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ST. MARYS CEMENT (CANADA) INC.

ST. MARYS FLAMBOROUGH QUARRY

AGGREGATE RESOURCES ACT SUMMARY STATEMENT

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ST. MARYS FLAMBOROUGH QUARRY
ST. MARYS CEMENT (CANADA) INC.
ARA Summary Statement

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ST. MARYS CEMENT (CANADA) INC.
St. Marys Flamborough Quarry
Part of Lots 1, 2 and 3, Concession 11,
Geographic Township of East Flamborough
City of Hamilton

Aggregate Resources Act Summary Statement

1.0 INTRODUCTION

This report has been prepared in support of an Application for a Category 2 (Quarry Below Water), Class 'A' licence by St. Marys Cement (Canada) Inc., as required under the *Aggregate Resources of Ontario Provincial Standards,* developed in support of the Aggregate Resources Act.

The report summarizes the information and conclusions of the professionals who have completed the following technical reports in support of the application:

- Hydrogeological Level 2 Technical Report, St. Marys Flamborough Quarry (Gartner Lee Limited (AECOM), February 2009)
- Natural Environment Level 2 Technical Report: St. Marys Flamborough Quarry (Stantec Consulting Ltd. (Stantec) and Savanta Inc. (Savanta), February 2009);
- Hydrological Level 2 Technical Report (Stantec Consulting Limited, January 2009);
- Stage 1, 2 and 3 Archaeological Assessment: Proposed Dolostone Quarry (Archaeologix Inc., June 2004 and December 2004);
- Site Plan and Rehabilitation Plan, St. Marys Flamborough Quarry (Harrington and Hoyle Ltd., February 2009);
- Blasting Impact Assessment: Proposed Flamborough Quarry (Golder Associates Limited, November 2008);
- Quarry Bench Height Evaluation (Golder Associates Limited, November 2008);
- Noise Impact Study, St. Marys Flamborough Quarry (Aercoustics Engineering Limited, February 2009);
- Agricultural Report: Proposed Dolostone Quarry (Stovel and Associates Inc., July 2004); and
- Soil / Agricultural Mapping Update: Proposed Flamborough Quarry (Conna Consulting Inc., July 2008).

The report is intended to supplement the information on the Site Plans, prepared by Harrington and Hoyle (February 2009).

1.1 Approval Process

This report has been prepared in accordance with the Aggregate Resources Act (ARA) which is administered through the Ministry of Natural Resources. The Ministry of Natural Resources (MNR) is responsible for the management of aggregate resources in the province. MNR's mandate includes the protection of mineral aggregate resources and ensuring the continued availability of these resources as close to markets as possible.

The purposes of the ARA include: providing for the management of aggregate resources in Ontario, controlling and regulating aggregate operations, requiring the progressive and final rehabilitation of land from which aggregate has been extracted, and minimizing adverse impacts on the environment from aggregate operations.

A license from MNR is required to operate a pit or quarry on private land in designated areas of Ontario. The process for aggregate licence applications under the Act is laid out in the Aggregate Resources of Ontario Provincial Standards. There are two classes of license: a Class "A" License, which is required where more than 20,000 tonnes of material are to be extracted each year, and; a Class "B" License, which is required where 20,000 tonnes or less are to be extracted annually. The St. Marys Flamborough Quarry has a proposed annual tonnage limit of 3 million tonnes, and is therefore a Class 'A' application. The actual amount extracted in any given year may vary according to market condition.

The projected life of the quarry operations is anticipated to be between 25 and 30 years, allowing for extraction of an estimated total tonnage of 62 million tonnes.

There are also areas of the site which contain marketable deposits of sand and gravel, overlying the limestone bedrock. The unconsolidated (sand and gravel) deposits are predominantly found in the northwest and southwest parts of the site. These deposits are also proposed for extraction.

In addition to the ARA license, Planning Act approvals are required. The municipal development applications include amendments to the (former) Town of Flamborough Official Plan and Zoning By-Law. These applications were submitted in September 2004 by the former owners of the property, Lowndes Holdings Inc., and are currently being reviewed by the City of Hamilton. The City established a Combined Aggregate Review Team (CART) to assist in the review. In October 2008, a supplementary Official Plan and Zoning By-Law Amendment application was submitted by St. Marys for a 10 acre parcel of land which abuts the main property (1869 Millburough Line).

Prior to commencing operations, a Permit to Take Water for dewatering and processing would be required as well as a Certificate of Approval (Air) for the processing facility.

1.2 St. Marys Cement (Canada) Inc.

St Marys Cement Inc. is a leading manufacturer of cement and related construction products in the United States and Canada. Headquartered in Toronto, Ontario, Canada, St Marys Cement Inc. supplies cementitious materials to the Great Lakes Region and is also a significant producer of concrete and aggregates to the Ontario market. St Marys Cement Inc. is a wholly-owned subsidiary of Votorantim Cimentos, an international cement manufacturer based in Sao Paulo, Brazil.

St. Marys also works closely with residents, local community groups and government to minimize the impact of their operations and to address environmental challenges. They support communities in many different ways, including providing employment opportunities and through direct charitable giving.

St. Marys Cement has implemented an ISO 14000 compliant Environmental Management System (EMS) for all of their Canadian operations. St. Marys Cement has earned widespread recognition for their efforts to preserve and enhance the natural environment, and for their innovative site rehabilitation programs.

1.3 Description of Subject Property

As shown on **Figure 1: Location Plan**, the subject lands are located on the north side of Concession Road 11, west of Milburough Line in the former Town of Flamborough, now the City of Hamilton. The lands consist of approximately 158 ha (390 acres) and are located in an area which is rural in nature. Surrounding land uses include a mix of rural residential, agricultural operations (horse farms), and natural areas. There is also estate residential development located to the north and northwest of the site. (see **Figure 2: Air Photo of Site and Surrounding Lands).**

The west-central portion of the property consists of cultivated land separated by treed hedgerows, and the south-central and southwest portions of the property include mixed coniferous and deciduous forest. A Provincially Significant Wetland, the Lower Mountsberg Creek Complex Wetland, occupies the headwaters of tributaries to Mountsberg Creek, and Flamboro Creek, at the north and east portions of the subject lands The extraction footprint generally coincides with the active agricultural fields and some cultural habitats and avoids the wetlands and forest areas. The important natural heritage features are outside of the proposed area of extraction.

1.4 The Proposal

The site is underlain by a significant Amabel dolostone deposit between 27 m and 40 m in depth, and has been designated as a mineral aggregate area. Extraction of this provincially significant resource is planned to produce a close to market supply of high quality crushed stone products. The proposed quarry will be developed in phases, which will be

progressively rehabilitated. Extraction will be below the water table and will require dewatering.

The recommended proposed quarry limits including the proposed entrance road occupy approximately 66.44 ha (43%) of the 158 ha site, leaving approximately 90 ha in an undeveloped and natural state.

The Operations Plan and associated characteristics are described in more detail in this report and in associated Site Plans. Information provided defines the limit of licensing and extraction along with other important elements (i.e. locations of berms, driveway accesses, provincially significant wetland limits). The quarry will be extracted according to four areas or stages. The locations of these areas and the direction of sequencing are depicted on the Operations Plan. (**Figure 3a: Simplified Operations Plan – Phase A; Figure 3b: Simplified Operations Plan – Phases B-E**).

The proposed quarry\ will be progressively rehabilitated. An Adaptive Management Plan will be applied to the initial stage. This plan will consist of compliance and performance monitoring for a variety of parameters. The majority of the perimeter berms, buffers and revegetation will be developed as part of this initial stage. Subsequent quarry stages would be excavated to the full depth warranted and progressively rehabilitated.

1.5 Site Plans

The Site Plans prepared by Harrington and Hoyle Ltd. (February 2009) provide details of existing features, the operational plans (including Phases A – E) (**Figure 3a: Operations Plan Phase A, and Figure 3b: Operations Plan Phase B – E)**, progressive rehabilitation, planned final rehabilitation (**Figure 4: Rehabilitation Plan**) and cross-sections of existing conditions and planned rehabilitation for the site.

2.0 SUMMARY STATEMENT – REQUIRED INFORMATION

The following sections are structured to provide concise information required under the *Aggregate Resources of Ontario Provincial Standard* for a Class A, 'Category 2 Quarry Below Water' Aggregate Resources Act License. Where applicable, the Standard Section Number has been indicated in the sub-title of the relevant section.

2.1 Planning and Land Use Considerations (Standard 2.1.1)

The following summarizes the planning and land use considerations related to the proposed St. Marys Flamborough Quarry.

In September 2004, applications were submitted (by the previous owners, Lowndes Holdings Inc.) for Official Plan and Zoning By-Law Amendments to permit the proposed quarry on the subject lands. The Planning Report prepared by Long Environmental Consultants Inc. (August 2004) provides a detailed overview of the planning justification and rationale for the development proposal, and references the 1997 Provincial Policy Statement, which was in effect at the time of the application submission.

As well, the 2004 municipal applications were amended through a submission to the City of Hamilton in October 2008 to include an additional 10.6 acres of land fronting on Milburough Line, immediately adjacent to lands subject to the original Flamborough Quarry municipal applications. This amendment to the original 2004 municipal applications was accepted as complete by the City of Hamilton on November 20, 2008.

In September 2006 the City of Hamilton adopted the new Rural Hamilton Official Plan. In early January 2009 the Minister of Municipal Affairs and Housing (MMAH) released their Notice of Decision with modifications to the adopted Official Plan. However, at the time of writing this report, the Rural Hamilton Official Plan policies are not in full effect. Accordingly this report references the Region of Hamilton-Wentworth Official Plan and Town of Flamborough Official policies, which are in effect.

There are two amendments that are required under the Planning Act to permit the St. Marys Flamborough Quarry, including:

- An amendment to the Town of Flamborough Official Plan; and
- An amendment to the Town of Flamborough Zoning By-Law.

The subject lands are located on the north side of Concession Road 11, immediately west of Milburough Line and consist of former agricultural land, mixed forest areas, and include components of the Lower Mountsberg Creek Provincially Significant Wetland Complex. The portion of the subject lands proposed for aggregate extraction is 66.4 ha and is currently occupied by agricultural fields and some cultural and natural habitats.

The predominant land uses surrounding the subject property include rural residential development, estate residential development, camping resort, agricultural uses, dog kennel, equestrian training centre (lands owned by St. Marys Cement (Canada) Inc.). Mountsberg Reservoir is located to the northeast of the site. (**Figure 2: Air Photo of Site and Surrounding Lands**).

The proposed quarry has been designed to minimize impacts on surrounding land uses. Technical reports have been prepared to address groundwater and surface water, natural heritage features, cultural heritage features, noise, blasting, and traffic. The technical recommendations have been included in the Aggregate Resources Act Site Plans prepared by Harrington and Hoyle Ltd (February 2009).

The Provincial Policy Statement (1997) has the following policies related to mineral aggregate resources:

> *"2.2.1 Mineral resources (mineral aggregates, minerals and petroleum resources) will be protected for long term use.*
>
> *"2.2.3.1 As much of the mineral aggregate resources as is realistically possible will be made available to supply mineral resource needs, as close to markets as possible."*

These policies help to ensure the protection and confirm the importance of mineral aggregate resources. Further, these policies reflect that the economic value of an aggregate deposit is based not only on the quantity and quality of the deposit, but also how close the deposit is to its final destination.

The proposed St. Marys Flamborough Quarry provides a close to market supply of construction materials to support the forecasted growth in the Greater Golden Horseshoe area. It is anticipated that 75% of the materials produced at the site would be transported northeast into the west part of the Greater Toronto Area. An estimated 10% would be transported northwest, 10% would be transported southeast, and 5% would be transported southwest **(Figure 5: Potential Destinations of Aggregate**).

In the Region of Hamilton-Wentworth Official Plan, the subject lands are designated "Rural Area" and include a "Mineral Aggregate Area" designation overlay on parts of the subject lands (**Figure 6: Region of Hamilton Wentworth Official Plan - 'Mineral Aggregate Areas')**). Part C (Land Use Strategy) of the Regional Official Plan contains policies recognizing the importance of Mineral Aggregates, as follows:

> *"2.2 Mineral aggregates are essential non-renewable resources that should be available with minimal environmental and social disruption. The Provincial Government has expressed its interest in this area through a Policy Statement on Mineral Aggregate Resources. The Region intends to protect and ensure the proper management (including progressive*

rehabilitation) of aggregate resources in concert with the preservation of environmental features and agricultural land."

Lands which are designated "Mineral Aggregate Area" on Map 5 of the Regional Official Plan, such as the subject lands, are to be protected for future mineral aggregate extraction. Policies related to lands designated "Mineral Aggregate Area" include the following:

"*2.2.1 Designate Mineral Aggregate Resource Areas on Map 5, to protect these areas for future mineral aggregate extraction. The location of these areas may be refined, without amendment to this Plan, in Area Municipal Official Plans."*

As shown on **Figure 6**, a portion of the subject lands are designated "Mineral Aggregate Area" in the Region of Hamilton-Wentworth Official Plan. However, as noted in the above policy, the location of Mineral Aggregate Areas may be refined in the Area Municipal Official Plan without amendment to the Regional Plan. Accordingly, an amendment to the Regional Official Plan is not required. While the resource has been identified as an important sand and gravel area rather than as a bedrock area, the policies are applied consistently, without differentiation for different types of significant mineral aggregate resource.

The subject lands are designated "Rural Area" and are identified as "Mineral Aggregate Resource Lands" in the Town of Flamborough Official Plan (**Figure 7: Town of Flamborough Official Plan – 'Mineral Aggregate Areas')**. The identification of the lands as "Mineral Aggregate Resource Lands" provides protection of the lands from incompatible land uses, to provide for the establishment of future extractive operations.

An Official Plan Amendment application is required to redesignate the subject lands from "Rural" to "Extractive Industrial" in the Official Plan. The objective of the Town of Flamborough Official Plan regarding extractive industrial uses is "*to ensure that aggregate extraction occurs with minimal social and environmental effects and that extraction sites are rehabilitated to an after-use which conforms to this Plan*." Official Plan policies related to Extractive Industrial lands include the following:

"*B.7 It is the intent of Council to recognize local, regional and provincial significance of Mineral Aggregate Resources within the Town and to provide for the establishment of extractive operations and their long term protection from incompatible land uses. In this regard, the establishment or expansion of pits and quarries shall require amendment to this Plan and the Town's Zoning By-Law. Further, Council shall encourage the rehabilitation of pits and quarries to an after-use which conforms to this Official Plan."*

B.7.3 The establishment of new pits and quarries or the expansion of existing operations beyond their boundaries as shown on Schedule 'B', shall require an amendment to the Plan and to the Zoning By-Law."

The St. Marys Flamborough Quarry will provide Amabel Dolostone, which is a high quality stone used in construction, road-building and manufacturing.

The EIS and Level 2 Natural Environment Report prepared by Stantec and Savanta (2009) examines significant natural heritage features both on and within 120 m surrounding the proposed extraction site. The report concludes that the important natural heritage features and functions will not be directly affected by the extraction operation. The extraction footprint will displace mostly active agricultural fields and some cultural and natural habitats, without significant effects predicted on functions and features associated with the remaining heavily forested local landscape.

The Mineral Aggregate Resource Area identification for the subject lands (**Figure 7**) is intended to recognize significant aggregate areas in the Town of Flamborough. Section C.5.2 of the Official Plan notes the following with respect to lands identified "Mineral Aggregate Resource Lands":

> "*C.5.2 Uses permitted within the Mineral Aggregate Resource Areas will be restricted to existing uses plus agricultural, open space and conservation and forestry uses which do not involve significant new buildings or structures. Council shall not permit the establishment of uses or activities whose presence would either prevent or conflict with the possible development of a pit or quarry extraction operation".*

The proposal to amend the Town of Flamborough Official Plan to permit the St. Marys Flamborough Quarry conforms with the objectives and policies in the Flamborough Official Plan and is therefore appropriate from a planning perspective.

The St. Marys Flamborough Quarry lands are zoned Agricultural (A) and Conservation Management (CM) in the Town's Zoning By-Law (**Figure 8: Town of Flamborough Zoning By-Law No. 90-145-Z**). An amendment to the Zoning By-Law is required to zone these lands "Extractive Industrial" (EI) to permit the St. Marys Flamborough Quarry. This application has been submitted to the City of Hamilton.

2.2 Quality and Quantity of Aggregate on Site (Standard 2.1.3)

Published Information

Map 2 (West) Selected Sand and Gravel Resource Areas in the *Aggregate Resources Inventory of the Regional Municipality of Hamilton-Wentworth* (ARIP 50), MNR (1984) maps a Selected Sand and Gravel Resource area of secondary significance in the southwestern part of the site. The deposit is mapped as an outwash deposit of between 3 to 6 metres in thickness. On page 16 of the ARIP it states, "*Several small outwash deposits, located in the northeastern part of the township have been selected at the secondary level.*

No subsurface information is available for these deposits, but small possible resources of crushable gravel may be available for extraction. Because of the generally low possible resources of crushable gravel in the region it is important to protect as much of the available material as possible."

Map 3 (West) Bedrock Resources in the *Aggregate Resources Inventory of the Regional Municipality of Hamilton-Wentworth* (ARIP 50), MNR (1984) notes that "*selected Bedrock Resource Area 1 (*which includes the subject property*) consists of the entire extent of the Amabel Formation covered by less than 25 feet (8 m) of drift in the eastern part of the township…The northern portions of Resource Area 1 consist of the well developed massive reefal facies of the Amabel Formation"* (page 21, 1984 ARIP). This is illustrated in **Figure 9: Bedrock Resources (excerpt from ARIP 50)**.

Map 2509 found in the *Ontario Geological Survey Report 255, Quaternary Geology of Hamilton-Cambridge Area* Ministry of Northern Development and Mines (1987) by P.F. Karrow, has mapped three distinct surficial deposit types on the site. The majority of the site is mapped as "Outcrop complex: bouldery till and bedrock ridges", with an outwash gravel deposit in the western part and peat and muck soils in the northern and southeastern areas of the subject site.

Geotechnical Investigations

In 2003 and 2004, John Emery Geotechnical Engineering Limited (JEGEL) was hired by the previous owner to complete a Geological Investigation of the overburden and bedrock on the subject lands. The following methodology is described in the July 16, 2004 report by JEGEL:

The geotechnical and geological investigations consisted of the following components:

GEOTECHNICAL INVESTIGATION OF THE SITE OVERBURDEN:

1. *Various maps and reports were reviewed to obtain general information on the site physiography, surficial geology and soil information;*
2. *Stereoscopic pairs of aerial photographs were examined to identify landforms on the property for field investigation;*
3. *Backhoe excavation equipment provided by the owners was used to dig 39 test pits on the site;*
4. *Each test pit was logged by Zolton Katona, P. Eng., Geological Engineer, JEGEL and, where necessary, samples were obtained from the return pile of the excavated material;*
5. *The samples were submitted to the certified testing laboratory of JEGEL to determine grain size distribution and to test for physical properties;*
6. *Maps of test pit locations; land surface contours and bedrock surface contours were prepared; and*

7. *Based on the surficial and soil information, the site plan, test pit logs and cross-sections, an evaluation of overburden material was undertaken for suitability and usable estimated quantity.*

BEDROCK INVESTIGATION:

1. *Various maps and reports were reviewed to obtain bedrock geology information;*
2. *Core drilling equipment provided by the owners was used to drill twelve boreholes through competent bedrock into the underlying shale; cores core the full length of each borehole were retained in core boxes and stored in a trailer on the site; geological units were identified at each drill site by Zolton Katona, P. Eng.; the cores were also examined for fractures by Jason Down, B. Sc. Environmental Technician, Gartner Lee Limited;*
3. *Cores from each borehole were transported from the proposed quarry site to JEGEL laboratory in Toronto, where they were logged by Zolton Katona, P.Eng., with assistance provided by a JEGEL senior laboratory technician;*
4. *From the twelve cores, five representative sets were selected for quality testing;*
5. *The remaining seven cores, after logging, were returned to storage at the site;*
6. *The borehole logs, the laboratory test results, available technical data and past experience were analysed and conclusions were made regarding the suitability of each sample, as well as each stratigraphic unit for construction aggregate uses; and*
7. *Using the borehole logs, the laboratory test data and the site plan, the potential for aggregate quantity for each rock formation was estimated.*

The following information and conclusions are presented in the 2004 JEGEL report:

The proposed Dolostone Quarry is located close to the eastern edge of a major geological structure known as the Michigan Basin. The erosional boundary of this structure to the east is the Niagara Escarpment, consisting of hard dolostones of the Amabel and Lockport Formations (north and east of Burlington, respectively). These rocks provide the highest quality dolostone in Ontario for the construction industry from quarries, such as the Lafarge Quarry at Dundas and the Dufferin Aggregates Quarry at Milton. The proposed Dolostone Quarry is located approximately halfway between these quarries in the Amabel Formation.

An investigation by JEGEL during the months of October and November 2003, established the average overburden depth at 2.4 m, with a range of 0.0 to 7.9 m, using 39 test pits. This will provide approximately 2.4 million cubic metres of topsoil, sandy gravel and sandy silt till for berms, land forms and progressive rehabilitation.

The laboratory test results and test pit logs indicate that the melt-out/outwash area on the property contains aggregate material which could be used as sub-base aggregate, such as Select Subgrade material and selectively some parts as Granular B, providing that the large boulders are removed or crushed. The petrographic analyses and other physical tests show that the gravel and cobble sized material is of fair quality, and is potentially

capable of producing material suitable for granular uses, but not for concrete or hot mix asphalt paving applications. The bouldery portions of the material may be used as Granular A material, if boulders smaller than 500 mm are crushed and added to improve the overall quality of the crushed sand and gravel. The total area of surficial sand and gravel on the site is over 23 hectares. With an average depth of approximately 3 metres, this would produce approximately 702,500 m^3. This equates to 1,243,500 tonnes of sand and gravel using a standard conversion factor of 1.77 t/m^3. Refer to existing features plan of the site plans for the location of the test pits completed by JEGEL.

Twelve boreholes were drilled on the area of the proposed quarry, to depths varying from 35 to 45 m to establish the rock types, the suitability and quantity of the rock. The boreholes were located at each corner of the site, as well as at the central portion. The rock cores from the boreholes were logged. Five boreholes were tested for physical properties in the certified geotechnical laboratory of John Emery Geotechnical Engineering Limited. Refer to existing features plan of the site plans for the location of the boreholes completed by JEGEL and additional boreholes completed on-site after 2004.

The top layer of the rock assemblage is a high quality Amabel Formation dolostone, at an average thickness of 32.6 m, with a range of 27 to 40 m. The Amabel dolostone can be separated into two levels at about the 270 masl elevation. At the top, there is an average 14 m thick layer, which tends to be somewhat porous and brittle, as some parts are of bioherm reef origin. Below this is an 18.6 m layer, which tends to be denser and harder (being of biostrome reef origin). On the basis of test results and core logs, both layers are acceptable for hot mix paving and concrete aggregate applications. Refer to Appendix E of the JEGEL report for the logs of the boreholes.

The average recovery of the cores was 95.36 percent. The core losses were mainly in the top 14 m, where the Amabel dolostone tends to be more brittle. No karst topography or karst features were detected.

The drilled area covers approximately 120 hectares. Based upon a 100 hectare active quarry, with a 32.6 m average depth of the Amabel dolostone, this deposit contains approximately 32.6 million m^3 of this rock, which could produce approximately 83.6 million tonnes of high quality aggregate, assuming 95 percent recovery.

With the proposed extraction area being 66.44 hectares, an AutoCad calculation of the total volume of rock available is 23,217,135 m^3. This equates to 60,364,500 tonnes using a conversion factor of 2.6 t/m^3 for Amabel dolostone.

The geotechnical investigations confirm that the proposed St. Marys Flamborough Quarry site contains high quality Provincially Significant aggregate resource known as the Amabel Formation Dolostone, which is between 27 and 40 m thick. Based upon the logging of cores and the physical test results undertaken on site, the full depth of the Amabel Dolostone is considered suitable for hot mix asphalt paving, concrete paving and structural concrete for both coarse and fine aggregates. The Amabel Formation is one of the most

consistent sources of high quality aggregates due to its superior hardness, toughness, crushability, workability, and durability.

The proposed St. Marys Flamborough Quarry requires a Class 'A' License through the Ministry of Natural Resources to permit a maximum of 3 million tonnes of aggregate to be removed from the site during any calendar year, on 66.44 hectares of the subject lands. The projected life of the operations is anticipated to be between 25 and 30 years.

Additional information related to quality and quantity of aggregates on site is found in the 2004 JEGEL geotechnical report and Section 1.0 of the Planning Report.

2.3 Technical Reports

The following technical reports were prepared in connection with the proposed St. Marys Flamborough Quarry:

- Hydrogeological Level 2 Technical Report, St. Marys Flamborough Quarry (Gartner Lee Limited (AECOM), February, 2009)
- Natural Environment Level 2 Technical Report: St. Marys Flamborough Quarry (Stantec Consulting Ltd. (Stantec) and Savanta Inc. (Savanta), February 2009);
- Hydrological Level 2 Technical Report (Stantec Consulting Limited, January 2009);
- Stage 1, 2 and 3 Archaeological Assessment: Proposed Dolostone Quarry (Archaeologix Inc., June 2004 and December 2004);
- Site Plan and Rehabilitation Plan, St. Marys Flamborough Quarry (Harrington and Hoyle Ltd., February 2009);
- Blasting Impact Assessment: Proposed Flamborough Quarry (Golder Associates Limited, November 2008);
- Quarry Bench Height Evaluation (Golder Associates Limited, November 2008);
- Noise Impact Study, St. Marys Flamborough Quarry (Aercoustics Engineering Limited, February 2009);
- Agricultural Report: Proposed Dolostone Quarry (Stovel and Associates Inc., July 2004); and
- Soil / Agricultural Mapping Update: Proposed Flamborough Quarry (Conna Consulting Inc., July 2008).

The proposed excavation area and associated berms and access driveway on the subject property is approximately 164.18 acres (66.44 hectares), or 42% of the entire site, with the remainder of the site to remain in a natural state. The site's Amabel Dolostone is between 27 and 40 metres thick, and excavation is proposed to be 34 metres (100 ft) deep. St. Marys is applying for a license under the Aggregate Resources Act for a maximum annual tonnage condition of 3 million tonnes, for an anticipated total tonnage of 61.6 million tonnes. The overburden from the site will be retained and used for the construction of perimeter berms, as well as rehabilitation efforts. The projected life of this operation is 25 to 30 years.

The proposed St. Marys Flamborough Quarry has been designed to minimize impacts on surrounding land uses, including natural heritage features. The technical recommendations made in each report to minimize impacts have been incorporated into the Aggregate Resources Act License Application and Site Plan. The following represents a summary of the technical reports prepared by each specialist.

2.3.1 Hydrogeological Assessment

Gartner Lee Limited (now known as AECOM) completed a Hydrogeological Level 2 Report (February 2009) in support of the proposed St. Marys Flamborough Quarry.

The property has been the subject of a series of geologic and hydrogeologic studies. The studies were initially directed at 'proving' the dolostone resource and subsequently to determine constraints such as overburden thickness and groundwater table conditions that could affect quarry development.

To develop a quarry in the Province of Ontario, the proponent is required to undertake various studies directed at the assessment of the potential effects of the quarry on the natural environment, and on adjacent property owners and the community at large. The assessment of the potential effect of the proposed quarry undertaking on the water resources in the vicinity of the property is one of these studies. The scope of work of this report was developed to obtain the information required to support the applications under The Aggregate Resources Act (Act) and amendments to local Official Plans and By-laws, and considers the Provincial Policy Statement under Section 3 of the Planning Act (March 1, 2005) and the Greenbelt Plan (February 28, 2005).

Quarrying the dolostone will result in an open excavation that will extend below the water table. The hydrogeological assessment undertaken to support St Marys' application to develop a quarry on the subject property has focused on:

a) characterization of the geologic and hydrogeologic setting with the goal of establishing the thickness and water-bearing properties of the overburden and bedrock units, direction and rate of groundwater flow, existing and potential groundwater use, and existing groundwater quality;
b) definition of the existing interrelationship between groundwater and surface water (hydrologic function of the wetland areas);
c) development of a water budget/balance for the area;
d) assessment of the potential effects of quarry development below the established groundwater table on surface water, wetland area, groundwater availability and quality, local groundwater users (residential, commercial and municipal);
e) identification of measures that could be implemented to mitigate the potential effects of quarry development; and,
f) preparation of an Adaptive Management Plan, which when implemented, will sustain the protection of critical ecological features and functions of Mountsberg

and Flamboro Creeks and associated wetland areas, and area groundwater supplies over the operating life of the quarry and beyond.

Major conclusions to the Hydrogeological Level 2 Report are summarized below:

1. The site is gently sloping in all directions from the high point in the central area. There is a layer of overburden soils varying in depth from 0 – 9metres, with an average depth of 2.4 metres.
2. Dolostone bedrock of the Amabel Formation lies directly beneath the overburden soils, with an average thickness of about 34 m. It is a regionally significant aquifer owing to a network of fractures and solution cavities along bedding planes within the rock. Groundwater is extensively used as a source of water supply for residences located in the immediate area. The community of Carlisle located about 3.5 km south of the subject property also draws its supply from high capacity wells installed in the Amabel Formation.
3. Extensive hydrogeological investigation, testing and monitoring carried out at the site has confirmed the hydrogeological properties of the Amabel Formation bedrock beneath the site. There are no consistently identifiable zones across the site, and the bedrock acts as a single aquifer system.
4. The water table beneath the site lies within a few metres of surface, within either the overburden soils or the uppermost part of the bedrock, varying with the local topography and drift thickness across the site. It fluctuates seasonally.
5. The direction of groundwater movement in the shallow and deep portions of the bedrock is to the south.
6. The wetlands associated with Mountsberg Creek, Concession 11 Road East and Flamboro Creek in the northern, southern and southeastern portion of the site, respectively, appear to be seasonally connected to the groundwater table.
7. In general, groundwater quality across the site in the Amabel Formation is characterized as being calcium and bicarbonate enriched with naturally elevated hardness. On average, the Amabel groundwater quality meets the Ontario Drinking Water Standards (ODWS) though a few shallow monitors show elevated nitrate concentrations (exceeding the ODWS). Elevated nitrates are possibly from local agricultural uses. Iron, E. coli and total coliform concentrations were also elevated above ODWS at some of the Amabel Formation monitors.
8. The hydrogeology of the site and its function in the watershed has been reasonably represented using the USGS MODFLOW three-dimensional computer model that incorporates the data from the site investigations, testing and monitoring, as well as other regional data. The model has been calibrated to observed and measured data and has been used to produce a baseline water balance for the site.
9. Quarry dewatering has the potential to lower groundwater levels around the quarry with possible adverse effects on nearby water wells, wetlands, streams and vegetation. A Groundwater Recirculation System (GRS) will be incorporated into the quarry design in order to mitigate these effects, with particular emphasis on the adjacent wetlands which are sensitive to groundwater table fluctuations. The GRS will be designed to recharge precipitation and groundwater seepage back into the groundwater system around the quarry.

10. The GRS will be based on recharge wells installed around portions of the quarry perimeter. Other types of recharge components such as recharge trenches and passive boreholes may also be incorporated into the GRS design as part of an adaptive management plan.
11. The groundwater model demonstrates that the operation of the GRS will contain the effects of quarry dewatering within the perimeter of the GRS. Groundwater levels at wetlands and water wells beyond the GRS can be adequately maintained as a result.
12. The groundwater model also demonstrates that there will be sufficient water available in the water budget for the site to operate the GRS, with a further surplus that can be discharged directly off-site into adjacent receiving streams. Specifically, there will be surplus discharge of water that will be discharged into Tributary C and Tributary D of Mountsberg Creek, and it is noted in the Hydrogeological Level 2 Report that the amount of discharge is not significant considering the volume of summer storm runoff flows observed in these Tributaries, and that both Tributaries appear to be intermittent, are not known to support fish habitat, and likely contribute to limited baseflow to Mountsberg Creek.
13. The overall net effect of the quarry operation on the watershed water balance are negligible, with the additional evaporative losses and other minor consumptive losses associated with the site operation being roughly balanced by the pre-quarry evapotranspirative losses from the agricultural operations.
14. The quarry dewatering zone of influence (i.e., contained on-site within the GRS) will not physically interfere with the zone of influence for the Carlisle municipal water wells. Therefore the yields of the Carlisle wells will not be affected by the quarry.
15. The modeling indicates that the capture zones for the Carlisle municipal wells is actually much smaller than the capture zones presented by the City of Hamilton and does not extend to the St. Marys property. We understand that previous work on these is being re-done by the City of Hamilton. Regardless, once the quarry is in operation these travel zones will not and cannot cross through the quarry since it forms a “sink” in the groundwater system, and the quarry will lie outside of any time-of-travel zones related to the municipal wells.
16. Fuels and lubricants will be handled with normal, reasonable precaution. The site must be operated in accordance with the requirements of the Technical Safety & Standards Act and its associated regulations (incorporating the Liquid Fuels Handling Code). Thus, the risk of groundwater contamination is very low. A Spills Contingency Plan is a mandatory condition of the site license. Furthermore, quarry dewatering places the site under positive hydraulic control at all times, permitting any spills to be contained and managed if necessary.
17. The final lake level for the site rehabilitation will be slightly lower than pre-quarry groundwater table levels along its northern edge. An underground passive barrier wall is proposed along the northern perimeter of the quarry to mitigate any minor drawdown effects that could result in the adjacent Lower Mountsberg Creek wetland. With this in place, the final rehabilitation of the quarry will eventually be

passive (i.e., the GRS can be shut off and put in standby), with no long-term operational liabilities for groundwater management.

18. Adaptive Management Plans (AMP) are proposed for the GRS operation, the direct surface water discharges from the site and the establishment of the final rehabilitation. In each case a program of progressive monitoring and adjustment is set out to meet established goals. The AMP are expected to be refined and finalized in collaboration with the respective public agencies.
19. A comprehensive and integrated program of groundwater monitoring is proposed for the site, along with triggering mechanisms and contingency plans should the monitoring ever identify an unexpected effect.

Major recommendations include the following:

1. Prior to the commencement of extraction at the site, a detailed design and specifications for the GRS shall be developed and submitted for approval in conjunction with applications for a Permit to Take Water and a Certificate of Approval required under the Ontario Water Resources Act.
2. Further consultation shall be carried out with local and provincial authorities regarding the Adaptive Management Plan, and the refined AMP shall be put in place prior to any site operations such that a suitable period of baseline monitoring is established.

The following technical recommendations are relevant to the Site Plans under the Aggregate Resources Act. The Site Plans that have been prepared for this license application (Harrington & Hoyle Limited, 2009) have been reviewed and are consistent with this report.

1. The hydrogeological monitoring program and triggering mechanisms set out in Section 7.1 of the Level 2 Hydrogeological Report (February 2009) shall be implemented.
2. An Adaptive Management Plan shall be developed in consultation with the Ministry of Natural Resources, Ministry of Environment and Conservation Halton, based on the structure set out in Section 6.6 of the Level 2 Hydrogeological Report (February 2009).
3. Water shall be used as a dust suppression agent to the extent necessary to minimize air emissions from the site. Any dust suppression agents necessary to augment the use of water shall be used sparingly, and shall include only dust suppression agents approved by the Ministry of the Environment for this purpose.

2.3.2 Natural Environment Assessment

Stantec Consulting Ltd. (Stantec) and Savanta Inc. (Savanta) completed a Natural Environment Level 2 Technical Report (February 2009) to support an application for a Category 2, Class "A" Below Groundwater Quarry License under the Aggregate Resources Act. The report considers the Provincial Policy Statement under Section 3 of the Planning Act (March 1, 2005) and the Greenbelt Plan (February 28, 2005).

A Level 2 Natural Environment Technical Report is required by the AROPS of the Aggregate Resources Act, if significant natural features exist on and/or within 120m of the site. The report is required to determine the degree of impact on the natural features or ecological functions and propose any preventative, mitigative or remedial measures that may be necessary. As part of the Level 1 background review and Preliminary Level 2 Natural Environment Report (Stantec Consulting Ltd., 2004) prepared for this site, significant natural features were determined to occur either on or within the 120 m surrounding the proposed extraction site. The report provides a detailed examination of the lands proposed for extraction as well as adjacent lands in terms of the potential for environmental effects associated with the proposal. Much data have been gathered since the initiation of technical studies in the fall of 2003, including ground and surface water conditions in and around these lands as well as information about the terrestrial and aquatic biological resources present and relationships amongst these features.

The Level 2 Natural Environment Report includes a description of the proposal, identifies the desktop sources, research and field work methods and analyses used, describes the existing on-site and surrounding environment, identifies and assesses the potential negative impacts of the proposal on natural heritage features and functions, and identifies positive effects of the proposal (enhancement, restoration).

The following were found to be important features and functions that require consideration in the impact assessment component of the Natural Environment Level 2 Technical Report:

- Significant Wetlands;
- Fish Habitat;
- Significant Woodlands;
- Significant Wildlife Habitat;
- Environmentally Significant Areas (ESAs);
- Permanent and Intermittent Streams; and
- Seepage Areas and Springs.

As well, it is noted in the Natural Environment Level 2 Technical Report that habitat of threatened and endangered species are considered, although no significant habitat for these species, as defined by the PPS, was identified on the subject lands or on lands adjacent to the subject lands. Impacts to other non-provincially significant features and functions, such as the provision of habitat for common species, are also assessed in the EIS report.

One provincial species at risk, butternut (endangered) has been recorded on the subject lands. Surveys were conducted for two other provincial species at risk, redside dace and Jefferson Salamander, but they were not found on or in the vicinity of the subject lands. A mitigation program is proposed to conserve butternut on the subject lands, in locations that suit habitat requirements for the species. The intention is to assist in the demonstration of an overall benefit to this species through the implementation of the proposed strategy. The strategies are centred around management planning, transportation and species propagation and enhancement. The intention is to develop a stewardship agreement under Sections 16 and 17 and a species-specific Exemption Regulation of the Endangered Species Act, 2007.

The proposed development limit does not intrude into the PSW as defined, surveyed and confirmed by the MNR. Additionally, the proposed road and berms associated with the Milburough Line access will not intrude into the PSW. In all cases, with the exception of a small encroachment of a berm and the entrance driveway, a minimum 30 metre setback has been included as part of the development limit. There will be no direct displacement of wetland areas within the PSW, and potential groundwater and surface water impacts beyond the quarry footprint will be mitigated. As well, the watercourses with confirmed fish habitat are well buffered from the effects associated with extraction.

As noted in the Hydrogeological Level 2 Technical Report prepared by AECOM (2009), dewatering discharge will be directed to the Groundwater Recirculation System (GRS). There are a number of feasible designs for the GRS with a combination of these proposed for use at the Flamborough Quarry. The net effect of this will be that the drawdown will be largely contained within the area encompassed by the GRS, with drawdown in water levels beyond the GRS minimized and maintained as close to possible to the pre-quarry conditions. The surplus discharge water will be discharged to Tributary C and Tributary D of Mountsberg Creek, and it has been confirmed that the amount of discharge is expected to be small relative to the average flows in the creeks. Further, both Tributary C and Tributary D appear to be intermittent, and are not known to support fish habitat (Stantec Hydrology Report, 2009).

The proposed quarry footprint avoids areas of significant woodland. The Greenbelt Plan allows for mineral aggregate operations in portions of significant woodlands where the habitat is young plantation or early successional. Accordingly, some early successional fringes or woodland projections have been included within the limit proposed for extraction. Some disturbance to the significant woodland will result from the installation of the GRS and the construction of the driveway. Forestry compensation and ecological rehabilitation will be provided to minimize impacts resulting from removal of successional fringe treed areas and disturbance of the significant woodland, and the introduction of a range of open water and other aquatic habitats will increase local biodiversity.

The proposed quarry maintains the significant natural features and functions of the site and limits potential effects on features and functions in the surrounding landscape.

The Level 2 Natural Environment Technical Report recommends the following core elements of the Rehabilitation Plan to ensure protection of significant natural features and functions on site:

- Establishment of shallow wetland shorelines with embayments to optimize nursery and spawning functions and to introduce wetland diversity to the larger open water feature;
- Enhancement / management of existing plantation areas to optimize diversity and restoration towards tolerant hardwoods;
- Butternut tree planting;
- Establishment of open meadow and thicket specifically designed to optimize foraging habitat for butterflies, odonates and pollinators generally;
- Creation of additional wetland features that will provide both hydrological and ecological functions. These will include shallow and deepened compartments to optimize viable amphibian breeding (especially for western chorus frog);
- Bottom draw (colder temperature) release of surplus lake water to receiving streams; and
- configuration of discharge seep/wetland.

With the refinement of these mitigation and rehabilitation measures, the Level 2 Natural Environment Technical Report confirms that there will be no negative impacts of this proposed quarry. As well, there are potential positive effects that can be created through the further refinement and development of the vision for the resultant post-rehabilitation landscape, which includes the creation and use of an open water body and the integration of wetland, aquatic and terrestrial habitats surrounding the water feature, in a manner that will optimize future uses associated with rehabilitation. Also, there are opportunities for the enhancement of local fisheries depending upon further consideration of potential quarry water discharge temperature and quality.

As well, the Level 2 Natural Environment Technical Report recommends that an Adaptive Management Program (AMP) be implemented to achieve specified performance goals including the maintenance of pre-quarry (baseline) seasonal ground water levels, and water temperatures and water quality in adjacent natural features (wetlands and watercourses). The Adaptive Management Program will include hydrogeological and hydrological components, as well as specific ecological considerations. A Butternut Stewardship Agreement will likely be developed separately to address key aspects of the butternut tree on the subject lands. The AMP will consider the management of the pre-extraction, extraction and post-extraction effects. The AMP has become an accepted and important component in the successful operation of an aggregate extraction facility. The report recommends that a Butternut Stewardship Agreement be developed and implemented for this site, including the establishment of a Butternut nursery.

The extraction footprint will displace mostly active agricultural fields and some cultural and natural habitats. The important natural heritage features and functions will not be affected by the extraction operation. Minor amounts of natural forest cover are proposed

for removal, without significant effects predicted on functions and features associated with the remaining heavily forested local landscape.

2.3.3 Hydrological Assessment

Stantec Consulting Limited completed a Level 2 Hydrological Technical Report (January 2009) in support of the proposed St. Marys Flamborough Quarry. The Level 2 Hydrological Technical Report provides baseline information to support the Level 2 Natural Environment Technical Report (Stantec and Savanta, February 2009), as well as the Level 2 Hydrogeological Technical Report undertaken by AECOM (2009).

The subject lands are located within the upper Bronte Creek Watershed. The majority of the site falls within the Mountsberg Creek subwatershed, except for the southeast corner, which is part of the Flamboro Creek subwatershed. A Provincially Significant Wetland (PSW), the Lower Mountsberg Creek Wetland Complex, occupies the headwaters of tributaries to Mountsberg Creek and Flamboro Creek, at the north and east portions of the property.

The headwaters of a tributary of Mountsberg Creek are located in the wetlands in the northern portion of the subject lands, and flow offsite into Mountsberg Creek. The Mountsberg Creek subwatershed includes the settlement areas of Brookville, Carlisle, Darbyville and Moffat and covers an area of 46.7 km^2 within the Bronte Creek Watershed. The Flamboro Creek watershed encompasses an area of 8.7 km^2, originating in the Carlisle North Wetland complex/ESA of the Flamborough Plain and flowing into Bronte Creek downstream of Progreston.

A comprehensive surface water monitoring program was established in September 2005 for both Mountsberg and Flamboro Creek to characterize flows and/or surface water levels on the subject property as well as off site. Continuous flow and temperature monitoring stations were established at several points within the watersheds.

Spring runoff flows surpassing 1 m^3/s were observed in Mountsberg Creek downstream of the Tributary A confluence. Low flows between 0.10 and 0.30 m^3/s were generally observed in the summer and fall, although flows below 0.100 m^3/s were also witnessed at times. Contributions from Tributary A to flows in Mountsberg Creek were generally observed to vary from 0.020 to 0.074 m^3/s during the spring, while prolonged, stagnant flow conditions (flows below 0.010 m^3/s) can predominate in the summer and fall.

Hydrological monitoring data from the hydrologic monitoring program estimates average base flow in Tributary A to be approximately 0.008 to 0.010 m^3/s. Monitoring program results suggest that seasonal groundwater contributions to Tributary A may be as great as 50%. Tributaries B and C are not known to support fish habitat. Both of these tributaries are ephemeral and likely contribute limited base flow to Mountsberg Creek. Flows of 0.002 to 0.014 m^3/s were observed in Tributary D during spring runoff. Summer storm water runoff flows of 0.077 m^3/s were also observed.

Pumping water from the proposed quarry will lower the water table and groundwater levels around the perimeter of the quarry. Without mitigation this drawdown would lead to effects on local natural features. The proposed quarry installation will also lead to changes in the existing surface water catchments where they overlap with the quarry. In addition to altered catchments and contributions of surface flows, the quarry will result in a surface water discharge from the dewatering activities.

The ground and surface water components of the proposed quarry will be the subject of Adaptive Management Programs. These programs are intended to achieve specified performance goals including for example, the maintenance of pre-quarry (baseline) seasonal ground water levels , surface water temperatures and surface water quality in adjacent natural features (wetlands and watercourses). A highly flexible GRS system has been proposed incorporating a wide range of adjustments and refinements that can be implemented as needed. From a surface water perspective meeting these performance goals will result in no contribution to increased flooding or erosion downstream, no contribution to Provincial Water Quality Objectives (PWQO) exceedances, and maintenance of water temperatures and quality in adjacent sensitive stream habitats.

The Adaptive Management Program will recognize the need to adapt surface water monitoring and water resource mitigation to the variable conditions that will be experienced in the vicinity of the subject lands and over the course of the monitoring program. Key components of an Adaptive Management Program include:

- Potential Effects: Development of a conceptual model to describe how quarrying activities and management actions will affect components of the environment.
- Triggers and Management Actions: A management policy that lays out rules specifying management actions (e.g., mitigation measures) based on current information on indicator variables. The development of mitigation measures through engineering and supporting scientific studies is proposed to limit potential impacts of the proposed quarry on local environmental receptors.
- Monitoring Plan: A monitoring plan to observe how the environment responds to aggregate extraction and management actions relative to key indicator variables.
- Management System: A management system which implements the policy (Triggers and Management Actions) and depends on the concurrent observations made on key indicator variables.

A baseline surface water monitoring program has been established for the proposed Flamborough Quarry. From a surface water monitoring perspective, it is expected that the existing surface water monitoring program will become a component of the adaptive management program. The program may be enhanced to a greater level of detail (spatial, temporal or parameters), depending upon the surface water triggers identified. Contingency measures for surface water will also be developed if abnormal environmental conditions occur or mitigation measures do not have the expected effect.

The proposed GRS (AECOM 2009) is intended to mitigate against any changes in the local groundwater levels and their relationship to dependent ecological features. With the successful implementation of the GRS, no negative impacts to the groundwater volume to Mountberg Creek and its tributaries, as well as the Mountsberg Wetland Complex are anticipated. The potential water quality impacts of the proposed quarry dewatering into Mountsberg Creek were assessed using a mass balance approach. The projected increases in alkalinity and conductivity levels as well as zinc concentrations are not projected to have an impact on the habitat quality of Mountsberg Creek. With mitigation, surplus discharge would be substantially reduced. The loss of subcatchment area to Tributary C and Tributary D should not interfere with the function of these ephemeral drainage features, since quarry dewatering during periods of excess runoff will direct surplus water through Tributary C and Tributary D. The 7.5 ha total reduction in catchment area for Tributary A is minimal in comparison to its total drainage area of approximately 3 km^2. Therefore potential impacts resulting from the changes in surface water catchment will be mitigated.

2.3.4 Cultural Heritage Assessment

Archaeologix Inc. completed a Stage 1, 2 and 3 Archaeological Assessment on the subject lands in June 2004 and an addendum report related to additional lands in December 2004. This assessment was undertaken as part of the aggregate pit licensing application in accordance with the Aggregate Resources Act – Ontario Provincial Standards, for a Category 2 – Class A, Quarry Below Water.

The study area is primarily comprised of woodlot and agricultural fields, with some areas of disturbance including the former farm and residential buildings. The Stage 2 field assessment resulted in the identification of four previously unregistered sites, including one find spot of an isolated pre-contact Aboriginal artifact, and three 19th century Euro-Canadian artifact scatters. Due to the limited significance and information potential of the find spot location and one of the artifact scatters which was found to be very diffuse, no additional assessment was recommended for these locations. Additional Stage 3 Assessment was recommended, and carried out, for the other two 19th century Euro-Canadian artifact scatters (A1Gx-241 and AiGx-242) in order to further evaluate their significance and information potential.

The Stage 3 field assessment of these two locations produced a number of mid-19th and early 20th century artifacts. Given the relatively late date of material recovered, it was determined that both AiGx-241 and AiGx-242 have a low degree of significance and information potential, and no additional archaeological assessment was recommended.

2.3.5 Agricultural Assessment and Classification of Proposed Site (Standard 2.1.2)

Stovel and Associates Inc. completed an Agricultural Report for the subject lands in June 2004 and Conna Consulting Inc. completed a Soil / Agricultural Mapping Update for the subject lands in July 2008. The agricultural reporting documents the quality and quantity

of agricultural soils on site and provides a conclusion related to whether the subject lands are considered to be prime agricultural lands in a prime agricultural area.

A soil survey of the subject lands was completed in 2003 in connection with the 2004 Stovel Report, and addendum soil mapping of previously 'not mapped' areas in the Stovel Report were completed by Conna Consulting. The purpose of the soil surveys was to examine and identify the onsite soils and to refine soil capability for agriculture mapping based on the Canada Land Inventory soil classification system. The majority of soils on the subject property were found to have developed from a stony, morainal till deposit. Outwash deposits, lacustrine deposition and organic soils were also identified.

As noted in the 2004 Stovel Report, seven soil series were identified on the site. These soil series include Dumfries, Killean, Lily, Burford, Toledo, Farmington and Muck. The subject land is comprised of Class 2 to 7 soils. There are only 12 hectares of Classes 2-3 soils. The majority of the original area surveyed by Stovel and Associates (approximately 91.2%) is made up of Class 4-7 soils and organic soils. Based on this information, the Stovel Report concludes that the subject lands are not considered to be prime agricultural land, and that given the findings of the soil survey, the subject lands should not be considered to be prime agricultural land in a prime agricultural area, as referred to in the (1997) Provincial Policy Statement. Further, the Stovel Report recommends that rehabilitation to substantially the same area and same average soil quality for agricultural should not be a policy requirement.

The 2008 Soil / Agricultural Mapping Update prepared by Conna serves as an addendum to the Stovel Report and provides soil classification information for approximately 22 hectares of land that were previously 'not mapped' in the Stovel Report (located on Part of Lot 1, Concession 11). The area subject to the addendum is dominated by poorly drained organic soils overlying bedrock. Soils included on these lands are Dumfries, Farmington, Lily, and Brant. The soil capability on these lands ranges from Class 4 to 7 with no Prime Agricultural Land occurring within this area. These lands are predominantly wooded and not in crop production, reflecting this low level soil capability **(Figure 10: Soil Capability for Agriculture**). While the Stovel Report indicated that the majority (91.2%) of the subject property is comprised of Class 4-7 soils (non-Prime Agricultural Land), the mapping of these additional lands would raise that figure slightly, to approximately 92.5% of the entire subject lands being Class 4 to 7, or non-Prime Agricultural Land.

The Conna report concludes that with approximately 92.5% of the entire subject lands comprised of Class 4 to 7 plus organic soil, and the remaining 7.5% comprised of fragmented and scattered pockets of Class 2 and 3 soils, the subject lands, as a whole, are generally not classified as Prime Agricultural Land and are not part of a Prime Agricultural Area within the policy framework of the Provincial Policy Statement and Greenbelt Plan. It is also concluded that agricultural rehabilitation is not feasible in this case because of the proposed underwater extraction and depth of extraction at the site.

2.3.6 Noise Assessment

Aercoustics Engineering Limited completed a Noise Impact Study for the proposed St. Marys Flamborough Quarry in February 2009. The purpose of this study was to provide noise control recommendations in order that the operation of the proposed quarry will satisfy the Ministry of the Environment (MOE) noise guidelines. The first step in the process was to identify the residential receptors in the vicinity where, based on professional experience, there was a potential for the proposed operation to exceed MOE noise limits. Receptors in the vicinity of the proposed quarry have been designated as Class 3 (Rural) receptors.

Based on the description of the proposed quarry operation provided by St. Marys and illustrated in the Site Plan drawings, noise impact predictions were performed. The operations in the noise impact evaluation included drilling, extraction, transportation and processing.

An iterative process of predicting noise impact was performed modeling various noise controls, and discussion occurred with St. Marys staff and the design team to obtain effective and practical controls. The resulting noise controls are presented in the final Noise Impact Study (February 2009). They include extraction directions to utilize the shielding provided by the working face, perimeter berm/barriers, berm/barriers close to equipment, operation time and distance setback restrictions, and other controls. With implementation of these noise controls, the MOE sound level limits will be satisfied.

The Noise Impact Study concludes that with the implementation of the recommended noise controls, the anticipated quarry noise levels will satisfy the MOE sound levels.

2.3.7 Blasting Assessment

Golder Associates Ltd. completed a Blasting Impact Assessment for the proposed St. Marys Flamborough Quarry in November 2008. The report provides an assessment of the potential effects from blasting operations for the proposed quarry, and assesses the potential effects of ground vibration and air vibration levels that could be produced at neighbouring residential and commercial properties, and whether these effects could meet the applicable recommended guidelines set out by Ontario Ministry of the Environment.

The report addresses the following topics:

- Reviews existing provincial and federal guidelines for the assessment of environmental impacts from blasting;
- Provides recommendations for the continued control of ground and air vibration effects;
- Evaluates the potential impact of the blasting operations on bedrock strata and adjacent water wells;

- Evaluates the long term impact of the blasting operations on surrounding structures; and
- Evaluates the impact of ground vibration effects at adjacent Canadian Fisheries waters.

As part of the ongoing blasting operations for the extraction of the proposed quarry, Golder Associates made the following recommendations in their Blasting Impact Assessment:

- The initial series of regular production blasts shall be monitored at a minimum of five locations at varying distances from each blast to confirm that the ground vibration and air vibration attenuation characteristics are within the estimated levels discussed in this report. This would entail establishing monitoring stations between the blast site and neighbouring residents to the west and south during the sinking cut and development of the bench face. The site specific attenuation data developed during this monitoring period shall then be used to better define ground and air vibration effects at the nearest properties.

- Subsequent routine monitoring of all blasting operations shall be carried out in the vicinity of the closest receptor to the proposed blasting operations. As extraction continues within the quarry and blasting operations move, the actual monitoring site shall be routinely and regularly reviewed so that the closest receptor is always being monitored for ground and air vibration effects.

- Blasting shall be scheduled so that it occurs routinely during a specific period of time each day. For example, all blasting may occur during a window of time from 12:00 noon to 2:00 p.m. Whatever window of time is selected by the quarry, this information shall be made available to the neighbouring property owners.

- The minimum blast hole size shall be limited to 114 mm to minimize the potential for holes to wander during drilling a 35 to 38 m bench.

- In the event that the quarry is extracted using a single bench, blast holes shall be periodically surveyed, such as with a Boretrac, to ensure they are being drilled vertically as per the blast design. Only a few holes need to be surveyed in any particular blast. The frequency of the surveys shall be increased if there is evidence of hole deviation but as a minimum the blast holes should be surveyed four times per year.

The Blasting Impact Assessment concludes by noting that the proposed St. Marys Flamborough Quarry can readily be operated within the current quarry blasting guidelines published by the Ontario Ministry of the Environment and Department of Fisheries and Oceans. All blasting and monitoring would occur in accordance with the Aggregate Resources Act prescribed conditions so as to comply with the provincial guidelines.

2.3.8 Quarry Bench Height Evaluation

Golder Associates Limited completed a geotechnical evaluation of the planned bench faces for the proposed St. Marys Flamborough Quarry in November 2008. The report evaluates the stability of the proposed quarry bench faces which are planned as single vertical faces up to 38 m high.

Based on the kinematic analyses carried out using the borehole televiewer data, the risk of both planar and wedge type failures on all four of the main quarry wall orientations has been examined. The risk of wedge-type failures is considered to be relatively low based on the statistical results, however, the frequency and continuity of the joints forming potential wedges will need to be confirmed by mapping of the exposed joints in the interim benches (i.e. during the sinking cuts) during the initial development.

Geotechnical mapping of the exposed interim bench faces during the initial sinking cut will be required to assess the likelihood of encountering joints which would be continuous enough to affect the overall wall stability. If continuous joints are noted in the initial sinking cut, then a benched final face will be required on some or all of the final walls to decrease the size and likelihood of large (full wall height) failures.

Alternatively, if the quarry excavation is designed with between 15 to 20 m high bench faces and a 6m to 8 m catch bench width (i.e. an effective inter-ramp angle of approximately 65 to 75 degrees) the probability of overall, large scale planar failures will decrease significantly (approximately 50% reduction compared to the full face excavation based on the kinematic analysis of the borehole data). The catch bench will also serve to contain small wedge and planar failures from the upper bench as well as raveling type failures due to ongoing weathering and blast damage. There will still be a risk of smaller scale wedge and planar failures at a bench scale, however, this is the case for most quarry faces where there are inclined joints present. These bench scale instabilities would need to be addressed through careful inspections and scaling after blasting.

Stability of final bench faces can be improved through the use of good quality controlled blasting methods and thorough scaling of loose rock from the bench faces after blasting.

2.3.9 Truck Traffic and Main Haulage Routes (Standard 2.1.4)

In 2007, St. Marys Cement retained iTRANS Consulting Inc. to evaluate haul route options for the proposed St. Marys Flamborough Quarry as part of the Official Plan and Zoning By-Law Amendment applications. iTRANS has a thorough understanding of the existing road and rail network and conditions in the area, as well as an understanding of the quarry's operations methodology and anticipated quarry truck traffic distribution.

iTRANS is completing an evaluation of haul routes for the St. Marys Flamborough Quarry, pursuant to the Terms of Reference prepared by Dillon Consulting Limited and adopted by the Combined Aggregate Review Team (CART). The evaluation has been conducted in a systematic manner and is consistent with the requirements of the Ontario Environmental Assessment process. A comparative evaluation has been carried out for the haul routes, involving an assessment of eight major evaluation factors: Aquatic Environment, Terrestrial Environment, Land Uses, Social Environment, Economic Environment, Cultural Heritage, Transportation and Cost. If there is a need to modify roadways along the preferred haul routes to support the project, a formal Class Environmental Assessment may need to be undertaken.

The interim evaluation has been completed which describes the preferred haul routes, associated site access, and respective quarry truck traffic. This interim evaluation is currently pending public comment and agency reviews. A complete technical report will be submitted once the public commenting component is complete. In respect of the pending stages of the study, iTRANS has described the preferred haul routes (**Figure 11: Haul Routes**), associated site access, and respective quarry truck traffic.

While the Haul Route Evaluation is still being finalized, it is believed that the preferred haul routes will encompass some or all of the roadways shown on **Figure 11**. Specifically, as a result of further analysis and public consultation, which is currently ongoing, it is possible that certain sections of roadway may be eliminated, and the preferred haul routes refined. As shown on **Figure 11**, the preferred haul routes currently include Concession Road 11 (between Milburough Line and Highway 6), Centre Road (between Con. Rd. 11 and Campbellville Road), Campbellville Road (between Centre Road and Highway 6), Highway 6, Milburough Line (from Concession Rd 11 to Campbellville Road), Campbellville Road (from Milburough Line to Twiss Road), Twiss Road (from Campbellville Road to Reid Sideroad), Reid Side Road, and Guelph Line (from Reid Sideroad to Highway 401).

The access for the proposed site is located off Milburough Line, just north of Concession Road 11. The necessary entrance permits will be acquired in connection with the final design and development of the quarry.

In the Haul Route Transportation Report (2008), the methodology for determining the number of truck trips per day is documented using the estimated average daily extraction and the average load per truck. The Haul Route Transportation Report summarizes that

there will be an estimated total of 1140 quarry truck trips on a peak day, peak year (570 inbound and 570 outbound). As well, the distribution of the aggregates was estimated by assuming that demand was first met from bordering municipalities that had a surplus and then by municipalities connected by a 400 series highway. The proposed distribution of crushed stone is estimated as follows **(Figure 5)**:

- 75 % will be transported northeast
- 10 % will be transported northwest
- 10 % will be transported southeast
- 5 % will be transported southwest

In order to accommodate the high volume of quarry truck traffic, cross-section improvements along non-provincial route links are recommended by iTRANS. Several design options are being explored, including an urban cross-section that would upgrade the roadway facility for all road users and avoid land acquisition, although there may be other tradeoffs. This detail will be included in the final Haul Route Evaluation.

To conclude, the Haul Route Evaluation is still being finalized and is currently subject to public review and a full technical submission will follow its completion. The preferred haul routes are shown on **Figure 11**, and will be able to accommodate the projected quarry truck traffic with implementation of the recommended road alterations, where necessary.

2.4 Progressive and Final Rehabilitation (Standard 2.1.5)

Applicant's Prior Experience with Rehabilitation

St. Marys Cement Inc. (Canada) has experience doing rehabilitation associated with pond and wetland after uses in their licensed sites which specify similar type of final rehabilitation as the proposed Flamborough quarry. The company has successfully completed pond/wetland rehabilitation of a number of their pits in the London, Aberfoyle and Sunderland areas in Southern Ontario and has received awards from the industry for the progressive rehabilitation completed in their licensed properties. On July 9, 2008, St. Marys Cement Inc. (Canada) was presented with the "Award of Excellence" by the Ontario, Stone, Sand & Gravel Association in recognition of their commitment to continued progressive rehabilitation, property enhancement and community relations at their Aberfoyle pit in the Township of Puslinch.

Description of Proposed Rehabilitation Plan

Harrington and Hoyle Ltd. have completed a detailed Progressive and Final Rehabilitation Plan for the proposed quarry development (February 2009) (**Figure 4**). The site plans show areas to be extracted will be progressively rehabilitated to a use that compatible with the surrounding land uses and the natural features on-site and on the adjacent lands. The proposed final rehabilitation consists of pond (59.27 ha), naturalized area (7.17 ha) and enhanced areas outside the extraction area (0.53 ha) for a total of 66.97 hectares.

The key characteristics of the proposed rehabilitation program include creation of a new, deep open water feature with open water fishery functions, establishment of shallow wetland shorelines, creation of specialized cliff habitat for nesting birds and other wildlife, establishment of areas of open meadow and thicket specifically designed to optimize foraging habitat for butterflies and odonates, and introduction of new amphibian breeding pools.

Where ecological restoration is proposed (e.g., meadows along berms), a variety of guiding principles can be applied to optimize outcomes.

All existing available topsoil and overburden will be stripped in the initial start up phases and stockpiled separately in perimeter berms as shown on the operational plans. On completion of the perimeter berms specified on the plans, on-site overburden stripped in Areas 3 and 4 will be used for slope rehabilitation of the north faces in Areas 1 and 2 and shoreline restoration. Acoustic berms required to attenuate noise and/or for visual screening of the site will remain in place for each phase as specified on the site plans until removed and used for rehabilitation of the site.

Side slopes will be constructed at a 2:1 slope and may be built from overburden materials, waste or off-spec rock found on site or with off-site clean inert fill imported for this purpose. Any soil imported for rehabilitation purposes will meet MOE's Table "1" as per MNR's revised policy no. AR 6.00.03. The rehabilitation also proposes to leave exposed sections of the quarry face for wildlife habitat diversity, as shown on the rehabilitation plan of the site plan. The proposed extraction and rehabilitation will facilitate both maximum resource utilization as well as timely progressive rehabilitation of the property. Reference should be made to notes on site plans for details of the progressive and final rehabilitation of the site including the planting of upland tree species and shoreline restoration work.

Rehabilitation of ponds/wetlands will include the following as noted on the site plans:

a) deep areas of open water as well as shallow and wide near-shore zones (wetlands);

b) the edges of the wetlands will be sculpted to lengthen the shoreline for enhancing biological diversity and productivity;

c) underwater habitat enhancement will employ logs, stumps and rock (see typical shoreline habitat details) and

It is intended that the subject lands will remain in a natural state, post-extraction. The lake is proposed to be part of a passive, private green space. From a natural heritage perspective, the rehabilitation plan intends to ensure ecological features and functions are optimized in the context of the local landscape. The proposed Rehabilitation Plan is well suited for conservation, recreation and educational opportunities, and is compatible with the objectives and vision for the Rural Area.

2.5 Site Plan Conformity with the Greenbelt Plan

The St. Marys Flamborough Quarry lands are comprised of lands identified in the Greenbelt Plan as Protected Countryside and Natural System. The proposed quarry and extraction activities are located entirely in the Protected Countryside designation. The Plan provides for a diverse range of social and economic activities including resource uses.

A review of the policies in the Greenbelt Plan confirms that the St. Marys Flamborough Quarry Site Plans conform to the Greenbelt Plan. This is confirmed as follows:

> *"4.3.2.3 Notwithstanding the Natural System policies of section 3.2 of this Plan, within the Natural Heritage System, mineral aggregate operations and wayside pits and quarries are subject to the following:*
>
> *a) No new mineral aggregate operation and no wayside pits and quarries, or any ancillary or accessory use thereto will be permitted in the following key natural heritage features and key hydrologic features:*
> *i. Significant wetlands;*
> *ii. Significant habitat of endangered species and threatened species; and*
> *iii. Significant woodlands unless the woodland is occupied by young plantation or early successional habitat (as defined by the Ministry of Natural Resources). In this case, the application must demonstrate that the specific provisions of policy 4.3.2.5 (c), (d) and 4.3.2.6 (c) have been addressed, and that they will be met by the operation;"*

The proposed aggregate operation (extraction footprint) is located outside the following features, with appropriate extraction setbacks or buffers as shown on the plans to protect them:

i) the provincially significant wetlands on site;
ii) any significant habitat of endangered species and threatened species (Butternut trees occur on site within the extraction area and a stewardship agreement is proposed for this site. This will include the establishment of a nursery to propagate healthy trees and a reintroduction planting program);
iii) significant woodlands (the Greenbelt Plan allows for aggregate operations in portions of significant woodlands where the habitat is young plantation or early successional). Some early successional fringes or woodland projections have been included within the proposed development (also see rehabilitation plan and reforestation areas).

"4.3.2.3 b) An application for a new mineral aggregate operation or new wayside pits and quarries may only be permitted in other key natural heritage features and key hydrologic features not identified in 4.3.2.3 (a) and any vegetation protection zone associated with such other feature where the application demonstrates:

i. How the Water Resource System will be protected or enhanced; and

ii. That the specific provisions in 4.3.2.5 (c), (d) and 4.3.2.6 (c) have been addressed, and that they will be met by the operation; and

c) Any application for a new mineral aggregate operation, or the expansion of an existing mineral aggregate operation shall be required to demonstrate:

i. How the connectivity between key natural heritage features and key hydrologic features will be maintained before, during and after the extraction of mineral aggregates;

ii. How the operator could immediately replace any habitat that would be lost from the site with equivalent habitat on another part of the site or on adjacent lands; and

iii. How the Water Resource System will be protected or enhanced."

The Water Resource System will be protected or enhanced by maintaining appropriate setbacks from the hydrologic features, including key hydrologic features such as the Mountsberg and Flamboro creeks and their tributaries, provincially significant wetlands on and adjacent to site and the seepage areas and springs noted on site, and by implementing the GRS system.

Connectivity between key natural heritage features and key hydrologic features will be maintained before, during and after extraction of aggregates on site. As shown on the Site Plans, the key natural heritage and hydrologic features will remain outside of the extraction footprint of the proposed quarry.

Any habitat for the Butternut trees that is lost from the site is replaced with equivalent habitat on another part of the site as shown on the plans.

"4.3.2.4 The Ministry of Natural Resources will pursue the following under the Aggregate Resources Act, for all mineral aggregate operations, including wayside pits and quarries, within the Protected Countryside:

a) Rehabilitated area will be maximized and disturbed area minimized on an ongoing basis during the life-cycle of an operation;

b) Progressive and final rehabilitation efforts will contribute to the goals of the Greenbelt Plan;

c) The Ministry of Natural Resources will determine the maximum allowable disturbed area of each mineral aggregate operation. Any

excess disturbed area above the maximum will be required to be rehabilitated. For existing operations this shall be completed within 10 years of the date of approval of the Greenbelt Plan, and 50% completed within six years. For new operations, including expansions, the total disturbed area shall not exceed an established maximum allowable disturbed area; and

d) An application for a mineral aggregate operation or wayside pits and quarries may be permitted only where the applicant demonstrates that the quantity and quality of groundwater and surface water will be maintained as per Provincial Standards under the Aggregate Resources Act.

Rehabilitation will be maximized within the proposed licensed property.

Rehabilitation within extraction area	57.27 ha (open water) 2.00 ha (wetlands) 2.73 ha (naturalized) 4.44 ha (reforestation)
Rehabilitation outside extraction area	0.30 ha (reforestation) 0.23 ha (wetlands)

The disturbed area is minimized on an ongoing basis during the life-cycle of the quarry. Specifically, stripped topsoil and overburden in the initial phase will be stored in acoustic berms for future rehabilitation. The site is divided into four areas and the extraction/rehabilitation phasing diagrams on the operational plan of the Site Plans show where stripped topsoil and/or overburden not stored in berms will be used directly for the progressive rehabilitation of depleted areas of the quarry, as soon as possible.

Because the quarry will be dewatered until all of the extraction is complete, an interim rehabilitation of the side slopes is proposed. The site will be graded, topsoiled, and planted with a nurse crop, allowing a natural meadow community to form. This will be maintained until the extraction is complete and the excavation fills to create the final lake. When this occurs, the shoreline wetlands will be planted to complete the final rehabilitation.

The maximum allowable disturbed area on the site will be 45 ha.

Progressive and final rehabilitation efforts will contribute to the goals of the Greenbelt Plan through the following measures:

- by rehabilitating the site to a state of equal or greater ecological value;
- long-term ecological integrity will be maintained or restored, or improved for the entire site;
- the health, diversity and size of key natural heritage features and key hydrologic features will be maintained or restored and improved to promote a net gain of ecological health; and

- aquatic areas remaining after extraction are being rehabilitated to aquatic enhancement which is representative of the natural ecosystem in the area.

The following specific rehabilitation is shown and noted on the site plans:

- formation of a new, deep open water feature with open water fishery functions
- establishment of shallow wetland near shore shorelines with embayments to optimize nursery and spawning functions and use of woody debris-branches, tree trunks, stumps, logs, boulders, etc. for habitat creation, physical diversity and wetland diversity to complement the larger open water feature
- vertical cliff faces and habitat creation for nesting birds and other wildlife
- Tree planting of 0.30 ha of open areas with indigenous deciduous forest species to close some existing forest gaps
- Establishment of areas of open meadow and thicket specifically designed to optimize foraging habitat for butterflies and odonates
- Construction of a small wetland south of extraction area
- The final rehabilitation plan was developed to maintain groundwater and surface water flows (quality and quantity) to the provincially significant wetlands, seeps, springs and the watercourses and their tributaries.
- The final rehabilitation intends the site to remain in a natural state as part of a passive, private green space that will be compatible with the adjacent land uses and natural features in the area

3.0 CONCLUSIONS

This Report provides the planning summary information related to the proposal to develop a portion of a 158 ha parcel of land for the St. Marys Flamborough Quarry. The municipal development applications that have been submitted include amendments to the (former) Town of Flamborough Official Plan and Zoning By-Law. The total lands consist of approximately 158 ha (390 acres) and are generally located north of 11th Concession Road, west of Milburough Line in the former Town of Flamborough, now City of Hamilton.

This Report has been prepared in accordance with the Aggregate Resources Act (ARA) which is administered through the Ministry of Natural Resources. The Ministry of Natural Resources (MNR) is responsible for the management of aggregate resources in the Province. MNR's mandate includes the protection of mineral aggregate resources and ensuring the continued availability of these resources as close to markets as possible. The proposed St. Marys Flamborough Quarry requires a Class 'A' License to permit a maximum of 3 million tonnes of aggregate to be removed from the site during any calendar year, on 66.44 hectares of the subject lands.
Applications for a Class "A" license must meet the requirements of the Aggregate Resources of Ontario Provincial Standards (AROPS). Each application category includes Site Plan Standards, Report Standards, Prescribed Conditions, and Notification and

Consultation Standards. This Report has been prepared in accordance with the Aggregate Resources of Ontario Provincial Standards. The application to develop the subject lands for the St. Marys Flamborough Quarry is supported by the following technical studies:

- Hydrogeological Level 2 Technical Report (Gartner Lee Limited (AECOM), (February 2009)
- Level 2 Natural Environment Technical Report (Stantec Consulting Ltd. (Stantec) and Savanta Inc. (Savanta), February 2009);
- Level 2 Hydrological Technical Report (Stantec Consulting Limited, January 2009);
- Stage 1, 2 and 3 Archaeological Assessment (Archaeologix Inc., June 2004 and December 2004);
- Site Plan and Rehabilitation Plan (Harrington and Hoyle Ltd., February 2009);
- Blasting Impact Assessment (Golder Associates Limited, November, 2008);
- Quarry Bench Height Evaluation (Golder Associates Limited, November 2008);
- Noise Impact Study (Aercoustics Engineering Limited, February 2009);
- Agricultural Report (Stovel and Associates Inc., July 2004); and
- Soil / Agricultural Mapping Update (Conna Consulting Inc., July 2008).

The proposed St. Marys Flamborough Quarry represents wise resource management and use, and achieves the intent and purpose of the Provincial Policy Statement, and conforms to the Region of Hamilton-Wentworth Official Plan. The proposal requires amendments to the Town of Flamborough Official Plan and Town of Flamborough Zoning By-Law to redesignate and rezone the lands to permit aggregate extraction, and requires a Class 'A' License to permit a maximum of 3 million tonnes of aggregate to be removed from the site during any calendar year, on 66.44 hectares of the subject lands.

With the investigation and planning undertaken in support of the extraction and rehabilitation of this site, we are confident that the site plans, as prepared, adequately address and mitigate any potential adverse impacts of the proposed operation on the surrounding land uses and on-site natural features, while maximizing the utilization of the aggregate resources and the after use potential of the property. Based on the excellent track record of St. Marys in operating and rehabilitating their aggregate properties, we believe that the application for this quarry should be approved.

Respectfully Submitted,

Glen A. Schnarr, MCIP, RPP

Karen A. Bennett

Karen A. Bennett, MCIP, RPP

February 12, 2009

Date

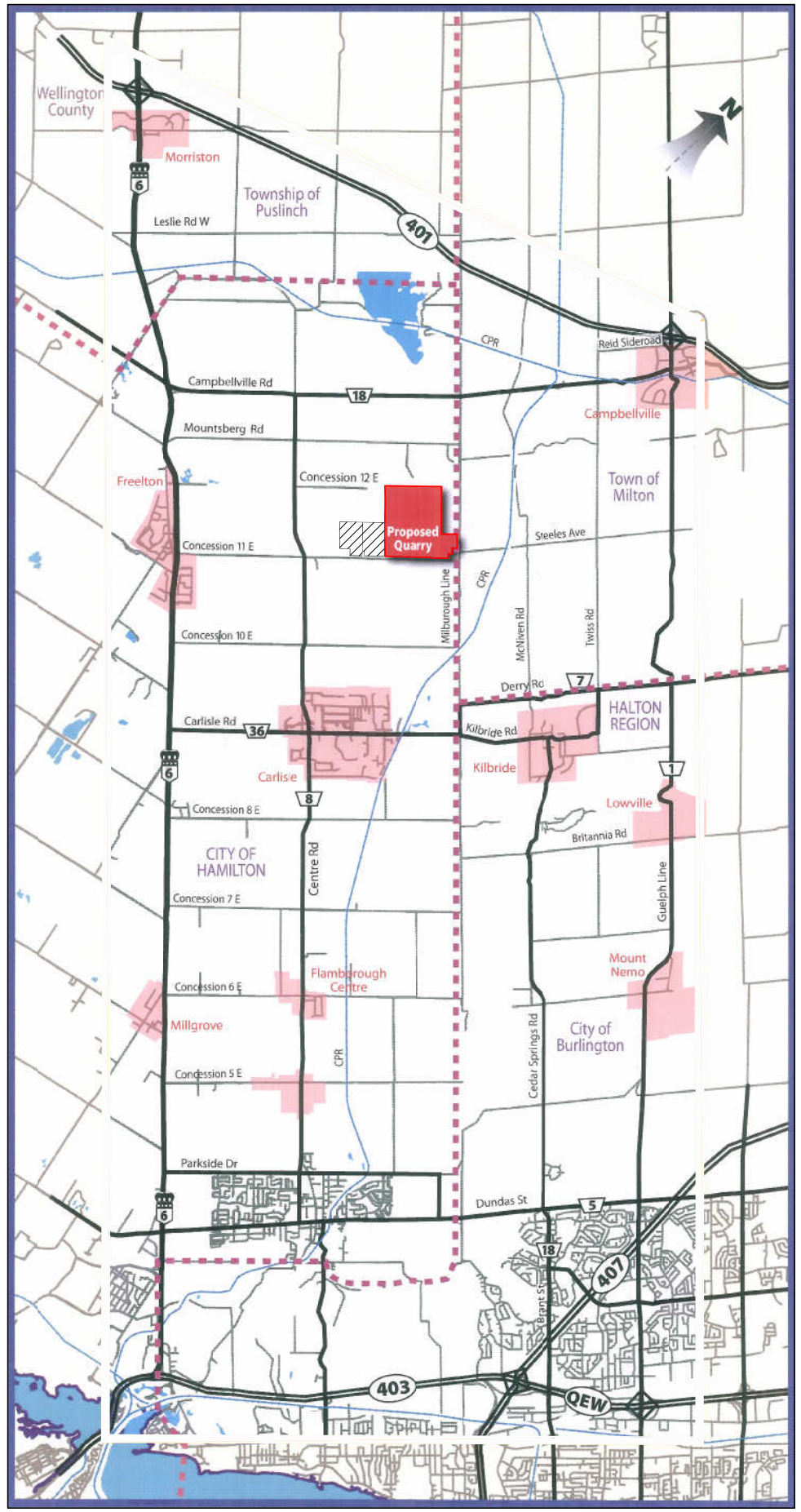

Figure 1 - Location Plan

Legend

- Subject Lands
- Additonal Lands owned by Applicant

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

(ARA Summary Statement and Planning Report)

December 8, 2008

GLEN SCHNARR & ASSOCIATES INC.
URBAN & REGIONAL PLANNERS, LAND DEVELOPMENT CONSULTANTS
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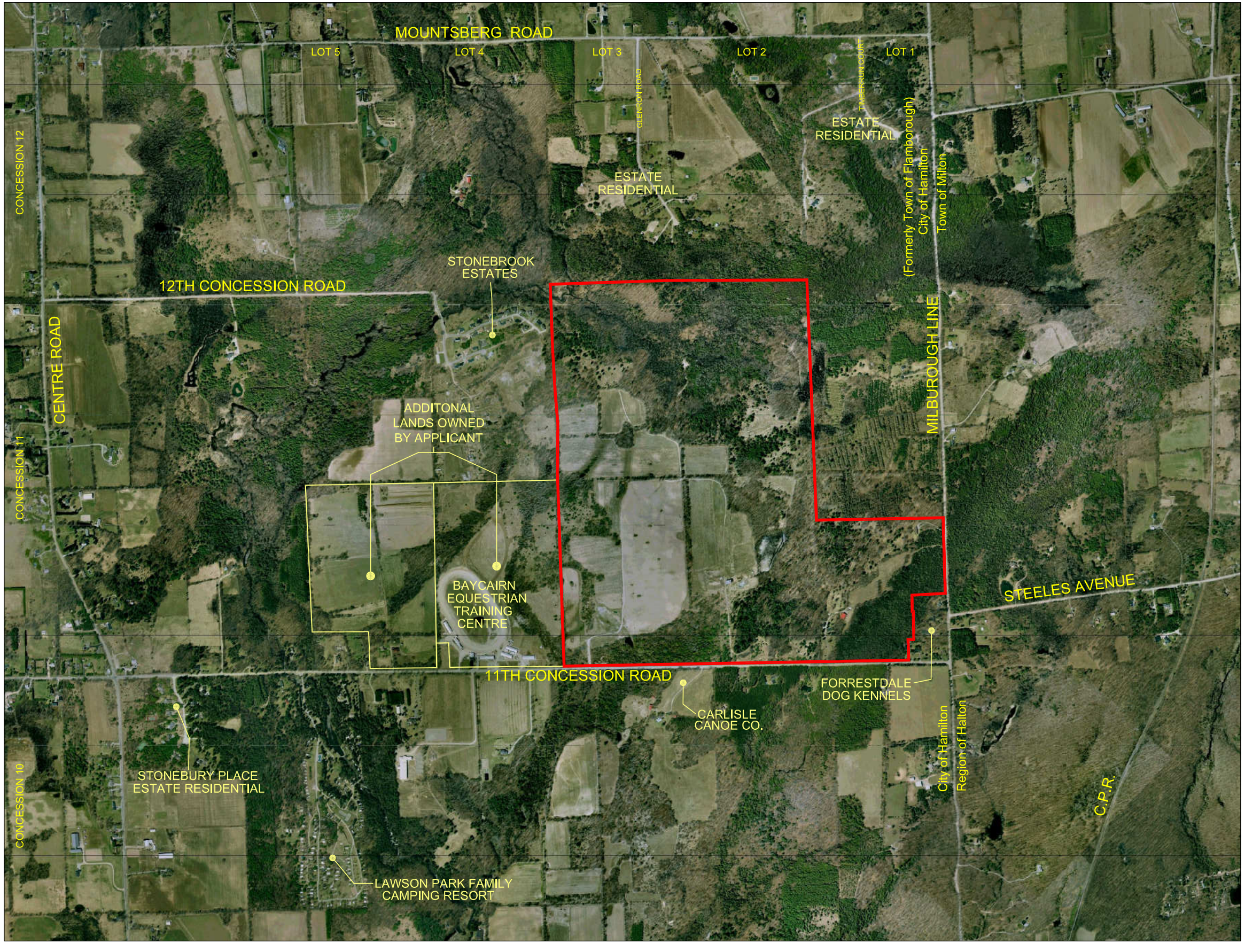
MISSISSAUGA, ONTARIO, L5R 3K6
TEL (905) 568-8888 FAX (905) 568-8894

Figure 2 - Air Photo of Site and Surrounding Lands



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Subject Lands

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

(ARA Summary Statement and Planning Report)

December 8, 2008

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Urban & Regional Planners, Land Development Consultants
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Mississauga, Ontario, L5R 3K6
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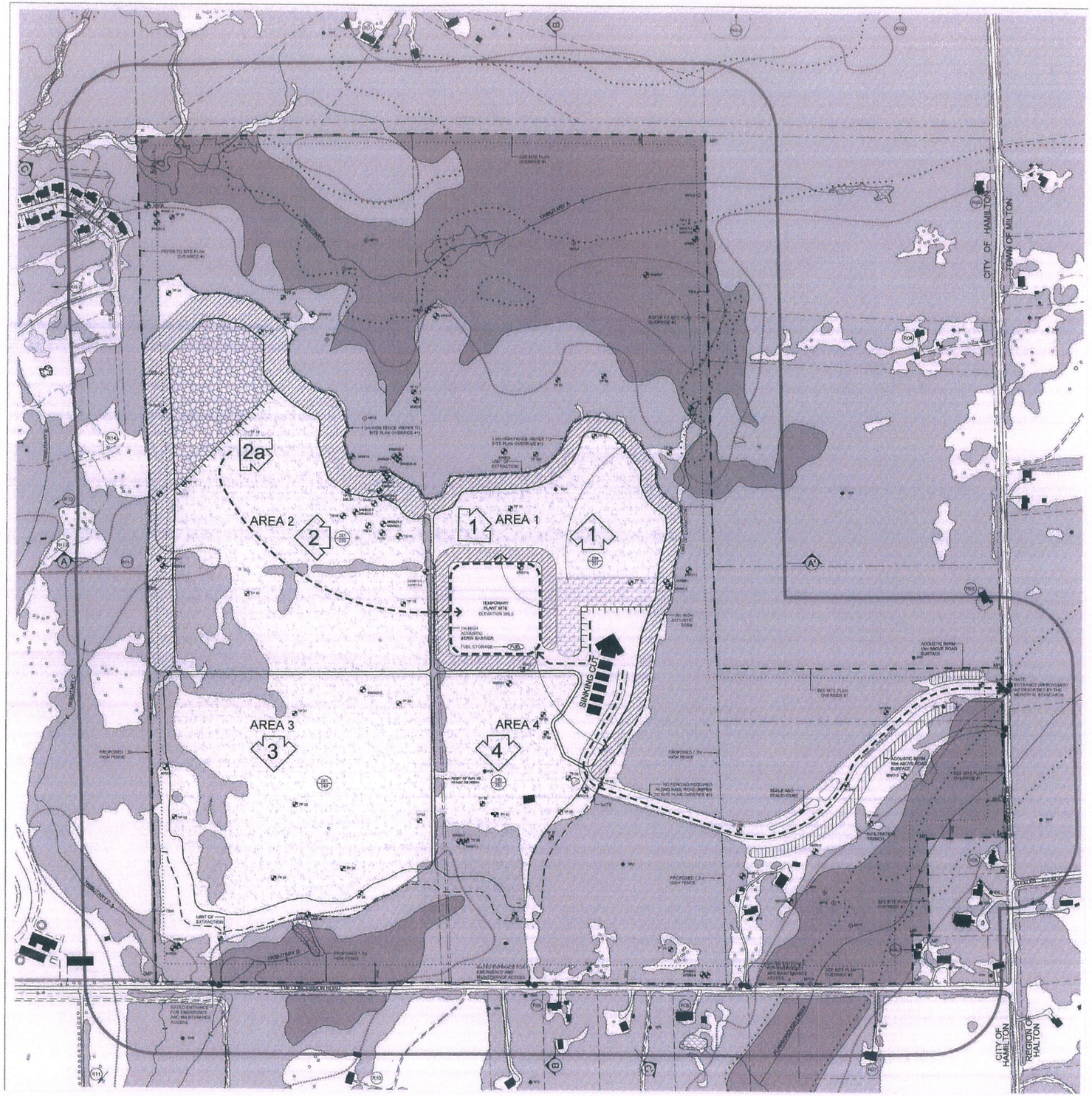

Figure 3(a) - Simplified Operations Plan - Phase A

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.
(ARA Summary Statement and Planning Report)

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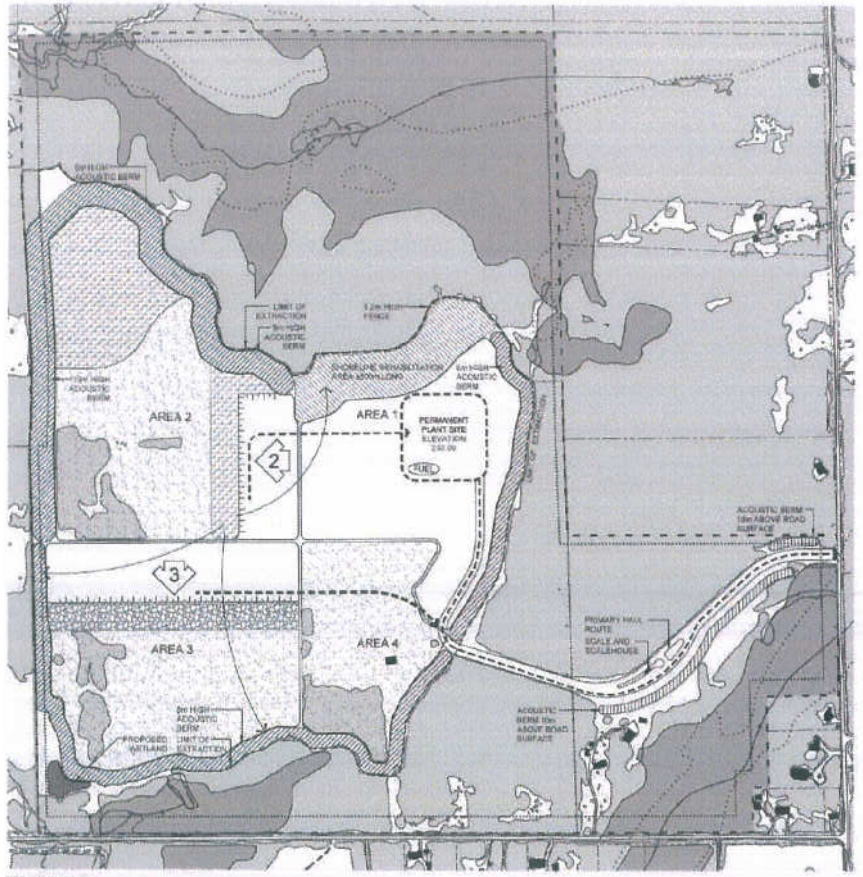
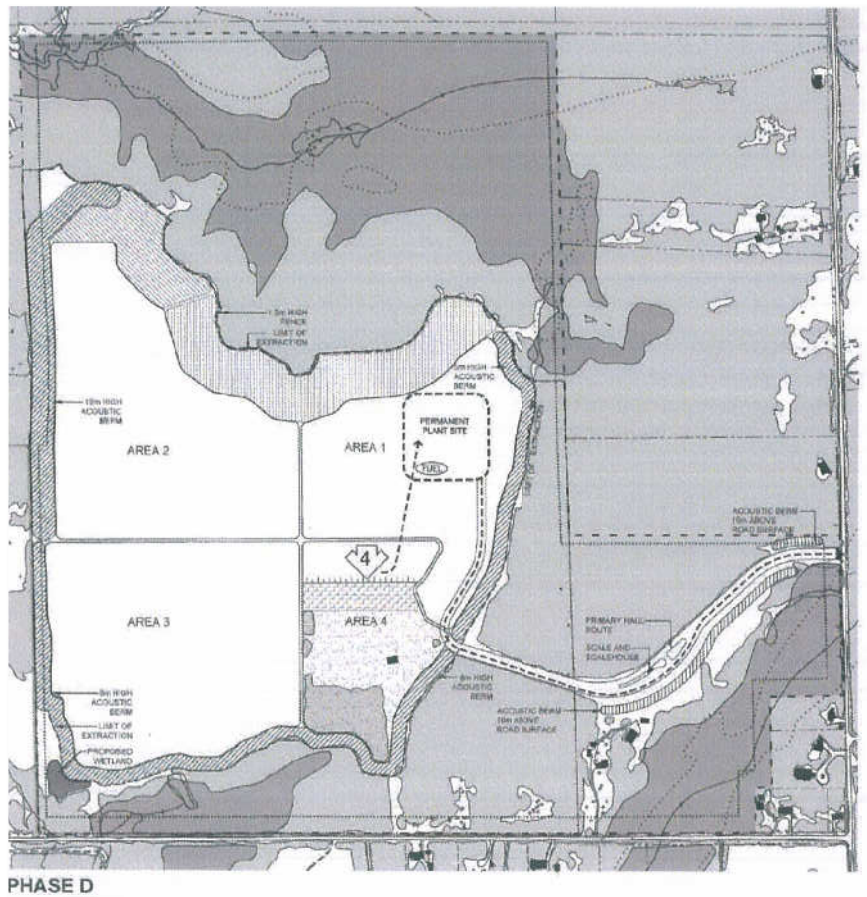


PHASE B

PHASE C



PHASE D

PHASE E

Figure 3(b) - Simplified Operations Plan - Phases B-E

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

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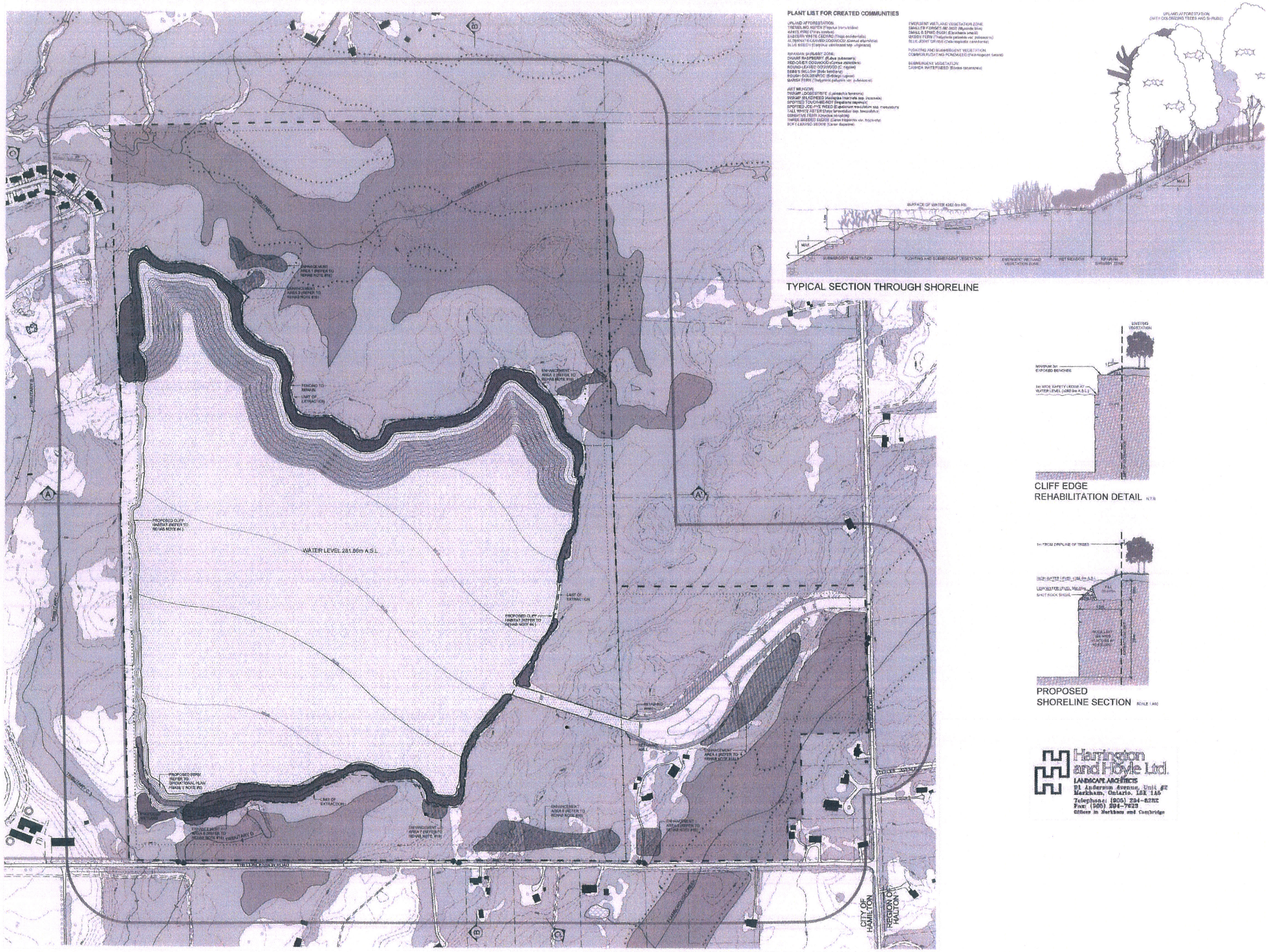
Figure 4 - Rehabilitation Plan



St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

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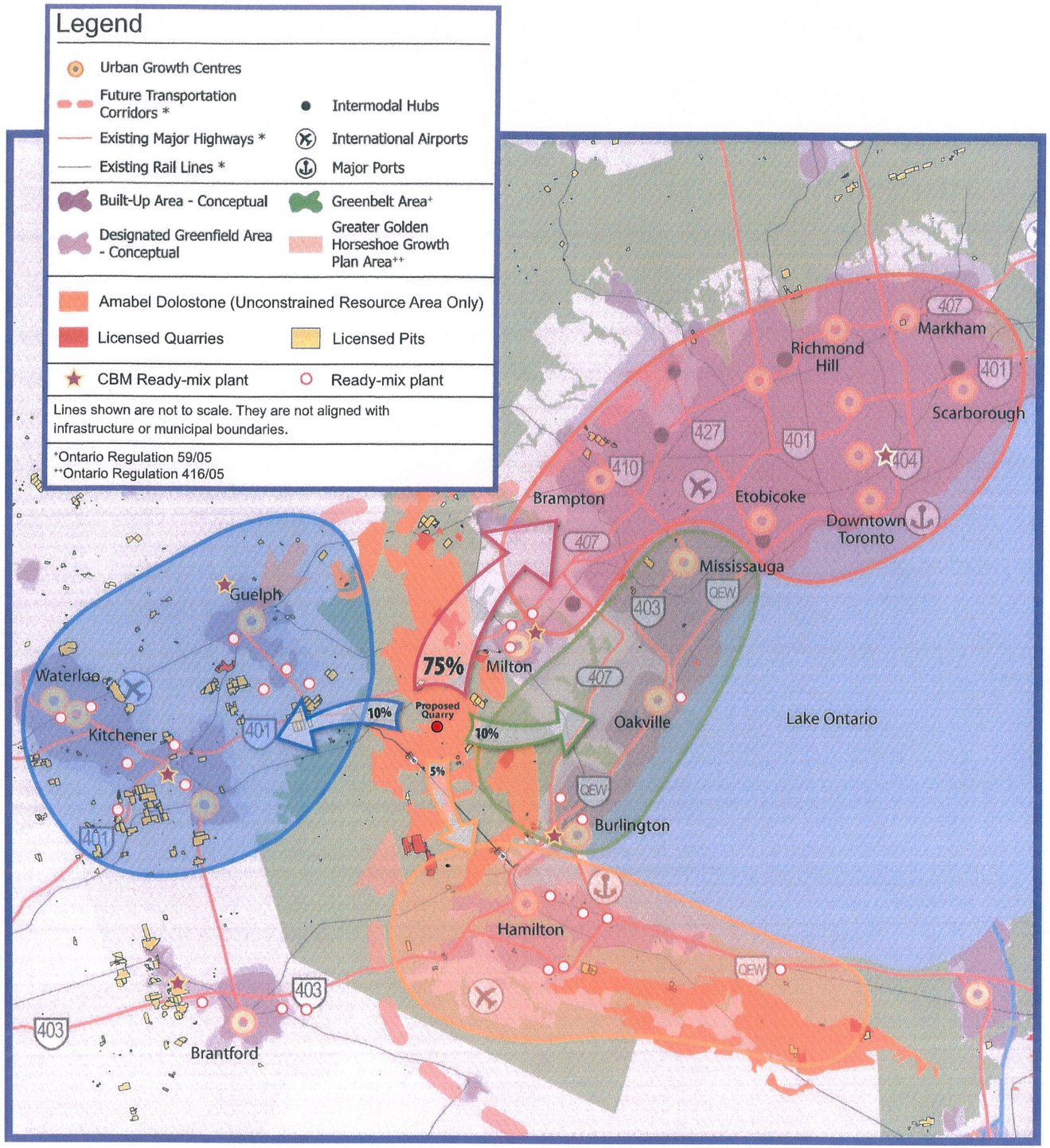

Figure 5 - Potential Destinations of Aggregate

(Source: iTrans Consulting Inc.)

Legend

- Subject Lands

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

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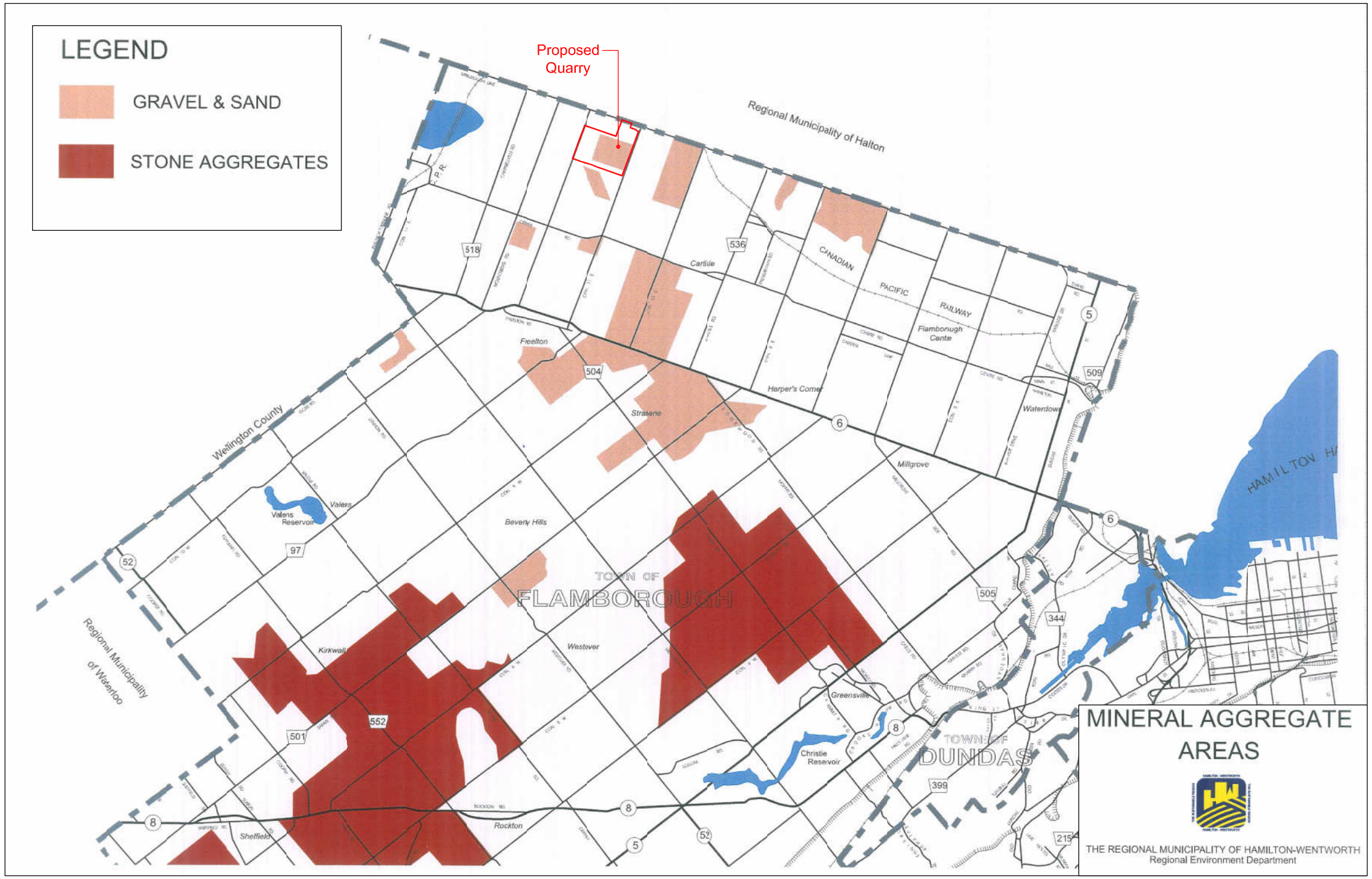
Figure 6 - Region of Hamilton Wentworth Official Plan - Excerpt 'Mineral Aggregate Areas'



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Subject Lands

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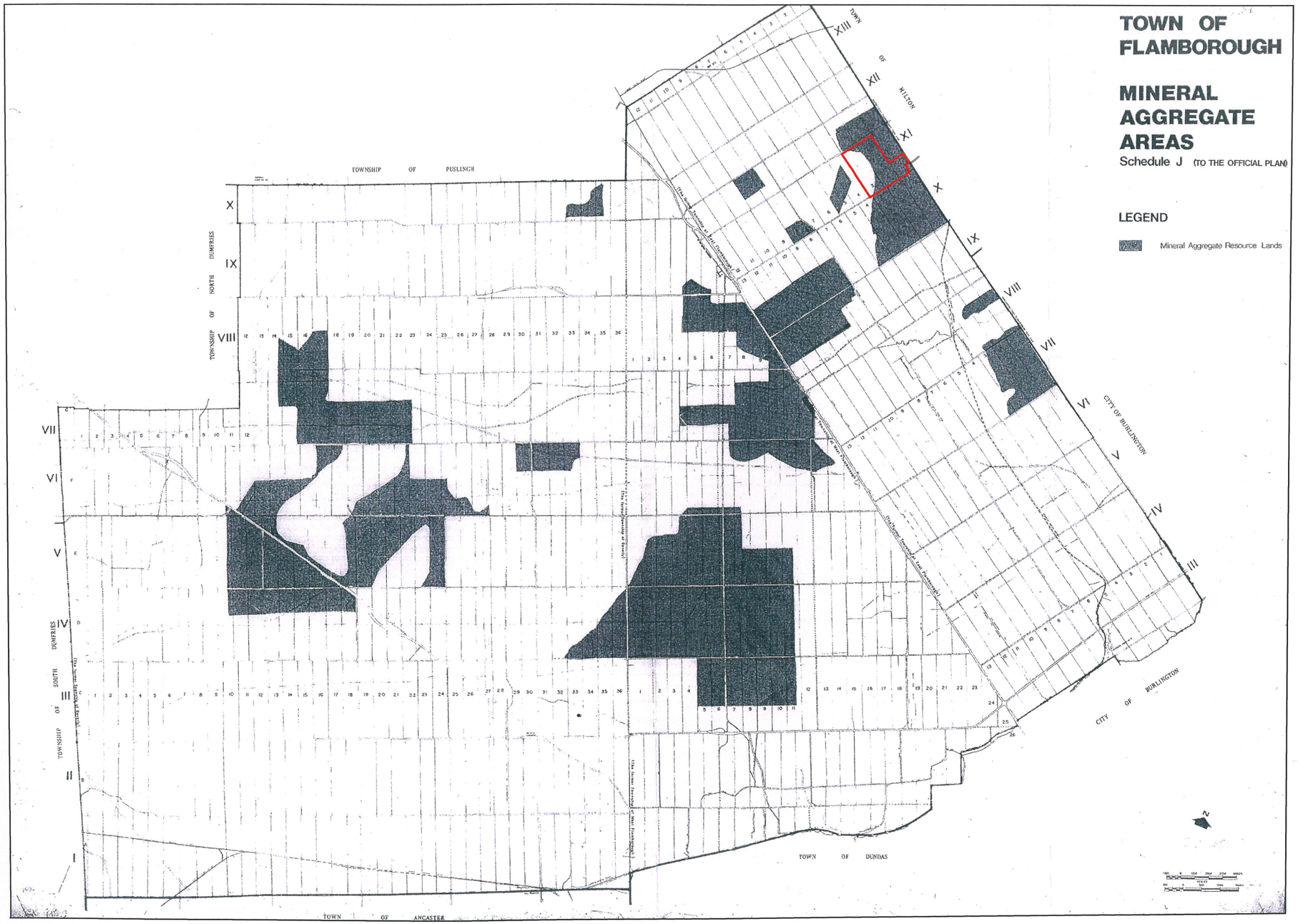

Figure 7 - Town of Flamborough Official Plan - Mineral Aggregate Areas

Legend

Subject Lands

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

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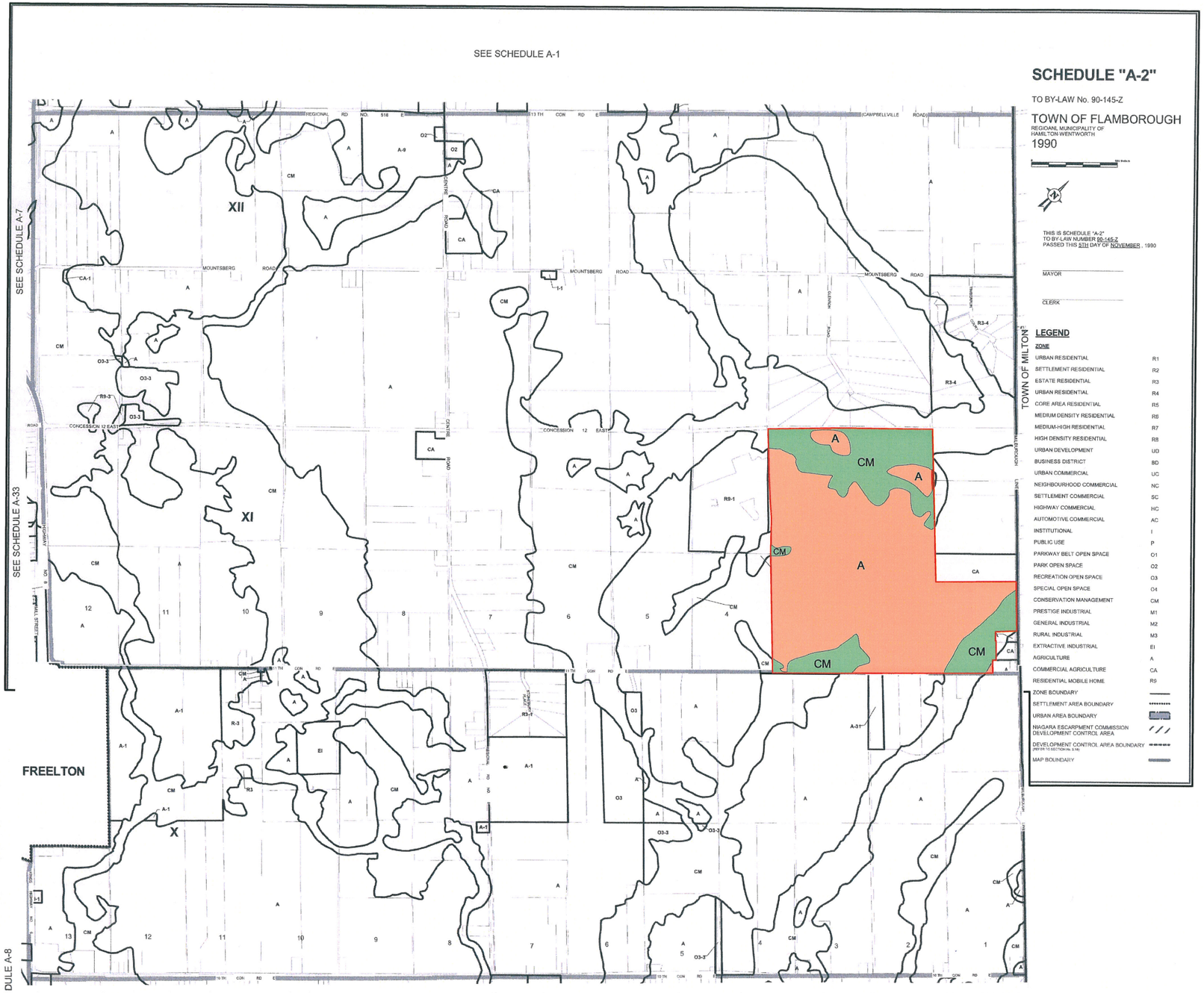
Figure 8 - Town of Flamborough Zoning By-Law No. 90-145-Z



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- Subject Lands
- CM (Conservation Management)
- A (Agricultural)

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

(ARA Summary Statement and Planning Report)

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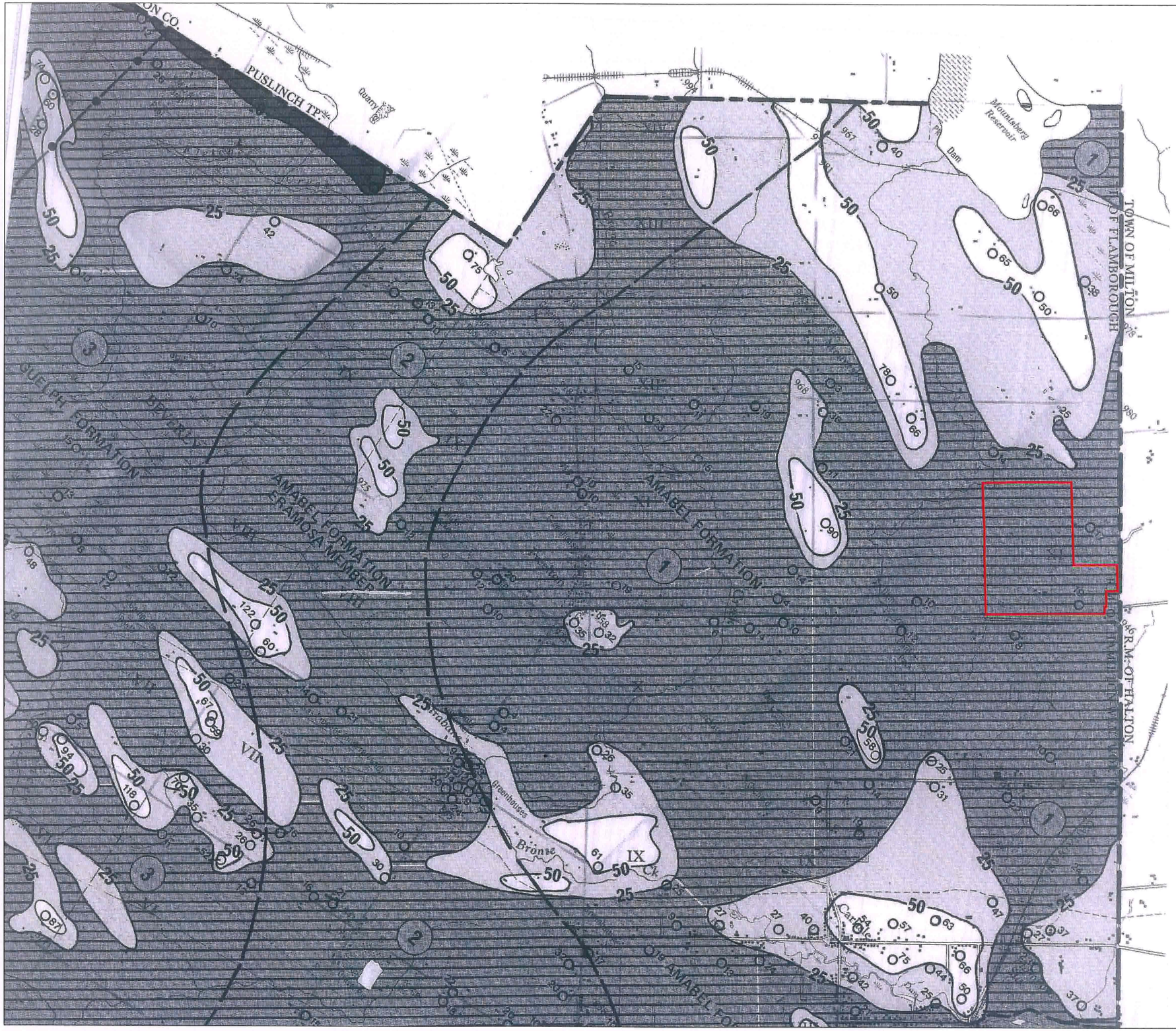
Figure 9 - Bedrock Resources (Excerpt from ARIP 50 MNR)



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Subject Lands

LEGEND

PALEOZOIC

SILURIAN

MIDDLE AND LOWER SILURIAN

GUELPH FORMATION
Dolostone

LOCKPORT-AMABEL FORMATIONS
Dolostone

CLINTON AND CATARACT GROUPS
Sandstone, shale, dolostone

ORDOVICIAN

UPPER ORDOVICIAN

QUEENSTON FORMATION
Red shale

SYMBOLS

(Some symbols may not apply to this map)

- Geological boundary.
- Formation thickness boundary (see text).
- 25 — Drift thickness contour line (25 foot (8 m) interval).
- x — Isolated bedrock outcrop.
- Bedrock within 3 feet (1 m) of surface; see Table 4.
- Bedrock covered by 3 to 25 feet (1 m to 8 m) of overburden; see Table 4.
- Bedrock covered by 25 to 50 feet (8 m to 15 m) of overburden; see Table 4.
- 1 — Selected bedrock resource area; Deposit number: see Table 6.
- Q3 — Licenced quarry boundary; Property number: see Table 5.
- Q5 — Unlicenced quarry*; Property number: see Table 5. *Abandoned quarry or wayside quarry operating on demand under authority of a permit.
- 27 — Selected drilling location indicating reported depth to bedrock (in feet).
- Municipal Boundary.

Source: MNR Aggregate Resource Inventory Paper 50, 1984.

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.
(ARA Summary Statement and Planning Report)

December 8, 2008

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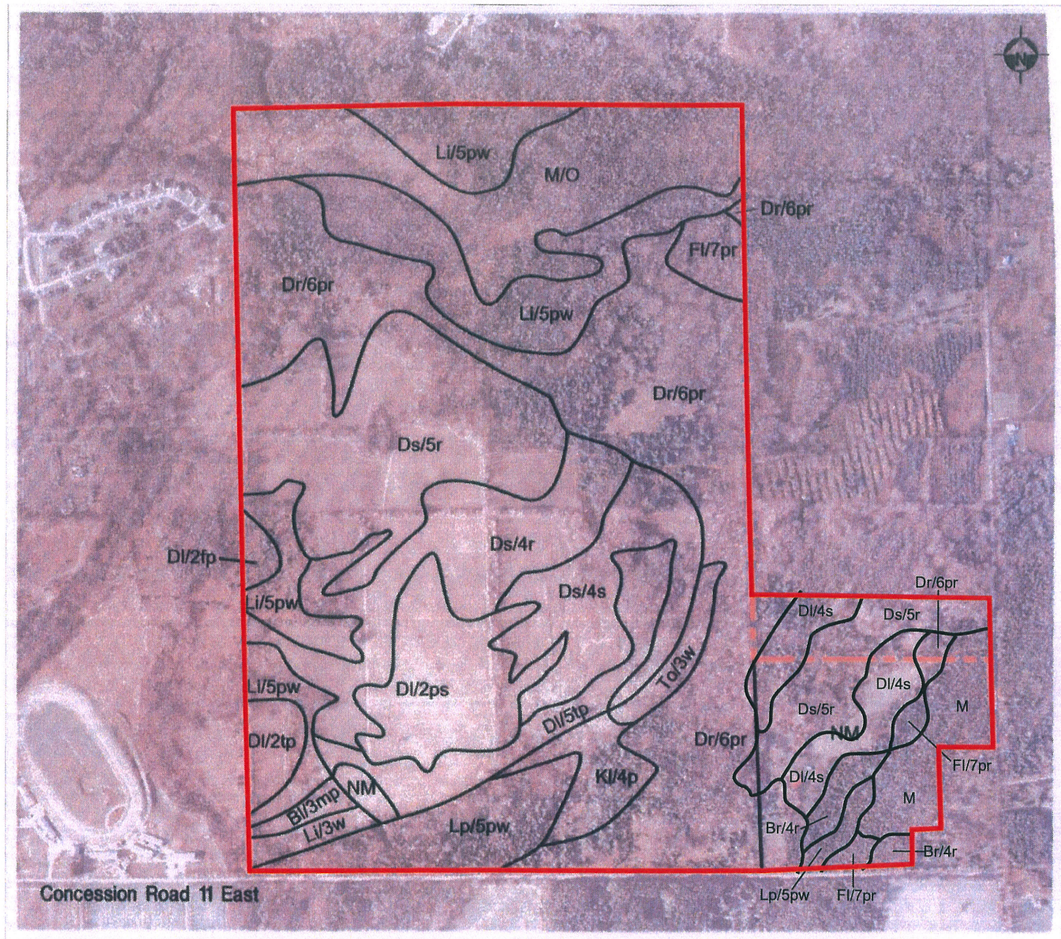

Soil Series — CLI Rating: Lp/5pw

Symbol	Soil Series	Drainage	Parent Material	CLI Rating
Dl	Dumfries loam	Good	Gravelly, sandy loam till	2ps, 4s, 5tp
Ds	Dumfries - shallow phase	Good	Gravelly, sandy loam till	5r
Dr	Dumfries - rocky phase	Good	Gravelly, sandy loam till	6pr
Kl	Killean loam	Imperfect	Loam till	4p
Ll	Lily loam	Poor	Loam till	5pw
Lp	Lily - peaty phase	Very Poor	Loam till	5pw
Bl	Burford loam	Good	Outwash sand & gravel	3mp
To	Toledo silt loam	Poor	Lacustrine silty clay loam	3w
Fl	Farmington loam	Excessive	Excessive Bedrock	7pr
M	Muck	Very Poor	Organic	O
NM	Area Not Mapped	(Disturbed or Not Part of Study Area)		
Br	Brant-shallow phase	Good	Lacustrine silt loam	4r

Descriptions of CLI - Soil Capability for Agriculture

Subclasses

Subclass	Description
w	excessive wetness
f	low fertility
t	topography
m	droughty
e	erosion
p	excessive stoniness
s	combination of d, f, or m
r	depth to bedrock
i	soils subjected to innundation by streams or lakes

0 400m

Scale 1 : 10,000

ONSITE SOILS

Prepared by Stovel and Associates Inc.(July 2004) & Conna Consutlng Inc.(July 2008)

Figure 10 - Soil Capability for Agriculture

Legend

Subject Lands

St. Marys Flamborough Quarry
St. Marys Cement (Canada) Inc.

(ARA Summary Statement and Planning Report)

December 8, 2008

GLEN SCHNARR & ASSOCIATES INC.
URBAN & REGIONAL PLANNERS, LAND DEVELOPMENT CONSULTANTS
SUITE 700 10 KINGSBRIDGE GARDEN CIRCLE,
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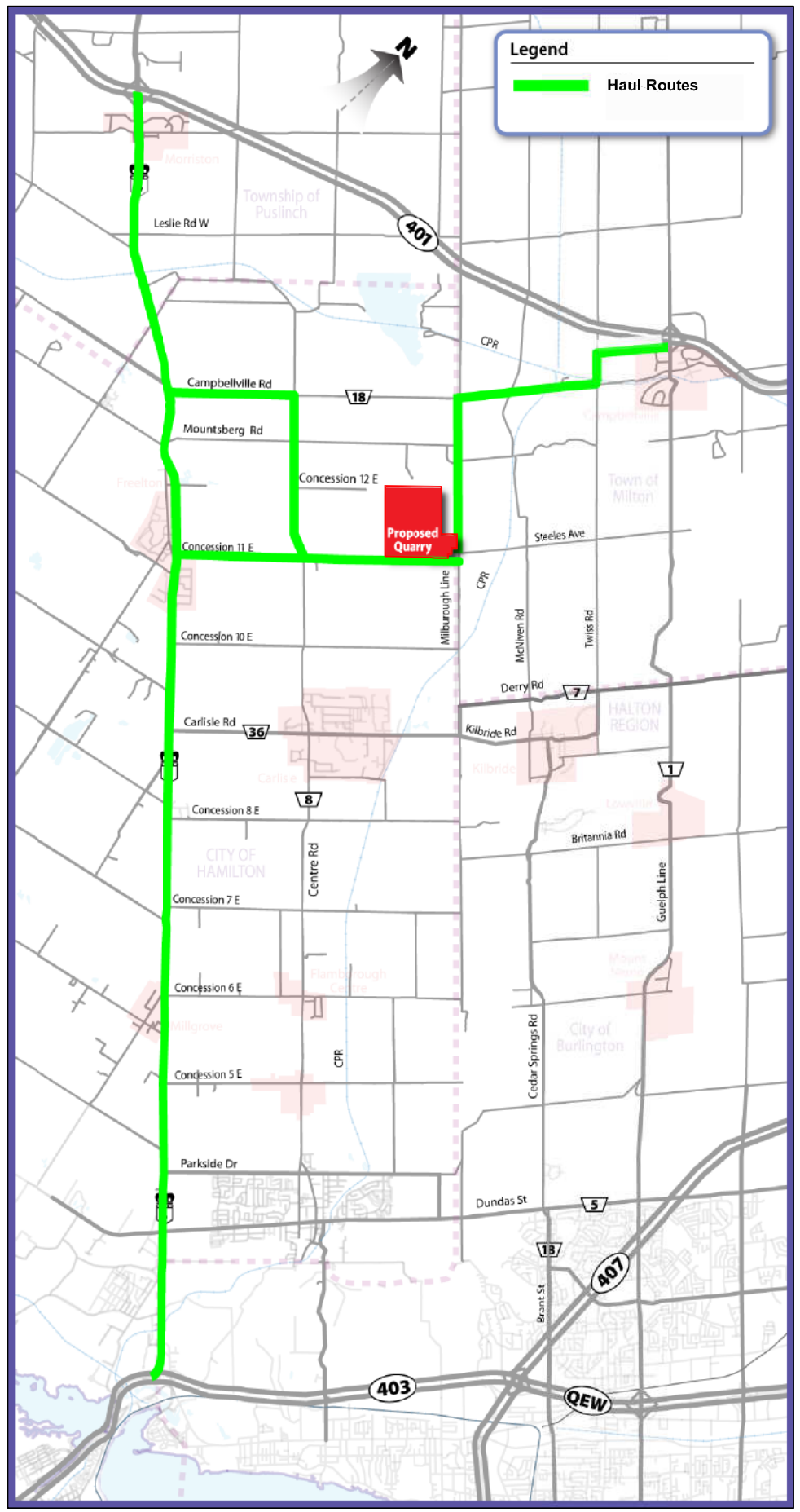

Figure 11 - Haul Routes

Legend

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