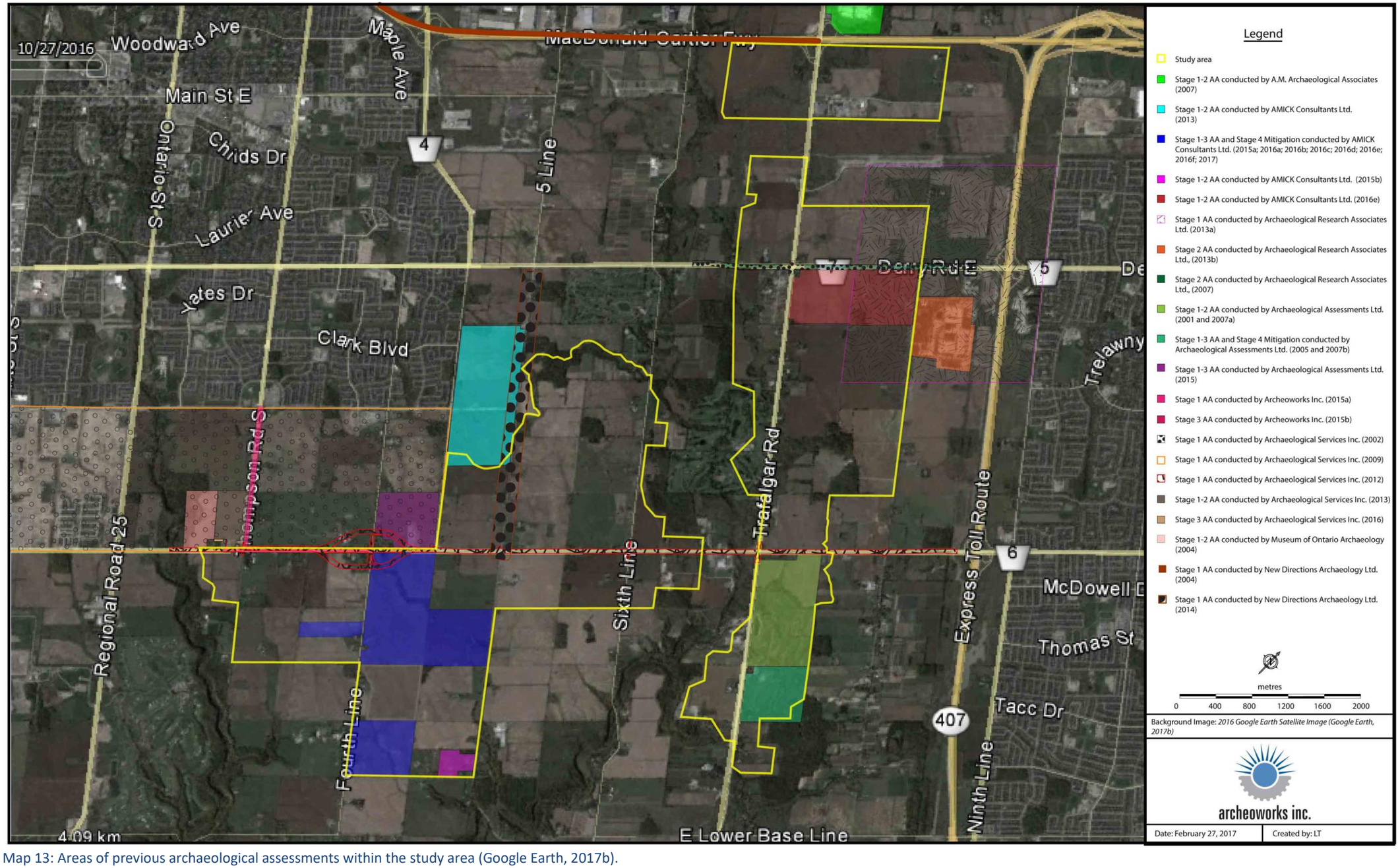
Map 10: East part of the Stage 1 AA study area within a 2005 satellite image (Google Earth, 2017a).



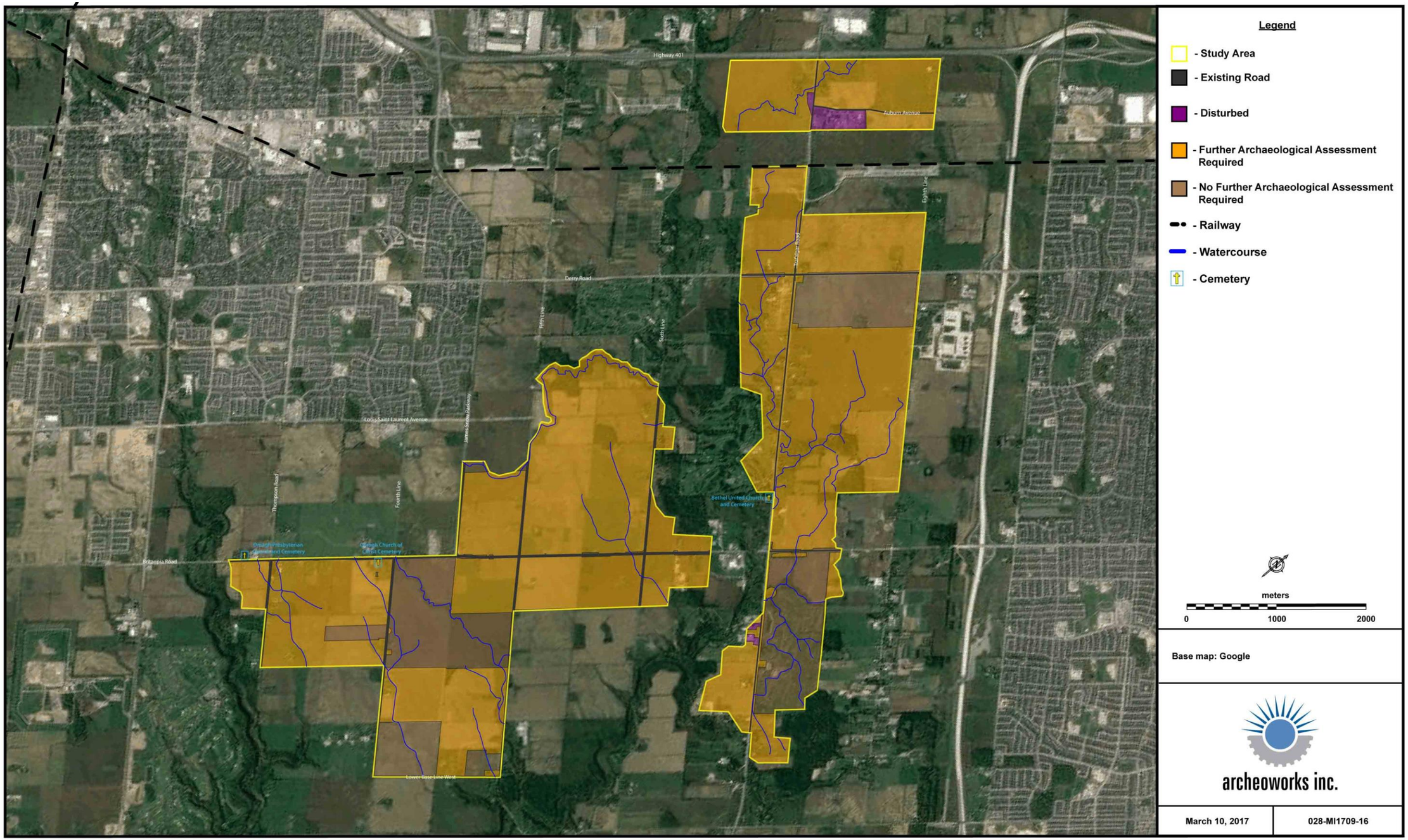
Map 11: West part of the Stage 1 AA study area within a 2016 satellite image (Google Earth, 2017b).



Map 12: East part of the Stage 1 AA study area within a 2016 satellite image (Google Earth, 2017b).



Map 13: Areas of previous archaeological assessments within the study area (Google Earth, 2017b).



Map 14 Stage 1 AA results.

APPENDIX B: SUMMARY OF BACKGROUND RESEARCH

Feature of Archaeological Potential		Yes	No	Unknown	Comment
1	Known archaeological sites within 300 m?	X			If Yes, potential confirmed
Physical Features		**Yes**	**No**	**Unknown**	**Comment**
2	Is there water on or adjacent to the property?	X			If Yes, potential confirmed
2a	Presence of primary water source within 300 metres of the study area (lakes, rivers, streams, creeks)	X			If Yes, potential confirmed
2b	Presence of secondary water source within 300 metres of the study area (intermittent creeks and streams, springs, marshes, swamps)	X			If Yes, potential confirmed
2c	Features indicating past presence of water source within 300 metres (former shorelines, relic water channels, beach ridges)		X		If Yes, potential confirmed
2d	Accessible or inaccessible shoreline (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh)		X		If Yes, potential confirmed
3	Elevated topography (knolls, drumlins, eskers, plateaus, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
4	Pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
5	Distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
Cultural Features		**Yes**	**No**	**Unknown**	**Comment**
6	Is there a known burial site or cemetery that is registered with the Cemeteries Regulation Unit on or directly adjacent to the property?	X			If Yes, potential confirmed
7	Associated with food or scarce resource harvest areas (traditional fishing locations, food extraction areas, raw material outcrops, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
8	Indications of early Euro-Canadian settlement (monuments, cemeteries, structures, etc.) within 300 metres	X			If Yes to two or more of 3-5 or 7-10, potential confirmed
9	Associated with historic transportation route (historic road, trail, portage, rail corridor, etc.) within 100 metres of the property	X			If Yes to two or more of 3-5 or 7-10, potential confirmed
Property-specific Information		**Yes**	**No**	**Unknown**	**Comment**
10	Contains property designated under the Ontario Heritage Act	X			If Yes, potential confirmed
11	Local knowledge (aboriginal communities, heritage organizations, municipal heritage committees, etc.)		X		If Yes, potential confirmed
12	Recent ground disturbance, not including agricultural cultivation (post-1960, extensive and deep land alterations)	X – parts of the study area			If Yes, low archaeological potential is determined

APPENDIX C: INVENTORY OF DOCUMENTARY AND MATERIAL RECORD

Project Information:				
Project Number:	028-MI1709-16			
Licensee:	Jessica Marr (P334)			
MTCS PIF:	P334-0288-2017			
Document/ Material			**Location**	**Comments**
1.	Research/ Analysis/ Reporting Material	Digital files stored in: /2016/028-MI1709-16 - Milton Land Base Analysis/Stage 1/	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers

Under Section 6 of Regulation 881 of the *Ontario Heritage Act*, *Archeoworks Inc*. will, "keep in safekeeping all objects of archaeological significance that are found under the authority of the licence and all field records that are made in the course of the work authorized by the licence, except where the objects and records are donated to Her Majesty the Queen in right of Ontario or are directed to be deposited in a public institution under subsection 66 (1) of the Act."

APPENDIX D

Public Information Centre Presentation Boards

Public Information Session No. 1

South-East Milton Urban Expansion Area
Land Base Analysis & Subwatershed Study

The Town of Milton has initiated a **Land Base Analysis** and **Subwatershed Study** for Milton's future urban expansion area.

What are these studies and what is their purpose?

Land Base Analysis

- This analysis will help us identify key opportunities and constraints to development. It will also inform future secondary planning processes.

Subwatershed Study

- This study will allow us to assess environmental features and functions within the study area so we can provide recommendations for the protection and management of these features, as part of future planned development.
- It will also help with planning for new environmental and stormwater management infrastructure that will be necessary for servicing this area.

TOWN OF MILTON | MALONE GIVEN PARSONS LTD. | amec foster wheeler

Where is the Town of Milton's future urban expansion area?

The Town's future urban expansion area is:

- Located in the southern and eastern portion of the Town of Milton.
- Made up of approximately 1,600 gross hectares (4,000 gross acres).
- Planned for new residential neighbourhoods and employment areas.

These lands were identified by the Region of Halton as part of the approval of Regional Official Plan Amendment (ROPA) #38, and will accommodate population and employment growth from 2021 to 2031.

TOWN OF MILTON | MALONE GIVEN PARSONS LTD.

Why does the Town of Milton need to grow?

Provincial policy

- The *Growth Plan for the Greater Golden Horseshoe (2006)* establishes population and employment forecasts for regional municipalities.
- To accommodate these forecasts, the *Growth Plan* establishes a minimum density target for designated greenfield areas, which includes urban expansion areas.

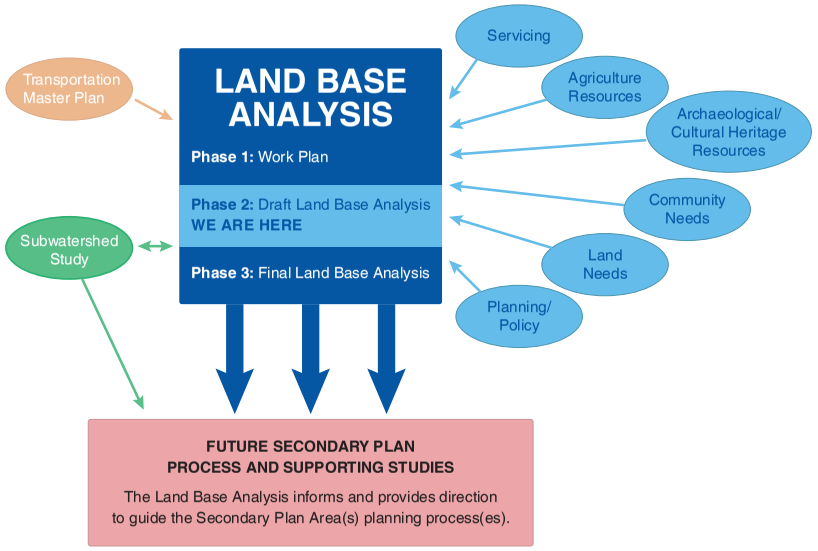
Regional policy

- Halton Region implements the *Growth Plan* through its *Regional Official Plan*, and assigns population and employment growth to the Town of Milton.
- The Town of Milton must plan to accommodate 238,000 people and 114,000 jobs by 2031.
- The Town of Milton is also required to plan for minimum densities (number of people and jobs per hectare) throughout all of its designated greenfield area lands.

Local policy

- The Town must ensure that all applicable provincial and regional land use planning requirements are achieved.
- The Town of Milton is required to identify how this planned growth strategy will be accommodated.

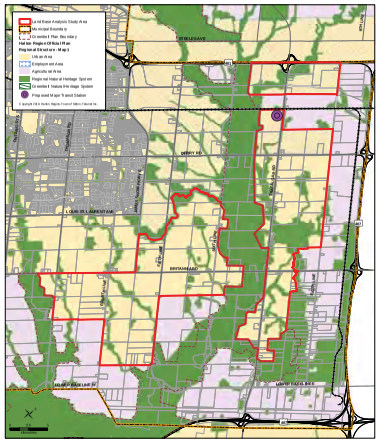
What is a Land Base Analysis?



The purpose of this Land Base Analysis is to:

- Identify key opportunities and constraints to development;
- Assess and estimate the amount and distribution of unconstrained land available for development;
- Assess the feasibility of developing the urban expansion area based on a preliminary assessment of public infrastructure required to create complete communities;
- Define logical secondary plan area(s); and
- Establish an approach to guide phasing for the secondary plan process and future studies.

What do we need to consider when planning for a complete community?



Natural Heritage System

- Regional NHS
- Greenbelt Plan Area

Transportation

- Roads widenings
- Potential transit station
- Commuter rail corridor
- Higher order transit corridor

Planned services

- Water servicing
- Wastewater servicing
- Stormwater management

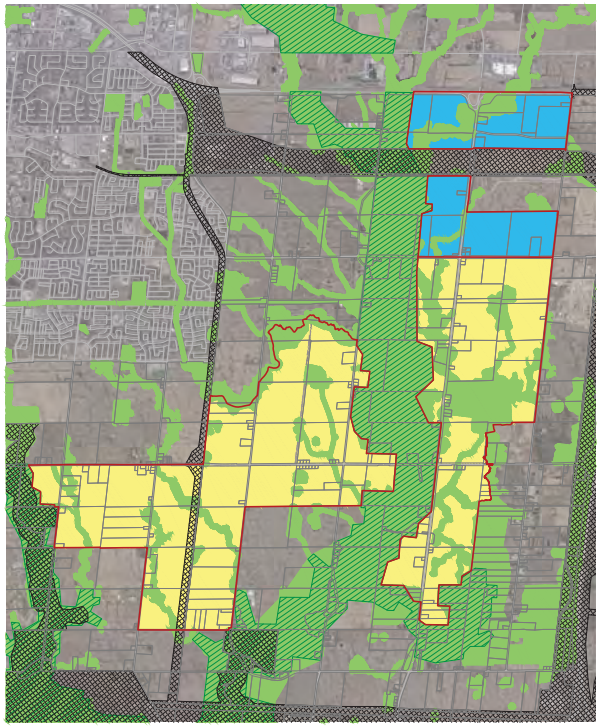
Employment needs

- Variety of employment opportunities

Community needs

- Variety of housing types
- Schools
- Parks
- Recreation centres
- Libraries
- Emergency services
- Places of worship

What are the preliminary findings of the Land Base Analysis?



“Yellow” community areas

- Net developable area* ±1,280 hectares (±3,060 acres)
- Potential population ± 80,000
- Potential jobs ± 19,000

“Blue” employment areas

- Net developable area* ± 290 net hectares (± 710 acres)
- Potential jobs ± 8,000, across a variety of sectors

** net developable area calculations exclude the Provincial Greenbelt Plan Area (hatch), the Regional Natural Heritage System (green) and arterial road widenings (Halton Region).*

How will these new community areas look?

Housing choices

- Singles & semis
- Townhouses
- Apartments
- Live & work

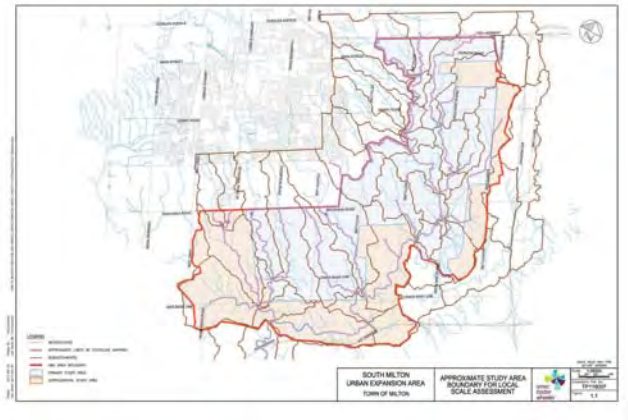
Transportation

- Roads & laneways
- Transit corridor
- Bicycle paths
- Walkways & trails

Community uses

- Schools & parks
- Commercial
- Recreation centres
- Libraries
- Emergency services
- Places of worship

What is a Subwatershed Study?



The purpose of the Subwatershed Study is to:

- Inventory, characterize and assess natural hazard, natural heritage and water resource features and functions within the study area (i.e., constraints to development);
- Provide recommendations for the protection, conservation and management of these natural hazard, natural heritage and water resource features;
- Provide details to support the designation of a Natural Heritage System, through refinement of the current Regional Natural Heritage System; and
- Provide recommendations for a management strategy, implementation and monitoring plan to be advanced through the secondary plans and future site/area specific studies.

The study area for this Subwatershed Study goes beyond the identified urban expansion area and includes subcatchments of the main, east and west branches of Sixteen Mile Creek. The entire study area encompasses approximately 5,260 hectares (13,000 acres).

Where are we in the Subwatershed Study process?

Phase 1 – Background & characterization

WE ARE HERE

Phase 2 – Analysis

Phase 3 – Management strategies

Phase 4 – Implementation & monitoring

Final reports (Phases 1-4)

The Subwatershed Study started in early 2016 and is anticipated to take approximately two years to complete.

The Subwatershed Study is being conducted under the Environmental Assessment (EA) Act provisions to satisfy the requirements of the Municipal Engineer's Association Class EA process.

The study will satisfy Phases 1 and 2 of the Class EA process and any municipal projects recommended as part of the plan will be identified as to their schedule and specific approval/implementation requirements.

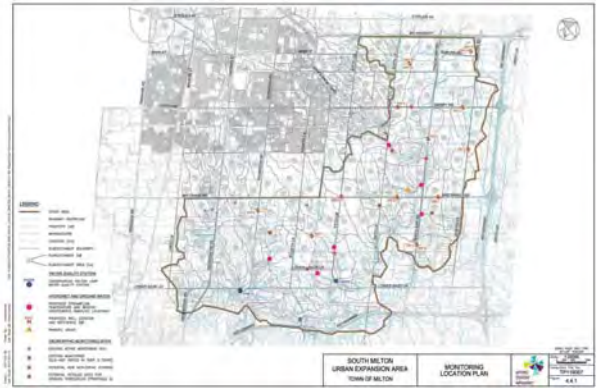
What has the Subwatershed Study looked at so far?

The Town's Subwatershed Study team conducted fieldwork across the study area in 2016 and began a review of all available background information (e.g. studies, mapping, models).

At the end of March 2017, a **Draft Phase 1: Background Review and Characterization Report** was prepared and released to the Steering Advisory Committee, which includes representation from the Town, Region of Halton, Conservation Halton, Ontario Ministry of Natural Resources, and Area Landowners' Group.

- **The Draft Phase 1 Report outlines:**
  - Purpose, objectives, and rationale for the study;
  - Background information reviewed and assessed;
  - Fieldwork conducted in 2016; and
  - Preliminary findings about the following key components:
    - Surface water
    - Groundwater (hydrogeology)
    - Stream morphology
    - Aquatic resources
    - Terrestrial resources

Surface Water



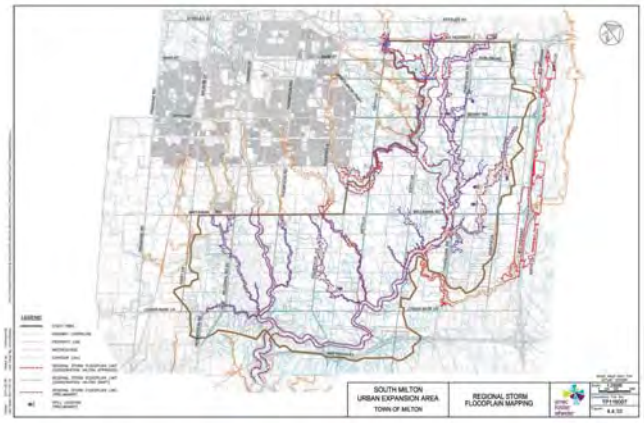
Why do we need to study surface water?

To understand existing surface water runoff potential and to inform the management of creeks and floodplains, as well as any water dependent features (i.e., wetlands and groundwater systems) for future land use conditions.

What work has been conducted so far?

- Installation of six (6) water level gauges and one (1) rain gauge
- Field survey of culverts / bridges (50 +/-)
- Water level / velocity measurements during storms
- Modelling / analysis
  - Hydrologic models were developed for the Sixteen Mile Creek and its tributaries to establish surface runoff conditions for long-term simulation periods and seasonally
  - Hydraulic models were built to better define the depth, velocity, and extent of flood water during storm events including major Regulatory event (Hurricane Hazel)

Surface Water



What are some of the preliminary findings?

- Regional Storm (regulatory) floodplain for the Sixteen Mile Creek and its tributaries established based on minimum 50 ha drainage area.
- In some locations, flat topography coupled with headwater creek channels that lack definition, results in wide floodplains.
- Some existing road and rail crossings lack capacity to convey Regulatory flows causing significant ponding / backwater and / or overtopping of crossings.
- The Regional Storm floodplain is contained within the main branch of the Sixteen Mile Creek valley systems.

Groundwater (Hydrogeology)

Why do we need to study groundwater?

To better understand the relationship between groundwater conditions, the ecosystem, and the use of groundwater for human needs, in order to assess and manage potential changes related to future land use.

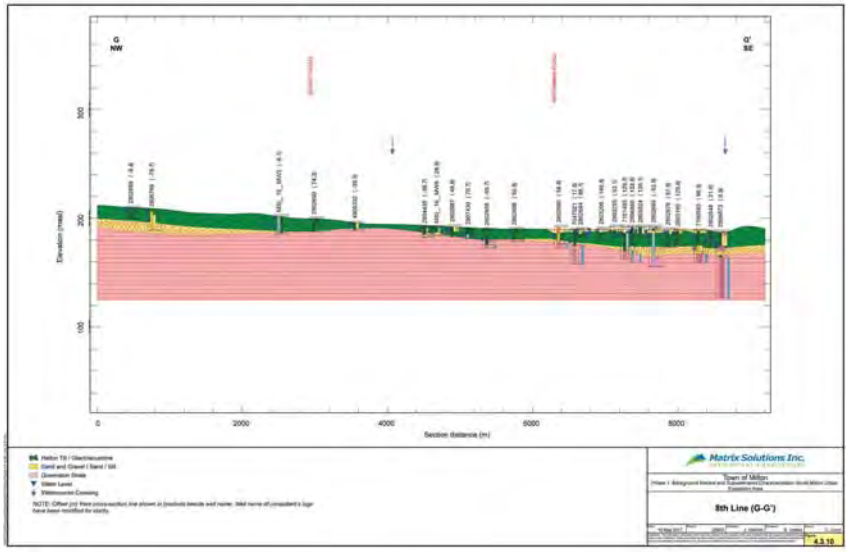
What work has been conducted so far?

- Borehole drilling and monitoring well installation at 11 locations
- Wetland and stream wells at 11 locations
- Groundwater level monitoring at all locations
- Water quality analysis at 10 locations
- Measuring stream flows at 61 locations

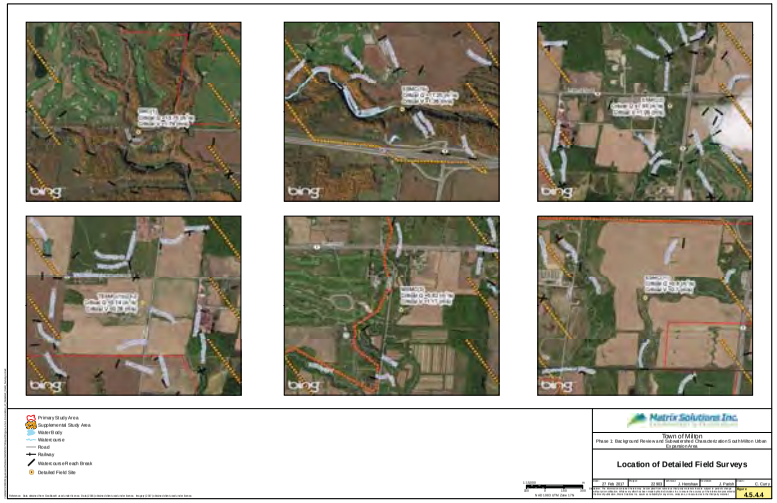
Groundwater (Hydrogeology)

What are some of the preliminary findings?

- The overburden (upper soil layers) mainly consist of clay (till) with some sand. It is generally 10-25m thick.
- The infiltration of water and resulting groundwater flow can be restricted by the clay overburden.
- Groundwater levels are generally within the upper 2.5 meters.
- Groundwater discharge to the stream and wetlands appear to be very limited.
- A shale bedrock valley exists in the study area which controls the deep groundwater flow.



Stream Morphology



Why do we need to study stream morphology?

To understand the existing and historical form (i.e., slope, width, depth, etc.) and function of streams and rivers in order to provide direction on future management practices.

What work has been conducted so far?

- Desktop assessment - background review, reach delineation, historical assessment of land use/watercourse changes
- Field work - rapid assessments, headwater drainage feature assessments, detailed data collection and watercourse survey (6 sites)
- Data analysis - determine erosion thresholds, delineate meander belt and channel migration rates

Stream Morphology

What are some of the preliminary findings?

Majority of watercourses are considered to be “stressed” and exhibit evidence of widening, sediment build-up or channel down-cutting.

SMC(1): Confined watercourse contacting valley slope

ESMC(1b): Watercourse with undermined gabion baskets

MSMC(4): Slow moving watercourse with slumping banks and agricultural land use

TSMC(1)9-1: Valley tributary

ESMC(6): Watercourse with slumping banks and sand deposits

TESMC(2)2-5a: Headwater drainage feature flowing though agricultural field

Aquatic Resources

Why do we need to study aquatic resources?

To determine the amount, type, and quality of aquatic habitat present, in order to provide direction on how best to manage the resource appropriately, under future land use conditions.

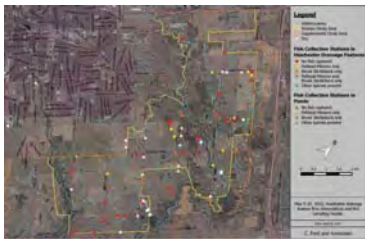
What work has been conducted so far?

- Review of existing information for Sixteen Mile Creek, including primary sources from:
  - Conservation Halton
  - Ontario Ministry of Natural Resources and Forestry
  - Past studies for the Town of Milton
- Field work conducted to determine fish presence/absence and species composition in headwater drainage features (i.e., small open water features upstream of creeks) and in ponds connected to headwater drainage features.

Aquatic Resources

What are some of the preliminary findings?

- Most of the base flow in the permanently flowing branches of the Sixteen Mile Creek comes from north of the respective study areas.
- Permanently flowing branches of Sixteen Mile Creek provide good quality aquatic habitats that support diverse fish communities.
- Threatened Silver Shiner are found in the West Branch and Lower Middle Branch.
- Most of the headwater drainage features are seasonal and do not support fish or have simple fish communities.



Terrestrial Resources

Why do we need to study terrestrial resources?

To document the presence and location of vegetation and wildlife, as well as to characterize and evaluate key features and functions, in order to provide direction on how best to manage these resources under future land use conditions.

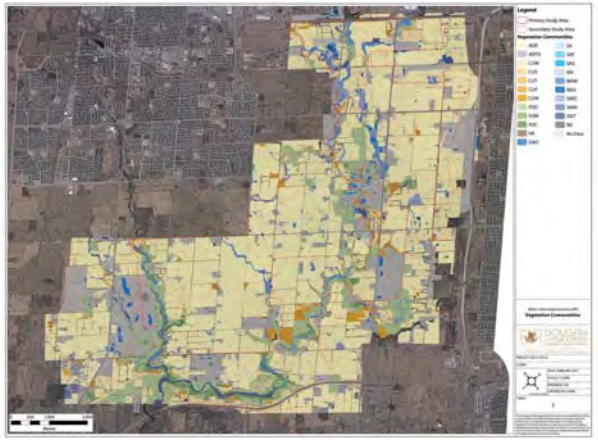
What work has been conducted so far?

- Background review of existing data
- Field investigations
- Environmental Land Classification & Botanical Inventory
  - Nocturnal amphibian call surveys
  - Breeding bird surveys
  - Turtle & snake surveys
  - Odonate (dragonfly and damselfly) & Lepidoptera (butterfly) surveys
- Data management & geomatics





Terrestrial Resources



What are some of the preliminary findings?

- **Vegetation** - 19 vegetation communities (5 provincially rare); 730 vascular plants; 172 significant species
- **Breeding birds** - 117 species* (95 native species & 9 species at risk)
- **Amphibians** - 7 anuran (frogs & toads) species*, including Western Chorus Frog; 1 Spotted Salamander
- **Reptiles (snakes & turtles)** - 4 species* (including snapping turtle
- **Odonates (dragonflies & damselflies)** - 50 species (6 provincially significant species)
- **Lepidoptera (butterflies)** - 33 species* (3 provincially significant species)
- **Winter wildlife** - 15 mammal species*

**denotes species observed*

What are the next steps?

Next steps to complete the Land Base Analysis:

- Delineate logical secondary plan area(s)
- Establish an approach to guide phasing for the future secondary plan process
- Present to Town of Milton Committee of the Whole and Town Council

Next steps to complete the Subwatershed Study:

- Finalize Phase 1 Background Review and Characterization Report
- Analyze study components in an integrated manner (Phase 2)
- Develop targets and management strategies to address potential impacts associated with future development (Phase 3)
- Develop a management strategy and monitoring program to evaluate the effectiveness of the Study's recommendations (Phase 4)
- Present to Town of Milton Committee of the Whole and Town Council; submit to Region of Halton for approval

Future Secondary Plan(s) will:

- Establish the detailed land use plan structure
- Establish policies to create complete, healthy and sustainable communities
- Implement the Region's NHS and the Town's management framework established by the Subwatershed Study

TOWN OF MILTON
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