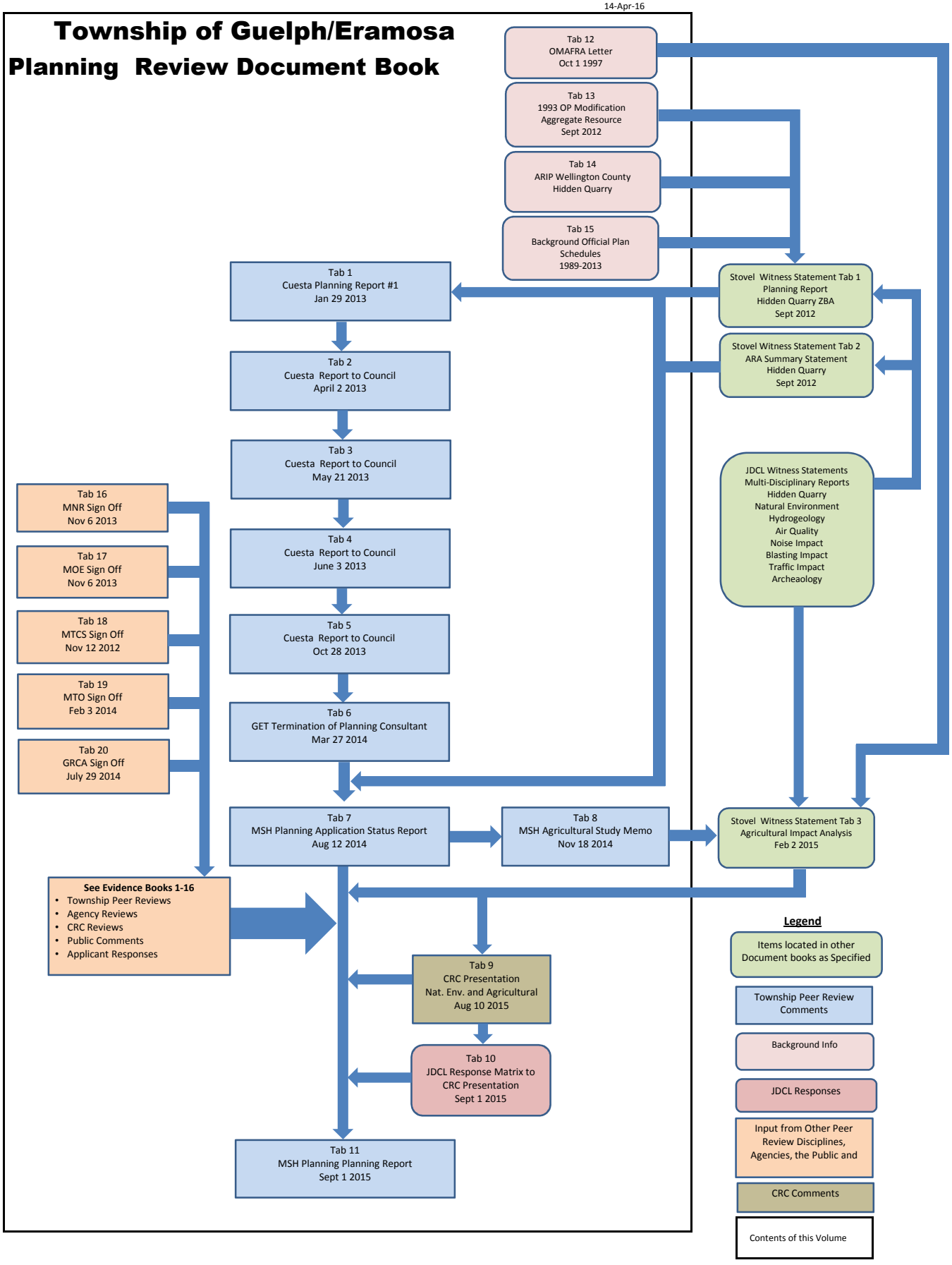
Evidence Book 18

14-Apr-16



Township of Guelph/Eramosa
Planning Review Document Book Index

TOWNSHIP OF GUELPH ERAMOSA
PLANNING REPORT # 1

Application: **Zoning By-law Amendment**
File No.: **ZBA 09/12**
Date: **January 29th, 2013**

TO: Township of Guelph/Eramosa Council, Janice Sheppard (CAO) & Gaetanne Kruse (Planning Administrator)

FROM: Cuesta Planning Consultants Inc.

SUBJECT: Zoning By-law Amendment Application (ZBA 09/12)
James Dick Construction Ltd. – Proposed Hidden Quarry

I. REASONS FOR AND NATURE OF APPLICATION:

The Township of Guelph/Eramosa has received a complete application (ZBA 09/12) from **James Dick Construction Ltd.** to amend Comprehensive Zoning By-law 57/1999.

James Dick Construction Ltd. is proposing to establish a Category 2 quarry (quarry with extraction below the proposed water table) with a Class 'A' license under the Aggregate Resources Act (ARA). The proposed quarry will be accessed from the 6th Line. The subject lands currently exist as a managed conifer plantation.

The proposed quarry is intended to provide high-quality sand, gravel and dolostone resources suitable for high end uses in hot-mix asphalt paving, Portland cement concrete products and other construction related uses. It is estimated that approximately 12 million tonnes of aggregate are available for extraction, including 10 million tonnes of dolostone and 2 million tonnes of sand and gravel. The proposed license would permit the extraction of up to 700,000 tonnes of aggregate material each year. A site specific zoning by-law amendment is required to permit extractive industrial uses on the 39.4 hectare (100 acre) area to be licensed, of which an area of 24.8 hectares (61.3 acres) is to be extracted.

II. PROPERTY INFORMATION SUMMARY

File No.:		ZBA 09/12
Legal Description:		Pt. Lot 6, Concession 1, (Eramosa); ARN: 2311000 004 00110 0000
Lot:	Frontage	553 metres
	Depth	607 metres
	Area	39.4 hectares
Access:	Existing	6th Line & Highway 7
	Proposed	6th Line
Uses:	Existing	Managed conifer plantation
	Proposed	Category 2 Class 'A' Quarry
County OP:		Prime Agricultural & Core Greenlands; Mineral Aggregate Area Overlay
Zoning:		Agricultural (A) and Hazard (H)
Surrounding Uses:		Agricultural, Non-farm rural residential, rural industrial, woodlands

III. PURPOSE OF APPLICATION AND CONTEXT:

The subject property is approximately 39.4 hectares (100 acres) in size and ranges in elevation from 354 to 365m masl. These lands are comprised, primarily, of coniferous forest plantation. It would appear that two former 'wayside' gravel pits exist on the lands. A single detached dwelling is also located on the southeastern portion of the site with access provided via Highway 7. The site is located approximately 2 kilometres east of Rockwood and 4.5 kilometres west of Acton along the municipal boundary of Guelph/Eramosa and the Town of Milton. (See **Appendix A** for Existing Features Plan).

Surrounding land uses include actively cultivated agricultural and agricultural operations, non-farm rural residences, rural industrial uses and vacant woodlands. A detailed overview of surrounding land uses is provided in **Appendix B**.

The application proposes to extract high quality aggregate material for construction related uses under a Category 2 Class 'A' quarry license. The license will permit extraction to occur above and below the established groundwater table at a rate of up to 700,000 tonnes of aggregate material annually. The sub-aqueous extraction noted above will be permitted to approximately 30 metres below the established water table. Extraction below the established water table is to occur by dragline excavation without dewatering in an attempt to minimize the disturbance of groundwater levels during the lifetime of the operation. The applicant estimates that up to 12 million tonnes of aggregate can be extracted.

The 24.8 hectare (61.3 acre) extraction area is proposed to be extracted in 3 phases, consisting of 2 lifts beginning towards the northwest portion of the site and progressing in a clockwise direction ending in the western portion of the site. Further information in this regard can be found on the Operations Plan attached as **Appendix C**. The first lift will involve the extraction of unconsolidated sand and gravel material above the water table while the second lift will involve extraction of consolidated dolostone material occurring both above and below the water table. Phases and lifts may be operated concurrently due to the variability in stone and sand graduations and fluctuations in market demand for various aggregate products.

Loaders, drag-lines and excavators will be used in the extraction operation. Material will be transported to an on-site processing plant for crushing, washing and screening and will be stockpiled adjacent to the processing plant before being shipped off-site via the 6th Line and Highway 7. The main processing area will be established on the southwest portion of the site, as shown in the Operations Plan. Other equipment to be used on the site includes trucks, tractors, portable drills, scrapers and dozers. This equipment will be stored in the main processing area.

Progressive rehabilitation of the site will occur, where possible. In general, the rehabilitation plan includes two primary pond areas reflective of areas where extraction has occurred below the water table. These ponds will be rehabilitated to diverse shorelines which include wetlands and deep and shallow water fish habitat. Remaining tableland areas, including setback areas, will be largely reforested with native trees and shrubs. More information regarding rehabilitation can be found on the Rehabilitation Plan attached as **Appendix D** to this report.

IV. LAND USE POLICY CONSIDERATIONS

IV.I MATTERS ARISING FROM PROVINCIAL INTERESTS, POLICY STATEMENTS OR PLANS

.i PROVINCIAL POLICY STATEMENT

Pursuant to Section 3 of the *Planning Act,* the Minister of Municipal Affairs, in consultation with other Ministries; may issue policy statements that provide direction on matters of provincial interest related to land use planning and development. The latest provincial policy statement (PPS) came into effect on March 1st, 2005 and any decision, by any authority that affects a planning matter, shall be consistent with the PPS.

The PPS contains three major policy areas relating to: 1) Building Strong Communities; 2) Wise Use and Management of Resources; and 3) Protecting Public Health and Safety. The applicable sections of the PPS in consideration of the proposed "Hidden Quarry" relate to development in rural areas, mineral aggregate resources and natural heritage. A detailed overview of the applicable sections of the PPS is provided in **Appendix E** to this report.

Section 1.1.4 of the PPS requires that, in rural areas of municipalities, development shall be appropriate to the infrastructure which is planned or available, and avoid the need for the unjustified or uneconomical expansion of this infrastructure.

Comment: *Aggregate material extracted from the proposed quarry will be hauled south along the 6th Line before heading east on Highway 7 towards the GTA. As noted, approximately 200 metres of the 6th Line will be used by trucks in the shipping of aggregate material. The applicants have submitted a Traffic Study prepared by Cole Engineering Group Ltd. which provides an assessment of the appropriateness of the available road infrastructure to accommodate the increase in traffic associated with the proposed quarry. This Study suggests a number of improvements to roadway signage along the 6th Line in order to address potential safety concerns. In their January 11th, 2013 correspondence, R.J. Burnside & Associates Ltd. suggests that the applicants should provide a more detailed review of the need to upgrade the 6th Line to accommodate the increased truck traffic. They have recommended that a geotechnical study be provided to confirm the road base and surface requirements.*

Once the technical experts reach a consensus on the extent of required road upgrades, the proponents should enter into a development agreement with the Township to ensure that required signage and road upgrades will be completed. This development agreement should clearly define the works to be completed and the cost sharing arrangement. Approval of the ZBA 09/12 will be subject to the applicant entering into a development agreement to address haul route issues.

In general, Section 2.5 of the PPS requires that aggregate resources be protected for long-term use and that as much of the aggregate resource as is realistically possible be made available as close to markets as possible. Extraction is to be undertaken in a manner which minimizes social and environmental impacts.

Comment: *The proposed Hidden Quarry will provide a close-to-market supply of high quality aggregates for construction related use primarily in the Greater Toronto Area (GTA). The proposed quarry is located within the Greater Golden Horseshoe, roughly 40 kilometres northwest of the GTA. Its location should be considered favourably in this regard.*

The applicants have submitted several technical reports which address potential social and environmental impacts of the proposed quarry. These technical reports contain operational recommendations designed to minimize the proposed quarry's impact on social and environmental features. These recommendations have been incorporated into the Quarry Site Plans and form the basis for the ARA license application. The mitigation measures/technical recommendations set out on the Site Plans, in conjunction with the prescribed conditions of the Category 2 Class 'A' serve to protect environmental resources and minimize potential social impacts. The technical review process will confirm the validity of the conclusions and recommendations contained in the technical reports and ensure conformity with the PPS in this regard.

Given the nature of surrounding development and access to a provincial highway, the site would appear to provide a suitable opportunity for the proposed extractive industrial use.

Section 2.5.3 of the PPS requires progressive and final rehabilitation to accommodate subsequent land uses, to promote land use compatibility, and to recognize the interim nature of extraction. Final rehabilitation of the quarry should take surrounding land uses and approved land use designations into consideration.

Comment: Given the interim nature of the proposed aggregate extraction activity, a Rehabilitation Plan has been submitted by the applicant in accordance with the PPS and ARA provincial standards. The rehabilitation plan provides a detailed description of the proposed use of the subject lands upon the completion of extraction.

The lands will be rehabilitated to a diverse ecosystem with two ponds. The shoreline of these ponds will be diversified to create shoals, wetlands and aquatic habitat. Remaining areas of the site will be re-forested with native vegetation.

Rehabilitation to agricultural use will not be required due to the limited agricultural capacity of the existing overburden and the quantity of aggregate material proposed for extraction below the proposed water table.

Section 2.6 of the PPS provides direction on the protection of significant cultural or heritage resources. Section 2.6 requires that development and site alteration shall only be permitted on lands containing archaeological resources or areas of archaeological potential if the significant archaeological resources have been conserved by removal and documentation, or by preservation on site. Where significant archaeological resources must be preserved on site, only development and site alteration which maintains the heritage integrity of the site may be permitted.

Comment: A Level ll Cultural Heritage Study was completed by York North Archaeological Services Inc. for the subject property. The Stage ll investigation revealed evidence of a mid to late 19th century farmstead, likely associated with the Ramshaw family, towards the northwestern boundary of the site. A 20 metre extraction setback and a 50 metre monitoring zone have been recommended by the consultant's archaeologist in order to protect this heritage resource. These setbacks have been included on the Operations Plan to the satisfaction of the Ministry of Tourism, Culture and Sport.

In order to allow for further preservation of this identified archaeological resource, the proponents may conduct a Stage lll assessment which would allow for the removal of significant artifacts. Site Plans may be further modified to allow for additional extraction in

this area if a Stage lll assessment is completed to the satisfaction of the Ministry of Tourism, Culture and Sport.

Notwithstanding the above directives, Section 2.1 of the PPS states that development and site alteration shall not be permitted in significant woodlands south and east of the Canadian Shield, significant wetlands and significant wildlife habitat unless it has been demonstrated that there will be no negative impacts on the natural heritage features or their ecological functions.

Comment: *A Level ll Natural Environment Technical Report was prepared by GWS Ecological & Forestry Services Inc. and submitted by the applicant in accordance with the Aggregate Resources Act Provincial Standards. This study contains an assessment of the proposal with regard to the seven natural heritage features to be considered under the PPS. The study identified Provincially Significant Wetlands, Significant Woodlands and Significant Wildlife habitat on or adjacent to the area to be licensed.*

Provincially Significant Wetlands

The Natural Environmental Technical Report prepared by GWS Ecological & Forestry Services Inc. identified the presence of provincially significant wetlands on and adjacent to the subject property. The NETR concludes that based on the proposed wetland extraction setbacks and the construction of a hydraulic barrier identified on the Operations Plan and supported by the Hydrogeological Investigation, that there will be no direct or indirect impacts to on-site or off-site PSW's and their significant wildlife habitat functions.

Significant Woodlands

The NETR suggests that only a small portion of the existing woodland area on-site could potentially warrant designation as significant. The NETR notes that woodlands on the subject property have not previously been identified as significant. Approximately 13.43 hectares of naturally established and confier plantation will be retained on the site throughout extraction. This residual woodland will be complemented by an additional 7.18 hectares of woodland proposed in the Rehabilitation Plan.

Significant Wildlife Habitat

As determined by the results of the NETR fieldwork, the on and off site PSW's noted above were identified as significant wildlife habitat because of their importance for amphibian breeding. The on-site wetland area, located on the northwest portion of the property, also supports a small population of snapping turtles, a species of conservation concern. The existing hydraulic function of these wetland areas provides the basis for the significant wildlife habitat.

The Hydrogeological Investigation has recommended a 30 metre extraction setback from indentified on-site wetland areas that provide habitat for snapping turtles and amphibian breeding ground. The Hydrogeological Investigation also recommends the installation of a hyrdraulic barrier around this wetland. These measures are intended to preserve its existing hydraulic function. The recommended setbacks and hydraulic barrier have been included on the Operations Plan. The NETR concludes that based on the implementation of recommendations contained in the Hydrogeological Investigation and generally noted

above, that the proposed quarry development will have no impact on the hydraulic function of the wetland and therefore no effect on the significant amphibian breeding or snapping turtle habitat.

.ii GROWTH PLAN FOR THE GREATER GOLDEN HORSESHOE (2006)

The PPS provides the most appropriate and comprehensive policy framework for considering aggregate resource development within the Golden Horseshoe. In general, the Growth Plan supports the wise use and management of significant resources identified in the PPS. Subject to the proposal's conformity with the PPS, approval of ZBA 09/12 will not offend the intent of the Growth Plan for the Greater Golden Horseshoe.

IV.II MATTERS ARISING FROM WELLINGTON COUNTY OFFICIAL PLAN (2006)

The subject lands are designated as Prime Agricultural and Core Greenlands within the Wellington County Official Plan. The lands are also recognized by a Mineral Aggregate Area overlay designation on Schedule 'A'.

The Mineral Aggregate Area designation is intended to indentify known significant close-to-market aggregate deposits and provide protection to these deposits from the intrusion of incompatible development. Proposals to establish new aggregate extraction operations in the Mineral Aggregate Area do not require an amendment to the Plan.

The Mineral Aggregate Area does not, however, presume that all conditions are appropriate to allow extraction or processing of the resource to proceed. Section 6.6.5 of the County Official Plan provides direction to local councils in considering applications for new aggregate operations. Specifically, Section 6.6.5 states:

6.6.5 New aggregate operations may be established within the Mineral Aggregate Area subject to the appropriate rezoning and licensing. New operations proposed outside of this area shall require an amendment to this Plan. In considering proposals to establish new aggregate operations, the following matters will be considered:

a) the impact on adjacent land uses and residents and public health and safety;
b) the impact on the physical (including natural) environment;
c) the capabilities for agriculture and other land uses;
d) the impact on the transportation system;
e) existing and potential municipal water supply resources are protected in accordance with Section 4.9.5 of this Plan.
f) the possible effect on the water table or surface drainage patterns;
g) the manner in which the operation will be carried out;
h) the nature of rehabilitation work that is proposed; and
i) the effect on cultural heritage resources and other matters deemed relevant by Council.

It is essential that extraction be carried out with as little social and environmental cost as practical. Provincial standards, guidelines and regulations will be used to assist in minimizing impacts.

In general, Section 6.6.5 of the Wellington County Official Plan is a broad reflection of the considerations relating to proposed aggregate development manifested in the Provincial Policy Statement and the Provincial Standards for Category 2 Class 'A' quarries.

The County Official Plan requires a comprehensive evaluation of the proposed operations impact on adjacent land uses and residents and public health and safety. The applicant has submitted a number of technical reports relating to noise, dust, blasting and vibration, traffic, natural environment, cultural heritage and hydrogeology. The quarry Site Plans incorporate recommendations of the various technical reports which are intended to provide measures to minimize and social and environmental impacts of the proposed quarry. The mitigation measures and technical recommendations identified in the technical studies, implemented through the site plans, coupled with the prescribed conditions of the Category 2 Class 'A' license are intended to ensure the protection of environmental resources and that potential social impacts are minimized.

The technical review process will shed more light on the validity of the proponent's technical reports. Upon the commencement of this review, we will be in a position to provide further comment of the merits of the proposed quarry with regard to potential social and environmental impacts identified in the County Official Plan.

The Aggregate Resources Act also provides a mechanism to ensure that aggregate development proposals minimize potential social and environmental impacts. Objections to the ARA license application by agencies and members of the pubic MUST be addressed to the satisfaction of the objector prior to the issuance of a license. If certain objections cannot be resolved, the matter is referred to the Ontario Municipal Board for resolution.

IV.III MATTERS ARISING FROM GUELPH/ERAMOSA COMPREHENSIVE ZONING BY-LAW 57/1999

The property is currently zoned as Agricultural (A) and Hazard (H) within the Township's Comprehensive Zoning By-law 57/1999. Aggregate extraction operations are not permitted within the Agricultural or Hazard Zone.

In order to facilitate the issuance of a Category 2 Class 'A' quarry license under the Aggregate Resources Act, the applicant has requested the lands be rezoned to M3 - Extractive Industrial. The M3 zone permits a variety of land use and development activities related to aggregate extraction. The Township may wish to include special provisions within the proposed by-law amendment to limit the permitted uses to only those proposed at the time of application.

Of specific relevance to the Hidden Quarry application, the M3 zone requires a 30 metre extraction setback from existing natural surface water features. The applicant has requested a reduction to this standard to allow for extraction within 20 metres of an intermittent stream. The Hydrogeological Investigation prepared by Harden Environmental Services Ltd. coupled with the technical review of this report will form the basis in considering this request.

V. MATTERS ARISING FROM AGENCY CIRUCLATION

The complete application was circulated to the required public agencies on December 7th, 2012. The complete circulation list is provided in **Appendix F** to this report. Mindful of the decision timelines outlined in Section 34 of the Planning Act; agencies were directed to submit comments by January 11th, 2013.

As of the date of writing this report, comments have been received from a number of agencies. These comments have been attached as **Appendix G** for further reference. The content and intent of their comments is generally summarized below.

R.J. Burnside & Associates Ltd.
R.J. Burnside has been retained by the Township to conduct a peer-review of the majority of the technical reports and plans submitted by James Dick Construction Ltd. in support of the proposed Hidden Quarry. The correspondence received from Burnside includes a number of general comments which should be addressed by the applicant prior to the approval of ZBA 09/12. In addition, Burnside raised a number of concerns regarding the proponent's Traffic Impact Study, Natural Environment Technical Report and Hydrogeological Investigation.

Comment: The applicants have received the comments from Burnside and are in the process of coordinating a response from their technical experts. This review process should continue on an on-going basis until both parties are satisfied that technical concerns have been resolved.

The technical review process and response will ensure that technical concerns are adequately addressed and that conclusions and recommendations contained in the technical reports are valid. Any additional mitigation measures or works deemed necessary should be included on the quarry Site Plans.

From a land use planning perspective, we must rely heavily on the conclusions of various technical reports in our evaluation of the merits of the proposed quarry. Therefore, it is imperative that parties involved in the technical review are satisfied that with these conclusions. Prior to the applicants satisfying the concerns raised by Burnside, it is premature to provide a thorough planning evaluation.

Grand River Conservation Authority
The GRCA has yet to provide formal comments but expressed their intention to do so in correspondence dated January 11, 2013.

Comment: The GRCA employs technical experts which will assist in the technical review of the proponents NETR and Hydrogeological Investigation. Comments from the GRCA will be relied on in order to evaluate the proposal's conformity with the Natural Heritage policies of Section 2.1 of the PPS. As with Burnside, the GRCA's review of the proposal should continue on an on-going basis until all parties are satisfied that technical concerns of their interest have been resolved.

Ministry of Tourism, Culture & Sport
In correspondence dated November 7, 2012, Ministry Staff expressed their satisfaction with the Archeological Assessment prepared by York North Archaeological Services submitted in support of ZBA 09/12.

County of Wellington
The County of Wellington has yet to provide formal comments. Based on recent discussions with County Staff, it would appear that comments are forthcoming.

Novus Environmental
Novus was retained by the Township to conduct a peer-review of the Noise Impact Study and Blast Impact Assessment reports submitted by the applicant in support of ZBA 09/12. No comments have been received as of the date of writing this report.

Township of Guelph/Eramosa Building Department
Correspondence was received from the Township Building Department on December 13, 2012 indicating that the department had reviewed the application and has no concerns. The department notes that building permits will be required for all new structures.

Those agencies which chose not to respond to the Township's request for comment are deemed to be satisfied and have no concern with regard to ZBA 09/12.

Comment: Concerns raised by technical experts at Burnside, Novus and the GRCA will be addressed by the applicant or their consultants. This review process will involve ongoing dialogue and likely result in the revision of some aspects of the Quarry Site Plans.

VI. MATTERS ARISING FROM PUBLIC CIRCULATION

Notice of a complete application for ZBA 09/12 was provided on December 7th, 2012 in the Wellington Advertiser publication. This notice was also circulated to the required public agencies with direction to provide comments by January 11th, 2013.

At the time of writing this report, no comments in objection to or in support of the proposed zoning by-law amendment had been received from members of the public.

In order to address the public consultation requirements of the Planning Act and collect comments from members of the public for the purposes of our review of the application, the Township must hold a public meeting in accordance with the Planning Act. Given the current stage of the application review process, it is an appropriate time to provide the required notice and schedule the required public meeting.

In an attempt to consolidate the Planning Act and Aggregate Resources Act approvals process, to the greatest extent possible, it is valuable to hold the required public meeting in a joint format. In our experience, this helps eliminate confusion with regard to the approval process and commenting protocol.

VII. SUMMARY OF REVIEW PROCESS AND NEXT STEPS

In general, this report provides a summary of the application review process to date and a framework for the broader review of ZBA 09/12 in accordance with the requirements of the Planning Act.

At this point, it is somewhat premature to comment as to land use planning merits of ZBA 09/12. As noted above, the technical review process will serve to validate studies provided by the proponent and ensure appropriate measures are implemented through the quarry Site Plans that serve to minimize the social and environmental impacts of the proposed quarry. This technical review process should continue on an on-going basis until there is consensus between the relevant parties.

In accordance with the requirements of the Planning Act, the Township must also proceed to hold a public meeting. The public meeting will provide ratepayers and residents with the details of the proposal and will

provide a forum for the submission of comments. Comments received from members of the public will form another component of our overall assessment of the merits of the proposal.

Pursuant to the completion of the technical review process and the receipt of public comments, we will be in a position to provide further comment on the proposal's consistency with the policies of the PPS & Wellington County Official Plan.

VIII. RECOMMENDATIONS

Based on the foregoing submissions, it is hereby recommended that:

1) The Township of Guelph/Eramosa host a public meeting pursuant to the Planning Act on Monday March 25th, 2013 at 7:00pm at the Rockmosa Community Centre to consider the request to amend the Township of Guelph Eramosa Comprehensive Zoning By-law 57/1999;

2) That the above noted public meeting be held in conjunction with the Public Information Session required pursuant to the Aggregate Resources Act to consider James Dick Construction Ltd.'s application for a Category 2 Class 'A' quarry license; and

3) That the Township proceed to provide notice of the public meeting in accordance with the Planning Act and Ontario Regulation 545/06.

Respectfully submitted,

Michael Davis, Planner
Cuesta Planning Consultants Inc.

APPENDIX A

EXISTING FEATURES PLAN

7.2

Water Wells Within 120m of Subject Property

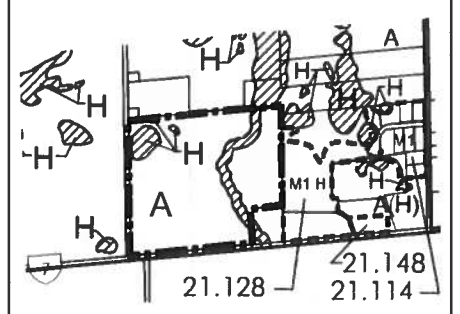
Well Location	MOE Well No.	Ground Elevation (mAMSL)	Depth of Well (mbgs)	Static Level (mbgs)	Pumped Level (mbgs)	Pumping Test Discharge (lgpm)
1	6705627	358.46	30.48	12.41	13.72	8
2	*	357.20	3.33	1.77	n/a	n/a
3	*	360.01	approx 61	6.23	n/a	n/a
5	*	360.25	n/a	n/a	n/a	n/a
10	6705424	355.97	approx 27	n/a	18.29	10
19	2802048	355.90	20.12	10.35	n/a	n/a

* No MOE Water Well Record

Monitoring Station	Type	Date Installed	Inside Diameter (in)	Stick-up (m)	Ground Elevation (mAMSL)	Reference Point Elevation (mAMSL)	Depth (mbgs)
M1D	Drilled Groundwater Monitor	May-1990	2.00	0.87	358.83	359.70	12.80
M1S	Drilled Groundwater Monitor	Dec-2010	2.00	1.00	358.84	359.84	8.38
M2	Drilled Groundwater Monitor	May-1990	2.00	0.94	357.41	358.35	58.47
M3	Drilled Groundwater Monitor	May-1990	2.00	0.93	358.27	359.20	11.13
M4	Drilled Groundwater Monitor	May-1990	2.00	0.74	356.89	357.63	19.56
M5	Dr.mpoint Groundwater Monitor	Nov-1990	1.25	1.01	358.64	359.71	9.94
M6	Dr.mpoint Groundwater Monitor	Nov-1990	1.25	1.13	354.97	356.10	1.98
M7	Dr.mpoint Groundwater Monitor	Apr-1998	1.25	1.14	352.43	353.57	7.67
M7R	Dr.mpoint Groundwater Monitor	Nov-2010	1.25	0.82	352.45	353.27	3.14
M8	Dr.mpoint Groundwater Monitor	Apr-1998	1.25	1.10	356.30	357.40	1.84
M9	Dr.mpoint Groundwater Monitor	Apr-1998	1.25	1.20	356.67	357.87	2.83
M9R	Dr.mpoint Groundwater Monitor	Nov-2010	1.25	1.01	352.69	353.70	2.93
M10	Dr.mpoint Groundwater Monitor	Apr-1998	1.25	1.14	356.13	357.27	0.92
M11	Drilled Groundwater Monitor	Dec-2010	2.00	0.85	358.57	359.43	9.35
M12	Drilled Groundwater Monitor	Dec-2010	2.00	0.85	357.00	357.85	8.84
M13S	Dr.lled Groundwater Monitor	Dec-2010	2.00	0.99	356.78	357.77	4.27
M13D	Drilled Groundwater Monitor	Dec-2010	2.00	0.95	356.76	357.71	18.06
M14S	Drilled Groundwater Monitor	Dec-2010	2.00	0.99	358.84	359.83	4.27
M14D	Drilled Groundwater Monitor	Dec-2010	2.00	0.75	358.90	359.65	7.62
TP1	Test Pit Location With Dr.mpoint Groundwater Monitor	Sep-1990	1.25	1.09	358.36	359.45	4.66
TP2	Test Pit Location With Dr.mpoint Groundwater Monitor	Sep-1990	1.25	1.27	354.99	356.26	5.08
TP3	Test Pit Location	Sep-1990	n/a	n/a	358.41	n/a	5.03
TP4	Test Pit Location	Sep-1990	n/a	n/a	n/a	n/a	5.03
TP5	Test Pit Location With Dr.mpoint Groundwater Monitor	Sep-1990	1.25	0.97	355.68	356.64	7.42
TP6	Test Pit Location	Sep-1990	n/a	n/a	358.20	n/a	7.00
TP7	Test Pit Location	Sep-1990	n/a	n/a	354.77	n/a	8.00
TP8	Test Pit Location With Dr.mpoint Groundwater Monitor	Feb-2012	1.25	0.91	358.48	359.39	4.57
TP9	Test Pit Location With Dr.mpoint Groundwater Monitor	Feb-2012	1.25	0.84	356.85	357.68	4.57
MPS-1	Mini-Piezometer	Jul-2009	0.75	0.84	354.57	355.41	7.01
MPS-2	Mini-Piezometer	Jul-2009	0.75	0.72	352.28	353.00	7.12
MPE-1	Mini-Piezometer	Jul-2009	0.75	0.72	354.71	355.43	7.12
MPE-2	Mini-Piezometer	Jul-2009	0.75	0.79	353.79	354.58	7.12
MPS-1	Mini-Piezometer	Jul-2009	0.75	0.77	354.75	355.52	7.12
MPS-2	Mini-Piezometer	Jul-2009	0.75	0.61	356.84	357.45	2.75
MPW-1	Mini-Piezometer	Jan-2011	0.75	0.70	354.92	355.62	2.20
MPW-2	Mini-Piezometer	Jan-2011	0.75	0.72	356.05	356.84	1.80
MP1	Mini-Piezometer	Nov-2010	0.75	1.14	356.81	358.01	2.61
MP2	Mini-Piezometer	Nov-2010	0.75	0.44	356.81	357.38	4.57
MP3	Mini-Piezometer	Nov-2010	0.75	0.71	359.80	360.61	4.00
MP4	Mini-Piezometer	Nov-2010	0.75	0.75	358.23	358.98	3.96
SW1	Surface Water Gauge	Aug-1996	n/a	n/a	n/a	356.34	n/a
SW2	Surface Water Gauge	Aug-1996	n/a	n/a	n/a	355.28	n/a
SW2-D	Surface Water Gauge and Stream flow Measurement	Aug-1996	n/a	n/a	349.64	351.02	n/a
SW2-U	Surface Water Gauge and Stream flow Measurement	Aug-1996	n/a	n/a	n/a	351.66	n/a
SW3A/SW3	Stream flow Measurement	Mar-2009	n/a	n/a	n/a	355.33	n/a
SW4	Surface Water Gauge and Stream flow Measurement	Aug-1996	n/a	n/a	348.97	350.12	n/a
SW5	Surface Water Gauge	Aug-1996	n/a	n/a	354.73	355.54	n/a
SW6	Surface Water Gauge	Oct-2001	n/a	n/a	n/a	354.96	n/a
SW7	Surface Water Gauge and Stream flow Measurement	Oct-2001	n/a	n/a	n/a	359.46	n/a

TOWNSHIP OF GUELPH-ERAMOSA
ZONING BYLAW
(CONSOLIDATED 2009, DEC. 31)

ZONING SCHEDULE:



LEGEND:

M1 RURAL INDUSTRIAL
H HAZARD LAND
A AGRICULTURAL
BOUNDARY TO BE LICENSED

LEGEND:

BOUNDARY TO BE LICENSED
120m 120m AROUND LICENCE
WOODED AREA
PONDS / WETLANDS
INTERMITTENT STREAM
FENCELINE
BUILDINGS (TYPE)
EXISTING CONTOURS(METRES ABOVE SEA LEVEL)
DIRECTION OF SURFACE RUN-OFF
A A' TYPICAL SECTION LOCATIONS
MUNICIPAL BOUNDARY
ENTRANCE/EXIT
S EXISTING AGGREGATE STOCKPILE
EXISTING LANE
10 MONITORING WELL

NOTES:

1. This Site Plan has been prepared for submission to the MNR under the Aggregate Resources Act for a Class "A" Licence, Category 2, Quarry Below Water.
2. This Site Plan has been completed using information taken from Township of Guelph-Eramosa Zoning By-law, the 1:100,000 scale Provincial Highway Mapping and County Roads mapping, Ontario Base Mapping (1:10,000), topographic base mapping and water elevations - Harden Environmental Services Ltd, field information and recent aerial photography of the local area.
3. This site is comprised of plantation, woodlands, a former wayside pit and a small pond/wetland. Zoning for the site is Agricultural and Hazard (See Zoning Schedule). Lands to the south are zoned Rural.
4. The existing entrances to the site are shown on this plan.
5. Stockpiles of aggregate are shown on the plan.
6. Wells on the site and adjacent to the property are shown on the site. A description of wells is provided in Table 1.
7. Along the southern portion of the site, there is a house and a shed. Residences and other structures within 120 m of the site are shown.
8. There are no existing piles of scrap on the site.
9. There are no existing fuel storage areas on the site.
10. The existing surface water drainage is shown on this plan. An intermittent watercourse is shown on the Site Plans. Wetlands/ponds on the site and adjacent to the site are illustrated on the Site Plans.
11. The existing ground water table ranges from 348 to 356 (masl). All measurements shown on the Site Plans are in metres.
12. Proposed Licensed Area = 39.4 ha.

REFERENCES:

Aercoustics Engineering Limited. 2012. Noise and Blast Impact Study - Project No. 11007.

Cole Engineering Limited. 2012. Traffic Impact Assessment of the Proposed Hidden Quarry.

County of Wellington. 1999. Official Plan.

Grand River Conservation Authority. 2011. Contour Information and Aerial Photography.

GWS Ecological and Forestry Services Inc. 2012. Proposed Hidden Quarry - Level 2 Natural Environment Technical Report.

Harden Environmental Services Ltd. 2012. Level 1 and 2 Hydrogeological Investigation - Hidden Quarry.

K. W. Ingram. 1990. Borehole Records - Lot 1, Concession 6, Eramosa Township, County of Wellington.

RWDI. 2012. Air Quality Assessment - Proposed Hidden Quarry - Report # 1201429.

Township of Guelph-Eramosa. Comprehensive Zoning By-law.

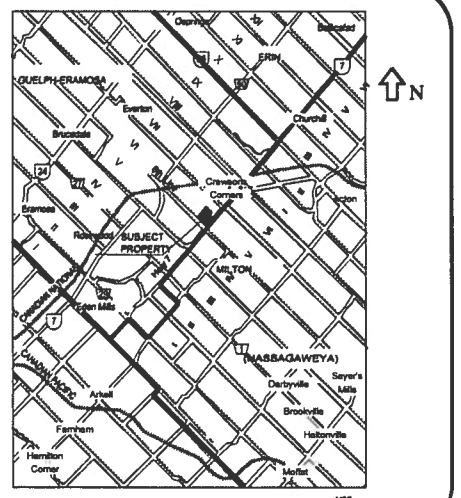
York North Archaeological Services., 2012, Stage I-II Archaeological Assessment of the Proposed James Dick Ltd. Hidden Quarry

HIDDEN QUARRY

PART OF LOT 1, CONCESSION 6
TOWNSHIP OF GUELPH-ERAMOSA
FORMER TOWNSHIP OF ERAMOSA
COUNTY OF WELLINGTON

Page 1 of 5
EXISTING FEATURES

KEY MAP



THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE, CATEGORY 2 - QUARRY BELOW WATER.

THESE SITE PLANS HAVE BEEN PREPARED UNDER THE DIRECTION OF AND CERTIFIED BY A PERSON APPROVED BY THE MINISTER OF NATURAL RESOURCES (AS PER SECTION 9(4) OF THE AGGREGATE RESOURCES ACT).

SIGNATURE: _____ DATE: _____

PREPARED FOR: JAMES DICK CONSTRUCTION LTD

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Box 470 Bolton Ontario L7E 5T4
Bolton:(905)857-3500 Fax:(905)857-4833
Toll Free: 1-888-535-3333

APPROVED: R.P.S. DRAWN: C.K.S.
PLOTTED: SEPTEMBER 21, 2012 FILE: [illegible]

No.	DATE	DESCRIPTION	APP'D

AMENDMENTS

Scale: 1:3000 0 100 200 meters

STOVEL and Associates Inc.
297 BRAEHILL DRIVE
STRATFORD, ONTARIO
N5A 7T1
PHONE (519) 273-7629

APPENDIX B

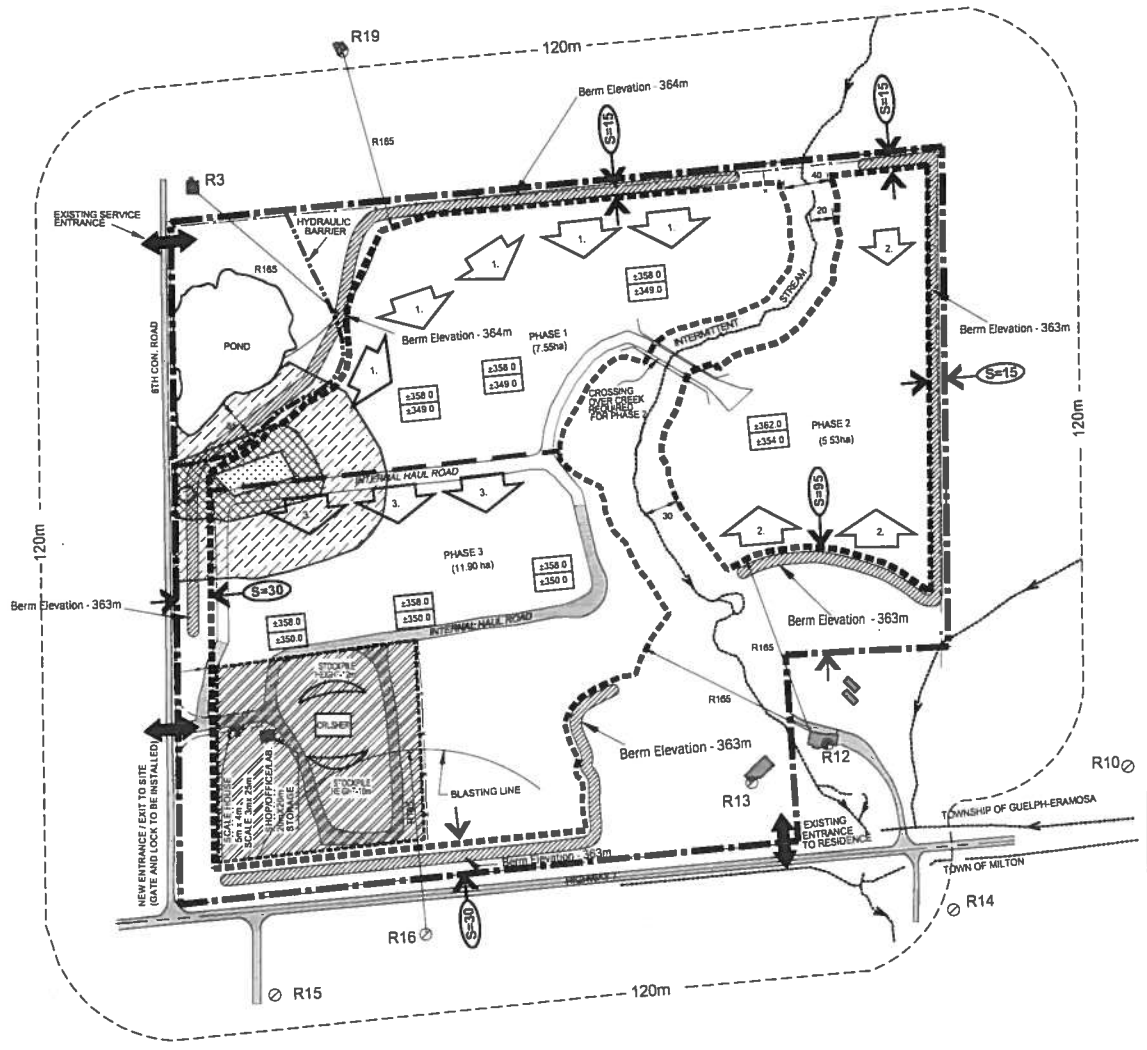
AERIAL PHOTO OF SITE AND SURROUNDING LANDS


Vierman Construction
Blue Springs
Bonduel Products Inc
System Fencing
7
5 Line

APPENDIX C

OPERATIONS PLAN

7.2



TECHNICAL RECOMMENDATIONS

Water - Hydrogeological Investigation Report by Harden Environmental

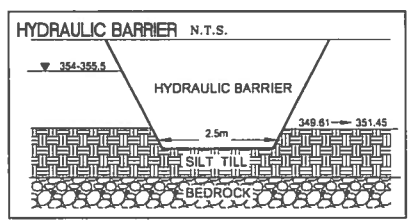
The monitoring program for this proposed pit/quarry involves the following activities:

- measuring groundwater levels,
- obtain water quality samples,
- monitoring water levels in the on-site wetland and stream, and
- stream flow measurements

Parameter	Monitoring Locations	Frequency
Groundwater Levels	M1 S/D, M2 M3, M4 M5, M13SD M14 S/D M, MPN1, MPN2, MPS1 MPS2, MPE1, MPE2 MPW1 MPW2, TP1 TP8, TP9	Monthly April to November, February
Groundwater Levels	M2, M3, TP1, M13 S/D M14 S/D	Weekly during first 3 months of extraction
Surface Water Levels	SW6	Monthly April to November
Surface Water Flow	SW4 SW6 SW3	Monthly April to November
Groundwater Quality	M2, M4	Annually
Surface Water Quality	West Pond, East Pond	Annually

A hydraulic barrier shall be installed along the southern and eastern portions of the wetland. The barrier will limit the outflow of groundwater downgradient of the wetland. The schematic of the hydraulic barrier is set out on the Site Plans.

A water well complaint protocol will be implemented. Details are contained in the Harden report.



Level II Natural Environment Technical Report by GWS Ecological Services

- A 30m buffer will be established from the limit of the PSW provided the identified Archaeological Feature is cleared. If this is not the case the hydraulic barrier will be installed approximately 20m from the PSW in this area in order to maintain buffer requirements around the Archaeological feature. This is shown in Figure 4-2 of the Hydrogeological Investigation prepared by Harden Environmental Services. A 20 to 30m buffer will be established from the banks of the intermittent stream and the edge of the locally significant wetland (MAM3-2) as shown on the Site Plans Wetland boundaries will be flagged by GWS staff.
- In the southeastern portion of the site GWS staff will flag and/or stake the dripline of trees which mark the boundary of FOM2-2 and will also assist the surveyor in staking the setback required from the existing off-site residence (i.e. minimum of 165m) which traverses portions of woodland units CUP3-12a, FOC2-2, FOD5-7 and CUP3-12d. Elsewhere on the property the surveyor must stake the required setbacks from property boundaries.
- Prior to the initiation of tree clearing operations trees which occur immediately beyond the specified setbacks will be marked with orange spray paint by GWS staff to further ensure there are no intrusions into tree protection areas. Trees to be removed will be marked with an orange dot at chest height and a slash of the butt which extends to the ground.
- Tree protection measures will be installed as required around the limit of the extraction area after all tree clearing and grubbing is completed.
- To facilitate access to the eastern extraction area an appropriately sized culvert must be installed in the intermittent stream at the location shown in the Operations Plan. Culvert installation should occur in the summer months when there is no flow in the stream.
- Topsoil and overburden will be stripped and stored separately in bermed stockpiles as illustrated on the Operations Plan. All berms will be graded to stable slopes and seeded to prevent erosion and minimize dust.
- Dust control will be implemented in accordance with the procedures described on the Operations Plan.
- Progressive rehabilitation will be implemented as specified in the Site Plans and replanting will commence as early as possible with an emphasis on the area adjacent to the PSW and northern property line (i.e. Phase 1 on the Operations Plan).
- All tree and shrub planting stock will be obtained from nurseries that utilize seed from the same genetic seed zone wherein the James Dick property is located.
- Shoreline wetlands will only be planted with native species taken from local wetlands.

Archaeology

Technical recommendations of the archaeologist have been incorporated onto the Site Plan to ensure protection of the cultural heritage resources.

o An archaeological resource area has been identified in the north-western portion of the site.
o The extent of the archaeological site has been buffered with a 20 m setback area. A 50 m monitoring zone has also been established around the site and around a buffer zone. Site disturbance will not be permitted within the 20 m buffer zone.
o Any soil disturbance within the monitoring zone will be monitored by a licensed archaeologist who is empowered to stop construction if there is a concern for impact to an archaeological site. The area within the 20-meter buffer is a no go zone by construction crews at any time.
o No activities within the confines of this site are allowed until after the Stage 3 assessment has been completed to the satisfaction of the Ministry of Tourism, Culture and Sport and the report has been entered into the Ontario Registry of Reports. A partial clearance is requested and a letter from the ministry confirming that there are no further concerns with regard to alterations to archaeological sites for the specified part of the project area namely AjHa-50 (Section 7.8.5 -a - e).
o A Stage 3 archaeological study and removal will be required to clear this property post licensing. The buffer zone shall not be disturbed should archaeological clearance not be granted. The acoustic berm will be relocated to the east and south of the Buffer zone if clearance is not granted. The limit of extraction will also be modified in this area.
o Should deeply buried archaeological material be found on the property during construction activities, the Ministry of Culture shall be contacted immediately (519) 675-7742.
o In the event that human remains are encountered during construction, the licensee shall immediately contact bout the Ministry of Culture and the Registrar of the Cemeteries Regulations Unit of the Ministry of Consumer and Commercial Relations (416) 326-8404.

SPILLS CONTINGENCY AND RESPONSE PROGRAM

1. Liquid petroleum products (fuels, oil) in quantities greater than 500 litres or other hazardous liquid chemical associated with the operation will not be stored onsite on a permanent basis.
2. Temporary fuel storage facilities will be inspected for leaks on a regular basis when operations are occurring. If operations are not occurring (for example on weekends or during an extended shutdown period), inspection of temporary fuel storage facilities remaining onsite will occur weekly.
3. Spills containment materials (for example, absorbency materials and portable containers) are to be available on-site as part of the temporary fuel storage equipment.
4. In the case of an accidental spill of fuel or oil, the following action is to be taken:
(a) If the spill volume is approximately 5 L or more, or the spill occurs directly to a surface water feature, contact the Township and the Spills Action Centre established by MOE (1-800-268-6060).
(b) Take reasonable measures to stop or control the spill (such as closing valves, collecting leakage in a container, applying the absorbency materials).
(c) Arrange for an inspection of the spill site and a general assessment of the environmental impact by a Qualified Person (Qualified Person means a professional engineer or professional geoscientist) and/or the Ministry of the Environment.
(d) Implement remedial measures as recommended by the Qualified Person and/or the Ministry of the Environment.
(e) Prepare a written report on the incident for review by the Township, MNR/MOE.

HOURS of OPERATION

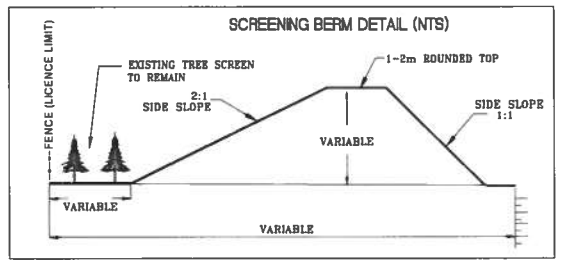
1. Shipping and Loading: 6 am to 7 pm - Weekdays and 6 am to 1 pm - Saturdays.
2. Extraction and Processing: 7 am to 7 pm - Weekdays and 7 am to 1 pm - Saturdays.
3. Drilling and Blasting: 8 am to 5 pm - Weekdays. No drilling and blasting on weekends.
4. Closed for Operations on Sundays and Public Holidays.
5. Maintenance and Rehabilitation may occur during normal weekday hours, 6 am to 7 pm, and on Saturdays from 7 am to 5 pm.

SITE PLAN OVERRIDE TABLE

THE FOLLOWING CONDITIONS ILLUSTRATED ON THIS PLAN VARY FROM THE REQUIREMENTS OF THE PROVINCIAL STANDARDS THAT APPLY TO LICENSED PITS AND QUARRIES IN ONTARIO.

OVERRIDE	STANDARD
Rehabilitation of side slopes may occur at a slope steeper than 2:1 to promote ecological diversity	5. 19.2

SCREENING BERM DETAIL (NTS)



DUST - Air Quality Assessment by RWDI

1. The quarry is limited to 12 hours of operation per day, from 7:00 am to 7:00 pm for site preparation drilling, blasting, excavation, processing operations and rehabilitation activities, and 6:00 am to 6:00 pm for shipping operations.
2. The maximum processing rate of 6,000 tonnes per day is not exceeded.
3. Equipment specific controls will be implemented including a 25km/hr speed limit, appropriate tail pipe emission tiers, and dust suppression.
4. An Environmental Compliance Approval under Section 9 of the Environmental Protection Act (EPA) will be obtained as required.
5. A Best Management Practices Plan will be developed and implemented.
6. The processing plant should be located approximately as shown on the site plans.
7. Stripping of overburden should be limited to times when extraction, production and shipping activities are well below the estimated peak rate of 6,000 tonnes per day.

LEGEND:

- BOUNDARY TO BE LICENSED
- LIMIT OF AREA TO BE EXCAVATED
- 120m 120m AROUND LICENCE
- RESIDENTIAL BUILDINGS (TYPE)
- ±358.0 / ±350.0 SPOT ELEVATION, TOP OF SAND & GRAVEL / SPOT EL., BOTTOM OF SAND & GRAVEL
- DIRECTION OF EXCAVATION
- MAIN INTERNAL HAUL ROUTE
- MAIN PROCESSING AREA
- WATERCOURSE
- HYDRAULIC BARRIER
- S=15 SETBACK
- ENTRANCE/EXIT
- BERM
- A A' TYPICAL SECTION LOCATIONS
- MUNICIPAL BOUNDARY
- R11 RECEPTOR LOCATION
- EXTENT OF ARCHEOLOGICAL SITE
- 20m BUFFER AROUND ARCHEOLOGICAL SITE
- 50m MONITORING ZONE AROUND BUFFER AREA

NOTES:

1. This plan depicts a schematic operations sequence for this property based upon the best information available at the time of preparation. Phases shown are schematic and may vary with demand and variations in the aggregate deposit. Phases do not represent any specific or equal time period. Phases and lifts may be operated concurrently. Excavation will occur above and below the water table.
2. The lands are to be rehabilitated to an ecological after-use with the incorporation of a lake (s).
3. The site will be operated in several Phases, consisting of two lifts, as shown on the Site Plan. The first lift will involve the extraction of the unconsolidated material above the water table. The second lift will involve the extraction of consolidated material above and below the water table. Due to the variability in stone and sand gradations, and with fluctuations in market demand for various aggregate products, extraction may occur simultaneously at different portions of the site, unless otherwise specified in the technical reports, i.e. noise and dust.
4. Extraction operations will use loaders, drag-lines and excavators, which will feed a processing plant(s), i.e. crushing, screening and washing plants. Other equipment to be used on the site includes: trucks, tractors, portable drill, scrapers, and dozers. Equipment will be stored in the main processing area.
5. Existing property limits are fenced. Once extraction initiated, fencing repairs and fence installation will occur along the perimeter of the site as required.
6. On site permanent fuel storage will not occur in quantities greater than 500 litres.
7. Processing equipment and aggregate stockpiles resulting from this operation shall proceed as close to the excavation face as possible, during the initial phase of operations. A main processing area will be developed in the western portion of the site once a sufficient area has been cleared.
8. It is anticipated that the only buildings or structures that will be constructed are a scale and scalehouse and a maintenance shop/office/ quality lab. The scale and scalehouse will be located close to the main entrance to the site, adjacent to the 6th Concession.
9. Scrap will not be stored permanently onsite. Temporary scrap piles will be located in the main processing area as shown on the Site Plan.
10. Onsite overburden quantities are minimal, therefore overburden and topsoil may be stored together in the stockpile locations or perimeter berms. Where there is a sufficient depth of subsoil and overburden, stripping and storage will occur separately.
11. Topsoil and overburden stockpiles will be seeded with an appropriate grass legume seed mixture to prevent erosion(See typical screening berm detail).
12. All vegetation planted during the operation of the site will be maintained in a healthy growing condition. Should any planted vegetation die, it will be replaced within one growing season.
13. One (looped) internal haul road is shown on the plan. Internal haul roads may need to be modified during the course of operations to permit efficient access to different product stockpiles. The internal haul road will be paved from the entrance to the scale. The internal haul road will be inspected daily, or more often as required, to ensure that dust and aggregate are not tracked onto the municipal road system. Dust will be controlled through mechanical sweeping and or treatment with water.
14. Aggregate will be transported from the pit to a year-round access onto 6th Concession. Trucks will use Provincial Highway 7 as the main haul route.
15. The existing ground water table occurs at +/- 348 to 356 masl.
16. There will be no proposed water diversions or points of discharge to surface water from this site. Surface drainage will be allowed to percolate through the rehabilitated pit/quarry floor and reflect the existing surface drainage as much as possible.
17. Dust control will be maintained through the use of a MOE approved dust suppressant or water as required.
18. During the early stages of operation a small pond (< 0.4 ha in size) may be temporarily established on the pit/quarry floor to permit washing operations and to provide water for dust suppression. Silt may be deposited in quarry ponds. A permit to take water will be obtained from the MOE prior to any washing operations taking place as required.
19. The location of existing vegetation/natural tree screening is shown on Page 1.
20. Any trees or stumps that are needed to be removed from the extraction area shall be harvested, mulched or used for rehabilitation purposes. The area to be extracted is 24.8 ha.
21. The maximum tonnage to be removed from this license in any calendar year shall be 700,000 tonnes.

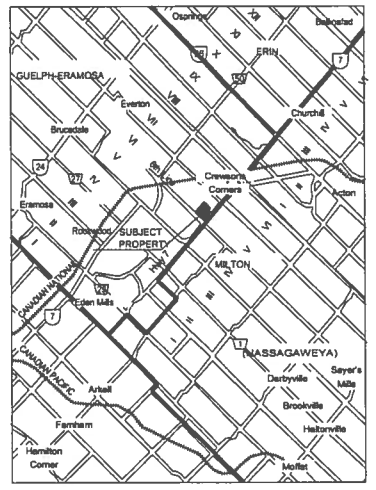
HIDDEN QUARRY

PART OF LOT 1, CONCESSION 6
TOWNSHIP OF GUELPH-ERAMOSA
FORMER TOWNSHIP OF ERAMOSA
COUNTY OF WELLINGTON

Page 2 of 5

OPERATIONS PLAN

KEY MAP



THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE, CATEGORY 2 - QUARRY BELOW WATER.

THESE SITE PLANS HAVE BEEN PREPARED UNDER THE DIRECTION OF AND CERTIFIED BY A PERSON APPROVED BY THE MINISTER OF NATURAL RESOURCES (AS PER SECTION 8(4) OF THE AGGREGATE RESOURCES ACT).

SIGNATURE: _____ DATE: _____

PREPARED FOR:

JAMES DICK CONSTRUCTION LTD
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Box 470 Bolton Ontario L7E 5T4
Bolton:(905)857-3500 Fax:(905)857-4833
Toll Free 1-888-535-3333

APPROVED: R.P.S. DRAWN: C.K.S.
PLOTTED: SEPTEMBER 21, 2012 FILE: [illegible]

No.	DATE	DESCRIPTION	APP'D

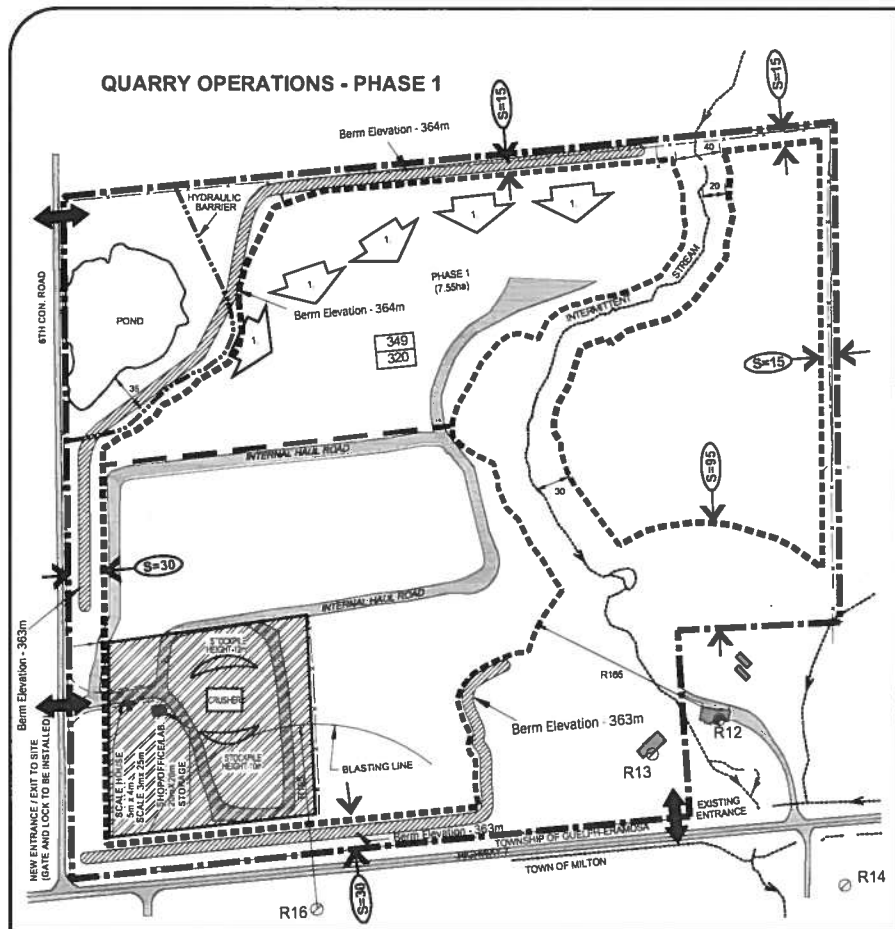
AMENDMENTS

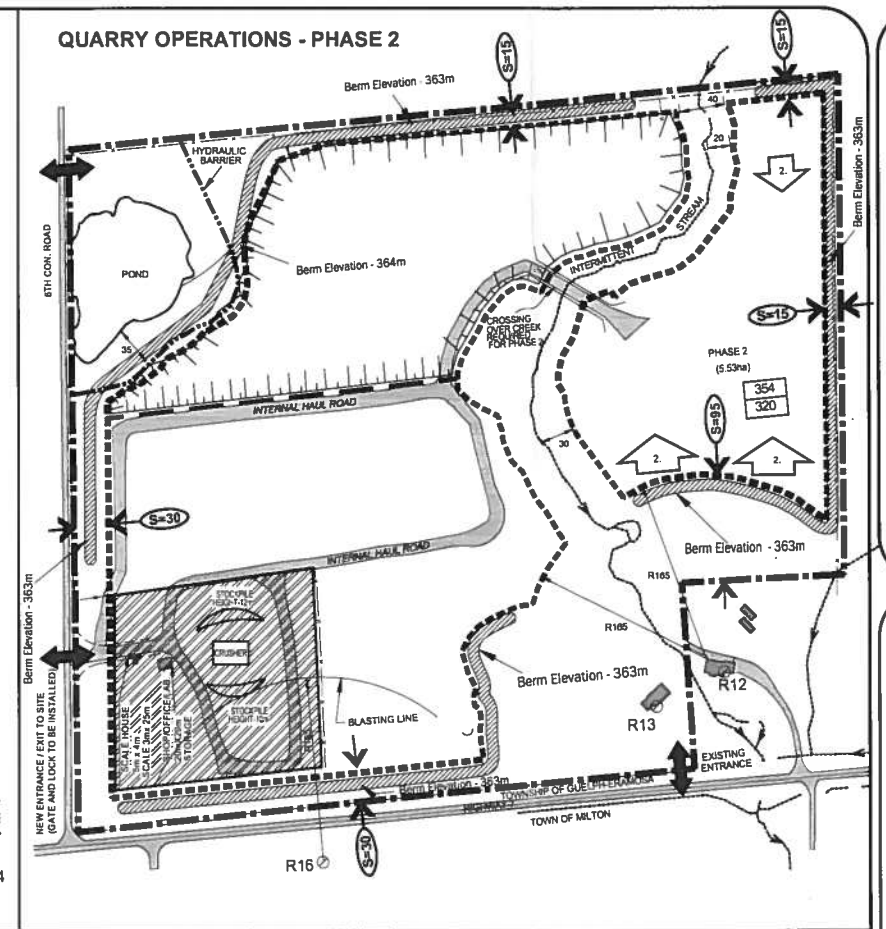
North

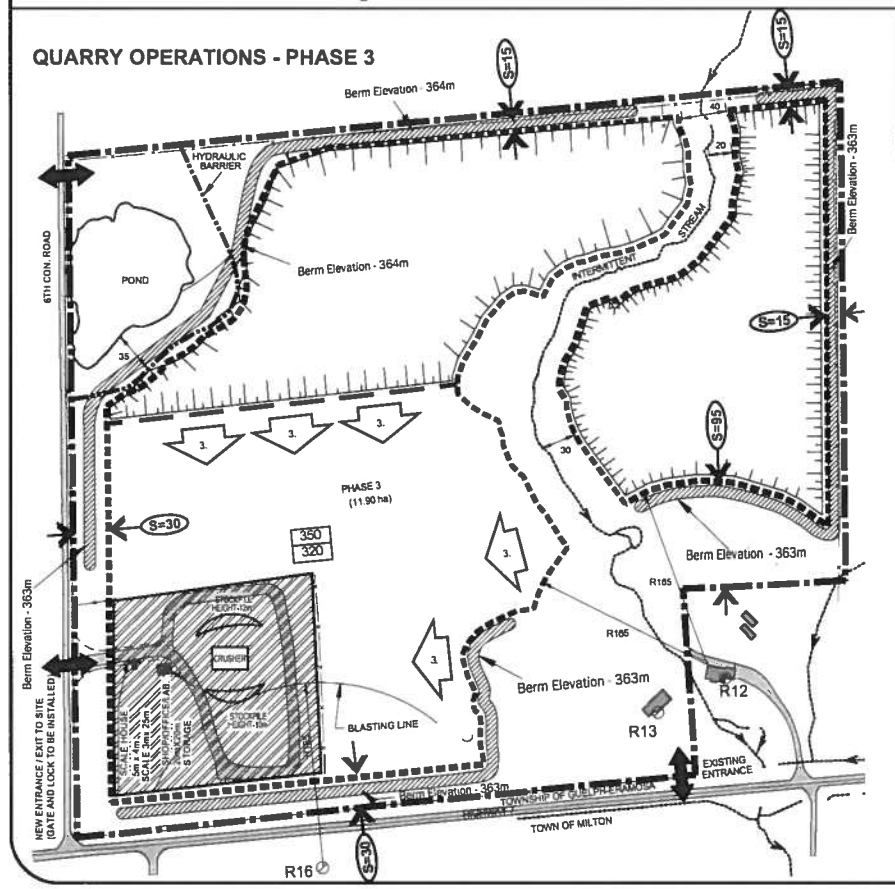
Scale: 1:3000 (0, 100, 200 meters)

STOVEL and Associates Inc.
297 BRAHILL DRIVE
STRATFORD, ONTARIO
N5A 7T1
PHONE (519) 273-7829

7.2







Noise and Blast Impact Study by Aercoustics

Overpressure and vibration due to quarry production blasting shall meet the specific limits outlined in MOE publication NPC-119. Provided that routine monitoring of levels is employed, the target criteria defined by this publication are 128dBLin and 12.5mm/sec. peak for overpressure and vibration, respectively.

The following recommendations are provided in order to meet the applicable criteria:

- 12m and 10m high stockpiles should be maintained in certain locations around the processing plant for each phase and stage. The stockpile peaks should be located no further than 30m from the processing plant, and should be located such that, in plan, they block line-of-sight between processing plant equipment and sensitive receptors, as described in the table below

Table 4: Recommended Stockpile Height and Position

Stockpiles Positioned to Shield Receptor Drs	Minimum Stockpile Height (m)
R1, R15, R16, R17, R18	10
R2, R4, R5, R11, R19	12

- A quiet drill with a maximum sound power rating of 112dBA should be used. This corresponds to a maximum sound pressure level rating of 75dBA at 30 meters.
- Earth berms should be constructed to the elevations shown and located as shown on the site plans.
- The recommended direction of extraction is indicated on the site plans.
- The permanent processing plant area should be established at an elevation of 349m, and a haul route trench connecting the processing plant area to Phase 1 extraction area should be excavated to the same 349m elevation.
- A blast design should be employed which limits the allowable weight of charge per minimum delay period. Typically the minimum delay period is in the order of 10 milliseconds and the weight of charge is designated accordingly depending on setback distance.

All construction equipment used in site preparation/construction must meet the sound emission standards defined in MOE publication NPC-115. The relevant background information on non- stationary noise sources as well as publication NPC-115 is given in MOE Model Municipal Noise Control Bylaw, 1978 as well as the sound source exclusions defined in MOE publications NPC 205/232, 1995, included in the attached.

LEGEND:

- BOUNDARY TO BE LICENSED
- LIMIT OF AREA TO BE EXCAVATED
- S=15 SETBACK
- RESIDENTIAL BUILDINGS (TYPE)
- SPOT ELEVATION, TOP OF SAND & GRAVEL
- SPOT EL., BOTTOM OF SAND & GRAVEL
- SPOT ELEVATION, TOP OF DOLOSTONE
- SPOT EL., BOTTOM OF DOLOSTONE
- DIRECTION OF EXCAVATION
- MAIN INTERNAL HAUL ROUTE
- EXCAVATION FACE
- HYDRAULIC BARRIER
- ENTRANCE/EXIT
- BERM
- VERTICAL FACE
- MAIN PROCESSING AREA
- 354 EXISTING BEDROCK ELEVATION
- 320 PROPOSED QUARRY FLOOR ELEVATION

NOTES:

Quarrying Operation

- Dolostone extraction will occur above and below the water table
- Dolostone extraction will occur once overburden, including sand and gravel, is removed and the bedrock surface is prepared for drilling and blasting
- The use of under water excavation will result in the quarry being able to operate without the need to dewater the excavation area
- Underwater blasting will be used in order to reduce the blasting noise and vibration impact. The frequency and timing of blasts over the duration of the operation will be variable
- Drilling and blasting will not occur within a distance of approximately 165 m to the adjacent sensitive receptor(s). Should the blasting pattern be revised, extraction may occur within this setback.
- Once the dolostone is broken up by blasting, the quarried rock will be removed by an excavator or drag-line, and placed on the working floor of the quarry to dry.
- Quarry haul trucks will be used to transport raw material from the active quarry area to the main processing area. A looped internal haul road system has been identified on the Site Plans. The size and location of this internal road system may be adjusted by the operator.
- The main processing area will include equipment such as crushing/screening plant(s) and a wash plant. Processed aggregate will be stockpiled in this area.
- Loaders will load highway trucks with finished aggregate product. Trucks will leave the site via an improved entrance on Concession 6
- The depth of dolostone extraction is anticipated to be +/- 30-35 m. The quarry floor has been established at 320 masl.
- The final blast for each respective phase will be adjusted to permit a more roughened face. This will allow for ecological diversification of the quarry face, as per the rehabilitation program
- As part of the rehabilitation program, stockpiled soil and overburden will be pushed from the perimeter berms into the quarried area. This material will be graded and planted with suitable vegetation

Phase 1 Operations:

- Phase 1 is approximately 7.5 ha in size
- Extraction of dolostone will start at the approximate elevation of 349 masl and terminate at 320 masl
- Perimeter berming, as established in the Noise and Blast Impact Study, will be established in respective phases prior to quarrying.
- A hydraulic barrier will be installed in the northwest portion of the site, prior to extraction below the water table in Phase 1
- Extraction will proceed in a southerly direction

Phase 2 Operations:

- Phase 2 is approximately 5.5 ha in size
- Extraction of dolostone will start at the approximate elevation of 354 masl and terminate at 320 masl
- Perimeter berming, as established in the Noise and Blast Impact Study, will be established in respective phases prior to quarrying.
- Extraction will proceed such that the extraction face proceeds towards the perimeter berm

Phase 3 Operations:

- Phase 3 is approximately 11.9 ha in size
- Phase 3 involves the extraction of the southwesterly portion of the site, including the Central Processing Area
- Extraction of dolostone will start at the approximate elevation of 350 masl and terminate at 317 masl
- The internal haul route will be adjusted to allow for the extraction of this area.
- Perimeter berming, as established in the Noise and Blast Impact Study, will be established in respective phases prior to quarrying.
- Extraction will proceed such that the extraction face proceeds towards the perimeter berm

General Notes:

Asphalt or concrete plants are not proposed and are not permitted in this licensed area.

Fuel, oil, radiator and hydraulic fluid, and other chemicals needed from the maintenance and functioning of on-site aggregate processing equipment shall be appropriately handled and shall meet the requirements of the Technical Standards and Safety Act (TSSA) and Liquid Fuels Handling Code, and in accordance with the Ministry of Environment's chemical storage guidelines. All refueling shall be within a containment pad and any spill shall be removed and disposed of immediately at the appropriate MOE approved facility and in accordance with the required spills contingency program for the licensed operation

The importation and storage of snow of the subject land is not an accessory use under the Extractive Industrial zoning or deemed ancillary to an aggregate operation. As such, the importation and storage of snow is not permitted at this site.

Certificates of Approval will be obtained from the Ministry of Environment, as required

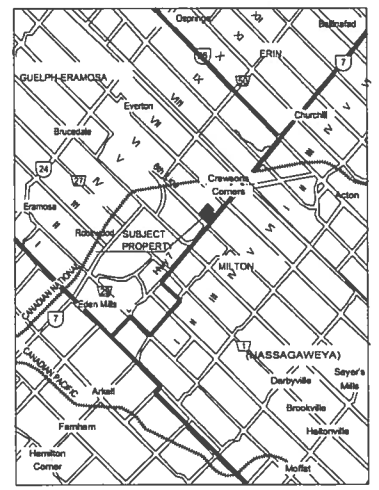
HIDDEN QUARRY

PART OF LOT 1, CONCESSION 6
TOWNSHIP OF GUELPH-ERAMOSA
FORMER TOWNSHIP OF ERAMOSA
COUNTY OF WELLINGTON

Page 3 of 5

QUARRY PHASING

KEY MAP



THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE, CATEGORY 2 - QUARRY BELOW WATER.

THESE SITE PLANS HAVE BEEN PREPARED UNDER THE DIRECTION OF AND CERTIFIED BY A PERSON APPROVED BY THE MINISTER OF NATURAL RESOURCES (AS PER SECTION 8(4) OF THE AGGREGATE RESOURCES ACT).

SIGNATURE: _____ DATE: _____

PREPARED FOR:

JAMES DICK CONSTRUCTION LTD
www.jamesdick.com
Box 470 Bolton Ontario L7E 5T4
Bolton:(905)857-3500 Fax:(905)857-4833
Toll Free: 1-888-535-3333

APPROVED: R.P.S.	DRAWN: G.K.S.
PLOTTED: SEPTEMBER 21, 2012	FILE: See ELP02-1(1)(a)

No.	DATE	DESCRIPTION	APP'D

AMENDMENTS

North

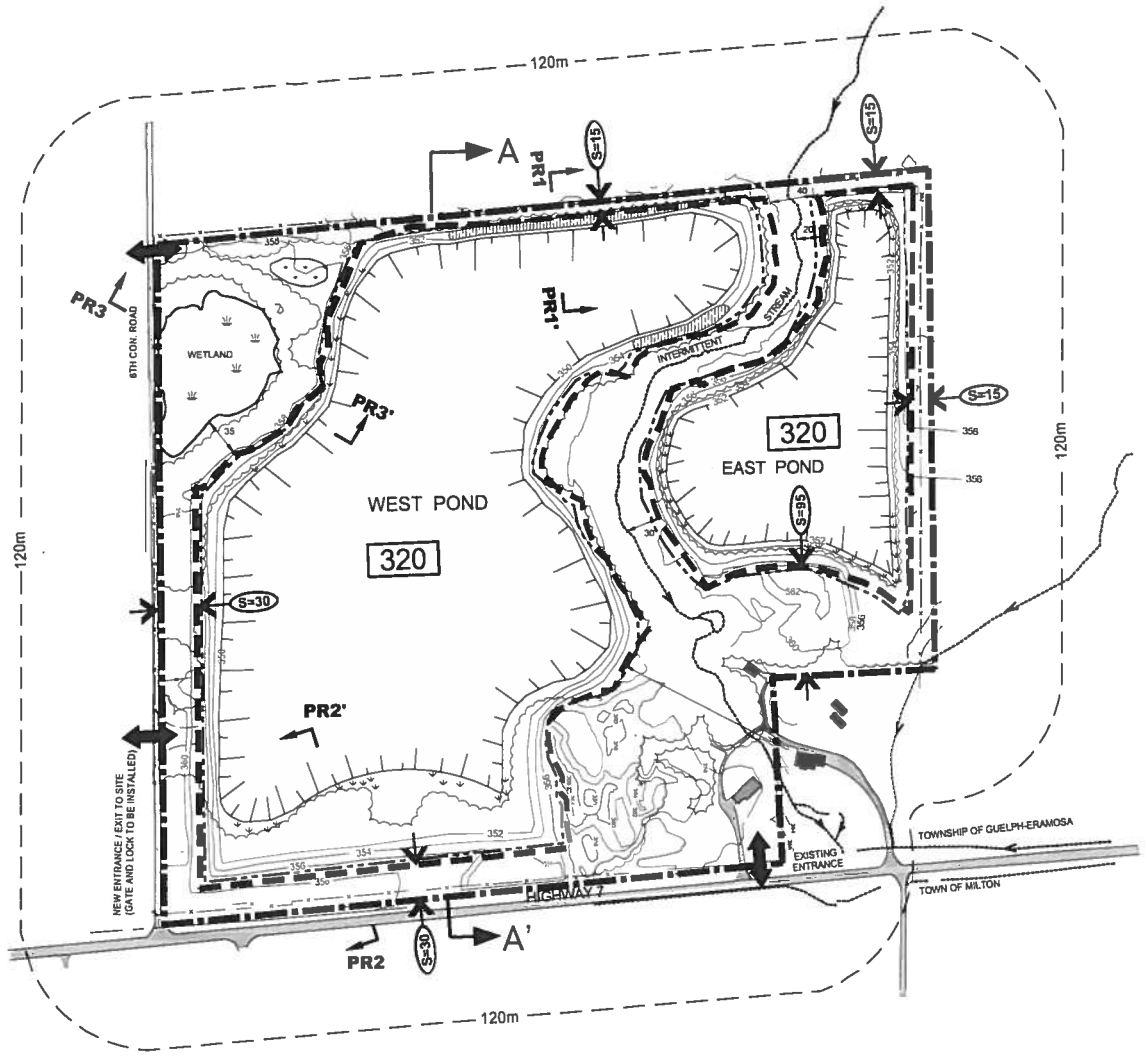
Scale: 1:3000 (0, 100, 200 meters)

STOVEL and Associates Inc.
297 BRIARHILL DRIVE
STRATFORD, ONTARIO
N5A 7T1
PHONE (519) 273-7629

APPENDIX D

REHABILITATION PLAN

7.2



Ecological Enhancement Strategy:

The goal of the ecological enhancement strategy is to create a growing environment that will provide for the long-term development of a healthy, diverse ecosystem.

The following features will be incorporated into the rehabilitation plan:
- Quarry lake areas, including the littoral zone,
- Quarry face,
- Created wetland areas, and
- Reforested tableland areas.

Quarry Lake Areas:
The extracted quarry lake areas will comprise good quality cold/cool water. The following features will be incorporated into the rehabilitation plan:

- Large boulders can be left in the bottom of the quarry
- Stone and screening piles can be left in the bottom of the quarry
- Boulders, stone and screenings piles can be dumped over the bank of the quarry
- Along the edge of the quarry, a productive littoral zone can be created by dumping soil over the edge. Stumps and logs can be strategically placed along the shoreline.

The opportunity exists to create a diversified shoreline through the extraction process. In near shore areas, on lands that will not be rehabilitated as wetlands, variable shorelines will also be considered. The area receiving this modified side sloping detail focuses on the first 2 m of the final lake water level. Side sloping and planting details similar to the wetland enhancement program will be employed.

Quarry Face:
It is recommended that the final blast for the quarry edge be rough. The quarry face below the water table may include features such as terraces and small ledges. Portions of the quarry face can receive a treatment of soil (simply by dumping a bucket of soil over the bank). As well, talus slopes can be created by dumping shot rock and other aggregate over the edge of the quarry face. Benches and terraces can be created by backfilling at the toe of the quarry face using shot rock and other aggregate that has not been sold. This material will receive a veneer treatment of soil. Native seeds and nuts can be broadcast to this area.

It is recommended, however, that at least 20 per cent of the quarry face remain barren and untreated.

Created Wetlands:
The site plans illustrate areas on the subject property where wetlands can be created. These areas are in immediate proximity to where the perimeter berming is located. The object of this process is to create wetland with a slope of approximately 5:1 to 10:1. Appropriate native vegetation should be planted in this area.

Reforested Tableland Areas:
Once the tableland areas have been graded using overburden to backfill, these areas should be treated with a layer of topsoil, and then planted with appropriate native vegetation. In general, the tableland areas will have a finished slope not to exceed 2:1. The depth of topsoil shall not be less than 10 cm.

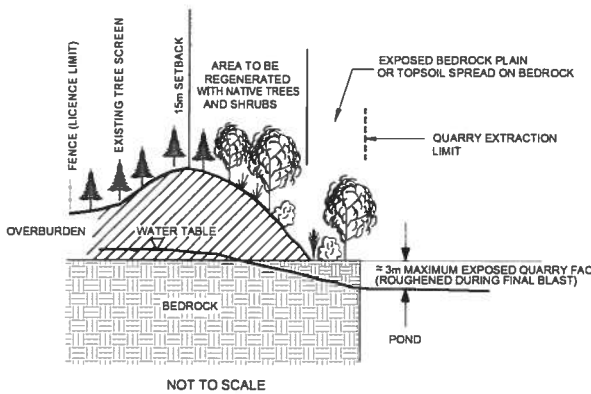
During the rough grading stage of the northwestern and southern portion of the site, the licensee shall consider creating microhabitat features such as, small depressions, mounding of soil in long, linear formations, brush piles, ephemeral pools, and small stone and screening piles. The intent of this grading program is to diversify the landscape and to create habitat opportunities for a variety of wildlife including amphibians. It is also recommended, that in portions of the rehabilitated quarry, the exposed dolostone quarry floor be left in a roughened condition without the treatment of a soil layer or planted with native vegetation.

Native species, such as white pine, white spruce, white cedar, red oak, sugar maple, red maple, white ash, red pine, white birch and bur oak, shall be used. Seedling stock from an appropriate nursery can be used with a minimum planting density of 1500 seedlings per ha, planted at a 2.4 x 2.4m spacing. Prior to reforestation common buckthorn and other invasive non-native shrubs shall be cut down low to the ground and/or treated with an appropriate herbicide. A minimum of 70% of the trees planted as part of the reforestation program will be coniferous trees. The following shrubs may be included in the replanting program, grey dogwood, red-osier dogwood, staghorn sumac, nannyberry, choke cherry and serviceberry. Forest cover should be approximately 80% of the tableland area.

To reduce undesirable competition and improve the probability of seedling survival and growth, grass and weed competition in planting areas may be scalped or controlled by other methods.

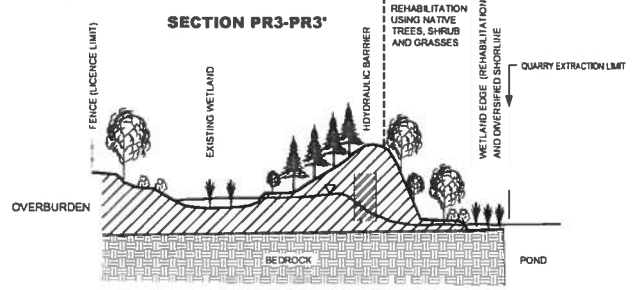
All vegetation planted shall be maintained in a healthy growing condition. Should planted vegetation die, it shall be replaced within one growing season.

SECTION PR1-PR1'



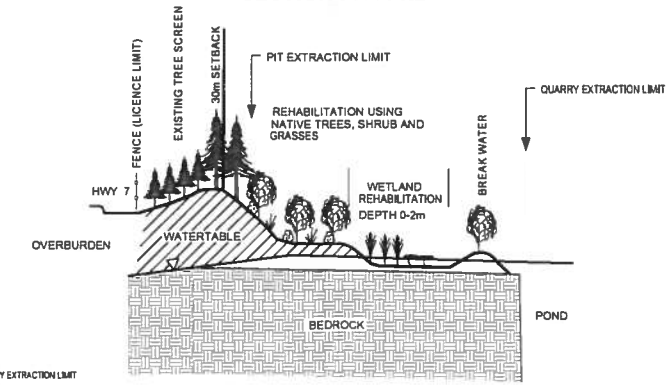
NOT TO SCALE

SECTION PR3-PR3'



NOT TO SCALE

SECTION PR2-PR2'



NOT TO SCALE

LEGEND:

- BOUNDARY TO BE LICENSED
- LIMIT OF AREA TO BE EXCAVATED
- 120m AROUND LICENCE
- A A' TYPICAL SECTION LOCATIONS
- MUNICIPAL BOUNDARY
- FENCELINE
- RESIDENTIAL BUILDINGS (TYPE)
- VERTICAL FACE
- S=15 SETBACK
- 320 FLOOR OF REHABILITATED QUARRY LAKE
- REFORESTED TABLELAND AREA
- CREATED WETLANDS
- WETLAND AREA
- CLIFF EDGE REHABILITATION
- OPEN MEADOW
- ENTRANCE/EXIT

NOTES:

General
- The site will be rehabilitated to an ecological end use, with two ponds. Wetlands will be created along the edge of the two ponds. Tableland areas will be reforested with appropriate native trees and shrubs as indicated.
- Surface runoff shall be directed toward the onsite ponds.
- The access road shall be maintained during the course of progressive rehabilitation efforts.
- Fencing shall remain around the perimeter of the quarry licence.
- All equipment and machinery within the extraction limits will be removed upon completion of extraction.
- The area to be rehabilitated is 24.8 ha.

Aquatic Rehabilitation
- The onsite ponds are approximately 13.8 ha and 3.6 ha in size.
- The predicted final water levels for the lakes are a) 348.6 masl in the west quarry lake, and b) 348.4 masl, in the east quarry lake.
- The area extracted below the water table will have a variable slope face that will range from 2:1 to vertical slopes.
- The rehabilitated lakes will be approximately 30 m in depth. The lakes will be rehabilitated for fish and aquatic habitat. Habitat enhancement measures for the lakes include the following: boulder features, shoals, and littoral zone development.
- Given the depth of the quarry ponds, it is anticipated to be suitable for walleye and smallmouth bass.
- Vertical faces can be modified during the final blast. The quarry face can remain roughened, to create ledges and crevices, thus enhancing micro-habitats.
- Available soil and large rock piles or boulders can be dumped over the quarry face to provide a diversity of habitat.

Wetland Creation
- The edges of the quarry ponds will be rehabilitated to create artificial wetlands as indicated.
- Wetland communities can be created along the pond edges within the 2 m zone where the final estimated water table is expected to occur, i.e. +/- 346 to 349 masl.
- In these wetlands, the excavation pattern will be modified to create a slope of approximately 5:1 to 10:1.
- Available overburden and soil can be used to create these slopes as well.
- Available soil can be graded to provide a medium for wetland plant communities.
- Once the wetland side slope has been graded, a minimum of 100 mm of soil will be applied to this area to permit the establishment of wetland vegetation. This area will be allowed to naturally regenerate to a wetland habitat.
- Vegetation species that are considered appropriate for the created wetland communities are listed on the Site Plan.

Terrestrial Rehabilitation
- The side slopes of the setback areas will be graded to achieve a slope of 2:1. Overburden may be applied to the side slope areas to achieve the necessary grade. A minimum of 100 mm of soil will be applied to the graded side slope areas.
- Terrestrial areas will be planted with suitable native shrubs and trees, such as white spruce, white pine and eastern white cedar. Shrubs that may be used include staghorn sumac, red-osier dogwood and raspberry. Additional plants are listed on the Site Plan.
- The sideslopes and tableland areas of the quarry floor will be covered with available overburden and topsoil and seeded with a suitable native upland meadow seed mix.
- Should seeding fail, the area shall be re-seeded as soon as possible.
- Minor grading of the setback areas may be required to permit proper final slopes for the site in areas not to be forested.

SITE PLAN OVERRIDE TABLE

THE FOLLOWING CONDITIONS ILLUSTRATED ON THIS PLAN VARY FROM THE REQUIREMENTS OF THE PROVINCIAL STANDARDS THAT APPLY TO LICENSED PITS IN ONTARIO

OVERRIDE	STANDARD
VARIANCE OF THE SIDE SLOPES FROM 2:1 IS PERMITTED TO PROMOTE ECOLOGICAL DIVERSIFICATION	5:1

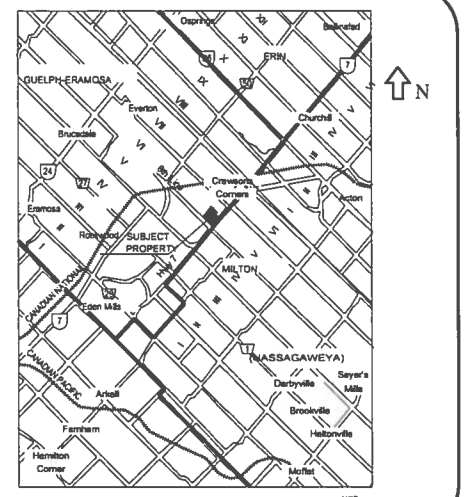
HIDDEN QUARRY

PART OF LOT 1, CONCESSION 6
TOWNSHIP OF GUELPH-ERAMOSA
FORMER TOWNSHIP OF ERAMOSA
COUNTY OF WELLINGTON

Page 4 of 5

PROGRESSIVE REHABILITATION AND FINAL REHABILITATION

KEY MAP



THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE, CATEGORY 2 - QUARRY BELOW WATER.

THESE SITE PLANS HAVE BEEN PREPARED UNDER THE DIRECTION OF AND CERTIFIED BY A PERSON APPROVED BY THE MINISTER OF NATURAL RESOURCES (AS PER SECTION 8(4) OF THE AGGREGATE RESOURCES ACT).

SIGNATURE: _____ DATE: _____

PREPARED FOR: JAMES DICK CONSTRUCTION LTD

www.jamesdick.com
Box 470 Bolton Ontario L7E 5T4
Bolton:(905)857-3500 Fax:(905)857-4833
Toll Free 1-888-535-3333

APPROVED:	R.P.S.	DRAWN:	G.K.S.
PLOTTED:	SEPTEMBER 21, 2012	FILE:	[illegible]

No.	DATE	DESCRIPTION	APP'D

AMENDMENTS

North

Scale: 1:3000
0 100 200
metres

STOVEL and Associates Inc.
297 BRAEHILL DRIVE
STRATFORD, ONTARIO
N5A 7T1
PHONE (519) 273-7829

APPENDIX E

PPS DUE DILIGENCE CHECKLIST

	.i PROVINCIAL POLICY STATMENT	
Applicable	**Section**	**Policy**
	1.0	Building Strong Communities
x	1.1	Managing and Directing Land Use to Achieve Efficient Development and Land Use Patterns
	1.1.3	Settlement Areas
x	1.1.4	Rural Areas in Municipalities
	1.1.5	Rural Areas in Territory Without Municipal Organization
	1.2	Coordination
	1.3	Employment Areas
	1.4	Housing
	1.5	Public Spaces, Parks and Open Space
	1.6	Infrastructure and Public Service Utilities
	1.6.4	Sewage and Water
x	1.6.5	Transportation Systems
	1.6.6	Transportation and Infrastructure Corridors
	1.6.7	Airports
	1.6.8	Waste Management
x	1.7	Long-Term Economic Prosperity
x	1.8	Energy and Air Quality
x	2.0	Wise Use and Management of Resources
x	2.1	Natural Heritage
x	2.2	Water
x	2.3	Agriculture
	2.3.3	Permitted Uses
	2.3.4	Lot Creation and Adjustments
	2.3.5	Removal of Land from Prime Agricultural Areas
	2.4	Minerals and Petroleum
	2.4.2	Protection of Long-Term Resource Supply
	2.4.3	Rehabilitation
	2.4.4	Rehabilitation Extraction in Prime Agricultural Areas
x	2.5	Mineral Aggregate Resources
x	2.5.2	Protection of Long-Term Resource Supply
x	2.5.3	Rehabilitation
	2.5.4	Extraction in Prime Agricultural Areas
	2.5.5	Wayside Pits and Quarries, Portable Asphalt Plants and Portable Concrete Plants
x	2.6	Cultural Heritage and Archaeology
x	3.0	Protecting Public Health and Safety
x	3.1	Natural Hazards
	3.2	Human-made Hazards

APPENDIX F

AGENCY CIRCULATION LIST

LIST UPDATED: SEPTEMBER 22, 2011
AGENCY CIRCULATION LIST

CIRCULATION DATE:

CIRCULATED TO THE FOLLOWING:

Notice of Complete Application
STAFF / Agency Circulation Letter
(only those noted with "+ Reports/Disk" will received the additional information. If others require the information they will be advised to contact me.)

MacNaughton, Hermsen, Britton, Clarkson
Planning Ltd.
Attn: Bernie Hermsen & Lana Phillips
540 Bingemans Centre Drive, Suite 200
Kitchener, Ontario N2B 3X9

Guelph Hydro
395 Southgate Drive
Guelph, Ontario N1G 4Y1

Upper Grand District School Board
Attn: Jennifer Passy, Planning Officer
500 Victoria Road North
Guelph, Ontario N1E 6K2

County of Wellington Aldo Salis
Attn: ~~Sarah Wilhelm~~, Planning &
Development Department
74 Woolwich Street
Guelph, Ontario N1H 3T9 + Reports/Disk

Union Gas Company Ltd.
Attn: Shirley Brundritt, Lands Department
50 Keil Drive North
Chatham, Ontario N7M 5M1

Conseil Scolaire de District Catholique
Centre-Sud
Attn : Andrew Aazouz, Planner
110 Avenue Drewry
Toronto, Ontario M2M 1C8

County of Wellington
Attn: Donna Bryce, Clerk
74 Woolwich Street
Guelph, Ontario N1H 3T9

Ontario Ministry of Transportation
Planning & Design Section
Corridor Control Office
659 Exeter Road
London, Ontario N6E 1L3 + Reports/Disk

Wellington Catholic District School Board
Attn: Dan Duszczyszyn, Superintendent of
Corporate Services & Treasurer
75 Woolwich Street, P. O. Box 1298
Guelph, Ontario
N1H 3V1

County of Wellington
Engineering Services, Roads Division
74 Woolwich Street
Guelph, Ontario N1H 3T9 + Reports/Disk

Canadian National Railway Properties
Attn: Nick Coleman
Mgr – Community Planning & Development
CN Business Development & Real Estate
1 Administration Road
Concord, Ontario L4K 1B9 + Reports/Disk

The French Language District School Board
for South-Western & Central Ontario
116 Cornelius Parkway
Toronto, Ontario M6L 2K5

Community Emergency Management
Coordinator
Attn: Linda Dickson
Suite 20, 474 Wellington Rd 18, RR #1
Fergus, Ontario N1M 0A1

Canadian Pacific Railway
1290 Central Parkway West, Suite 600
Mississauga, Ontario L5C 4R3

Township of Guelph/Eramosa
Mike Newark
Chief Building Official

Miller Thomson
Attn: Scott Galajda (Twp Solicitor)
Ontario AgriCentre
100 Stone Road West, Suite 301
Guelph, Ontario N1G 5L3

Bell Access Network, Grand River Region
Attn: Gayle Widmeyer
575 Riverbend Dr, 2nd Floor
Kitchener, Ontario N2K 3S3

Township of Guelph/Eramosa
Mark Robertson
Manager of Public Works + Reports/Disk

R. J. Burnside & Associates Limited
Attn: Jackie Kay (Twp Engineer)
292 Speedvale Avenue West, Unit 7
Guelph, Ontario N1H 1C4 + Reports/Disk

Bell Canada
Attn: John La Chapelle, Manager
Development & Municipal Services, Ontario
100 Borough Drive, Floor 5
Toronto (Scarborough), Ontario M1P 4W2

Township of Guelph/Eramosa
Meaghen Reid, Clerk
& Secretary of Heritage Committee

Grand River Conservation Authority
Attn: Fred Natolochny / Heather Ireland
Supervisor of Resource Planning
400 Clyde Rd, P.O. Box 729
Cambridge, Ontario N1R 5W6 + Reports/Disk

Ministry of Municipal Affairs & Housing
659 Exeter Road, 2nd Floor
London, Ontario N6E 1L3 + Reports/Disk

City of Guelph
John Osborne, Deputy Fire Chief
City of Guelph Fire Department
50 Wyndham Street South
Guelph, Ontario N1H 4E1

Mike Davis
Cuesta Planning Consultants Inc.
978 First Avenue West
Owen Sound, ON
N4K 4K5 + Report/Disk

Ontario Power Generation Inc.
Executive Vice President
Law & Development
700 University Avenue
Toronto, Ontario M5G 1X6

LIST UPDATED: SEPTEMBER 22, 2011
AGENCY CIRCULATION LIST

CIRCULATION DATE:

CIRCULATED TO THE FOLLOWING:

Township of Centre Wellington, Clerk
1 MacDonald Square, P.O. Box 10
Elora, Ontario N0B 1S0

Region of Waterloo, Clerk
150 Frederick Street
Kitchener, Ontario N2G 4J3

Ministry of Tourism, Culture and Sport
Attn: ANDREA K. Williams
Culture Programs Unit
Programs & Services Branch
Culture Division
401 Bay STREET, Suite 170
TORONTO, ON M7A 0A7
(Rec'd comment Nov 7/2012

Town of Erin, Clerk
5684 Wellington Rd 24, RR #2
Hillsburgh, Ontario N0B 1Z0

Township of Woolwich, Clerk
69 Arthur St, P.O. Box 158
Elmira, Ontario N3B 2Z6

City of Guelph, City Clerk
City Hall, 50 Carden Street
Guelph, Ontario N1H 3A1

City of Guelph, Director of Planning
City Hall, 50 Carden Street
Guelph, Ontario N1H 3A1

Ministry of Agriculture & Food
Wellington Place, RR #1
Fergus, Ontario N1M 2S3

COMBINED CIRCULATION WITH COUNTY OF WELLINGTON PLANNING APPLICATION(S). N/A

PLEASE ALSO FORWARDED TO:

Town of Halton Hills
1 Halton Hills Drive, Box 128
Georgetown, Ontario L7G 5G2

Wellington-Dufferin-Guelph Health Unit
Suite 100
474 Wellington Road 18, RR #1
Fergus, Ontario N1M 2W3

County of Wellington N/A
Attn: Aldo Salis
Planning & Development Department
74 Woolwich Street
Guelph, Ontario N1H 3T9

Region of Halton, Clerk
1151 Bronte Road
Oakville, Ontario L6M 3L1

Wellington-Dufferin-Guelph Health Unit
125 Delhi Street
Guelph, Ontario N1E 4J5

County of Wellington N/A
Attn: Gary Cousins
Planning & Development Department
74 Woolwich Street
Guelph, Ontario N1H 3T9

Town of Milton, Clerk
43 Brown Street
Milton, Ontario L9T 5H2 +REPORTS/Dick

Wellington & Guelph Housing Committee
85 Westmount Road
Guelph, Ontario N1H 5J2

Councillor Don McKay (County Ward 7)
County of Wellington N/A
84 Queen Street, R. R. 2
Puslinch, Ontario N0B 2J0

Township of Puslinch, Clerk
7404 Wellington Road 34, RR #3
Guelph, Ontario N1H 6H9

Ministry of Community & Social Services
Central West Region
6733 Mississauga Road, Suite 200
Mississauga, Ontario L5N 6J5

Canada Post Corporation N/A
Attention: Tom Zadorsky
Delivery Planning Officer
300 Wellington Street
London, Ontario N6B 3P2

Barbara McKay
84 Queen St, R. R. 2,
Puslinch, Ontario N0B 2J0

(Note: Assigned Planner and County Councillor inclusive of any additional agencies will be provided by the County of Wellington)

APPENDIX G

AGENCY COMMENTS

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 Canada
telephone (519) 823-4995 **fax** (519) 836-5477 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

January 11, 2013

Via: Email

Mrs. Janice Sheppard, AMCT
CAO
Township of Guelph/Eramosa
P.O. Box 700
Guelph ON N1G 5B4

Dear Janice:

Re: ZBA Hidden Quarry – Township of Guelph/Eramosa
James Dick Construction
File No.: 300032475.0000

We have reviewed the above noted ZBA along with the following documentation:

- Site Plan Drawings, prepared by Stovel and Associates, plotted September 21, 2012:
  - Page 1 of 5, Existing Features
  - Page 2 of 5, Operations Plan
  - Page 3 of 5, Quarry Phasing
  - Page 4 of 5, Cross Sections
  - Page 5 of 5, Cross Sections
- Planning Report, prepared by Stovel and Associates Inc., dated September 2012;
- Stage I – II Archaeological Assessment, prepared by York North Archaeological Services Inc., dated August 31, 2012;
- Air Quality Assessment, prepared by RWDI, dated September 6, 2012;
- Traffic Impact Study, prepared by Cole Engineering, dated April 2012;
- Level II Natural Environment Technical Report, prepared by GWS Ecological & Forestry Services Inc., dated August 2012; and,
- Level I and II Hydrogeological Investigation, prepared by Harden Environmental Services Ltd., dated September 2012.

We offer the following comments.

Background
The subject site (Part of Lot 6, Concession 1 in the Township of Guelph/Eramosa) is currently zoned Agricultural and Hazard. The applicant is proposing to amend the existing Agricultural and Hazard zoning to Extractive Industrial with a special provision to provide relief from required surface water excavation setbacks. Since 1999, the Official

Plan has identified this area as an Aggregate Resource area; only a portion of the property will be used for extraction purposes. Extraction is being proposed both above (80%) and below (20%) the water table. The site will be accessed off of 6th Line. The proposed annual tonnage limit for the site is 700,000 tonnes.

General

- Details of private water and wastewater services required to service the scale house or Shop/Office/Lab building should be provide on the drawing showing location and size/footprint. CBO to confirm adequacy of services.
- A residential unit exists within the proposed site. Details regarding the intended use or removal of this residence and the associated services and entrance should be provided.
- Details should be provided for the driveway apron and should adhere to Township Design Standards within the ROW.
- A high point at the property limit of the right of way should be provided in the New Entrance/Exit to the site to ensure additional surface runoff is not being directed towards 6th Line.
- The proposed entrance to be paved from the scale house to the public road.
- Will the existing service entrance shown on the Operations Plan remain or be removed?
- Fence/Gate geometry to be such that one full truck length can be off the travelled portion of the public road with the gate closed.
- Note 5 on the Operations Plan indicates that the existing property limits are fences although also indicates that fencing and repairs will be undertaken once extraction is initiated. An inspection of the existing fence condition is recommended to confirm the condition of existing fence and to establish the municipality's requirements in this regard.
- Top of rock elevation should be added to the Operations Plan.
- The Township's By-law Enforcement Officer should confirm the activities noted below conform to the Township's Noise Control by-law:
  - extraction operations may occur between the hours of 7 a.m. and 7 p.m., Monday to Friday and 7 a.m. until 1 p.m. on Saturday;
  - hauling operations may occur between 6 a.m. and 6 p.m. Monday to Friday and 6 a,m, to 1 p.m. on Saturday; and,
  - drilling and blasting will occur between 8 a.m. and 5 p.m. Monday to Friday.
- It is understood that a small pond will be constructed for wash water. Additional details should be provided on washing operations.
- Additional details should be provided outlining how the stripped overburden will be dealt with.

Archaeological Assessment

- It is noted that a significant cultural heritage feature has been identified in the northwest portion of the site. The technical recommendations of the archaeologist (York North Archaeological Services) have been included on the site operation plan.
- It is understood that a Stage III assessment will be undertaken prior to any works being completed on site. This assessment should be completed to the satisfaction of the Ministry of Tourism, Culture and Sport.

Air Quality

- The Emissions Summary and Dispersion Modelling (ESDM) as prepared by RWDI was reviewed. Although the documentation took some time to interpret, there was nothing in the ESDM to indicate that the site could not request and receive an Environmental Compliance Approval ("ECA").

Traffic Impact Study

The Traffic Impact Study (TIS) for the proposed quarry was prepared by Cole Engineering Limited (2012) and generally considers traffic operations at the access onto the 6th Line as well as the intersection of Highway 7/6th Line and Highway 7/5th Line. Our comments in this regard are as follows:

- The TIS notes that 5th Line is under the jurisdiction of the Township of Guelph/Eramosa, however it is actually under the jurisdiction of the Town of Milton.
- Comments should be obtained from the Ministry of Transportation (MTO), for operations affecting Highway 7, and from the Town of Milton, for operations affecting 5th Line.
- No information is provided on the anticipated lifespan of the quarry, which would provide context into the potential for longer term impacts.
- The forecast of background traffic is based on traffic counts taken in February 2012. The MTO classifies Highway 7 as a commuter road, which is also confirmed by the strong directional distribution of traffic on a daily basis (i.e., high eastbound traffic in a.m. peak period and high westbound traffic in p.m. peak period). On a seasonal basis, MTO's commuter roads typically have 20 to 25% higher traffic volumes in the summer months, when compared to winter traffic (i.e., February counts). Traffic volumes should be increased to account for these seasonal variations.
- The forecast of trip generation from the proposed quarry is based on data from a proxy site (i.e., Erin Pit). On a weekly basis, the calculation assumes consistent traffic over a Monday to Saturday period, inclusive. Information should be provided to confirm this assumption. The number of working days assumed for the critical month (i.e., August) also does not appear to take into account holiday period, or any reduced operations due to weather, over the monthly period. Also the trip generation is based on average loads which are typical of tractor trailers, whereas actual trip volumes may be higher if the fleet is comprised of higher numbers of tandem or triaxle trucks. Based on the above factors, the estimates for peak period traffic may be low.
- No analysis was provided on the requirements for turning lanes at the intersection of Highway 7/6th Line and at the intersection of Highway 7/5th Line. It is recommended that turning lane warrants and requirements be reviewed for these intersections.
- The TIS does not provide any review of the need to upgrade 6th Line to accommodate the increased truck traffic. It is recommended that a geotechnical study be provided to confirm the road base and road surface requirements. Road widths should also be reviewed, to confirm sufficiency to allow two lanes.
- Analysis of stopping sight distances have been provided for the proposed access onto 6th Line, based on an assumed 50 km/h operating speed. However, since speeds are not posted, the legal speeds on this rural road should be assumed to be 80 km/h, in accordance with the Highway Traffic Act. The required stopping sight distance should be revised accordingly.

- The TIS does not analyze the available sight distances at the intersection of Highway 7/6th Line. It should be confirmed that sufficient stopping sight distances and turning sight distances are available to accommodate the significant increase in truck turning movements at this location.
- The visibility triangles (daylighting) are limited at the intersection of Highway 7/6th Line, by encroachment of existing trees. Considering the down gradient on the 6th Line approach and the type of traffic (i.e., large trucks), visibility triangles should be provided for the approaches, in accordance with the requirements of the Geometric Design Manual for Ontario Highways.
- The design and placement of truck entrance warning signs should meet the requirements of the Ontario Traffic Manual, based on a design speed of 100 km/h on Highway 7 and 80 km/h on 6th Line.

Natural Environmental Technical Report

Burnside has reviewed the report titled "Proposed Hidden Quarry Level II Natural Environment Technical Report" as prepared by GWS Ecological &Forestry Services Inc. Our comments are as follows:

- Development and site alteration are not permitted within a Provincially Significant Wetland ("PSW"). The boundary of the Eramosa River-Blue Springs Creek PSW should be staked in the field with the Ministry of Natural Resources ("MNR") or the Grand River Conservation Authority ("GRCA") with MNR's approval. The report notes that the boundary will be staked at a later date but we strongly suggest that this exercise should occur prior to acceptance of the Level II report as it could have significant implications on the limit of extraction.
- Development and site alteration are not permitted adjacent to a PSW unless it can be demonstrated that no negative effects will result. As such, additional information is required to confirm that the proposed quarry will not affect the hydrology of the wetland. Specifically, the Level II report notes that a hydraulic barrier will be required to prevent the loss of water from the wetland into the quarry bottom. However, there is no discussion of potential effects based on changes to the amount of water entering the wetland. Will the drainage area to the wetland be reduced as a result of the quarry?
- Development and site alteration are also not permitted within or adjacent to Significant Wildlife Habitat unless it can be demonstrated that no negative effects will result. It is not clear that all Significant Wildlife Habitats have been identified and, as such, it is not clear that adequate protection will be provided. We specifically note that the following types of habitats have not been discussed or addressed:
  - According to Section 4.5.5 of the report, Little Brown Bat was recorded on the property. This species is listed as Endangered federally but not provincially. As a result, its habitat would qualify as a type of Habitat for Species of Conservation Concern, in accordance with the Under the Natural Heritage Reference Manual (MNR, 2005) and the Significant Wildlife Habitat Technical Guide (MNR, 2000). The latest guidance for the MNR is that habitat may exist in naturally occurring forest stands (FOD communities) but not in plantations (CUP). It is suggested that the MNR be contacted for further guidance on identifying the significant habitat of this species and the type of protection required.

Hydrogeological Investigation
Burnside has reviewed the report prepared by Harden Environmental Services Ltd entitled "Level 1 and 11 Hydrogeological Investigation Hidden Quarry, Rockwood, Ontario as dated September 2012 and have the following comments:

- We raise some caution with respect to the water level information provided from standpipes installed in open pit excavations.
- TP9 has no description of the dolostone rock. Since the basal till layer has been removed, it is possible that the rock could be acting as an underdrain. Many intervals in the test pit logs do not include descriptions of soil colour and, as a result, it is not clear whether there was any evidence of colour changes associated with saturated conditions.
- Borehole logs for M5 to M10 were missing from the report.
- It is noted that wells M1D to M4 do not include a surface seal and, as a result, the water levels reported may not be accurate.
- Multi-level wells are located only on the west side of the site. The overburden geology changes from primarily sand at M3 to primarily silty sand till at M11. An understanding of the change in geology and variations in water levels between M3/M9 and M11 is needed so that the impacts of extraction on Tributary B can be fully understood.
- Table C1 provides flow data. It is not clear from the table whether data with no values are due to no measurement being taken or whether flows were below the sensitivity of the flow meter. The data should be compared with precipitation data. This should be clarified. Continuous flow measurements would provide an additional level of understanding since spit flows are highly variable.
- An in-situ hydraulic assessment was completed using falling head testing and using a pump to remove water at constant rate (M2, M4). Table D1 indicates that a falling head test was completed at M2 and a short term pumping test was completed in both M2 and M4. A comparison of hydraulic conductivity values obtained with the two methods at M2 should be provided.
- Both MW1D, M2 and M4 have a silica sand pack above the lower bentonite seal whereas the other two bedrock wells (M13-D, M14-D) have a bentonite seal above the sand pack to surface. Wells M1D and M13D have lower hydraulic conductivity values. Is it possible that the minimal annular seal and substantial sand pack in M2 and M4 is impacting the results of hydraulic conductivity testing?
- A good job was done in documenting wells near the site. The two nearby overburden wells are either no longer used (No. 6) or are used occasionally for cleaning purposes (No. 2). Well No. 2 is shallow (3.97 mbtoc) and should be monitored.
- Viewlog™ and Modflow™ were used to create a model of groundwater potentials for the bedrock aquifer.
  - The model uses three layers to represent the bedrock aquifer. How does the model consider the overburden at the site?
  - Hydraulic conductivity values of 5.8 v10^{-7} m/sec (M1D) and 4.0 x 10^{-7} m/sec (M13D). How were these lower k values utilized in the model?
  - Appendix D does not contain any hydraulic conductivity data for M3 and the highest k value is 2.0 x 10^{-4} m/sec at MpN-1. What is the rationale for assigning a value of 1.8 x 10^{-4} m/sec to the bedrock and what is the thickness of this layer?

  - Is the recharge value of 150 mm realistic given the hummocky nature of the site, the relatively coarse deposits that overlie the bedrock in some areas and the closed drainage areas (D5, D6 and D7)?
  - How does the recharge used in the model created for the site compare to values used in the Source Water Protection work completed for the area by Golder and Aqua Resource?
  - Figure H10 provides the predicted groundwater flow in the bedrock. How does this compare to the current flow direction (there is no north arrow on the map)?
  - The model is used to predict changes in bedrock water levels as a result of extraction in two areas of the site (east pond and west pond). What will the impacts be in the overburden?
  - Many of the figures (H4, H5, H6 and H7) do not have legends and, as a result, the significance of the colours used is not always apparent.
  - Tributary B is an ephemeral stream which was assigned a recharge value of 0.154 m/day. How was this value calculated? How was limited flow data for SW5/SW7 considered in the calculation?
  - Burnside recommends that a thorough review of the model be completed by a groundwater modeller with experience in fractured rock geology.
- The infiltration rates used in the groundwater model are less than the rates in the Gartner Lee model (2004) which seems reasonable given the till layer overlying the bedrock. However, it is not clear if higher recharge rates in micro drainage area D7 would affect the interpretation of future impacts. Based on the 1 m contours in Figure 3.4 it is also not clear why D5 and D6 are not considered as one micro-drainage area.
- The bedrock surface is shown in Figure 3.5. The proposed extraction area should be added to this map. It appears that there are few (if any) bedrock monitoring wells within the two extraction areas. Given the heterogeneity of the bedrock, it is recommended that monitoring wells be installed within the extraction areas.
- The report indicates that in general the basal silt till is thin or absent above the bedrock near Tributary B. It is our opinion that there is insufficient information to conclude that the basal till is thin or absent near Tributary B. TP3, TP5 and TP11 did not encounter bedrock but did have finer grained materials. There is no discussion about the difference in effective "k" values between the till and the finer grained materials. This suggests that the water "lost" by Tributary B is may be remaining in the overburden and may not reach the bedrock.
- It is noted in the report that the Brydon Spring likely represents discharge directly from the bedrock and can be considered to be the re-emergence of Tributaries B and C. There are limited bedrock wells on the proposed quarry site and there is no data that confirms that the tributary loses water to the bedrock. Tracer testing should be considered to confirm this statement.
- It is indicated that some monitors have up to 17 years of records and provides groundwater potentials for overburden and bedrock in Figures 3.16 and 3.17. Although there are numerous monitors on site, few (if any) are actually within the extraction area. Only one bedrock well (M2) extends to the bottom of the proposed extraction depth. This well is screened near the top of the bedrock and, as a result, only provide information for a small portion of the bedrock. Water level data from TP8 and TP9 is from a different date than the remainder of the data that was used to prepare Figure 3.16. There also appears to be limited data to support the contours between MW1 and M7. Similarly, there does not appear to be sufficient data

presented in the report to support the assertion that "groundwater occurring within the overburden does so above the silt till as a silt layer generally in the northern portion of the site and percolates into the bedrock within the southern portion of the site. An isopach map of silt thickness would assist in demonstrating the limit of the till unit.

- An estimate of hydraulic conductivity and transmissivity based on data collected during short term pumping tests and falling head tests is provided. Based on the mapping provided, it appears that none of the bedrock wells tested are within the two proposed extraction areas. Onsite in-situ testing was completed in wells with limited screened intervals. The lack of data within the extraction areas results in several concerns:
  - Given the heterogeneity of the bedrock, is there the potential for zones of higher or lower hydraulic conductivity to be present. There are significant variations in flow (400 L/min at mushroom farm vs. 82 L/m in TW2).
  - The excavation will behave as a large diameter well open through the bedrock sequence. The onsite wells are screened over discrete intervals and hydraulic testing will not be representative of the entire bedrock sequence.
  - The Guelph/Eramosa Study used significantly higher hydraulic conductivity values. Since the bedrock is heterogeneous significant variations in hydraulic conductivity can be expected. Additional data from within the extraction areas is needed to confirm on-site conditions.
- Figure 3.18 shows the relationship between water levels in the tributary and MP2, M9 and MP1. The water levels in the tributary are consistently higher than levels in the monitors, however, this may simply demonstrate a lack of connection between the base of the tributary and the fine grained till. Adding stratigraphy to Figure 3.18 would assist in the interpretation of water levels.
- It is agreed that there does not appear to be any groundwater contribution to the Northwest wetland from the bedrock. The water level data in Figure 3.19 and information in cross section B-B' suggests that upward gradients in the overburden west of the wetland may provide discharge to the wetland in the spring when water levels are highest. Please comment.
- It is indicated that Allen wetland is supported by direct precipitation runoff and interflow from the north. Streamflow enters the wetland from the De Grandis Pond. There does not appear to be any relationship between water levels in the Allen wetland and the bedrock wells on the Hidden Quarry Site with diffuse groundwater seepage into the pond interpreted as interflow along the contact between the relatively permeable surficial till found on the De Grandis property and there silt till identified beneath the wetland. The water level in bedrock well 6707545 on cross section A to A' are is the overburden. This well appears to be unconfined. There do not appear to be any bedrock wells in the vicinity of the De Grandis Property. If similar conditions exist on the De Grandis property, is there the potential that the maximum predicted drawdown of 0.6 m shown in Figure 4.3 could impact the Pond?
- Elevated nitrate concentrations (>5 mg/L) were present in samples from bedrock wells M2 and M3. Both M2 and M3 are bedrock wells located at the north end of the Hidden Quarry site. The top of screen at M3 is near the bedrock/till contact and the top of screen at M2 is about 7 m below the bedrock/till contact. Neither well has a surface seal. As a result, it is not certain if there was a conduit created through the till when the wells were constructed. The current level of information does not allow the following concerns to be addressed:

  - What is the source of the nitrate?
  - If the elevated nitrate is currently present in only the shallow bedrock, excavation of the bedrock will create a vertical connection between the shallow and deep fracture systems. What will be the impact to nearby domestic well quality?
  - The final depth of extraction is not indicated. What are the impacts of mixing water from the underlying shale with the water from the dolostone?
- The bedrock below the water table will be blasted and the broken rock will be removed with excavators or draglines stationed above the water table without dewatering (Note: should dewatering be required additional review of the detailed operations will be required). The proposed mining area is shown in Figure 4.1. The proposed depth of extraction should be shown on all the cross sections with an additional cross section created to show the extraction area east of Tributary 5.
- The construction of a hydraulic barrier along the downgradient side of the onsite wetland is proposed. The proposed barrier is to be 2.5 m wide and keyed into the silt/silt till layer.
  - It is not clear from Figure 4.2 how the location of the proposed barrier corresponds to the limits of micro drainage areas on Figure 3.4. The scale of the contours on Figure 3.4 suggests that D5 and D6 are connected. The addition of the limits of extraction and the location of the proposed barrier to this Figure would assist in confirming that runoff to the wetland will not change.
  - The addition of wells and water level data to Figure 5.1 along with observed lithology is needed to ensure that the barrier is placed at the optional location.
  - Additional detail on how the width of the barrier was calculated should be provided.
- There does not appear to be any wells which are located in the two extraction areas that penetrate the entire bedrock sequence. As a result, the bulk hydraulic conductivity and the depths of fracture are not reliably known. The extraction of the bedrock may result in the connection of horizontal fractures that are currently separated by zones of relatively impermeable bedrock. This could result in the alteration of current groundwater flow in the bedrock. The statement that the creation of a waterbody will result in increased storage and will benefit downstream wells, springs, ponds or streams during drier conditions suggests that there is a connection between the bedrock beneath the site and downstream resources. As a result, any decrease in available water onsite or changes in water quality will potentially impact downgradient features.
- There is not sufficient information on the bedrock in the extraction areas to allow for a reliable prediction of drawdown to be made. The vertical spacing and contribution of the water bearing fractures is not known and as a result, inflow into the pit may result in temporary dewatering of shallow fractures. The length of time for water levels to stabilize is not estimated. There is also a potential that bedrock water quality will be affected if cascading occurs within the extraction area.
- The report indicates that there is downgradient of the Northwest Wetland (southeast of M1), groundwater flow in the silty sand layer and sand and gravel layer ceases and there is only groundwater found in the bedrock. There are no overburden monitoring wells downgradient of M1S/D and as a result, there is no evidence to confirm that there is no water in the overburden.
- Northwest Wetland water balance should address the following:
  - There is a difference between the flux of groundwater upgradient and downgradient of the wetland. Is the increase unsaturated thickness due to

variations in the elevations of the top of the till or is it a result of contribution by the wetland?
  - The design hydraulic conductivity of the barrier 1 x 10^{-7} m/s in Section 5.1.1.2 which is different than the value of 5 x 10^{-8} m/s in Section 4.2.1.
- The predicted water level change in the aquifer for the nearest well will be 1.6 m. However, there are no wells within the proposed extraction areas that penetrate to the proposed depth of the quarry. As a result, the potential for a connection with nearby domestic wells is not known.
- The extraction of the bedrock has the potential to connect shallow fractures with deeper fractures and as a result, there is the potential to cause changes in water quality in nearby domestic wells. Please comment.
- There are no wells that provide an indication of water levels in the bedrock within the extraction areas. Wells in test pits are not considered to provide reliable water levels. The monitoring network needs to be modified to provide additional information on water levels in the overburden south of the wetland and to provide a better understanding of where the significant water bearing fractures occur in the bedrock. We concur with the need to compete a well survey. Contingency measures should be tied into trigger levels for both water levels and water quality.

Summary
It is recommended that the above noted technical issues be addressed prior to approving the zone change application.

Please feel free to contact me or Don McNalty if you have any questions regarding the above noted comments. This review has been carried out by staff with specific areas of expertise. Consequently questions or comments may be passed on to the appropriate individuals who have carried out the initial reviews

Yours truly,

R.J. Burnside & Associates Limited

Jackie Kay

Jackie Kay, P.Eng. MBA
JK/jw

Cc: Gae Kruse, Township of Guelph/Eramosa (Email)
Mike Davies, Cuesta Planning Consultants (Email)
Heather Ireland, GRCA (Email)

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Grand River Conservation Authority

400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

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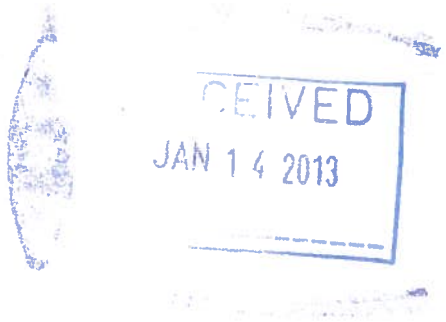

January 11, 2013

Township of Guelph/Eramosa
8348 Wellington Road 124
P.O Box 124
Rockwood, ON
N0B 2K0

Attention: Janice Sheppard, AMCT

Re: Zoning By-law Amendment Application ZBA 09/12 (Hidden Quarry)
8352 Highway 7, Township of Guelph/Eramosa
634745 Ontario Limited (James Dick Construction)

The GRCA is not in a position to comment on the proposed zoning by-law amendment application at this time. Technical staff are currently reviewing the reports which were included with the application submitted to the GRCA. We will provide comments upon the completion of that review.

Should you have any questions or require further information, please do not hesitate to contact Heather Ireland at 519-621-2763 ext. 2320.

Yours truly,

F. Natolochny

Fred Natolochny MCIP RPP
Supervisor of Resource Planning
Grand River Conservation Authority
FN/hi

cc. Township of Guelph-Eramosa c/o Meaghen Reid (clerk)
County of Wellington c/o Aldo Salis
Cuesta Planning Consultants Inc. c/o Mike Davis – 978 First Avenue West, Owen Sound ON N4K 4K5
James Dick Construction c/o Greg Sweetnam & Leigh Mugford – Box 470 Bolton ON L7E 5T4
Ministry of Natural Resources Guelph District

Member of Conservation Ontario, representing Ontario's 36 Conservation Authorities ■ The Grand – A Canadian Heritage River

Ministry of Tourism, Culture and Sport

Culture Programs Unit
Programs and Services Branch
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401 Bay Street, Suite 1700
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Ontario

November 7, 2012

Mrs. Patricia Dibb
York North Archaeological Services, Inc
1264 Bathurst Street
Peterborough, ON
K9H 6X8

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, *"A Stage I-II Archaeological Assessment of the Proposed James Dick Construction Ltd. Hidden Quarry: Located in Part Lot 1 W1/2, Concession 6, Eramosa Township, County of Wellington, Ontario,"* Dated August 31, 2012, Revised Report Dated October 22, 2012, Revised Report Received by MTCS Toronto Office on October 24, 2012, MTCS Project Information Form Number P156-133-2012, MTCS RIMS Number 23AG067

Dear Mrs. Dibb:

This office has reviewed the above-mentioned report, which has been submitted to this Ministry as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the Ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report recommends the following:

> YNAS recommended in Stage I that based on (i) the archaeological/heritage background research, (ii) the presence of a potable water source, and (iii) both elevated and lowland areas that possess potential for the existence of prehistoric and/or historic heritage resources, that a Stage II investigation should be conducted. The results of Stage 2 have found a mid to late 19th century farmstead likely associated with the Ramshaw family. The results of the Stage 2

assessment were inconclusive given the occupation history of the site. YNAS recommends that a Stage 3 assessment be undertaken on AjHa-50 to establish the historic significance and value of AjHa-50. The alternative option is to erect the fencing around the site at the 20-meter to protect the site and impose a 50-meter monitoring buffer out from the edge of the 20-meter buffer that must be monitored by a licensed archaeologist during any soil disturbance. The area within the 20-meter buffer is a no go zone by construction crews at any time. No activities within the confines of this site are allowed until after the Stage 3 assessment has been completed to the satisfaction of the Ministry of Tourism, Culture and Sport and the report has been entered into the Ontario Registry of Reports. A partial clearance is requested and a letter from the ministry confirming that there are no further concerns for the area outside of archaeological site AjHa-50, its 20 and 50 meter buffers and those areas characterized by any development setbacks (Section 7.8.5 –a - e).

James Dick Construction Ltd. has agreed to conduct a Stage 3 assessment of the AjHa-50 James D. site once the Ministry of Natural Resources has signed off on their application for the Category 2 Class "A" quarry (Supplementary Section). A partial clearance is requested under section 7.8.5 of the Standards and Guidelines (Supplementary Section). (a) Stage 2 has been completed for all of the property, (b) the recommendation forms part of the final report, (c) See Recommendation 6.0 above. (d)The Stage II recommends further work on all sites that meet the criteria requiring Stage 3 assessment. The following can be found in the Supplementary Section,(e) – sub section (i) development map with setbacks both 20 and 50-m buffers (Supplementary section). (e)- subsection, (ii) detailed avoidance strategy, written confirmation from the proponent regarding their commitment to implementing the strategy and that ground alterations (e.g. servicing, landscaping) will avoid archaeological sites with outstanding concerns and their protective buffers areas. (iii) Construction monitoring schedule, written confirmation from the proponent that a licensed consultant archaeologist will monitor construction in area within 50-m monitoring buffer zone, and that the consultant archaeologist is empowered to stop construction if there is a concern for impact to an archaeological site. (iv)The proponent provides a timeline for completing the remaining archaeological fieldwork.

The strategy used in Stage 3 will document the presence and extent of buried artifacts, structures, stratigraphy and cultural features and to collect a representative sample of artifacts, from across the entire archaeological site. To this end Stage 3 will result in the excavation of a series of 1 m square units, across the length and breadth of the positive test pits identified in Map. The placement of the grid will be based on the permanent datum to at least the accuracy of transit and tape measurements. All test units will be excavated by hand. Heavy machinery will not be used. Test units will be excavated in systematic levels (either stratigraphic or standardized). All excavated test units will be excavated into the first 5 cm of subsoil, unless excavation uncovers a cultural feature(s). If unit excavation uncovers a cultural feature that feature will not be excavated but will have the portion of the feature plan view recorded and the floor covered by geotextile fabric and backfilled. Screen all excavated soil through mesh with an aperture of no greater than 6mm. Unless otherwise specified in Table 6.1 and 6.2 in section 6 or in the site specific requirements

stated in section 4.2, YNAS will collect and retain all artifacts. Theses artifacts will be recorded and catalogued by their corresponding grid unit designation.

Since the number of test units required varies depending on the site Table 3.1 will be used. The placement of the test units will provide a uniform level of data collection across the site Section 3.1 (under "Other contexts (e.g., 19th century villages industrial complexes # 15). It will focus on testing key areas in and around the foundation, well and concrete structure and any other areas as may be appropriate. The strategy will gather a representative sample from across the site, determine the nature of subsurface deposits determine the extent of the site and support any recommendation for a Stage 4 if necessary.

The area shown in Map 10 which was not assessed and has a high archaeological potential should be assessed by Stage 2 shovel testing if and when there is any future impact to this area.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences.This report will be entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Andrea K. Williams

Andrea K. Williams
A/ Archaeology Review Officer

cc. Archaeology Licensing Officer
Greg Sweetnam, James Dick Construction Limited
Gaetanne Kruse, Planning Administrator, Township of Guelph/Eramosa

In no way will the Ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

The Corporation of the Township of Guelph/Eramosa

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Toll Free: 1-800-267-1465

Michael Newark
Chief Building Official
Email: mnewark@get.on.ca

MEMORANDUM

To: Gaetanne Kruse

From: Michael Newark, Chief Building Official

Date: December 13, 2012

Re: Zoning By-Law Amendment Application (ZBA 09/12)
8352 Highway 7 (Hidden Quarry)
Assessment Roll No. 2311000 004 00110 0000

This is to confirm that the Building Department has reviewed the subject application and have no concerns.

Please note that building permits will be required for any new structures

Michael Newark

Michael Newark
Chief Building Official

Cuesta PLANNING CONSULTANTS
Urban and Rural Planning and Resource Management

978 First Ave. West
Owen Sound, Ont. N4K 4K5
Tel: (519) 372-9790 Fax: (519) 372-9953

To: Township of Guelph/Eramosa Council, Janice Sheppard (CAO) & Meaghen Reid (Clerk)

From: Cuesta Planning Consultants Inc.

Date: April 2, 2013

File: 21237

Subject: Zoning By-law Amendment Application (ZBA 09/12)
James Dick Construction Ltd. – Proposed Hidden Quarry

Dear Members of Council:

As a follow-up to the March 25, 2013 Public Meeting and in response to concerns raised by members of the public, I wish to offer some clarification on the status of agency and peer-review comments received regarding ZBA 09/12.

On December 7, 2012 ZBA 09/12 was deemed complete by the Township of Guelph/Eramosa. Notice of the complete application was subsequently circulated to relevant public agencies for comment as required by the Planning Act in accordance with Regulation 545/06. At this time, the application documents were also forwarded to the Township's engineering consultants to be peer-reviewed.

On February 4th, 2013 our firm presented Council with a preliminary Planning Report which contained a summary of the peer-review and agency comments received as of January 29, 2013. **Appendix F** to this report contained the complete agency circulation list and **Appendix G** contained the complete list of agency comments received as of January 29th, 2013. The agency circulation required by the Planning Act provides an opportunity for voluntary response but does not require these agencies to comment if they find the application to be of no concern or interest.

At the time of writing this report, the Grand River Conservation Authority (GRCA) had not yet provided formal written comments. The Township of Guelph/Eramosa did receive formal comments from the GRCA regarding ZBA 09/12 in correspondence addressed to the Township on January 31st, 2013. The receipt of their comments was briefly mentioned in our February 4, 2013 presentation to Council. All agency comments are available to the public upon being received by the Township.

The intent of the GRCA's review of the application is to provide technical comments from expert staff regarding Hydrogeological and Environmental issues. These comments assist us in evaluating the proposal in the context of the relevant policies of the Provincial Policy Statement (PPS). It is noted in our preliminary planning report that GRCA's review of the proposal should continue on an on-going basis until they are satisfied that the applicants have addressed any concerns they have with the application. The extent of comments offered by the GRCA's January 31, 2013 correspondence is typical for quarry applications of this scale.

The January 31, 2013 comments from the GRCA recommend that any decision on the approval of the application be deferred until their comments have been addressed. As noted in our preliminary planning report, a recommendation from our firm regarding approval of the proposed zoning by-law amendment absent of the applicants providing a satisfactory response to GRCA's concerns would be premature.

In order to provide further clarification and reference regarding the agency commenting and peer-review process, we have attached a chart which provides a synopsis of the status of comments. It is important to note that this review will continue until the concerns of agencies and peer-reviewers have been

adequately addressed and no decision regarding ZBA 09/12 will be made until such time. We trust that you will find this to be helpful.

Township Peer-Review Comments		
Agency	*Status*	*Notes*
R.J. Burnside and Associates	Preliminary comments received on January 11, 2013.	Original peer-review comments have been provided to Township and have reviewed by the applicants. Response has been provided to these comments and the Township is currently awaiting further comment from Burnside.
Novus Environmental	Review in process	Still awaiting preliminary peer-review comments relating to Noise and Blast impact studies.
Agency Comments		
Agency	*Status*	*Notes*
Grand River Conservation Authority	Preliminary comments received on January 31, 2013	Comments relate to technical concerns with Hydrogeological Investigation and Natural Environment Technical Report. All concerns will be addressed by the applicants to the satisfaction of the GRCA prior to a decision on ZBA 09/12.
Ministry of Tourism, Culture and Sport	Comments received on November 7, 2012	MTCS notes that the applicant's Archaeological Assessment satisfies ministry guidelines.
County of Wellington	Comments received on March 14, 2013	County of Wellington notes that the proposal will not require an amendment to the County Official Plan. Directs Township to consider the relevant policies of Section 6.6.5 "New Aggregate Operations".
Township Building Department	Comments received on December 13, 2012	Township Building department notes that building permits will be required for on-site structures. Department has no other concerns.
Ministry of Transportation	Awaiting comment	In response to public concerns, we are currently soliciting comments from MTO. To date, they have neglected to provide comments regarding ZBA 09/12. MTO has also been circulated for comment under the Aggregate Resources Act Licensing

		process. They will have until April 15th to submit comments under the ARA before the commenting period expires.

All future planning reports from our firm will include an updated summary of agency and peer-review comments under *Section V. Matters Arising from Agency Circulation*. The full comments will also be provided at this time, as an appendix, for further reference.

Respectfully submitted,

Michael Davis, Planner

Don Scott, Principal
Cuesta Planning Consultants Inc.

Cuesta PLANNING CONSULTANTS
Urban and Rural Planning and Resource Management

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To: Township of Guelph/Eramosa Council, Janice Sheppard (CAO) & Meaghen Reid (Clerk)

From: Cuesta Planning Consultants Inc.

Date: May 21, 2013

File: 21237

Subject: Zoning By-law Amendment Application (ZBA 09/12)
James Dick Construction Ltd. – Proposed Hidden Quarry

Dear Members of Council:

On May 6th, 2013 Cuesta Planning Consultants Inc. attended a meeting of the Township of Guelph/Eramosa Council to address concerns from the Concerned Residents Coalition (CRC) regarding zoning by-law amendment application ZBA 09/12 received from James Dick Construction Ltd. Mr. Dan Kennaley, MCIP, RPP, spoke on behalf of the CRC and raised three (3) questions/concerns with Council regarding the James Dick Construction Ltd. application. For your convenience and clarification, we have provided an overview of these questions and our response to each item raised by Mr. Kennaley.

1) *Request that Township Council require the applicant to undertake additional cultural heritage studies to address built heritage resources and cultural heritage landscapes.*

As we advised at the May 6, 2013 meeting of Council, Section 2.6 of the PPS requires that significant built heritage resources and significant cultural heritage landscapes shall be conserved. Section 6.6.5 subsection i) of the Wellington County Official Plan requires Council to consider the effect of the proposal on cultural heritage resources. Based on our preliminary review, we would agree that the application presents some deficiencies in consideration of these policy requirements. We have requested that the applicant provide further information to assist us in our evaluation of the proposal in the context of the relevant policies of the Provincial Policy Statement and Wellington County Official Plan. As a result of discussions with the proponent, we are anticipating receipt of this material towards the end of May 2013. Additional materials submitted by the proponent regarding cultural heritage issues will be made available to the public for review upon receipt. A future planning report from our office will provide a detailed overview of how this issue has been addressed by the proponent and a recommendation as it relates to consistency and conformity with the above noted policy requirements.

2) *Requesting that Township Council require the applicant to undertake a study of visual impact, which the applicant has not done to date.*

It would appear that the CRC has referred to the Rockfort Quarry decision, in part, as the basis for this request. Page 4 & 5 of that OMB decision provide an overview of the Town of Caledon's Official Plan policies relevant to the consideration of aggregate development

proposals. Section 5.11.2.4.2.(e) of the Town of Caledon Official Plan, "provides that an applicant must complete a Visual Impact Report and have demonstrated that the proposal will not have any unacceptable impacts." Under the Caledon policy regime it is clear that the applicant must complete a visual impact report and demonstrate that no unacceptable impacts will occur.

As you are aware, this application is subject to the policies of the Wellington County Official Plan. The relevant policies of the Wellington County Official Plan differ significantly from those outlined in the Town of Caledon's Official Plan which were considered in the Rockfort Quarry decision. Section 6.6.5(a) of the Wellington County Official Plan requires Council to consider, "the impact [of the proposal] on adjacent land uses and resident's public health and safety." This policy is broad and vague but it would not be unreasonable to interpret this policy so as to include the consideration of visual impacts. It should be noted that similar applications have not historically been subjected to a visual impact study requirement under this policy regime in the County of Wellington. Additionally, draft policies of Wellington County's most recent 5-year Official Plan update (OPA 81) include a new section regarding technical study requirements for a variety of land use planning applications. These policies do not appear to include a requirement for a visual impact study for any type of application. Consultation with County Staff has served to substantiate this interpretation.

The language of the County Official Plan would appear to provide for some level of acceptance of the inherent visual impacts associated with pits and quarries. The policies do not specifically require applicants to meet a standard or test of acceptability but do state that "Provincial standards, guidelines and regulations will be used in minimizing impacts". The provincial standards under the Aggregate Resources Act for Class 'A' Category 2 quarries include such measures as screening, berming and proper site maintenance. The Quarry Site Plans submitted by the proponents contain important information necessary to ensure that visual impacts are minimized in accordance with the requirements of the provincial standards.

Notwithstanding the foregoing, we agree to some extent that additional information would be helpful for Council in its consideration of potential visual impacts. The applicants intend to provide additional information to Council regarding the potential visual impacts of the proposed quarry so that Council can more fully understand and consider this issue. The visual impact study may be useful in order to identify additional opportunities for mitigation measures and thereby assist in minimizing social impacts. It should be noted however that the PPS and Wellington County Official Plan do not provide any objective criteria or tests related to visual impacts such as: "demonstrate the proposal will not have any unacceptable visual impacts".

Based on the information provided by the application and supporting Site Plans, the proposed operation will be screened by mature vegetation along its perimeter and include berms beyond the initial tree screen to block views into the quarry. These berms will be constructed to a height of 363masl-364masl and will not "dwarf" the existing tree screen as suggested by the CRC representative. It would appear the CRC comments regarding the relative scale of berms as compared to tree height were based on a schematic that is noted as "not to scale". It should also be noted that existing views from areas of the 6th Line include aggregate stockpile remnants from previous aggregate extraction activity on the Hidden Quarry site. Furthermore, the proposed quarry is an interim land use and the rehabilitation plan presents a landscape which attempts to enhance the natural and rural character of the area.

3) *Finally, I need to express concerns about the Cuesta report. The CRC is very concerned that the Cuesta report demonstrates a predisposition to approve the Hidden Quarry rezoning application.*

The January 29, 2013 report is not a prejudicial document in that its contents are not used to recommend a decision of council which could be appealed to the OMB. The recommendation to move the application forward to a public meeting is not something which should be viewed as controversial. This is a necessary step in the Planning Act process once the application was deemed to have merit for further consideration. The report did not contain any recommendation regarding approval or denial of ZBA 09/12 and explicitly stated that prior to the completion of the technical review and review of public comments, that it would be premature to offer an opinion to Council on approval or refusal of ZBA 09/12.

The purpose of this report is for information and to brief council and the public on the status of the process. The report also served to introduce the policy framework and how the application attempts to address those policies. Council can be satisfied the January 29, 2013 report does not demonstrate a predisposition to this application. The contents of the report are appropriate given its timing and context.

We trust that you will find this response to be of assistance in considering the comments raised by Mr. Kennaley on behalf of the CRC at the May 6, 2013 meeting of Council. Should you have any further questions or require clarification with regard to the foregoing, please do not hesitate to contact the undersigned.

Respectfully submitted,

Michael Davis, B.U.R.Pl. (Planner)

Don Scott, MCIP, RPP (Principal)
Cuesta Planning Consultants Inc.

Cuesta PLANNING CONSULTANTS
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To: Township of Guelph/Eramosa Council, Janice Sheppard (CAO) & Meaghen Reid (Clerk)

From: Cuesta Planning Consultants Inc.

Date: June 3, 2013

File: 21237

Subject: Zoning By-law Amendment Application (ZBA 09/12)
James Dick Construction Ltd. – Proposed Hidden Quarry

Dear Members of Council:

On May 30, 2013, Cuesta Planning Consultants Inc. received correspondence from CRC representatives Joyce and William Hill regarding ZBA 09/12. We understand that this correspondence is intended to provide the basis for a delegation at the June 3, 2013 meeting of Council. Township staff have directed us to prepare a response to the questions raised in the CRC's May 30, 2013 correspondence. For your information, we have provided an overview of these questions and our response to each item raised by the CRC below:

1) *GRCA Plan Review Report, Jan 31, 2013 GET file # ZBA09-12. The report identifies 23 areas of concern that needed further investigation and clarification. Has the GET received any updates? Specific reference to site visits and intermittent stream #s 6, 8 and 16.*

Subsequent to receipt of the GRCA's January 31, 2013 comments, the applicants have been working with technical experts at the GRCA in an attempt to resolve their concerns. In order to respond to additional information/clarification provided by the applicant and to provide an overview of their outstanding concerns, additional comments were provided by the GRCA on April 15, 2013. This correspondence is available at the Township Office upon request.

2) *Joint Application Review Team (JART). Has the GET responded to the JART proposal to establish a process to coordinate research on the Hidden Quarry?*

To date, no proposal to establish a Joint Agency Review Team (JART) has been received from any public agencies. The Planning Act provides the framework for Council's responsibilities as it relates to the processing of planning applications. Council can be satisfied that ZBA 09/12 has been and will continue to be processed in accordance with the Planning Act.

Neither the County of Wellington nor the Township of Guelph/Eramosa have guidelines as it relates to the establishment of Joint Agency Review Teams and as such, this mechanism has not been employed in our review of the Hidden Quarry proposal.

The absence of a JART should not be construed so as to discredit the Township's review of the application. Council can be satisfied that all required parties and technical agencies have been consulted and are reviewing the application in accordance with their mandate and technical expertise.

3) *The CRC submitted Dr. Jensen's report for your consideration. Do you have any comment?*

Section 3 of the Planning Act requires that a decision of any authority that affects a planning matter shall be consistent with the Provincial Policy Statement. Section 2.5.2 of the PPS provides policies aimed at protecting the provinces long-term supply of mineral aggregate resources. Section 2.5.2.1 of the PPS specifically states…

As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible.

Demonstration of need for mineral aggregate resources, including any type of supply/demand analysis, shall not be required, notwithstanding the availability, designation or licensing for extraction of mineral aggregate resources locally or elsewhere.

The above noted policy is intended to facilitate the security of Ontario's mineral aggregate resource supply. Until such time that these policies of the PPS are amended by the Province it would be contrary to the Planning Act to subject the proponents to a demand/supply analysis requirement or base a decision regarding ZBA 09/12 on a lack thereof.

We trust that you will find this response to be of assistance in considering the comments raised by Ms. Hill on behalf of the CRC at the June 3, 2013 meeting of Council. Should you have any further questions or require clarification with regard to the foregoing, please do not hesitate to contact the undersigned.

Respectfully submitted,

Michael Davis, B.U.R.Pl. (Planner)

Don Scott, MCIP, RPP (Principal)
Cuesta Planning Consultants Inc.

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Janice Sheppard, AMCT
Chief Administrative Officer
Township of Guelph/Eramosa

Dear Janice, **Re: Concerned Citizens Coalition – September 16th Presentation**

Council has requested a formal response to the question raised by the Concerned Citizens Coalition (CCC) delegation at the September 16th meeting of Council. The question as stated by the delegation is as follows:

"When will Guelph/Eramosa Council engage a suitably qualified consultant (individual or corporation), using existing tendering procedures, to carry out an economic analysis of the proposed Hidden Quarry?"

In support of this request the Coalition tabled the following documents with its presentation.

i) The Potential Financial Impacts of the proposed Rockford Quarry, February 26th, 2009 authored by the Centre for Spatial Economics (C4SE).
ii) The above noted report included the following study conducted in the state of Michigan.

"An Assessment of the Economic Impact of the proposed Stoneco Gravel Mine Operation on Richland Township" Augusts 15th, 2006

iii) A 2012 letter from MPAC advising of assessment reductions for residential properties that are adjacent to industrial uses.

In preparing the following response we have reviewed the above noted documents, the CCC's presentation, as well as the OMB decision on the Rockford Quarry which is cited in the presentation to Council and has been referred to on previous occasions by the CCC. Although the CCC asked when Council would retain an economic consultant, this question should be prefaced by whether or not Council "should" retain such a consultant. The question of "when" could then be considered. Council should be aware that retaining a consultant to conduct a financial analysis of the Hidden Quarry, would in all likelihood, be strictly a municipal cost.

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1) The Coalition's September 16th presentation

The two primary concerns stated in the presentation relate to the loss of municipal taxes because of the reduction in property assessment near the proposed quarry and municipal costs related to overhead and unsuccessful mitigation.

The presentation relies heavily on the failed application in the Town of Caledon of the James Dick Construction Ltd.'s (JDCL) "Rockford Quarry." The Coalition presentation compares the mining proposal in the Rockford Quarry proposal with that of the Hidden Quarry. I am not certain that the extraction techniques are the same. The Rockford proposal was to be primarily a dewatering method of extraction, which is different from the Hidden Quarry.

The liability issues identified if the quarry proceeds and any related costs, may be better commented upon by the municipal solicitor. However, the concerns cited would appear to be within the jurisdiction of the Ministry of Natural Resources (MNR) or the Ministry of the Environment (MOE) (i.e. the blasting restrictions) or the responsibility of the operator (i.e. mitigating issues on site).

2) Potential financial Impacts of the Rockford Quarry (Centre for Spatial Economics)

There is considerable reliance on the Centre for Spatial Economics' (C4SE) financial analysis by the CCC. We have reviewed the C4SE report in some detail and although there are certain areas where there are questions about jurisdiction and responsibility, certain aspects of the analysis can be highlighted.

We concur that there may be additional strains put in municipal infrastructure, primarily road upgrades and maintenance from large aggregate operations. These issues should be addressed by the municipal jurisdiction responsible for the haul road, when a new aggregate operation is being considered.

I am not certain the report's claims regarding municipal and agency costs are compelling as the report seems to disregard the role of the proponent, MNR and MoE in monitoring, mitigation and rehabilitation. It would also have been helpful to evaluate the impact on property values and assessment using MPAC's percentages as a base as opposed to those found in a Michigan study.

3) Municipal Property Assessment Corporation (MPAC)

The coalition brought to our attention the potential impact on assessment and therefore, we have confirmed MPAC's position on the assessment adjustments for strictly residential properties that abut or are in the proximity of industrial uses. Aggregate removal is considered an industrial use. The adjustment for abutting properties (-4%) or

properties within a 1km (-2%) of an industrial use would be reviewed when new assessments are prepared (every 4 years) and any reduction would be reviewed at that time. MPAC advised that any reductions would be removed when the pit or quarry is rehabilitated. Mr. Jason Moore, author of the MPAC letter, advises that these "economic influences" may create positive or negative influence on a neighborhood. The determination of what can be considered "in proximity" may change with the nature of the economic influence.

The MPAC correspondence notes that any assessment reduction can be set by MPAC on existing and proposed aggregate extraction sites. We are not certain as to whether or not this adjustment has been made for residential lands in the vicinity and adjacent to the Hidden Quarry site. A copy of Mr. Moore's e-memo is attached.

4) OMB Order – Rockford Quarry (PL000643) (PL060448)

The Board member devoted a little over three pages out of sixty-six to fiscal impact. The C4RE study does not seem to be mentioned but the financial concerns of the Town of Caledon are noted. The Board noted that there is "no requirement for an applicant to prepare a fiscal impact assessment of a proposed quarry, or to prepare financial guarantees to any public authority." The Board member, however, used a general provision of the Aggregate Resources Act (ARA) to suggest that the cost of mitigation measures and who will bear the costs, should be considered. The Board felt that JDCL should have followed the template established by Dufferin Aggregates in its Milton quarry expansion. The Board felt this was the appropriate example to follow as both the Milton and Rockford quarries had costly long-term adaptive management plans (AMPs). It may have been helpful if MNR had been represented during the hearing to assist the Board in obtaining an understanding of the responsibilities of the proponent, MNR and MoE in the monitoring, mitigation and rehabilitation of aggregate operations. The Board member did not approve the Rockford Quarry based on the lack of agreements on the AMP but equally, if not more importantly, on a number of policies in the Caledon Official Plan related to cultural heritage resources on the subject lands and surrounding area, protection of natural heritage resources and the reliance on an adaptive management plan (AMP) that was left to the MNR and MoE to administer.

What is very clear from the Rockford decision, is that the decision was based on that specific site and its environs. The Rockford site is of significant cultural value. The area surrounding the Rockford site consists of rolling country side with large rural estates and equestrian farms. The Hidden Quarry on Highway 7 would appear to lack the attractive locational attributes of the Rockford site.

We concur with the CCC, that there are lessons to be learned from the Rockford decision, however, one needs to be careful when comparing the limitations of the Rockford site with the characteristics of the Hidden Quarry proposal.

5) Conclusion

The CCC has a number of concerns with the Hidden Quarry proposal. Although several concerns are mentioned in the background section of the delegation report, the principal concern relates to the economic impact of the Hidden Quarry. The OMB decision on the Rockford Quarry does not mention the C4SE study, but does identify some financial concerns raised by the Town of Caledon. Although these issues are not indentified in the Board's conclusions, I believe the questions, financial or otherwise, of the long-term administration of the adaptive management plan, influenced the Board's ruling.

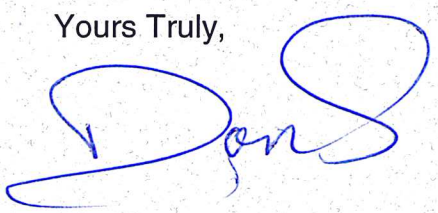
I am hesitant to suggest retaining a consultant based on the failed Rockford proposal. The two sites are in different jurisdictions, under different policy regimes, of different sizes, on different haul routes, in quite different geographic and cultural landscape settings.

There may, however, be some merit in reviewing the financial impact based on MPAC's guidelines. Such a review would, however, form only part of an "economic impact" analysis, should Council decide to initiate the study.

Should Council decide to pursue the impact on assessment and the cost/benefit of the Hidden Quarry proposal, we would be pleased to prepare a brief analysis or to assist staff in preparation of such an analysis.

I would be prepared to discuss the forgoing response with you or Council when convenient.

Yours Truly,



Don Scott
RPP, MCIP

Appendix

Jason Moore, MPAC
Monday, September 23rd, 2013

1. MPAC completes an assessment update every four years based on the current legislation. The most recent update was for the 2013 tax year using a January 1, 2012 valuation date. These current values will be phased-in over the next four years. So, these adjustments will be in place for this four year cycle. In 2017 a new assessment update will occur using a January 1, 2016 valuation date. A new analysis will be conducted at that time. An adjustment for being in proximity to a gravel pit will be tested again in this new analysis.

2. The adjustments applied for properties abutting a gravel pit or being in proximity to a gravel pit are the "Abuts Industrial" and "Proximity to Industrial" adjustments. Examples of industrial properties would be manufacturing, pulp and paper, mining, saw mills, steel mills, shipyards, foundries, warehousing, grain elevators, gravel pits and other industrial type operations. MPAC defines abutting as: "Property is directly and immediately contiguous, physically touching, or sharing a common boundary line with another property or a site characteristic." MPAC's definition for proximity is: "Most commonly, property is directly across or diagonally across from the feature or attribute being described. It also includes properties within an economic neighbourhood that are positively or negatively affected by an economic influence, which affects the value within that neighbourhood. This may affect a few houses on a street, the entire street or a larger area. The positive or negative effect of economic influences may be different in some extreme situations and therefore may change the boundaries of what is normally considered 'proximity'". MPAC conducted a study of residential properties near gravel pits in Halton and Peel regions and applied an adjustment for proximity to industrial to homes within 1km of a gravel pit.

3. The adjustment is applied to active and proposed pits. It would be removed when the pit is rehabilitated.

4. The adjustment is -4% for abutting and -2% for properties not abutting but within 1km.

5. It is applied only to residential properties.

6. MPAC collects data on many site variables. Please see the attached like for a list of abuts and proximity variables MPAC collects and tests in its analysis. http://www.mpac.ca/property_owners/residential_data_definitions/abutment_proximity_variables.asp

Please note not all these variables will be found to affect sale price. In this instance, MPAC conducted a review of sales in the area based on concerns raised and did expand the area considered to be in proximity to a gravel pit.

So, MPAC does collect and test these features on its own. However, when an issue is raised, MPAC will review its data and make changes based on sales evidence. Also, it will collect new data as the real estate market changes and new issues come to light. A recent example would be industrial wind turbines. MPAC now has data fields to identify residential properties abutting and in proximity to industrial wind turbines and is currently conducting analyses to ensure that homes near turbines are assessed equitably in comparison to those further away.

Guelph/Eramosa Township

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March 27, 2014

Mr. Greg Sweetnam
James Dick Construction Ltd.
Box 470
Bolton, ON L7E 5T4

Via email: gsweetnam@jamesdick.com

Re: Termination of Planning Consulting Services

Dear Mr. Sweetnam:

I am writing this letter to inform you that the Township has terminated its retainer with Cuesta Planning Consultants in connection with your zoning bylaw amendment application ZBA 09/12, effective March 26, 2014.

The Township is in the process of retaining replacement planning consultant services and will advise you when that has occurred. While it is unavoidable that some time will be required to retain the new planner and for that planner to be brought up to speed, needless to say, every effort will be made to minimize this amount of time so that your application can continue to be processed in a timely fashion

Regards,

Kimberly Wingrove,
Chief Administrative Officer
Township of Guelph/Eramosa

cc: Mayor Chris White
Meaghen Reid, Clerk

Kim Wingrove

Tel: 519-856-9596 ext. 105
kwingrove@get.on.ca

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APPLICATION STATUS REPORT

To: Township of Guelph/Eramosa Council

From: Elizabeth Howson, MCIP, RPP, Macaulay Shiomi Howson Ltd. (MSH)

Meeting Date: August 12, 2014

Subject: Zoning By-law Amendment Application Township File ZBA 09/12
James Dick Construction Ltd. – Hidden Quarry Proposal

Executive Summary

The proposed Hidden Quarry application raises a number of complex technical issues which have been under review by the Township and its consultants, as well as other agencies and the public since December 2012. Significant analysis and review have been undertaken, however, in order to achieve the Township's objective of a complete and comprehensive review of the application as a basis for any decision by Council with respect to the proposal, additional work is required. Some of this work is on-going, while other reviews must still be initiated. Further, submissions and responses continue to be received and these will be reviewed and an appropriate response determined. Some of the additional submissions currently under review include hydrogeological and haul route comments from the Region of Halton, a review of the cultural heritage study by the Township consulting team, submissions on behalf of CRC with respect to hydrogeology, air quality, blasting and other issues. Additional studies which will be carried out as part of the ongoing review process include a review by the Township consulting team of the visual impact package submitted by the applicant, and submission of an assessment of potential impacts on agricultural operations by the applicant.

Report

1. Purpose

The Township of Guelph/Eramosa received an application under the Planning Act from James Dick Construction Ltd.(JDCL) to amend the Township's Comprehensive Zoning By-law 57/1999 to permit a quarry. The Township deemed the rezoning application complete on December 7, 2012. JDCL is proposing to establish a Category 2 quarry (quarry with

extraction below the proposed water table) with a Class 'A' license under the Aggregate Resources Act (ARA). JDCL has also submitted an application to the Ministry of Natural Resources (MNR) under the Aggregate Resources Act (ARA).

The proposed development raises a number of complex technical issues which have been under review by the Township and its consultants, as well as other agencies and the public since December 2012. The process included a statutory public meeting in March 2013. The Township's objective is to ensure that a complete and comprehensive review of the application is carried out as a basis for any decision by Council with respect to the proposal.

The purpose of this report is not to make any determination as to the appropriateness of the application, but rather to summarize the review undertaken to date and make recommendations on the next steps in the on-going review for Council's information and consideration. The report briefly discusses the background to the application and the review process, and then outlines the status of the technical review of each of the technical reports submitted by the applicant, followed by a discussion of input received from the public and additional reports and input requested by the public. The report concludes with recommendations with respect to the approach to the on-going review of the application.

2. Background Summary

The subject site is approximately 39.4 hectares (100 acres) in size and located in the northeast quadrant of Highway 7 and 6th Line. Approximately 24.8 hectares (61.3 acres) of the site is proposed to be used for extraction of aggregate material. The proposed quarry would include extraction above and below the established groundwater table at a rate of up to 700,000 tonnes of aggregate material annually. There will be an on-site processing plant for crushing, washing and screening and the material will be shipped off-site via 6th Line and Highway 7.

In support of the application, in addition to a Planning Report, the applicant submitted a number of reports regarding specific technical issues as required by the Township. Table 1 lists the issues and related reports and additional submissions to date provided in response to comments.

Table 1
JDCL Technical Reports

Technical Issue	Reports and Additional Submissions/Responses
Hydrogeology	• Level I and II Hydrogeological Investigation Hidden Quarry Rockwood, Ontario, Harden Environmental Services Ltd. September 2012 • Responses to Comments included in comment matrix date March 12/13 • Letter to GRCA from Harden, "Response to GRCA Comments regarding Hidden Quarry", March 13, 2013 • Letter to from Harden, Summary of Drilling and Testing of M15, June 7, 2013

Table 1 JDCL Technical Reports	
Technical Issue	**Reports and Additional Submissions/Responses**
	• Letter to JDCL from Harden, "MOE Comments Hidden Quarry", July 15, 2013 • Letter to JDCL from Harden, Hydrogeological Summary Report for Township of Guelph Eramosa, September 5, 2013 • Letter to Burnside, Response to Burnside Review of Hydrogeological Summary, January 14, 2014 • Letter to Burnside, Response to Burnside Review of Summary of Drilling and Testing Of New Well M15 at Hidden Quarry, January, 14, 2014 • Letter to JDCL from Harden, "Timeline for Changes to Monitoring Plan", February 5, 2014 • Letter to GRCA from JDCL, "Response to GRCA Letter dated April 23, 2014 regarding revised materials Hidden Quarry", June 6, 2014. • Letter to R.J. Burnside and Associates Limited from Harden, "Letter – Response to Burnside Review of Summary of Drilling and Testing of New Well M15 at Hidden Quarry Site..Harden Response to Burnside Review of Hydrogeological Summary…, June 10, 2014 • Letter to the Region of Halton from JDCL, "Zoning By-law Application 09/12 Hidden Quarry: Part 1, Concession 6, Township of Guelph/Eramosa, County of Wellington", August 1, 2014
Natural Environment	• Level II Natural Environment Technical Report, GWS Ecological & Forestry Services Inc. in association with Gray Owl Environmental Inc. (GWS), August 2012 • Letter to GRCA from Harden, "Response to GRCA Comments regarding Hidden Quarry", March 13, 2013 • Letter to JDCL from GWS, "Hidden Quarry- Response to MNR Comments", May 27,2013 • Letter to County of Wellington from GWS, "Hidden Quarry", September 6, 2013 • Letter to GRCA from GWS, "Hidden Quarry Site Meeting Notes", September 17, 2013
Air Quality	• Air Quality Assessment, RWDI, September 6, 2012 • Letter to JDCL from RWDI, "RWDI Response to Airzone One Ltd. Screening-Level Review Air Quality Assessment for the Proposed Hidden Quarry", June 6, 2014
Traffic	• Traffic Impact Study, Cole Engineering, April 2012 • Revised Traffic Impact Study, Cole Engineering, November 2013 • Revised Traffic Impact Study, Cole Engineering, December 2013 • Letter to JDCL from Cole Engineering, "Response to April 7, 2014 Comments Eramosa Quarry Township of Guelph-Eramosa, April 17, 2014
Noise/ Blast Vibration	• Noise Impact Study, Hidden Quarry, Aercoustics Engineering Limited, November 2012

Table 1 JDCL Technical Reports	
Technical Issue	**Reports and Additional Submissions/Responses**
	• Blast Impact Analysis, Explotech, November 19, 2012 • Noise Impact Study, Aercoustics Engineering Limited, May 24, 2013 • Letter to JDCL from Aercoustics Engineering limited, "Response to Peer Review from Novus Environmental Inc. for Proposed Hidden Quarry in Rockwood, Ontario, dated April 8, 2013", May 24, 2013
Archaeology	• Stage I-II Archaeological Assessment, York North Archaeological Services Inc., August 31, 2012
Cultural Heritage	• Cultural Heritage Resource Assessment (1), George Robb Architect, June 2013
Visual	• Visual Impact Study JDCL
Site Plans	• Site Plans were submitted as part of the ARA application • Revised Site Plans submitted to the Township June 2014

3. Status of Technical Review

The status of the technical review of each issue by the Township and other agencies to date is outlined in the following sections, together with a recommendation with respect to any additional work or input required.

Table 2 Summary of Status of Technical Review	
Issue	**Status**
Hydrogeology	• Under review by Township Consultant and Region of Halton • Review complete MNR, MOE, GRCA
Natural Environment	• Under review Region of Halton • Review complete Township Consultant, MNR, GRCA, County
Traffic	• Under review by Region of Halton • Review complete Township Consultant, MTO
Noise/Blast Vibration	Review complete Township Consultant, Union Gas
Archaeology	Review complete Ministry of Tourism, Culture and Sport
Cultural Heritage	Under review by Township Consultant
Visual	To be reviewed by Township Consultant

3.1 Hydrogeology

3.1.1 Township

Review Summary

R.J. Burnside (Burnside), the Township's consultant, reviewed the initial submission by Harden Environmental Services Ltd (Harden) entitled "Level I and II Hydrogeological Investigation" on behalf of Guelph Eramosa Township (GET). The Burnside comments were provided to GET in a letter dated- January 11, 2013. A meeting was held on January 29, 2013 with the proponent and their technical representatives to discuss the technical review comments prepared by Burnside. James Dick Construction Ltd (JDCL) provided response comments to the Burnside and agency comments in a planning matrix dated March 12, 2013 which was circulated by Cuesta Planning. Burnside also received copies of various correspondence between JDCL, Harden and various agencies including MOE and GRCA for information purposes.

Burnside met with representatives from JDCL and Harden on the Hidden Quarry site on April 16, 2013 in order to select a location for new well M15 and also to look at existing features. Burnside was also present at the Hidden Quarry site to observe portions of the drilling and testing of M15 in May 2013.

Harden submitted a report entitled "Summary of Drilling and Testing of M15" dated June 7, 2013. Burnside met with Harden, JDCL, and GET on August 1, 2013 to review the results of Drilling and Testing of M15 and to confirm the expectations for further response to peer review comments. Harden submitted a report to JDCL entitled Hydrogeological Summary Report for Township of Guelph Eramosa dated September 5, 2013.

Burnside on behalf of GET provided comments on the Hydrogeological Summary report and the Summary of Drilling and Testing of M15 report in two letter reports addressed to Harden on November 12, 2013. These were in turn responded to by Harden in correspondence to Burnside dated January 14, 2014.

Harden provided a proposed timeline for changes to the Monitoring Plan and attached a Revised Monitoring Program and Contingency Measures (January 2014) in correspondence to JDCL dated February 5, 2014. The revised monitoring program was included in the January 14, 2014 Harden letter and as a result, a formal review of the February 5, 2014 correspondence was not required.

A Burnside letter dated April 8, 2014 replied to the January 14, 2014 Harden Letter regarding Summary of Drilling and Testing of M15 and provided specific comments on the outstanding issues. In a summary statement, it was noted that the level of on-site data has been improved but further additional assessment and background data collection is required to reduce the number of variables. Burnside recommended that the monitor well construction/testing/sampling and domestic well survey be completed as soon as possible to improve the understanding of the bedrock aquifer. Further correspondence forwarded by Burnside to Harden dated April 9, 2014 regarding the Hydrogeological Summary Report (Harden letter of January 14, 2014) noted that Burnside's primary concerns are the potential for impact on the water levels in the upgradient domestic wells, the potential for water quality impacts in the down gradient wells and potential impacts to Rockwood Well 4. Although additional information had been provided, Burnside indicated that the predictions regarding the response of the fracture systems in the bedrock aquifer need to be confirmed through ongoing data collection and a thorough investigation of nearby domestic wells.

Review Status

Harden has provided their latest response to Burnside comments in correspondence dated June 10, 2014. Burnside is completing a review of this latest submission and will be formalizing comments in the near future. GET has also received related comments regarding the Hydrogeological implications of the proposed quarry from the Region of Halton as discussed in Section 3.1.5 below, and Burnside is currently reviewing those comments and the Harden response on behalf of GET and will provide a formal comment in the near future.

3.1.2 Ministry of Environment (MOE)

Review Summary

MOE provided formal comments to JDCL on July 3, 2013 and to JDCL's consultant, Harden Environmental Services Ltd. (Harden) on October 10, 2013 with respect to the Level I and II Hydrogeological Investigation. MOE's input was separated into surface water and groundwater review and comments and a range of matters were identified for additional review. Harden responded to the MOE comments in a letter to JDCL on July 15, 2013. MOE in their comments of October 10, 2013 indicated that their comments regarding surface water had been addressed, and, in particular that "the risk for significant environmental impact in regards to Tributary B and the Northwest Wetland are perceived to be low". With respect to groundwater, MOE note that they agree with "Harden's assessment of the groundwater thermal impacts of the proposed quarry on the Brydson Spring and the Blue Spring Creek" and "that groundwater movement in the bedrock is mainly controlled by fractures and not by karst features."

Review Status

MOE indicates in their October 10, 2013 letter that "the surface water and groundwater outstanding items have been addressed to MOE satisfaction."

3.1.3 Ministry of Natural Resources (MNR)

Review Summary

The Guelph District Office of MNR provided formal comments to JDCL on April 15, 2013, July 11, 2013 and November 6, 2013 with respect to the Level I and II Hydrogeological Investigation, as well as the Level II Natural Environment Technical Report and the Site Plans. The MNR comments with respect to hydrogeology did not address "any potential impact on water supply" (April 15, 2013 Letter). The comments requested clarification with respect to proposed monitoring, contingency measures and a statement regarding runoff.

Review Status

In both their July and November letters, MNR indicated that "The Ministry has no further concerns in regards to the Hydrogeological Investigation." In a meeting between the

Township and MNR on July 23, 2014, MNR advised that no additional comments will be submitted.

3.1.4 Grand River Conservation Authority (GRCA)

Review Summary

GRCA submitted comments related to the Level I and II Hydrogeological Investigation, as well as the Level II Natural Environment Technical Report and the Site Plans. Initial detailed comments were submitted on January 31, 2013 to the Township with respect to the zoning application. Additional comments were provided to MNR on April 15, 2013 with respect to the ARA application which also reflected the input received from Harden in a letter dated March 13, 2013. Subsequently, GRCA provided comments on November 4, 2013, March 28, 2014, April 23, 2014, July 8, 2014 related to a range of hydrogeological and natural environmental issues, as well as flooding. On July 29, 2014, GRCA indicated that they had "no objection to the application being taken forward for consideration."

Review Status

GRCA in their letter of July 29, 2014 indicated that they had "no objection to the application being taken forward for consideration" but that they would "be open to review and comment on additional information circulated by the Township." Burnside to monitor on-going review and advise if additional input should be solicited from GRCA.

3.1.5 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton, with the support of the Town of Milton and the Town of Halton Hills, submitted initial comments in July 5, 2013 which requested a number of additional studies including revisions to the Level I and II Hydrogeological Investigation. In a further letter dated July 28, 2014, technical comments were provided with respect to key hydrogeological matters, focusing on water resources and potential sensitive receptors within Halton Region. This letter is described as being in addition to the earlier letter. JDCL responded to the July 28th letter in a letter to the Region dated August 1, 2014.

Review Status

The Region of Halton will need to review the response from JDCL to their July 28th comments and establish whether the response satisfies their concerns, or whether additional information and/or study is required. As part of this process, a determination will need to be made with respect to the request for related additional studies in the Region's original July 5, 2013 letter.

3.2 Natural Environment

3.2.1 Township

Review Status

Burnside reviewed for the Township the initial submission by GWS Ecological & Forestry Services Inc. in association with Gray Owl Environmental Inc.) (GWS) which was submitted on behalf of JDCL, and dated August 2012. Burnside original comments with respect to the Natural Environment were included in a peer review comment letter dated January 13, 2013. JDCL submitted a response to the Natural Environment comments provided by Burnside in a Planning Comment Matrix dated March 12, 2013 and numbered 31 through 33 in that matrix. Correspondence was issued by GWS dated May 27, 2013 to JDCL which provided a response to MNR comments regarding the Level II Natural Environment Technical Report. A site meeting including a walk through the site was arranged for June 7, 2013 and was attended by representatives of JDCL, Harden, GRCA, Wellington County, MNR, Stovel Associates, GWS and Burnside. Site meeting notes were prepared by JDCL and circulated on July 9, 2013 and later revised to include additional comments from GRCA and Wellington County and recirculated on August 22, 2013. GWS provided comments to the County of Wellington in correspondence dated September 6, 2013 and to GRCA in correspondence dated September 17, 2013 to address concerns raised by Wellington and GRCA respectively.

Burnside reviewed the various responses contained within the planning comment matrix as well as the information gathered during the site meeting/visit and the comments provided to various agencies (Wellington, GRCA and MNR) and from this prepared our correspondence dated April 7, 2014 which indicated that Burnside felt that JDCL had adequately addressed concerns related to the Natural Environment at the Hidden Quarry including protection of Wetlands as well as Species at Risk and their habitat. It is noted that Burnside has reserved the right on behalf of GET to carry out additional review if new information is provided.

Review Summary

Burnside have indicated that in their opinion JDCL has adequately addressed concerns related to the Natural Environment at the Hidden Quarry including protection of Wetlands as well as Species at Risk and their habitat, subject to additional review if new information is provided.

3.2.2 Ministry of Natural Resources

Review Summary

As noted above, the Guelph District Office of MNR provided formal comments to JDCL on April 15, 2013, July 11, 2013 and November 6, 2013 with respect to the Level II Natural Environment Technical Report, as well as the Level I and II Hydrogeological Investigation and the Site Plans. The MNR initial April comments with respect to natural environment identified a number of questions and additional considerations to be addressed related to

matters such as natural heritage features, amphibians, wetlands, woodlands and species at risk. A response to the MNR comments, a further submission was provided by GWS, JDCL's consultant dated May 27, 2013 and a site visit was carried out on June 7, 2013 attended by representatives of MNR, GRCA, County of Wellington and the Township. Additional comments were submitted by MNR in July related to the stream status, loss of woodlands and species at risk. With respect to Site Plans – Rehabilitation Plans the Ministry comments indicate that they approve "the details given on reforestation procedures and follow-up monitoring." Further to the July comments, MNR undertook additional review. Through this review it was concluded that the wetland in the centre of the subject site is not part of the Eramosa River-Blue Springs Creek PSW, while the wetland adjacent to the 6th Line is part of the PSW. In addition, it was concluded that surveys of amphibians, bats, snakes, turtles, birds and insects were carried out using appropriate protocols and that the concerns related to Species- at -Risk had been addressed. Consequently, in their letter of November 6, 2013, MNR identified no further concerns with the Natural Environment Report.

Review Status

In their November 6, 2013 letter, MNR indicated that "The Ministry has no further concerns in regards to the Natural Environment Report." The letter also indicated that "the Ministry approves the details given on reforestration procedures and follow-up monitoring" with respect to the Site Plans – Rehabilitation Plans. In a meeting with Ministry staff on July 23, 2014, MNR advised that no additional comments will be submitted.

3.2.3 Grand River Conservation Authority (GRCA)

See discussion under Section 3.1.4

3.2.4 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton with the support of the Town of Milton and the Town of Halton Hills submitted initial comments in July 5, 2013 which requested a number of additional studies including revisions to the Natural Environment Technical Report to reflect the policies of the Greenbelt Plan and the zone of influence for the quarry. The Region has advised that further comments will be provided on the natural environment. These comments are anticipated in August 2014.

Review Status

Once comments on the natural environment are received from the Region of Halton, they will be reviewed by JDCL and a response provided. As part of this process, a determination will need to be made with respect to the request in the Region's original July 5, 2013 letter for revisions to the Natural Environment Report. Burnside to monitor on-going review and advise if additional input should be solicited from GRCA.

3.2.5 County of Wellington

Review Summary

The County retained Williams & Associates Forestry Consultants Ltd. to review background material related to vegetation and wildlife. The consultant concluded in a letter dated June 13, 2013 that "the proposed project would have limited negative impacts" on the woodland functions. GWS responded to his comments in a letter of September 6, 2013 to the County. The County indicated their support for the measures identified in the GWS letter in an email of September 12, 2013 to GWS.

Review Status

The focus of the County's input has been with respect to the natural environment. Their email of September 6, 2013 indicated that they would be supportive of the following ecological measures being incorporated as part of the license request as proposed by JDCL:

- retain existing vegetation until just prior to extraction;
- promptly restored completed extraction areas to an ecological after-use to specified in the Progressive Rehabilitation Plan; and
- plant a mix of coniferous/deciduous trees (with a min. spacing of 3 metres) in the area of the 6th Line to increase forest density in an attempt to provide an effective natural corridor in the north and west side of the property.

3.3 Air Quality

3.3.1 Township

Review Summary

Burnside, in particular their Technical Group Leader, Air and Noise, reviewed on behalf of the Township, the initial submission by RWDI which was prepared for submission with the application by JDCL.

The original submission documents supporting the JDCL application for the Hidden Quarry included an Emission Summary and Dispersion Model (ESDM) which was included in a document entitled "Proposed Hidden Quarry, Township of Guelph Eramosa, Wellington County, Final Report, Air Quality Assessment", and dated September 6, 2012. It is noted that the report followed the MOE A-10- Procedure for preparing an ESDM report. Burnside indicates that the air dispersion model used is an acceptable air dispersion model and produces results that are acceptable to the MOE. The final report document followed the format recommended by the MOE for similar documents. Further, Burnside indicates that the assumptions made within the document (e.g. contaminant of concern)were reasonable and represented worse case scenarios and were still within acceptable limits. Consequently Burnside saw nothing in the ESDM which would indicate that the site could not receive an Environmental Compliance Approval (ECA) as noted in the overall review comments of January 13, 2013.

Review Status

Burnside has indicated that that the air quality review was based on reasonable assumptions and there was nothing in the ESDM which would indicate that the site could not receive an Environmental Compliance Approval.

3.4 Traffic

3.4.1 Township

Review Summary

Burnside reviewed on behalf of the Township of Guelph Eramosa, the submission by Cole Engineering entitled "Eramosa Quarry, Draft Traffic Impact Study" dated April 2012. The draft report generally considered traffic operation at the access onto the 6th Line, as well as the intersections of Highway 7/6th Line and Highway7/5th Line. Initial review comments were provided by Burnside to GET dated January 11, 2013. Issues raised at that time generally related to the need for MTO involvement and comments, traffic counts and trip generation, operational improvements at the intersections, required upgrades to the 6th Line and conformance to geometric design standards. Responses from JDCL in the planning matrix document of March 12, 2013 generally agreed with comments provided, and provided or undertook to provide additional information.

JDCL informed Burnside and GET during August, 2013 that there had been ongoing discussions with MTO and that a revised Traffic Impact Study as well as comments from MTO would be forthcoming. Further that JDCL would be responding to issues raised by the Region of Halton.

Burnside received directly from JDCL a revised Traffic Impact Study dated November, 2013, as well as comments from Diana Beaulne of the MTO dated September 30, 2013. Burnside later received a revised Traffic Impact Study Report dated December 2013 which corrected two typographical errors in two figures. The revised Traffic Impact Study document and the comments from MTO were reviewed by Burnside on behalf of GET and comments provided in correspondence addressed to the municipality dated April 7, 2014. Generally the outstanding issues identified relate to the operational improvements required to address intersection turning movements and upgrades to the 6th Line

Review Status

TIS is generally satisfactory subject to specific recommendations which will have to be addressed as a condition of approval:

- Upgrading 6th Line
- Eastbound left turn lane at intersection of Highway 7/6th Line
- Need for analysis of the warrant for a left hand turn lane at Highway 7/5th
- Westbound right turn lane at Highway 7/6th Line and placement of truck entrance signs

3.4.2 Ministry of Transportation (MTO)

Review Summary

MTO originally provided comments April 18, 2013. Additional comments were provided May 28, 2013, September 30, 2013, October 16, 2013 and December 10, 2013. On February 3, 2014, MTO advised that they had no objections to the application. "However, should the re-zoning be approved, all MOE, MNR, MTO and Aggregate Resources Act rules and regulations and policies must be adhered to." MTO also set out a list of additional requirements should the application be approved related to site plan, geometric design, legal agreement and letter of credit, stormwater management report and updated traffic report.

Review Status

In an email of February 3, 2014, MTO indicated that they had no objections to the rezoning.

3.4.3 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton with the support of the Town of Miton and the Town of Halton Hills, based on an update to them on the status of the application, reiterated in an email dated July 15, 2014 an earlier request for JDCL to submit a Haul Route Study for the proposed Hidden Quarry. Regional Staff request that the Term of Reference for this study be submitted to the Region, the Town of Milton, and the Town of Halton Hills for review and approval prior to the study's commencement. Discussions with the Region, Milton and Halton Hills staff indicate that the primary concern is an increase in truck traffic through urban areas (e.g. Acton). Burnside is aware of the concerns raised by the Region of Halton and member municipalities with respect to truck traffic generated by the proposed quarry and the anticipated haul route. Burnside is currently preparing a draft Terms of Reference for a study/report which will be required of JDCL to address the haul route issues.

Review Status

A draft terms of reference for a Haul Route Study is being prepared by Burnside on behalf of the Township to address the issues identified by the agencies. It should be reviewed with the agencies and the applicant before the applicant's transportation consultant proceeds with the study. It will then be circulated for review.

3.5 Noise / Blast Vibration

3.5.1 Township

Review Summary

Novus Environmental (Novus) carried out a peer review of the initial Noise Impact Study prepared by Aercoustics Engineering Ltd. (AEL) and the Blast Impact Analysis prepared by Explotech Engineering Ltd. (Explotech), both dated November 19, 2012. In their initial comments of April 8, 2013, Novus concurred with the blast vibration report, including the recommendations for blast monitoring. They further recommended that the blast record information be made available to the Township for its review in the presence of any vibration complaints. With respect to the noise, Novus recommended in the April 8, 2013 comments that a number of issues be addressed. An updated report was prepared by AEL dated May 24, 2013, together with a response to the Novus comments. Novus reviewed these documents and indicated that they were satisfied that "noise levels from the proposed quarry operation will meet the applicable guideline limits at all noise-sensitive points of reception." However, Novus recommended that as a condition of approval the development be subject to a third party acoustical audit in the first year of operation to confirm the conclusions of the study.

Review Status

The review of the noise and blasting impacts analyses by Novus concluded that the analyses and conclusions were satisfactory subject to blast monitoring, provision of blast record information to the Township and a third party acoustical audit in the first year of operation.

3.5.2 Union Gas

Review Summary

Union Gas in a letter of May 7, 2013 identifies a number of conditions related to their pipeline and notes that JDCL have indicated that these conditions can be met.

Review Status

Union Gas requires that vibrations at the pipeline remain below 50mm/sec (proposed as 12.5 mm/sec) and that blasting not occur within 30 metres of the pipeline (proposed at 200 metres).

3.6 Archaeology

Review Summary

A Stage I-II Archaeological Assessment was carried out by York North Archaeological Services Inc., August 31, 2012.The report identifies an area on the west side of the site

south of the former pit (AjHa-50 James D. site) as the only area where historic archaeological resources were located. It has been identified as requiring a Stage 3 assessment. JDCL has agreed to conduct a Stage 3 assessment once MNR has signed off on their application for the Category 2 Class "A" quarry.

The report has been reviewed by the Ministry of Tourism, Culture and Sport. In a letter dated November 7, 2012, the Ministry advises that the "ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences."

Review Status

The Ministry of Tourism, Culture and Sport has advised that they are satisfied with the archaeological assessment. The Stage 3 assessment will be carried out as a condition of approval of the license.

3.7 Cultural Heritage

Review Summary

A Cultural Heritage Resource Assessment was carried out by Mr. Peter Stewart of George Robb Architect. The submission did not appear to have been subject to any review by the Township or other agency. Unterman McPhail Associates, Heritage Resource Management Consultants (Unterman McPhail) were requested to carry out a review of the submission. They did not identify any significant issues with the report, but suggested that some of the existing information in the report be amplified. This information will be provided to JDCL as a basis for revisions to the report.

Review Status

The Cultural Heritage Resource Assessment be revised based on the input from Unterman McPhail and resubmitted to the Township.

3.8 Visual

Review Summary

JDCL submitted a "Visual Impact Package". The submission was prepared by JDCL in response to a request from the Township. The submission does not appear to have been subject to any review by the Township or other agency. To assess the submission a review by a landscape architect and/or architect to confirm the accuracy of the presentation would be appropriate.

Review Status

The submission has not been subject to review. A landscape architect and/or architect should be retained by the Township to confirm the accuracy of the submission and comments should be provided to JDCL.

4. Public Input and Review

Significant input has been received, and continues to be received, from the general public and stakeholder groups at the public meeting and in submissions to Council as well as written submissions to the Township. Through the technical review by the Township and other agencies all the matters of concern are being considered including issues related to hydrogeology, blasting, air quality, traffic, and natural environment and the input will be addressed in the final report. However, the Concerned Residents Coalition (CRC) has also chosen to retain consultants who have made submissions with respect to the key issues identified by the public, specifically hydrogeology, species at risk and air quality. In addition, a submission was received on August 5, 2014 from one of the consultants which relates to a range of issues (e.g. a request for a fish community and aquatic habitat baseline survey, transportation, rock quality tests, implications for equestrian exercise tracks, increased surface and groundwater monitoring). The CRC has also made submissions with respect to risks related to mining and the Dolime Quarry. Finally, a request has been made by the CRC for additional studies. These issues and input are summarized in the following section, together with the status of their review as an indicator of how the public input is being considered.

4.1 Hydrogeology

4.1.1 Input and Review Summary

A key concern of the public is with water quality and quantity, particularly as it affects private wells. The CRC retained Mr. Garry Hunter with respect to these issues. A presentation and written submission was made to GET Council on behalf of the CRC by Mr. Hunter which set out a number of questions and requests for documentation. A copy of the Response to the Hunter comments was provided to MSH in a memo from JDCL dated July 8, 2014. Burnside has reviewed the Hunter submissions and the JDCL response on behalf of GET and found the response to be reasonable. The response from JDCL should be made available to CRC for their information, and will be considered by Burnside in their on-going review of the application.

4.1.2 Input and Review Status

The response from JDCL to the CRC submission should be made available to CRC for their information, and will be considered by Burnside in their on-going review of the application.

4.2 Natural Environment

4.2.1 Input and Review Summary - Species-at-Risk

CRC retained Dr. Bill McMartin with respect to Species-at-Risk. Dr McMartim conducted one site visit on July 2, 2014, although he did not follow normal professional protocol in accessing the site. He identified one barn swallow, a species which he indicates as being designated "Threatened" by Environment Canada's Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as part of his site visit. He also provides general commentary regarding other potential species at risk including Snapping Turtle, Blanding's Turtle and the Eastern Wood-Pewee. MNR has reviewed the submissions by GWS on behalf of JDCL with respect to Species-at-Risk and indicated that they are satisfied with the findings. However, the additional information should be provided to JDCL for review and response. In addition, it should also be provided to Burnside for comment and to MNR and GRCA for information.

4.2.2 Input and Review Status- Species-at-Risk

The submission from Dr. Bill McMartin, should be forwarded to JDCL for review and response by their environmental consultant. In addition, the submission and JDCL response should also be provided to Burnside for information and comment and to MNR and GRCA for information with comments invited.

4.3 Air Quality

4.3.1 Input and Review Summary

CRC retained Airzone One Ltd. (Airzone) to review the report "Proposed Hidden Quarry Air Quality Assessment" prepared by RWDI AIR Inc. for JDCL. Airzone provided:

- "a "how-to" guide for AQA for aggregate operations;
- "screening-level review of RWDI report" ; and,
- answered "questions posed by CRC.

RWDI prepared a response to the Airzone submission dated June 6, 2014 which expresses concerns with the Airzone submission. An independent evaluation of the Airzone submission and RWDI response should be carried out. Burnside should be requested to review and comment on both the Airzone submission and RWDI response. The material should also be provided to MOE for information with comments invited.

4.3.2 Input and Review Status

The Airzone submission and RWDI response should be provided to Burnside for their review and comment. The material should also be provided to MOE for information with comments invited.

4.4 Risks of Mining/Comparison between Dolime Quarry (DQ) and Hidden Quarry (HQ)

4.4.1 Input and Review Summary

Mr. William Hill of CRC made a presentation to Council with respect to the risks involved in mining on October 21, 2013 (e.g. fly rock). In addition, Mr. Hill provided a memorandum dated July 22, 2014 related to a comparison between Dolime Quarry (DQ) and Hidden Quarry (HQ). The memorandum was developed to clarify "the question of whether the two projects are similar enough to justify mining of the HQ based on the criteria derived from the proponents' experience in the DQ". The memorandum also addressed related issues (e.g. flyrock). JDCL submitted a response in a letter dated July 22, 2014 to the second submission. The Township's consultants Novus should be requested to review and comment on the Hill submission and JDCL response.

4.4.2 Input and Review Status

The Township's consultants Novus should be requested to review and comment on the Hill submission and JDCL response.

4.5 Mega-Quarry Application –Related Issues

4.5.1 Input and Review Summary

CRC forwarded to the Township on July 30, 2014, a document entitled "Technical Review On Behalf of Nottawasaga Valley Conservation Authority of Supporting Documentation Provided by Highland Companies in Support of Their Application to the Ministry of Natural Resouces (MNR) For a Category 2, Class A License Under The Aggregate Resources Act", Melancthon Township, May 2014 prepared by SLR. This was provided to them by their consultant, Garry Hunter. The cover email indicates that "Table 1 is very important to review as many of the concerns the CRC raised about the Hidden Quarry application are also of concern in the Megaquarry application. Garry also drew our attention to Sec D.3 beginning on pg. 44 and specifically pages 50-54 with respect to blasting and fisheries. There is no similar information in the HQ application."

There are significant differences between the current application and the Melancthon application with respect to size, complexity, location and environment. It is questionable therefore how applicable the information provided is to the current application. However, the submission has been provided to Burnside and the applicant for their information.

The cover email also indicates:

"Our group is concerned that with the recent purchase of the land adjacent to the site and other aggregate applications that are being submitted to council.... we may have a megaquarry in our community."

The application that is under review is specific. There is no indication of any proposed expansion or "megaquarry". If such an expansion should occur it would require submission

of additional applications under the Planning Act and ARA and a detailed review including full public consultation would be required. It is not possible or appropriate to evaluate something that has not yet been, and may never be, proposed.

Further, the use of the term "mega-quarry" would not appear to be applicable in the GET context given the accepted definition of such a use. The State of the Aggregate Resource in Ontario Study (SAROS), Paper 2: Future Aggregate Availability and Alternatives Analysis prepared by MHBC, includes a discussion of Mega-Quarries. It indicates that the criteria for such a quarry are reserves of at least 150 million tones and an annual production capacity of 5-10 million tonnes (compared with 12 million tonnes and extraction of 700,000 tonnes for the proposed Hidden Quarry). The Report goes on to indicate that one of the primary challenges for establishing a mega-quarry for Southern Ontario would be "the significant land acquisition required" given the degree of parcel fragmentation. An extraction area of 280 hectares at a 20 metre extraction depth was estimated as being required for a "mega-quarry".

4.5.2 Input and Review Status

The information submitted by CRC regarding the proposed Melancthon Quarry should be provided to Burnside and JDCL for their information.

4.6 Additional Studies

4.6.1 Input and Review Summary

In a submission of May 1, 2014 to Council, CRC requested additional meetings and studies. They elaborated on this request at a meeting on May 22, 2014.The submission is listed in Table 3 together with the proposed direction:

Table 3
CRC Requests for Additional Meetings and Studies

CRC Submission	Proposed Direction
• **Burnside Meeting:** We believe that some of the concerns raised by CRC have been affirmed by the Burnside Hydrogeological Summary Report. However, we are concerned about the conclusions, and the process by which they arrived at them, in their Traffic Impact and Natural Environment Summary Reports. We believe that an opportunity to discuss these issues with Burnside personnel is essential at the earliest possible date.	Upon completion of the additional review by Burnside with respect to natural environment, air quality, and transportation a meeting can be arranged with CRC to discuss issues.
• **Peer Reviews:** We again request that peer reviews of the Visual Impact and Cultural Heritage studies submitted by	As noted above, a review of the Cultural Heritage Study has been carried out and a review of the Visual Impact Study is

Table 3 CRC Requests for Additional Meetings and Studies	
CRC Submission	**Proposed Direction**
the applicant be undertaken.	recommended.
• **Blasting Impacts:** We have submitted thorough reports assessing the likely blasting impacts of the proposed operations, and have highlighted the inadequacy of the proponent's blasting impact study and the peer review received by the Township. We strongly recommended that a more extensive peer review by an expert company such as Golder Associates be undertaken.	See discussion in Section 4.4.
• **CRC Written Submission -Economic Impacts:** We have twice made a case for an assessment of economic impacts of the proposed quarry operation on the Township and its residents. In our April 7 delegation to Council, we again raised the question of compensation for those nearby agri-businesses that will likely be adversely affected should the quarry operation be implemented. While the Township's previous planning consultants did not recommend that an economic impact analysis be carried out, they did acknowledge that the Township might choose to have one conducted. In light of the new consultants carrying the quarry application file, we are reiterating our view that an economic impact assessment be carried out and the issue of compensation for damages by the proponent be addressed. • Meeting with CRC Economic Impacts/ Agricultural Assessment: At the May 22nd meeting it was indicated that the Economic Impact Report should look at matters such as potential impacts on property value and resulting loss of assessment, the risks to agri-businesses and infrastructure impacts. Finally, an Agricultural Assessment was requested in terms of the impacts on adjacent agricultural operations.	The PPS establishes in Section 2.5.2.1 that "As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible. Demonstration of need for mineral aggregate resources, including any type of supply/demand analysis shall not be required, notwithstanding the availability, designationor licensing for extraction of mineral aggregate resources locally or elsewhere." At the same time, Section 2.5.2.2 states that: "Extraction shall be undertaken in a manner which minimizes social, economic and environmental impacts." The evaluation of the application to date is designed to ensure that Section 2.5.2.2 is addressed. It assumes that if impacts on key factors such as air quality, hydrogeology and natural environment are minimized, then social, economic and environmental impacts will also be minimized. The CRC primary focus appears to be on the determination of adverse economic impacts and in particular on nearby agri-businesses, on the assumption that there will be adverse impacts as a result of environmental impacts (e.g. hydrogeology, air quality). However, if significant impacts were to be established

Table 3 CRC Requests for Additional Meetings and Studies	
CRC Submission	**Proposed Direction**
	the development would not be recommended for approval given the policies of the PPS. It would appear more appropriate therefore given the particular concerns with agricultural uses, to request JDCL to identify the agricultural operations in proximity to the proposed quarry in consultation with MSH/Burnside and to provide, based on their work to date, an assessment of potential impacts on adjacent agricultural operations and how they are being addressed to minimize the impacts on those uses. This would be a "double check" to ensure that the special needs of these uses are being protected. The results of this work would then be reviewed by MSH, Burnside and Novus.
• **Cumulative Impacts** -At the May 22, 2014 meeting, it was also suggested that a report on cumulative impacts should be considered related to the Dolmine pit and Tri-City application.	Burnside have advised that due to the distance between the sites there will be no cumulative impacts related to hydrogeology which would be a key consideration in any assessment of cumulative impacts. This would also be true for other factors such as air quality and noise. Therefore, such a study is not considered appropriate.
• **Well Monitoring:** We have requested that the applicant be required to carry out a more extensive well monitoring program, a view which is shared by the Burnside consultants. We note that, in its correspondence to the Township, the Region of Halton (**letter to Ms. Meaghen Reid, copied to Janice Sheppard, dated July 5, 2013 over the signature of Brian Hudson, Senior Planner**) also requested additional studies including a detailed Baseline Well Survey for lands within 1,000 m of the quarry site. As we have explained, such a program is required to establish a valid baseline for nearby domestic wells and the municipal well #4 which we understand may be commissioned in the foreseeable future. We are very interested to know how the	As noted Burnside and the Region of Halton have requested well monitoring and the review and resolution of this issue is on-going.

Table 3 CRC Requests for Additional Meetings and Studies	
CRC Submission	**Proposed Direction**
Township proposes to deal with this matter.	
• **Document Management:** As Dan noted in his email, we were disappointed that we were not alerted to the Burnside summary reports and that we did not have the opportunity to make direct input on all of the issues considered as Burnside arrived at their conclusions. As we continue to investigate the critical issues—including some that relate to traffic impacts and site hydrogeology—we believe that we can assist the Township by making the results of our investigations available. In particular, the correspondence between the applicant's consultants and Burnside that led to their conclusions would be of particular interest to us, including (we understand) correspondence between Harden and Burnside copied to Janice Sheppard dated January 14, 2014.	The Township continues to make available material on their website as it becomes available. However, it has become apparent that with all the correspondence, one point of contact needs to be established for all reports, submissions and other material related to the application. It is recommended that the Township establish one person to be that point of contact and that all material from the applicant and the Township's consultants, and agencies be directed to that contact. That person will be responsible for making sure that any material which is required to be posted on the website is put up and any other distribution of the documents occurs.
Finally, in light of the Township retaining Elizabeth Howson as the planning consultant for this file, we request through you a meeting with her to review the issues on which CRC has commented.	A meeting was held with CRC on May 22, 2014 as requested. On going communications from CRC have also been provided to Ms. Howson.

4.6.2 Input and Review Status

In response to the requests from CRC for additional meetings and studies, in addition to the directions outlined in Section 3 of this report, the following directions are proposed:

- A meeting be held with Burnside to review their conclusions with respect to natural environment and transportation; and,
- JDCL be requested to provide, based on their work to date, an assessment of potential impacts on adjacent agricultural operations and how they are being addressed to minimize their impacts on those uses. MSH/Burnside to be consulted on identification of agricultural operations. This will be reviewed by the MSH, Burnside and Novus.

4.7 Other Issues

4.7.1 Input and Review Summary

Additional submissions continue to be received including two submissions from the general public the week of August 5, 2014 and an additional submission from Mr. Garry Hunter on behalf of CRC on August 5, 2014. The CRC Hunter submission relates to the Site Plans and a variety of matters as follows;

- Fish Community and Aquatic Habitat Baseline Survey of Brydson Creek
- Rock Quality
- Transportation
- Blasting
- Vacant Lots of Record
- Equestrian Exercise Tracks
- Surface and Groundwater Monitoring
- Brydson Creek Base Flow Monitoring

4.7.2 Input and Review Status

As additional public submissions are received, including the August 5, 2014 submission from CRC – Hunter, MSH/Burnside will identify the appropriate approach to review. Generally this will involve forwarding the submissions to JDCL for response, and a review of submission and response by the appropriate Township consultant and circulation to agencies for information with comments invited.

5. Review Process – Next Steps

The proposed development raises a number of complex technical issues which have been under review by the Township and its consultants, as well as other agencies and the public since December 2012. Significant analysis and review have been undertaken, however, in order to achieve the Township's objective of a complete and comprehensive review of the application as a basis for any decision by Council with respect to the proposal, additional work is required. Some of this work is on-going, while other reviews must still be initiated. Further, submissions and responses continue to be received and these will continue to be reviewed and an appropriate response determined. Table 4 outlines the additional work and its status as of August 7, 2014.

Table 4
Review Process – Next Steps August 7, 2014

Issue	Required Action	Responsibility
Hydrogeology	Burnside to complete review of latest submission from Harden on behalf of JDCL dated June 10, 2014.	Burnside
	Burnside to complete review of comments from Region of Halton and JDCL response.	
	Burnside to monitor on-going review and advise if	

Table 4 Review Process – Next Steps August 7, 2014		
Issue	**Required Action**	**Responsibility**
	additional input should be solicited from GRCA.	
	Region of Halton to review response from JDCL/Harden to the Region's hydrogeology comments and provide response.	Halton
	MSH/Burnside to monitor on-going Halton Region review and requirements for additional studies or other work arising from review.	MSH/Burnside
	Provide JDCL response to Hunter initial questions on behalf of CRC.	Township
Natural Environment	Region of Halton is to provide comments with respect to the natural environment in August 2014. They would be reviewed by GWS on behalf of JDCL.	JDCL
	Burnside to review of comments from Region of Halton and JDCL response.	Burnside
	Burnside to monitor on-going review and advise if additional input should be solicited from GRCA.	
	MSH/Burnside to monitor on-going Halton Region review and requirements for additional studies or other work arising from review.	MSH/Burnside
	Provide CRC McMartin submission to JDCL for comment. Also provide submission and JDCL response to Burnside for information and comment, and to MNR and GRCA for information with comments invited.	JDCL Burnside
	Burnside to meet with CRC upon completion of additional review.	Burnside
Air Quality	Provide Airzone submission and RWDI response to Burnside for their review and comment. The information should also be provided to MOE for information with comments invited.	Burnside
Traffic	In response to a request from the Region of Halton, a draft terms of reference for a haul route study is being prepared by Burnside. It will then be reviewed with the applicant and Region, Halton Hills and Milton before being finalized.	Burnside
	JDCL will be responsible for having the haul route study will be carried out.	JDCL
	The haul route study will be reviewed by Burnside and the Region, Halton Hills and Milton.	Burnside/Halton/ Halton Hills/Milton
	Burnside to meet with CRC upon completion of additional review.	Burnside
Noise/Blast Vibration	Novus to be requested to review and comment on the CRC Hill submission and JDCL response.	Novus

Table 4 Review Process – Next Steps August 7, 2014		
Issue	**Required Action**	**Responsibility**
Cultural Heritage	George Robb Architect on behalf of JDCL review the comments from Unterman McPhail and revise the Cultural Heritage Assessment as appropriate.	JDCL
Visual	A review of the Visual Impact Package to confirm accuracy of the submission be carried out by a landscape architect/architect on behalf of the Township.	MSH
	JDCL review input and revise Visual Impact Package if required.	JDCL
Agriculture	JDCL be requested to provide, based on their work to date, an assessment of potential impacts on adjacent agricultural operations and how they are being addressed to minimize impacts on those uses. MSH/Burnside to be consulted on identification of agricultural operations.	JDCL
	Review of agricultural assessment by MSH/Burnside/Novus.	MSH/Burnside/Novus.
Other Action	As additional public submissions are received, including August 5, 2014 submission from CRC – Hunter, MSH/Burnside will identify the appropriate approach to review. Generally this will involve forwarding the submissions to JDCL for response, and a review of submission and response by the appropriate Township consultant and circulation to agencies for information with comments invited.	MSH/Burnside
	Information submitted by CRC regarding Melancthon Quarry to be forwarded to Burnside and JDCL for their information.	Township
	Correspondence – establishment of one point of contact (Township planner) for all reports, submissions and other material related to application.	Township

6. Recommendation

That the Application Status Report of August 12, 2014 with respect to Zoning By-law Amendment Application Township File ZBA 09/12 James Dick Construction Ltd. – Hidden Quarry Proposal be RECEIVED.

MSH
BOUNDLESS INGENUITY

600 Annette Street
Toronto, ON M6S 2C4
T 416.487.4101
F 416.487.5489

471 Timothy Street
Newmarket, ON L3Y 1P9
T 905.868.8230
F 905.868.8501

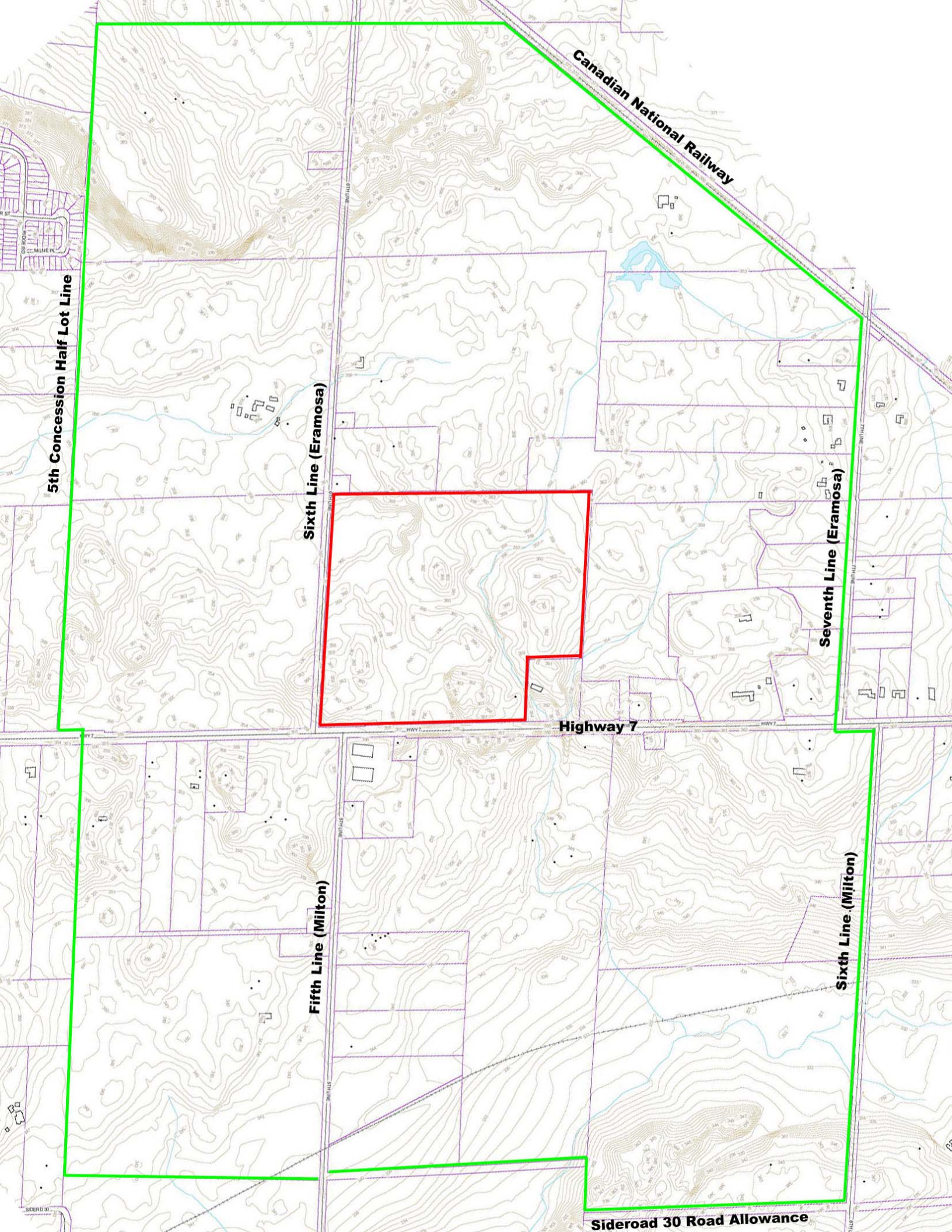
MEMORANDUM

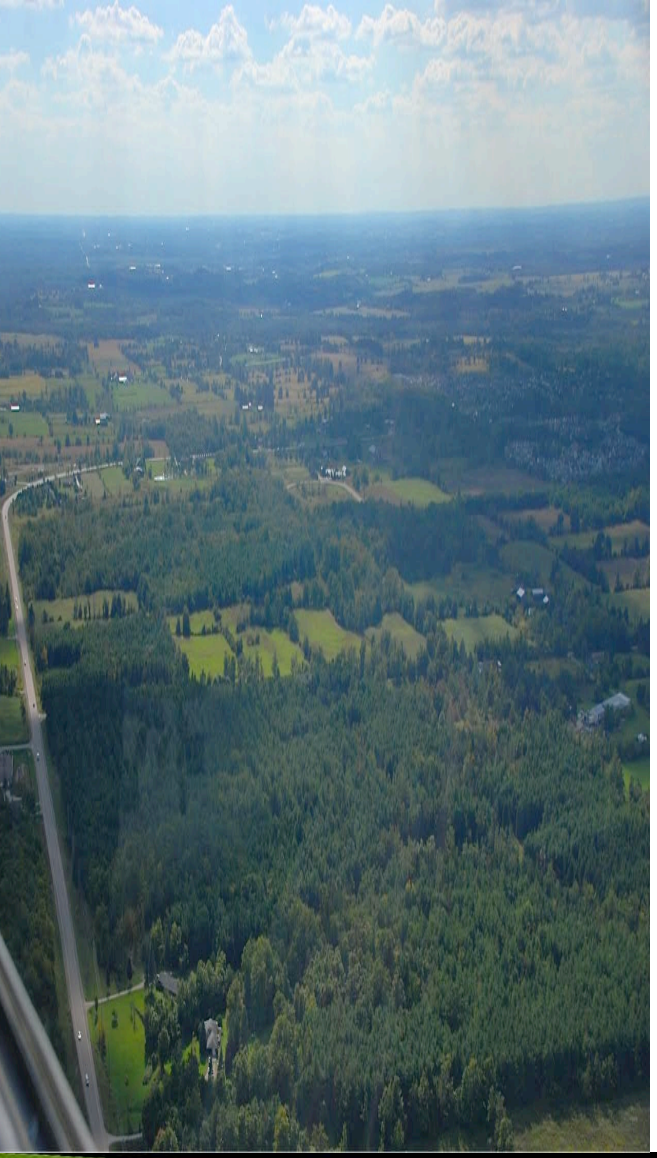
To: Kim Wingrove, CAO, Township of Guelph-Eramosa
From: Elizabeth Howson, Macaulay Shiomi Howson Ltd.
Re: Hidden Quarry Agricultural Impact Study Approach
Date: November 18, 2014

As you are aware in my August 12th report to Council on the status of the Hidden Quarry application, I recommended the following:

"It would appear more appropriate therefore given the particular concerns with agricultural uses, to request JDCL to identify the agricultural operations in proximity to the proposed quarry in consultation with MSH/Burnside and to provide, based on their work to date, an assessment of potential impacts on adjacent agricultural operations and how they are being addressed to minimize the impacts on those uses. This would be a "double check" to ensure that the special needs of these uses are being protected. The results of this work would then be reviewed by MSH, Burnside and Novus."

Further to this general direction, JDCL consulted with the Township regarding the appropriate boundary for the agricultural assessment. As part of these discussions, Township staff and myself provided input. As well, the Township consulted with a professor in rural planning at the University of Guelph. The boundary agreed on is shown on the attached map. It is my understanding that JDCL have retained Stovel and Associates Inc, Planners, Agrologists and Environmental Consultants to carry out this study which is currently underway.


Canadian National Railway
5th Concession Half Lot Line
Sixth Line (Eramosa)
Seventh Line (Eramosa)
Highway 7
Fifth Line (Milton)
Sixth Line (Milton)
Sideroad 30 Road Allowance



HQ Natural Environment and Agricultural Impact Assessment Reviews

Stephanie De Grandis, PhD MBA

Peter Kauss, PhD

CRC Scientific Review Committee

GET Council Meeting – August 10th 2015

Natural Environment Report GWS

- Described biological conditions in 2011 and 2012 with reference to earlier 1995-96 study
- 38.08 hectares, 1.8 wetlands 35.5 woodlands (coniferous, deciduous and mixed forest: 30-150 years old)

Areas of Natural and Scientific Interest (ANSI) and Environmentally Significant Areas (ESA)

Tributary B –Feeder for Brydson Creek- Hidden Quarry Site

- GWS 2012 – none on-site or off site
- Eramosa River-Blue Springs PSW ?
- Brydson Springs and Creek Trout Habitat?
- Wetlands N&E of site?

Aggregate Resources Act and Provincial Policy Statement

Brydson Creek

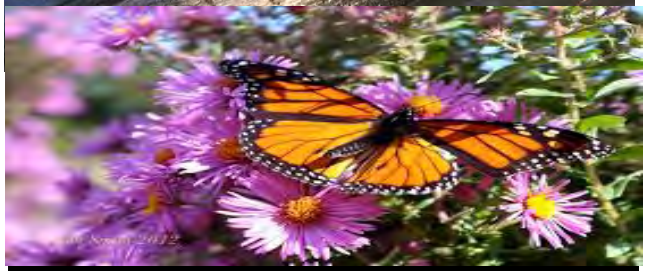
- No development allowed within habitat of endangered and threatened species, significant wetlands and significant, coastal wetlands.
- No development and site alteration allowed on lands adjacent to such features or within adjacent to significant woodlands, significant valleylands, significant wildlife features or their ecological functions.
- Consideration to be given to potential indirect impact on the PSW by change in surface water flow and groundwater levels.

Significant Wetlands

Allen Wetlands

- Large PSWs north and south of site
- Four wetlands on-site. Largest wetland (1.0 ha Cattail Marsh) is a PSW.
- Significant Turtle, fish and bird habitat on-site and adjacent to site.
- Confirmed by Trout Unlimited and Ducks Unlimited (Brydson Creek and De Grandis ponds).

Significant Wildlife Habitat



Species	Status	GWS
Monarch Butterfly	Special concern – food and habitat available.	Not significant habitat.
Snapping turtle	Special Concern nationally and provincially – wetland cattail pond	Hydraulic barrier. Fencing and gates to keep them out site when egg laying
Barn Swallow (McMartin Study)	Endangered	MNRF interested if found within 200 m
Eastern Wood Pewee	Special Concern nationally and provincially	No comment (but is now species of concern)
Little Brown Bat	Endangered nationally and provincially. Facing extinction. Questions from MNRF concerning habitat	GWS no caves on site.
Bobolink (adjacent to site)	Threatened nationally and provincially	Not on site
Woodthrush (adjacent to site)	Special concern nationally and provincially	Not on site

Area-Sensitive Species

- Ruffed Grouse
- Hairy Woodpecker
- Pileated woodpecker
- Scarlet Tanager
- Veery
- Need 10 - 50 hectares of woodland for breeding purposes
- **Site considered significant wildlife habitat (GRCA 2013)**

Landscape Connectivity

- Well connected to natural areas to north and west
- Brydson Creek connects the waterway north (Allen wetlands and DeG pond)
- Williams Assoc. On-site woodlands provide important ecological connection to the nearby natural areas.
- Culvert under the highway
- Greenbelt connectivity question

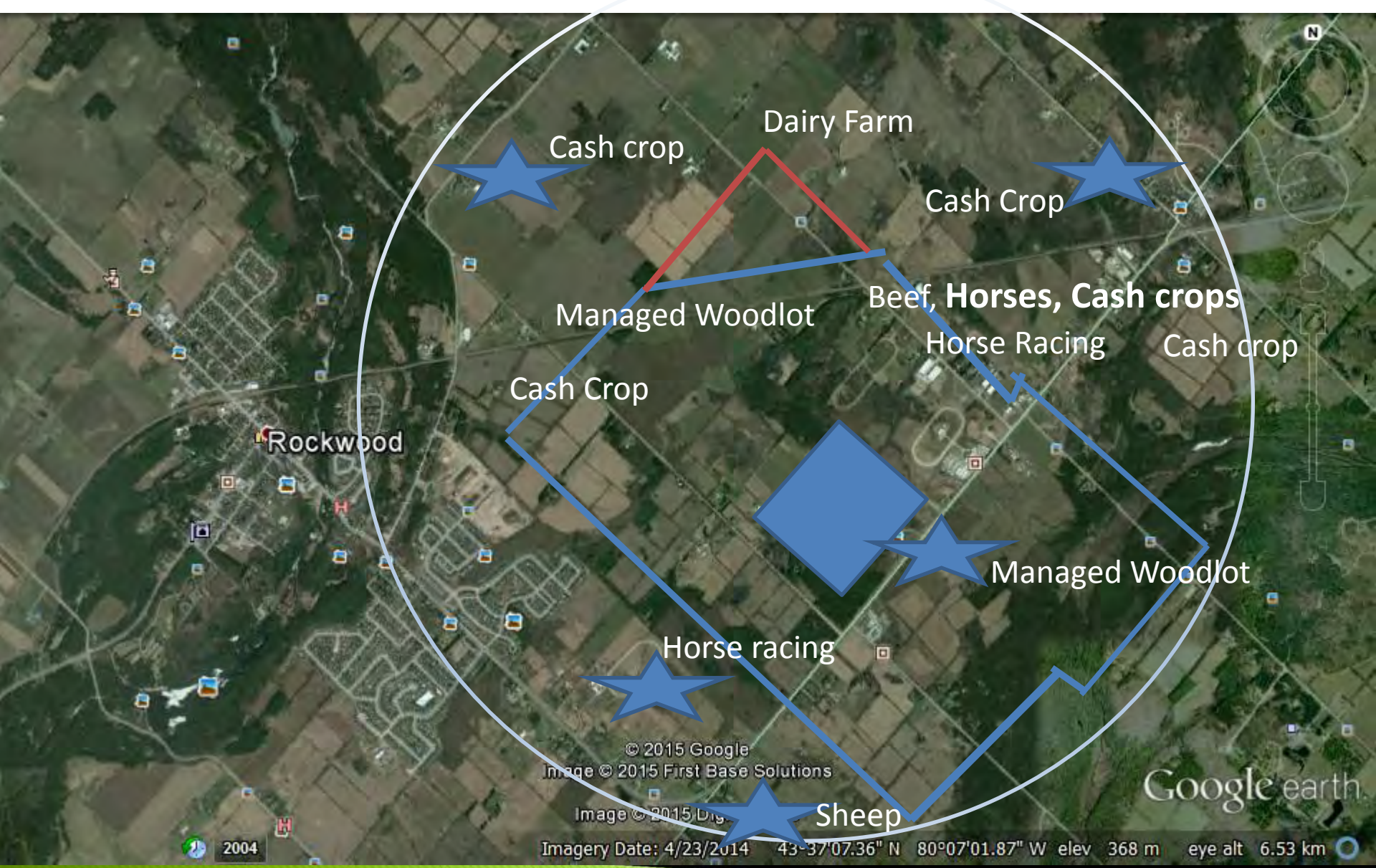
Culvert under the Hwy – 5 ft high

Agricultural Impact Assessment: Gaps in Analysis (Format of Survey)

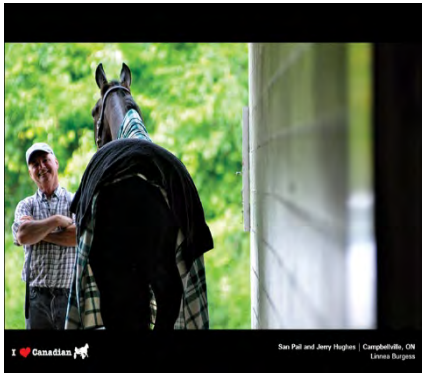
AGRICULTURAL IMPACT ASSESSMENT PROPOSED HIDDEN QUARRY

Stovel and Associates Inc.

- Terms of reference not disclosed to residents
- Reconnaissance-level road-side survey vs other site analysis (visits by hydrogeologist on property)
- No discussion with farmers about farm businesses or best practices
- Some farm businesses missed (woodlots, sheep, dairy)
- Findings based on flawed applicant reports (blasting, hydrogeology, noise, traffic)
- Limited geographic scope


Dairy Farm
Cash crop
Cash Crop
Managed Woodlot
Beef, **Horses, Cash crops**
Horse Racing
Cash crop
Cash Crop
Rockwood
Managed Woodlot
Horse racing
Sheep
© 2015 Google
Image © 2015 First Base Solutions
Google earth
2004
Imagery Date: 4/23/2014 43°37'07.36" N 80°07'01.87" W elev 368 m eye alt 6.53 km

Gaps in Analysis: Dust Impact



- No discussion of known dust impact on plants and animals. Multi-million dollar businesses effected.
- Baseline levels of dust should be determined now! What about fine particulate matter air pollution ($PM_{2.5}$)?
- Mitigation measures are not specific to the need of each farm business. Only discusses horse and mushroom farm?
- Complaint protocol offered? Too late if dust contamination occurs in mushroom farm factory or on the fields.
- No buffering capacity as the trucks travel on Hwy 7 – trucks produce most of the dust.

Agricultural Impact Assessment Gaps Hydrogeology

- **No impact** based on Harden Hydro G report. The quarry floor may be raised?
- The water table is predicted to rise on the south side of quarry. Waterlogging of young plants cause poor crop yields. No discussion of this impact,
- Drawdowns, precipitation levels, evaporation, temperature all effect soil growth capacity. No detailed discussion of these parameters
- No analysis of soil drainage in lands abutting quarry site (tiling, soil type?)
- Accumulative impacts (new municipal well online).
- Haulage of water into farm not mentioned in mitigation measures.

Agricultural Impact Assessment Gaps
Soil Type/Prime Agricultural Land

Soil type	Area(ha)	%
3	15.1	39
4	14.37	38
5	2.3	6
6	1.78	5
7	4.61	12

Stovel Report

- *OMAFRA: subject property consists of primarily 50% Class 3 and 50% Class 5 lands, with some Class 2 lands, according to the Canada Land Inventory.*
- *What happened to the class 2 lands?*

Ontario Federation of Agriculture:

Federation of Agriculture (OFA) is demanding the provincial definition of prime agricultural land be expanded to include Canada Land Inventory Class 4 soils, along with Class 1, 2 and 3 soils. The OFA is also advocating that aggregate extraction be prohibited from Canada Land Inventory Class 1, 2, 3 and 4 soils and specialty crop lands.

New policies may be in effect after Greenbelt, Niagara Escarpment, Oakridges Morraine policies review.

Hidden Quarry site: 77% prime agricultural land???

Gaps in Analysis: Economic Impact

Talbot Ontario

- Multi-million dollar mushroom operation closed
- Cash crop spoilage
- Potential water shortages
- Livestock and human health concerning dust.
- Third party bond?

Request to Council

- Natural Environment report must be revised and third party should address significant habitat and wildlife CRC concerns.
- Agricultural assessment should be updated and extensive interviews with farmers should be completed.
- Decline rezoning of HQ site

Oregon and new legislation to prohibit extraction on farmland

THANK YOU!

Concerned Residents Coalition Rockwood

www.crcrockwood.org

Response to CRC Delegation August 10, 2015

"HQ Natural Environment and Agricultural Assessment Reviews"

Note: This CRC Presentation responded to in this matrix is not a professional review and should not be given any weight when compared to the Professional Peer Reviews undertaken by the township.

Slide #		Issue Raised	Reponse	Reviewer
1	Area	Title Slide		
2	Natural Environment	Described biological conditions in 2011 and 2012 with reference to earlier 1995-96 study	The GWS Study refers to work done in 1995-1996 as having factually occurred but also details extensive work including 54 site visits conducted in 2011 and 2012 as detailed in Table 1 Site Investigation Record found on page 6 of the Level II Natural Environment Technical Report. Additional visits were done in conjunction with follow up work.	GWS
		38.08 hectares, 1.8 wetlands 35.5 woodlands (coniferous, deciduous and mixed forest: 30-150 years old)	While the naturally established forest that has developed on this site has some trees in it that are quite old, these trees were remnants of former agricultural fields (mainly used for livestock) and hedgerows. Aerial photography found in the GWS report at Figure 3 and more clearly in the Harden Report Appendix I Historical Aerial Photographs indicate that as late as April 9, 1964 the mixed forest was a widely spaced group of individual trees near an active gravel pit. The Gravel Pit area has now naturalized and the areas between the older specimens have filled in to create the mixed woodland that exists on site today. All of the mature deciduous and mixed woodlands are being protected and are not in the extraction area. The vegetation communities are discussed at length in 4.4.1 and Table 2.	GWS
3	Natural Environment	Areas of Natural and Scientific Interest (ANSI) and Environmentally Significant Areas (ESA) GWS 2012 – none on-site or off site	All these areas are discussed in Section 3.1 of the GWS Report	GWS
		Eramosa River-Blue Springs PSW ?	Discussed in Section 5.1.1 and 3.1.2	GWS
		Brydson Springs and Creek Trout Habitat?	The Stream on the Brydson Property is appropriately identified as a cold water stream in Section 3.1.1 and is identified as supporting resident brook and brown trout populations.	GWS
		Wetlands N&E of site?	All wetlands are identified in Section 3.1.2 and on Figures 6 and 7.	GWS
4	Natural Environment	Aggregate Resources Act and Provincial Policy Statement No development allowed within habitat of endangered and threatened species, significant wetlands and significant, coastal wetlands.	MNR has evaluated the site in the context of the Species at Risk Act and has been satisfied that there will be no unacceptable impact.	GWS
		No development and site alteration allowed on lands adjacent to such features or within adjacent to significant woodlands, significant valleylands, significant wildlife features or their ecological functions.	The report has been written and evaluated by the peer reviewers and agencies in the context of development and site alteration on lands adjacent to significant woodlands, valleylands, wildlife features or their ecological functions. All reviewers have indicated that they are satisfied that the application does not present a concern in his regard.	GWS
		Consideration to be given to potential indirect impact on the PSW by change in surface water flow and groundwater levels.	The impact on wetland catchment area and changes in ground water levels have been examined by GRCA and found to be acceptable. Specifically see Harden Response to GRCA dated November 26, 2013	GWS
5	Natural Environment	Large PSWs north and south of site	This is well understood and has been taken into account.	GWS
		Four wetlands on-site. Largest wetland (1.0 ha Cattail Marsh) is a PSW.	This is well understood and has been taken into account.	GWS
		Significant Turtle, fish and bird habitat on-site and adjacent to site.	Onsite and adjacent habitat is well understood and has been taken into account.	GWS
6	Natural Environment	Significant Wildlife Habitat	Section 4.5.7 discusses significant wildlife habitat. MNRF has had their comments answered by GWS in correspondence dated May 27, 2013 and has been satisfied in this regard. CRC references the McMartin Study (GAIA) performed by a consultant who illegally trespassed on the property.	GWS

7	Natural Environment	Area-Sensitive Species	All these species are discussed in Section 5.1.6. GRCA and MNR are satisfied with the responses of GWS.	GWS
8	Natural Environment	Landscape Connectivity. Well connected to natural areas to north and west	This is well understood and has been taken into account.	GWS
		Brydson Creek connects the waterway north (Allen wetlands and DeG pond)	This is well understood and has been taken into account.	GWS
		Williams Assoc. On-site woodlands provide important ecological connection to the nearby natural areas.	Willams states in his June 13, 2013 letter that, "While these woodland functions would be temporarily affected by the project, I believe that the basic linkages can be maintatined by the vegetated corridors on the north and east side of the property and the stream channel as proposed."	GWS
		Culvert under the highway	Will not be altered by the proposal.	GWS
		Greenbelt connectivity question	Connections will be maintained as stated above. This property not within the Greenbelt Plan.	GWS
9	Agrucultural Impact Analysis	Agricultural Impact Assessment: Gaps in Analysis (Format of Survey) Terms of reference not disclosed to residents	The study approach followed standard approach established in the County of Wellington Official Plan.	Stovel
		Reconnaissance-level road-side survey vs other site analysis (visits by hydrogeologist on property)	The type of study determines the type of survey in this case a reconnaisance level survey was adequate to gather information regarding general agricultural land uses in the area. There was an onsite survey completed by ESG to define CLI classifications.	Stovel
		No discussion with farmers about farm businesses or best practices	Given that Minimum Distance Separation 1 (MDS1) is not required, there was no need to conduct surveys with adjacent farmers	Stovel
		Some farm businesses missed (woodlots, sheep, dairy)	The figure presented indicates that while the sheep farm and the dairy farm exist in the wider area, they were outside the defined study area and well removed from the proposed quarry. In any event, it is anticipated there will be no impact on these operations.	Stovel
		Findings based on flawed applicant reports (blasting, hydrogeology, noise, traffic)	The reports that the AIA references have been peer reviewed by a number of agencies and professionals and their conclusions have been signed off on by various agencies inclusing MNR, MOECC and the Grand River Conservation Authority.	Stovel
		Limited geographic scope	The scope of the study was similar to other AIA's and consistant with Official Plan Policy. The scope of the study area was agreed to by the township's consultant prior to commencement.	Stovel
10	Agrucultural Impact Analysis	Sketch of Study are showing operations outside of the study area (eg. Sheep, Horse Racing, Dairy Farm)	The figure presented indicates that while the sheep farm and the dairy farm exist, they were outside the study area and well buffered from the proposed quarry. In any event, there is no anticipated impact on these operations.	Stovel
11	Agrucultural Impact Analysis	Gaps in Analysis: Dust Impact		RWDI

		No discussion of known dust impact on plants and animals. Multi-million dollar businesses effected.	The air quality assessment has been completed using the relevant MOECC standards and guidelines. These criteria are established using an effects-based process, as described by the MOECC Guideline for the Implementation of Air Standards in Ontario (GIASO). This effects-based process is based on the MOECC's understanding and interpretation of both health and environmental effects. As discussed in the GIASO, these environmental effects include biomagnification and direct toxicity within aquatic ecosystems; contamination of soil, terrestrial vegetation, and surface water; soiling and corrosion of property; effects on vegetation; effects on visibility; and, odour. The MOECC bases the criteria on the most limiting of these effects, as well as potential health concerns, ensuring that the criteria is broadly protective of both the environment and human health. As a result, the use of the MOECC criteria in the assessment is considered valid and appropriate. Furthermore, agricultural operations and aggregate sites coexist in many locations around the world. There will be no impact on the agricultural operations surrounding the site.	RWDI
		Baseline levels of dust should be determined now! What about fine particulate matter air pollution (PM2.5)?	Background PM2.5 levels modelled were based on a 5-year average of the annual 90th percentile hourly concentration measured at the MOE monitoring station in Guelph (14.8ug/m3) The Guelph monitoring station is located less than 15km upwind if the site, and is located in a more urban setting, it is expected to provide a more conservative estimate of background concentrations.	RWDI
		Mitigation measures are not specific to the need of each farm business. Only discusses horse and mushroom farm?	The two operations discussed are the closest operations to the site.	RWDI
		Complaint protocol offered? Too late if dust contamination occurs in mushroom farm factory or on the fields.	The MOECC has authority to deal with dust related complaints and has broad powers to order immediate remedies.	RWDI
		No buffering capacity as the trucks travel on Hwy 7 – trucks produce most of the dust.	As stated elsewhere, the Hidden Quarry will reduce overall trucking in Ontario.	RWDI
12	Agrucultural Impact Analysis	Agricultural Impact Assessment Gaps Hydrogeology		Harden
		No impact based on Harden Hydro G report. The quarry floor may be raised?	There is no impact on the issue of raising the floor seasonally due to local high water tables. This was fully assessed by Aercoustics in their August 10, 2015 Addendum No. 1.	
		The water table is predicted to rise on the south side of quarry. Waterlogging of young plants cause poor crop yields. No discussion of this impact,	"The Kettle depression has an estimated minimum elevation of 349 m AMSL according to the one meter contour mapping provided by the GRCA. As shown in figure 3.17 the potentiometric surface has an elevation of 346m AMSL. The predicted water level rise beneath the kettle depression, as shown in figure 4.3 is approximately one metre. Therefore, root zone flooding is not predicted." Hidden Quarry - Harden Response to Township regarding CRC Hunter Queries July 8, 2014. In addition, the static groundwater levels in bedrock wells located along the southside of Hwy 7 are all in excess of eight metres depth and therefore well below the root zone.	Harden
		Drawdowns, precipitation levels, evaporation, temperature all effect soil growth capacity. No detailed discussion of these parameters	There is not expected to be any significant impact of water drawdown on any agricultural property. The parameters of precipitation level, evaporation and temperature are all independent of the impacts of the quarry. The drawdown predicted by Harden Environmental occurs in the bedrock aquifer and not the rooting zone.	Harden

		No analysis of soil drainage in lands abutting quarry site (tiling, soil type?)	There will be no change to soil drainage on lands abutting the quarry. The soil type as obtained from the Wellington County Soil Survey is shown on Figure 3.13 of the 2012 Harden Environmental Report. The soil conditions were confirmed with hand auger sampling (off site) and test pits (on-site). The lands upgradient of the site are underlain by the Dumfries Sandy Loam. the Dumfries Sandy Loam is well drained. The water table measured in monitoring well M2 located at the northern property boundary of site is some 12 metres below ground level. Any small deviation of the water table will not affect drainage of the soils at the ground surface. Where drainage is poor and seasonally wet conditions occur, i.e. in the northern portion of the Allen Farm, the soil contains silt and thus retains moisture. The quarry activities will not affect this soil property or moisture content.	Harden
		Accumulative impacts (new municipal well online).	No significant impact is expected. Measurements obtained by Burnside and Associates confirm that there was no impact of municipal water taking observed at wells on the Hidden Quarry site. The measured impact of water taking by the Mushroom Farming operation is less than thirty centimetres at observations wells on the Hidden Quarry site a clear indication that the significant drawdown in the Mushroom Farm well is rapidy attenuated in the aquifer.	Harden
		Haulage of water into farm not mentioned in mitigation measures.	Any well interference, residential or agricultural, would be remedied immediately according to the well complaint protocol. See Section 6.2.5 Water-Related Effects in the Revised AIA, August 5, 2015.	Stovel
13	Agrucultural Impact Analysis	What happened to the class 2 lands?	There are no Class 2 lands present on the site based on the onsite soil survey.	Stovel
14	Agrucultural Impact Analysis	Federation of Agriculture (OFA) is demanding the provincial definition of prime agricultural land be expanded to include Canada Land Inventory Class 4 soils, along with Class 1, 2 and 3 soils. The OFA is also advocating that aggregate extraction be prohibited from Canada Land Inventory Class 1, 2, 3 and 4 soils and specialty crop lands.	The Provincial Policy Staement defines Prime Agricultural Land as: "Prime agricultural land: means specialty crop areas and/or Canada Land Inventory Class 1, 2, and 3 lands, as amended from time to time, in this order of priority for protection." As such The subject land is not comprised primarily of CLI Classes 1-3 agricultural soils. Therefore, the proposed mineral aggregate operation will not result in a significant consumption good quality agricultural land.	Stovel
15	Agrucultural Impact Analysis	Gaps in Analysis: Economic Impact Multi-million dollar mushroom operation closed	 There are not anticipated to be any significant impacts on the Mushoom operation.	Stovel
		Cash crop spoilage	There will be no spoilage of cash crops.	Stovel
		Potential water shortages	Extensive peer reviewed hydrogeology does not predic any impact in water availablity to homes and farms. A robust monitoring program followed up by a well complaint response protocol will ensure that any unexpected impacts are mitigated immediately.	Harden
		Livestock and human health concerning dust.	The air quality assessment indicates that the Hidden Quarry will operate within the acceptable levels based on guidelines enforced by the MOECC.	RWDI
		Third party bond?	The MOECC has authority to deal with dust related complaints and has broad powers to order immediate remedies.	RWDI
16	Natural Environment	Natural Environment report must be revised and third party should address significant habitat and wildlife CRC concerns.	Respectfully, the GWS work has been peer reviewed by the MNRF, the GRCA and by R.J Burnside and Associates on behalf of the Township.	GWS
	Agrucultural Impact Analysis	Agricultural assessment should be updated and extensive interviews with farmers should be completed.	Respectfully, the Agricultural Impact Assessment adequately describes the impact of the Hidden Quarry site on the surrounding agricultural operations.	Stovel

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PLANNING REPORT

To: Township of Guelph/Eramosa Council

From: Elizabeth Howson, MCIP, RPP, Macaulay Shiomi Howson Ltd. (MSH)

Date: September 1, 2015

Subject: Zoning By-law Amendment Application Township File ZBA 09/12
James Dick Construction Ltd. – Hidden Quarry[1] Proposal

Executive Summary

The Township of Guelph/Eramosa received an application under the Planning Act from James Dick Construction Ltd.(JDCL) to amend the Township's Comprehensive Zoning By-law 57/1999 to permit a quarry. The Township deemed the rezoning application complete on December 7, 2012. JDCL is proposing to establish a Category 2 quarry (quarry with extraction below the proposed water table) with a Class 'A' license under the Aggregate Resources Act (ARA). JDCL also submitted an application to the Ministry of Natural Resources (MNR) under the Aggregate Resources Act (ARA) dated October 2, 2012.

The subject site is approximately 39.4 hectares (100 acres) in size and located in the northeast quadrant of Highway 7 and 6th Line. Approximately 24.8 hectares (61.3 acres) of the site is proposed to be used for extraction of aggregate material. The proposed quarry would include extraction above and below the established groundwater table at a rate of up to 700,000 tonnes of aggregate material annually.

The proposed quarry raises a number of complex technical issues which have been under review by the Township and its consultants, as well as other agencies and the public since December 2012. The Township's objective through this review was to ensure that a complete and comprehensive review of the application was carried out as a basis for any decision by Council with respect to the proposal.

At the May 19, 2015 Council meeting, JDCL informed Council that they intended to appeal the zoning amendment application to the Ontario Municipal Board (OMB), citing Council's lack of decision on the application. The OMB has received the appeal and has scheduled a Pre-hearing for November 9, 2015. In addition, the MNRF has requested an OMB hearing to

[1] Note: The proposed quarry has commonly been described as the "Hidden Quarry" however in some of the background reports and comments it is also referred to as the "Eramosa Quarry". Generally in this report it will be referenced as the Hidden Quarry. However, there may be some instances where quotations are referenced which use the "Eramosa Quarry" terminology.

resolve matters concerning the ARA licence application. That file has now been joined with the appeal of the zoning by-law application.

The final decision with respect to the zoning amendment application, as well as with respect to the ARA application, will now be made by the OMB. However, the Township is continuing their review of the zoning by-law amendment application as a basis for a decision by Council with respect to their position on the application and their role at the OMB hearing.

The purpose of this planning report is to make a determination as to the appropriateness of the zoning amendment application based on the information and review carried out to date. The report discusses the background to the application and the review process, and then outlines the planning status of the application; the status of the technical review of each of the technical reports submitted by the applicant, followed by a discussion of input received from the public and an evaluation of the application. The report concludes with a recommendation with respect to the application.

With respect to the policy framework which is reviewed in detail in Appendix A, the County of Wellington Official Plan (Official Plan) designates the subject lands with a Mineral Aggregate Area Overlay designation. The Provincial Policy Statement (PPS) and Official Plan, which provide the key planning policy direction for this site, recognize that:

"As much of the mineral aggregate resources as is realistically possible shall be made available as close to the markets as possible."

At the same time, the Provincial and Official Plan policy framework makes it clear that planning decisions must properly balance all the Province's and County's competing objectives. Given this direction, the fundamental question that must be answered in evaluating the proposed quarry application is - Can the development be permitted in a manner which provides an appropriate balance between all the various goals and objectives of the Province and local community?

To address this question, a detailed technical review of the application and supporting reports was carried out by the Township. In addition, the application was reviewed by Ministry of Natural Resources and Forestry (MNRF), Ministry of Environment and Climate Change (MOECC), Grand River Conservation Authority (GRCA), the County of Wellington, Ministry of Transportation (MTO), and Union Gas with respect to their individual mandates. The Region of Halton, the Town of Halton Hills and the Town of Milton also initiated reviews of specific areas of concern particularly hydrogeology, natural heritage and the haul route. As part of this, the Township also directed that an economic impact study be carried out.

The results of these technical reviews are discussed in detail in Section 4 of this report. Generally, recognizing that final comments have not been submitted by the Region of Halton, Town of Halton Hills and Town of Milton, the results of the technical review indicate that the proposed quarry, based on revised plans which reflect the technical input, can be

permitted from a technical perspective as it would be anticipated to have minimal impacts with respect to the following issues:

- hydrogeology including water levels in up-gradient domestic wells, water quality in down-gradient domestic wells, the potential for impacts on Rockwood Well Number 4 and other related issues subject to a number of conditions including a private well survey, monitoring and refinement of the well contingency plan;
- natural environment including protection of wetlands, as well as Species at Risk and their habitat subject to a number of conditions;
- air quality;
- traffic impact subject to upgrading Sixth Line and the addition of turn lanes on Highway 7;
- haul route subject to completion of the Haul Route Study;
- noise and blast vibration subject to blast monitoring, provision of blast record information and a third party acoustical audit in the first year of operation;
- archaeology subject to a Stage 3 assessment for an area on the west side of the site;
- cultural heritage including the cultural landscape on Sixth Line;
- visual impact;
- agriculture, provided the recommendations related to the other issues are satisfactorily addressed; and,
- economic impact.

However, approval would be subject to the establishment of detailed conditions of development to the satisfaction of the Township, in consultation with respect to specific issues with the Region of Halton, Town of Halton Hills and Town of Milton and the County of Wellington, as well as other agencies if appropriate. Initial direction with respect to the key conditions has been outlined in the report. These initial directions are consolidated in Appendix B for ease of reference. The precise range and nature of the conditions, including implementation mechanisms (e.g. ARA site plan, zoning by-law) for establishment of the conditions will require additional consideration and consultation, particularly with the Region of Halton, Town of Halton Hills and Town of Milton regarding cross jurisdictional issues such as the haul route and well contingency plan.

In addition to the technical review, an extensive public review was carried out. Significant input has been received, and continues to be received, from the general public and stakeholder groups at the public meetings and in submissions/delegations to Council as well as written submissions to the Township. To date, 135 written submissions have been made to the Township from 95 individuals, as well as written submissions and 24 delegations to Council by the Concerned Residents Coalition (CRC).

Through the technical review by the Township and other agencies, all the issues identified by the general public have been reviewed and considered. These include concerns with impacts related to:

- property value;
- private wells;
- traffic including road upgrades and traffic lights;
- blasting/vibration;
- air quality;
- noise;
- natural environment including water quality, wetlands, wildlife including Species at Risk and Brydson Creek;
- damage to homes;
- taxes;
- archaeology/cultural heritage;
- karst topography;
- visual impacts;
- haul route;
- impacts on agriculture including food production and equestrian farms;
- lack of need for additional aggregate resources.

However, the CRC has also chosen to retain consultants who have made submissions with respect to the key issues identified by the public, specifically hydrogeology, Species at Risk, Brydson Creek and air quality. In addition, a submission was received on August 5, 2014 from one of the consultants which relates to a range of issues (e.g. a request for a fish community and aquatic habitat baseline survey, transportation, rock quality tests, implications for equestrian exercise tracks, increased surface and groundwater monitoring). The CRC has also made submissions with respect to a number of technical matters including risks related to mining and the Dolime Quarry, including flyrock, and an "Appraisal of the Golder "Peer Review" of Blast Impact Analysis Reports", as well the Traffic Impact Study, Haul Route Study, radon gas, natural environment, and agricultural assessment. The key CRC issues have all been reviewed by JDCL and their response in turn reviewed by the Township's consultants. Arising from this additional review, in part, a number of changes have been proposed to the application. In particular:

- Hydrogeology
  Modifications have been proposed to the ARA Site Plan to identify a range of water levels for the quarry pond rather than one value, and a review of the quarry floor relative to high groundwater level is to be done to make sure the working floor is not below water table and if it is the elevation is to be adjusted. In addition, methodology for trigger levels is to be established.

- Natural Environment
  Additional conditions of development are proposed for Species at Risk.

- Haul Route Study
  Additional work is required with respect to the Haul Route Study.

Based on the policy and extensive technical and public review, in my opinion, the proposed quarry can, in principle, be developed in a manner which provides an appropriate balance between all the various goals and objectives of both the Province and local community. In the case of the proposed Hidden Quarry, it is appropriate, in my opinion after considering all the technical and public input to date, to make the mineral aggregate resource available for extraction given:

- its proximity to the key GTA market; and,
- the fact that based on the technical review, together with consideration of public input, extraction can be undertaken in a manner which minimizes social, economic and environmental impacts.

In particular, the development, based on the available information, can proceed with minimal impacts anticipated on the environment and the local community. However, this result can only be achieved provided appropriate conditions of development are established through the ARA licence approval, the zoning by-law amendment and through other available mechanisms. The precise range and nature of the conditions, including implementation mechanisms (e.g. ARA site plan, zoning by-law) for establishment of the conditions will require additional consideration and consultation, particularly with the Region of Halton, Town of Halton Hills and Town of Milton regarding cross jurisdictional issues such as the haul route and well contingency plan.

Recommendation

That the Planning Report re: Zoning By-law Amendment Application Township File ZBA 09/12 James Dick Construction Ltd. – Hidden Quarry Proposal dated September 2, 2015 be received;

And that the request to amend the Township of Guelph/Eramosa Zoning By-law, O.M.B. Case File No. PL140985, be recommended to the Ontario Municipal Board for approval in principle, subject to detailed conditions of development being developed to the satisfaction of the Township in consultation with the Region of Halton, Town of Halton Hills and Town of Milton and County of Wellington, as well as other agencies if appropriate, and established through the Aggregate Resources Act licence approval, an amendment to the Township Zoning By-law Amendment and through other available mechanisms;

And that Council direct the Township Solicitor and consultants to attend any Ontario Municipal Board proceeding which may take place in connection with the Planning Act and Aggregate Resources Act applications, in support of the recommendations outlined in Planning Report Re: Zoning By-law Amendment Application Township File ZBA 09/12 James Dick Construction Ltd. – Hidden Quarry Proposal dated September 1, 2015; and,

And that Council provide the Township Solicitor with authority to engage in settlement discussions with the applicant (and other parties to the Ontario Municipal Board hearing) and to make a request for mediation in this matter to the Ontario Municipal Board.

Report

1. Purpose

The Township of Guelph/Eramosa received an application under the Planning Act from James Dick Construction Ltd.(JDCL) to amend the Township's Comprehensive Zoning By-law 57/1999 to permit a quarry. The Township deemed the rezoning application complete on December 7, 2012. JDCL is proposing to establish a Category 2 quarry (quarry with extraction below the proposed water table) with a Class 'A' license under the Aggregate Resources Act (ARA). JDCL also submitted an application to the Ministry of Natural Resources (MNR)[2] under the Aggregate Resources Act (ARA) dated October 2, 2012.

The proposed quarry raises a number of complex technical issues which have been under review by the Township and its consultants, as well as other agencies and the public since December 2012. The process included a statutory public meeting in March 2013, as well as a Special Council meeting on August 12, 2014 at which a status report on the review of the application was presented. In addition, the Concerned Residents Coalition (CRC), a community group "formed to support a thorough and fair assessment of the Hidden Quarry application"[3] has made 24 delegations to Council. The Township's objective through this review was to ensure that a complete and comprehensive review of the application was carried out as a basis for any decision by Council with respect to the proposal.

At the May 19, 2015 Council meeting, JDCL informed Council that they intended to appeal the zoning amendment application to the Ontario Municipal Board (OMB), citing Council's lack of decision on the application. A notice of appeal was filed with the Township dated May 25, 2015. The OMB has received the appeal and has scheduled a Pre-hearing for November 9, 2015. In addition, the MNRF has requested an OMB hearing to resolve matters concerning the ARA licence application. That file has now been joined with the appeal of the zoning by-law application as noted in a letter to the Township from the OMB dated July 29, 2015.

The final decision with respect to the zoning amendment application, as well as with respect to the ARA application, will now be made by the OMB. However, the Township is continuing their review of the zoning by-law amendment application as a basis for a decision by Council with respect to their position on the application and their role at the OMB hearing. In finalizing their position, Council has directed that a Special Meeting of Council be held on September 10, 2015 to receive the planning report. Following this an additional Special Council meeting will be held on September 15, 2015 to receive public input and comments on the planning report.

[2] Note: MNR is now the Ministry of Natural Resources and Forestry (MNRF) and will be referred to as such throughout unless a quotation uses the previous name.
[3] Concerned Citizens Coalition, About CRC, www.crcrockwood.org.

The purpose of this planning report is to make a determination as to the appropriateness of the zoning amendment application based on the information and review carried out to date. The report discusses the background to the application and the review process, and then outlines the planning status of the application; the status of the technical review of each of the technical reports submitted by the applicant, followed by a discussion of input received from the public and an evaluation of the application. The report concludes with a recommendation with respect to the application.

2. Background Summary

The subject site is approximately 39.4 hectares (100 acres) in size and located in the northeast quadrant of Highway 7 and 6th Line. Approximately 24.8 hectares (61.3 acres) of the site is proposed to be used for extraction of aggregate material. The remaining lands include a Provincially Significant Wetland in the northwest corner which is proposed to be protected, as well as lands associated with an intermittent stream (Tributary B) which will also be protected. The proposed quarry would include extraction above and below the established groundwater table at a rate of up to 700,000 tonnes of aggregate material annually.

There will be an on-site processing plant for crushing, washing and screening and the material will be shipped off-site via 6th Line and Highway 7. In addition, a scale, a scalehouse and a maintenance shop/office/quality lab are also proposed in the southwest corner of the site adjacent to the new main entrance. The existing Service Entrance at the north end is proposed only for the use of maintenance and service vehicles.

In support of the application, in addition to a Planning Report prepared by Stovel and Associates Inc., September 2012, the applicant submitted a number of reports regarding specific technical issues as required by the Township. Table 1 lists the issues and related reports and additional significant submissions/responses to date provided in response to comments from the Township and agencies.

Regard should also be had to the ARA application and the most recent ARA Site Plan dated June 18, 2015. In addition, an economic impact study was undertaken by a consultant, Altus Group Economic Consulting, retained by the Township.

Table 1
JDCL Technical Reports and Related Submissions/Responses

Technical Issue	Reports and Additional Submissions/Responses[4]
Hydrogeology	• Level I and II Hydrogeological Investigation Hidden Quarry Rockwood, Ontario, Harden Environmental Services Ltd. September 2012 • Responses to Comments included in comment matrix dated March

[4] Note: Reports and Submissions/Responses can be found on the Township's website.

Table 1 JDCL Technical Reports and Related Submissions/Responses	
Technical Issue	**Reports and Additional Submissions/Responses[4]**
	12/13 • Letter to GRCA from Harden, "Response to GRCA Comments regarding Hidden Quarry", March 13, 2013 • Letter to from Harden, Summary of Drilling and Testing of M15, June 7, 2013 • Letter to JDCL from Harden, "MOE Comments Hidden Quarry", July 15, 2013 • Letter to JDCL from Harden, Hydrogeological Summary Report for Township of Guelph Eramosa, September 5, 2013 • Letter to Burnside, Response to Burnside Review of Hydrogeological Summary, January 14, 2014 • Letter to Burnside, Response to Burnside Review of Summary of Drilling and Testing Of New Well M15 at Hidden Quarry, January, 14, 2014 • Letter to JDCL from Harden, "Timeline for Changes to Monitoring Plan", February 5, 2014 • Letter to GRCA from JDCL, "Response to GRCA Letter dated April 23, 2014 regarding revised materials Hidden Quarry", June 6, 2014. • Letter to R.J. Burnside and Associates Limited from Harden, "Letter – Response to Burnside Review of Summary of Drilling and Testing of New Well M15 at Hidden Quarry Site.Harden Response to Burnside Review of Hydrogeological Summary...", June 10, 2014 • Letter to the Region of Halton from JDCL, "Zoning By-law Application 09/12 Hidden Quarry: Part 1, Concession 6, Township of Guelph/Eramosa, County of Wellington", August 1, 2014 • Letter to R.J. Burnside and Associates Limited from Harden, "Hidden Quarry Burnside Letter of October 6, 2014....", December 9, 2014 • Memorandum To: R.J. Burnside and Associates Ltd. From: Harden "Hidden Quarry: Specific Well Contingency Plans", January 8, 2015 • Response to comments from Region of Halton in comment matrix dates May 8, 2015 • Letter to R.J. Burnside and Associates Limited from Harden, "Hidden Quarry Burnside Letters of April 24, 2015....", June 12, 2015 • Letter to R.J. Burnside and Associates Limited from Harden, "Hidden Quarry Burnside Letters (sic) of July 28, 2015....", August 17, 2015
Natural	• Level II Natural Environment Technical Report, GWS Ecological &

Table 1 JDCL Technical Reports and Related Submissions/Responses	
Technical Issue	**Reports and Additional Submissions/Responses[4]**
Environment	Forestry Services Inc. in association with Gray Owl Environmental Inc. (GWS), August 2012 • Responses to Comments included in comment matrix dated march 12, 2013 • Letter to GRCA from Harden, "Response to GRCA Comments regarding Hidden Quarry", March 13, 2013 • Letter to JDCL from GWS, "Hidden Quarry- Response to MNR Comments", May 27,2013 • Letter to County of Wellington from GWS, "Hidden Quarry", September 6, 2013 • Letter to GRCA from GWS, "Hidden Quarry Site Meeting Notes", September 17, 2013
Air Quality	• Air Quality Assessment, RWDI, September 6, 2012 • Responses to Comments included in comment matrix dated march 12, 2013
Traffic	• Traffic Impact Study, Cole Engineering, April 2012 • Responses to Comments included in comment matrix dated march 12, 2013 • Revised Traffic Impact Study, Cole Engineering, November 2013 • Revised Traffic Impact Study, Cole Engineering, December 2013 • Letter to JDCL from Cole Engineering, "Response to April 7, 2014 Comments Eramosa Quarry Township of Guelph-Eramosa, April 17, 2014
Haul Route	• Cole Engineering, Haul Route Study Eramosa Quarry, Township of Guelph-Eramosa, March 30, 2015 • JDCL letter to MSH, "Comments on Town of Halton Hills – Hatch Mott Macdonald Report", July 23, 2015 • Response to comments from Region of Halton in comment matrix dates May 8, 2015 • Response Matrix to Burnside Letter dated June 26, 2015, July 23, 2015
Noise/ Blast Vibration	• Noise Impact Study, Hidden Quarry, Aercoustics Engineering Limited, November 2012 • Blast Impact Analysis, Explotech, November 19, 2012 • Noise Impact Study, Aercoustics Engineering Limited, May 24, 2013 • Letter to JDCL from Aercoustics Engineering limited, "Response to Peer Review from Novus Environmental Inc. for Proposed Hidden Quarry in Rockwood, Ontario, dated April 8, 2013", May 24, 2013 • Letter to JDCL from Explotech "Proposed James Dick Hidden Quarry Licence Application Blasting Flyrock", April 10,2014 • Letter to JDCL from Golder Associates "Follow up to Technical

Table 1 JDCL Technical Reports and Related Submissions/Responses	
Technical Issue	**Reports and Additional Submissions/Responses[4]**
	Peer Review – Blast Impact Analysis Hidden Quarry....", October 1, 2014 • Email from Golder Associates to JDCL, "Blasting and Flyrock questions", April 2, 2015
Agriculture	• Stovel and Associates Inc., Agricultural Impact Assessment Proposed Hidden Quarry, February 3, 2015, Revised August 5, 2015
Archaeology	• Stage I-II Archaeological Assessment, York North Archaeological Services Inc., August 31, 2012
Cultural Heritage	• Cultural Heritage Resource Assessment (1), George Robb Architect, June 2013
Visual	• Visual Impact Study JDCL
Site Plans	• Site Plans were submitted as part of the ARA application • Revised Site Plans submitted to the Township dated June 18, 2015

3. Planning Status

Key applicable policies and regulations with respect to the planning status of the subject lands are those found in:

- Provincial Policy Statement 2014;
- Places to Grow: Growth Plan for the Greater Golden Horseshoe (Growth Plan); and,
- County of Wellington Official Plan (Official Plan).

Planning decisions by the Township must be consistent with the policies of the Provincial Policy Statement and conform to the policies of the Growth Plan, and Official Plan. The application requires an amendment to the Zoning By-law; as context the current regulations of the Zoning By-law applicable to the site are outlined. With respect to the Provincial Greenbelt Plan, the subject site is outside the area of the Plan and is not subject to its policies.

The following summarizes the planning policy directions and regulations relevant to the proposed quarry. A detailed review and evaluation of the application with respect to the policy framework is found in Appendix A to this report.

3.1 Provincial Policy Statement 2014 (PPS)

All planning decisions are required to be consistent with the applicable provisions of the PPS (Section 4.2). The subject lands have been identified in the Official Plan with a Mineral Aggregate Area overlay designation. As such the key applicable policies of the PPS are

those found in Section 2.5 Mineral Aggregate Resources. In particular, Section 2.5.2.1 states:
"As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible.

Demonstration of need for mineral aggregate resources, including any type of supply/demand analysis, shall not be required, notwithstanding the availability, designation or licensing for extraction of mineral aggregate resources locally or elsewhere."

Despite this direction, however, extraction must also minimize impacts as set out Section 2.5.2.2 which states:

"Extraction shall be undertaken in a manner which minimizes social, economic and environmental impacts."

In addition, "progressive and final rehabilitation is required to accommodate subsequent land uses, to promote land use compatibility, to recognize the interim nature of extraction, and to mitigate negative impacts to the extent possible..."(Section 2.5.3.1).

Further, consideration must be given to the policies of Section 2.1 Natural Heritage which requires the protection of natural features and areas; Section 2.2 Water which requires that the quality and quantity of water be protected, improved or restored; and Section 2.6 Cultural Heritage and Archaeology which requires the conservation of significant built heritage resources and significant cultural heritage landscapes. It also prohibits development and site alteration on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved.

A number of other applicable policies are found in Section 1 Building Strong Healthy Communities. The general direction in the policies in Section 1 is congruent with the policy direction in Section 2.5 - generally recognizing the need to promote efficient development and land use patterns and to accommodate a mix of uses, while ensuring any impacts are minimal.

3.2 Growth Plan

All planning decisions are required to conform with the applicable provisions of the Growth Plan. The focus of the Growth Plan is on the development of settlement areas. However, the Plan does recognize that certain development must be located outside of settlement areas particularly "development related to the management or use of resources.... that cannot be located in settlement areas." (Section 2.2.2.1 (i))

The Plan also specifically with respect to mineral aggregate identifies the need to carry out a sub-area assessment "to identify significant mineral aggregate resources in the GGH, and to develop a long-term strategy for ensure the wise use, conservation, availability and management of mineral aggregate resources in the GGH, as well as identifying opportunities

for resource recovery and for co-ordinated approaches to rehabilitation where feasible." (Section 4.2.3). However the sub-area assessment has not yet been carried out. Nevertheless, the policy provides a general direction similar to, although much less detailed, than the policy direction of the PPS with respect to mineral aggregate.

It should also be noted that the Growth Plan puts a priority on improving corridors for goods movement (Section 3.2.4).

3.3 Official Plan

The Official Plan designates the subject lands with a Mineral Aggregate Area overlay designation (See Figure 1). Such lands only require approval of a rezoning and ARA licence. Based on the policies in place at the time of the application, an Official Plan amendment is not required.[5]

The Plan identifies a long-term vision (Part 2 of the Plan) and establishes policies to attain that vision. The basis for the vision is the need for planning decisions to properly balance all the County's competing objectives. Given this direction, the fundamental question arising from the Official Plan that must be answered in evaluating the proposed quarry is - Can the development be permitted in a manner which provides an appropriate balance between all the various goals and objectives of the local community? These include general directions set out in Sections 2.1.2, 2.1.3 and 2.1.4 as well as more specific objectives in Section 2.2 and as more precisely established through the Plan's detailed policies?

The key specific policies are found in Section 6.6 Mineral Aggregate Areas which is applicable to lands such as the subject site which are designated with a Mineral Aggregate Area overlay designation. Section 6.6.1 notes that the lands identified "only indicates that aggregate deposits are likely to be available. It does not presume that all conditions are appropriate to allow extraction or processing of the resource to proceed. The intention is to make as much aggregate resources available as close to markets as is realistically possible." This direction reflects the general direction in Part 2 and also repeats a key policy direction from the PPS.

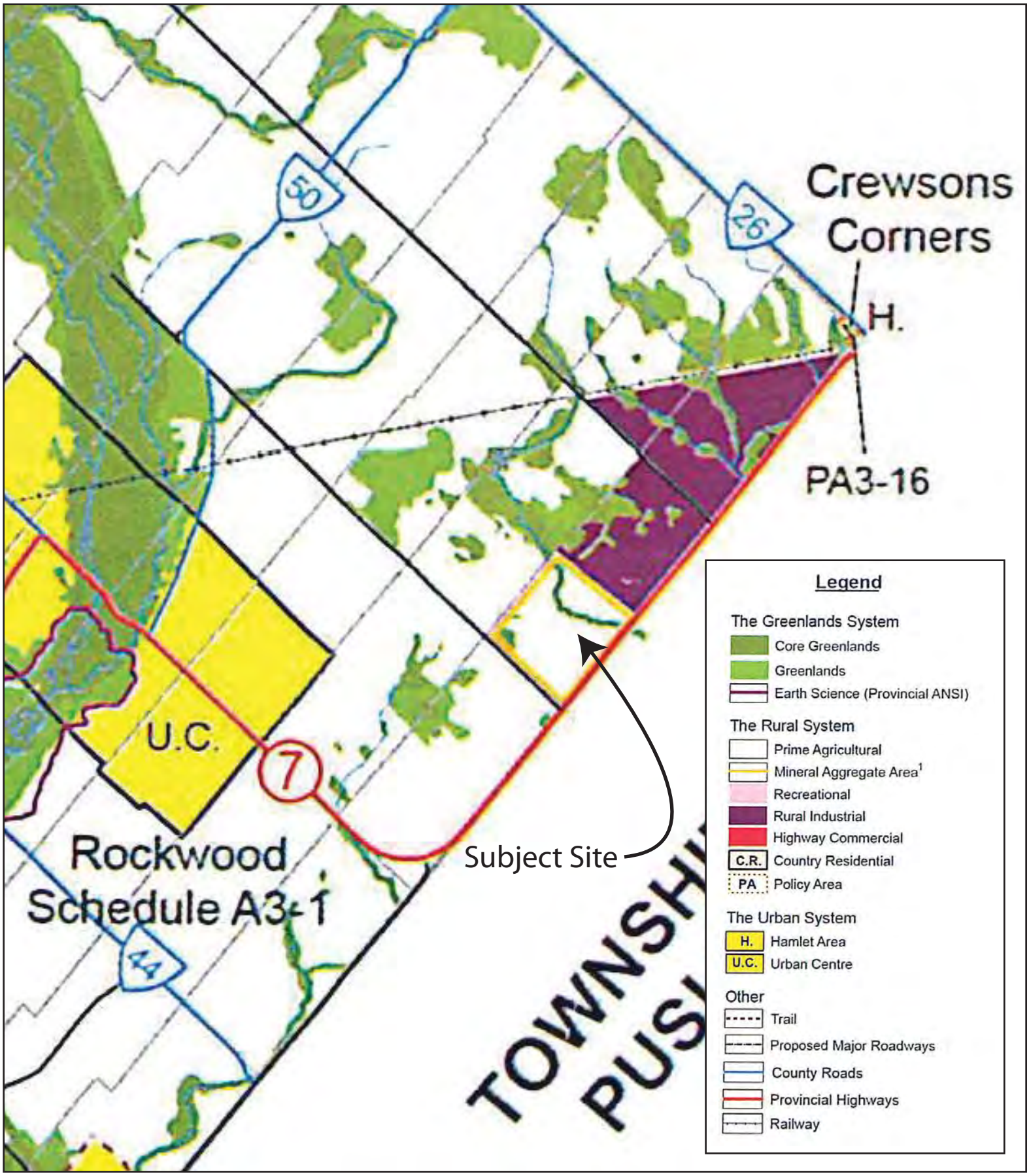
Section 6.6.5 provides the criteria to be considered in evaluating new aggregate operations while Section 6.6.9 provides criteria for evaluating proposals for mining below the water table which is applicable to the proposed quarry. Section 6.6.8 focuses on rehabilitation.

[5] Note: The Official Plan as amended by Official Plan Amendment (OPA) 81 would now require an OPA despite the fact that the overlay designation still applies. However, the rezoning application was submitted before OPA 81 was adopted or approved, and in fact before changes were proposed to this aspect of the Mineral Aggregate policies. As such the Township has received a legal opinion that under The Clergy Principle which "states that every applicant is entitled to have their application evaluated on the basis of the laws and policies as they existed on the date that the application was made", the policies of OPA 81 are not applicable and only a rezoning is necessary, in addition to the approval of the ARA licence.

Figure 1

Excerpt County of Wellington Official Plan

(Amendments made to February 12, 2013 Last Revision May 15, 2013)



The criteria seek to ensure that the manner of operation and the nature of rehabilitation, as well as impacts on adjacent land uses, residents, public health and safety, the physical (including natural) environment, agriculture, transportation, municipal water supply, water table or surface drainage patterns and cultural heritage and other matters deemed relevant by Council, are all addressed to ensure that extraction can be carried out with as little social and environmental cost as possible. With respect to mining below the water table a focus is on ensuring minimal impacts on the environment including surface and groundwater and compatibility of the after use.

Other applicable policies in the Official Plan provide additional direction on the evaluation of specific impacts related to cultural heritage (Section 4.1), water resources (Section 4.9) and natural heritage (Part 5).

3.4 Township Zoning By-law 57/1999, as amended (Zoning By-law)

The Zoning By-law reflects the designations in the Official Plan prior to its amendment by OPA 81. The majority of the subject lands are zoned "Agricultural (A) Zone", while the key natural heritage features are zoned "Hazard (H) Zone". The application requests a rezoning to "Extractive Industrial (M3) Zone". The only variation to the M3 Zone regulations which is requested in the application is a reduction in the setback to a body of water from 30 meters to 20 meters.

3.5 Planning Policy Status Conclusions

The Official Plan designates the subject lands with a Mineral Aggregate Overlay designation. The PPS, Growth Plan and Official Plan all recognize that:

"As much of the mineral aggregate resources as is realistically possible shall be made available as close to the markets as possible."

At the same time, the Provincial and Official Plan policy framework make it clear that planning decisions must properly balance all the Province's and County's competing goals and objectives. Given this direction the fundamental question that must be answered in evaluating the proposed quarry in the context of both the Provincial policy framework and the Official Plan is - Can the development be permitted in a manner which provides an appropriate balance between all the various goals and objectives of the Province and local community?

The specific requirements of any zoning by-law amendment, together with other development conditions established through the ARA licence approval, must be considered as part of addressing this question.

4. Technical Review Status

The status of the technical review of each issue by the Township and other agencies is outlined in the following sections and the most significant matters are summarized in Table 2.

Table 2 Summary of Status of Technical Review

Issue	Status
Hydrogeology	• Review complete by Township Technical Consultant, R.J. Burnside and Associates Limited (Burnside); • Review complete by Ministry of Natural Resources and Forestry (MNRF), Ministry of Environment and Climate Change (MOECC), Grand River Conservation Authority (GRCA); and, • Reviewed by Region of Halton. Most recent Regional comments focus on need to finalize commitments by JDCL concerning downgradient property protection, mitigation and monitoring.
Natural Environment	• Review complete Township (Burnside), MNRF, GRCA, and County; and, • Reviewed by Region of Halton, and Region's comments addressed by JDCL and reviewed by Burnside.
Traffic Impact	• Review of initial report completed Burnside and MTO. • As part of the Haul Route Study review, Burnside requested that the Traffic Impact Study be updated. Revised report dated August 20, 2015 and submitted on August 21, 2015. Revised report has been reviewed by Burnside who confirmed that the report provided sufficient information to confirm the requirements for road improvements in the area of the proposed quarry.
Haul Route Study	• Initial study by Cole Engineering for JDCL reviewed by Burnside; • Initial study by Cole Engineering for JDCL reviewed by Hatch Mott Macdonald on behalf of the Town of Halton Hills, also reviewed by Region of Halton and considered by Burnside in their review; and, • Revised Report submitted August 21, 2015. Revised report has been reviewed by Burnside who concluded that matters remain outstanding which need to be addressed before the study is approved.
Noise/Blast Vibration	• Review complete by Township Technical Consultant, Novus Environmental Inc. (Novus) and by Union Gas
Agriculture	• Review complete by Township Consultant, MSH
Archaeology	• Review complete Ministry of Tourism, Culture and Sport
Cultural Heritage	• Review complete by Township Consultant, Unterman McPhail Associates
Visual	• Review complete by Township Consultant, Brook McIlroy Inc.
Economic Impact	• Report, "Economic Impact of Proposed Hidden Quarry",

Table 2 Summary of Status of Technical Review	
Issue	**Status**
	completed by Township Consultant, Altus Group Economic Consulting (Altus).

It should be noted with respect to the review by Provincial ministries that while a response was received to the initial submissions from JDCL from a number of key ministries (e.g. MNRF, Ministry of Environment and Climate Change (MOECC)[6]), no response was received to additional submissions, including submissions from the CRC. Relevant additional submissions were circulated by the Township through the Provincial one-window review process which requires that the submission be made to the Ministry of Municipal Affairs and Housing (MMAH). The following response was received by the Township from MMAH:

"Where the municipality is the approval authority for a planning application, it is responsible for co-ordinating the review, decision-making and appeal process for planning applications. This includes ensuring that appropriate reports are conducted, and peer reviews are arranged where needed. The municipality is also responsible for ensuring that any decision with respect to Planning Act application is consistent with the Provincial Policy Statement, 2014, and conforms to any applicable Provincial Plan."

This email reiterates that partner Ministries (e.g. MOECC and OMAFRA) do not generally provide a broad review of reports related to zoning bylaw amendments, such as Agricultural Impact Studies or Noise Impact Studies. However, MMAH also states that should the Township have any specific technical questions with respect to these reports, they would direct them to the applicable Provincial Ministry for their consideration and response, as possible. Such assistance has not been requested as technical questions have been addressed by the Township's consultants.

4.1 Hydrogeology

4.1.1 Township

Review Summary

Burnside, the Township's consultant, reviewed the initial submission by Harden Environmental Services Ltd (Harden) entitled "Level I and II Hydrogeological Investigation" on behalf of the Township. The Burnside comments were provided to the Township in a letter dated January 11, 2013. A meeting was held on January 29, 2013 with the proponent and their technical representatives to discuss the technical review comments prepared by Burnside. JDCL provided response comments to the Burnside and agency comments in a planning matrix dated March 12, 2013 which was circulated by Cuesta Planning[7]. Burnside

[6] The Ministry of Environment is now the Ministry of Environment and Climate Change (MOECC) and will be referred to as such throughout unless a quotation uses the previous name.

[7] Cuesta Planning were the Township Planning Consultant at the time with respect to the application.

also received copies of various correspondences between JDCL, Harden and various agencies including MOECC and GRCA for information purposes.

Burnside met with representatives from JDCL and Harden on the proposed Hidden Quarry site on April 16, 2013 in order to select a location for new well M15 and also to look at existing features. Burnside was also present at the proposed Hidden Quarry site to observe portions of the drilling and testing of M15 in May 2013.

Harden submitted a report entitled "Summary of Drilling and Testing of M15" dated June 7, 2013. Burnside met with Harden, JDCL, and the Township on July 31, 2013 to review the results of Drilling and Testing of M15 and to confirm the expectations for further response to peer review comments. Harden submitted a report to JDCL entitled "Hydrogeological Summary Report for Township of Guelph Eramosa" dated September 5, 2013. This report includes a list of main issues discussed at the July 31, 2013 meeting and the Harden conclusions regarding these issues.

Burnside on behalf of the Township provided comments on the Hydrogeological Summary report and the "Summary of Drilling and Testing of M15" report in two letter reports addressed to Harden on November 12, 2013. These were in turn responded to by Harden in two letters to Burnside dated January 14, 2014.

Harden provided a proposed timeline for changes to the Monitoring Plan and attached a Revised Monitoring Program and Contingency Measures (January 2014) in correspondence to JDCL dated February 5, 2014. The revised monitoring program was included in the January 14, 2014 Harden letter and as a result, a formal review of the February 5, 2014 correspondence was not required.

A Burnside letter dated April 8, 2014 replied to the January 14, 2014 Harden letter regarding "Summary of Drilling and Testing of M15" and provided specific comments on the outstanding issues. The letter noted that the level of on-site data had been improved, but that further additional assessment and background data collection would be required to reduce the number of variables. Burnside recommended that the monitor well construction/testing/sampling and domestic well survey be completed as soon as possible to improve the understanding of the bedrock aquifer. Further correspondence forwarded by Burnside to Harden dated April 9, 2014 regarding the "Hydrogeological Summary Report" (Harden letter of January 14, 2014) noted that Burnside's primary concerns were the potential for impact on the water levels in the upgradient domestic wells, the potential for water quality impacts in the down gradient domestic wells and potential impacts to Rockwood Well 4. Although additional information had been provided, Burnside indicated that the predictions regarding the response of the fracture systems in the bedrock aquifer needed to be confirmed through ongoing data collection and a thorough investigation of nearby domestic wells.

Harden provided their response to Burnside in correspondence dated June 10, 2014. The response addressed the three primary areas of concern in the April 9, 2014 Burnside letter.

Harden then grouped the remaining Burnside comments into eight areas of interest – Karst; Groundwater Parameters – Hydraulic Connectivity – M15 intervals; Nitrate Balance; Deeper Water Sources and Water Quality; Local Well Survey; Quarry Depth Limitation; Brydson Spring and Blue Springs Creek; and Sinking Cut-Monitoring and Historical Low Water Level. The Burnside letter of October 6, 2014 responded to the eight issues addressed by Harden.

In particular, Burnside still had concerns with the potential of the proposed quarry to impact water levels and water quality in the nearby domestic wells and that the quarry might result in reduced flow in the Brydson Spring. Burnside requested the following additional data be provided as part of the application: a detailed well survey of all domestic wells within 500m of the proposed quarry; drilling and evaluation of new wells M16 and M17 in the same fashion as M15; an investigation of flow in Brydson Spring and its relationship to flow in Tributary B; and collection of water quality samples from on-site monitors and surface water features at the same time the domestic wells are sampled.

At a meeting on October 21, 2014, Harden agreed to collect water quality samples from 15 select private wells, nine on-site monitoring wells and five surface water locations "to provide baseline data to evaluate water quality impacts (if any) from the quarry (if approved)."[8] Harden also agreed to prepare a well specific contingency plan for each of the wells within 500m of the proposed quarry using the results of the water quality sampling and the data on well depth, pump setting and well condition that they had collected during previous visits to the domestic wells.

Harden responded to the Burnside comments on December 9, 2014 and also provided a memorandum related to Specific Well Contingency Plans on January 8, 2015. Burnside reviewed these submissions and responded in a letter on April 24, 2015. The April 24th comments indicated that Burnside was generally satisfied with the Harden responses related to the eight areas of interest that had been identified, subject to a number of conditions of development. In particular, they note the benefit of the water quality samples to provide baseline data. A number of domestic wells have elevated nitrate and Burnside indicated that it was important to identify the probable sources of elevated nitrate prior to the onset of any quarrying activities. They also note that JDCL has agreed to complete a detailed well survey and install wells M16 and M17 upon approval of the quarry. They identify a number of conditions of development related to M16/17 and M18/19. In addition, Burnside establishes the need for flow measurements to be taken as soon as possible at Brydson Spring and Tributary B so that the contribution of Tributary B to the Brydson Spring can be quantified. This additional baseline information will be useful in assessing the impact of the proposed quarry on Tributary B and the Brydson Spring.

With respect to the Specific Well Contingency Plans, Burnside had requested available information for each well be used to come up with a well-specific contingency plan to deal with potential impacts. Information on 39 wells was provided. Burnside requested that

[8] R.J. Burnside & Associates Limited, Letter to Harden Environmental Services Ltd. Re: Harden Letter of December 9, 2014 and Specific Well Contingency Plan dated January 8, 2015, April 24, 2015, page 5.

additional information be provided for a number of wells related to water quantity and water quality in a second letter dated April 24, 2015. A response was provided by Harden on June 12, 2015. Burnside responded further on July 28th and Harden responded on August 17th. This correspondence relates to refining the details of the well-specific contingency plan, and work continues with the applicant regarding this matter. However, the principle of the requirement for the establishment of a specific well-contingency plan has been established.

Review Status

Based on all the submissions from the applicant with respect to hydrogeology, as set out in their letter of April 24, 2015, Burnside have indicated that their concerns with the proposed quarry have been generally addressed including their concerns with water levels in up-gradient domestic wells, water quality in the down-gradient domestic wells and the potential for any impacts on Rockwood Well Number 4. Their opinion is subject to the following conditions of development being established through the ARA site plan, as well as modifications to the current ARA site plan, a zoning by-law amendment or other appropriate mechanisms:

- A private well survey completed by JDCL in accordance with Terms of Reference approved by the Township to be conducted well in advance of any quarrying activities which will include both upgradient and downgradient wells within 500 meters (or somewhat outside that area where appropriate) of the proposed quarry including in the Town of Milton. Data collected during the survey will include at a minimum well stickup, casing diameter, depth of well, depth to water, depth to pump intake and surface drainage around the wellhead. The survey will include collection of a sufficient number of water quality samples to allow for pre quarry water quality to be established for each well. For wells with elevated nitrate or detections of E.coli or total coliform, the probable source will be identified. The well will either be upgraded by JDCL so that it is no longer impacted by the source, or if upgrades are not possible, the pre-existing concentrations will be considered in the evaluation of possible quarry impacts;
- The results of the private well survey will be used to establish an off-site monitoring program in accordance with Terms of Reference approved by the Township for both upgradient and downgradient domestic wells within 500 meters, or somewhat outside that area where appropriate, of the proposed quarry, including in the Town of Milton. Wells included in the monitoring program will be upgraded by JDCL to comply with Regulation 903. The monitoring program will also include the Brydson Spring/Creek in particular the relationship of the flow in Tributary B and the flow in Brydson Spring. A copy of the annual reporting shall be provided to the Township;
- Pre-quarrying water level and water quality monitoring will continue in the wetland, on-site wells and on-site and off-site surface water features at the locations listed on Drawing 2 of the ARA Site Plan. This monitoring along with the private well survey will provide sufficient data to allow for confirmation that the monitoring program referenced on Drawing 2 is sufficiently rigorous to maintain current conditions in the

wetland, on-site wells on-site ponds and domestic wells and will allow for trigger levels and contingency plans to be created;

- Refinement of the well contingency plan which has been established in accordance with direction provided by the Township based on results of the private well survey and results of revised groundwater modeling;
- Installation of onsite open hole wells M16 south of the Phase 2 extraction limit, M17 between the sinking cut and the nearest domestic wells, and M18 and M19 along the southern property boundary;
- Completion of the following at onsite wells M16/17 and M18/19:
    - Detailed core logging which includes fracture identification;
    - A pumping test on the open hole wells to assess connectivity with other wells on site;
    - A downhole video and flow profile to identify productive fracture systems;
    - Completion of a multi-level well at M16 with M17 to remain an open hole;
    - The construction of M18/M19 were not specified by Burnside, however Halton Region requested that they be constructed as multi-level wells;
    - Water quality sampling from each well to allow assessment of water quality variations with depth; and,
    - Hydraulic conductivity testing;
- Deepening of existing onsite Well M3 to 227 masl to provide more reliable water level data;
- Data from all automatic water level recording devices should be provided to the Township on a bi-weekly basis until the data indicates that water levels are remaining consistently above the trigger level; and,
- Modifications to the current ARA site plan including:
    - Drawing 4-the trigger levels and contingency measures table needs to be revised to coincide with the monitoring table on drawing 2. Table 2 indicates that wells 1D, 2,13D, 14D, 15, and 16 are all to be equipped for automatic daily readings and that monthly manual water levels will be collected, yet the table on Drawing 4 indicates that if a trigger level is breached then water level monitoring will be increased to weekly. The table should be revised to indicate that manual water levels collection will be increased from monthly to weekly and data from automatic water level recorders (AWLR's) will be downloaded and reviewed on a weekly basis. The water level data from the AWLR's can then be plotted and the water level trends analysed so that the time it will take for water level recovery to above trigger levels can be predicted. Similarly, there is no note to indicate what actions will occur if a warning level is breached. The Harden letter of December 09, 2014 indicates that if a warning level is breached then bi-weekly water level measurements will be initiated. A statement similar to the one for trigger levels should be added to the table to identify the actions to be undertaken if a warning level is breached.
    - Drawing 4-Note 3 on the trigger table indicates "If quarry activities are found to be responsible, the above actions will be considered and a response

presented to the GRCA and the Township of Guelph Eramosa". The wording should be changed to "...one of the above actions will be undertaken...".

- Drawing 2- under Technical Recommendations references water well contingency protocol on page 62 of the Harden report dated December 9, 2014. This is a letter report and the details of the monitoring are actually presented in Appendix B "Monitoring Program and Contingency Measures".

4.1.2 Ministry of Environment and Climate Change (MOECC)

Review Summary

MOECC provided formal comments to JDCL on July 3, 2013 and to JDCL's consultant, Harden Environmental Services Ltd. (Harden) on October 10, 2013 with respect to the Level I and II Hydrogeological Investigation. MOECC's input was separated into surface water and groundwater review and comments and a range of matters were identified for additional review. Harden responded to the MOECC comments in a letter to JDCL on July 15, 2013. MOECC in their comments of October 10, 2013 indicated that their comments regarding surface water had been addressed, and, in particular that "the risk for significant environmental impact in regards to Tributary B and the Northwest Wetland are perceived to be low". With respect to groundwater, MOECC note that they agree with "Harden's assessment of the groundwater thermal impacts of the proposed quarry on the Brydson Spring and the Blue Spring Creek" and "that groundwater movement in the bedrock is mainly controlled by fractures and not by karst features."

Review Status

MOECC indicates in their October 10, 2013 letter that "the surface water and groundwater outstanding items have been addressed to MOECC satisfaction."

4.1.3 Ministry of Natural Resources and Forestry (MNRF)

Review Summary

The Guelph District Office of MNRF, provided formal comments to JDCL on April 15, 2013, July 11, 2013 and November 6, 2013 with respect to the Level I and II Hydrogeological Investigation, as well as the Level II Natural Environment Technical Report and the Site Plans. The MNRF comments with respect to hydrogeology did not address "any potential impact on water supply" (April 15, 2013 Letter). The comments requested clarification with respect to proposed monitoring, contingency measures and a statement regarding runoff.

Review Status

In both their July and November letters, MNRF indicated that "The Ministry has no further concerns in regards to the Hydrogeological Investigation." In a meeting between the Township and MNRF on July 23, 2014, MNRF advised that no additional comments will be submitted.

4.1.4 Grand River Conservation Authority (GRCA)

Review Summary

GRCA submitted comments related to the Level I and II Hydrogeological Investigation, as well as the Level II Natural Environment Technical Report and the Site Plans. Initial detailed comments were submitted on January 31, 2013 to the Township with respect to the zoning application. Additional comments were provided to MNRF on April 15, 2013 with respect to the ARA application which also reflected the input received from Harden in a letter dated March 13, 2013. Subsequently, GRCA provided comments on November 4, 2013, March 28, 2014, April 23, 2014, July 8, 2014 related to a range of hydrogeological and natural environmental issues, as well as flooding. On July 29, 2014, GRCA indicated that they had "no objection to the application being taken forward for consideration."

Review Status

GRCA in their letter of July 29, 2014 indicated that they had "no objection to the application being taken forward for consideration" but that they would "be open to review and comment on additional information circulated by the Township." Additional submissions from JDCL and CRC have been circulated to the GRCA, but no additional response has been received from the GRCA to date.

4.1.5 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton, with the support of the Town of Milton and the Town of Halton Hills, submitted initial comments in July 5, 2013 which requested a number of additional studies including revisions to the Level I and II Hydrogeological Investigation. In a further letter dated July 28, 2014, technical comments were provided with respect to key hydrogeological matters, focusing on water resources and potential sensitive receptors within Halton Region. This letter is described as being in addition to the earlier letter. JDCL responded to the July 28th letter in a letter to the Region dated August 1, 2014.

The Region submitted further comments primarily concerned with "Natural Heritage System Related Technical Comments" on September 16, 2014. However, included in those comments was a request to undertake ongoing monitoring of the Brydson Spring.

The Region also submitted comments in April 22, 2015. These comments included additional comments on the impact of private wells and Brydson Spring/Creek in Halton Region based on a review of the applicable documents since August 2014. The focus of these comments was the need for clarification on how the monitoring program and contingency measures would be implemented specifically "it is not clear what JDCL's approach to finalizing their commitments concerning down gradient property protection, mitigation and monitoring. In the absence of an Adaptive Management Plan (AMP) and key references identified on a site plan it is not clear how off-site monitoring and implementation matters are to be applied and fulfilled."

Review Status

Burnside reviewed the July 28, 2014 comments and the Harden response to them, on behalf of the Township, and provided comments on October 6, 2014 to the Harden comments, and on November 20, 2014 to the Region of Halton. Burnside concurred with the majority of the Regional comments, in particular those requesting monitoring of Brydson Spring and domestic wells within 500 metres of the proposed quarry in Halton, including some that might be located outside the 500 metre zone. They also advised that the well complaint protocol would apply to wells in Halton Region. The response from Burnside has been reflected in their ongoing review of the JDCL submissions.

With respect to the April 22, 2015 submission, Burnside has indicated in their comments the need as a condition of development to require ongoing monitoring and contingency plans both on and off site. The mechanism for applying and fulfilling on-site and off-site monitoring and implementation matters will be primarily through the ARA Site Plan, but also through the zoning by-law amendment and other mechanisms. As noted above, Burnside has proposed a number of conditions of development. Finalization of any conditions should be done in consultation with the Region.

4.1.6 Conclusions: Hydrogeology

With respect to issues related to hydrogeology, MNRF, MOECC and GRCA have indicated that they have no further concerns. The most recent comments of the Region of Halton focus on need to finalize commitments by JDCL concerning downgradient property protection, mitigation and monitoring. Finalization of any conditions of development should be done in consultation with the Region.

Based on all the submissions from the applicant with respect to hydrogeology, as set out in their letter of April 24, 2015, Burnside have indicated that their concerns with the proposed quarry have been generally addressed including their concerns with water levels in up-gradient domestic wells, water quality in the down-gradient domestic wells and the potential for any impacts on Rockwood Well Number 4. Their opinion is subject to extensive conditions of development being established through the ARA site plan, as well as modifications to the current ARA site plan, a zoning by-law amendment or other appropriate mechanisms.

4.2 Natural Environment

4.2.1 Township

Review Status

Burnside reviewed for the Township the initial submission by GWS Ecological & Forestry Services Inc., in association with Gray Owl Environmental Inc. (GWS) which was submitted on behalf of JDCL, and dated August, 2012. Burnside's original comments with respect to the Natural Environment report were included in a peer review comment letter dated January 13, 2013. JDCL submitted a response to the Natural Environment comments provided by Burnside in a Planning Comment Matrix dated March 12, 2013 and numbered 31 through 33 in that matrix. Correspondence was issued by GWS dated May 27, 2013 to JDCL which provided a response to MNRF comments regarding the Level II Natural Environment Technical Report. A site meeting including a walk through the site was arranged for June 7, 2013 and was attended by representatives of JDCL, Harden, GRCA, Wellington County, MNRF, Stovel Associates, GWS and Burnside. Site meeting notes were prepared by JDCL and circulated on July 9, 2013 and later revised to include additional comments from GRCA and Wellington County and re-circulated on August 22, 2013. GWS provided comments to the County of Wellington in correspondence dated September 6, 2013 and to GRCA in correspondence dated September 17, 2013 to address concerns raised by Wellington and GRCA respectively.

Burnside reviewed the various responses contained within the comment matrix, as well as the information gathered during the site meeting/visit and the comments provided by various agencies (Wellington, GRCA and MNRF). Based on this review, Burnside prepared correspondence dated April 7, 2014 which indicated that Burnside felt that JDCL had adequately addressed concerns related to the Natural Environment at the proposed Hidden Quarry including protection of Wetlands, as well as Species at Risk and their habitat. It is noted that Burnside has reserved the right on behalf of the Township to carry out additional review if new information is provided. CRC submitted a report related to Species at Risk and Burnside reviewed that additional information and the results of that review are reported on in Sections 5.2.1 and 5.2.2 of this report below.

Review Summary

Burnside indicated that in their opinion JDCL has adequately addressed concerns related to the Natural Environment at the proposed Hidden Quarry, including protection of Wetlands as well as Species at Risk and their habitat, subject to additional review if new information is provided. Burnside's recommendations based on the additional information are set out in Sections 5.2.1 and 5.2.2 below.

4.2.2 Ministry of Natural Resources and Forestry (MNRF)

Review Summary

The Guelph District Office of MNRF provided formal comments to JDCL on April 15, 2013, July 11, 2013 and November 6, 2013 with respect to the Level II Natural Environment Technical Report, as well as the Level I and II Hydrogeological Investigation and the Site Plans. The MNRF initial April comments with respect to natural environment identified a number of questions and additional considerations to be addressed related to matters such as natural heritage features, amphibians, wetlands, woodlands and species at risk. In response to the MNRF comments, a further submission was provided by GWS, JDCL's consultant dated May 27, 2013 and a site visit was carried out on June 7, 2013 attended by representatives of MNRF, GRCA, County of Wellington and the Township. Additional comments were submitted by MNRF in July related to the stream status, loss of woodlands and species at risk. With respect to Site Plans – Rehabilitation Plans the Ministry comments indicate that they approve "the details given on reforestation procedures and follow-up monitoring." Further to the July comments, MNRF undertook additional review. Through this review it was concluded that the wetland in the centre of the subject site is not part of the Eramosa River-Blue Springs Creek PSW, while the wetland adjacent to the 6th Line is part of the PSW. In addition, it was concluded that surveys of amphibians, bats, snakes, turtles, birds and insects were carried out using appropriate protocols and that the concerns related to Species at Risk had been addressed. Consequently, in their letter of November 6, 2013, MNRF identified no further concerns with the Natural Environment Report.

Review Status

In their November 6, 2013 letter, MNRF indicated that "The Ministry has no further concerns in regards to the Natural Environment Report." The letter also indicated that "the Ministry approves the details given on reforestration procedures and follow-up monitoring" with respect to the Site Plans – Rehabilitation Plans. In a meeting with Ministry staff on July 23, 2014, MNRF advised that no additional comments would be submitted.

4.2.3 Grand River Conservation Authority (GRCA)

See discussion under Section 4.1.4

4.2.4 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton, with the support of the Town of Milton and the Town of Halton Hills submitted initial comments in July 5, 2013 which requested a number of additional studies including revisions to the Natural Environment Technical Report to reflect the zone of

influence for the proposed quarry. The Region submitted further comments related to the natural heritage system on September 16, 2015.

JDCL responded to the Region's comments in a Response Matrix on September 23, 2014. Burnside responded to the Halton comments and the JDCL Response Matrix in a letter dated March 4, 2015. Burnside concludes:

"In general Burnside feels based on our review that the findings of the Natural Heritage Reporting are accurate and provide appropriate recommendations for both protection (setbacks and buffers) and mitigation measures to minimize or negate potential effects to the features and functions of the natural heritage system on and surrounding the proposed Hidden Quarry. Additional information may be helpful to the reader….. to round out the technical reporting for the Site."

Review Status

The Region of Halton has not provided final comments, however, the Township peer reviewer has reviewed their most recent comments on the natural environment and the identified issues appear to have been addressed. However, finalization of any conditions of development should be done in consultation with the Region.

4.2.5 County of Wellington

Review Summary

The County retained Williams & Associates Forestry Consultants Ltd. to review background material related to vegetation and wildlife. The consultant concluded in a letter dated June 13, 2013 that "the proposed project would have limited negative impacts" on the woodland functions. GWS responded to his comments in a letter of September 6, 2013 to the County. The County indicated their support for the measures identified in the GWS letter in an email of September 12, 2013 to GWS.

Review Status

The focus of the County's input has been with respect to the natural environment. Their email of September 6, 2013 indicated that they would be supportive of the following ecological measures being incorporated as part of the license request as proposed by JDCL. These measures are generally reflected in the most recent ARA Site Plan dated June 18, 2015, however some refinements should be considered as noted in italic:

- retain existing vegetation until just prior to extraction;
- promptly restore completed extraction areas to an ecological after-use to specified in the Progressive Rehabilitation Plan – *plans should include reference to timing of either plant removal or restoration plantings/seed application*; and

- plant a mix of coniferous/deciduous trees (with a min. spacing of 3 meters) in the area of the 6th Line to increase forest density in an attempt to provide an effective natural corridor in the north and west side of the property – *add to rehab plan drawing and also modify the plan to include reference to planting deciduous trees as currently only reference is to coniferous trees*.

4.2.6 Conclusions: Natural Environment

With respect to issues related to natural environment, MNRF and GRCA have indicated that they have no further concerns. The County of Wellington's request for certain ecological measures to be included in the ARA Site Plan are generally reflected in the most recent proposed Site Plan dated June 18, 2015 subject to refinement.

The Region of Halton has not provided final comments, however, the Township peer reviewer has reviewed their most recent comments on the natural environment and the identified issues appear to have been addressed. However, finalization of any conditions of development should be done in consultation with the Region.

Finally, Burnside, the Township's consultant, have indicated that in their opinion JDCL has adequately addressed concerns related to the Natural Environment at the proposed Hidden Quarry including protection of Wetlands as well as Species at Risk and their habitat, subject to additional review if new information is provided. Burnside's recommendations reflect the additional information received to date is set out in Sections 5.2.1 and 5.2.2 below.

4.3 Air Quality

4.3.1 Township

Review Summary

Burnside, in particular their Technical Group Leader, Air and Noise, reviewed on behalf of the Township, the initial submission by RWDI which was prepared for submission with the application by JDCL.

The original submission documents supporting the JDCL application for the proposed Hidden Quarry included an Emission Summary and Dispersion Model (ESDM) which was included in a document entitled "Proposed Hidden Quarry, Township of Guelph Eramosa, Wellington County, Final Report, Air Quality Assessment", and dated September 6, 2012. It is noted that the report followed the MOECC A-10- Procedure for preparing an ESDM report. Burnside indicates that the air dispersion model used is an acceptable air dispersion model and produces results that are acceptable to the MOECC. The final report document followed the format recommended by the MOECC for similar documents. Further, Burnside indicates that the assumptions made within the document (e.g. contaminant of concern) were reasonable, represented worse case scenarios and were still within acceptable limits.

Consequently Burnside saw nothing in the ESDM which would indicate that the site could not receive an Environmental Compliance Approval (ECA) as noted in the overall review comments of January 13, 2013.

Review Status/Conclusions

Burnside has indicated that that the air quality review was based on reasonable assumptions and there was nothing in the ESDM which would indicate that the site could not receive an Environmental Compliance Approval.

4.4 Traffic Impact

4.4.1 Township

Review Summary

Burnside reviewed on behalf of the Township of Guelph Eramosa, the submission by Cole Engineering entitled "Eramosa Quarry, Draft Traffic Impact Study" dated April 2012. The draft report generally considered traffic operation at the access onto the 6th Line, as well as the intersections of Highway 7/6th Line and Highway 7/5th Line. Initial review comments were provided by Burnside to the Township dated January 11, 2013. Issues raised at that time generally related to the need for MTO involvement and comments, traffic counts and trip generation, operational improvements at the intersections, required upgrades to the 6th Line and conformance to geometric design standards. Responses from JDCL in the planning matrix document of March 12, 2013 generally agreed with comments provided, and provided or undertook to provide additional information.

JDCL informed Burnside and the Township during August, 2013 that there had been ongoing discussions with MTO and that a revised Traffic Impact Study as well as comments from MTO would be forthcoming. Further that JDCL would be responding to issues raised by the Region of Halton.

Burnside received directly from JDCL a revised Traffic Impact Study (TIS) dated November, 2013, as well as comments from Diana Beaulne of the MTO dated September 30, 2013. Burnside later received a revised TIS dated December 2013 which corrected two typographical errors in two figures. The revised TIS document and the comments from MTO were reviewed by Burnside on behalf of the Township and comments provided in correspondence addressed to the municipality dated April 7, 2014. Generally the outstanding issues identified related to the operational improvements required to address intersection turning movements and upgrades to the 6th Line.

Subsequent to the April 7, 2014 review of the TIS, the applicant was required to submit a Haul Route Study. As part of the review of the first submission of the Haul Route Study, in a letter dated June 26, 2015, Burnside noted that the TIS should be updated to reflect

certain recommendations in the Haul Route Study. The revised TIS was submitted on August 21, 2015. Burnside reviewed the revised TIS and the additional or revised conclusions and recommendations in a letter dated August 27, 2015. Similar to their comments in April, 2014, Burnside deemed the revised TIS generally satisfactory subject to specific conditions being addressed as a condition of approval.

Review Status

Burnside has indicated that the TIS has "provided sufficient information to confirm the requirements for road improvements in the area of Eramosa Quarry, which should be implemented through the detailed design and approval process." Specifically, Burnside identifies the following conditions of development in their August 27, 2015 letter:

- Upgrading Sixth Line
  Upgrades to Sixth Line are required to remove the crest to provide sufficient sight distance to the intersection with Highway 7, plus upgrade the road base, including asphalt surface, to accommodate quarry traffic. These improvements should be included in detailed designs based on a twenty year operational period /agreements required for this project; and,

- Turn Lanes on Highway 7
  The TIS recommends a continuous turning lane on Highway 7, between 6th Line and 5th Line, to provide for an east bound left lane at 6th Line and a westbound left turn lane at 5th Line. A westbound right turn deceleration lane on Highway 7 at 6th Line and placement of truck entrance signs is also recommended. The responsibility, designs and permits for these improvements are required to be confirmed with Ministry of Transportation. These improvements should be included in detailed designs based on a twenty year operational period /MTO permits and agreements required for this project.

4.4.2 Ministry of Transportation (MTO)

Review Summary

MTO originally provided comments April 18, 2013. Additional comments were provided May 28, 2013, September 30, 2013, October 16, 2013 and December 10, 2013. On February 3, 2014, MTO advised that they had no objections to the application, "however, should the re-zoning be approved, all MOECC, MNRF, MTO and Aggregate Resources Act rules and regulations and policies must be adhered to." MTO also set out a list of additional requirements should the application be approved related to site plan, geometric design, legal agreement and letter of credit, stormwater management report and updated traffic report.

Review Status

In an email of February 3, 2014, MTO indicated that they had no objections to the rezoning, however, implementation will require submission of additional information and other requirements for MTO approval.

4.4.3 Conclusions: Traffic Impact

MTO has indicated that they had no objections to the rezoning, however, implementation will require submission of additional information and other requirements for MTO approval.

Burnside has indicated that the TIS has "provided sufficient information to confirm the requirements for road improvements in the area of Eramosa Quarry, which should be implemented through the detailed design and approval process." However, they identify a number of conditions of development related to upgrading Sixth Line and Turn Lanes on Highway 7.

4.5 Haul Route

4.5.1 Region of Halton, Town of Milton and Town of Halton Hills

Review Summary

The Region of Halton with the support of the Town of Miton and the Town of Halton Hills, based on an update to them on the status of the application, reiterated in an email dated July 15, 2014 an earlier request for JDCL to submit a Haul Route Study for the proposed Hidden Quarry. A haul route study is a support document, used as a basis for setting the final conditions of development. Regional Staff requested that the Term of Reference for this study be submitted to the Region, the Town of Milton, and the Town of Halton Hills for review and approval prior to the study's commencement. Discussions with the Region, Milton and Halton Hills staff indicated that the primary concern was an increase in truck traffic through urban areas (e.g. Acton). In response to this request, Burnside on behalf of the Township prepared Terms of Reference for a Haul Route Study dated October 10, 2014.

The Haul Route Study, prepared by Cole Engineering dated March 2015 was reviewed by Burnside. In addition, Burnside also considered the following related reports:

- Revised Traffic Impact Study, Cole Engineering, December 2013;
- Eramosa Quarry, Final Traffic Impact and Haul Route Assessment ,prepared for the Town of Halton Hills by Hatch Mott MacDonald, March 3, 2015;
- Letter Response to Burnside's April 7 ,2014 Comments, Eramosa Quarry, Township of Guelph-Eramosa, Cole Engineering, April 17, 2014;
- Review of JDCL Traffic Impact Study and Haul Route Study, Concerned Residents Coalition (CRC Rockwood Inc.), April 27, 2015; and,

- Letter Response to CRC Memo dated April 27, 2015, prepared by James Dick Construction Limited (Greg Sweetnam), June 26, 2015.

Based on their review, Burnside identified a number of issues and recommended that the Haul Route Study be revised and resubmitted.

A Revised Haul Route Study, as well as a Revised Traffic Impact Study were prepared by Cole Engineering dated August 20, 2015 and submitted on August 21, 2015. Burnside in carrying out their peer review of these studies also considered:

- Letter RE: Comments on Town of Halton Hills – Hatch Mott MacDonald Report, prepared by James Dick Construction (Greg Sweetnam), July 23, 2015;
- Email response matrix to Burnside Haul Route Study Comments (June 26, 2015), prepared by James Dick Construction (Greg Sweetnam), July 23, 2015;and,
- Potential impacts of Hidden Quarry on the 6th Line & Residents; presentation to Guelph/Eramosa council by Concerned Residents Coalition (Perry Groskopf, CRC Rockwood Inc.), February 3, 2015.

Burnside's conclusions with respect to the revised TIS are discussed above. With respect to the Haul Route Study (HRS), Burnside concludes that matters remain outstanding with respect to the HRS, which should be further addressed before the study is approved. In particular with respect to the key issue of safety they note:

"The revised HRS now provides a turning template analysis of the intersection of Main Street / Mill Street in Acton…. We suggest that the HRS should also include further review of the following additional potential mitigation works to address the safety issue identified at this intersection:

- Improvement of the northeast curb radius, and/or
- Reduction of the length of the westbound right turn lane (i.e. rather than elimination of the lane), to better allow for westbound trucks to take control of both lanes to make the turn, rather than being forced into the relatively narrow right turn lane in advance of the intersection.

We confirm that the safety issue identified already exists for large trucks turning at this location. The data provided forecasts that between 12 and 14 heavy vehicles per hour (vph) currently make the westbound right turn movement at this intersection during peak periods. Based on the HRS we forecast that the Eramosa Quarry may increase the volume of heavy vehicles making this turn by about 10%, adding about 10 heavy truck turning movements on a daily basis during peak operational periods at the quarry.

While the revised HRS provides some additional analysis of the truck issues along the Highway 7 connecting links (i.e. analysis of the intersection of Main Street / Mill Street in Acton), it does not confirm the magnitude of safety issues along the corridor. We understand that the Town of Halton Hills will be requesting the Minister of Transportation to partner with the Town to commence a study for long-term transportation alternatives for aggregate haul routes impacting the Town of Halton Hills, including reviewing the need for an Acton By-pass to accommodate truck traffic."

Burnside also concludes the following:

- **"Forecasted Truck Traffic in the Peak Period and on a Daily Basis** – The revised HRS forecasts a maximum of 13 truckloads shipped from the Eramosa Quarry per peak hour at peak operation during the peak season, based on average rates over the peak period (i.e. including Saturdays, which have significantly lower production rates). The monthly production data for the proxy site (Erin Pit) has now been included in the revised HRS. Based on our review of the proxy shipping data we suggest that a more appropriate design peak hour rate should be in the range of 20 vehicles per hour (vph), which is closer to the 30th highest hour that is typically used for peak hour traffic analysis purposes. The data recorded shows a maximum hourly shipping rate of 23 vph, which would be experienced on an infrequent basis.

  The HRS forecasts an average daily truck shipping volume of 114 trucks per day during the peak month. The proxy data provided shows that the peak day of the peak month had a truck shipping volume of 174 vehicles per day (vpd) and that 65% of the days in that month had shipping volumes that exceeded 114 vpd. Based on this review we conclude that the forecasted daily truck volumes, used for analysis, may under-estimate typical peak period conditions.

  While the HRS may under-estimate the peak hour and peak day volumes of trucks generated by the Eramosa Quarry, it is unlikely that the higher volumes will substantially change the conclusions reached in the impact assessment that has been provided to date in the HRS. "

- **"Need for Additional Environmental Review** – The HRS concludes that Sections 5 to 8 of the *Haul Route Study – Terms of Reference* need not be completed because it has been demonstrated that the additional truck traffic on the haul routes would be very low. As noted above we believe that the truck volumes may be under-estimated in the HRS. However, with the exception of the safety issues identified at the intersection of Main Street / Mill Street (Acton), there has not been sufficient information provided to identify the potential issues along the haul routes. Therefore, in our opinion, it is premature to conclude that a more holistic environmental review is not warranted."

- **"Consideration of Alternate Haul Routes**– The response matrix provided by James Dick Construction Limited (JDCL) provides some rationale for not diverting additional traffic to Guelph Line, in lieu of sending almost all of the traffic to the east on Highway 7. The disadvantages identified for this route include the following:

  - Adds 9 km to the typical haul route;
  - Requires travel on Milton Townline (Regional Road 32) which has seasonal truck restrictions;
  - Requires additional turning movements to access Highway 401.

  The revised HRS does not provide an assessment of this alternate haul route. It is recommended that the HRS be revised to include an appropriate assessment of this haul route option."

Further comments from the Region of Halton, Town of Halton Hills and Town of Milton would also be anticipated on the HRS.

Review Status/Conclusions

The Burnside review of the August 20, 2015 revised HRS concludes that matters remain outstanding with respect to the HRS, which should be further addressed before the study is approved. It is anticipated that additional comments on the HRS would also be provided by the Region of Halton, Town of Halton Hills and Town of Milton.

The primary concerns identified by Burnside relate to examination of additional options for better mitigation of the safety issue at Main Street/Mill Street in Acton and a broader examination of potential issues along the haul routes, particularly related to safety. In addition, an appropriate assessment of the potential for using Guelph Line as an alternative haul route should be undertaken.

However, it is noted, that with respect to the primary issue of safety at the intersection of Main Street/Mill Street in Acton, Burnside recognize the safety issue identified already exists for large trucks turning at this location regardless of any traffic from the proposed Hidden Quarry. This situation presumably also applies to any other safety issue identified in the corridor. Further, the broad significance of this issue has been recognized by the Town of Halton Hills who are requesting that the issue of long-term transportation alternatives for aggregate haul routes impacting the Town be examined in a joint study with MTO. Similarly, Burnside recognize that some justification have been provided with respect to the disadvantages of diverting traffic to the Guelph Line, but request that a thorough assessment be carried out.

As noted a haul route study is a support document used as a basis for setting conditions of development. Given the conclusions of the Burnside review, and the progress that has been made with the Haul Route Study, it is appropriate to require that the study be completed to the satisfaction of the Township of Guelph/Eramosa in consultation with the Town of Halton Hills, the Town of Milton and the Region of Halton, and that its recommendations be implemented as a condition of development.

4.6 Noise /Blast Vibration

4.6.1 Township

Review Summary

Novus Environmental (Novus) carried out a peer review of the initial Noise Impact Study prepared by Aercoustics Engineering Ltd. (AEL) and the Blast Impact Analysis prepared by Explotech Engineering Ltd. (Explotech), both dated November 19, 2012. In their initial comments of April 8, 2013, Novus concurred with the blast vibration report, including the recommendations for blast monitoring. They further recommended that the blast record information be made available to the Township for its review in the presence of any vibration complaints. With respect to the noise, Novus recommended in the April 8, 2013

comments that a number of issues be addressed. An updated report was prepared by AEL dated May 24, 2013, together with a response to the Novus comments. Novus reviewed these documents and indicated that they were satisfied that "noise levels from the proposed quarry operation will meet the applicable guideline limits at all noise-sensitive points of reception." However, Novus recommended that as a condition of approval the development be subject to a third party acoustical audit in the first year of operation to confirm the conclusions of the study.

Review Status

The review of the noise and blasting impacts analyses by Novus on behalf of the Township concluded that the analyses and conclusions were satisfactory subject to blast monitoring, provision of blast record information to the Township and a third party acoustical audit in the first year of operation.

4.6.2 Union Gas

Review Summary

Union Gas in a letter of May 7, 2013 identifies a number of conditions related to their pipeline and notes that JDCL have indicated that these conditions can be met.

Review Status

Union Gas requires that vibrations at the pipeline remain below 50mm/sec (proposed as 12.5 mm/sec) and that blasting not occur within 30 meters of the pipeline (proposed at 200 meters).

4.6.3 Conclusions: Noise / Blast Vibration

The review of the noise and blasting impacts analyses by Novus on behalf of the Township concluded that the analyses and conclusions were satisfactory subject to blast monitoring, provision of blast record information to the Township and a third party acoustical audit in the first year of operation. Union Gas also identified a number of conditions related to their pipeline.

4.7 Archaeology

Review Summary

A Stage I-II Archaeological Assessment was carried out by York North Archaeological Services Inc., August 31, 2012.The report identifies an area on the west side of the site south of the former pit (AjHa-50 James D. site) as the only area where historic archaeological resources were located. It has been identified as requiring a Stage 3

assessment. JDCL has agreed to conduct a Stage 3 assessment once MNRF has signed off on their application for the Category 2 Class "A" quarry.

The report has been reviewed by the Ministry of Tourism, Culture and Sport. In a letter dated November 7, 2012, the Ministry advises that the "ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences."

Review Status/Conclusions

The Ministry of Tourism, Culture and Sport has advised that they are satisfied with the archaeological assessment. The Stage 3 assessment of the area on the west side would be carried out as a condition of approval of the license.

4.8 Cultural Heritage

Review Summary

A Cultural Heritage Resource Assessment was carried out by Mr. Peter Stewart of George Robb Architect. Unterman McPhail Associates, Heritage Resource Management Consultants (Unterman McPhail) reviewed the submission on behalf of the Township. They did not identify any significant issues with the report, but suggested that some of the existing information in the report be amplified. A revised report was submitted dated September 8, 2014. Unterman McPhail reviewed it and indicated in a memorandum dated August 26, 2015 that the report "does address most 'information gaps' although there are a couple of areas which could be dealt with in the future if deemed necessary." It is also noted that when the final site plan is available it should be appended to the report to allow for a better understanding of conceptual site design and the mitigation measures discussed in the Assessment.

Review Status/Conclusions

Based on the review carried out by Unterman McPhail, the revised Cultural Heritage Resource Assessment addresses most information gaps and no additional work is required, subject to the addition of the final site plan when available. In the future, if deemed necessary by the Township, consideration could also be given to whether more information on family history should be provided to enhance any commemorative history relating to the study area.

The report concludes that the project will not involve or result in any potential impacts to the subject property or an adjacent property and, in particular the cultural heritage landscape represented by the rural roadscape of Sixth Line north of Highway 7 will be

preserved by retention of the treed road verge and landscaped berm beyond. This should be required as a condition of development.

4.9 Visual

Review Summary

JDCL submitted a "Visual Information Package" in 2012 The submission was prepared by JDCL in response to a request from the Township. Mr. Colin Berman, OALA, CSLA of Brook McIlroy Inc. (Brook McIlroy), a licensed landscape architect, undertook a review of the Visual Information Package on behalf of the Township and considered site plans from June 6, 2014 and August 1, 2014. As part of Mr. Berman's review he also toured the site. This included driving along Highway 7 and 6th Line and stopping at the vantage points depicted in the Visual Information Package. In addition, he entered the site at the south-west and north-east corners to view areas where a berm is proposed to be constructed. Mr. Berman concluded in a letter dated November 5, 2014 that "the information contained within it is reasonably accurate and that it fairly represents the ability of the public to view the proposed operation from lands around the site."

Review Status/Conclusions

The review of the Visual Information Package provided by JDCL carried out on the Township's behalf by Brook McIlroy, concluded that the information is reasonably accurate and fairly represents the ability of the public to view the proposed operation from lands around the site. The development should be controlled to ensure that it generally reflects the proposal as assessed as a condition of development through the zoning by-law and ARA site plan.

4.10 Agriculture

Review Summary

Stovel and Associates prepared the "Agricultural Impact Assessment Proposed Hidden Quarry", dated February 3, 2015. It was reviewed on behalf of the Township by Macaulay Shiomi Howson Ltd. A number of issues were identified related to evaluation of impacts on the agricultural potential of the area, additional clarity on the impacts on horse farms in the area, applicability of MDS and provision of water. A revised Assessment was submitted dated August 5, 2015.

The Assessment is based on a review of relevant background information (e.g. correspondence from Ministry of Agriculture Food and Rural Affairs, soil maps, aerial photography); an agricultural inventory of the study area; an inventory of agricultural operations in the study area; a review of the Operations and Rehabilitation Plan for the

proposed quarry; an assessment of the potential impacts on agricultural resources in the study area based on an evaluation of quarry impact reports, consideration of the need for mitigation protocol and monitoring programs to protect agricultural resources and a comparative evaluation of the proposed quarry application in terms of planning policies related to the protection of agricultural resources.

The Assessment concluded that "impacts on the agricultural resource base and on adjacent agricultural operations are anticipated to be minimal. Monitoring measures are implemented in the Site Plans to ensure that adjacent sensitive land uses and farm operations are not negatively affected by the mineral aggregate operation." In particular, two agricultural operations were closely considered as part of the Assessment: the mushroom farm to the north and the horse farm to the east. The Assessment notes "the main concern related to the mushroom farm focuses on the potential for impacts related to dust. Design features are set out on the Site Plan, i.e. berm and vegetative screening, to mitigate impacts." With respect to the horse farm to the east, blasting is identified as the main concern. This would be mitigated by the "large vegetated setback/buffer between the horse farm and the proposed quarry." Similarly, the effects on other horse farms to the east/northeast were considered. "Given the technical recommendations included within the blasting, hydrogeology, dust and noise reports, impacts on these adjacent horse farms are considered to be minimal." The monitoring program and complaint protocol are also noted to ensure that any concerns are addressed.

Review Status/Conclusions

The Agricultural Impact Assessment essentially concludes that if the recommendations included within the blasting, hydrogeology, dust and noise reports are followed, impacts on agriculture within the Study Area would be minimal and concerns will be addressed through the monitoring program and complaint protocol. To ensure that this conclusion is implemented as a condition of development, the monitoring program and complaint protocol should specifically identify the need to address any potential for impacts on agricultural operations.

4.11 Economic Development

Review Summary

Altus Group Economic Consulting was retained by the Township to carry out an economic impact study of the proposed quarry based on Terms of Reference established by the Township. Their report "Economic Impact of Proposed Hidden Quarry" is dated August 21, 2015. It provides estimates of the potential economic impact of the development and operation of the proposed quarry; an assessment of any property value impacts; and estimates the net change to the local government revenue that would occur should the proposed quarry proceed. Its key conclusions are as follows:

"**Local Economic Impacts**

- The estimated total extra expenditure occurring within the Guelph-Eramosa Township as a result of 20 years of regular operations at the proposed quarry is $11.9 million;
- The estimated total extra expenditure occurring within Wellington County as a result of 20 years of regular operations at the proposed quarry is $24.3 million; and
- The estimated total extra expenditure occurring within the Halton Region as a result of 20 years of regular operations at the proposed quarry is $2.2 million.

Effects on Local Property Values

- Review of relevant literature indicates some evidence that pits and quarries are associated with modestly lower property values, but the causality of this association may be linked to other factors such as amenities and zoning, rather than being directly related to operations;
- Analysis of local existing home transaction data indicates no statistically significant price impacts, either positive or negative, resulting from proximity to the subject site as the proposed uses became known; and
- As a result, there is neither conclusive evidence nor strong reason to conclude that operation of the proposed Hidden Quarry will have a diminutive effect on local property values as the quarry goes into operation.

Net Change in Municipal Government Finances

- The annual on-going government revenues (taxes, aggregate fees) generated from the proposed hidden quarry would represent a total net change from existing revenue of more than $47,300 to the Municipality;
- The Township would be faced with around $4,120 in additional annual operating costs as a result of the quarry on an annual basis; and
- This results in an increase of more than $43,200 in annual net revenue to the Municipality."

Review Status/Conclusions

The report prepared for the Township "Economic Impact of Proposed Hidden Quarry", establishes that local economic impacts from the proposed quarry would be positive and that there would be an increase of more than $43,200 in annual net revenue to the Township. With respect to local property values the report indicates that there is no conclusive evidence, or strong reason to conclude that the operation of the proposed quarry will have "a diminutive effect on local property values".

5. Public Input and Review

Significant input has been received, and continues to be received, from the general public and stakeholder groups at the public meetings and in submissions/delegations to Council as well as written submissions to the Township. To date, 135 written submissions have been

made to the Township from 95 individuals, as well as written submissions and 24 delegations to Council by the CRC.

Through the technical review by the Township and other agencies all the issues identified by the general public have been reviewed and considered. These include concerns with impacts related to:

- property value;
- private wells;
- traffic including road upgrades and traffic lights;
- blasting/vibration;
- air quality;
- noise;
- natural environment including water quality, wetlands, wildlife including Species at Risk and Brydson Creek;
- damage to homes;
- taxes;
- archaeology/cultural heritage;
- karst topography;
- visual impacts;
- haul route;
- impacts on agriculture including food production and equestrian farms; and,
- lack of need for additional aggregate resources.

However, the CRC has also chosen to retain consultants who have made submissions with respect to the key issues identified by the public, specifically hydrogeology, Species at Risk, Brydson Creek and air quality. In addition, a submission was received on August 5, 2014 from one of the consultants which relates to a range of issues (e.g. a request for a fish community and aquatic habitat baseline survey, transportation, rock quality tests, implications for equestrian exercise tracks, increased surface and groundwater monitoring). The CRC has also made submissions with respect to a number of technical matters including risks related to mining and the Dolime Quarry, including flyrock, and an "Appraisal of the Golder "Peer Review" of Blast Impact Analysis Reports", as well the TIS and HRS, radon gas, natural environment, and agricultural assessment. The key CRC issues and input are addressed in the following section, together with the status of their review.

5.1 Hydrogeology

5.1.1 Input and Review Summary

A major concern of the public is with water quality and quantity, particularly as it affects private domestic wells. This was also a key focus of the Township's technical review as discussed above.

The CRC retained Mr. Garry Hunter, Hunter and Associates, with respect to these issues. A presentation and written submission was made to Township Council on behalf of the CRC by Mr. Hunter which set out a number of questions and requests for documentation. A copy of the response to the Hunter comments was provided to MSH in a memo from JDCL dated July 8, 2014. Burnside reviewed the Hunter submissions and the JDCL response on behalf of the Township and found the response to be reasonable. The response from JDCL has been made available to the CRC and the public, and was considered by Burnside in their on-going review of the application.

A further submission was made by Mr. Hunter on behalf of CRC on August 5, 2014. The CRC Hunter submission relates to the Site Plans and a variety of matters including Surface and Groundwater Monitoring and Brydson Creek Base Flow Monitoring. JDCL responded to these comments on August 15, 2015. Burnside reviewed the response and found it appropriate. Burnside indicated that many of the concerns raised in the CRC Hunter submission were related to domestic wells and that the detailed domestic well survey to be completed by JDCL would provide additional clarification.

A Peer Review was then prepared by Hunter and Associates dated May 15, 2015. JDCL's consultant, Harden Environmental Services Ltd. responded to the Peer Review in a letter dated July 16, 2015. The letter notes that, based on the Hunter and Associates analysis, "there are two areas where the site plans could be improved upon". These relate to showing a range of water levels for the proposed quarry pond elevations instead of one value and a review of quarry floor elevations relative to high groundwater level should be done in order to ensure that the working floor is not below the water table.

Burnside have reviewed the response from JDCL and found the responses appropriate. However, Burnside was not clear as to why Hunter believes that the Tributary B hydrogeological conclusions are suspect since Harden has demonstrated that bedrock water levels have no influence on Tributary B. In addition, Hunter raised concerns about the calibration of the Harden groundwater model and applies a 2x safety factor to the applicants drawdown predictions. Hunter provides a number of specific examples of how the model has been adversely affected by the data input. Burnside notes that although Harden provides a satisfactory response to the Hunter concerns, they do not respond to the specific examples raised by Hunter and do not challenge the 2x factor of safety proposed by Hunter.

The Hunter review includes detailed trigger levels for water levels and water quality. Harden proposes that trigger levels be developed once additional monitoring has been completed. Burnside concurs with Harden that the trigger levels should be set after more data is collected, but recommends that the methodology for setting trigger levels should be agreed upon.

5.1.2 Input and Review Status/Conclusions

Burnside reviewed the original Hunter submissions in 2014 and the JDCL response on behalf of GET and found the response to the Hunter submissions to be reasonable.

With respect to the May 15, 2015 Peer Review, Harden on behalf of JDCL recommends two changes to the site plans with which Burnside concurs. Therefore, the following conditions of development are recommended to be established through the ARA licence application approval:

- That the ARA Site Plan identify a range of 347.6 m AMSL to 349.6 AMSL water levels for the proposed quarry pond elevations instead of one value;
- That a review of the quarry floor elevation relative to high groundwater level be done to ensure that the working floor is not below the water table, and if the quarry floor is below the high water table, that an appropriate elevation adjustment be identified on the ARA Site Plan; and,
- That trigger levels for water levels and water quality should not be set until the collection of additional data is complete, however the methodology for setting trigger levels should be determined and the trigger levels set prior to the start of any extraction.

5.2 Natural Environment

5.2.1 Input and Review Summary - Species-at-Risk

CRC retained Dr. Bill McMartin with respect to Species at Risk potential within lands adjacent to the proposed Hidden Quarry site. Dr. McMartin conducted one site visit on July 2, 2014, although he did not follow standard professional protocol in accessing the site. He identified one barn swallow[9], a species which he indicates as being designated "Threatened" by Environment Canada's Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as part of his site visit. He also provides general commentary regarding other potential Species at Risk including Snapping Turtle, Blanding's Turtle and Eastern Wood-Pewee.

Dr. McMartin's report was reviewed by GWS on behalf of JDCL. GWS noted that, in their opinion "the mandate for endangered and threatened species in Ontario lies solely with the Ministry of Natural Resources and Forestry (MNRF).... In the case of Hidden Quarry, the Ministry has concluded that the inventory work to determine presence/absence of endangered and threatened species was adequate and that no additional fieldwork was required." Further, GWS noted that as the site is private land "provincial designations of Species at Risk by MNRF and the Committee on the Status of Species at Risk in Ontario (COSSARO) apply to the site, not federal designations by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). GWS then go on to explain why in their opinion the Barn Swallow observed was not a breeding individual. Further, they advise that with respect to significant turtle species, GWS noted that wetland habitats on the site are being maintained and additional habitat created not lost as indicated by Dr. McMartin. Therefore,

[9] Barn Swallow is listed as threatened under Ontario's Endangered Species Act, 2007 (ESA) and has been designated as threatened in Canada by COSEWIC.

GWS indicate that turtles will not be excluded from the site, and no permit is required at any level.

The McMartin report was also reviewed by Burnside on behalf of the Township. Burnside notes in a letter dated March 4, 2015 that the report "includes additional field data collection to determine if the Site and surrounding lands provide habitat for any Species at Risk (SAR) that may be located within the study area." Burnside notes that no breeding evidence of any birds listed under the Endangered Species Act 2007 were found, although the Site was assessed as having feeding and foraging habitat. Burnside also notes that Snapping Turtle, a Species of Special Concern was documented on and in the immediate vicinity of the Site. Burnside concludes that "we are not suggesting additional field data collection and mapping but rather that additional mitigation measures would minimize the potential for adverse effects….. rehabilitation and mitigation plans are required under the Aggregate Resources act and are expected to be included as notes on the application (site) plans. According to the Site Plans date (sic) July 14, 2014, tree removal will not occur during the breeding bird season. Therefore, additional mitigation measures to ensure that the proposal is in accordance with the Migratory Birds Convention Act are not required."

5.2.2 Input and Review Status- Species at Risk

GWS on behalf of JDCL, and Burnside on behalf of the Township, have reviewed the McMartin report and identify no need for additional field data collection or mapping. Burnside do indicate that additional mitigation measures should be considered and included in rehabilitation and mitigation plans established through the ARA licence application approval as part of the ARA Site Plan. Burnside have identified that the following should be established as conditions of development:

- Exclusion fencing should be installed prior to April to prevent turtle species from using stockpiled areas as nesting habitat;
- Worker education programs to identify and relocate turtles from hazardous areas of the site should be included in Health and Safety training;
- Stockpiling of materials should be excluded from natural heritage features, especially adjacent to wetlands;
- Wetlands should be fenced, and edge buffer to the feature should be included in the fenced area, to be determined by MNRF;
- Rehabilitation plans should include habitat creation and enhancement for species suspected to be using the site, including basking areas for turtles in wetlands, foraging habitat for grassland birds and nesting structures for barn swallow (as examples);
- Wetland features that exclude habitat for fish to enhance herpetofaunal habitat (particularly breeding habitat) should also be included as part of the wetland creation:
- A mixture of coniferous and deciduous trees should be included, with less focus on white spruce;

- Wetland plantings should include a mixture of submergent, emergent, floating and woody vegetation species, to diversify habitat; and,
- Open cliff habitat should include ledges for bird nesting and roosting.

5.2.3 Input and Review Summary – Brydson Creek

In addition to the McMartin report, a study was prepared by K. Schiefer, Aquatic Ecologist on behalf of CRC entitled "Aquatic Habitat & Fish Survey of Brydson Creek". The report was reviewed on behalf of the Township by Burnside. In a letter dated March 4, 2015, Burnside notes that "based on Burnside's detailed peer reviews of the proposed quarry application and the supporting technical studies to date, including the Hydrogeology and Hydrology Study and the Level 2 Natural Environment Report, it is our opinion that the proposed quarry operations will not cause a change that is significant enough to result in adverse effects to the resident fish population…Therefore, it is not expected that the proposed Hidden Quarry will result in an adverse effect to the local brook trout fishery provided that best management practices and standard Erosion and Sediment Control mitigation measures are followed."

5.2.4 Input and Review Status – Brydson Creek

Based on the review of the report "Aquatic Habitat & Fish Survey of Brydson Creek", by Burnside on behalf of the Township, no additional conditions of development, other than those proposed above related to hydrogeology, are required.

5.3 Air Quality

5.3.1 Input and Review Summary

CRC retained Airzone One Ltd. (Airzone) to review the report "Proposed Hidden Quarry Air Quality Assessment" prepared by RWDI AIR Inc. for JDCL. Airzone provided:

- "a "how-to" guide for AQA for aggregate operations";
- "screening-level review of RWDI report" ; and,
- answered "questions posed by CRC".

In a letter to JDCL from RWDI, "RWDI Response to Airzone One Ltd. Screening-Level Review Air Quality Assessment for the Proposed Hidden Quarry", June 6, 2014, RWDI prepared a response to the Airzone submission dated June 6, 2014 which expresses concerns with the Airzone submission.

Burnside reviewed both the Airzone submission and the RWDI review of that submission and the results of the review are reported in a letter to the Township dated January 22, 2015. Burnside concluded based on their review of all the documents that:

"Overall, the documents in Table A show:

- The proponent can receive an Environmental Compliance Approval for the property (as summarized in the initial general review letter of January 11, 2013),
- Including road dust, there are some exceedences of the appropriate particulate criteria,
- The number of exceedences predicated depends on the scaling factor used to predict the background values for PM_{10} and TSP based on the $PM_{2.5}$ background values. Using either scaling factor, the number of exceedences is likely acceptable since the exceedences will only happen when meteorological conditions match the model and the production is at a maximum, which the proponent indicates is unlikely. The difference between scaling factors is within the uncertainty of each factor.

Based on these points, the AQA shows the proposed Hidden Quarry is unlikely to cause adverse effect to sensitive receptors in the area."

5.3.2 Input and Review Status

Based on the review of the Airzone submission, and the response from RWDI, Burnside has confirmed its initial conclusion that the air quality review was based on reasonable assumptions and there was nothing in the ESDM which would indicate that the site could not receive an Environmental Compliance Approval.

5.4 Blasting/Fly Rock

5.4.1 Input and Review Summary

Mr. William Hill of CRC made a presentation to Council with respect to the risks involved in mining on October 21, 2013 (e.g. fly rock). In addition, Mr. Hill provided a memorandum dated July 22, 2014 related to a comparison between Dolime Quarry (DQ) and Hidden Quarry (HQ). The memorandum was developed to clarify "the question of whether the two projects are similar enough to justify mining of the HQ based on the criteria derived from the proponents' experience in the DQ". The memorandum also addressed related issues (e.g. flyrock). JDCL submitted a response in a letter dated July 22, 2014 to the second submission.

JDCL also submitted a peer review of the Explotech report in response to a request from CRC for a peer review by Golder Associates. The initial peer review carried out by Golder related to the 2012 Explotech report. The final Golder peer review dated October 1, 2014, related to the September 5, 2014 Explotech report. Golder concluded that:

"....we are conditionally in agreement with the BIA conclusion that the "blasting operations required for operations at the proposed James Dick Construction Ltd. Hidden Quarry site

can be carried out safely and within governing guidelines set by the Ministry of the Environment." While the empirical formulas applied are generic in nature and are to be confirmed on site through the institution of attenuation analysis and compliance monitoring programs, it is also important to apply realistic estimates so that designs, and associated costs, more closely reflect the reality to be expected. This statement should not be interpreted to mean that compliance with MOECC overpressure limits would not be possible. However, compliance may require additional effort and associated additional cost. As suggested in the BIA "the point of termination of blasting operations will be governed by the results of the on-site monitoring program and market economics.

The remainder of the report's recommendations are reasonable and acceptable."

Bill Hill, William Hill Mining Consultants Ltd. submitted on behalf of CRC, a delegation to Council on February 17, 2015 "Appraisal of Golder "Peer Review" of Blast Impact Analysis Reports" which identified a range of issues "addressed inadequately or not at all by BIA and Golder peer review". These included geology and karst weathering, unique characteristics of HQ site, fly rock, drilling and blasting considerations, blasting patterns and powder factor, shockwaves and ground vibrations. CRC requested that the Township "secure its own, thorough peer review of the proponent's blasting impact reports" and also that "the HMC Appraisal report to be submitted to the Township's peer reviewer and responses directed to CRC".

Further to this submission, on March 3, 2015, JDCL submitted a letter dated April 10, 2014 from Explotech regarding the potential for flyrock from the proposed quarry. The letter provides an analysis of theoretical flyrock projection distances "based on a quarry operating in the dry", while noting that "it is critical to note that the proposed Hidden Quarry intends to operate in a wet environment. It has been our experience that the presence of water will restrict rock projection by up to 90% when compared to calculations contained below." Explotech concludes that:

"the actual observed flyrock will be drastically restricted due to the presence of water. Portions of rock above the water level would not leverage this same benefit.

Through proper blast design and diligence in inspecting the geology before every blast, flyrock can readily be maintained within the quarry limits. It may be necessary to increase collars when blasting along the perimeter. The operational plan for the quarry has been designed to retreat towards the closest receptors thereby projecting flyrock and overpressures away from receptors."

The letter also notes that "government regulations strictly prohibit the ejection of flyrock off of quarry property. The regulations regarding flyrock are enforced by the Ministries of Natural Resources, Environment and Labour. In the event of an incident where flyrock does leave a site, the punitive measures include suspension/revocation of licences and fines to both the blaster and quarry owner/operator. Fortunately, flyrock incidents are extremely

rare due to the possible serious consequences of such an event….. Through proper blast planning and design, it is possible to control and mitigate the possibility of flyrock."

Mr. Hill in a letter dated March 13, 2015 took issue with the letter from Explotech and states:

"In conclusion it is important to point out that Explotech has long been aware of the challenges posed by geology which is clearly pointed out in their November 16, 2012 Blasting Impact Analysis on page14…..The letter, like the previous reports (BIA 1 and in the Golder peer review) has again ignored the most important contributors to flyrock i.e. human error and geology."

JDCL submitted an email dated April 2, 2015 from Golder outlining their credentials for carrying out an impartial third party review of Explotech's impact assessment. In addition, Golder also indicates that the April 10, 2014 letter from Explotech "described the approach widely used by industry to estimate flyrock range from quarry bench blasts…we agree with the approach and flyrock range estimates contained in the letter report. The presence of water within the quarry will restrict the face burst flyrock from below the water level and not that from the bench top cratering." The Township's consultant, Novus, have also advised that they are in general agreement with the letter from Explotech.

Further to these various submissions, in an April 16, 2015 letter to CRC, Ms. Wingrove the CAO of the Township advised that JDCL was not prepared to undertake a detailed review of the issues raised by Mr. Hill. She also advised that a decision on further review of blasting impacts would be undertaken by Council once they have considered the results of the planning report. CRC indicates that in their view "the assessment of matters as serious as blasting impacts must inform the planning report." They therefore again ask the Township to retain "its own qualified blasting consultant to carry out a thorough assessment of the proponent's blasting impact reports, and that the issues raised in the Hill Report be provided as input to the review process."

5.4.2 Input and Review Status

As noted above the review of blasting impacts analysis by Novus on behalf of the Township concluded that the analyses and conclusions were satisfactory subject to blast monitoring, and provision of blast record information to the Township. This conclusion is supported by the additional input provided by JDCL including the review by Golder and the additional input on flyrock from Explotech.

5.5 Traffic Impact and Haul Route

5.5.1 Input and Review Summary

CRC submitted "Review of JDCL Traffic Impact Study and Haul Route Study" dated April 27, 2015 and CRC made a delegation to Township Council regarding the submission on May 4, 2015. The submission reviewed and provided comments on the March 30, 2015 Haul Route Study. It concluded that the "haul route study is seriously flawed and misleading". The JDCL Letter Response to CRC Memo dated April 2015 was prepared by JDCL (Greg Sweetnam) and is dated June 26, 2015. Burnside considered the CRC submission and the JDCL response in its peer review of the Haul Route Study (HRS) dated June 26, 2015. Since that time based on the peer review carried out by Burnside and other input, a revised Haul Route Study and a revised Traffic Impact Study have been submitted. The results of the peer review of these revised documents by Burnside are outlined above. Burnside continues to take into account the earlier input in their peer review comments on the revised studies.

5.5.2 Review Status

The Burnside review of the August 20, 2015 revised HRS concludes that matters remain outstanding with respect to the HRS, which should be further addressed before the study is approved. It is anticipated that additional comments on the HRS would also be provided by the Region of Halton, Town of Halton Hills and Town of Milton.

However, as noted a haul route study is a support document used as a basis for setting conditions of development. Given the conclusions of the Burnside review, and the progress that has been made with the HRS, it is appropriate to require that the study be completed to the satisfaction of the Township of Guelph/Eramosa in consultation with the Town of Halton Hills, the Town of Milton and the Region of Halton, and that its recommendations be implemented as a condition of development.

5.6 6th Line

5.6.1 Input and Review Summary

In a delegation to Council on February 3, 2015, "Potential Impact of Hidden Quarry on the 6th Line & Residents", CRC identifies potential impacts primarily related to traffic, and modifications to the road, but also blasting, and the cultural heritage landscape of 6th Line. Burnside advise in a letter dated August 27, 2015 that based on their peer review of the TIS, they believe that "the improvements identified for 6th line and for Highway 7 are sufficient to mitigate the traffic impacts from this development in this area. The relocation of 6th Line and 5th Line into a single signalized intersection is not justified from a traffic perspective, given the potential for less obtrusive mitigation measures being available (i.e. left turn lanes at each of the intersections, with a continuous turn lane between the intersections, plus a right turn deceleration lane at 6th Line). The background traffic using the 6th Line intersection is forecasted to be very low (i.e. 11 vehicles per hour in the peak hours), which does not justify the bridge replacement on 6th Line to the north, which would

be required to provide an alternative travel route. The improvements to Highway 7 are subject to approvals / permits being obtained from the Ministry of Transportation (MTO), since Highway 7 is under their jurisdiction. Previous comments from the MTO have not identified the spacing of 5th Line and 6th Line to be a potential concern."

Issues related to blasting and cultural heritage have also been addressed through the various studies and peer reviews.

5.6.2 Review Status

The issues identified with respect to 6th Line identified by CRC in their delegation of February 3, 2015 have been addressed through the peer reviews of the TIS, Haul Route Study, blasting study and cultural heritage study and related conditions of development.

5.7 Mega-Quarry Application –Related Issues

5.7.1 Input and Review Summary

CRC forwarded to the Township on July 30, 2014, a document entitled "Technical Review On Behalf of Nottawasaga Valley Conservation Authority of Supporting Documentation Provided by Highland Companies in Support of Their Application to the Ministry of Natural Resouces (MNR) For a Category 2, Class A License Under The Aggregate Resources Act", Melancthon Township, May 2014 prepared by SLR. This was provided to them by their consultant, Garry Hunter. The cover email indicates that "Table 1 is very important to review as many of the concerns the CRC raised about the Hidden Quarry application are also of concern in the Megaquarry application. Garry also drew our attention to Sec D.3 beginning on pg. 44 and specifically pages 50-54 with respect to blasting and fisheries. There is no similar information in the HQ application."

There are significant differences between the current application and the Melancthon application with respect to size, complexity, location and environment. It is questionable therefore how applicable the information provided is to the current application. However, the submission was been provided to Burnside and the applicant for their information.

The cover email also indicates:

"Our group is concerned that with the recent purchase of the land adjacent to the site and other aggregate applications that are being submitted to council.... we may have a megaquarry in our community."

Further, in a March 2, 2015 delegation to Council, CRC identified two properties one in the northwest quadrant of Highway 7 and 6th Line, and the other to the northeast, east of the railway on the Township boundary, which CRC asked the Township to consider "implications

for additional quarry applications for these two properties or more if Hidden Quarry rezoning approved."

The application that is under review is specific. There is no indication of any proposed expansion or "megaquarry". If such an expansion should be proposed it would require submission of additional applications under the Planning Act, including with the recent changes to the County Official Plan an amendment to that Plan, as well as applications under ARA, and a detailed review including full public consultation would be required. It is not possible or appropriate to evaluate something that has not yet been, and may never be, proposed.

Further, the use of the term "mega-quarry" would not appear to be applicable in the GET context given the accepted definition of such a use. The State of the Aggregate Resource in Ontario Study (SAROS), Paper 2: Future Aggregate Availability and Alternatives Analysis prepared by MHBC, includes a discussion of Mega-Quarries. It indicates that the criteria for such a quarry are reserves of at least 150 million tones and an annual production capacity of 5-10 million tonnes (compared with 12 million tonnes and extraction of 700,000 tonnes for the proposed Hidden Quarry). The Report goes on to indicate that one of the primary challenges for establishing a mega-quarry for Southern Ontario would be "the significant land acquisition required" given the degree of parcel fragmentation. An extraction area of 280 hectares at a 20 metre extraction depth was estimated as being required for a "mega-quarry".

5.7.2 Input and Review Status

The information submitted by CRC regarding the proposed Melancthon Quarry was provided to Burnside and JDCL for their information.

5.8 Other Issues

5.8.1 Input and Review Summary

Radon Gas

In a delegation to Council on July 13, 2015, CRC identified concerns regarding radon gas and asked what action the Township would take "to address the possibility that operations of Hidden Quarry will influence the increase of Radon gas release into our environment?" JDCL have advised that they will have RWDI provide additional input, but that Radon is a naturally occurring gas related to uranium decay in the rocks that make up the earth. They further advise that Radon is essentially everywhere. Further, Radon gas accumulating in basements is a function of the local geology, house construction methods and air circulation in and around the basement. Therefore, JDCL indicates that given that the quarry has been designed not to impact on any surrounding structures there should be no impact.

Cumulative Impacts

At a meeting on May 22, 2014 CRC suggested that a report on cumulative impacts should be considered related to the Dolmine pit and Tri-City application. Burnside have advised that due to the distance between the sites there will be no cumulative impacts related to hydrogeology which would be a key consideration in any assessment of cumulative impacts. This would also be true for other factors such as air quality and noise. Therefore, such a study is not considered appropriate.

Financial Protection against damages, Third Party Bond

With respect to the W&T Mushroom Farm, CRC has raised the issue of financial protection against damages and a third party bond including in a delegation on June 1, 2015. As part of the conditions of development, various approaches will be established to protect any landowners, including the mushroom farm, which may be impacted by the quarry operations (i.e. well contingency plan). JDCL will be responsible for any impacts and this responsibility will be enforced through MNRF and MOECC and the Township. A third party bond is unlikely to address impacts, however, as it is not possible to determine security levels for possible work or damages that are unknown and unquantified and which science indicates is unlikely to happen. Further, the powers of the Township to demand bonds or other similar mechanisms are limited by the ARA.

Submission Natural Environment and Agricultural Impact Assessment Reviews

A delegation was made to Council by CRC on August 10, 2015 with respect to the GWS Natural Environment Report, August 2013 and the Agricultural Impact Assessment, February 3, 2015 revised August 5, 2015. The request was:

- "Natural Environment report must be revised and third party should address significant habitat and wildlife CRC concerns.
- Agricultural assessment should be updated and extensive interviews with farmers should be completed.
- Decline rezoning of HQ site"

The GWS Natural Environment report has been subject to extensive review by Burnside on behalf of the Township and the relevant agencies. Further, additional related submissions from consultants retained by CRC have been reviewed by GWS and Burnside. The results of these reviews and related conclusions are discussed above including recommended conditions of development. Burnside has advised that no changes are required based on the CRC submission. JDCL has provided a response to the comments in a comment matrix submitted on September 1, 2015. The response also indicates that no changes are required to the report.

The Agricultural Impact Assessment has also been reviewed by Macaulay Shiomi Howson Ltd. on behalf of the Township and the report revised to respond to the comments. JDCL

has provided a response to the CRC comments in a comment matrix submitted on September 1, 2015 with comments provided by Stovel, Harden, RWDI and GWS. In summary, the comments note that:

- The study approach follows the standard approach established in the County of Wellington Official Plan;
- The type of study determines the type of survey in this case a reconnaissance level survey was adequate to gather information regarding general agricultural land uses in the area.
- Given that Minimum Distance Separation (MDS1) is not required, there is no need to conduct surveys with adjacent farmers.
- The figure presented indicates that while the sheep farm and dairy farm exist, they were outside the study area and well buffered from the proposed quarry. In any event, there is no anticipated impact on these operations.
- The reports that are referenced have been peer reviewed by a number of agencies and professionals and their conclusions signed off on by various agencies.
- The air quality assessment has been completed using the relevant MOECC standards and guidelines. These criteria are established using an effects-based process….The effects-based process is based on MOECC's understanding and interpretation of both health and environmental effects…..The MOECC bases the criteria on the most limiting of these effects, as well as potential health concerns, ensuring the criteria is broadly protective of both the environment and human health. AS a result, the use of the MOECC criteria in the assessment is considered valid and appropriate. Furthermore, agricultural operations and aggregate sites coexist in many locations around the world. These will be no impact on the agricultural operations surrounding the site.
- Background PM2.5 levels modeled were based on a 5-year average of the annual 90th percentile hourly concentration measured in the MOECC monitoring station in Guelph (14.8 ug/m^3). The Guelph monitoring station is located less than 15 km upwind of the site, and is located in a more urban setting; it is expected to provide a more conservative estimate of background concentrations.
- The mushroom farm and the horse farm are the two closest operations to the site.
- The MOECC has authority to deal with dust related complaints and has broad powers to order immediate remedies.
- The proposed quarry will reduce overall trucking.
- There is no impact on the issue of raising the floor seasonally due to local high water tables. This was fully assessed by Aercoustics in their August 10, 2015 Addendum No. 1.
- The predicted water level rise beneath the kettle depression….is approximately one metre. Therefore, root zone flooding is not predicted…..In addition, the static groundwater levels in bedrock wells located along the south side of Highway 7 are all in excess of eight metres depth and therefore well below the root zone.
- There is not expected to be any significant impact of water drawdown on any agricultural property…. The drawdown predicted by Harden Environmental occurs in the bedrock aquifer and not in the rooting zone.

- There will be no change to soil drainage on lands butting the quarry..... The soil conditions were confirmed with hand auger sampling (off site) and test pits (on-site).
- Measurements obtained by Burnside and Associates confirm that there was no impact of municipal water taking observed at wells on the Hidden Quarry site.
- Any well interference, residential or agricultural, would be remedied immediately according to the well complaint protocol.
- There is no Class 2 lands present on the site based on the onsite soil survey.
- The proposed quarry will not result in significant consumption of good quality agricultural land based on the PPS definition of Prime Agricultural Land.
- No significant impacts anticipated on Mushroom operation.
- There will be no spoilage of cash crops.
- Extensive peer reviewed hydrogeology does not predict any impact on water availability to homes and farms. A robust monitoring program followed up by a well complaint response protocol will ensure that any unexpected impacts are mitigated immediately.

5.8.2 Review Status

- JDCL has advised that they will have RWDI respond to the issue of Radon gas, but that no impacts are anticipated.
- A study of cumulative impacts is not considered appropriate.
- As part of the conditions of development various approaches will be established to protect landowners which may be impacted by quarry operations.
- The Natural Environment report has been subject to extensive review and related conclusions are discussed above including recommended conditions of development. No changes to the report have been identified based on the CRC submission.
- The Agricultural Impact Assessment has been reviewed on behalf of the Township and revised. JDCL has provided a detailed response to the CRC comments and no changes to the report have been identified based the CRC submission.

6. Evaluation

The Official Plan designates the subject lands with a Mineral Aggregate Area Overlay designation. The PPS and Official Plan, which provide the key planning policy direction for this site, recognize that:

"As much of the mineral aggregate resources as is realistically possible shall be made available as close to the markets as possible."

At the same time, the Provincial and Official Plan policy framework makes it clear that planning decisions must properly balance all the Province's and County's competing objectives. Given this direction the fundamental question that must be answered in evaluating the proposed quarry application is - Can the development be permitted in a

manner which provides an appropriate balance between all the various goals and objectives of the Province and local community?

To address this question, a detailed technical review of the application and supporting reports was carried out by the Township. In addition, the application was reviewed by MNRF, MOECC, GRCA, the County, MTO, and Union Gas with respect to their individual mandates. The Region of Halton, the Town of Halton Hills and the Town of Milton also initiated reviews of specific areas of concern particularly hydrogeology, natural heritage and the haul route. As part of this, the Township also directed that an economic impact study be carried out.

The results of these technical reviews are discussed in detail in Section 4 of this report. Generally, recognizing that final comments have not been submitted by the Region of Halton, Town of Halton Hills and Town of Milton, the results of the technical review indicate that the proposed quarry, based on revised plans which reflect the technical input, can be permitted from a technical perspective as it would be anticipated to have minimal impacts with respect to the following issues:

- hydrogeology including water levels in up-gradient domestic wells, water quality in down-gradient domestic wells and the potential for impacts on Rockwood Well Number 4 and other related issues subject to a number of conditions including a private well survey, monitoring and refinement of the well contingency plan;
- natural environment including protection of wetlands, as well as Species at Risk and their habitat subject to a number of conditions;
- air quality;
- traffic impact subject to upgrading Sixth Line and the addition of turn lanes on Highway 7;
- haul route subject to completion of the Haul Route Study;
- noise and blast vibration subject to blast monitoring, provision of blast record information and a third party acoustical audit in the first year of operation;
- archaeology subject to a Stage 3 assessment for an area on the west side of the site;
- cultural heritage including the cultural landscape on Sixth Line;
- visual impact;
- agriculture provided the recommendations related to the other issues are satisfactorily addressed; and,
- economic impact.

However, as noted, approval would be subject to the establishment of detailed conditions of development to the satisfaction of the Township, in consultation with respect to specific issues with the Region of Halton, Town of Halton Hills and Town of Milton and the County of Wellington, as well as other agencies if appropriate. Initial direction with respect to the key conditions has been outlined in the report. These initial directions are consolidated in Appendix B for ease of reference. The precise range and nature of the conditions, including implementation mechanisms (e.g. ARA site plan, zoning by-law) for establishment of the

conditions will require additional consideration and consultation, particularly with the Region of Halton, Town of Halton Hills and Town of Milton regarding cross jurisdictional issues such as the haul route and well contingency plan.

In addition to the technical review, an extensive public review was carried out. Significant input has been received, and continues to be received, from the general public and stakeholder groups at the public meetings and in submissions/delegations to Council as well as written submissions to the Township. To date, 135 written submissions have been made to the Township from 95 individuals, as well as written submissions and 24 delegations to Council by the CRC.

Through the technical review by the Township and other agencies all the issues identified by the public have been reviewed and considered. These include concerns with impacts related to:

- property value;
- private wells;
- traffic including road upgrades and traffic lights;
- blasting/vibration;
- air quality;
- noise;
- natural environment including water quality, wetlands, wildlife including Species at Risk and Brydson Creek;
- damage to homes;
- taxes;
- archaeology/cultural heritage;
- karst topography;
- visual impacts;
- haul route;
- impacts on agriculture including food production and equestrian farms; and,
- lack of need for additional aggregate resources.

However, the Concerned Residents Coalition (CRC) has also chosen to retain consultants who have made submissions with respect to the key issues identified by the public, specifically hydrogeology, Species at Risk, Brydson Creek and air quality. In addition, a submission was received on August 5, 2014 from one of the consultants which relates to a range of issues (e.g. a request for a fish community and aquatic habitat baseline survey, transportation, rock quality tests, implications for equestrian exercise tracks, increased surface and groundwater monitoring). The CRC has also made submissions with respect to a number of technical matters including risks related to mining and the Dolime Quarry, including flyrock, and an “Appraisal of the Golder “Peer Review” of Blast Impact Analysis Reports”, as well the TIS and HRS, radon gas, natural environment, and agricultural assessment. The key CRC issues have all been reviewed by JDCL and their response in turn reviewed by the Township’s consultants. Arising from this additional review, in part, a number of changes have been proposed to the application. In particular:

- Hydrogeology
  Modifications have been proposed to the ARA Site Plan to identify a range of water levels for the quarry pond rather than one value, and a review of the quarry floor relative to high groundwater level is to be done to make sure the working floor is not below water table and if it is the elevation is to be adjusted. In addition, methodology for trigger levels is to be established.

- Natural Environment
  Additional conditions of development are proposed for Species at Risk.

- Haul Route Study
  Additional work is required with respect to the Haul Route Study.

Based on the policy and extensive technical and public review, in my opinion, the proposed quarry can, in principle, be developed in a manner which provides an appropriate balance between all the various goals and objectives of both the Province and local community. In the case of the proposed Hidden Quarry, it is appropriate, in my opinion after considering all the technical and public input to date, to make the mineral aggregate resource available for extraction given:

- its proximity to the key GTA market; and,
- the fact that based on the technical review, together with consideration of public input, extraction can be undertaken in a manner which minimizes social, economic and environmental impacts.

In particular, the development, based on the available information, can proceed with minimal impacts anticipated on the environment and the local community. However, this result can only be achieved provided appropriate conditions of development are established through the ARA licence approval, the zoning by-law amendment and through other available mechanisms. The precise range and nature of the conditions, including implementation mechanisms (e.g. ARA site plan, zoning by-law) for establishment of the conditions will require additional consideration and consultation, particularly with the Region of Halton, Town of Halton Hills and Town of Milton regarding cross jurisdictional issues such as the haul route and well contingency plan.

7. Recommendation

That the Planning Report re: Zoning By-law Amendment Application Township File ZBA 09/12 James Dick Construction Ltd. – Hidden Quarry Proposal dated September 2, 2015 be received;

And that the request to amend the Township of Guelph/Eramosa Zoning By-law, O.M.B. Case File No. PL140985, be recommended to the Ontario Municipal Board for approval in principle, subject to detailed conditions of development being developed to the satisfaction of the Township in consultation with the Region of Halton, Town of Halton Hills and Town of Milton and County of Wellington, as well as other agencies if appropriate, and established through the Aggregate Resources Act licence approval, an amendment to the Township Zoning By-law Amendment and through other available mechanisms;

And that Council direct the Township Solicitor and consultants to attend any Ontario Municipal Board proceeding which may take place in connection with the Planning Act and Aggregate Resources Act applications, in support of the recommendations outlined in Planning Report Re: Zoning By-law Amendment Application Township File ZBA 09/12 James Dick Construction Ltd. – Hidden Quarry Proposal dated September 1, 2015; and,

And that Council provide the Township Solicitor with authority to engage in settlement discussions with the applicant (and other parties to the Ontario Municipal Board hearing) and to make a request for mediation in this matter to the Ontario Municipal Board.

Appendix A

Policy Analysis

Appendix A.1 Provincial Policy Statement (2014) (PPS)	
Policy	**Analysis and Conclusions**
Provincial Policy Statement	
Section 2.5 Mineral Aggregate Resources	
2.5.2.1:"As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible. Demonstration of need for mineral aggregate resources, including any type of supply/demand analysis, shall not be required, notwithstanding the availability, designation or licensing for extraction of mineral aggregate resources locally or elsewhere."	The subject lands have been identified through the County of Wellington Official Plan with a Mineral Aggregate Area overlay designation recognizing the potential mineral aggregate resource. Given the location of the site close to the major markets for aggregate in the Greater Toronto Area, this policy, indicates that a priority should be given to extraction of the resource. Further, no demonstration of need is required.
2.5.2.2:"Extraction shall be undertaken in a manner which minimizes social, economic and environmental impacts."	Despite the priority given to extraction in Section 2.5.2.2, however, extraction must also minimize impacts as set out Section 2.5.2.2. The review of the studies submitted as part of the application by the Township and agencies, as well as consideration of input from the public including the CRC submissions, indicate that extraction can be undertaken in a manner that minimizes social, economic and environmental impacts subject to the recommended conditions of development including on-going monitoring.
2.5.3.1: "Progressive and final rehabilitation is required to accommodate subsequent land uses, to promote land use compatibility, to recognize the interim nature of extraction, and to mitigate negative impacts to the extent possible. Final rehabilitation shall take surrounding land use and approved land use designations into consideration."	The ARA Site Plan (June 18, 2015) includes a quarry phasing plan and a plan for the progressive rehabilitation and final rehabilitation of the site. These plans illustrate how progressive and final rehabilitation will occur and recognize the interim nature of extraction. The site will be rehabilitated to an ecological land use which should be compatible with the surrounding rural land use and natural features. This use also recognizes the current land use designations in the County of Wellington Official Plan which are primarily "Greenlands" or "Core Greenlands".
2.5.4.1:....on prime agricultural land extraction of mineral aggregate resources is permitted as an interim use provided the site will be	The site does not appear to be prime agricultural land although it was primarily designated as such in the County Official Plan prior to OPA 81. It is now primarily designated "Greenlands" or "Core Greenlands" in the County Official Plan as amended by OPA 81, although

Appendix A.1 Provincial Policy Statement (2014) (PPS)	
Policy	**Analysis and Conclusions**
rehabilitated back to an agricultural condition. Complete rehabilitation to an agricultural condition is not required if: a) Outside of a specialty crop area, there is a substantial quantity of mineral aggregate resources below the water table warranting extraction, or the depth of planned extraction in a quarry makes restoration of pre-extraction agricultural capability unfeasible;.... "Prime agricultural land: means specialty crop areas and/or Canada Land Inventory Class 1, 2 and 3 lands, as amended from time to time, in this order of priority for protection." "Prime agricultural areas: means areas where prime agricultural lands predominate....."	there are some small areas designated "Prime Agricultural". As part of the Agricultural Impact Assessment prepared for the site by Stovel and Associates Inc. a detailed soil survey was carried out. It indicated that there were no Class 1 or 2 soils on the site. There is some Class 3 soils, but of the 15.01 ha only 7.9 ha will be removed as a result of the proposed quarry operation based on the Stovel assessment. The remaining lands consist of a mix of lower agricultural potential soils. Therefore, there is no requirement to rehabilitate back to an agricultural condition. Further, complete rehabilitation to an agricultural condition would not be required given that a substantial quantity of the mineral aggregate is below the water table.
Section 2.1 Natural Heritage	
2.1.1 Natural features and areas shall be protected for the long term.	The Township's peer reviewer, Burnside has advised that, in their opinion, the background work has adequately addressed concerns related to the Natural Environment at the proposed Hidden Quarry including protection of Wetlands as well as Species at Risk and their habitat, subject to additional review if new information is provided. MNRF and GRCA have also indicated that they accepted the background work. The Region of Halton has not issued a final position; however, based on a review by Burnside, the issues identified by the Region of Halton appear to have been addressed. Burnside do indicate, based additional information provided through a study conducted on behalf of CRC that
2.1.2 "The diversity and connectivity of natural features in the area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface	

Appendix A.1 Provincial Policy Statement (2014) (PPS)	
Policy	**Analysis and Conclusions**
water features and ground water features."	additional mitigation measures should be considered and included in rehabilitation and mitigation plans established through the ARA licence application approval as part of the ARA Site Plan. Burnside have identified that the following should be established as conditions of development: • Exclusion fencing should be installed prior to April to prevent turtle species from using stockpiled areas as nesting habitat; • Worker education programs to identify and relocate turtles from hazardous areas of the site should be included in Health and Safety training; • Stockpiling of materials should be excluded from natural heritage features, especially adjacent to wetlands; • Wetlands should be fenced, and edge buffer to the feature should be included in the fenced area, to be determined by MNRF; • Rehabilitation plans should include habitat creation and enhancement for species suspected to be using the site, including basking areas for turtles in wetlands, foraging habitat for grassland birds and nesting structures for barn swallow (as examples); • Wetland features that exclude habitat for fish to enhance herpetofaunal habitat (particularly breeding habitat) should also be included as part of the wetland creation: • A mixture of coniferous and deciduous trees should be included, with less focus on white spruce; • Wetland plantings should include a mixture of submergent, emergent, floating and woody vegetation species, to diversify habitat; and, • Open cliff habitat should include ledges for bird nesting and roosting. In addition, the consultant for the County of Wellington indicated that they were supportive of the following ecological measures being reflected in the ARA Site. The measures are generally reflected in the current ARA Site Plan dated June 18, 2015 subject to some refinements identified in italic: • retain existing vegetation until just prior to
2.1.3 "Natural heritage systems shall be identified in Ecoregions 6E and 7E....."	
2.1.4 "Development and site alteration shall not be permitted in: a) significant wetlands in Ecoregions 5E, 6E and 7E...."	
2.1.5 "Development and site alteration shall not be permitted in:.... b)significant woodlands.... d)significant wildlife habitat....."	
2.1.6"Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements."	
2.1.7 "Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements."	
2.1.8 "Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be not negative impacts on the natural features or on their ecological functions."	

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	extraction; • promptly restore completed extraction areas to an ecological after-use to specified in the Progressive Rehabilitation Plan – *plans should include reference to timing of either plant removal or restoration plantings/seed application*; and • plant a mix of coniferous/deciduous trees (with a min. spacing of 3 meters) in the area of the 6th Line to increase forest density in an attempt to provide an effective natural corridor in the north and west side of the property – *add to rehab plan drawing and also modify the plan to include reference to planting deciduous trees as currently only reference is to coniferous trees*.
Section 2.2 Water	
2.2.2:"Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored. Mitigative measures and/or alternative development approaches may be required in order to protect, improve or restore sensitive surface water features, sensitive ground water features and their hydrologic functions."	Based on all the submissions from the applicant with respect to hydrogeology, as set out in their letter of April 24, 2015, Burnside, the peer reviewer for the Township, have indicated that their concerns with the proposed quarry have been generally satisfied including their concerns with water levels in up-gradient domestic wells, water quality in the down-gradient domestic wells and the potential for any impacts on Rockwood Well Number 4. However, their opinion is subject to a number of conditions of development being established through the ARA site plan including a private well survey, a monitoring program and refinement of the well contingency plan, and modifications to the current ARA site plan (See Appendix B). Further, the MOECC, MNRF and GRCA have indicated that they have no further concerns with respect to hydrogeology. The Region of Halton has not issued a final position; however, Burnside concurred with the majority of the Regional comments and the response from Burnside to the Region's comments in November 2014 has been reflected in their ongoing review of the JDCL submission.
Section 2.5 Cultural Heritage and Archaeology	
2.6.1 "Significant built heritage and significant cultural heritage landscapes shall be conserved."	A Cultural Heritage Resource Assessment was carried out in support of the application. It assessed the built heritage resources and cultural heritage landscapes on or adjacent to the proposed quarry site. Unterman McPhail, the Township's peer reviewer determined that the report is satisfactory and no additional work is required. The

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	report concludes that the project will not involve or result in any potential impacts to the subject property or an adjacent property and, in particular the cultural heritage landscape represented by the rural roadscape of Sixth Line north of Highway 7 will be preserved by retention of the treed road verge and landscaped berm beyond. This should be required as a condition of development.
2.6.2 "Development and site alteration shall not be permitted on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved."	A Stage I-II Archaeological Assessment was carried out by York North Archaeological Services Inc., August 31, 2012.The report identifies an area on the west side of the site south of the former pit (AjHa-50 James D. site) as the only area where historic archaeological resources were located. It has been identified as requiring a Stage 3 assessment. JDCL has agreed to conduct a Stage 3 assessment once MNRF has signed off on their application for the Category 2 Class "A" quarry. The Ministry of Tourism, Culture and Sport has advised that they are satisfied with the archaeological assessment. The Stage 3 assessment of the area on the west side would be carried out as a condition of approval of the license.
Section 1 Building Strong Healthy Communities	
1.1 Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns	
1.1.1. Healthy, livable and safe communities are sustained by: a) Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term; b) Accommodating an appropriate range and mix of residential...., employment...., institutional...., recreational, park and open space and other uses to meet long term needs; c) Avoiding development and land use patterns which may cause environmental	This general policy direction is congruent with the policy direction in Section 2.5 Mineral Aggregate Resources. It recognizes the need to promote efficient development and land use patterns (i.e. 2.5.2.1 "As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible") and that the need to accommodate a mix of uses, while ensuring that any impacts of such development are minimal (ie. 2.5.2.2 "Extraction shall be undertaken in a manner which minimizes social, economic and environmental impacts."). As discussed above, the proposed quarry is consistent with this approach.

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or public health and safety concerns;	
1.1.4 Rural Areas in Municipalities	
1.1.4.1 Healthy, integrated and viable rural areas should be supported by: a) building up rural character, and leveraging rural amenities and assets;... f)promoting diversification of the economic base and employment opportunities through goods and services, including value-added products and the sustainable management or use of resources;.... h)conserving biodiversity and considering the ecological benefits provided by nature...." 1.1.4.4 Growth and development may be directed to rural lands in accordance with policy 1.1.5.....	These policies recognize that leveraging rural assets including the sustainable management or use of resources is important to support viable rural areas. At the same time conserving natural environment is important. The proposed quarry achieves these objectives by providing for use of the aggregate resource while protecting key natural features and allowing for the eventual rehabilitation of the site for an ecological end use.
1.1.5 Rural Lands in Municipalities	
1.1.5.1 When directing development on rural lands, a planning authority shall apply the relevant policies of Section 1:....Section 2... and Section 3.	As required all relevant policies have been reviewed and considered.
1.1.5.2 On rural lands located in municipalities, permitted uses are: a)management or use of resources....	The proposed quarry is consistent with the permitted uses.
1.1.5.3 Recreational, tourism and other economic opportunities should be promoted. 1.1.5.4 Development that is compatible with the rural landscape and can be sustained by rural service	These policies reflect the theme that a diversified rural economy is promoted by supporting resource related uses, while ensuring development is compatible with the rural landscape. The proposed quarry achieves in a manner which minimizes impacts on the surrounding area.

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levels should be promoted. 1.1.5.6 Opportunities should be retained to locate new or expanding land uses that require separation from other uses. 1.1.5.7 Opportunities to support a diversified rural economy should be promoted by protecting agricultural and other resource-related uses and directing non-related development to areas where it will minimize constraints on these uses.	
1.1.5.9 New land uses.... shall comply with the minimum distance separation formulae.	As noted in the Agricultural Impact Assessment, MDS 1 provisions do not apply to aggregate extraction applications, and MDS 2 provisions are not impacted negatively by the presence of an adjacent mineral aggregate operation. This is confirmed by the list of key changes proposed to the MDS Formulae and Implementation Guidelines identified by OMAFRA (www.omafra.gov.on.ca/english/landuse/mds_review.htm) which states that a proposed key change is "Clarifying that MDS does not apply to the extraction of minerals(sic) aggregates and petroleum resources, infrastructure, and landfills."
1.2 Coordination	
1.2.1 A coordinated, integrated and comprehensive approach should be used when dealing with planning matters within municipalities, across lower, single and/or upper-tier municipal boundaries, with other orders of government, agencies and boards including: a) managing and/or promoting growth and development;.... c) managing natural heritage, water, agricultural, mineral, and cultural heritage and archaeological resources; d) infrastructure....multi-modal transportation systems....;	The proposed quarry is on the boundary with the Town of Milton and the Region of Halton and truck traffic from the proposed quarry will travel through the Town of Halton Hills. Consequently, the Township has been aware of the need to coordinate their review with those municipalities. In addition, the Township has worked closely with the relevant agencies including MNRF, MOECC and GRCA, as well as liaising with the County of Wellington regarding a number of issues including wells.

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e) ecosystem, shoreline, watershed….issues….	
1.2.6 Land Use Compatibility	
1.2.6.1 *Major facilities* and *sensitive land uses* should be planned to ensure they are appropriately designed, buffered and/or separated from each other to prevent or mitigate adverse effects from odour, noise and other contaminants, minimize risk to public health and safety, and to ensure the long term viability of major facilities. "Major facilities: means facilities which may require separation from sensitive land uses, including…..mineral extraction activities."	The issues of land use compatibility has been addressed through all the studies submitted on behalf of JDCL particularly those related to air quality, noise/blast vibration, traffic, agriculture, visual impact and cultural heritage. Based on the results of the studies and the input from the peer reviewers for the Township and agencies, the design and operation of the proposed quarry has been designed, buffered and/or separated from adjacent sensitive uses in a manner consistent with this policy.
1.6.7 Transportation Systems	
1.6.7.2 Efficient use shall be made of existing and planned infrastructure…..	The proposed quarry abuts Provincial Highway 7 which will allow it to directly access the Highway from the 6th Line.
1.6.7.5 Transportation and land use considerations shall be integrated at all stages of the planning process.	The TIS was prepared as one of the initial required background studies and reviewed by the Township and agencies including the MTO. The HRS was a later requirement but has been under review since it was submitted in March 2015.
1.6.8.3 ……New development proposed on adjacent lands to existing or planned corridors and transportation facilities should be compatible with, and supportive of, the long-term purposes of the corridor and should be designed to avoid, mitigate or minimize negative impacts on and from corridor and transportation facilities.	The TIS has been reviewed by MTO who control Highway 7. They have indicated that they have no objections to the application. They, however, also provided a list of additional requirements which must be met should the application be approved. Burnside, the peer reviewer for the Township, has also concluded that the TIS provides sufficient information to confirm the requirements for road improvements in the area of the quarry and have identified specific conditions of development. Based on this input, the proposed development would be considered compatible with and supportive of the long term purposes of the Highway 7 corridor.
1.7 Long-Term Economic Prosperity	
1.7.1 Long-term economic prosperity should be supported	These policies reflect the theme noted above that a diversified rural economy is promoted by supporting

Appendix A.1 Provincial Policy Statement (2014) (PPS)	
Policy	**Analysis and Conclusions**
by: a) promoting opportunities for economic development and community investment readiness; b) optimizing the long-term availability and use of land, resources, infrastructure.... d) encouraging a sense of place, ...by conserving features that help define character, including built heritage resources and cultural heritage landscapes;.....	resource related uses, while ensuring development is compatible with the rural landscape. The proposed quarry achieves this objective in a manner which minimizes impacts on the surrounding area. In particular, as discussed above it will be designed to maintain the cultural heritage landscape on the 6th Line.
1.8 Energy Conservation, Air Quality and Climate Change	
1.8.1 Planning authorities shall support energy conservation and efficiency, improved air quality, reduced greenhouse gas emissions, and climate change adaptation through land use and development patterns which:.... d)focus freight-intensive land uses to areas well served by major highways, airports, rail facilities and marine facilities;....	The proposed quarry is located on a Provincial highway.
4.0 Implementation and Interpretation	
4.2 In accordance with section 3 of the Planning Act, a decision of council of a municipality.....including the Municipal Board, in respect of the exercise of any authority that affects a planning matter, "shall be consistent with" this Provincial Policy Statement.	This establishes the "test" to be used in evaluating the application in relation to the PPS.
4.4 The Provincial Policy Statement shall be read in its entirety and all relevant policies are to be applied to each situation.	This provides direction on the interpretation of the PPS.

Appendix A.2 Growth Plan for the Greater Golden Horseshoe(Growth Plan) Review	
Policy	**Analysis and Conclusions**
1. Introduction	
The Provincial Policy Statement and Provincial Plans As provided for in the Places to Grow Act, 2005, this Plan prevails where there is a conflict between this Plan and the PPS.....	
2. Where and How to Grow	
2.2.2 Managing Growth	
1. (i) directing development to *settlement areas*, except where necessary for development related to the management or use of resources, resource-based recreational activities, and rural land uses that cannot be located in *settlement areas*.	The Growth Plan recognizes the necessity of resource-based development including mineral aggregate, occurring where the resource is located despite the fact that generally the Plan encourages development to locate in settlement areas.
2.2.9 Rural Areas	
2. Development outside of settlement areas, may be permitted in rural areas in accordance with Policy 2.2.2.1 (i)	This policy reflects the direction in 2.2.2.1(i).
3. Infrastructure to Support Growth	
3.2.4 Moving Goods	
2. The Ministers of Transportation and Infrastructure, other appropriate Ministers of the Crown, and municipalities will work with agencies and transportation service providers to – a) co-ordinate and optimize goods movement systems b) improve corridors for moving goods across the GGH consistent with Schedule 6 of this Plan.....	The Growth Plan reflects a direction to improve corridors for goods movement.
3. The planning and design of highway corridors, and the land use designations along these corridors, will support the policies of this Plan.....	As noted, the TIS has been reviewed by MTO who control Highway 7. They have indicated that they have no objections to the application. They, however, also provided a list of additional requirements which must be met should the application be approved. Burnside, the peer reviewer for the Township, has also concluded that the TIS provide sufficient information to confirm the requirements for road improvements in the area of the quarry and have identified specific conditions of development. Based on this input, the proposed development would be considered compatible with and supportive of the long term purposes of the Highway 7 corridor.
4. Municipalities will provide for the	The Growth Plan reflects a direction to

Appendix A.2 Growth Plan for the Greater Golden Horseshoe(Growth Plan) Review	
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establishment of priority routes for goods movement, where feasible, to facilitate the movement of goods in and out of areas of significant employment, industrial and commercial activity and to provide alternate routes for connecting to the provincial network.	improve corridors for goods movement.
4. Protecting What is Valuable	
4.2.3 Through sub-area assessment, the Ministers of Infrastructure and Natural Resources will work with municipalities, producers of mineral aggregate resources, and other stakeholders to identify significant mineral aggregate resources for the GGH, and to develop a long-term strategy for ensuring the wise use, conservation, availability and management of mineral aggregate resources in the GGH, as well as identifying opportunities for resource recovery and for co-ordinated approaches to rehabilitation where feasible.	The sub-assessment has not been completed, however this policy reflects the direction in the PPS with respect to mineral aggregate.
5. Implementation and Interpretation	
5.4.1 General Implementation and Interpretation	
1. This Plan..... should be read in its entirety and all relevant policies are to be applied to each situation.	This provides direction on the interpretation of the Growth Plan.
9. Where this Plan indicates that further analysis and assessment will be carried out but the analysis has not been completed, all relevant policies of this Plan continue to apply and any policy that relies on information that will be available from further analysis should be implemented to the fullest extent possible.	This policy is applicable to Section 4.2.3.

Appendix A.3 County of Wellington Official Plan (Amendments made to February 12, 2013 Last Revision May 15, 2013)	
Policy	**Analysis and Conclusions**
Part 1 Introduction	
1.3 The Plan	
This Official Plan is a legal document intended to give direction over the next 20 years, to the physical development of the County, its local municipalities and the long term protection of the County's resources. All land use and servicing decisions must conform to the policies of this plan. Through this Plan, County Council will outline a long-term vision for Wellington County's communities and resources. The Plan provides policy to attain the long – term vision. It is expected that the policies of this Plan will be the basis on which County and local councils and government agencies make decisions on land use planning matters. Public and private initiatives will be required to conform with County policy.	This section outlines the status of the Plan and the interrelationship between the vision and the policies.
Part 2 Wellington Planning Vision	
2.1 Fundamental Beliefs	
2.1.2 Sustainable Development ....Wellington County will make planning decisions which properly balance: • Protecting and enhancing the natural environment; • Enhancing economic competitiveness; • Fostering a healthy, safe and socially responsible society.	As noted in Section 1.3, the Plan identifies a long-term vision and establishes policy designed to attain that vision. Part 2 of the Plan outlines the long-term vision. The basis for the vision as identified in Section 2.1.2 is the need for planning decisions to properly balance all the competing objectives. The achievement of the proper balance underlies the other sections of Part 2 which further articulate the Vision. It provides general guidance with respect to the approach to evaluating the proposed quarry – Can the development be permitted in a manner which provides an appropriate balance between all the various goals and objectives of the community including general directions set out in Sections 2.1.2, 2.1.3 and 2.1.4 as well as more specific
2.1.3 Land Stewardship Land Stewardship recognizes that preserving natural features and protecting the environment is a shared value between government, community groups and landowners. County Council believes that all landowners are entitled to reasonable use and enjoyment of their land but they are also stewards of the land with responsibility	

to the community for the long term health of their land.	objectives in Section 2.2 and as more precisely established through the Plan's detailed policies?
2.1.4 Healthy Communities Healthy communities are those which: • Foster physical, mental, social and economic well being; • Provide residents with a sense of control over decisions which affect them; • Are designed to reduce the stress of daily living and meet the life-long needs of its residents; • Make accessible employment, social, health, educational and recreational opportunities to all segments of the community.	
2.2 Our Commitment to the Future	
2.2.12 Require development to pay its fair share of growth related costs and to demonstrate compliance with the County's planning policies;	Section 2.2 sets out specific objectives which are to be pursued in the planning policies. Section 2.2.18 is most relevant to the proposed quarry application and it provides for wise management of the County resources including mineral aggregates. Wise management implies a balanced approach which is also reflected in the fact that while calling for protection and management of resources, the objectives also seek the protect and enhance the natural heritage areas, ensure the quality and quantity of groundwater and surface water and requires that development pay its fair share of growth related costs.
2.2.15 Protect and where reasonable enhance features and functions within natural heritage areas....	
2.2.18 Protect County resources such as farmland, minerals, mineral aggregates and forests and provide for wise management practices;	
2.2.24 Ensure the quality and quantity of groundwater and surface water are protected as an essential resource for urban and rural water supplies, agricultural production, the maintenance of the Greenland system and future growth.	
2.3 Urban, Rural and Greenland Systems	
In order to clearly articulate the County's vision, lands within Wellington will be placed in broad categories – urban, rural and greenland systems..... rural systems will be the focus of resource activities and greenlands will be the focus of natural heritage protection.	This policy reinforces that the policies are intended to articulate the vision. It identifies the rural systems as the focus for resource activities such as the proposed quarry.
2.4 The Province	
.... The County recognizes and accepts the value of provincial policy statements to provide a common planning framework for Ontario and its planning decisions shall be consistent with the Provincial Policy	The Plan recognizes the need for planning decisions to be consistent with the PPS, and the Growth Plan (although it should be noted that in fact the test is conformity with the Growth Plan). The proposed quarry has

Statement.....The decisions of the County will be consistent with the Growth Plan for the Greater Golden Horseshoe.....	been reviewed with respect to consistency and conformity respectively with respect to the Provincial policies.
2.5 Our Neighbours	
....The County recognizes and welcomes the need to work co-operatively with our neighbours to ensure our common interests are achieved.	The Plan identifies the need to work with neighbouring municipalities, a commitment which the Township has acknowledged and acted upon in the processing of the proposed quarry application.
2.6 County-Local Partnership	
The County and the local municipal governments in Wellington share responsibility for wise management of our resources and the betterment of the community. The County will work co-operatively with local governments to provide a land use planning system which is thorough and efficient and which promotes the County's overall planning vision.....	These sections articulate the relationship between the County and the local municipalities with respect to management of resources and the land use planning system.
2.7 Local Planning	
The County's Official Plan attempts to provide a consistent set of policies across Wellington. These policies are developed in sufficient detail to provide appropriate official plan coverage for the entire County, while still responding to local conditions.....	
3.1 General Strategy	
.... As a general strategy, Wellington will encourage development patterns which: • are cost efficient • are environmentally sound • are compatible with existing uses • maintain small town character • maintain resource land • provide access to community services and facilities	This general strategy reflects the Vision as it encourages a balanced approach to development patterns.
Part 4 General County Policies	
4.1 Cultural Heritage Resources	
4.1.5 Policy Direction	
a) significant built heritage resources and significant cultural heritage landscapes shall be conserved..... e) in order to conserve a cultural heritage resource, a Heritage Impact Assessment and/or Conservation Plan may be required.	The proposed quarry conforms with this policy as Heritage Impact Assessment has been prepared which has been determined to be complete by the Township's peer reviewed. It addresses the preservation of the cultural heritage landscape along 6th Line.
g)Where development and site alteration is	A Stage I-II Archaeological Assessment has

allowed, significant archaeological resources must be conserved..... h) Where the County has determined a proposed development has areas of archaeological potential, an assessment of the property will be required to identify the archaeological resources. Resources identified and determined to be significant will be conserved. The County may also required parts of the site to be excluded from development in order to maintain the heritage integrity of the site.	been prepared and accepted by the Ministry of Tourism, Culture and Sport. A Stage 3 assessment for an area on the west side of the site south of the former pit is required. This is to be carried out as a condition of approval of the license.
4.2 Economic Development	
4.2.5 Rural Opportunities	
.... The main employment generator in the rural system will be resource based industries such as agriculture, aggregate operations and forestry.....	This policy acknowledges that aggregate operations are an employment generator in the rural area.
4.3 Farmland Protection	
4.3.3 Policy Direction	
a) Class 1, 2 and 3 agricultural soils, associated Class 4 to 7 soils and additional areas where there is a local concentration of farms which exhibit the characteristics of ongoing agriculture, and specialty crop land will be designated as prime agricultural area unless: i) Studies demonstrate that the land would more appropriately be placed in greenlands or secondary agricultural designation, ii) The lands are to be used on an interim basis for mineral aggregate extraction.....	The subject lands are primarily designated "Prime Agricultural" on Schedule A3 of the County Official Plan in place at the time of the submission of the application. However, the Agricultural Impact Assessment prepared on behalf of the applicant has demonstrated that the "property does not contain any CLI – Soil Capability for Agriculture Class 1 or 2 soils and the balance of the property consists of a mixture of lower agricultural potential soils, i.e. Classes 4, 5, 6 and 7 soils." There are 15.01 hectares of Class 3 soils but "it is estimated that approximately 7.9 ha of Class 3 soils will be removed as a result of the proposed quarry operation." In addition, the subject lands are subject to a "Mineral Aggregate Area" overlay on Schedule A3, and the current Official Plan as amended designates the majority of the lands "Core Greenlands" or "Greenlands" supporting the finding that the subject lands should not be considered prime agricultural area.
4.6 Impact Assessment	
4.6.1 General	
In order to assess the merit of planning applications, the County or local municipality may require studies to be undertaken to	The applicant has submitted a full range studies to address the various anticipated impacts as required by the Township. These

measure the various impacts and to propose methods of reducing or eliminating the negative impacts. These studies shall be prepared by qualified professionals and will include, but are not limited to: • planning impacts • environmental impacts • traffic impacts • agricultural impacts • fiscal impacts	studies have been the subject of review by the Township's consultants, as well as by agencies, and have been revised in accordance with the input received.
4.9 Water Resources	
4.9.2 Surface Water	
Streams, lakes, ponds and wetlands normally will be protected through their inclusion in the County's Greenlands System.	The subject lands include surface water resources which are designated "Core Greenlands" on Schedule A3.
4.9.3 Groundwater	
.... It is the intent of this Plan that all development shall be subject to the following policies to ensure water quality and quantity are not adversely affected. Specifically, it is the County's intent that the development of public and private uses will not: • significantly alter groundwater recharge or discharge • impair groundwater or surface water quality • negatively impact municipal groundwater supply ..... Groundwater is not confined to municipal boundaries. As such, the County will work collaboratively with local municipalities and municipal neighbours to ensure effective groundwater protection.	The proposed quarry conforms with this policy as a Level I and II Hydrogeological Investigation, which has been revised to address input by Township and agency reviewers, has been prepared which addresses these concerns. In addition, related work has been carried out at the request of the Township peer reviewer. The Township's peer reviewer is generally satisfied subject to a number of conditions of development being established through the ARA licence application approval. MNRF, MOECC and GRCA have also indicated they have no further concerns. The most recent Region of Halton comments focus on the need to finalize commitments by JDCL.
4.9.4 Policy Direction	
Wellington County commits to pursuing the following directions relating to water resources:..... e) ensure development does not alter groundwater levels to the detriment of surrounding users and resources;..... g) protect wetlands and areas that make significant contributions to groundwater recharge;.... l)ensure the base flow needed to protect streams, fisheries and wetlands are	See discussion under 4.9.3 above. Also it should be noted that the reference in subsection p) to Section 4.9.5.8 is applicable to aggregate operations in a WHPA which is not applicable to the subject site.

maintained;.... k)maintain and enhance water quantity and quality through the retention of vegetation or through revegetation; l) maintain and enhance fish habitat;.... p)require mineral aggregate operations to use best management practices to protect groundwater resources as set out in Section 4.9.5.8; q)require impact studies when development proposals have the potential to affect water or water related resource.	
Schedule A-3 Guelph Eramosa	
The subject lands are designated: • Prime Agricultural • Mineral Aggregate Area • Core Greenlands	The Mineral Aggregate Area designation is an overlay designation. The majority of the lands are designated "Prime Agricultural" with key water resources (e.g. Provincially Significant Wetlands, intermittent stream) designated "Core Greenlands".
Part 5 The Greenlands System	
5.4 Core Greenlands	
Within the Greenlands System certain areas have greater sensitivity or significance. These areas will be identified in policy and protected. These areas have been included in the "Core" Greenlands designations and include: • provincially significant wetlands • habitat of endangered or threatened species • floodway or hazardous lands	The proposed quarry conforms with this policy as a Level II Natural Environment Technical Report, which has been revised to address input by Township and agency reviewers, has been prepared which addresses these concerns. The Township's peer reviewer has indicated that the report adequately addressed concerns related to the natural environment related to the proposed quarry including the protection of wetlands, specifically a Provincially Significant Wetland in the northwest area of the subject site, as well as Species at Risk and their habitat. The peer reviewer has indicated that development would be subject to a number of conditions of development being established through the ARA licence application approval. MNRF and GRCA have also indicated they have no further concerns. The Region of Halton has not provided final comments, however, the Township peer reviewer has reviewed their comments and the identified issues appear to have been addressed.
5.4.1 Wetlands	
Development and site alteration will not be permitted in wetlands considered provincially	See discussion under 5.4 above.

significant....All other wetlands will be protected in large measure and development that will seriously impair their future ecological functions will not be permitted.	
5.4.2 Habitat of Endangered or Threatened Species and Fish Habitat	
Development and site alteration will not be allowed in significant habitat of endangered or threatened species. Development and site alteration shall not be allowed in fish habitat expect in accordance with provincial and federal requirements.	See discussion under 5.4 above.
5.4.3 Flooding Hazards and Hazardous Lands	
.... Generally development shall be directed away from areas in which conditions exist which would pose a threat to public health and safety.....	See discussion under 5.4 above.
5.6 Development Control	
5.6.1 Permitted Uses	
Within the Core Greenlands designation, no development or site alteration is permitted within Provincially Significant Wetlands or in provincially significant habitat of threatened or endangered species. In other areas, permitted uses include conservation, forestry, aggregate extraction within Mineral Aggregate Areas, open space, passive recreation, agriculture and existing uses.... The above uses for both, the Core Greenlands and Greenlands designations, as well as accessory buildings and structures, shall only be permitted if: • there are no negative impacts on provincially significant features and functions and not significant negative impacts on other greenland features and functions; • any natural hazards present can safely be overcome; • the development conforms to policies of applicable adjacent or underlying designation.	As discussed under 5. 4 above, the proposed quarry will be developed in accordance with the directions in Section 5.6.1 with respect to Permitted Uses. Negative impacts are not anticipated based on background work and the conditions of development.
5.6.2 Zoning	
Core Greenland areas shall be placed in a restrictive zone which prohibits buildings, structures and site alterations.....Zoning by-laws may also establish setbacks from greenland areas in which no buildings or	The implementing zoning bylaw should reflect the directions in the Level II Natural Environment Technical Report particularly with respect to the zoning of the lands in the Provincially Significant Wetland and

structures shall be permitted.	associated buffers, and along the stream.
5.6.3 Development Impacts	
Where development is proposed in the Greenland system or on adjacent lands, the County or local municipality shall require the developer to: a) identify the nature of the natural heritage resource(s) potentially impacted by the development b) prepare, where required, an environmental impact assessment to address potential impacts; c) consider enhancement of the natural area where appropriate and reasonable; d) demonstrate that there will be no negative impacts on the natural heritage resources or feature or on its ecological function. No development shall be approved unless the County is satisfied that the Greenland policies are met.	See discussion under 5.4 above.
5.6.4 Adjacent Lands	
.... adjacent lands are considered to be: a) lands within 120 meters of provincially significant wetlands; b) lands within 30 meters of all other Core Greenlands and Greenland areas.	See discussion under 5.4 above.
5.6.6 Mineral Aggregate Areas	
Areas of high potential for mineral aggregate are shown as an overlay over the Greenland System. Mineral Aggregate operations are not allowed in provincially significant wetlands or in significant habitat of threatened or endangered species but may be considered in other areas subject to the policies of this Plan.....	See discussion under 5.4 above.
5.6.7 Greenlands Mapping	
The mapping identifying Core Greenlands and Greenlands on the various schedules to the Plan may need to be refined by more detailed mapping on individual sites. Where more detailed mapping is available, minor adjustments may be made without an amendment to this Plan and the land use policies of the adjacent designation will apply as determined by Council.	See discussion under 5.4 above.

5.6.8 Conservation Authority Regulations	
…. Where development or site alteration is proposed within a regulated area…. the Conservation Authority should be consulted before development….	The GRCA has reviewed the application and provided input.
6.1 Defined	
The Rural System is primarily natural resource land and some other uses typically found in non-urban areas. The Rural System includes: • prime agricultural areas • secondary agricultural areas • mineral aggregate areas • seasonal and recreational use areas • rural housing • rural industrial areas • highway commercial areas • waste management sites • special use areas	As noted, the subject lands have been identified with a Mineral Aggregate Area overlay designation. The majority of the lands are designated "Prime Agricultural" with key water resources (e.g. Provincially Significant Wetlands, intermittent stream) designated "Core Greenlands".
6.2 Purpose	
The Rural System, for the most part, is a relatively stable part of the County landscape devoted to economic activities based on natural resources. The Rural system policies are intended to maintain the essential character of these areas and to ensure that the economic activities and employment opportunities which depend on Wellington's natural resources are maintained and enhanced. The Rural System is a large and diverse area. Opportunities exist for a variety of resource, employment and community uses which need to be accommodated.	This introductory statement establishes the context for the Rural system policies – to establish a balance between maintaining "the essential character" of the area and ensuring "that economic activities and employment opportunities which depend on Wellington's natural resources are maintained and enhanced."
6.3 Planning Approach	
Prime agricultural areas will be protected for farming uses. Secondary agricultural areas of non-prime farmland will be identified. While farming will be the main land use activity in these areas, a broader range of residential, employment and community uses will be allowed then in prime agricultural areas so long as the use does not adversely impact	As noted above under Section 4.3.3, while designated as "Prime Agricultural", the subject lands do not meet the criteria to be recognized as such. However, regardless, Section 6.3 recognizes that significant mineral aggregate deposits will be identified in prime agricultural areas and that provision should be made for appropriate extraction activities. In this case, the site is recognized in the Official Plan with a Mineral

existing agricultural operations and is in keeping with the rural character of the area. While existing Country Residential and Lifestyle Community areas in the rural system are recognized, they will not be allowed to expand and new locations will not be permitted. Significant mineral aggregate deposits will be identified and policies established to protect the resource and provide for appropriate extraction activities. Areas of existing seasonal and recreational use will be identified. Many of these uses were established to take advantage of the rural setting or the proximity to natural heritage features. Rural housing primarily supports natural resource activities such as farming. Non-farm related housing may be considered in areas which do not conflict with resource related or other rural uses. Rural industrial and highway commercial lands are intended to provide locations for business activities that may be better served by sites outside urban areas. New locations for Country Residential and Lifestyle Communities are not allowed in the Rural system unless specifically provided for by an existing policy in this Plan. Existing Country Residential and Lifestyle Communities in the Rural System may be recognized but will not be expanded unless provided for by an existing policy in this plan. Waste management Facilities may be allowed in the Rural System subject to the Environmental Assessment Act or the Environmental Protection Act and the Environmental Services policies of this plan. A variety of special purpose areas will be identified to recognize the diverse character	Aggregate Area overlay designation. The policies for that overlay designation are the main policies which should be considered in evaluating the proposed quarry.

and history of the rural system. Some of these areas reflect environmental concerns or existing development patterns.	
6.4 Prime Agricultural Areas	
6.4.1 Defined	
Class 1, 2 and 3 agricultural soils, associated Class 4 to 7 soils and additional areas where there is a local concentration of farms which exhibit the characteristics of ongoing agriculture, and specialty crop land will be designated as prime agricultural areas. These areas will be protected for agriculture.	See discussion under Section 4.3.3. and 6.3 above.
6.4.2 Agriculture First	
In Prime Agricultural Areas, agricultural uses and normal farm practices will be promoted and protected. As a general rule, land use activities which support agriculture will be encouraged and land use activities which do not support agriculture will be discouraged.	See discussion under Section 4.3.3. and 6.3 above.
6.4.3 Permitted Uses	
Permitted uses and activities in Prime Agricultural Areas may include: a) agricultural uses b) secondary uses including home businesses and farm businesses c) agriculture-related uses d) existing uses e) single detached homes f) accessory residential uses g) forestry uses h) wayside pits and quarries, portable asphalt plants and portable concrete plants used on public authority contracts i) licensed aggregate operations j) community service facilities k) group homes on existing lots of records l) kennels on existing lots of record All uses permitted by this section must be compatible with and not hinder surrounding agricultural uses.	See discussion under Section 4.3.3. and 6.3 above.
6.4.9 Mineral Aggregate Areas	
Areas of high potential for mineral aggregate are shown as an overlay over the Prime	The subject lands are subject to the Mineral Aggregate Area overlay designation and as

Agricultural Areas. Mineral aggregate operations may be allowed in these areas subject to the more detailed policies of this Plan.	such are subject to the policies of Section 6.6.
6.6 Mineral Aggregate Areas	
6.6.1 Mineral Aggregate Areas	
Mineral Aggregate Areas are areas of high potential for mineral aggregate extraction and are shown as an overlay on Schedule "A". These lands have been identified using information provided by the Ministry of Natural Resources. The overlay for mineral aggregate areas only indicates that aggregate deposits are likely to be available. It does not presume that all conditions are appropriate to allow extraction or processing of the resource to proceed. The intention is to make as much aggregate resources available as close to markets as is realistically possible. There are no known mineral deposits or petroleum deposits of significance that warrant inclusion in this Plan. Should any deposits be identified, the County will develop policies to govern their protection and development.	The subject lands are subject to the Mineral Aggregate Area overlay designation and as such are subject to the policies of Section 6.6. The application for the proposed quarry has been subject to detailed review and analysis to ensure that all conditions are appropriate to allow for extraction or processing of the resource.
6.6.2 Protection	
In areas adjacent to or in Mineral Aggregate Areas, development which would preclude or hinder new aggregate operations or access to the resource will only be allowed if: a) resource extraction use would not be feasible; b) the proposed development serves a greater long term public interest; in this case, reasonable efforts should be made to use the resource wherever practical; c) issues of public health, public safety and environmental impact are addressed.	The proposed quarry is designed to allow for access to the resource and is in conformity with this policy.
6.6.3 Existing Aggregate Operations	
Existing licensed mineral aggregate operations are permitted and shall be recognized in Municipal zoning by-laws. Licensed aggregate operations are shown in Appendix 2 of this Plan. Expansion of an	The proposed quarry is not an existing operation and requires a rezoning.

existing operation shall be subject to all policies of this Plan which would apply to new aggregate operations. These operations will be protected from new uses which would preclude or hinder their expansion or continued use, or which would be incompatible due to public health, public safety or environmental concerns.	
6.6.4 Permitted Uses	
In addition to the uses allowed by the underlying designation, the following uses may be allowed in Mineral Aggregate Areas through rezoning: a) aggregate extraction; b) associated uses such as stripping, berm construction, screen planting, landscaping, drilling, blasting, haulage, crushing, screening, washing, stockpiling, storage, loading, weighing, equipment parking, repair and maintenance, office facilities, importing and blending materials, environmental and safety control features and rehabilitation uses; c) ancillary uses such as asphalt plants, concrete plants, aggregate transfer stations, stockpiling and blending of aggregates with materials such as salt, sand-salt mixture and recycled road material.	The re-zoning application is for aggregate extraction and associated uses. The ARA application is for a Class A – Category 2 licence with extraction permitted both above and below the established water table. As specifically indicated in the Planning Report submitted by Stovel and Associated Inc., "the proposed zoning application does not seek approval for the following land uses: Ready-mix concrete plant, asphalt plant, aggregate transfer station or a waste recycling depot".
6.6.5 New Aggregate Operations	
New aggregate operations may be established within the Mineral Aggregate Area subject to the appropriate rezoning and licensing. New operations proposed outside of this area shall require an amendment to this Plan. In considering proposals to establish new aggregate operations, the following matters will be considered: a) the impact on adjacent land uses and residents and public health and safety; b) the impact on the physical (including natural) environment; c) the capabilities for agriculture and other land uses;	The proposed quarry is to be solely contained in lands in the Mineral Aggregate Area overlay designation. Therefore, while a rezoning is needed, an Official Plan Amendment is not required. It should be noted that the Official Plan as amended by Official Plan Amendment (OPA) 81 would now require an OPA despite the fact that the overlay designation still applies. However, the rezoning application was submitted before OPA 81 was adopted or approved, and in fact before changes were proposed to this aspect of the Mineral Aggregate policies. As such the Township has received a legal opinion that under The Clergy Principle which "states that every applicant is entitled

d) the impact on the transportation system; e) existing and potential municipal water supply resources are protected in accordance with Section 4.9.5 of this Plan; f) the possible effect on the water table or surface drainage patterns; g) the manner in which the operation will be carried out; h) the nature of rehabilitation work that is proposed; and i) the effect on cultural heritage resources and other matters deemed relevant by Council. It is essential that extraction be carried out with as little social and environmental cost as practical. Provincial standard guidelines and regulations will be used to assist in minimizing impacts.	to have their application evaluated on the basis of the laws and policies as they existed on the date that the application was made", the policies of OPA 81 are not applicable and only a rezoning is necessary, in addition to the approval of the ARA licence. With respect to the evaluation criteria, the application has been subject to detailed technical review which has considered all of the criteria in detail as discussed above particularly under Sections 4.1.5, 4.3.3 and 6.3 above and in Sections 4 and 5 of the main report. In particular, a focus of the studies and review has been to ensure that impacts will be minimal and that development is carried out with as little social and environmental cost as practical. Based on extensive review, the Township's reviewers are satisfied, subject to conditions of development, that this objective can be achieved.
6.6.6 Public Information	
When planning approvals are being considered for new or expanded mineral aggregate operations, the following information shall be made available to the public. a) Detailed site plans which provide a description of the proposed aggregate operation including location, size, contours, topography, existing and proposed buildings and structures, setbacks, screening, buffers, entrances, exits, haul routes, drainage facilities, water table, any water diversions or storage, existing and anticipated final grades, excavation depth, stockpiles, and the sequence of operations and rehabilitation; b) The estimated quality and quantity of the resource; c) A description of the surrounding lands including land uses, locations and use of buildings and structures, fences, significant natural features and wells and other lands owned by	The Township has made extensive efforts to ensure that all information on the proposed development and the review process is available to the public. In addition, to a number of public meetings and delegations to Council, all available information has been posted on the Township website.

the applicant; d) Any related reports prepared by the proponents; and e) Any other information deemed relevant by Council.	
6.6.7 Ancillary Uses	
Ancillary uses may only be established if the following matters are addressed: a) The protection of adjoining lands from the negative effects of a reduced water supply, noise, dust, odour, lighting and unsightly storage; b) The protection of the environment from negative effects of dust, chemical spills, run-off, or contaminated surface or ground water; and c) Ensuring that access can be obtained directly to a road capable of carrying the anticipated truck traffic.	The applicant does not propose any ancillary uses.
6.6.8 Rehabilitation	
All proposals for new aggregate extraction shall include a plan for eventual rehabilitation. The plan shall: a) Provide for progressive rehabilitation whenever feasible; b) Be prepared in detail by a recognized expert; c) Be compatible with the long term uses permitted by the surrounding official plan designations; d) On lands designated Prime Agricultural Areas, provide a detailed agricultural rehabilitation plan which restores substantially the same areas and average soil quality for agriculture as before extraction occurred; and e) On lands designated Secondary Agricultural Areas, provide an agricultural rehabilitation plan which, whenever feasible, restores substantially the same areas and average soil quality for agriculture as before extraction occurred.	The ARA site plan includes Quarry Phasing Plan, and Progressive Rehabilitation and Final Rehabilitation Plan, which address criteria a), b), and c). With respect to criteria d) and e), while the subject lands are designated "Prime Agricultural" in the Official Plan prior to its amendment by OPA 81, they do not actually meet the criteria to be considered as such. Rather they are more appropriately considered as greenlands as designated in the Official Plan as amended by OPA 81. As such an ecological end use is proposed and is appropriate.
6.6.9 Mining Below Water Table	
Extraction below the water table may only	The subject lands have a substantial

be allowed and complete rehabilitation is not required under 6.6.8 if it is demonstrated that: a) There is substantial quantity of mineral aggregates below the water table warranting extraction or the depth of planned extraction in a quarry makes rehabilitation unfeasible; b) On lands designated Prime Agricultural Areas, other alternatives have been considered by the applicant and found unsuitable, and rehabilitation in remaining areas will be maximized; c) Impacts on the environment, including quality and quantity of surface and groundwater resources, will be minimal; and d) The intended after use will be compatible with the long term uses of adjacent areas.	quantity of mineral aggregate below the water table and such extraction is proposed in that area after extraction of unconsolidated material above the water table. As noted while the subject lands are designated "Prime Agricultural" in the Official Plan prior to its amendment by OPA 81, they do not actually meet the criteria to be considered as such. Therefore, criteria b) is not applicable. With respect to the evaluation criteria c), the application has been subject to detailed technical review which has considered all of the criteria in detail as discussed above particularly under Sections 4.3.3 and 6.3 above and in Sections 4 and 5 of the main report. In particular, a focus of the studies and review has been to ensure that impacts on the environment will be minimal. Based on extensive review, the Township's reviewers are satisfied, subject to conditions of development, that this objective can be achieved. With respect to criteria d), the ecological end use as proposed and is compatible with the surrounding rural development including agricultural uses.

Appendix B

Initial Proposed Development Conditions

Appendix B Initial Proposed Development Conditions

Hydrogeology

- A private well survey completed by JDCL in accordance with Terms of Reference approved by the Township to be conducted well in advance of any quarrying activities which will include both upgradient and downgradient wells within 500 meters (or somewhat outside that area where appropriate) of the proposed quarry including in the Town of Milton. Data collected during the survey will include at a minimum well stickup, casing diameter, depth of well, depth to water, depth to pump intake and surface drainage around the wellhead. The survey will include collection of a sufficient number of water quality samples to allow for pre quarry water quality to be established for each well. For wells with elevated nitrate or detections of E.coli or total coliform, the probable source will be identified. The well will either be upgraded by JDCL so that it is no longer impacted by the source, or if upgrades are not possible, the pre-existing concentrations will be considered in the evaluation of possible quarry impacts;
- The results of the private well survey will be used to establish an off-site monitoring program in accordance with Terms of Reference approved by the Township for both upgradient and downgradient domestic wells within 500 meters, or somewhat outside that area where appropriate, of the proposed quarry, including in the Town of Milton. Wells included in the monitoring program will be upgraded by JDCL to comply with Regulation 903. The monitoring program will also include the Brydson Spring/Creek in particular the relationship of the flow in Tributary B and the flow in Brydson Spring. A copy of the annual reporting shall be provided to the Township;
- Pre-quarrying water level and water quality monitoring will continue in the wetland, on-site wells and on-site and off-site surface water features at the locations listed on Drawing 2 of the ARA Site Plan. This monitoring along with the private well survey will provide sufficient data to allow for confirmation that the monitoring program referenced on Drawing 2 is sufficiently rigorous to maintain current conditions in the wetland, on-site wells on-site ponds and domestic wells and will allow for trigger levels and contingency plans to be created;
- Refinement of the well contingency plan which has been established in accordance with direction provided by the Township based on results of the private well survey and results of revised groundwater modeling;
- Installation of onsite open hole wells M16 south of the Phase 2 extraction limit, M17 between the sinking cut and the nearest domestic wells, and M18 and M19 along the southern property boundary;
- Completion of the following at onsite wells M16/17 and M18/19:
    - Detailed core logging which includes fracture identification;
    - A pumping test on the open hole wells to assess connectivity with other wells on site;
    - A downhole video and flow profile to identify productive fracture systems;
    - Completion of a multi-level well at M16 with M17 to remain an open hole;
    - The construction of M18/M19 were not specified by Burnside, however Halton Region requested that they be constructed as multi-level wells;
    - Water quality sampling from each well to allow assessment of water quality variations with depth; and,
    - Hydraulic conductivity testing;
- Deepening of existing onsite Well M3 to 227 masl to provide more reliable water

Appendix B Initial Proposed Development Conditions
level data; • Data from all automatic water level recording devices should be provided to the Township on a bi-weekly basis until the data indicates that water levels are remaining consistently above the trigger level; and, • Modifications to the current ARA site plan including: o Drawing 4-the trigger levels and contingency measures table needs to be revised to coincide with the monitoring table on drawing 2. Table 2 indicates that wells 1D, 2,13D, 14D, 15, and 16 are all to be equipped for automatic daily readings and that monthly manual water levels will be collected, yet the table on Drawing 4 indicates that if a trigger level is breached then water level monitoring will be increased to weekly. The table should be revised to indicate that manual water levels collection will be increased from monthly to weekly and data from automatic water level recorders (AWLR's) will be downloaded and reviewed on a weekly basis. The water level data from the AWLR's can then be plotted and the water level trends analysed so that the time it will take for water level recovery to above trigger levels can be predicted. Similarly, there is no note to indicate what actions will occur if a warning level is breached. The Harden letter of December 09, 2014 indicates that if a warning level is breached then bi-weekly water level measurements will be initiated. A statement similar to the one for trigger levels should be added to the table to identify the actions to be undertaken if a warning level is breached. o Drawing 4-Note 3 on the trigger table indicates "If quarry activities are found to be responsible, the above actions will be considered and a response presented to the GRCA and the Township of Guelph Eramosa". The wording should be changed to "...one of the above actions will be undertaken...". o Drawing 2- under Technical Recommendations references water well contingency protocol on page 62 of the Harden report dated December 9, 2014. This is a letter report and the details of the monitoring are actually presented in Appendix B "Monitoring Program and Contingency Measures".
Natural Environment
• Exclusion fencing should be installed prior to April to prevent turtle species from using stockpiled areas as nesting habitat; • Worker education programs to identify and relocate turtles from hazardous areas of the site should be included in Health and Safety training; • Stockpiling of materials should be excluded from natural heritage features, especially adjacent to wetlands; • Wetlands should be fenced, and edge buffer to the feature should be included in the fenced area, to be determined by MNRF; • Rehabilitation plans should include habitat creation and enhancement for species suspected to be using the site, including basking areas for turtles in wetlands, foraging habitat for grassland birds and nesting structures for barn swallow (as examples); • Wetland features that exclude habitat for fish to enhance herpetofaunal habitat (particularly breeding habitat) should also be included as part of the wetland creation: • A mixture of coniferous and deciduous trees should be included, with less focus on

Appendix B Initial Proposed Development Conditions
white spruce; • Wetland plantings should include a mixture of submergent, emergent, floating and woody vegetation species, to diversify habitat; and, • Open cliff habitat should include ledges for bird nesting and roosting. The following measures are generally reflected in the most recent ARA Site Plan dated June 18, 2015, however some refinements should be considered as noted in italic: • retain existing vegetation until just prior to extraction; • promptly restore completed extraction areas to an ecological after-use to specified in the Progressive Rehabilitation Plan – *plans should include reference to timing of either plant removal or restoration plantings/seed application*; and • plant a mix of coniferous/deciduous trees (with a min. spacing of 3 meters) in the area of the 6th Line to increase forest density in an attempt to provide an effective natural corridor in the north and west side of the property – *add to rehab plan drawing and also modify the plan to include reference to planting deciduous trees as currently only reference is to coniferous trees*.
Traffic
• Upgrading Sixth Line Upgrades to Sixth Line are required to remove the crest to provide sufficient sight distance to the intersection with Highway 7, plus upgrade the road base, including asphalt surface, to accommodate quarry traffic. These improvements should be included in detailed designs based on a twenty year operational period /agreements required for this project; and, • Turn Lanes on Highway 7 The TIS recommends a continuous turning lane on Highway 7, between 6th Line and 5th Line, to provide for an east bound left lane at 6th Line and a westbound left turn lane at 5th Line. A westbound right turn deceleration lane on Highway 7 at 6th Line and placement of truck entrance signs is also recommended. The responsibility, designs and permits for these improvements are required to be confirmed with Ministry of Transportation. These improvements should be included in detailed designs based on a twenty year operational period /MTO permits and agreements required for this project.
Haul Route
Completion of the Haul Route Study to the satisfaction of the Township of Guelph/Eramosa in consultation with the Town of Halton Hills, the Town of Milton and the Region of Halton, and implementation of its recommendations as a condition of development.
Noise and Blast/Vibration
• Blast monitoring, • Provision of blast record information to the Township; and, • A third party acoustical audit in the first year of operation.
Cultural Heritage
The cultural heritage landscape represented by the rural roadscape of Sixth Line north of Highway 7 will be preserved by retention of the treed road verge and landscaped berm

Appendix B Initial Proposed Development Conditions
beyond.
Archaeology
A Stage I-II Archaeological Assessment was carried out by York North Archaeological Services Inc., August 31, 2012.The report identifies an area on the west side of the site south of the former pit (AjHa-50 James D. site) as the only area where historic archaeological resources were located. It has been identified as requiring a Stage 3 assessment. JDCL has agreed to conduct a Stage 3 assessment once MNRF has signed off on their application for the Category 2 Class "A" quarry.
Visual Impact
The development should be controlled to ensure that it generally reflects the proposal as assessed as part of the Visual Impact analysis as a condition of development through the zoning by-law and ARA site plan.
Agriculture
The monitoring program and complaint protocol should specifically identify the need to address any potential for impacts on agricultural operations.

Post-it® Fax Note 7671	Date 10/2/97	# of pages ▶ 2.
To J. Parkin	From Carol Wellman	
Co./Dept. MHBC	Co. OMAFRA	
Phone #	Phone # 846-0491	
Fax # 519-576-0121	Fax #	

Ministry of Agriculture, Food and Rural Affairs

Ministère de l'Agriculture, de l'Alimentatic et des Affaires rurales

Wellington Place
RR #1
Fergus, Ontario
N1M 2W3
Tel: (519) 846-0941
1-800-265-8332
Fax: (519) 846-8178

Ontario

9153 H / 9633 / [redacted] / 88280 / 9129 A

Resources and Planning

"By Fax Only"

October 1, 1997

Mr. James Parkin,
MacNaughton Hermsen Britton Clarkson
171 Victoria Street North
Kitchener, Ontario
N2H 5C5

Dear Mr. Parkin:

Re: Site Inquiries Regarding Potential Aggregate License Applications

Further to your letter dated May 27, 1997, I wish to advise you of the following:

1. Lot 1, Concession 6, Eramosa Township, Wellington County 9153H
The subject property consists of primarily 50% Class 3 and 50% Class 5 lands, with some Class 2 lands, according to the Canada Land Inventory at a scale of 1:50,000. As stated in your letter these lands are designated Rural Industrial. These lands have been designated for a use other than agriculture and are not of provincial interest from an agricultural perspective. The policies of the local plans would apply with respect to rehabilitation.

2. Lot 1, Concession 6 W, Town of Caledon, Region of Peel 9129
3. Lot 12, Concessions 1 and 2 W.H.S., Town of Caledon, Region of Peel
If these lands are outside the "Prime Agricultural Area" designation in the Regional Plan, as stated, then they are not of provincial interest from an agricultural perspective. Again, the policies of the local plans would apply with respect to rehabilitation.

While the above represents this Ministry's interpretation of provincial policy with regard to agricultural interests, it does not reflect an overall provincial position. There may be planning

concerns or interests of other agencies that should be regarding in addition to any municipal planning considerations.

Should you have any questions or wish to discuss the matter further, please do not hesitate to contact me at the above noted telephone number.

Yours truly,

Carol Neumann
Rural Planner

cc: Joe Perrotta, Ministry of Municipal Affairs and Housing

THE CORPORATION OF THE
TOWNSHIP OF ERAMOSA

R.R. 1, ROCKWOOD, ONTARIO, CANADA N0B 2K0
TELEPHONE (519) 856-9951 FAX (519) 856-2240

August 24, 1993

J.L. Cox Planning Consultants
45 Speedvale Avenue, East
Guelph, Ontario
N1H 1J2

Attention: Mr. Chris Corosky

Dear Chris:

Re: Request for Official Plan Modification
James Dick - Lot 1, Conc. 6

Please be advised that Township Council at their regular meeting held August 16, 1993, passed the following resolution:

> "That J.L. Cox Planning Consultants be asked to include the identification of the Dick pit at Lot 1, Conc. 6 as an aggregate resource as a modification to the new Official Plan."

Should you have any questions concerning the above, please do not hesitate to contact me.

Yours truly,

V Sinnott

Virginia Sinnott, CMO,CMM2
Clerk-Administrator

VS/ks

cc Greg Sweetnam, James Dick Construction

Resolution 9.7

ERAMOSA

THE CORPORATION OF THE TOWNSHIP OF ERAMOSA

Minutes of Regular Meeting No. 22-93 of the Council of the Corporation of the Township of Eramosa held on Monday, August 16, 1993 at 7:00 p.m. in the Council Chambers, Township Municipal Building.

Members Present - Reeve J.C. Leverne Harris
Deputy-Reeve Ken Mercer
Councillor Dale Hamilton
Councillor Gordon Tosh
Councillor Rick Hughes

Staff Present - Virginia Sinnott, Clerk-Administrator
Len Smeltzer, Superintendent of Public Works
Thom Roberts, Chief Building Official
Kerri Swanston, Administrative Assistant IV - Planning and Clerks Department
Kim Clark, Administration Assistant II - Treasury

IC.1
Moved by Councillor Tosh
Seconded by Councillor Hamilton

That the Council convene In Camera, in Committee of the Whole in the Committee Room at 5:40 p.m. to discuss legal, personnel and property matters.

Carried.

IC.2
Moved by Councillor Hughes
Seconded by Councillor Tosh

That the Committee of the Whole adjourn, as Council, to Council Chambers for the regular meeting of Council.

Carried.

The regular meeting of Council was called to order at 7:00 p.m. The Reeve introduced Len Smeltzer as the new Superintendent of Public Works.

1. APPROVAL OF AGENDA

1.1 Moved by Councillor Tosh
Seconded by Deputy-Reeve Mercer

That the agenda for the regular meeting of the Council of the Corporation of the Township of Eramosa to be held August 16, 1993 be approved as printed, circulated and amended for items removed from the consent agenda and referred to Committee of the Whole 11.2 as attached, plus addendum Item 12.5, JEPP approval be discussed.

Carried.

2. DECLARATIONS

No declarations.

3. ADOPTION OF MINUTES

3.1 Moved by Councillor Hughes
Seconded by Councillor Tosh

That the minutes of the regular meeting of Council held on July 5, 1993 be adopted as printed and circulated.

Carried.

3.2 Moved by Deputy-Reeve Mercer
Seconded by Councillor Tosh

That the minutes of the public meeting held June 23, 1993 re Smeltzer be adopted as printed and circulated.

Carried.

REPORT OF COMMITTEE OF THE WHOLE RE ITEMS REMOVED FROM CONSENT AGENDA

9.3 County of Wellington dated June 28, 1993 re Meeting Concerning Police Village Dissolution

Moved by Councillor Hamilton, Seconded by Councillor Hughes and withdrawn after some discussion,

That the correspondence from the County of Wellington dated June 28, 1993 re Meeting Concerning Police Village Dissolution be received and the County asked for clarification re Paragraph 5 - reference to a Ward System as less efficient.

Moved by Councillor Hamilton
Seconded by Councillor Hughes

That the correspondence from the County of Wellington dated June 28, 1993 re Meeting Concerning Police Village Dissolution be received.
Carried.

9.4 Eden Mills Bowstring Road and Bridge Committee re Terms of Reference for Condition Survey

9.4.1 Moved by Deputy-Reeve Mercer
Seconded by Councillor Tosh

That the amended Condition Survey be referred back to the Eden Mills Bridge and Road Committee with the Reeve's notes and brought forward again at September 7th meeting.
Carried.

9.4.2 Moved by Councillor Hamilton
Seconded by Councillor Hughes

That the Eden Mills Bridge and Road Committee be authorized to conduct both an Origin/Destination and Traffic Count Survey provided that the cost of same does not exceed nil and provided safety and liability issues have been addressed.
Carried.

9.5 Administrative Assistant Report dated July 19, 1993 re School Crossing Guards

Moved by Councillor Tosh
Seconded by Deputy-Reeve Mercer

That Ms. Tammy Slavin and Mr. Laurie Lloyd be confirmed as the crossing guards for the 1993-94 school year and Mrs. Ezeard be retained as a back up or emergency crossing guard dependent on a successful interview conducted by the Clerk.

9.7 Administrative Assistant Report dated July 15, 1993 re Request for Official Plan Modification

Moved by Councillor Tosh
Seconded by Councillor Hamilton

That J.L. Cox Planning Consultants be asked to include the identification of the Dick pit at Lot 1, Conc. 6 as an aggregate resource as a modification to the new Official Plan.
Carried.

9.10 Interim Director of Public Works Report dated June 28, 1993 re Training Courses

Moved by Deputy-Reeve Mercer
Seconded by Councillor Tosh

That the training courses outlined in the report of the Interim Director of Public Works be approved.
Carried.

REPORT TO COUNCIL

DATE: July 15, 1993

TO: Reeve Harris and Members of Council

FROM: K. Swanston, Administrative Assistant

SUBJECT: Modification to the Official Plan
James Dick Construction Ltd.
West Half Lot 1, Concession 6

The following comments have been received regarding the above request of James Dick Construction for redesignation of the property located at the West Half Lot 1, Conc. 6, in order to recognize extractive resources;

1) Ministry of Transportation - no objections

2) Grand River Conservation Authority - no objections to redesignation. Will require environmental impact study, hydrological report and associated plans which can be submitted through the Ministry of Natural Resources pit licensing process.

3) Ministry of Natural Resources - consistent with the intent of the Mineral Aggregate Resource Policy Statement

4) Triton Engineering Services Limited - indicating that site was used in 1992 as a gravel source and gravel is of good quality. Also outlines concerns which should be addressed should a license be allowed.

5) J.L. Cox Planning Consultants Inc. - no concerns with modifying the Official Plan in order to identify the subject property as an extractive resource.

I would recommend that J.L. Cox Planning Consultants Inc., be asked to include the identification of the Dick pit at Lot 1, Conc. 6 as an aggregate resource along with the other modifications to the Official Plan.

Respectfully submitted,

K. Swanston

K. Swanston
Administrative Assistant

J. L. COX PLANNING CONSULTANTS INC.

URBAN, REGIONAL & RURAL PLANNING

45 Speedvale Avenue E.
Guelph, Ontario N1H 1J2
Telephone: (519) 836-5622
Fax: (519) 822-7170

July 20, 1993

FAX

Township of Eramosa
R.R. #1 Rockwood, Ontario
NOB 2KO

ATT: Kerri Swanston

Dear Kerri:

Re: Modification to Proposed O.P.
James Dick Pit: Lot 1 Con. 6

Further to our July 7, 1993 meeting, and subsequent discussions regarding the above captioned request for a modification to the proposed O.P. we advise as follows.

A review of correspondence submitted by Ministry of Transportation, Ministry of Natural Resources, and the Grand River Conservation Area, indicates no concerns with such a modification to the new O.P. Based on these comments we advise that we have no concern with a modification of the proposed O.P. to identify the above noted site as "Extractive Resources". This will be one of a number of modifications to the proposed O.P., all which must ultimately be supported by the Minister of Municipal Affairs as part of the O.P. approval process.

MNR has advised that this modification is justified, and believe that it would be consistent with the intent of the O.P. to identify areas having high mineral aggregate extraction potential. From a practical standpoint the designation of the property will not change the on the ground development pattern until the property is rezoned and licensed for aggregate extraction. This area is currently designated "Rural Industrail 'A'" by the existing (1985) official plan.

In separate correspondence to our office James Dick Construction Limited has correctly pointed out that this site is identified on Schedule "C" of the existing official plan an "existing gravel pit operation". A review of our copy of the zoning by-law indicates that this site has no special zoning to permit extractive uses, however you should check this against consolidated by-law records in your office. →

The new O.P. requires the submission of a comprehensive technical report to support any future zone change application. In addition, the licensing process for aggregate operations requires detailed technical information to be submitted and approved prior to extraction occurring. Accordingly the Township will be centrally involved in the approvals process should James Dick construction Limited decide in the future to actively pursue an aggregate extraction operation on this site.

ERAMOSA.

Grand River Conservation Authority

Administration Office:
400 Clyde Road
Box 729 Cambridge Ontario
N1R 5W6
Telephone 621-2761
Area Code 519
Fax (519) 621-4844

June 22, 1993.

OR: WELL(S)/ERAMOSA/ZC/C

Kerri Swanston
Planning Advisory Secretary
Township of Eramosa
R.R. #1,
Rockwood, Ontario.
N0B 2K0

Re: Proposed Official Plan Amendment
Part Lot 1, Concession 6, Township of Eramosa (Dick)

Dear Ms. Swanston:

We have now had the opportunity to review the above noted proposal. Information currently available at this office indicates that the subject lands contain a tributary of Blue Springs Creek. Consequently this area is regulated by the Grand River Conservation Authority under Ontario Regulation 149/90 as amended by 69/93 (Fill, Construction and Alteration to Waterways). In addition, this area has been included in the Preliminary Blue Springs Creek Scheduled Area mapping (see attached sketch). We note that this mapping is currently under review in conjunction with the Eramosa River/Blue Springs Corridor Initiative.

The Grand River Conservation Authority's Fill, Construction and Alteration to Waterways Regulation (Ontario Regulation 149/90 as amended by 69/93) prohibits the: 1) construction of structures in a pond or swamp or in any area susceptible to flooding during a "Regional Storm"; 2) dumping or placing of fill in the Authority's scheduled areas; and, 3) alterations to any watercourse prior to receiving written consent of the Grand River Conservation Authority.

The applicant has outlined his reasons and provided data to support the proposed redesignation of these lands to Extractive.

The Grand River Conservation Authority is concerned that the above noted tributary may be affected by any extraction on these lands. The tributary appears to be connecting an upstream wetland to the Blue Springs Creek Corridor.

It is our recommendation that a detailed Environmental Impact Study, Hydrological Report and associated plans be required to the satisfaction of the Grand River Conservation Authority. These reports may be circulated through the Ministry of Natural Resources licensing process for this site.

At this time, we have no objection to the proposed Official Plan Amendment.

However, please be advised that the Grand River Conservation Authority suggests that the applicant pursue the following:

1. the watercourses be monitored to provide a greater factual data base for future reports.

..../2

recycled paper

2. consult with the Ministry of Natural Resources, Cambridge District regarding their evaluation requirements for the watercourses to determine whether there may be fish habitat.

3. consult with the Ministry of Natural Resources, Cambridge District regarding their criteria to confirm whether or not any of the wetlands on this site may be part of the Blue Springs Creek Complex.

4. the area to be licensed exclude the watercourse and any on stream wetlands as well as a 30m buffer (if required).

5. the area to be licensed exclude extraction below the water table where it will have an impact on the wetlands which are on or adjacent to the subject lands and/or the baseflow of the watercourse.

6. prior to any studies being prepared to support a gravel pit license, the G.R.C.A. be contacted to review "terms of reference" for the studies.

We note that the subject lands are within the study limit of the Eramosa River/Blue Springs Linear Corridor Initiative. The municipality and all review agencies will implement the final recommendations of this study upon its completion. These recommendations may impact on the future development of the subject lands.

Please be advised that any future construction or other alteration in or adjacent to the above noted areas will require the prior written approval of the Grand River Conservation Authority.

We trust this information is of assistance.

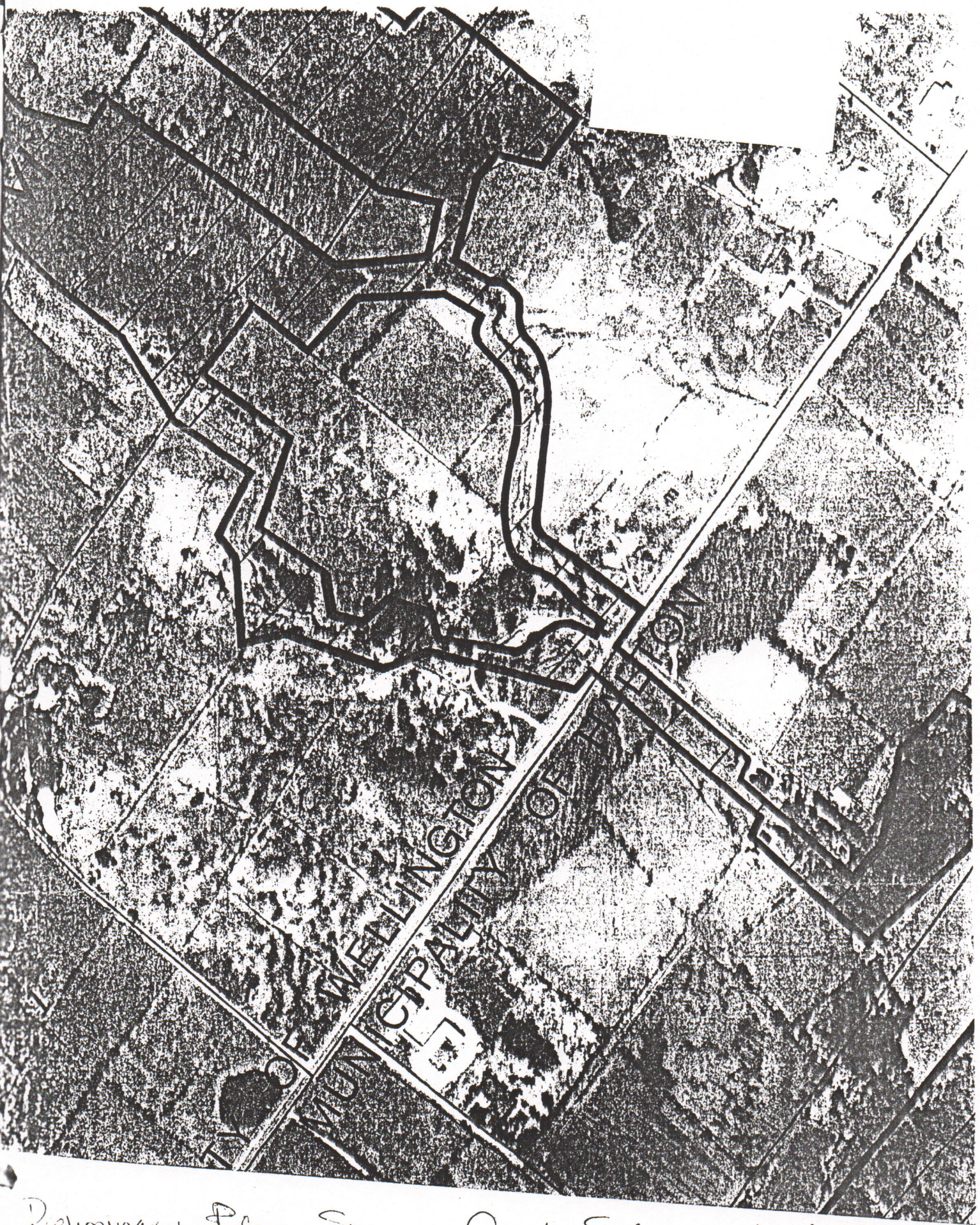
If you should have any further questions, please do not hesitate to contact me.

Yours very truly,

Nancy Davy
Development Planner
Policy and Planning Division

ND/kr

c.c. Ministry of Natural Resources, Cambridge - Att. Mitch Wilson
Greg Sweetnam, James Dick Construction.



Preliminary Blue Springs Creek Scheduled Area

Ministry of Natural Resources
Ministère des Richesses naturelles

CONSERVATION OFFICER 100 YEARS 1892 - 1992 AGENT DE PROTECTION DE LA NATURE

Box 21048
605 Beaverdale Road
Cambridge, Ontario
N3C 2W1

8550.7.3.5

February 15th, 1992 3

Township of Eramosa
R.R. #1
Rockwood, Ontario
N0B 2K0

Attention: Kerri Meindertsma

SUBJECT: Draft Official Plan
James Dick Construction Limited
West Half Lot 1, Concession 6
Eramosa Township

Dear Ms. Meindertsma:

Please note that staff have reviewed the information submitted under your covering letter of July 10, 1992, and wish to provide you with the following comments.

James Dick Construction Limited is requesting a redesignation of the above noted property in the Draft Official Plan to 'Extractive Resources' from 'Agriculture'. Based on the reports submitted to this office, there appears to be enough support for the inclusion of the subject property as part of the Extractive Resources Area on Schedule 'A' of the Draft Official Plan. Designation would be consistent with the intent of the Township of Eramosa to designate resource areas with high potential for extraction as well as meeting the intent of the Mineral Aggregate Resource Policy Statement.

Please be advised that a small portion of the site is designated 'Natural Environment' on Schedule 'A' of the Draft Official Plan. Although we have no concern modifying or removing the 'Natural Environment' designation at this location, you may wish to consult with the Grand River Conservation Authority to discuss their interests.

...2

Questions concerning these comments should be directed to Mitch Wilson at this office.

Yours truly,

A.D. Carr
Area Supervisor - Wellington
Cambridge District
Telephone (519) 658-9355

AMW/

cc: Grand River Conservation Authority, Att. Nancy Davy 621 2761
The County of Wellington, Att. Mark Van Patter 208

James Dick Construction Limited
P.O. Box 470,
Bolton, Ontario
L7E 5T4
Att. Greg Sweetnam

2KO

...g cover sheet) 16

Ontario

Aggregate Resources Inventory of

Wellington County

Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph

Ontario Geological Survey
Aggregate Resources Inventory
Paper 162

1999

Ontario

Aggregate Resources Inventory of

Wellington County

Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph

Ontario Geological Survey
Aggregate Resources Inventory
Paper 162

By Planning & Engineering Initiatives Ltd. and Staff of the Sedimentary Geoscience Section, Ontario Geological Survey

1999

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ISSN 0708-2061
ISBN 0-7778-8162-4

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Canadian Cataloguing in Publication Data

Main entry under title:

Aggregate resources inventory of Wellington County: townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph

(Ontario Geological Survey aggregate resources inventory paper, ISSN 0708-2061; 162)
Includes bibliographical references.
ISBN 0-7778-8162-4

1. Aggregates (Building materials) — Ontario — Wellington (County).
I. Ontario Geological Survey. II Ontario. Ministry of Northern Development and Mines. III. Planning and Engineering Initiatives Limited IV. Series.

TN939.A43 1999 553.6'2'0971342 C98-964039-6

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Parts of this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

Planning & Engineering Initiatives Ltd. and Staff of the Sedimentary Geoscience Section, Ontario Geological Survey 1999. Aggregate resources inventory of Wellington County: Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph; Ontario Geological Survey, Aggregate Resources Inventory Paper 162, 73p.

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GEOLOGICAL MAPS (back pocket)

Abstract

This report includes an inventory and evaluation of sand, gravel and bedrock resources for Wellington County. Within Wellington County, a total of 40 primary selected sand and gravel resource areas have been identified. These selected sand and gravel resource areas occupy 13 030 hectares (ha), exclusive of licenced areas. Once cultural, environmental and other constraints have been taken into account, an estimated 10 373 ha are possibly available for extraction. The total possible aggregate resources available for Wellington County is 1094.5 million tonnes.

The sand and gravel resources within the northern part of Wellington County are found within a number of small outwash, esker and ice-contact stratified drift deposits located throughout the area. Larger outwash and ice-contact stratified drift deposits are found in the most northerly part of the county, especially Minto Township. Much of the remaining part of northern Wellington County is covered by the Elma and Mornington till. In this till dominated area, the main sand and gravel resources are found within eskers that are limited in size and geographic extent. Although a large area of primary significance is located within the outwash and ice-contact deposits in Minto Township, north of the town of Harriston, much of this area is covered by wetlands.

In south Wellington County, Puslinch and Erin townships are the most important in terms of aggregate production. In particular, the outwash deposits along Highways 6 and 401 have accounted for as much as 40% of the county's total sand and gravel production. In Erin Township, the most important natural aggregate deposit is an outwash deposit located south and east of the Village of Erin.

With respect to bedrock resources suitable for crushed stone, northern Wellington County has limited resources. Only one area of bedrock having a thin cover of glacial drift was identified near the village of Monck in West Luther Township. No quarrying activity is currently undertaken in north Wellington County.

In south Wellington County, 9 selected bedrock resource areas have been identified for protection. However, at present, the only municipalities within which quarrying is actively taking place are the City of Guelph and Puslinch Township.

Selected resource areas are not intended to be permanent, single land use units which must be incorporated in an official planning document. They represent areas in which a major resource is known to exist. Such resource areas may be reserved wholly or partially for extractive development and/or resource protection within the context of the official plan.

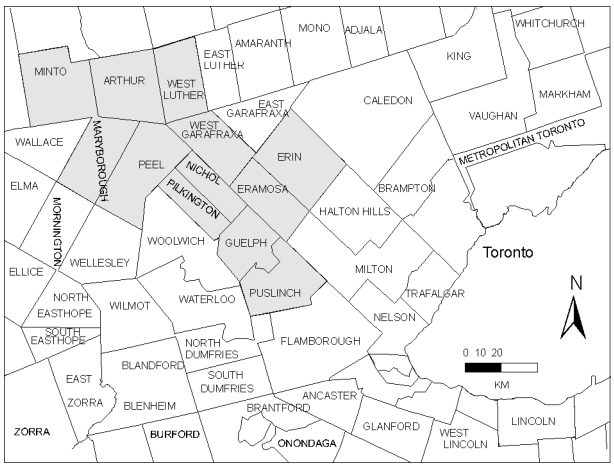


Figure 1. Key Map Showing the Location of Wellington County.

Aggregate Resources Inventory of Wellington County Townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichol, Guelph, Eramosa, Erin, Puslinch and the City of Guelph

By Planning & Engineering Initiatives Ltd. and Staff of the Sedimentary Geoscience Section, Ontario Geological Survey

Project Supervisors: C. L. Baker; fieldwork and report by D. A. Stewart, Z. L. Katona, P. F. Puopolo, and A.G. McLellan; compilation and drafting by staff of Planning & Engineering Initiatives Ltd. and staff of the Sedimentary Geoscience Section, Ontario Geological Survey. Assistance with review provided by the Cambridge District Office, Ministry of Natural Resources.

Manuscript accepted for publication by, and published with the permission of, C. L. Baker, Senior Manager, Sedimentary Geoscience Section, Ontario Geological Survey, 1999.

Introduction

Mineral aggregates, which include bedrock-derived crushed rock as well as naturally formed sand and gravel, constitute the major raw material in Ontario's road-building and construction industries. Very large amounts of these materials are used each year throughout the Province. For example, in 1993, the total tonnage of mineral aggregates extracted in Ontario was 131 million tonnes, greater than that of any other metallic or nonmetallic commodity mined in the Province (Ontario Ministry of Natural Resources 1995).

Although mineral aggregate deposits are plentiful in Ontario, they are fixed-location, non-renewable resources, which can be exploited only in those areas where they occur. Mineral aggregates are characterized by their high bulk and low unit value so that the economic value of a deposit is a function of its proximity to a market area as well as its quality and size. The potential for extractive development is usually greatest in areas where land use competition is extreme. For these reasons the availability of adequate resources for future development is now being threatened in many areas, especially in urban areas where demand is the greatest.

Comprehensive planning and resource management strategies are required to make the best use of available resources, especially in those areas experiencing rapid development. Unfortunately, in some cases, the best aggregate resources are found in or near areas of environmental sensitivity, resulting in the requirement to balance the need for the different natural resources. Therefore, planning strategies must be based on a sound knowledge of the total mineral aggregate resource base at both local and regional levels. The purpose of the Aggregate Resources Inventory is to provide the basic geological information required to include potential mineral aggregate resource areas in planning strategies. The reports should form the basis for discussion on those areas best suited for possible extraction. The aim is to assist decision-makers in protecting the public well being by ensuring that adequate resources of mineral aggregate remain available for future use.

This report is a technical background document, based for the most part on geological information and interpretation. It has been designed as a component of the total planning process and should be used in conjunction with other planning considerations, to ensure the best use of an area's resources.

The report includes an assessment of sand and gravel resources as well as a discussion on the potential for bedrock-derived aggregate. The most recent information available has been used to prepare the report. As new information becomes available, revisions may be necessary.

Part I – Inventory Methods

FIELD AND OFFICE METHODS

This report provides a consolidation and update of the previously released Aggregate Resource Inventory Reports for the townships of Minto, Arthur, West Luther, Maryborough, Peel, West Garafraxa, Pilkington, Nichols, Guelph, Eramosa, Erin, Puslinch and the City of Guelph (Ontario Geological Survey 1980a, 1980b, 1980c, 1981a-g, 1982, 1985). The contents of existing reports were reviewed in detail. All of the resource areas of primary significance and some of the resource areas of secondary significance that had been originally outlined were field checked. As necessary, field samples were collected and tested for gradation and were also petrographically analysed. Data was also collected from the Ontario Ministry of Transportation (MTO) files and from testing companies involved in licencing procedures under the *Aggregate Resources Act*, 1989. The collected information was compiled, analysed and incorporated with the data found within the existing Aggregate Resource Inventory Reports.

All previously Selected Sand and Gravel Resource Areas of primary and secondary significance were examined considering the following: 1) licencing that has occurred since the original inventory was conducted; 2) discussions with the appropriate staff of the Ministry of Natural Resources; 3) review of available public and private research reports; 4) reports prepared for licences under the *Aggregate Resources Act*, 1989, and other documents; and 5) personal knowledge of the staff involved in completion of the project.

Field methods included the examination of natural and man-made exposures of granular material. Most observations were made at quarries and sand and gravel pits located from records held by the Ontario Ministry of Transportation (MTO), the Ontario Geological Survey (OGS) and by Regional, District and Area Offices of the Ontario Ministry of Natural Resources (MNR). Observations made at pit sites included estimates of the total face height and the proportion of gravel- and sand-sized materials in the deposit. Observations regarding the shape and lithology of the particles were also made. These characteristics are important in estimating the quality and quantity of the aggregate. In areas of limited exposure, subsurface materials were assessed by hand augering and test pitting.

Deposits with potential for further extractive development or those where existing data are scarce, were studied in greater detail. Representative sections in these deposits were evaluated by taking 11 to 45 kg samples from existing pit faces or from test pits. The samples were tested for grain size distribution, and in some cases the Los Angeles abrasion and impact test, absorption, Magnesium Sulphate soundness test and petrographic analyses were carried out. Analyses were performed in the laboratories of the Ontario Ministry of Transportation.

The field data were supplemented by pit information on file with the Geotechnical Section of the Ontario Ministry of Transportation. Data contained in these files includes field estimates of the depth, composition and "workability" of deposits, as well as laboratory analyses of the physical properties and suitability of the aggregate. Information concerning the development history of the pit and acceptable uses of the aggregate is also recorded. The locations of additional sources were obtained from records held by Regional, District and Area Offices of the Ontario Ministry of Natural Resources. In addition, reports on geological testing for type, quantity and quality of aggregates were also obtained from numerous aggregate licence applications on file with the MNR, and with specific individuals and companies. The cooperation of the above-named groups in the compilation of inventory data is gratefully acknowledged.

Aerial photographs at various scales are used to determine the continuity of deposits, especially in areas where information is limited. Water well records, held by the Ontario Ministry of the Environment, were used in some areas to corroborate deposit thickness estimates or to indicate the presence of buried granular material. These records were used in conjunction with other evidence.

Topographic maps of the National Topographic System, at a scale of 1:50 000, were used as a compilation base for the field and office data. The information was then transferred to a base map, also at a scale of 1:50 000. These base maps are prepared with information taken from maps of the National Topographic System by permission of Natural Resources Canada, for presentation in the report.

RESOURCE TONNAGE CALCULATION TECHNIQUES

Sand and Gravel Resources

Once the interpretative boundaries of the aggregate units have been established, quantitative estimates of the possible resources available can be made. Generally, the volume of a deposit can be calculated if its areal extent and average thickness are known or can be estimated. The computation methods used are as follows. First, the area of the deposit, as outlined on the final base map, is calculated in hectares (ha). The thickness values used are an approximation of the deposit thickness, based on the face heights of pits developed in the deposit or on subsurface data such as test holes and water well records. Tonnage values can then be calculated by multiplying the volume of the deposit by 17 700 (the density factor). This factor is approximately the number of tonnes in a 1 m thick layer of sand and gravel, 1 ha in extent, assuming an average density of 1770 kg/m^3.

Tonnage = Area x Thickness x Density Factor

Tonnage calculated in this manner must be considered only as an estimate. Furthermore, such tonnages represent amounts that existed prior to any extraction of material (i.e., original tonnage) (Table 1, Column 4).

The Selected Sand and Gravel Resource Areas in Table 3 are calculated in the following way. Two successive subtractions are made from the total area. Column 3 accounts for the number of hectares unavailable because of the presence of permanent cultural features and their associated setback requirements. Column 4 accounts for those areas that have previously been extracted (e.g., wayside, unlicenced and abandoned pits are included in this category). The remaining figure is the area of the deposit potentially available for extraction (Column 5). The available area is then multiplied by the estimated deposit thickness and the density factor (Column 5 x Column 6 x 17 700), to give an estimate of the sand and gravel tonnage (Column 7) potentially available for extractive development and/or resource protection. It should be noted however, that recent studies (Planning Initiatives Limited 1993) have shown that anywhere from 15 to 85% of this last figure in any resource area may be further constrained or not accessible because of such things as environmental considerations (e.g., floodplains, environmentally sensitive areas), lack of landowner interest, resident opposition or other matters.

Resource estimates are calculated for deposits of primary significance. Resource estimates for deposits of secondary and tertiary significance are not calculated in Table 3, however, the aggregate potential of these deposits is discussed in the report.

Bedrock Resources

The method used to calculate resources of bedrock-derived aggregate is much the same as that described above. The areal extent of bedrock formations overlain by less than 15 m of unconsolidated overburden is determined from bedrock geology maps, drift thickness and bedrock topography maps, and from the interpretation of water well records (Table 4). The measured extent of such areas is then multiplied by the estimated quarriable thickness of the formation, based on stratigraphic analyses and on estimates of existing quarry faces in the unit. In some cases a standardized estimate of 18 m is used for thickness. Volume estimates are then multiplied by the density factor (the estimated weight in tonnes of a 1 m thick section of rock, 1 ha in extent).

Resources of limestone and dolostone are calculated using a density factor of 2649 kg/m^3, sandstone resources are calculated using a density estimate of 2344 kg/m^3, and shale resources are calculated with a factor of 2408 kg/m^3 (Telford, Geldart, Sheriff and Keys 1980).

Units and Definitions

The measurements and other primary data available for resource tonnage calculations are given in Metric units in the text and on the tables which accompany the report. Data are generally rounded off in accordance with the Ontario Metric Practices Guide (Ontario Interministerial Committee on National Standards and Specifications 1975).

The tonnage estimates made for sand and gravel deposits are termed possible resources (see Glossary, Appendix B) in accordance with terminology of the Ontario Resource Classification Scheme (Robertson 1975, p.7) and with the Association of Professional Engineers of Ontario (1976).

Part II – Data Presentation and Interpretation

Two maps, each portraying a different aspect of the aggregate resources in the report area, accompany the report. Map 1, "Sand and Gravel Resources", gives a comprehensive inventory and evaluation of the sand and gravel resources in the report area. Map 2, "Bedrock Resources", shows the distribution of bedrock formations, the thickness of overlying unconsolidated sediments and identifies the Selected Bedrock Resource Areas.

MAP 1: SAND AND GRAVEL RESOURCES

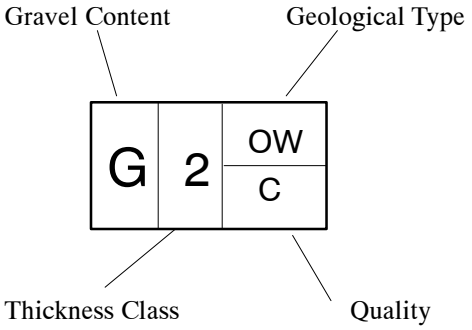
Map 1 shows the extent and quality of sand and gravel deposits within the study area and an evaluation of the aggregate resources. The map is derived from existing surficial geology maps of the area or from aerial photograph interpretation in areas where surficial mapping is incomplete.

The present level of extractive activity is also indicated on Map 1. Those areas which are licenced for extraction under the Aggregate Resources Act are shown by a solid outline and identified by a number which refers to the pit descriptions in Table 2. Each description notes the owner/operator and licenced hectarage of the pit, as well as the estimated face height and percentage gravel. A number of unlicenced pits (abandoned pits or pits operating on demand under authority of a wayside permit) are identified by a numbered dot on Map 1 and described in Table 2. Similarly, test hole locations appear on Map 1 as a point symbol and are described in Table 7.

Map 1 also presents a summary of available information related to the quality of aggregate contained in all the known aggregate deposits in the study area. Much of this information is contained in the symbols which are found on the map. The Deposit Symbol appears for each mapped deposit and summarizes important genetic and textural data. The Texture Symbol is a circular proportional diagram which displays the grain size distribution of the aggregate in areas where bulk samples were taken.

Deposit Symbol

The Deposit Symbol is similar to those used in soil mapping and land classification systems commonly in use in North America. The components of the symbol indicate the gravel content, thickness of material, origin (type) and quality limitations for every deposit shown on Map 1. These components are illustrated by the following example:



For example, the above symbol identifies an outwash deposit 3 to 6 m thick containing more than 35% gravel. Excess silt and clay may limit uses of the aggregate in the deposit.

The "gravel content" and "thickness class" are basic criteria for distinguishing different deposits. The "gravel content" symbol is an upper case "S" or "G". The "S" indicates that the deposit is generally "sandy" and that gravel-sized aggregate (greater than 4.75 mm) makes up less than 35% of the whole deposit. "G" indicates that the deposit contains more than 35% gravel.

The "thickness class" indicates a depth range which is related to the potential resource tonnage for each deposit. Four thickness class divisions have been established as shown in the legend for Map 1.

Two smaller sets of letters, divided from each other by a horizontal line, follow the thickness class number. The upper series of letters identifies the geologic deposit type (the types are summarized with respect to their main geologic and extractive characteristics in Appendix C), and the lower series of letters identifies the main quality limitations that may be present in the deposit as discussed in the next section.

Texture Symbol

The Texture Symbol provides a more detailed assessment of the grain size distribution of material sampled during field study. These symbols are derived from the information plotted on the aggregate grading curves found in the report. The relative amounts of gravel, sand, and silt and clay in the sampled material are shown graphically in the Texture Symbol by the subdivision of a circle into proportional segments. The following example shows a hypothetical sample consisting of 30% gravel, 60% sand and 10% silt and clay.

SELECTED SAND AND GRAVEL RESOURCE AREAS

All the Selected Sand and Gravel Resource Areas are first delineated by geological boundaries and then classified into 3 levels of significance: primary, secondary and tertiary. Each area of primary significance is given a deposit number and all such deposits are shown by dark shading on Map 1.

Selected Sand and Gravel Resource Areas of primary significance are not permanent, single land use units. They represent areas in which a major resource is known to exist and may be reserved wholly or partially for extractive development and/or resource protection. In many of the recently approved local and Regional/County Official Plans primary, and in some cases resources of secondary significance, are identified and protected.

Deposits of secondary significance are indicated by medium shading on Map 1. Such deposits are believed to contain significant amounts of sand and gravel. Although deposits of secondary significance are not considered to be the "best" resources in the report area, they may contain large quantities of sand and gravel and should be considered as part of the aggregate supply of the area.

Areas of tertiary significance are indicated by light shading. They are not considered to be important resource areas because of their low available resources, or because of possible difficulties in extraction. Such areas may be useful for local needs or extraction under a wayside permit but are unlikely to support large-scale development.

The process by which deposits are evaluated and selected involves the consideration of 2 sets of criteria. The main selection criteria are site specific, related to the characteristics of individual deposits. Factors such as deposit size, aggregate quality and deposit location and setting are considered in the selection of those deposits best suited for extractive development. A second set of criteria involves the assessment of local aggregate resources in relation to the quality, quantity and distribution of resources in the region in which the report area is located. The intent of such a process of evaluation is to ensure the continuing availability of sufficient resources to meet possible future demands.

Site Specific Criteria

DEPOSIT SIZE

Ideally, selected deposits should contain available sand and gravel resources large enough to support a commercial pit operation using a stationary or portable processing plant. In practice, much smaller deposits may be of significant value depending on the overall resources in the rest of the project area. Generally, deposits in Class 1 (greater than 6 m thick), and containing more than 35% gravel are considered to be most favourable for commercial development. Thinner deposits may be valuable in areas with low total resources.

AGGREGATE QUALITY

The limitations of natural aggregates for various uses result from variations in the lithology of the particles comprising the deposit and from variations in the size distribution of these particles.

Four indicators of the quality of aggregate may be included in the deposit symbols. They are: gravel content (G or S), fines (C), oversize (O) and lithology (L).

Three of the quality indicators deal with grain size distribution. The gravel content (G or S) indicates the suitability of aggregate for various uses. Deposits containing at least 35% gravel in addition to a minimum of 20% material greater than the 26.5 mm sieve are considered to be the most favourable extractive sites, since this content is the minimum from which crushed products can be economically produced.

Excess fines (high silt and clay content) may severely limit the potential use of a deposit. Fines content in excess of 10% may impede drainage in road subbase aggregate and render it more susceptible to the effects of frost action. In asphalt aggregate, excess fines hinder the bonding of particles. Deposits known to have a high fines content are indicated by a "C" in the quality portion of the Deposit Symbol.

Deposits containing more than 20% oversize material (greater than 10 cm in diameter) may also have use limitations. The oversize component is unacceptable for uncrushed road base, so it must be either crushed or removed during processing. Deposits known to have an appreciable oversize component are indicated by an "O" in the quality portion of the Deposit Symbol.

Another indicator of the quality of an aggregate is lithology. Just as the unique physical and chemical properties of bedrock types determine their value for use as crushed rock, so do various lithologies of particles in a sand and gravel deposit determine its suitability for various uses. The presence of objectionable lithologies such as chert, siltstone and shale, even in relatively small amounts, can result in a reduction in the quality of an aggregate, especially for high quality uses such as concrete and asphalt. Similarly, highly weathered, very porous and friable rock can restrict the quality of an aggregate. Deposits known to contain objectionable lithologies are indicated by an "L" in the quality component of the Deposit Symbol.

If the Deposit Symbol shows either "C", "O" or "L", or any combination of these indicators, the quality of the deposit is considered to be reduced for some aggregate uses. No attempt is made to quantify the degree of limitation imposed. Assessment of the 4 indicators is made from published data, from data contained in files of both the Ontario Ministry of Transportation (MTO) and the Sedimentary Geoscience Section of the Ontario Geological Survey and from field observations.

Quality data may also appear in Table 9, where the results of MTO quality tests are listed by test type and sample location. The types of tests conducted and the test specifications are explained in Appendixes B and E, respectively.

Analyses of unprocessed samples obtained from test holes, pits or sample sites are plotted on grain size distribution graphs. On the graphs are the Ontario Ministry of Transportation's gradation specification envelopes for aggregate products: Granular A and Granular B Type 1; Hot-Laid Asphaltic Sand Nos. 1, 2, 3, 4 and 8; and concrete sand. By plotting the gradation curves with respect to the specification envelopes, it can be determined how well the unprocessed sampled material meets the criteria for each product. These graphs, called Aggregate Grading Curves, follow the tables in the report.

LOCATION AND SETTING

The location and setting of a resource area has a direct influence on its value for possible extraction. The evaluation of a deposit's setting is made on the basis of natural, environmental and man-made features which may limit or prohibit extractive development.

First, the physical context of the deposit is considered. Deposits with some physical constraint on extractive development, such as thick overburden or high water table, are less valuable resource areas because of the difficulties involved in resource recovery. Second, permanent man-made features, such as roads, railways, power lines and housing developments, which are built on a deposit, may prohibit its extraction. The constraining effect of legally required setbacks surrounding such features is included in the evaluation. A quantitative assessment of these constraints can be made by measurement of their areal extent directly from the topographic maps. The area rendered unavailable by these features is shown for each resource area in Table 3 (Column 3).

In addition to man-made and cultural features, certain natural features, such as provincially significant wetlands, may prove to be constraints. In this report such constraints have not been outlined and the reader is advised to consult with municipal planning staff and the local office of the MNR for information on these matters. Depending on the number and type of constraints, anywhere from a minimum of 15 to 85% of an individual licence or resource area can become inaccessible when these or other specific local constraints are considered (Planning Initiatives Ltd. 1993).

The assessment of sand and gravel deposits with respect to local land use and to private land ownership is an important component of the general evaluation process. Since the approval under the Planning Act of the Mineral Aggregate Resource Policy Statement (MARPS) in the mid 1980s and the Comprehensive Set of Policy Statements, including MARPS, in March 1995, many of the more recently approved local and regional Official Plans now contain detailed policies regarding the location and operation of aggregate extraction activity and should be consulted at an early date in regard to considering the establishment of an aggregate extraction operation. These aspects of the evaluation process are not considered further in this report, but readers are encouraged to discuss them with personnel of the pertinent office of MNR, and regional and local planning officials.

Regional Considerations

In selecting sufficient areas for resource development, it is important to assess both the local and the regional resource base, and to forecast future production and demand patterns.

Some appreciation of future aggregate requirements in an area may be gained by assessing its present production levels and by forecasting future production trends. Such an approach is based on the assumptions that production levels in an area closely reflect the demand, and that the present production "market share" of an area will remain roughly at the same level. In most cases, however, the market demand for aggregate products, especially in urban areas, is greater than the amount of production found within the local market area. Consequently, conflicts often arise between the increasing demand for aggregates in such areas and the frequent pressures to restrict aggregate operations, especially in the near urban areas.

The aggregate resources in the region surrounding a project area should be assessed in order to properly evaluate specific resource areas and to adopt optimum resource management plans. For example, an area that has large resources in comparison to its surrounding region constitutes a regionally significant resource area. Areas with high resources in proximity to large demand centres, such as metropolitan areas, are special cases.

Although an appreciation of the regional context is required to develop comprehensive resource management techniques, such detailed evaluation is beyond the scope of this report. The selection of resource areas made in this study is based primarily on geological data or on considerations outlined in preceding sections.

MAP 2: BEDROCK RESOURCES

Map 2 is an interpretative map derived from bedrock geology, drift thickness and bedrock topography maps, water well data from the Ontario Ministry of the Environment (MOE), oil and gas well data from the Non-Renewable Resources Section Ontario Ministry of Natural Resources (MNR), and from geotechnical test hole data from various sources. Map 2 is based on concepts similar to those outlined for Map 1.

The geological boundaries of the Paleozoic bedrock units are shown by dashed lines. Isolated Paleozoic outcrops are indicated by an "X". Three sets of contour lines delineate areas of less than 1 m of drift, areas of 1 to 8 m of drift, and areas of 8 to 15 m of drift. The extent of these areas of thin drift are shown by 3 shades of grey. The darkest shade indicates where bedrock outcrops are within 1 m of the ground surface. These areas constitute potential resource areas because of their easy access. The medium shade indicates areas where drift cover is up to 8 m thick. Quarrying is possible in this depth of overburden and these zones also represent potential resource areas. The lightest shade indicates bedrock areas overlain by 8 to 15 m of overburden. These latter areas constitute resources which have extractive value only in specific circumstances. Outside of these delineated areas, the bedrock can be assumed

to be covered by more than 15 m of overburden, a depth generally considered to be too great to allow economic extraction (unless part of the overburden is composed of economically attractive deposits).

Other inventory information presented on Map 2 is designed to give an indication of the present level of extractive activity in the report area. Those areas which are licenced for extraction under the Aggregate Resources Act are shown by a solid outline and identified by a number which refers to the quarry descriptions in Table 5. Each description notes the owner/operator, licenced hectarage and an estimate of face height. Unlicenced quarries (abandoned quarries or wayside quarries operating on demand under authority of a permit) are also identified and numbered on Map 2 and described in Table 5. Two additional symbols may appear on the map. An open dot indicates the location of a selected water well which penetrates bedrock. The overburden thickness in metres, is shown beside the open dot. Similarly, test hole locations appear as a point symbol with the depth to bedrock, in metres, shown beside it. The test holes may be further described in Table 7.

Selection Criteria

Criteria equivalent to those used for sand and gravel deposits are used to select bedrock areas most favourable for extractive development.

The evaluation of bedrock resources is made primarily on the basis of performance and suitability data established by laboratory testing at the Ontario Ministry of Transportation. The main characteristics and uses of the bedrock units found in southern Ontario are summarized in Appendix D.

Deposit "size" is related directly to the areal extent of thin drift cover overlying favourable bedrock formations. Since vertical and lateral variations in bedrock units are much more gradual than in sand and gravel deposits, the quality and quantity of the resource are usually consistent over large areas.

Quality of the aggregate derived from specific bedrock units is established by the performance standards previously mentioned. Location and setting criteria and regional considerations are identical to those for sand and gravel deposits.

Selected Resource Areas

Selection of Bedrock Resource Areas has been restricted to a single level of significance. Three factors support this approach. First, quality and quantity variations within a specific geological formation are gradual. Second the areal extent of a given quarry operation is much smaller than that of a sand and gravel pit producing an equivalent tonnage of material, and third, since crushed bedrock has a higher unit value than sand and gravel, longer haul distances can be considered. These factors allow the identification of alternative sites having similar development potential. The Selected Areas, if present, are shown on Map 2 by a line pattern and the calculated potential tonnages are given in Table 6.

Selected Bedrock Resource Areas shown on Map 2 are not permanent, single land use units. They represent areas in which a major bedrock resource is known to exist and may be reserved wholly or partially for extractive development and/or resource protection, within an Official Plan.

Part III – Assessment of Aggregate Resources in Wellington County

LOCATION AND POPULATION

Wellington County occupies an area of approximately 265 931 ha in Southern Ontario (Figure 1). The study area is covered by parts of the Brampton (30M/12), Cambridge (40P/8), Guelph (40P/9), Conestogo (40P/10), Palmerston (40P/15), Orangeville (40P/16), Dundalk (41A/1) and Durham (41A/2) 1:50 000 scale map sheets of the National Topographic System (NTS).

In 1994, the population of Wellington County was approximately 162 851 (Ontario Ministry of Municipal Affairs and Housing and the Association of Municipal Clerks and Treasurers of Ontario 1997), representing a 5.6% increase from 1991 population data (Ontario Ministry of Municipal Affairs 1992) (Chart A).

Wellington County is largely rural in character. The dominant urban centres include the City of Guelph, the towns of Arthur, Elora, Fergus, Erin and a number of smaller villages and settlement areas.

Road access throughout the study area is provided by a network of county and local township roads. Highway 401 traverses the southern part of Wellington County in a westerly direction, providing a direct link to other major market areas of southern Ontario including the western part of the Greater Toronto Area (GTA). Highways 6, 7, 9, 10 and 25 also provide relatively direct access to the northwestern part of the GTA from the northern and eastern portions of the county.

SURFICIAL GEOLOGY AND PHYSIOGRAPHY

The physiography and distribution of unconsolidated surficial materials within Wellington County are largely the result of glacial activity that took place in the late Wisconsinan substage of the Pleistocene Epoch about 23 000 to 10 000 years ago. The onset of this period was marked by lobes or sub–masses of the continental ice sheet advancing out of the Great Lake basins and joining to cover south-

CHART A - AREA AND POPULATION
WELLINGTON COUNTY

Municipality	Area (ha)	1991 Population	1994 Population
City of Guelph	6 875	85 625	93 400
Town of Fergus	716	7 657	8 008
Town of Harriston	335	1 946	1 900
Town of Mount Forest	692	4 095	4 164
Town of Palmerston	291	2 273	2 400
Village of Arthur	417	2 033	1 960
Village of Clifford	241	746	722
Village of Drayton	234	1 156	1 333
Village of Elora	303	3 119	3 116
Village of Erin	439	2 400	2 414
Twp. Of Arthur	27 016	2 456	2 472
Twp. Of Eramosa	18 860	5 789	5 764
Twp. Of Erin	29 411	7 263	7 468
Twp. Of Guelph	11 801	3 122	3 045
Twp. Of Maryborough	23 061	2 565	2 573
Twp. Of Minto	28 970	2 297	2 357
Twp. Of Nichol	10 881	3 907	3 999
Twp. Of Peel	30 422	4 238	4 294
Twp. Of Pilkington	12 341	2 337	2 400
Twp. Of Puslinch	23 108	4 843	4 607
Twp. Of West Garafraxa	18 940	3 147	3 341
Twp. Of West Luther	20 577	1 095	1 114
Total	**265 931**	**154 109**	**162 851**

ern Ontario. The latter part of this period was characterized by the repeated advance and retreat of these glacial lobes. During the late stages of glacial activity in the report area, the northwestern and northeastern townships of Wellington County were covered by glacial ice of the Huron-Georgian Bay lobe (Cowan 1979). The margin of this lobe advanced to the south and southeast over these townships and deposited a thick layer of glacial till over the bedrock surface and the pre-existing sediments. In most of the townships, this till is composed of clayey silt with few pebbles and is termed the Tavistock Till (Cowan 1979, Karrow 1971, 1986). This till is not generally suited for use as aggregate because of its fine texture, but is well suited for agriculture when it is drained.

Subsequently, minor retreat and re-advance of the Huron-Georgian Bay lobe first deposited the Mornington Till, which is exposed in Maryborough and Peel townships, followed by the Elma Till, which occurs in Maryborough, Minto and Arthur townships. As a warming climate caused the margin of the glacial lobe to melt back, eskers, outwash and ice-contact deposits of sand and gravel were laid down in Minto Township. The esker deposits in Minto Township have been extensively worked at numerous small pits and remain a good aggregate source for the township. A halt in the retreat of the Huron-Georgian Bay lobe margin in the northern portion of Minto Township is marked by extensive deposits of ice-contact stratified drift and outwash sand and gravel. These ice-contact deposits form a large area of hummocky topography known as the Saugeen Kames (Chapman and Putnam 1984, Cowan 1979). These deposits contain large amounts of sand and gravel which are worked in numerous pits. In many areas the deposits underlie wetland areas. In the other townships of northern Wellington County (Arthur, West Luther, Maryborough and Peel townships), sites of commercial aggregate extraction are generally limited to the long sinuous esker ridges that occur in the area. These deposits contain moderate amounts of crushable gravel and have been traditional sites for extraction. The material extracted from the eskers forms an important component of the local resource base. Other small ice-contact stratified drift deposits associated with the esker systems have also been utilized as a source of aggregates in the northern part of Wellington County.

During the middle part of the late Wisconsinan the southern part of Wellington County was affected by glacial ice of the Ontario lobe. Glacial ice of this lobe advanced across the southern part of Wellington County depositing a thick layer of till over the bedrock surface and the pre-existing sediments in the area. This till, known as the Port Stanley Till, is composed of silt and sand with minor stone content (Cowan 1976). In addition, long, rounded drumlins occur throughout the southern portion of the townships forming a physiographic region known as the Guelph Drumlin Field. This region occupies an area of 83 000 ha in Wellington County (Chapman and Putnam 1984). The till has little value as aggregate because of its high silt content.

After deposition of the Port Stanley Till, the margin of the ice lobe began to recede from this area. Several eskers and kames were deposited in the southern and central portions of the county. These deposits contain small amounts of sand and gravel suitable for extraction. In Pilkington Township, additional ice-contact deposits and one large kame deposit are located in the northern portion of the township, north of Pentland Corners. These deposits contain large amounts of stratified sand with scattered lenses of coarse aggregate.

The southern portion of West Garafraxa Township is covered by the southwesterly trending Orangeville Moraine (Cowan 1976). The moraine formed in an interlobate position between glacial ice of the Huron-Georgian Bay and Ontario lobes. High relief and hummocky topography are characteristic of the moraine. It consists of a lower glaciofluvial layer of gravel and an upper glaciolacustrine unit of fine sand, silt and some varved sand and clay.

After the deposition of the Orangeville Moraine, the margin of the Huron-Georgian Bay lobe melted back toward the northwest. Some of the meltwater that flowed from the ice front formed an ice-marginal channel in which outwash gravel was deposited. The channel is now occupied by the Grand River and Lake Belwood and the outwash now forms a series of terraces along the northwestern shore of the lake. This deposit contains large resources of sand and crushable gravel and is an important local resource.

The City of Guelph, Guelph Township and Eramosa Township are characterized by extensive areas of Port Stanley Till, and the Guelph Drumlin Field and Paris Moraine physiographic regions. In the report area the Port Stanley Till (Karrow 1974) is a moderately stoney, sandy silt till. The Guelph Drumlin Field, which covers much of Guelph Township and the central portions of Eramosa and central western Erin townships, consists of streamlined mounds of till. The southwest trending Paris Moraine complex is located in the southern parts of these townships. Associated with the moraine are kame deposits and northwest trending eskers. The Eramosa, Ariss and Guelph eskers provided an early source of coarse aggregate, but are now largely depleted or inaccessible.

Ice marginal spillways containing meltwaters seeking an outlet to the south and west also deposited stratified sands and gravels in these townships. As the retreating Ontario lobe halted at the Paris Moraine (Puslinch Township) a major spillway or valley outwash system developed along the present Speed River valley. Variable thicknesses of uniform outwash materials, in places burying drumlins, were deposited. These terraced deposits provide the best quality aggregate sources for the Guelph area and contain materials suitable for a variety of crushed products.

The Eramosa Esker (Karrow 1968) is the best developed esker within Eramosa Township. The esker, situated in the southern portion of the township, consists of a narrow, east trending ridge. Ice-contact stratified drift deposits in the township contain large amounts of stratified sand and usually small amounts of gravel. These deposits provide good sources of fine-grained aggregate.

A large channel which trends through central Erin Township was formed by meltwaters flowing southward

along the margin of the Ontario lobe. Outwash sand and gravel deposited by the meltwaters cover a large area near the Town of Erin near the eastern boundary of the township. The deposit, known as the Caledon Outwash, contains large resources of aggregate and is an important component of Erin Township's resource base. Smaller gravel deposits are found further to the west.

The most southerly, and most significant township in Wellington County in terms of aggregate production, is Puslinch Township. It contains 3 physiographic areas: the Guelph Drumlin Field; the Horseshoe Moraines and the Flamborough Plain (Chapman and Putnam 1984).

The Guelph Drumlin Field is located in the northwestern portion of the township. The physiographic region of the Horseshoe Moraines consists of 2 major glacial features, those being the Paris and Galt moraines. Together they form a belt 6 to 8 km wide (Karrow 1968) extending through Puslinch Township from north to southwest. The Paris Moraine is situated to the north and west of the Galt Moraine; both are composed primarily of sandy Wentworth Till. The Paris Moraine was formed at the margin of the Ontario ice lobe as it retreated into the Lake Ontario basin and the Galt Moraine was deposited during a minor readvancement of the margin.

The Flamborough Plain, located in the southeast part of the area, is an isolated tract of shallow drift that consists of bouldery glacial till or sand and gravel (Chapman and Putnam 1984). The Flamborough Plain constitutes an area of about 39 000 ha. In some places the limestone bedrock has been exposed and washed bare by wave action associated with glacial lakes.

Related to the Paris and Galt moraines is an integrated system of spillways with broad gravel and sand terraces (Chapman and Putnam 1984). Excellent cross-sections of the Horseshoe Moraines area can be seen along Highway 6 between Guelph and Puslinch, and along Highway 401. Portions of the Horseshoe Moraines area are very hilly with a local relief of more than 30 m (Chapman and Putnam 1984). Kettles and kettle lakes (e.g., Puslinch Lake) are also prominent.

An extensive outwash plain between Killean Station and Aberfoyle separates the Galt and Paris moraines. This outwash plain was apparently fed by glacial meltwaters when ice of the Ontario lobe stood at the Galt Moraine. Coarse aggregate deposits of the spillway channel are concentrated southwest of Aberfoyle where the material is now extracted in several pits. To the north of the Paris Moraine are gravel terraces of the Speed and Eramosa rivers. Numerous extractive operations exist in this area.

Several other aggregate operations are found in the kame, esker and beach gravels that are located southeast of the Galt Moraine. After its brief halt at the Galt Moraine, the margin of the Ontario lobe retreated from Puslinch Township, thus marking the end of glacial activity in the area. Postglacial erosional and depositional processes have since been of minor importance in modifying the physiography of the township and the land still shows the strong influence of the glacial ice.

EXTRACTIVE ACTIVITY

At the time of writing there were 92 licenced sand and gravel pits and 4 quarry operations in Wellington County (Table 2). Nearly 50% of the aggregate activity occurs within Puslinch and Erin townships. Average annual aggregate production within Wellington County over the 5 year period from 1989 to 1993 was approximately 5.8 million tonnes, with the largest average annual production coming from the Township of Puslinch (1.57 million tonnes per year) (Chart B).

During the last 5 year period Puslinch Township has produced as much as 2.87 million tonnes per year of aggregate (Planning Initiatives and Associates Ltd. 1993) and has frequently been one of the top 10 aggregate producing municipalities in the province. One of the main reasons for this is the presence of high quality aggregate resources located in the area immediately adjacent to Highway 401, which provides a direct route to the largest market in Ontario, the Greater Toronto Area (GTA). Should further restrictions to extraction be placed on other high quality aggregate resources near the GTA (e.g., the Niagara Escarpment or Oak Ridges Moraine) Puslinch Township can be expected to be placed under increased pressure to extract increasing amounts of the high quality resources. As of mid May, 1995, an additional 7 licence applications have been formally submitted for approval within Puslinch Township. In the future, similar pressures are likely to be exerted upon Erin Township given its proximity and relatively easy access to parts of the GTA.

Wellington County has provided aggregates for the construction industry for over 50 years. Over this time period commercial extraction of aggregates has occurred in Puslinch, Guelph, the eastern part of Erin and the northern part of Minto townships. In the remainder of the county aggregate extraction has occurred mainly to supply local needs.

QUALITY OF AGGREGATES

The quality of aggregate from sand and gravel deposits in Wellington County is not uniform. Acceptable aggregate for the production of Granular A, B and M can be found in all parts of the county. However, sources of sand and gravel acceptable for high quality uses are limited. Sand and gravel in the central and southern parts of the county are, in general, of good quality. In the townships of Puslinch, Guelph, Pilkington, Eramosa and in the northeastern part of Minto commercial sources are capable of producing very high quality aggregates, including fine and coarse aggregates suitable for use with Portland cement. In the outwash deposits of Puslinch Township sources are capable of producing Heavy Duty and Medium Duty Binder asphalt paving aggregates from those parts of the deposits containing a high percentage of coarse gravel.

The suitability of the aggregate in the county is affected by 3 main factors: 1) the presence of chert-cherty carbonates; 2) the presence of siltstone; and 3) the coarseness of gravel.

The Bois Blanc Formation forms a 10 to 20 km wide, northwesterly trending band that underlies the glacial drift

Chart B - EXTRACTIVE ACTIVITY
WELLINGTON COUNTY

Municipality	Average Annual Aggregate Production (1989-1993)	Number of Licences		Total Licenced Area	
		Pits	Quarries	Pits	Quarries
Minto	270 00	17	-	469.48	-
Arthur	280 000	13	-	121.55	-
Maryborough	136 000	5	-	111.09	-
Peel		4	-	76.05	-
West Garafraxa	484 000	2	-	20.23	-
West Luther		1	-	14.78	-
Pilkington	951 000	9	-	234.99	-
Nichol	-	-	-	-	-
Guelph	638 000	3	2	45.54	192.94
Eramosa	247 000	8	-	169.27	-
Erin	1 181 000	9	-	430.55	-
Puslinch	1 569 000	21	2	1037.41	140.29
Total	**5 756 000**	**92**	**4**	**2730.94**	**333.23**

in the western part of Minto, Maryborough and Peel townships. The formation consists primarily of thin- to medium-bedded, cherty limestone with local dolostone. Many chert-rich nodules were derived from this formation and incorporated into the local surficial aggregate deposits through glacial activity associated with the Huron-Georgian Bay lobe. A high concentration of chert-cherty carbonates are found in deposits situated in the western part of Minto, Maryborough and Peel townships. Elsewhere, chert-rich clasts may be present, however, not in significant quantities. In general, the chert-cherty carbonate content decreases in an easterly direction from about 20% in the west to 1 to 3% in Guelph and Puslinch townships. This trend has been demonstrated by previous work (Ingham and Dunikowska-Koniuszy 1965).

The effect of the presence of chert is threefold. Firstly, the white coloured "chalky" leached chert can "pop-out" from Portland cement structural and paving concrete and from surface course hot-mix asphalt pavements due to its high water absorption and resultant frost susceptibility. Secondly, the presence of chert, even in small amounts, can make a gravel or sand unsuitable for Portland cement concrete aggregate due to reactivity with the alkalis in Portland cement. Thirdly, a high percentage of unleached chert (approximately 20%) may require use of anti-stripping additives in asphalt cement for hot-mix asphalt paving.

The coarseness of aggregate clasts containing chert may also pose quality problems as noted by Ingham and Dunikowska-Koniuszy (1965). One of the findings in this paper was that the greatest percentage of chert in the gravels is concentrated between the 1.18 mm and 50 mm sizes. Therefore, if a deposit in the chert-rich zones contains mainly fine gravel size particles, the effect of areal predominance of chert and the concentration of cherty particles in the fine gravel sized particles can make the gravel unacceptable for hot-mix asphalt paving and Portland cement concrete uses. While the presence of chert mainly influences the quality of coarse aggregate, it can also render fine aggregates unsuitable for the same uses. This is caused by the high percentage of chert in the coarser particle sizes of the fine aggregate fraction.

The presence of siltstone is also the result of glacial and glaciofluvial action. The westerly advancing Ontario ice lobe eroded siltstones and shales from formations in the Clinton-Cataract Group at the base of the Niagara Escarpment. These lithologies were incorporated into the glacial tills that were deposited across Erin, Eramosa and surrounding townships to the north and east. As the ice margin retreated, glacial meltwaters washed out, transported and deposited the siltstones in outwash deposits located west and southwest of the ice margin. During this process most of the shale disintegrated. While the siltstone content in the eastern and northern parts of Erin Township is about 15% the content in Eramosa and West Garafraxa townships is reduced to about 3%.

While the siltstone content does not have any affect on the suitability of gravels for Granular A, B and M, it can influence acceptability for hot-mix paving and concrete aggregates. The siltstone tends to be hard, however, in pavement, repeated frost action can break up siltstone clasts along bedding planes.

Fortunately, the effect of chert and siltstone content on aggregate quality occurs only locally within Wellington County. Research conducted by the MTO (Ingham and Dunikowska-Koniuszy 1965), records from MTO Mineral Aggregate Inventory data files, examination of MTO contract Aggregate Sources Lists (ASLs) and recent sampling

indicate that the highest concentrations of chert are found in the eskers located in the western corner of Minto Township, the southern half of Maryborough Township and small outwash deposits in the western corner of Peel Township. Within these areas, the aggregates are unsuitable for hot-mix paving and Portland cement concrete coarse and fine aggregates. They do, however, meet requirements for Granular A, B Type I and M.

The influence of siltstone on aggregate usage can be observed in the northern half of Erin Township. In general, aggregates in the Orangeville Moraine area are unsuitable for hot-mix asphalt and Portland cement concrete coarse and fine aggregates. In the central and eastern portion of this township, the aggregates are not acceptable for high quality HL3 hot-mix paving aggregates, but are acceptable for lower quality HL4 aggregates. In general, the remainder of the county can provide, with appropriate processing, aggregates acceptable for high quality uses, including Portland cement concrete coarse and fine aggregates. Hot-mix asphalt paving sands often require blending to correct grain size distribution deficiencies. This is a normal procedure for these uses. There are no quality limitations for Granular A, B and M and sand products used by the construction industry, other than possible grain size distribution problems.

SELECTED SAND AND GRAVEL RESOURCE AREAS

Maps 1A and 1B show the surficial deposits that contain sand and gravel in Wellington County. In the county, the total area occupied by selected sand and gravel deposits is approximately 13 030 ha. When constraints such as areas depleted by previous or current extraction, urban areas, provincial parks and conservation areas, as well as physical constraints like roads, railways, rivers, lakes and ponds are considered the area possibly available for extraction is reduced to approximately 10 373 ha (Table 3). It must be noted, however, that further restrictions on the area actually available or accessible for extraction may occur because of provincially or regionally significant wetlands or other sensitive natural heritage features that are not taken into account in this report. The most significant resource areas are shown on the maps and are described in detail below.

Selected Sand and Gravel Resources Area 1, 2, 3, and 4

Selected Sand and Gravel Resource Areas 1, 2, 3, and 4 are dealt with together due to the fact that they are all outwash deposits and form part of the Saugeen Kames physiographic region (Chapman and Putnam 1984). The genesis, thickness, texture and quality of these deposits are much the same.

Cowan (1979) describes the outwash deposits as follows. The most extensive deposits of outwash gravel occur within the Saugeen Kames as belts of braided outwash between ridges of morainic deposits. With regard to the texture and quality of the aggregate Cowan (1979) notes that these gravels range for the most part from 2 to 6 m in thickness although more than 15 m has been reported locally. The gravels contain 25 to 60% gravel of which most is medium- to very-coarse pebble gravel.

Selected Sand and Gravel Resource Area 1 is an irregular 311 ha area of outwash sand and gravel situated east of Clifford. Local topography indicates the existence of erosional remnants of older fluvial landforms. No licenced properties are located within this resource area. A previously licenced pit situated north of the resource area exposed a 4 m face containing up to 70% of well stratified gravel. An unlicenced pit (Pit No. 23) located south of the resource area has 2 to 4 m face heights that show mainly gravel (45 to 75%). Based on 289 ha being potentially available for extraction and assuming a deposit thickness of 5 m, the deposit could contain up to 25.6 million tonnes of aggregate (Table 3).

Selected Sand and Gravel Resource Area 2 consists of an irregular belt of braided outwash channels in the north-central part of Minto Township. The surface of the deposit is relatively flat but marshy depressions are frequent, indicating high water table conditions. One presently licenced source (Pit No.1) exposes 3 to 6 m of sandy aggregate that contains up to 45% crushable material. Below water extraction is now occurring in this pit. Other exposures indicate generally less than 3 to 5 m of sandy aggregate. Selected Resource Area 2 occupies a total of 716 ha. Approximately 543 ha are potentially available for extraction. Assuming an average deposit thickness of 4 m, the potentially available sand and gravel resources are estimated to be 38.4 million tonnes (Table 3). Competing land uses may pose future constraints on extraction. High water table levels and significant wetlands may limit development of large parts of the area. Road access to the deposit is provided by gravel-surfaced township and county roads. Rail access is provided by a line of the Canadian National Railway.

Selected resource area 3 is a small outwash deposit located at the eastern boundary of Minto Township, near the South Saugeen River. No subsurface data are available for the resource area, but it is probable that it resembles the other outwash deposits with respect to average thickness and aggregate quality. Selected Sand and Gravel Resource Area 3 occupies 89 ha, of which 70 ha are potentially available for extraction. Assuming an average deposit thickness of 5 m throughout the resource area, possible sand and gravel resources are estimated to be 6.2 million tonnes (Table 3).

Selected resource area 4 forms a large area of flat to undulating topography on the southwest side of Pike Lake in Minto Township. Several marshy depressions in the central part of the resource area suggest a high water table. Selected resource area 4 occupies a total of 640 ha, of which 534 ha are potentially available for extraction. Assuming an average thickness of 5 m throughout resource area 4, the potential sand and gravel resources are estimated to be 47.3 million tonnes (Table 3). Wetland constraints on extraction are likely to be significant as the

Provincial Wetland Policy Statement prohibit any development within designated Class 1, 2 and 3 Wetlands. At the eastern end of the resource area, recreational land use development is also taking place along the shores of Pike Lake. Access to resource area 4 is provided by Highway 89 and by county and township roads.

Future development in parts of these 4 resource areas is likely to be affected by the designation of portions of these areas as Provincially Significant Wetlands by the Province.

MTO records and recent field research indicates that the aggregate material within these deposits is not suitable for high quality uses such as for hot-mix paving and concrete, due to the high chert content. The materials are, however, suitable for Granular A, B Type I and M.

Selected Sand and Gravel Resource Area 5

Selected Sand and Gravel Resource Area 5 is an extensive deposit of ice-contact stratified drift located near Pike Lake in the northeastern corner of Minto Township. The topography of the area is characteristically irregular and hummocky, and a series of depressions, several of which now form small lakes, suggest the melting out of ice blocks during deglaciation. This portion of the selected area appears to be associated with the very extensive Riverstown Esker that extends southeast to Riverstown in Arthur Township. The portion of the Riverstown Esker in Arthur Township has also been selected for possible resource protection at the primary level of significance.

At present 2 licenced sand and gravel pits are situated within resource area 5 (Pit Nos. 3 and 8). Faces in these 2 pits range from 5 to 7 m in height and expose sandy, irregularly stratified material with a crushable gravel content of 35 to 50%. Excess fines pose a problem in parts of the deposit and because of excessive chert the stone quality is locally considered unsuitable for high quality uses such as road-surfacing aggregates (Deike 1978a). The materials are, however, suitable for Granular A, B Type I and M.

Selected Sand and Gravel Resource Area 5 occupies a total area of 855 ha, exclusive of the licenced properties. Approximately 657 ha are potentially available for extraction prior to taking into account any other constraints. Assuming an average thickness of 5 m throughout the deposit, possible resources of sand and gravel are estimated to be 58.1 million tonnes (Table 3). The resource area is accessible by road and rail and is located in close proximity to local demand areas, but may be further constrained by wetland and water table considerations.

Selected Sand and Gravel Resource Area 6

Selected Sand and Gravel Resource Area 6 is an outwash deposit located in the northeastern corner of Minto Township. The topography of the area is relatively flat, except where dissected by the South Saugeen River and associated small tributaries. Presently the area contains 3 licenced pits (Pit Nos. 4, 5 and 6) that contain from 35 to 70% gravel (Davis 1994). A large licenced pit, (Pit No. 5) in the resource area is described by Cowan (1979). In the pit, up to 8 m of material was exposed although the gravels are reported to be 21 m thick. In general, a coarse upper unit of weakly stratified, poorly sorted, rounded gravel, containing 60 to 70% stone, overlies a cross-bedded medium- to coarse-sand unit containing as much as 15% gravel. The coarse unit was observed to range from 2 to 6 m in thickness. These gravels may contain up to 10% fines and many of the pebbles and cobbles had a silt coating on their surface. Most of the aggregate extracted from this pit is used for pre-mix concrete although a full range of granular products is also supplied from the pit (Cowan 1979).

Recent licencing reports for the newest pit (Pit No. 4) (Gamsby Mannerow Limited 1993) and MTO records indicate that the material is suitable for Granular A, B Type I and M. This source is also approved for hot-mix HL4 paving and concrete coarse and fine aggregates.

Resource area 6 occupies 43 ha, excluding licenced areas. An estimated 22 ha are possibly available for extraction. Assuming an average thickness of 7 m throughout the resource area, possible sand and gravel resources suitable for a range of road-building and construction products are estimated to be 2.7 million tonnes (Table 3).

Access to Resource area 6 is provided by Highway 89 as well as by several county and township roads. Rail access is provided by a line of the Canadian National Railway. The resource area is located in close proximity to local demand centres such as Harriston and Mount Forest and is capable of supplying high-specification aggregate products both for housing and commercial construction.

Selected Sand and Gravel Resource Area 7

Selected Sand and Gravel Resource Area 7 consists of several esker segments, located in the southwestern corner of Minto Township. The deposits extend northwestward into Wallace Township in Perth County. In Minto Township the esker segments are single, sharply defined ridges with local relief of 6 to 15 m. The esker ridges have been deposited directly on the till plain and trend in a northwest direction. All of the deposits are shown as a single resource area because of their similarities in thickness, texture, quality and possible uses. Six pits (Pit Nos. 11, 12, 13, 14, 16 and 17) are currently licenced for extraction. Faces in the pits range from 2 to 6 m. The pits expose gravel and sand suitable for crushing and the production of granular base aggregate. The stone quality is too poor, because of chert content, to be used for hot-mix asphaltic aggregate or for concrete aggregate (Deike 1978a). This has been confirmed by recent field observations. Sandy deposits flanking the esker ridges have been selected for possible resource protection at the secondary level. These deposits contain small amounts of material suitable for granular subbase aggregate.

The individual esker segments which form Selected Sand and Gravel Resource Area 7 occupy a total of 141 ha of which an estimated 104 ha are possibly available for ex-

traction. Assuming an average thickness of 4 m in each of the esker segments, total possible sand and gravel resources are estimated to 7.4 million tonnes (Table 3).

Although the possible resource tonnage in the resource area is relatively low and individually the deposits are quite small, as a group they constitute a valuable local resource for a number of reasons. First, since the deposits are distributed over a large area they are well situated to supply local markets throughout the southern part of the township. Secondly, most of the deposits consist of crushable aggregate and are suitable for a range of products. Finally, since most of the aggregate lies above the level of the surrounding ground surface, extraction is made simple and rehabilitation is easily accomplished.

Selected Sand and Gravel Resource Area 8

Selected Sand and Gravel Resource Area 8 consists of a large esker and delta complex that trends northwest from the settlement of Riverstown in Arthur Township. Near Riverstown, one of the esker ridges broadens significantly into an irregular hummocky plateau with local relief of 15 to 23 m. The plateau consists of sandy deltaic material that was deposited into water at the mouth of the subglacial stream(s) which deposited the esker ridges. There are 6 licenced pits (Pit Nos. 35, 36, 38, 41, 42 and 43) distributed within the resource area. Pit faces range in height from 3 to 10 m, and expose well stratified, sandy aggregate with, locally, significant amounts of crushable gravel (40 to 80%). Granular A and B as well as asphaltic sand and stone have been produced from the pits, although sand control is required in places. The fine aggregate contains excess fines and occasional silt seams are encountered.

Deike (1978b) noted that the stone quality in Resource Area 8 is affected by the presence of significant amounts of shale and soft, porous limestone. However, recent work indicates that the aggregate is acceptable for the production of Granular A, B Type I and M and HL4 coarse and fine aggregates. Extensive deposits of ice-contact stratified sand and gravel flank the western portion of the resource area.

Selected Sand and Gravel Resource Area 8 occupies a total of 343 ha, excluding licenced areas. An estimated 294 ha are potentially available for extraction. Assuming an average thickness of 7 m throughout the deposit, possible sand and gravel resources are estimated to be 36.4 million tonnes (Table 3). Access to the resource area is provided by Highway 6 and a line of the Canadian Pacific Railway, both of which are located at the eastern end of the deposit. The area is also well situated with respect to the regional markets of Mount Forest and Arthur. The population in the vicinity of the resource area is low and there are few potential constraints on extraction. Resource area 8 is well suited for extraction and rehabilitation.

Selected Sand and Gravel Resource Area 9

Selected Sand and Gravel Resource Area 9 consists of an esker deposit, located in the northeastern portion of Arthur Township near the settlement of Derrynane. The esker extends into West Luther Township. The deposit consists of a long, narrow, sharply defined, single ridge with local relief of more than 15 m. Five pits have been developed in the ridge, 2 of which are presently licenced for extraction (Pit Nos. 34 and 40). Pit faces range in height from 6 to 15 m and expose coarse gravel and sand. The gravel is of high quality and is abundant, making the resource area well suited for the production of high specification aggregate products. The only quality limitations are the occasional presence of silt seams and excess silt content in the fine fraction of the aggregate. Pits in resource area 9 are given a moderate to high use rating by the MTO (Deike 1978b) with the material suitable for Granular A, B Type I, M and possibly HL4 coarse and fine aggregates.

The unlicenced portions of resource area 9 occupy a total of 168 ha, of which 129 ha are possibly available for extraction. Assuming an average deposit thickness of 10 m, the possible available sand and gravel resources are estimated to be 22.8 million tonnes (Table 3).

Cultural constraints on extraction, in the form of roads and houses, are minor. Esker deposits are generally well suited for extraction since most of the aggregate is situated at or above the surrounding land surface. Also, for this reason, post-extractive rehabilitation may be quickly and inexpensively accomplished.

Selected Sand and Gravel Resource Area 10

Selected Sand and Gravel Resource Area 10 is a large esker deposit situated in the north-central portion of West Luther Township. Currently, no licenced pits are present, however 2 previously worked sources are located in the northern part of the esker (Pit Nos. 55 and 56). Faces in these pits range from 3 to 6 m and expose poorly sorted, coarse gravel and sand. The aggregate has been used in the past for pit run and crusher run products and for hot-mix asphaltic sand and stone. Some oversize gravel has to be processed in order to use the aggregate as Granular A. In places the sand fraction may be coarse and contain excess fines which will require blending for some products. Pits in the resource area have been given a moderate to high use rating by the MTO.

Resource area 10 has a total area of 150 ha of which 118 ha are possibly available for extraction. Assuming an average deposit thickness of 5 m, the possible sand and gravel resources could be 10.4 million tonnes (Table 3). The southern part of the esker lies within the West Luther Marsh Wildlife Management Area, therefore, a considerable portion of it is likely to be constrained for extractive purposes. The resource area is accessible by road and is moderately well suited for extractive development.

Selected Sand and Gravel Resource Area 11

Selected Sand and Gravel Resource Area 11 consists of an ice-contact stratified drift deposit located in the central part of West Luther Township. One unlicenced pit, Pit No. 57, has been opened in the deposit, exposing a 6 m face. While the deposit is quite sandy, preliminary investigation has indicated that appreciable amounts of crushable gravel may be found and should be suitable for Granular A, B Type I and M. Cowan (1976) indicated that the probability of locating economic deposits in resource area 11 is moderate to high. Selected Sand and Gravel Resource Area 11 occupies a total of 47 ha, of which 42 ha could be available for extraction. Assuming an average deposit depth of 5 m, possible resources in the area total 3.7 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 12

Selected Sand and Gravel Resource Area 12, consists of an esker deposit located south of Luther Lake in West Luther Township, near the settlements of Damascus and Mount View. The esker is composed of a central ridge of coarse gravel that is surrounded by an extensive deposit of ice-contact stratified drift. The latter deposit has been selected as a sand and gravel resource area of secondary significance. At least 5 pits have been developed in the resource area, however, at present, only Pit No. 54, is licenced for extraction. Pit face heights range from 2 to 12 m and expose poorly sorted, coarse gravel and sand. The coarse aggregate is of exceptionally high quality and is suitable for many road-building and construction products. Also, the material may have potential for Portland cement concrete aggregates (Deike 1978c). The sand component of the deposit is of lower quality. An excess of fines in portions of the deposit prohibits the production of some types of hot-mix asphaltic sand. In addition, some oversize material is present in the deposit and may require processing. Several of the pits in the resource area have been given a moderate to high use rating by the MTO. Such pits contain aggregate generally suitable for Granular A and hot-mix HL4 asphaltic stone (Deike 1978c).

Resource area 12 occupies a total area of 71 ha, exclusive of licenced area. Cultural constraints reduce the area possibly available for extractive development to 49 ha. Assuming an average thickness of 5 m throughout the deposit, possible resources of sand and crushable gravel are estimated to be 4.3 million tonnes. The resource area is accessible by road and is well suited for extractive development.

Selected Sand and Gravel Resource Area 13

Selected Sand and Gravel Resource Area 13 consists of a small esker deposit located at the southern boundary of Arthur Township. The esker ridge extends south into Maryborough Township, where it has also been selected for possible resource protection at the primary level of significance. As with other eskers in Arthur Township, the deposit consists of a single, narrow, sharply defined ridge that is seldom more than 6 m in height. Information on the texture and quality of the material present indicates that sandy aggregate may predominate and that selection and sand control will be required for crushing.

The portion of the esker that extends into the northern part of Maryborough Township consists of a narrow central ridge that in places has relief of more than 12 m. The central ridge is flanked by a narrow deposit of sand. In places the central core of the esker has been removed entirely by previous extractive activity. The sandy flanking deposits have been selected as resource areas of secondary significance. At least 6 pits (Pit Nos. 52, 64, 65, 69, and 71) have been developed along the esker ridge. Pit Nos. 64 and 65 are presently licenced for extraction. The pit faces range in height from 3 to 12 m and expose primarily sandy aggregate, although considerable amounts of crushable aggregate are present in pockets. Approximately half of the pits contain sufficient amounts of coarse material to produce aggregate for Granular A and asphaltic hot-mix. For crushing purposes, selection to avoid silt seams and sand control is required throughout the resource area. All of the pits are capable of providing material acceptable for the production of lower specification aggregates such as Granular B and fill. Generally, pits in Resource Area 13 have been given a moderate to high use rating by MTO (Deike 1978d).

Selected Sand and Gravel resource area 13 occupies 54 ha. After considering cultural setbacks an estimated 44 ha are potentially available for extraction. Assuming an average usable aggregate thickness of 5 m throughout the deposit, possible available sand and gravel resources are estimated to be 3.9 million tonnes (Table 3). The deposit is accessible by Highway 9. Together with its northern extension into Arthur Township, the deposit forms a locally important source of aggregate. Agriculture is the major land-based activity in the area at present.

Selected Sand and Gravel Resource Area 14

Selected Sand and Gravel Resource Area 14 consists of 3 small outwash deposits located south of the settlement of Moorefield in the central portion of Maryborough Township. Numerous water well logs in this area indicate that significant amounts of sand and gravel may be present. Immediately east of the resource area indications are that portions of an older, much more extensive buried outwash deposit may be present. Water well records in this area indicate up to 5 m of clay overlies 2 to 7 m of gravel. For the purposes of this report, however, the resource area is restricted to the mapped extent of the exposed outwash deposit. Further investigation and testing of the area may expand the potential resource area.

The total extent of the mapped outwash unit in resource area 14 is 57 ha, of which 48 ha could be available for extraction. Assuming an average thickness of 4 m throughout the resource area, sand and gravel resources are

estimated to be 3.4 million tonnes (Table 3). The resource area is well situated with respect to road and rail transport routes.

Selected Sand and Gravel Resource Area 15

Selected Sand and Gravel Resource Area 15 consists of segments from 2 parallel esker ridges that are located in the west-central portion of Maryborough Township. The deposits consist of segmented, narrow ridges with relief of less than 6 m. Parts of the ridges have been removed through previous extraction.

One licenced pit (Pit No. 68) are present in the resource area. Pit faces range in height from 3 to 15 m and expose predominantly sandy aggregate, with scattered pockets of crushable aggregate. The presence of significant amounts of chert in the coarse aggregate fraction and excess silt in the fine fraction excludes the use of the material for higher specification products, however, the material is acceptable for Granular A, B and M. The pits are given a low use rating by MTO (Deike 1978d). Sample No. 95-ZLK-1006 (Table 9) taken at the south end of licenced Pit No. 68 provided a petrographic number of 208 for hot-mix and concrete uses and 101.8 for granular uses. The chert-cherty carbonate content is 53.1% and the shale content 0.2%. With the high chert-cherty carbonate content, the aggregate is not considered suitable for hot-mix or to be used with Portland cement. The fine aggregate tends to have an excess of fines for hot-mix paving and concrete fine aggregates.

After considering constraints, an original total resource area of 28 ha is reduced to 19 ha. Assuming an average usable material thickness of 9 m throughout the area, possible available sand and gravel resources are estimated to be 3 million tonnes (Table 3). Agriculture is the main land use in the vicinity of the resource area.

Selected Sand and Gravel Resource Area 16

Selected Sand and Gravel Resource Area 16 consists of several, small ice-contact stratified drift deposits located in east-central Peel Township. The deposits consist of irregular low ridges and mounds. One licenced property, Pit No. 77, occupies part of the area and contains reserves of predominantly sandy aggregate. This material may, in sections, be suitable for crushing to produce Granular A and B and hot-mix asphaltic stone (Deike 1978e). Material with similar use capabilities may be present in the unexcavated portions of the resource area.

Resource area 16 totals 29 ha, exclusive of licenced areas. After considering limited cultural constraints an estimated 22 ha are potentially available for extraction. Assuming an average usable material thickness of 4 m throughout the resource area, possible available sand and minor gravel resources are estimated to be 1.6 million tonnes (Table 3). The resource area is accessible by both road and rail and is close to local markets.

Selected Sand and Gravel Resource Area 17

Selected Sand and Gravel Resource Area 17, located in the south end of Peel Township, consists of 2 outwash terrace deposits situated along the Conestogo River. One unlicenced pit (Pit No. 84) is present in the more westerly deposit. Faces in the pit are approximately 3 m in height and expose sandy gravel. Material from the pit is unsuitable for high-specification products due to the high chert content, however, the material is suitable for granular base aggregate use. The presence of oversize material in the deposit requires processing (Deike 1978e).

Resource Area 17 occupies 39 ha, of which 29 ha is possibly available for extraction. Assuming an average deposit thickness of 3 m, the resource area has possible resources of 1.6 million tonnes (Table 3). Access to this area is provided by Highway 86.

Selected Sand and Gravel Resource Area 18

Selected Sand and Gravel Resource Area 18 consists of a large ridge of ice-contact stratified drift that is located on the west side of Carroll Creek in the northern part of Pilkington Township. The ridge has irregular to hummocky topography that, in places, produces local relief of more than 30 m. Only the central portion of the ridge contains large amounts of crushable gravel. The lower relief deposits which flank the main deposit contain considerable sand. Five pits have been developed in the resource area, 4 (Pit Nos. 85, 86, 87, and 88) of which are presently licenced for extraction. Face heights in the pits are variable, ranging from 6 to 10 m.

The crushable gravel content is variable throughout the area. The pits expose stratified sand and gravel with interbeds of silt and fine sand. The deposit also contains oversized material. Pits in the resource area have a moderate to high use rating and the material is acceptable for high specification roadbase and surfacing aggregate, such as Granular A, B Type 1 and M and hot-mix asphaltic sand and stone.

Selected Sand and Gravel Resource Area 18 occupies a total area of 145 ha, excluding licenced areas. An estimated 126 ha are potentially available for extraction. Assuming an average deposit thickness of 8 m, possible resources of sand and gravel are estimated to be 17.8 million tonnes (Table 3). The resource area is sparsely populated and the dominant land use activity is agriculture. The area is accessible by township roads and by County Road 17.

Selected Sand and Gravel Resource Area 19

Selected Sand and Gravel Resource Area 19 is an ice-contact stratified drift deposit that is located on the north side of Carroll Creek. It is surrounded by the outwash deposits that form resource area 20. The deposit is a single irregular knoll with relief of more than 15 m. The area currently contains 3 licenced pits (Pit Nos. 89, 90 and 91). Li-

cenced property (Pit No. 90) occupies the central portion of the area. Face heights at Pit No. 90 are approximately 9 m and expose stratified sand and gravel, with variable stone content. This pit can produce Granular A, B and M, hot-mix HL4 and Portland cement concrete coarse and fine aggregates. Crushable material is common, but its occurrence within the deposit is variable. Licenced Pit No. 89 is located on the west side of the deposit, adjacent to Pit No. 90. Pit No. 89 has a face height of 5 m and is located on the sandier flanks of the deposit. The gravel content at this site varies from 25 to 40%.

Resource area 19 occupies 52 ha exclusive of licenced areas. After dconsidering limited cultural constraints an estimated 36 ha are possibly available for extraction. Assuming an average thickness of 7 m, possible available sand and gravel resources are estimated to be 4.5 million tonnes (Table 3). Access to the area is provided by township and county roads.

Selected Sand and Gravel Resource Area 20

Selected Sand and Gravel Resource Area 20 consists of 2 portions of an outwash terrace deposit that lies in the valley of the Grand River. The resource area forms a broad terrace which is characterized by indistinct scarps that mark successively lower stages of water flow. A small ice-contact stratified drift deposit is located within the terrace and additional ice-contact stratified drift may underlie the outwash deposits. This ice-contact material may have formed the parent material from which the outwash was derived. Two small unlicenced pits (Pit Nos. 96 and 97) are located in the area. Face heights in the pits are 3 to 8 m and reveal gravel content ranging from 40 to 70%. The sand fraction tends to be dirty and field investigation of Pit No. 96 revealed the presence of some siltstone. Results of laboratory analysis for sample No. 95-ZLK-1004 (Table 9) collected from unlicenced Pit No. 97 which is located in a small ice contact deposit within the outwash material of selected area 20, indicate a petrographic number of 119.8 for hot-mix and concrete uses and 103.6 for granular use. The chert-cherty carbonate content of this sample is 8.1%. The material is acceptable for the production of Granular A, B and M, and HL4 coarse and fine aggregates.

Resource area 20 totals 440 ha, of which 371 ha are presently available for extraction. Assuming an average deposit thickness of 4 m, the possible available sand and gravel resources are estimated to be 26.3 million tonnes (Table 3). The lower portions of the resource area are located within the floodplain of the Grand River and extraction in these areas may not be feasible.

Selected Sand and Gravel Resource Area 21

Selected Sand and Gravel Resource Area 21 is a combination of esker and outwash deposits located along Swan Creek in both Pilkington and Nichol townships.

In Pilkington Township, the outwash terrace deposit is located on the north side of Swan Creek at its confluence with the Grand River. The terrace is narrower and slopes more steeply to the river level than the terrace deposits in resource area 20, however, the materials are similar in character.

South of Swan Creek, an esker deposit runs parallel with the creek. The esker consists of a single sharply defined ridge with local relief of 6 to 12 m. An unlicenced pit (Pit No. 98) is located in this part of the resource area. A 5 m pit face exposes gravel suitable for Granular A and B, as well as asphalt paving aggregate. The deposit covers 267 ha in Pilkington Township and is accessible by road and rail. The material at the west end of the deposit is acceptable for Granular A, B and M, and hot-mix HL4 coarse and fine aggregates. It is thought that the quality of the material continues to the east.

In Nichol Township the esker deposit continues as a single, narrow, segmented ridge that lies parallel to the course of Swan Creek. In general, the esker segments have relief of less than 6 m. No pits or other subsurface exposures are available in the esker or outwash deposits. Consequently, the texture and use suitability of the aggregate are unknown. The esker ridges are flanked by outwash terraces which were deposited in a glacial meltwater channel now occupied by Swan Creek. One water well drilled in the central portion of the terrace indicates that the deposit may be greater then 6 m thick.

The deposits within Nichol Township occupy a total of 173 ha. Generally, the deposits are thought to be suitable for crushed aggregate products. This is based on the few available water well records and on a basic understanding of the textural characteristics of esker and outwash deposits. The resource area is accessible by township and county roads and is reasonably close to local demand centres.

The resource area occupies a total of 440 ha of which approximately 336 ha could be available for extraction after considering limited constraints. Assuming an average deposit thickness of 5 m, possible resources of sand and gravel are estimated to be 29.7 million tonnes (Table 3). Although the area is accessible by road and rail, cultural constraints imposed by transport routes render a significant amount of the potential resource unavailable for extractive use. In addition, resources in the lower portions of the area may be unavailable for extraction due to their location on the floodplains of Swan Creek and the Grand River.

Selected Sand and Gravel Resource Area 22

Selected Sand and Gravel Resource Area 22 is made up of an outwash and an ice-contact stratified drift deposit located on the western boundary of Nichol Township, north of Elora.

Although no pits have been developed in this resource area, water well data indicates the presence of 7 to 14 m of coarse aggregate. Since no extraction has taken place, no texture or use suitability data are available. The resource area has been selected for protection because it may contain the greatest concentration of crushable aggregate in

Nichol Township. No other deposit in the township has comparable amounts of potentially crushable gravel.

The deposits which comprise the resource area occupy a total of 74 ha, of which 63 ha are possibly available for extraction. Assuming an average thickness of usable aggregate of 11 m throughout the 2 deposits, possible sand and gravel resources are estimated to be 12.3 million tonnes (Table 3). Portions of the resource area are unavailable for extraction due to its proximity to residential development in the community of Elora.

Selected Sand and Gravel Resource Area 23

Selected Sand and Gravel Resource Area 23 is a large outwash deposit located on the northwestern shore of Lake Belwood in West Garafraxa Township. The deposit forms part of an extensive series of outwash terraces that flank the Grand River throughout much of its length. This series of terraces is known as the Grand River Outwash (Cowan 1976). Numerous pits have been opened in the deposit under authority of wayside permits. The lands below the waters of Lake Belwood have also been the subject of a wayside permit by the Township of West Garafraxa, although no material has been removed to date. Currently only one pit is licenced for extraction (Pit No. 103) in the area. Depths of material are indicated as 8 to 13 m (Planning Initiatives Ltd. 1994a, Lotowater Ltd. 1995). Cowan (1976) notes that the deposits are 5 to 8 m thick. Gravel content ranges from 25 to 75% and much of it is suitable for crushing purposes, however, local presence of siltstone may affect quality. The currently licenced pit has pit faces of only 3 to 6 m. The material is acceptable for the production of Granular A, B Type 1 and M, and HL4 coarse and fine aggregates.

Resource area 23 covers 399 ha, exclusive of the licenced areas. After considering constraints an estimated 308 ha could be available for extraction. Assuming an average deposit thickness of 7 m, possible available sand and gravel resources are estimated to be 38.2 million tonnes (Table 3). Competing recreational and rural residential land uses, especially adjacent to county roads, and along the shoreline of Lake Belwood may restrict extractive development in parts of the resource area.

Selected Sand and Gravel Resource Area 24

Selected Sand and Gravel Resource Area 24, located in the southern part of West Garafraxa Township, consists of a thin sheet of outwash material that was deposited at the margin of the Orangeville Moraine during the time of its formation. No pits have been developed in the deposit and no subsurface information is available, however, it is thought that the deposit is similar in texture and thickness to Selected Sand and Gravel Resource Area 23.

Resource area 24 occupies 179 ha, of which 153 ha are possibly available for extraction. Assuming an average deposit thickness of 4 m, possible resources of sand and minor gravel are estimated to be 10.8 million tonnes (Table 3). Physical constraints on extraction are few and the resource area is well situated for local use.

Selected Sand and Gravel Resource Area 25

Selected Sand and Gravel Resource Area 25 consists of an outwash deposit located near the southern boundary of West Garafraxa Township, southeast of Lake Belwood. The outwash sands and gravels were deposited as irregular sheets along the flanks of the Orangeville Moraine. The deposit was mapped as gravel by Karrow (1968), however, data obtained from MTO for 2 pits that once operated in the deposit indicate the material has a low gravel content and is likely to be acceptable primarily for Granular B.

The resource area occupies 284 ha, of which 233 ha could be available for extraction. A power line right-of-way, several township roads and farms pose physical constraints on extraction. Assuming an average deposit thickness of 5 m, the possible sand and gravel resources are estimated to be approximately 20.6 million tonnes (Table 3). The resource area is accessible by township and county roads and by rail.

Selected Sand and Gravel Resource Area 26

Selected Sand and Gravel Resource Area 26 is an ice-contact stratified drift deposit located beside Selected Sand and Gravel Resource Area 25 in West Garafraxa Township and extends south-eastwards into Eramosa Township. The deposit forms part of the Orangeville Moraine, the bulk of which is located further to the east. Currently licenced Pit No. 104 is located in the resource area. There are two other pits (Pit Nos. 112 and 138), presently unlicenced, from which material was extracted in the past. Pit faces expose 2 to 5 m of well sorted, sand-rich aggregate with isolated lenses of crushable gravel. Because of the localized nature of the gravel detailed field testing would be required to identify those areas containing quantities of coarser aggregate. Granular A has been produced from the pits although extensive selection was required. The material is also suitable for Granular B and M.

The topography in Eramosa Township is rolling to irregular, with a maximum local relief of 46 m. The highest elevations occur on a small kame in the central portion of the resource area, where a now rehabilitated sand pit (Pit No. 138) had been developed. Faces reaching 5 to 6 m in height expose aggregate of variable quality which was extracted for hot-mix asphalt paving coarse and fine aggregate.

After considering limited constraints, 298 ha are potentially available for extraction. Assuming an average thickness of usable material of 5 m, possible resources are estimated to be 26.4 million tonnes (Table 3). Access to resource area 26 is provided by township and county roads.

Selected Sand and Gravel Resource Area 27

Selected Sand and Gravel Resource Area 27 is a well developed outwash fan deposit located in north-central Eramosa Township, near the settlement of Oustic. The material was deposited by water that flowed to the northwest from the margin of the Ontario ice lobe (Karrow 1968). The deposit has a relatively level surface and slopes gently to the northwest. Licenced Pit No. 130 is located in the northern part of the deposit. Faces in the pit range from less than 2 m to 6 m and expose moderately stratified sand and gravel. The material is of high quality and is acceptable for Granular A, B Type 1 and M, hot-mix HL4 and concrete coarse and fine aggregates.

The resource area occupies a total of 152 ha, of which 131 ha are possibly available for extraction. Assuming an average deposit thickness of 4 m, possible sand and gravel resources are estimated to be 9.3 million tonnes (Table 3). Access to the resource area is provided by township roads.

Selected Sand and Gravel Resource Area 28

Selected Sand and Gravel Resource Area 28, located in the south-central portion of Eramosa Township, forms part of an extensive glacial meltwater channel system that is now partially occupied by the Speed River and one of its tributaries. Resource area 28 has flat to undulating topography and slopes gently to the southeast. Water well data regarding subsurface materials are not available for this area, however, some information is provided by faces in 2 pits (Pit Nos. 143 and 145). Both sources expose a high percentage of coarse aggregate that is suitable for the production of Granular A, B and asphaltic hot-mix HL4 coarse and fine aggregate. Sand control may be required in the fine-grained portions of the deposit in order to produce crushed aggregates, while in other places, oversize material may need to be removed. Faces in the pits range between 3 and 5 m.

Selected Sand and Gravel Resource Area 28 occupies 263 ha of which 207 ha could be potentially available for extraction. Assuming an average thickness of 5 m in the resource area, possible resources of good-quality sand and gravel are estimated to be 18.3 million tonnes (Table 3). The population in the vicinity is sparse and agriculture is the main land use. Access is provided by gravel-surfaced township roads.

Selected Sand and Gravel Resource Area 29

Selected Sand and Gravel Resource Area 29 is an extensive outwash deposit located east and southeast of resource area 27. The topography of the area is rolling to irregular with isolated kettle depressions present on the surface of the outwash plain. No water well data are available for the resource area. Two unlicenced pits (Pit Nos. 140 and 141) have been previously worked in the deposit. Faces in the pits range from 3 to 5 m in height and expose coarse aggregate suitable for crushing.

Resource area 29 occupies a total of 589 ha, of which 467 ha are potentially available for extraction. Assuming an average usable material thickness of 4 m, the possible available resources are estimated to be 33 million tonnes (Table 3). The resource area is sparsely populated and is presently used for agriculture. As in resource area 27, access is provided by gravel-surfaced township roads.

Selected Sand and Gravel Resource Area 30

Selected Sand and Gravel Resource Area 30 consists of several esker segments that form the Eramosa Esker in the southern part of Eramosa Township. The esker trends westerly and consists of a single, narrow ridge, broken into numerous sections. The relief of the ridge is generally 3 to 6 m. Three licenced properties (Pit Nos. 133, 134 and 135) cover portions of the deposit. Faces in the pits are approximately 3 to 5 m high and expose sand and crushable gravel suitable for a range of road-building and construction products. The pits have been given a moderate to high use rating by the MTO.

The resource area occupies a total area of 56 ha. After considering limited constraints approximately 44 ha are possibly available for extraction. Assuming an average deposit thickness of 4 m, the possible remaining sand and gravel resources are estimated to be 3.1 million tonnes (Table 3). The resource area is well situated with respect to transport routes and local demand centres. As a result, it is an attractive site for local extractive development. In addition, esker deposits are generally well suited for rapid excavation and rehabilitation.

Selected Sand and Gravel Resource Area 31

Selected Sand and Gravel Resource Area 31 is an ice-contact stratified drift deposit consisting of a large hummocky area located south of Rockwood along Highway 7. The deposit forms part of the Paris Moraine.

One unlicenced pit (Pit No. 150) and one licenced source (Pit No. 136), are located in the resource area and expose 5 to 8 m of texturally variable aggregate. Pit data indicate that good quality crushable gravel is available in portions of the deposit. In other areas the deposit is primarily sand with a high silt content making the material unsuitable for most aggregate products. Testing of a site within this deposit (Ingham 1990) showed that up to 8 m of sand and gravel (20 to 50%) exist above the Amabel Formation dolostone. Water well records also indicate variable thicknesses of gravel, from 5 to 16 m, above bedrock. Further investigation of the deposit needs to be undertaken to identify those areas best suited for the production of crushed aggregates.

An additional potential resource exists in the Amabel Formation bedrock that underlies the resource area. The Amabel Formation is well suited for the production of many road-building and construction aggregates and

would be available for extraction beneath pits opened in the ice-contact stratified drift. For a description of the Amabel Formation and overlying surfical material, see the summary for test hole ER-TH-1 in Table 7.

Within Eramosa Township, this selected resource area includes 901 ha, however, after allowing for cultural and other constraints, approximately 889 ha are considered potentially available for sand and gravel extraction. Assuming an average deposit depth of 7 m the resource area could contain possible resources of up to 110.1 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 32

Selected Sand and Gravel Resource Area 32 is part of a large outwash deposit known as the Caledon Outwash. The main part of the Caledon Outwash is located in the Regional Municipality of Peel, east of Wellington County. Two pits have been developed in the deposit, one of which (Pit No. 157) is presently licenced (Ecological Services For Planning Ltd. and S.E.Yundt Limited 1992), with material being extracted from below water. This licence has recently been expanded to allow access to more resources located below water. Face heights in the pits are 4 to 5 m and expose stratified sandy gravel consisting of 65 to 80% gravel. Aggregate from the pits has been used for a range of granular base and subbase products. The material is also suitable for crushing, although in some areas poor quality of gravel may be a limiting factor for hot-mix paving uses. The pits are given a moderate to high use rating according to MTO standards.

Selected Sand and Gravel Resource Area 32 comprises 195 ha, excluding the licenced area. Previous extractive activity has been minimal and cultural features are primarily roads and watercourses. The area available for extraction is thus estimated to be 144 ha. Assuming an average deposit thickness of 5 m, total possible resources are approximately 12.7 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 33

Selected Sand and Gravel Resource Area 33 is located west of the village of Erin on the north side of the Credit River (Erin Branch), and represents an outwash terrace deposited in an extension of the Caledon Outwash meltwater channel system.

One unlicenced pit (Pit Nos. 168) has operated in the deposit during the past. Face heights range from 2 to 4 m and expose stratified sandy gravel with a crushable gravel content ranging from 35 to 60%. The aggregate from this pit has been used for Granular B Type 1 and for Select Subgrade Material (SSM). Due to high siltstone content the coarse aggregate fraction of crushed material is unsuitable for some products unless beneficiation is undertaken.

Resource area 33 covers an area of 296 ha. Some of this area is unavailable for extraction as Highway 24 stretches the length of the terrace and residential development is prevalent in some areas. Previous extractive activity has been minimal. The area remaining available for extraction is estimated to be 237 ha. Although water well data indicate as much as 18 m of gravel, a more conservative estimate of 8 m was used for resource calculation purposes. Possible resources in Resource area 33 are estimated to total approximately 33.6 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 34

Selected Sand and Gravel Resource Area 34 consists of a large portion of the Caledon Outwash situated at the eastern boundary of Erin Township. The material present in the deposit is described by Cowan (1976) as well-stratified, medium to coarse-textured with gravel content ranging from 25 to 75%. The deposit thickness ranges from 3 to 23 m. Overburden is up to 2 m thick. In addition, the water table has been encountered in several pits at depths of 9 to 15 m below ground surface.

Two licenced properties are located in the resource area (Pit Nos. 156 and 159). Face heights range from 5 to 15 m and expose stratified sandy gravel. The crushable material content ranges from 20 to 50%. Aggregate from the pits has been used for Granular A, B and M and for Select Subgrade Material. It is generally not suitable for higher specification uses. Undesirable quantities of siltstone and shale reduce the quality of the gravel and beneficiation must be undertaken to improve quality. Beneficiation procedures are used in large commercial pits developed in the Caledon Outwash in the Town of Caledon. The procedure is costly, however, the size of the deposit allows economies of scale that make the treatment economically viable. Pits in Area 34 have been given a low to moderate use rating (Deike 1976). Test results for sample 95-ZLK-1007, taken from an unlicenced pit (Pit No. 162) yielded a petrographic number of 128.5 for hot-mix and concrete and 109.0 for granular use, an unleached chert-cherty carbonate content of 3.0% and siltstone content of 4.5%.

Resource area 34 covers 638 ha, excluding licenced areas. Considering present and previous extractive activity and constraints due to residential development around the Village of Erin an estimated 436 ha are theoretically available for extraction. Assuming an average deposit thickness of 9 m, possible resources are calculated to be approximately 69.5 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 35

This selected resource area consists of outwash sediments deposited in low lying areas between drumlins in Guelph Township. At present, there are no licenced operations in this selected area, however, Pit No. 119 has been developed in this deposit. The resource area has been given a moderate to high use rating by the MTO, however, the deposit is irregular in extent and composition is variable. Testing by McLellan (1975) for the development of a recreational park showed an unpredictable content of crushable materials. Gravel content as low as 4 to 20% has been

reported (Deike 1981). Although the water table is close to the surface, deposit thicknesses of up to 8 m have been noted. Testing by the MTO has shown that, with selection, material in the deposit is acceptable for a wide range of products including asphaltic hot-mix HL4 and Granular A, B and M. The variability of this deposit may, however, present operational problems for commercial development.

Existing rural-residential uses along major access routes partially limit the availability of this resource area. Assuming an average resource thickness of 5 m and considering cultural constraints and previously extracted areas, the remaining area of approximately 428 ha contains possible resources of 37.9 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 36

Selected Sand and Gravel Resource Area 36, located on the east side of the City of Guelph, forms a part of the Speed River spillway system. The double terraced deposit occupies a total area of 211 ha with estimated thickness of material ranging between 4 to 6 m.

This well-stratified deposit contains one licenced property (Pit No. 114) and one abandoned site (Pit No. 123). A large quantity of crushable gravel (with gravel content of 50% or higher including oversize material) is available above the water table. The MTO has rated sources within this deposit as moderate to high (Deike 1981). Material derived from this deposit is acceptable for a wide range of products including HL4 asphaltic paving hot-mix and Granular A, B and M. Sand grading may vary and require blending for hot-laid aggregate uses.

Existing residential uses, the Guelph airport and industrial land recently serviced by the City of Guelph, severely limit the future availability of material from this resource area. After accounting for these cultural constraints and previously extracted areas, 121 ha remain available for possible resource extraction. Assuming an average thickness of 6 m in the upper terrace and 4 m in the lower terrace, the possible resources are estimated to be a maximum of 10.7 million tonnes (Table 3). As noted, much of this resource may be sterilized by any future encroaching urban development.

Selected Sand and Gravel Resource Area 37

Selected resource area 37 consists of an upper and lower linear terraced outwash deposit situated along the north side of the Speed River in both Guelph and Puslinch townships. Because of varying deposit thicknesses, the resource area has been divided into 2 areas, 37A and 37B.

Resource area 37A consists of the upper terrace of this outwash deposit and is notably thinner (about 5m) and sandier (gravel content 20%) in comparison to the lower terrace which comprises resource area 37B. Presently there are no licenced operations in the area, however unlicenced pits (Pit Nos. 124 and 125) supplied road subbase materials in the past. Detailed test information is not available for this area. Because of industrial development along Highway 24 the availability of material from this resource area is limited.

After accounting for cultural setbacks, only 148 ha from the original 237 ha, are available for extraction. Assuming an average depth of 5 m for resource area 37A, estimated resources are calculated to be 13.1 million tonnes (Table 3).

The lower terrace of this outwash deposit makes up Selected Sand and Gravel Resource Area 37B. This deposit has a thickness of 9 m or more of well stratified sand and gravel with a gravel content of 60%. Although parts of the deposit may contain excess fines for some uses, products such as Granular A and B Type 1 can be produced (Deike 1981). The gravels are also suitable for Granular M, hot-mix asphaltic paving and Portland cement concrete coarse and fine aggregates provided that suitable processing is carried out. A good portion of the deposit is licenced. Pit No. 115 is both a pit and a quarry. It is largely located in resource area 37B, but also crosses over into resource area 37A. This large commercial operation has washing and asphalt facilities to supply a wide range of products for the Guelph and Cambridge markets (Trauffer 1976).

Resource area 37B occupies a total of 136 ha, of which 76 ha are potentially available for extraction after considering constraints. Assuming an average thickness of usable sand and gravel material of 6 m, possible sand and gravel resources in Area 37B total 8.1 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 38

Selected Sand and Gravel Resource Area 38 is part of an extensive outwash deposit that lies immediately north and west of the Paris Moraine. The resource area lies within both Puslinch Township and the south end of the City of Guelph. Extractive activities have not been extensive in the part of the deposit that lies within the City of Guelph. The resource area appears suitable for the production of Granular B Type 1 with some areas suitable for Granular A. With processing, parts of the deposit would be suitable for hot-mix asphalt paving and Portland cement concrete coarse and fine aggregates.

In the northern part of the Puslinch Township portion of the resource area, a materials investigation (Dominion Soils Investigation Inc. 1979) revealed that the deposit is generally coarser near the surface and becomes finer with depth. The average deposit thickness is 5 m, however, beneath the coarse aggregate an additional 7 m (average) of finer material is present. This lower material is marginally suitable for Granular A. With processing, some parts of the deposit would be suitable for hot-mix asphalt paving and Portland cement concrete coarse and fine aggregates.

Resource Area 38 occupies a total of 846 ha, but after allowing for cultural setbacks, such as developed areas within the City of Guelph, a major highway corridor and an industrial subdivision, only 563 ha are potentially avail-

able for extraction. Assuming an average thickness of usable material of 6 m the possible available resources of approximately 59.8 million tonnes (Table 3) are present.

Selected Sand and Gravel Resource Area 39

Selected Sand and Gravel Resource Area 39 is part of an outwash plain and spillway deposit associated with the Paris Moraine. The resource area is located north of Puslinch Lake and southwest of the City of Guelph, and also extends along the south side of the Speed River.

Pits along the Speed River (Pit Nos. 172, 176, 177, 178 and 181) have face heights of approximately 6 m. Portions of the deposit have considerably greater thickness and some operations are also licenced for quarrying operations. Further details regarding quarrying are provided in the bedrock section of the report. The gravel content is approximately 70% in the licenced properties; however, considering the deposit as a whole the average gravel content is approximately 60%. In these pits, products such as Granular A, B Type 1 and M, hot-mix asphaltic paving HL4 and concrete coarse and fine aggregates can be produced (Deike 1976). Blending of different sand grades is also required in some areas to produce acceptable aggregates for hot-mix paving.

In the southern portion of the resource area there are 2 licenced pits (Pit Nos. 181 and 182) as well as several abandoned or rehabilitated pits and sites from wayside permits. The average gravel content of this part of the deposit is 60 to 80% a large quantity of which is crushable and of high quality. The water table is high throughout much of this area, located generally 3 to 5 m below the surface. Laboratory tests performed by the MTO on the materials from the Puslinch Crown Resources Management Area indicate that the gravel is suitable for Granular A and M. The gravel portion is of acceptable quality for hot-mix asphaltic paving HL 3, HL4, and HL8 and for structural concrete coarse aggregates. This source can currently produce Heavy Duty Binder coarse and fine aggregates. Previously, one of the commercial sources in this deposit produced the same materials on a trial basis. The sand fraction meets the specifications for all grades of hot-laid asphalt as well as concrete sand. Since there is a low percentage of sand, blending will also be necessary for all hot-mix paving fine aggregates (Deike 1976). Although the above data pertains to the Puslinch Crown Resource Management Area the material in the remainder of the resource area is expected to be similar in nature.

Resource area 39 comprises of 793 ha, however, after considering cultural constraints, the area potentially available for extraction is 645 ha. Assuming an average depth of material of 6 m, the possible resources are 68.5 million tonnes (Table 3).

Selected Sand and Gravel Resource Area 40

Selected Sand and Gravel Resource Area 40 is an outwash deposit associated with the Galt Moraine. This deposit is situated near the junction of Highways 401 and 6 and occupies a total of 1004 ha. Ten currently licenced operations in this deposit are normally working a 3 to 8 m face above the water table, and on several properties an additional 6 m of material below the water table are removed by dragline. Most of the pits are licenced to allow extraction below the water. In most exposures the material is well stratified and sorted and there is generally less than 5% oversize material (Planning Initiatives Ltd 1989,1994b). The Galt-Aberfoyle Creek drainage system bisects the deposit and results in portions of the deposit being covered by wetland. A major watershed study is currently being completed and will be examining among other matters, the potential impact of extraction on that watershed.

Selected Sand and Gravel Resource Area 40 has a considerable thickness of usable material. Portions of the deposit are up to 18 m in depth with 40 to 80% gravel content. Because the material in the eastern part of the resource area was deposited close to the ice front the aggregate is more poorly sorted, but thicker, than in the western part. The material also becomes finer towards the west. Data from the MTO indicate that the material is acceptable for Granular A, B Type 1 and M, hot-mix asphaltic paving and Portland cement concrete coarse and fine aggregates (Deike 1976). The sand requires blending for hot-mix applications.

Removing licenced and previously extracted areas and cultural setbacks, the available resource area consists of approximately 900 ha. Assuming an average thickness of 9 m throughout the whole deposit above and below the water table, the possible available sand and gravel resources are estimated to total 143.4 million tonnes (Table 3).

RESOURCE AREAS OF SECONDARY SIGNIFICANCE

A total of 59 aggregate deposits have been identified as being of secondary significance. These areas include esker, outwash, ice-contact and kame deposits. These deposits contain materials similar to those selected at the primary level, however, aggregate quality is more varied and the quantity of available material is limited. Also, the possibility of finding fine-grained material within these deposits is greater. Nevertheless, protective measures should be considered for these resource areas since they provide alternate extraction sites.

Cowan (1979) indicates that the aggregate resources contained in the Saugeen Kames, situated in the northern part of Minto Township, are of regional importance. All of the major outwash deposits in that area have been selected as resource areas of primary significance. The kames are composed of ice-contact stratified drift deposits that contain large possible resources of sand and significant, although variable, amounts of crushable gravel. The ice-contact deposits form “islands” of rugged, irregular topography, surrounded by the relatively flat outwash deposits, and are easily delineated on topographic maps. All of the major ice-contact stratified drift deposits in the northern part of the township have been selected as sand and gravel

resource areas of secondary significance. These deposits are generally composed of poorly to well-sorted, stratified sand. In places, oversized boulders are present. The amount and distribution of the crushable material is highly variable in all of the deposits. Cowan (1979) classifies the deposits as, "Area(s) underlain by stratified drift which contain localized masses of usable granular aggregates. Exploration and development cost may be high." Cowan also notes that the probability of locating deposits suitable for local use is moderate, but is low for locating large commercial deposits.

In addition to the ice-contact deposits in the north, several esker segments in the central and southern parts of Minto Township have been selected as sand and gravel resource areas of secondary significance. These deposits have been selected at the secondary level because they contain less usable material than those selected at the primary level or have had most of the usable material removed by prior extraction. The esker deposits at Melgund, and those in the extreme southwest corner of the township for example, have been extensively worked in the past, and little of the esker ridges remain. Additional crushable material may be available below many of the pits and the deposits may contain material useful for local needs. The established extractive land use of these areas makes them attractive sites for continued extraction. Several small esker segments at the Maitland River have also been selected at the secondary level. These deposits are quite thin but may contain small amounts of crushable gravel.

An esker and ice-contact stratified drift deposit located at the eastern boundary of Minto Township has also been selected at the secondary level. The deposit forms the western end of the Riverstown Esker deposit. Two pits (Pit Nos. 10 and 28) in the deposit have been given a moderate to high use rating by MTO (Deike 1978a). Pit faces expose 3 to 6 m of sand and gravel suitable for most uses. Silt seams in the deposit, however, may pose problems for some applications.

The outwash deposit in the extreme northeast corner of Minto Township has been selected as an area of secondary importance. It was formed in the same manner as Selected Sand and Gravel Resource Area 6, but because it is a thinner deposit, the area has been classified at the secondary level of significance.

In the southeast part of the township another outwash deposit has been selected as a resource area of secondary significance. This deposit is part of the network of outwash channels situated in the south-central part of the township. Most of these channel deposits are sand-rich, however, this deposit contains a considerable amount of gravel. Licenced Pit No.15, which is partially included in this area, has 5 to 6 m faces containing 45 to 50% gravel. The local presence of excess fines may limit the uses of the aggregate.

In Arthur Township, several outwash and ice-contact stratified drift deposits located south of Mount Forest and 2 small deposits near the western and southern boundaries of the township have been selected as sand and gravel resource areas of secondary significance. Although very little extraction has taken place in these deposits and subsurface data are scarce, there are indications that significant amounts of both sandy and crushable aggregate exist. Water well data for some of the deposits indicate thicknesses of sandy aggregate in excess of 9 m. Further investigation on a detailed level is necessary to identify those portions of the deposits best suited for extraction.

A small selected resource area of secondary significance is located in north-central Arthur Township. This ice-contact stratified drift deposit presently supports one licenced property (Pit No. 37) containing aggregate with 40 to 75% gravel that, with some selection and sand control, may be used for crushed products. An additional resource area of secondary significance located east of Mount Forest is similar in character to the previously described deposit and is suitable for the production of crushed aggregate.

In West Luther Township, several ice-contact stratified drift deposits situated in the northeast part of the township have been selected as sand and gravel resource areas of secondary significance. The deposits generally contain fine-grained aggregate and may be suitable for some local sand uses.

The largest of the resource areas of secondary significance is the ice-contact stratified drift deposit that forms the eastern flank of Selected Sand and Gravel Resource Area 12. Very little subsurface information is available for this deposit, but limited MTO data indicate that it contains large amounts of fine sand and lesser amounts of crushable gravel. Areas of hummocky topography within the deposit may contain small amounts of gravel. Further investigation of the deposit is required.

Several small ice-contact stratified drift deposits in the central and northern parts of the township have also been selected at the secondary level. No subsurface information is available for these deposits, but it is likely that they contain small amounts of sandy aggregate suitable for local road subbase use.

In Maryborough Township, the sandy deposits that surround the lower flanks of the esker deposit in Selected Sand and Gravel Resource Area 13 have been classified at the secondary level. These deposits contain small amounts of material suitable for low specification uses but, because of the limited quantities of possible resources throughout Maryborough Township, they may be significant for local use. While some licences in the northern part of selected resource area 13 have been cancelled, there has been recent expansion of activity in this area of secondary significance. Two licenced pits (Pit Nos. 64 and 65) with faces up to 12 m have been opened in the deposit. Material from this source is suitable for use as Granular A and B Type 1 (Deike 1978d).

A small outwash deposit located in the northern portion of Maryborough Township near the settlement of Rothsay has been selected as a resource of secondary significance. Pit No. 72 was formerly operated under a wayside permit in the central part of the resource area. Faces in the pit are approximately 3 m in height and expose predominantly sandy aggregate with isolated pockets of

crushable gravel. Crushed aggregate has been produced from the resource area, however, selection and sand control was required. Deike (1978d) indicates the material is suitable for the production of Granular A as well as HL4 asphalt paving coarse and fine aggregates.

A small ice-contact and esker deposit situated in the north-central part of Maryborough Township has also been selected as an area secondary resource. One licenced pit (Pit No. 66) is located within both these deposits. Material from this source is suitable for use as Granular Base Course A and sub-base aggregates (Deike 1978d)

Four esker segments located in the southern portion of Maryborough Township have also been selected as secondary resource areas. Some fines and deleterious lithologies are present within these deposits.

In Peel Township, several small outwash deposits and ice-contact stratified drift deposits in the northern and southern portions of the township have been selected as sand and gravel resource areas of secondary significance.

Several outwash terrace deposits situated in the northwestern part of Peel Township along the banks of the Conestogo River contain small amounts of sandy gravel that, in places, may be suitable for crushing. A few long-abandoned pits may exist in the deposits but no information on the type or quality of material removed is available. Further testing of the deposits would be required to identify areas suitable for extraction.

Several ice-contact deposits along the northern and southern boundaries of Peel Township have been selected at the secondary level of significance. Some extraction in these deposits has taken place in the past. Shallow faces in these pits expose dirty sandy gravel which, in places, may be suitable for crushed products, however, high chert content in the gravel may pose problems for crushed products. The silt content of the fine aggregate is high in places and prohibits use of the material for higher specification products.

Test results for sample No. 95-ZLK-1005 (Table 9) taken from licenced Pit No. 75 provide a petrographic number of 130.6 for hot-mix and concrete and 100.0 for granular uses with an unleached chert-cherty carbonate content of 15.3%. The high chert-cherty carbonate content makes the contained material unacceptable for hot-mix paving and concrete coarse aggregates. The fine aggregate tends to contain a high percent of fines for hot-mix and concrete uses. For further aggregate information of this area see the summary for test hole PE-TH-1 in Table 7.

In the extreme southern corner of Peel Township, 2 areas of sand-rich outwash have been selected as resource areas of secondary significance. Testing done for a licence (Pit No. 78) north of Wallenstein (Black, Shoemaker, Robinson and Donaldson Ltd. 1994) indicated up to 3 to 4 m of sandy gravel and cobbles (55 to 75% gravel). It is apparent that parts of the deposit are overlain by clay. Much of the licenced area lies outside of the boundaries of the selected resource areas. Further investigation may provide data that would allow expansion of the currently outlined resource area.

In the south-central part of Peel Township, an ice-contact/esker deposit has been selected at the secondary level because of minimal remaining aggregate material.

A secondary deposit located along the eastern boundary of Peel Township consists of a low esker segment, with small ice-contact deposits at the northern and southern ends. At one time, 2 pits, now exhausted, were opened in the deposit. Shallow faces in the pits expose sandy aggregate with considerable silt content in places. The aggregate was used to produce Granular B Type 1 (Deike 1978e).

In Pilkington Township several outwash deposits in the central and southern portions of the township have been selected for possible resource protection at the secondary level. The outwash was deposited as part of an extensive meltwater channel system that extends to the south from the Grand River into an east-trending channel, now partially occupied by Cox Creek. The entire system is known as the Cox Creek spillway (Bryant and McLellan 1974).

The Cox Creek spillway deposits are relatively thin and sandy. Little extraction has occurred, although a few abandoned pits and one licenced pit are present. The currently licenced source (Pit No. 93), located in the eastern portion of the deposit, has a face height of 3 to 5 m with a considerable amount of oversized material present. Subsurface information on the texture and quality of the aggregate is scarce. Bryant and McLellan (1974) indicate that the deposit tends to be dirty and/or unsorted and contains significant proportions of clay and silt. MTO surveys indicate that the material has difficulties meeting highway specifications. Despite the generally low quality of the material, its widespread occurrence provides alternatives in locating pits for the provision of locally needed road subbase aggregate.

Portions of the Ariss Esker, located in the southern part of Pilkington Township, have also been selected at the secondary level of significance. The esker is highly segmented and consists of several single, sharply defined ridges with relief of less than 6 m. Minor resources of sand and gravel may be available in these deposits.

In Nichol Township several thin, sandy outwash deposits located in the central and southern portions of the township have been selected as sand and gravel resource areas of secondary significance. Although these sources are probably not suitable for the production of crushed aggregates, they constitute virtually the only alternative sources available for extraction in the township, if Resource Area 21 or sections of Resource Area 22 are, for some reason, unavailable for extraction. These secondary level sources may be able to supply substantial amounts of subbase aggregate, sand cushion and fill for local use. Two unlicenced pits (Pit Nos. 100 and 101), developed in parts of the secondary resource areas, expose 2 to 4 m of sand-rich aggregate.

In West Garafraxa Township, a large portion of the Orangeville Moraine occupies the southeastern corner of the township. Although water well data in the deposit indi-

cate a considerable thickness of granular material, the crushable gravel is variable in occurrence and is usually overlain by an upper silty fine sand unit that may be up to 8 m thick. Cowan (1976) notes that granular materials are best exposed where erosion has taken place. In the portion of the moraine located in Erin and East Garafraxa townships, considerable amounts of crushable gravel are found at depth. The Orangeville Moraine covers a considerable area in West Garafraxa Township and may contain large amounts of gravel suited for a variety of uses. Cowan (1976) includes the area in a class of deposits where prospecting and development costs are high and the probability of locating economic deposits is low. Aggregate suited for local needs may, however, be available.

Two small ice-contact stratified drift deposits are located in the southwestern corner of West Garafraxa Township. These resource areas have rolling topography and relief of up to 15 m. A small pit was previously licenced for operation in the area and faces exposed 3 to 6 m of sandy aggregate with low gravel content. Crushable gravel is available in pockets and lenses within the sandier material.

Additional sand and gravel resource areas of secondary significance include several outwash and ice-contact deposits. Two outwash deposits flanking the Grand River consist of relatively thin narrow terraces. These terraces have been extracted at 2 locations in the past and may contain useful resources of sandy gravel. East of Fergus are 2 areas of ice-contact stratified drift. These deposits are extensively built over but small quantities of possible resources may still be available.

In Guelph Township 3 outwash deposits and one small esker deposit are selected as resource areas of secondary significance. One of the outwash deposits selected as a secondary resource area adjoins Selected Sand and Gravel Resource Area 35. Testing by the MTO and water well log data suggest that this area is less than 3 m thick but the aggregate is of sufficient quality to yield road base subbase aggregates (Granular A, B Type 1 and M) and hot -mix paving coarse and fine aggregates (Pit No. 122).

Also in Guelph Township, a second outwash deposit selected at the secondary level of significance is a continuation of Selected Resource Area 34, however, the deposits thickness is not as great. Granular investigations have not been reported for this area and, therefore, quality information is not available.

A third outwash deposit, located in the City of Guelph, is an eastward extension of selected Resource Area 37. Data from water well records and from licenced sand and gravel pits in adjacent Puslinch Township indicate that the deposit is predominantly gravel with a thickness ranging from 6 to 17 m. The aggregate in this part of the outwash deposit is believed to be of poor quality compared to that of Resource Area 37.

Much of the esker gravel in the Guelph area has been fully exploited, except for a small segment of the Ariss Esker, situated on the northern limits of the City of Guelph. Although not subject to detailed investigation, the deposit could be a useful source of road construction aggregate.

In Eramosa Township, several ice-contact stratified drift and outwash deposits have been selected as sand and gravel resource areas of secondary significance. The first outwash deposits is a thin but extensive outwash plain located in the northern portion of the township. It is developed on the northern edge of the outwash that forms Resource Area 27 and may be a northerly extension of that deposit. Although data is scarce it is thought to consist predominantly of sand and be less than 3 m thick.

Two outwash deposits adjacent to Resource Area 28 in Eramosa Township have also been selected at the secondary level of significance. These deposits are similar in character and use suitability to Selected Sand and Gravel Resource Area 28. However, since the depth of aggregate in the deposits is thinner than in Selected Resource Area 28 they have been selected at the secondary level.

The ice-contact stratified drift deposit in Eramosa Township, that partially surrounds Resource Area 27 has been selected at the secondary level of significance. The deposit has subdued, but irregular topography and has several silt filled depressions that may have formed as a result of the melting of blocks of ice stranded in the ice marginal area. At the eastern edge of the deposit, an abandoned pit exposes variably textured material with isolated pockets of coarse aggregate suitable for crushing. The remaining aggregate is predominantly sand and contains excess silt. The material is suitable for low-specification uses.

Two ice-contact deposits situated in the northwest corner of Eramosa Township have been selected at the secondary level of significance. The deposits are similar in nature to Resource Area 26, but are thinner and sandier. Coarse aggregate may be found in isolated pockets.

A small ice-contact stratified drift deposit in the northern corner of Eramosa Township has also been selected as a resource area of secondary significance. The deposit is a western extension of the Orangeville Moraine. The deposit is predominantly sand, but minor resources of crushable gravel may be found in isolated pockets.

Another small ice-contact feature located at the centre of Eramosa Township has also been selected as a resource area of secondary significance. A licenced pit (Pit No. 132) situated in the deposit exposes 3 to 5 m of irregularly bedded sand and gravel. The presence of silt in the upper layers of the deposit limits the suitability of the deposit for high-specification uses.

In Erin Township, several resource areas of secondary significance have been identified. Further investigation should be undertaken in these areas. Portions of the Hillsburgh meltwater channel, which extends from the eastern boundary of the township to Hillsburgh, may have moderate aggregate resources. Two unlicenced pits (Pit Nos. 160 and 161) have been opened in the deposit and contain faces of 3 to 5 m. Water well data in the area indicates thickness of sandy gravel ranging from 8 to 20 m. Although the resource area is large, much of the southern portion is unavailable for extraction because of development around Hillsburgh.

The Orangeville Moraine which covers much of northern Erin Township, has also been identified as a resource area of secondary significance. Although water well data in the deposit indicates a considerable thickness of granular material, the crushable gravel is variable in its occurrence. The gravel is usually overlain by an upper silty fine sand unit up to 8 m thick. Cowan (1976) notes that the granular materials are best exposed where erosion has taken place; for instance, numerous gravel showings are present in the walls of the entrenched Hillsburgh Meltwater Channel. Two licenced pits (Pit Nos. 151 and 152) in the central portion of the deposit have pit faces ranging between 6 and 20 m with well-stratified, poor to well-sorted sand and gravel consisting of up to 50% gravel, 40% of which exceeds 2.5 cm in diameter. Little quality data is available for this part of the moraine, but Cowan (1976) notes that to the north in Mono Township, siltstone is present in the aggregate and that beneficiation is usually required for high specification uses. Licenced Pit No. 151 is situated in the moraine northwest of Pit No.152. Deike (1976) indicates that this source is developed in the upper sand unit only. Coarse aggregate may be available at greater depths. Licencing reports for a recent expansion of Pit No. 154, located in the south central part of the resource area, indicate an estimated volume of 1.5 million tonnes in a 4.8 ha expansion. The percentage of crushable gravel increases with depth.

The Orangeville Moraine covers a very large area in Erin Township and may contain considerable amounts of aggregate suitable for a variety of uses. Although Cowan (1976) includes the area in a class of deposits where prospecting and development costs are high and the probability of locating economic deposits is low, further detailed investigation, especially in eroded areas on the flanks of the moraine, may identify suitable coarse aggregate resources. Aggregate materials in the moraine contain a considerable amount of siltstone which limits suitability of the aggregate to Granular A, B Type 1 and M uses. Coarser deposits may be beneficiated by special crushing procedures to elevate suitability to hot-mix paving coarse aggregate quality.

In addition, 2 ice-contact stratified drift deposits, located in south-central Erin Township, have been selected as resource areas of secondary significance. Two pits have been opened in the smaller deposit, one of which is presently licenced (Pit No.158). The pits expose approximately 3 to 6 m of variable sand and minor gravel. Similar material may be found in the larger of the 2 resource areas, although subsurface data are lacking. Detailed field checking in this deposit would be required to identify areas suitable for extractive development.

Within Puslinch Township, several aggregate deposits have been selected as sand and gravel resource areas of secondary significance. The first of the outwash deposits is quite thick and extensive and is located south of the Eramosa River, in the northeastern part of the township. Data from water well records and from licenced sand and gravel pits indicate that the deposit is predominantly gravel with a thickness of 6 to 17 m. One licenced sand and gravel pit has been opened in this resource area (Pit No. 175). A 6 to 7 m face exposes poorly sorted, often coarse aggregate consisting of approximately 60 to 70% gravel and 30 to 40% sand. This deposit is currently active and is being expanded. According to Burwasser (1976) the resource area contains large aggregate reserves. The deposit extends through the southern part of the City of Guelph and becomes part of Selected Resource Area 37. Field investigation reveals that the quality of the aggregate in the area selected at the secondary level is much poorer in quality than that in Selected Sand and Gravel Resource Area 37.

Another outwash deposit of secondary significance in Puslinch Township is an outwash plain located along the west side of the Paris Moraine. This deposit is located directly northeast of selected Resource Area 38. Water well information suggests a possible depth of 21 m of gravel, however, quality data are scarce for the deposit.

Within Puslinch Township, a secondary sand and gravel resource area consists of an outwash terrace found in channels that are associated with the Eramosa River complex. This secondary area is located on the northeastern boundary of the township. No subsurface data are available for this deposit and there has been no extractive activity. A property to the north of the township in the same deposit reveals a 5 m face with a gravel content of 50 to 60%. This outwash terrace has been designated as secondary due to the large area lost to cultural setbacks that limit the possible resources required for large-scale commercial production.

A deposit identified at the secondary level of significance in Puslinch Township lies along the northern perimeter of selected Resource Area 39. This selected area is shown on the surficial map (Karrow 1987) as consisting primarily of peat and muck, with some localized surface exposures of ice-contact and outwash gravels. Some licenced pits (Pit Nos. 183, 185 and 187) extend into this area. Examination of water well records indicate up to 21 m of sand and/or gravel below a mixture of peat, muck, clay, and/or stones. While the upper materials may preclude commercial extraction at this time, the rapid depletion of resources in the immediate area may make economic extraction feasible in the future.

A deposit ranked at the secondary level of significance in Puslinch Township consists of 2 glaciolacustrine plain areas situated southwest of Resource Area 39. Water well records indicate possible sand or sand and gravel thicknesses of from 12 to 24 m.

Additional secondary level areas are located west of Puslinch. One area includes a portion of glaciolacustrine sands and outwash gravel. Two unlicenced pits (Pit Nos. 205 and 206) have face heights of 5 to 11 m with 50 to 80% gravel. The second area, situated closer to Puslinch, has been mapped as ice-contact gravel (Karrow 1987). Three unlicenced pits (Pit Nos. 202, 203 and 204) in or immediately adjacent to this area show face heights of 3 to 11 m, with 15 to 80% gravel content.

BEDROCK GEOLOGY

The Paleozoic rocks underlying the glacial drift in the County of Wellington comprise a portion of the eastern rim of the Michigan Basin. In this area the rocks are of Silurian and Devonian age, and consist mainly of limestones and dolostones which contain some shale, gypsum, anhydrite, salt and chert. The rock formations, in general, lie conformably over each other and dip gently toward the southwest. In Puslinch Township, the Silurian Guelph and Amabel Formations dip southwest at 4 to 6 m/km (Morrison Beatty Ltd. 1989). The eastern boundary of the Township of Erin nearly reaches the Niagara Escarpment, however, is far enough away to be outside the Niagara Escarpment Plan Area.

The county is underlain by a series of formations ranging from the youngest Bois Blanc Formation of Middle Devonian age in the west, to subsequently older formations towards the east. These older formations include, in descending stratigraphic order, the Upper Silurian Bass Islands and Salina formations, and the Middle Silurian Guelph and Amabel formations (Chart C). The areal distribution of the bedrock formations are shown on Maps 2A and 2B (Sanford 1969, Ontario Geological Survey 1991).

The bedrock surface is relatively even, but it is interrupted in several places by steep sided valleys which are now filled with glacial drift. Except for local exposures in river valleys and quarries, there are no major outcrops of bedrock within the county. In general, overburden thickness is greater in the northwestern townships. The most bedrock exposures and thinnest overburden occur in the townships of Eramosa, Erin, Guelph and Puslinch and in the City of Guelph.

The Bois Blanc Formation consists of brownish grey, medium-grained, medium- to thin- bedded, cherty limestone. It has been quarried for crushed stone products at several locations in the Niagara Peninsula and is suitable for Granular A, B and M. The high chert content that characterizes the Bois Blanc Formation makes the crushed rock unsuitable for hot-mix asphalt paving and Portland cement concrete coarse and fine aggregates (Hewitt 1960). The formation occurs in the southwestern part of Minto and Maryborough townships (Map 2A). The drift cover over the formation exceeds 15 m except for an area in the central portion of Minto Township. No areas of this formation have been selected for resource protection.

The Bass Islands Formation occurs in a 3 km wide band that trends northwest through the central part of Minto Township and through the western part of Maryborough Township. The formation consists of up to 40 m of brown, microcrystalline dolostone. It is extensively quarried in the Niagara Peninsula and is suitable for the production of crushed aggregate for Granular A, B and M, hot-mix paving and Portland cement concrete coarse and fine aggregates (Hewitt 1960, 1972). Drift cover over the formation is greater than 15 m, except in an area in the central part of Minto Township, southwest of Harriston (Map 2A).

The Salina Formation consists of about 100 m (Telford 1979) of grey to tan, soft shale and dolostone with numerous interbedded evaporitic deposits of salt, anhydrite and gypsum (Liberty and Bolton 1971, Hewitt 1972). In several areas throughout Ontario, salt, anhydrite, and gypsum are mined as an industrial mineral and chemical resource (Hewitt 1960). Gypsum is mined at Hagersville, Caledonia and Drumbo. Salt is mined at Windsor and Goderich. The formation is not suitable for road construction aggregates. This formation occurs in: the northern and eastern part of Minto Township; most of Arthur Township; the central, northern and eastern part of Maryborough Township; most of Peel Township; the western corner of Pilkington; the southwest corner of West Luther and the northwest corner of West Garafraxa townships (Maps 2A and 2B). In all of these areas, the formation is overlain by more than 15 m of overburden. For this reason and because of its lack of suitability for road aggregate uses, no areas underlain by the Salina Formation have been selected for resource protection.

The Guelph Formation underlies parts of West Luther, West Garafraxa, Nichol, Pilkington, Guelph, Puslinch and Eramosa townships, the northeast corner of Arthur Township and the western and central parts of Erin Township (Maps 2A and 2B).

The formation consists mainly of buff coloured, irregular medium- to massive-bedded, fine- to medium-crystalline, sucrosic dolostone (Liberty and Bolton 1971, Telford 1976). Its thickness is about 40 m. Some beds contain abundant fossils which weather irregularly. The dolostone generally has high chemical purity and is a valuable raw material for chemical and metallurgical products (Hewitt 1960). In general, the rock is of reefal origin and therefore, it tends to be soft and weathers easily. In general, it is not well suited for high quality road construction uses, such as hot-mix paving and Portland cement concrete aggregates. In the inter-reefal parts of this formation, however, the rock may be sounder and more resistant to weathering. In such locations, the rock may be acceptable for higher quality aggregate uses.

The Guelph Formation is extracted on a large scale at the Guelph Dolime quarry (Quarry No. 1) for the production of lime (Hewitt 1960, Telford 1976) and also at the Lafarge Canada Inc. quarry (Quarry No. 2) in Puslinch Township. In most areas, the Guelph Formation is overlain by glacial drift greater than 15 m in thickness. Thinner drift cover occurs in: the north central part of West Luther Township; in the southern part of West Garafraxa Township along the Grand River; the valleys of the Grand River, Irvine Creek and Swan Creek in Nichol Township; the central and southern part of Eramosa Township; many parts of Guelph and Puslinch townships; and in the City of Guelph. In the valleys of the Eramosa, Grand and Speed rivers, and the southern part of Puslinch Township, outcrops of this formation occur. In some of these areas, parts of this formation have been selected for resource protection.

Chart C - Bedrock Resources Summary
REGIONAL MUNICIPALITY OF WELLINGTON

FORMATION	ROCK TYPE	APPROXIMATE THICKNESS (m)	SUITABILITY AGGREGATE	OTHER USES	OCCURRENCE	NOTES
Bois Blanc	Limestone, cherty, brownish grey, locally fossiliferous	3-50	Yes (Granular base and subbase only)	-	Southwest part of Minto and west corner of Maryborough townships under more than 8 m of overburden	High chert content makes this formation unacceptable for hot-mix paving and concrete. Chert from this formation is found in gravel in varied amounts
Bass Islands	Dolostone, brown microcrystalline	40	Yes	-	Central part of Minto and west part of Maryborough townships under more than 8 m of overburden	Good quality dolostone, used for high quality aggregates on Niagara Peninsula.
Salina	Shale and dolostone with layers of gypsum, anhydrite and salt	100	No	Gypsum, anhydrite and salt	East part of Minto, most of Arthur, all of Maryborough except west, most of Peel, west corner of Pilkington, southwest corner of West Luther, and northwest corner of West Garafraxa townships under more than 8 m of overburden	Gypsum mined at Hagersville, Caledonia and Drumbo; salt is mined at Windsor and Goderich.
Guelph	Dolostone, fossiliferous, light brown, medium- to massive-bedded	40	No, in most areas; yes in a few areas (best in interreefal areas)	Chemical and metallurgical stone	Most of West Luther, West Garafraxa, Nichol, Pilkington, Guelph, Puslinch and Eramosa townships and northeast corner of Arthur, west and central part of Erin townships	Generally has high chemical purity and locally is very pure. Is used as chemical and metallurgical stone. Generally poor aggregate better in interreefal areas.
Amabel	Dolostone, from very thin to medium bedded brownish grey to greyish black, fine crystalline, bituminous (Eramosa Member) to thick bedded, fossiliferous, white, micro- and fine crystalline	30-35	Yes	Armourstone	East part of Puslinch, east corner of Guelph, south part of Eramosa, south and east part of Erin townships.	High quality, well suited for hot-mix paving and concrete aggregates, a provincially significant resource. Outcroppings and less than 8 m overburden occur at east corner and along Eramosa River in Guelph Township, City of Guelph and Eramosa Township, east corner and east of Town of Erin in Erin Township.

The Amabel Formation underlies the southern part of Eramosa, the eastern part of Puslinch and the eastern part of Erin townships. It forms the hard erosion-resistant cap of the Niagara Escarpment. The formation has been separated into 2 units on the basis of textural differences. The upper level is named the Eramosa Member and consists of very thin- to medium-bedded, brownish grey to greyish black, fine crystalline, bituminous dolostone with some minor sandy layers (Telford 1976, 1979). The thickness of the Eramosa Member in Puslinch Township ranges from 15 to 25 m (Telford 1979). Locally, such as in the southern part of Puslinch Township, this member is suitable for the production of high quality aggregates. The remainder of the Amabel Formation consists of white to blue-grey, fine- to coarse-crystalline, medium- to massive-bedded, fossiliferous dolostone. The formation is approximately 30 to 35 m thick (Telford 1979). The formation is well suited for the production of high quality construction and road aggregates such as hot-mix paving and Portland cement concrete aggregates and is a resource of provincial significance for these uses. Several areas in Puslinch and Erin Townships have been noted for resource protection. In this area 2 quarries, now abandoned, have extracted material from the Amabel Formation. Both quarries expose the lower portion of the Amabel Formation. Additional outcrops of the lower unit of the Amabel Formation are found in the Rockwood Conservation Area west of Rockwood.

In Guelph at the turn of the century, a number of quarries were in operation, producing road construction aggregate, building stone and lime (Parks 1912) but at present, only 2 properties are licenced for quarrying. One of these which has been in operation for many years is Quarry No. Q1. The other quarry (Quarry No. Q2) is licenced both as a gravel pit and as a quarry, but active quarrying of bedrock has not yet occurred. Of the several abandoned quarries in the City of Guelph, only the quarry at the Guelph Correctional Centre remains visible.

SELECTED BEDROCK RESOURCE AREAS

Selected bedrock resource areas in Wellington County consist of those areas in Minto, Nichol, West Luther, Guelph, Puslinch, Eramosa and Erin townships where bedrock of suitable quality for aggregate use is overlain by less than 8 m of glacial sediment.

Selected Bedrock Resource Area 1

In West Luther Township, in the vicinity of the village of Monck, a small portion of the Guelph Formation is covered by less than 8 m of overburden. Recent testing by MTO indicates that the rock is of high quality with potential for hot-mix paving and concrete use. For these reasons, a small area around the village has now been selected for resource protection. This area is located near Highways 9 and 89. The West Luther Marsh Wildlife Management Area and Wildlife Preserve limits its potential.

In mid-1995, a quarry licence application (Henderson, Paddon and Associates Limited. 1993) indicated that the Guelph Formation extends at least 75 m below the overlying soils. MTO test results indicated an 18.4 m section of high quality dolostone overlain by 2 m of overburden.

This newly selected resource area includes approximately 131 ha in total, but at least 31 ha are constrained by cultural setbacks, leaving a maximum total of 100 ha potentially available for extraction. Assuming a depth of 18 m workable thickness, this area could contain up to 49 million tonnes of accessible material (Table 6).

Selected Bedrock Resource Area 2

Selected Bedrock Resource area 2 is located in the central portion of Nichol Township, west of Ennotville. Bedrock resource area 2 consists of the Guelph Formation overlain by less than 8 m of drift. Much of the drift overlying the bedrock consists of Port Stanley Till which should not seriously hinder quarry development in the area. In the remaining portions of the resource area, the bedrock is overlain by the outwash sand and gravel deposits that were selected for possible resource protection. Thus, the potential for the extraction of both sand and gravel for road construction and crushed stone for metallurgical use exists in Selected Bedrock Resource Area 2.

Selected Bedrock Resource Area 2 has a total area of 230 ha. After considering cultural constraints approximately 168 ha are possibly available for extraction. Assuming an average workable thickness of 18 m throughout the available portions, possible bedrock resources are estimated to be 81 million tonnes (Table 6). The resource area is accessible by both Highway 6 and a line of the Canadian National Railway. It is also well situated with respect to local markets.

Selected Bedrock Resource Area 3

Selected Bedrock Resource Area 3 is located near the small community of Marden in Guelph Township. Overburden thickness is less than 8 m and is much less in the eastern part of the resource area. Bedrock resource area 3 is partially overlain by an outwash deposit which has also been selected for resource protection and therefore has a combined natural aggregate and bedrock resource potential.

The Guelph Formation dolostone is generally suitable for lime production because of its high chemical purity although detailed investigation has not been undertaken in this resource area. The area currently available for extraction is estimated to be 354 ha after allowing for cultural setbacks. Assuming a workable thickness of 18 m, possible resources are estimated to be 168 million tonnes (Table 6).

Selected Bedrock Resource Area 4

Selected Bedrock Resource Area 4 is underlain by dolostone of the Guelph Formation. The area is located southwest of the City of Guelph, south of Highways 6 and 24, and extends along the Speed River valley into Puslinch

Township. The resource area forms a part of a larger bedrock resource area that continues to the southwest into the Regional Municipality of Waterloo.

Overburden thickness is less than 8 m and probably less than 5 m in many areas. A few outcrops occur along a small escarpment (Map 2B). Guelph Dolime Limited has operated a quarry at Part Lots 1-5, Concession 5G, Guelph Township and Part Lots 1 and 2, Concession 4G, City of Guelph for a number of years (Hewitt 1960). The quarry face of approximately 13 m represents the total thickness of the Guelph Formation at this location as dolostone of the Eramosa Member (Amabel Formation) is exposed at the base of the section. Part of Selected Bedrock Resource Area 4 is also licenced to Lafarge Canada Inc. for quarry purposes. This resource area lies adjacent to the Glenchristie quarry (Lots 1, 2, and 3, Concession 4, Puslinch Township) which has been operated since the turn of the century. The quarry has produced dolomitic lime, hydrated lime and limestone.

Selected Bedrock Resource Area 4 occupies a total of 740 ha, of which 580 ha are possibly available for extraction. Assuming a total workable thickness of 18 m in this part of the formation, the bedrock resources presently available for extraction are estimated to be 284 million tonnes (Table 6).

Selected Bedrock Resource Area 5

Selected Bedrock Resource Area 5 covers an area of the Amabel Formation that is located at the southern boundary of Eramosa Township and extends into Erin Township. The limit of resource area 6 is defined by the 8 m drift thickness contour. The sediments that overlie the bedrock are ice-contact stratified sand and gravel which have been designated as a selected sand and gravel resource area of primary significance. The combined resource potential of this area makes it attractive for resource protection. Bedrock resource area 5 occupies a total of 1054 ha of which 918 ha are available for extraction. Assuming a workable thickness of 18 m the crushed stone resources possibly available for extraction are 440 million tonnes (Table 6).

Bedrock resource area 5 is well situated with respect to road (Highway 7) and rail transport routes and, for the most part, is sparsely populated. Consequently, it may be well suited for large scale extractive development. Selected Bedrock Resource Area 6 is partially overlain by ice-contact stratified drift deposits, and therefore, has combined natural aggregate and crushed stone resource potential.

Selected Bedrock Resource Area 6

Selected Bedrock Resource Area 6 is situated in the southeast corner of Erin Township and is underlain by the Amabel Formation. The area is extensive and extends into the Town of Caledon to the east and the Town of Halton Hills to the south. Those areas have also been selected for possible resource protection. Bedrock resource area 6 is generally less favourable for development than the areas to the south, but provides a viable alternative if planning or other considerations prevent protection of these latter resources. In Lot 1, Concession 6, test hole drilling indicated 6 to 7 m of sand and gravel which would increase the value of this resource area.

Selected Bedrock Resource Area 6 occupies an area of 1488 ha. No previous extraction has taken place and constraints imposed by land use are minimal. Thus, the area currently available for extraction is estimated to be 1193 ha. Assuming a maximum quarriable thickness of 18 m, total possible resources are approximately 580 million tonnes (Table 6). Access to the area is provided by Highway 7.

Selected Bedrock Resource Area 7

Selected Bedrock Resource Area 7 is underlain by the Guelph Formation. The area is located on the southern boundary of Puslinch Township, near the villages of Crieff and Puslinch and is covered by less than 8 m of overburden (Map 2B). The estimated workable thickness in selected area 7 includes 9 m of the Guelph Formation. Bedrock resource area 7 occupies 620 ha of which 505 ha are available for quarrying. Of this, 120 ha have bedrock outcropping at or near the surface. Assuming a total workable thickness of 9 m, the bedrock reserves potentially available for extraction in the resource area is estimated to be 120 million tonnes (Table 6).

There are no operating quarries in the resource area at the present time, however, there are two abandoned quarries (Q6 and Q7) within the selected area. The area is traversed by a line of the Canadian Pacific Railway and by numerous gravel-surfaced roads.

Selected Bedrock Resource Area 8

Selected Bedrock Resource Area 8 is underlain by the Eramosa Member of the Amabel Formation. The area consists of 2 parts of the Eramosa where drift thickness is less than 8 m. The resource area is located near the hamlet of Puslinch (Map 2B). The resource area consists of 269 ha, of which 210 ha are possibly available for extraction. Assuming a total working thickness of 15 m, the crushed stone resources are estimated to be 84 million tonnes. There are presently no quarries in this resource area, however, the Eramosa dolostone in this part of the township is acceptable for the production of high-quality aggregate. Bedrock resource area 8 is well situated with respect to road and rail transportation. The resource area is located on either side of Highway 6 and is traversed by gravel-surfaced roads and a line of the Canadian Pacific Railway.

Selected Bedrock Resource Area 9

Selected Bedrock Resource Area 9 is underlain by the Amabel Formation and is located on the southeast corner of Puslinch Township in the vicinity of Mountsberg and extends both north and south of Highway 401. The resource area has a cover of less than 8 m of overburden (Map 2B). Selected Bedrock Resource Area 9 consists of 152 ha, of which 129 ha are possibly available for extraction. Assuming a total working thickness of 18 m in this part of the

formation, the crushed stone resources presently available for extraction are estimated to be 62 million tonnes (Table 6). Stone from the Amabel Formation is suitable for a wide range of road-building products as well as high-specification concrete and asphalt aggregate. Bedrock resource area 9 is traversed by Highway 401 and by gravel-surfaced roads.

SUMMARY

Sand and gravel deposits within Wellington County provide a major source of aggregates for the county and for other markets especially the western part of the Greater Toronto Area (GTA). The best quality sand and gravel is generally found in the larger glacial outwash areas associated with the Speed River, the Galt and Paris moraines and related meltwater channels. The better materials, especially those in Puslinch Township, are suitable for high quality uses such as hot-mix asphalt, and coarse and fine aggregates for concrete usage.

In other areas of the county, especially in parts of the northwestern townships of Minto, Maryborough and Peel, high chert content (20%+), limits the range of uses to varying degrees, depending on the location. In those areas, the sand and gravel is used primarily for Granular A, B Type 1 and M for road construction. Siltstone content in the northern and eastern part of Erin Township also limits the range of uses to Granular A, B Type 1 and M unless the gravels are beneficiated by special processing.

The Paleozoic bedrock underlying the glacial drift in Wellington County are of Silurian and Devonian age, and consist mainly of limestones and dolostones. The main bedrock formations of economic importance include the Amabel, and Guelph formations.

Currently quarrying of the Guelph Formation and Eramosa Member of the Amabel Formation occurs within the study area. Quarrying restrictions and depletion of available bedrock in the Niagara Escarpment Plan Area coupled with increased demand for quarried rock for highway construction and high strength concrete is placing increased demand on bedrock resources.

Within Wellington County 10 373 ha containing 1095 million tonnes of possible sand and gravel resources have been selected at the primary level of significance and 5 145 ha of bedrock containing possible resources of 1868 million tonnes have been selected for possible resource protection. Only limited constraints such as residential and industrial development have been taken into consideration. It should be noted that there are many other possible restrictions such as social considerations and transportation difficulties which may also restrict the availability of resources. Nevertheless the inventory provides an overview of possible resources which should be considered in the context of the regional and provincial need for aggregates.

Enquiries regarding the Aggregate Resources Inventory of Wellington County should be directed to the Sedimentary Geoscience Section, Ontario Geological Survey, Mines and Minerals Division, Ontario Ministry of Northern Development and Mines, 7th Floor, 933 Ramsey Lake Road, Sudbury, Ontario P3E 6B5 [Tel: (705) 670-5758], or the Cambridge Area Office, Ontario Ministry of Natural Resources, Cambridge, Ontario [Tel: (519) 658-9355] .

TABLE 1 - TOTAL SAND AND GRAVEL RESOURCES WELLINGTON COUNTY			
1 CLASS NO.	**2 DEPOSIT TYPE**	**3 AREAL EXTENT (Hectares)**	**4 ORIGINAL TONNAGE (Million Tonnes)***
MINTO TOWNSHIP			
1	G-OW	74	8
2	G-E	500	39
	G-IC	4100	300
	S-IC	40	4
	G-OW	2060	151
	S-OW	910	76
3	G-E	16	<1
	G-IC	196	9
	S-IC	148	6
	G-OW	520	24
	S-OW	2270	102
4	G-IC	44	1
	G-OW	28	<1
	S-OW	101	2
Subtotal		11007	724
ARTHUR TOWNSHIP			
1	G-E	340	42
2	G-E	32	3
	G-IC	740	54
	G-OW	445	33
	S-OW	510	37
3	G-E	61	2
	G-IC	188	8
	S-IC	600	20
	G-OW	305	10
4	G-E	26	1
	G-IC	69	2
	S-IC	67	2
	G-OW	320	5
	S-OW	740	13
Subtotal		4443	232
WEST LUTHER TOWNSHIP			
1	G-E	28	4
	G-IC	57	6
2	G-E	247	22
	G-IC	123	11
	S-OW	101	5
3	G-E	16	1
	G-IC	400	18
	S-IC	184	8
	G-OW	37	2
	S-OW	760	25
4	S-OW	71	2
Subtotal		2024	104
MARYBOROUGH TOWNSHIP			
1	G-OW	46	6
	S-OW	6	1
2	G-E	91	8

TABLE 1 - TOTAL SAND AND GRAVEL RESOURCES WELLINGTON COUNTY			
1 CLASS NO.	**2 DEPOSIT TYPE**	**3 AREAL EXTENT (Hectares)**	**4 ORIGINAL TONNAGE (Million Tonnes)***
	G-IC	101	6
	G-OW	18	1
	S-OW	8	1
3	G-E	73	4
	G-OW	77	3
	S-OW	134	4
4	G-E	73	2
	G-IC	73	2
	S-IC	4	<1
	G-OW	89	2
	S-OW	295	5
Subtotal		1088	46
PEEL TOWNSHIP			
2	G-IC	152	13
	S-IC	12	1
	G-OW	24	2
3	G-E	12	1
	G-IC	107	4
	G-OW	46	2
	S-OW	162	5
4	G-IC	20	<1
	S-IC	61	2
	G-OW	61	1
	S-OW	206	4
Subtotal		863	36
PILKINGTON TOWNSHIP			
1	G-IC	202	23
	S-IC	89	10
2	G-E	49	4
	G-IC	223	16
	G-OW	2270	190
3	G-E	67	3
	G-IC	415	21
	G-OW	89	4
4	G-E	4	<1
	G-IC	243	5
	S-IC	24	1
	G-OW	61	2
	S-OW	1050	24
Subtotal		4786	304
NICHOL TOWNSHIP			
1	G-IC	73	14
	G-OW	34	6
2	G-E	12	1
	G-OW	275	19
3	G-E	16	1
	G-IC	4	<1
	G-OW	310	11
	S-OW	990	29

TABLE 1 - TOTAL SAND AND GRAVEL RESOURCES WELLINGTON COUNTY			
1 CLASS NO.	**2 DEPOSIT TYPE**	**3 AREAL EXTENT (Hectares)**	**4 ORIGINAL TONNAGE (Million Tonnes)***
4	G-IC	34	1
	G-OW	44	1
	S-OW	174	3
Subtotal		1966	87
WEST GARAFRAXA TOWNSHIP			
1	G-OW	400	45
	S-IC	1150	130
2	G-OW	660	55
	G-IC	345	33
	G-E	8	1
	G-K	132	11
	S-OW	32	3
3	G-IC	260	10
	S-IC	63	3
	S-OW	2140	96
4	G-OW	22	1
	S-OW	69	2
	S-IC	6	<1
Subtotal		5287	391
CITY OF GUELPH AND GUELPH TOWNSHIP			
1	G-OW	1780	199
	G-E	134	15
	G-K	29	4
2	G-OW	5600	470
	G-E	26	3
	G-K	490	41
3	G-OW	162	6
	G-E	33	1
	G-K	202	8
4	G-OW	267	7
	G-E	44	1
	G-K	101	3
	S-OW	1880	53
Subtotal		10748	811
ERAMOSA TOWNSHIP			
1	G-IC	1000	163
	S-IC	6	1
	G-OW	235	26
2	G-E	69	5
	G-IC	1000	84
	G-OW	1130	102
	S-OW	21	2
3	G-E	75	4
	G-IC	610	27
	G-OW	1270	57
	S-OW	40	1
4	G-IC	375	8
	S-IC	40	1
	G-OW	630	14

TABLE 1 - TOTAL SAND AND GRAVEL RESOURCES
WELLINGTON COUNTY

1 CLASS NO.	2 DEPOSIT TYPE	3 AREAL EXTENT (Hectares)	4 ORIGINAL TONNAGE (Million Tonnes)*
	S-OW	1210	27
Subtotal		7711	522
ERIN TOWNSHIP			
1	G-IC	850	119
	S-IC	5140	721
	G-OW	1295	181
2	G-IC	670	56
	S-IC	630	53
	G-OW	1100	90
3	G-IC	275	14
	G-OW	710	36
4	G-IC	267	6
	S-IC	83	2
	G-OW	445	10
	S-OW	2390	54
Subtotal		13855	1342
PUSLINCH TOWNSHIP			
1	G-E	20	2
	G-IC	1070	163
	G-K	8	1
	G-OW	3950	680
2	G-E	49	4
	G-IC	710	64
	G-OW	510	54
	S-OW	12	1
3	G-IC	490	27
	G-OW	132	7
4	G-E	30	1
	G-IC	355	10
	S-IC	138	4
	G-K	10	<1
	S-K	16	<1
	S-LP	121	4
	G-OW	375	11
	S-OW	550	15
Subtotal		8546	1050
COUNTY TOTAL		72303	4671

Minor variations in tables are caused by rounding of data.

* The above figures represent a comprehensive inventory of all granular materials in the map area. Some of the material included in the estimate has no aggregate potential and some is unavailable for extraction due to land use restrictions.

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
MINTO TOWNSHIP					
Licenced Pits					
1	Harry Bouwman	17.90	3-6	45	Below water extraction
2	Dr. Terry Fisk	4.08	5-6	20-50	
3	Township of Minto	9.74	5	50	
4	The Murray Group Limited	18.06	-	-	Not yet opened
5	The Murray Group Limited	40.50	5-8	70	Below water extraction
6	The Murray Group Limited	58.70	8-10	-	
7	The Murray Group Limited	47.00	3-12	35-60	Below water extraction
8	Marsha Elaine Boulton	20.24	5-7	50	
9	Jeff and Susan Small	1.50	3-8	20-30	
10	Matt Seifried	13.20	5-6	60-70	Overlain by sand
11	Donegan's Haulage Limited	80.97	2-3	35	
12	Everett and John Armstrong c/o Carl D'Arcey	39.90	3-5	55-60	
13	Reint Wassink	12.70	3-6	50	
14	Percy Gedcke	14.00	5-6	50	
15	Kenneth James Littlewood	37.40	5-6	45-50	
16	Alex Connell	12.80	2-6	50-60	
17	Township of Wallace	40.49	2-5	50-60	
Unlicenced Pits					
18	-	-	2	0-80	Sand and gravel
19	-	-	TH3.3	60-85	Mainly gravel,unopened, reforested
20	-	-	3	55-75	Mainly gravel
21	-	-	TH3.3	60-85	Mainly gravel, unopened, reforested
22	-	-	TH3.3	40-80	Mainly gravel, unopened
23	-	-	2-4	45-75	Mainly gravel
24	-	-	TH3.3	25-85	Mainly gravel, unopened
25	-	-	5	40	Overgrown
26	-	-	TH3.3	75-80	Mainly gravel, unopened
27	-	-	2-3	5-35	Mainly sand
28	-	-	2-3	35	Mainly sand
29	-	-	3	35-80	Mainly gravel
30	-	-	3-5	10-15	Mainly fine sand
31	-	-	2-3	10-20	Mainly sand, overgrown
32	-	-	3-7	60-70	Mainly gravel
ARTHUR TOWNSHIP					
Licenced Pits					
33	Laverne Martin	1.90	8-10	-	
34	Joe Kerr Limited	6.08	9-15	70-80	
35	Harold J. Whetham	6.32	5-8	70-80	
36	Andrew Tarc	3.00	5-8	-	
37	Raymond & April Halbert	12.96	9-15	50-75	
38	Reeves Construction Ltd.	7.49	3-8	40	Future below water extraction
39	Reeves Construction Ltd.	9.92	5-6	40-55	
40	861467 Ontario Inc.	21.06	6-14	25-65	Below water extraction

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
41	Township of Arthur	26.16	5-6	40-50	
42	North Wellington Sanitary Landfill	2.02	5-6	40-50	
43	Township of Arthur	6.20	8-10	40-50	
44	Murray Wilson Equipment Inc.	9.92	3	40-50	Below water extraction
45	Cox Construction Limited	8.52	3	70	
Unlicenced Pits					
46	-	-	8-9	25-30	Mainly sand, heavy clay, overburden
47	-	-	3-4	10-20	Sand only
48	-	-	8	40-50	No open pit, thick overburden
49	-	-	3-4	45	Partly overgrown, crushable with sand control
50	-	-	8-9	60	Crushable
51	-	-	2	45	Mainly sand
52	-	-	4	40-50	Depleted above water, dragline required
53	-	-	2-3	45-50	Extraction by dragline.
WEST LUTHER TOWNSHIP					
Licenced Pits					
54	Danny and Donna Clark	14.78	5-6	20-80	
Unlicenced Pits					
55	-	-	3-6	50-60	Mainly gravel
56	-	-	6	55	Rehabilitated, mainly gravel
57	-	-	6	35-50	Sand and gravel
58	-	-	3-12	55-75	Mainly gravel
59	-	-	2	-	Bush covered
60	-	-	-	-	Bush covered, unopened
61	-	-	2	50-80	Mainly gravel
62	-	-	2-11	40-80	Mainly gravel
63	-	-	8	20-80	Overgrown, mainly gravel
MARYBOROUGH TOWNSHIP					
Licenced Pits					
64	Arthur Crushed Stone Inc.	16.61	3-5	35	
65	Kenneth & Bertha Kidnie	26.73	8-12	35	
66	David Wooddisse	19.85	3-4	20	Licence cancelled
67	Gordon Elliott	15.20	3-10	35-40	
68	Willis Sand and Gravel	32.70	5-15	40	
Unlicenced Pits					
69	-	-	3-9	35	
70	-	-	2-6	30	Overgrown, partially rehabilitated
71	-	-	3-5	25-50	
72	-	-	3	60-70	Depleted
73	-	-	8	-	Material below water
74	-	-	3	40	Small, overgrown, mainly sand

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
PEEL TOWNSHIP					
Licenced Pits					
75	Mildred Lunz	22.47	2-4	50	
76	David Bender	3.24	2-5	-	Primarily sand, partially rehabilitated
77	Edwin Horst	5.06	4	40	
78	Wallenstein Sand & Gravel	45.28	-	-	Recently opened
Unlicenced Pits					
79	-	-	7.5-9	-	Mainly sand
80	-	-	-	35	Unopened, mainly sand
81	-	-	6	40	Depleted
82	-	-	5	25	
83	-	-	5	40	Overgrown
84	-	-	3	50-75	
PILKINGTON TOWNSHIP					
Licenced Pits					
85	Mann Construction Limited	40.10	8-10	50-60	
86	Sand Hill Estates Ltd. (Operated as Ronald Seiling Trucking)	27.14	8-9	50-60	Below water extraction
87	Mann Construction Limited	29.30	8	30-70	Sandy
88	Five Star Swine Ltd. c/o E. Martin	24.95	6-8	40-50	
89	The Murray Group Limited	10.13	5	25-40	Sandy
90	Nancy Watson	27.14	8-9	50	Asphalt plant on site
91	Nancy Watson	10.83	8	50	
92	Dadboys Enterprises Limited (Kurtz)	25.10	4-5	30-50	
93	Mann Construction Limited	40.30	3-5	40-50	
Unlicenced Pits					
94	-	-	6	30-60	Mainly gravel
95	-	-	3	35	Mainly sand, overgrown
96	-	-	3	40-50	Depleted
97	-	-	3-8	60-70	Mainly gravel
98	-	-	5	55-75	Mainly gravel
NICHOL TOWNSHIP					
Licenced Pits					
			NONE		
Unlicenced Pits					
99	-	-	2-3	35	Depleted, gravel content variable
100	-	-	1.5-2.5	65	Gravel under lumber yard
101	-	-	4	50	Reforested
102	-	-	3	35	Sandy gravel

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
WEST GARAFRAXA TOWNSHIP					
Licenced Pits					
103	Highland Pines Campground (1987) Limited	10.13	3-6	30-70	
104	John Eisen Limited	10.10	2-5	35-55	
Unlicenced Pits					
105	-	-	2-8	75-80	Rehabilitated
106	-	-	3-5	10	Sand only
107	-	-	2	75	Part is trailer park
108	-	-	1-9	45-75	Mainly gravel
109	-	-	2-5	60-65	Depleted, under housing
110	-	-	3-8	25	Some material below water, rehabilitated
111	-	-	3-6	20	Rehabilitated
112	-	-	2	65	Overgrown
GUELPH TOWNSHIP AND THE CITY OF GUELPH					
Licenced Pits					
113	James Thoume Construction Ltd.	16.69	3-5	30-60	
114	Carolyn A. Stradiotto	22.28	6	40-50	
115	Lafarge Canada Inc	140.29			Both a pit and quarry operation
Unlicenced Pits					
116	-	-	4	45	
117	-	-	4	25	
118	-	-	3	45	
119	-	-	5	70	Depleted, processing plant on site
120	-	-	TH4.5	25-60	Mainly sand
121	-	-	-	-	
122	-	-	3	65	Gravel
123	-	-	TH3.5-4	45-80	Mainly Gravel
124	-	-	3	20	Rehabilitated
125	-	-	4	20	
126	-	-	TH4.5-6	55-70	Gravel
127	-	-	3	55-70	Gravel
128	-	-	TH3.5	75-85	Gravel
ERAMOSA TOWNSHIP					
Licenced Pits					
129	Carolina F. Holman	20.25	2-3	30	
130	Henry A. Holman	20.25	2-6	30-35	
131	Cox Farms Ltd.	19.36	-	-	
132	Giuseppe Bernardi	66.02	3-5	35-60	variable
133	William D. McVety	16.20	3-5	30	Primarily sand, below water extraction
134	Sterling Packers Limited	4.94	3-5	-	Partially rehabilitated, gravelly
135	Sterling Packers Limited	11.75	3	-	Partially rehabilitated
136	George W. Leslie and Marion Shirley Leslie	10.50	5-8	30	Expansion application

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
Unlicenced Pits					
137	-	-	2-3	35	Mainly sand
138	-	-	5-6	30-60	Rehabilitated
139	-	-	3-6	35-70	Some crushable material
140	-	-	3	20-50	Mainly sand
141	-	-	3-5	40-50	Some crushable material
142	-	-	4	35-40	Sandy gravel
143	-	-	4	40	
144	-	-	2-3	50-80	Gravel
145	-	-	3-5	50-60	Gravel
146	-	-	3-5	40-80	Mainly gravel
147	-	-	3	0-50	Variable from sand to crushable material
148	-	-	-	-	
149	-	-	3-5	-	Rehabilitated
150	-	-	5	60-75	Gravel
ERIN TOWNSHIP					
Licenced Pits					
151	J.C. Duff	52.60	6-8	20	Expansion
152	647495 Ontario Limited	44.96	12-15	50	
153	Mann Construction Limited	13.00	3	50	Below water extraction, future fish farm
154	Christian E. Dehn	9.64	2-5	25	Sandy
155	Harry Lockyer	41.51	12	30-50	
156	James Dick Construction Ltd.	136.40	5	-	Below water extraction
157	Mulmur Aggregates Inc. (Cox)	22.28	4-5	65	Below water extraction
158	Mulmur Aggregates Inc.	8.10	3-6	30-75	
159	Dufferin Aggregates	102.06	5	50	Recently opened
Unlicenced Pits					
160	-	-	TH4-5	10-70	Unopened, mainly sand
161	-	-	TH3.5-4.5	10-50	Unopened, mainly sand
162	-	-	8	30	Sandy gravel
163	-	-	TH3.1-4.5	45-85	Unopened, gravel rich
164	-	-	TH2.2-4.6	55-85	Unopened, gravel rich
165	-	-	TH4-4.5	75-80	Unopened, gravel
166	-	-	TH4.5	10-80	Unopened, mainly gravel
167	-	-	TH3-4.5	30-65	Unopened, mainly gravel
168	-	-	4	35-60	Crushable gravel
169	-	-	TH 2.5-5	10-80	Unopened, gravel
170	-	-	3	5	Sand only
171	-	-	-	70	Gravel
PUSLINCH TOWNSHIP					
Licenced Pits					
172	Cox Construction Limited	32.48	5-6	60-70	
173	Lafarge Canada Inc.	140.29	6	35-60	Partially rehabilitated

TABLE 2 - SAND AND GRAVEL PITS
WELLINGTON COUNTY

Pit No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)*	% Gravel	Remarks
174	Fred Prior and Sons Ltd.	6.57	9	50	Licence cancelled, partially rehabilitated.
175	McKenzie Brothers (Guelph) Limited	14.57	6-7	60-70	Good quality stone, adjacent application to expand
176	Preston Sand & Gravel Company Ltd.	35.64	6-7	60-70	
177	Guelph Dolime Limited	78.98	18-25		Pit and quarry, below water extraction
178	Preston Sand & Gravel Company Ltd.				
179	Cox Construction Limited	6.32	6	65-80	Good stone, below water extraction
180	Cox Construction Limited	141.45	6	50	Main site, future below water extraction
181	Preston Sand & Gravel Company Ltd.	17.30	5-7	65-80	
182	Capital Paving Inc.	40.50	5-6	50-60	Below water extraction
183	Capital Paving Inc.	28.85	5-6		Below water extraction
184	TCG Materials Limited	7.03	7-8	65-80	Extension to main pit.
185	TCG Materials Limited	32.40	5-6	10-35	Below water extraction, sandy
186	TCG Materials Limited	8.10	8	60-70	
187	Dufferin Aggregates	73.50	16	40-60	Below water extraction, processing site
188	Dufferin Aggregates	79.30	5-7	60-70	Future below water extraction
189	TCG Materials Limited	56.30	6	70-75	Below water extraction
190	TCG Materials Limited	115.70	8	60-70	Below water extraction
191	TCG Materials Limited	42.40	6-7		Below water extraction
192	University of Guelph	188.60	3		Recently opened, below water extraction.
Unlicenced Pits					
193	-	-	17	50-85	Mainly gravel
194	-	-	TH2.5-4.5	0-75	Unopened, sand and gravel
195	-	-	TH4.4-6	60-70	Unopened gravel
196	-	-	TH4-5	30-75	Unopened, mainly gravel
197	-	-	3-5	60-80	Gravel, rehabilitated, extraction below water
198	-	-	5	75	Gravel
199	-	-	TH3-4.5	45-85	Unopened, gravel
200	-	-	TH2.8-4.5	70-85	Gravel
201	-	-	1-5	10-60	Mainly sand
202	-	-	5-9	15-70	Partially rehabilitated
203	-	-	5	5-80	Partially rehabilitated
204	-	-	3	10-60	Partially rehabilitated
205	-	-	6-11	50-80	Mainly gravel
206	-	-	6	50-70	Gravel

*** TH indicates the thickness of material noted within a test hole**

TABLE 3 - SELECTED SAND AND GRAVEL RESOURCE AREAS, WELLINGTON COUNTY

1 DEPOSIT NO.	2 UNLICENCED AREA (Hectares)*	3 CULTURAL SETBACKS (Hectares)**	4 EXTRACTED AREA (Hectares)***	5 POSSIBLE RESOURCE AREA (Hectares)	6 ESTIMATED DEPOSIT THICKNESS (Metres)	7 POSSIBLE AGGREGATE RESOURCES (Million Tonnes)****
MINTO TOWNSHIP						
1	311	22		289	5	25.6
2	716	173		543	4	38.4
3	89	19		70	5	6.2
4	640	106		534	5	47.3
5	855	198		657	5	58.1
6	43	21		22	7	2.7
7	141	37		104	4	7.4
Subtotal	2795	576		2219		185.7
ARTHUR TOWNSHIP						
8	343	49		294	7	36.4
9	168	39		129	10	22.8
13	54	10		44	5	3.9
Subtotal	565	98		467		63.1
WEST LUTHER TOWNSHIP						
10	150	32		118	5	10.4
11	47	5		42	5	3.7
12	71	22		49	5	4.3
Subtotal	268	59		209		18.4
MARYBOROUGH TOWNSHIP						
14	57	8	1	48	4	3.4
15	28	9		19	9	3.0
Subtotal	85	17	1	67		6.4
PEEL TOWNSHIP						
16	29	7		22	4	1.6
17	39	10		29	3	1.6
Subtotal	68	17		51		3.2
PILKINGTON TOWNSHIP						
18	145	19		126	8	17.8
19	52	8	8	36	7	4.5
20	440	69		371	4	26.3
21	440	104		336	5	29.7
Subtotal	1077	200	8	869		78.3
NICHOL TOWNSHIP						
22	74	11		63	11	12.3
Subtotal	74	11		63		12.3
WEST GARAFRAXA TOWNSHIP						
23	399	91		308	7	38.2
24	179	26		153	4	10.8

TABLE 3 - SELECTED SAND AND GRAVEL RESOURCE AREAS, WELLINGTON COUNTY

1 DEPOSIT NO.	2 UNLICENCED AREA (Hectares)*	3 CULTURAL SETBACKS (Hectares)**	4 EXTRACTED AREA (Hectares)***	5 POSSIBLE RESOURCE AREA (Hectares)	6 ESTIMATED DEPOSIT THICKNESS (Metres)	7 POSSIBLE AGGREGATE RESOURCES (Million Tonnes)****
25	284	51		233	5	20.6
26	321	23		298	5	26.4
Subtotal	1183	191		992		96.0
ERAMOSA TOWNSHIP						
27	152	21		131	4	9.3
28	263	56		207	5	18.3
29	589	122		467	4	33.0
30	56	12		44	4	3.1
31	901	12		889	7	110.1
Subtotal	1961	223		1738		173.8
ERIN TOWNSHIP						
32	195	48	3	144	5	12.7
33	296	59		237	8	33.6
34	638	202		436	9	69.5
Subtotal	1129	309	3	817		115.8
GUELPH TOWNSHIP AND CITY OF GUELPH						
35	598	170		428	5	37.9
36	211	90		121	5	10.7
37A	237	89	2	148	6	13.1
Subtotal	1046	349	2	697		61.7
PUSLINCH TOWNSHIP						
37B	136	58	2	76	6	8.1
38	846	253	30	563	6	59.8
39	793	144	4	645	6	68.5
40	1004	95	9	900	9	143.4
Subtotal	2779	550	43	2184		279.8
TOTAL	13030	2600	57	10373		1094.5

Minor variations in all tables are caused by the rounding of data.

* Does not include areas licenced under the Aggregate Resources Act

** Cultural setbacks include heavily populated urban areas, roads (including a 100 m wide strip centered on each road), water features (e.g., lakes, streams), 1 ha for individual houses. NOTE: this provides a preliminary and generalized constraint application only. Additional environmental and social constraints will further reduce the deposit areas.

*** Extracted area is a rough estimate of areas that are not licenced but due to previous extractive activity, largely depleted

**** Further environmental, resource, social and economic constraints will greatly reduce the selected resource quantity realistically available for potential extraction.

TABLE 4 - TOTAL IDENTIFIED BEDROCK RESOURCES, WELLINGTON COUNTY

1 DRIFT THICKNESS (Metres)	2 FORMATION	3 ESTIMATED DEPOSIT THICKNESS (Metres)	4 AREAL EXTENT (Hectares)	5 ORIGINAL TONNAGE (Million Tonnes)*
MINTO TOWNSHIP				
8-15	Bois Blanc	18	1300	630
8-15	Bass Islands	18	1580	760
1-8	Salina	18	71	31
8-15	Salina	18	3850	1650
Subtotal			6801	3071
ARTHUR TOWNSHIP				
8-15	Salina	18	270	132
8-15	Guelph	18	1000	490
Subtotal			1270	622
WEST LUTHER TOWNSHIP				
1-8	Guelph	18	19	9
8-15	Guelph	18	1780	860
Subtotal			1799	869
MARYBOROUGH TOWNSHIP		- NONE -		
PEEL TOWNSHIP		- NONE -		
PILKINGTON TOWNSHIP				
<1	Guelph	18	28	14
1-8	Guelph	18	265	127
8-15	Guelph	18	1170	570
Subtotal			1463	711
NICHOL TOWNSHIP				
<1	Guelph	18	4	2
1-8	Guelph	18	520	255
8-15	Guelph	18	2950	1430
Subtotal			3474	1687
WEST GARAFRAXA TOWNSHIP				
1-8	Guelph	18	121	59
8-15	Guelph	18	202	98
Subtotal			323	157
CITY OF GUELPH AND GUELPH TOWNSHIP				
<1	Guelph	15	93	37
1-8	Guelph	15	2390	960
8-15	Guelph	15	10300	4150
<1	Amabel (Eramosa Member)	15	93	37
1-8	Amabel (Eramosa Member)	15	700	280

TABLE 4 - TOTAL IDENTIFIED BEDROCK RESOURCES, WELLINGTON COUNTY

1 DRIFT THICKNESS (Metres)	2 FORMATION	3 ESTIMATED DEPOSIT THICKNESS (Metres)	4 AREAL EXTENT (Hectares)	5 ORIGINAL TONNAGE (Million Tonnes)*
8-15	Amabel (Eramosa Member)	15	240	98
Subtotal			13816	5562
ERAMOSA TOWNSHIP				
1-8	Guelph	18	1150	560
8-15	Guelph	18	3250	1570
<1	Amabel (Eramosa Member)	15	71	29
1-8	Amabel (Eramosa Member)	15	1170	470
8-15	Amabel (Eramosa Member)	15	620	250
<1	Amabel	18	46	23
1-8	Amabel	18	1150	560
8-15	Amabel	18	1000	480
Subtotal			8457	3942
ERIN TOWNSHIP				
<1	Guelph	18	8	4
1-8	Guelph	18	128	62
8-15	Guelph	18	1295	627
<1	Amabel	18	6	3
1-8	Amabel	18	1960	951
8-15	Amabel	18	2670	1294
Subtotal			6067	2941
PUSLINCH TOWNSHIP				
<1	Guelph	18	240	115
1-8	Guelph	18	1000	480
8-15	Guelph	18	940	455
<1	Amabel (Eramosa Member)	15	16	6
1-8	Amabel (Eramosa Member)	15	700	285
8-15	Amabel (Eramosa Member)	15	1520	620
1-8	Amabel	18	158	76
8-15	Amabel	18	126	61
Subtotal			4700	2098
COUNTY TOTAL			48170	21193

* Minor variations in above table are due to rounding of data.

TABLE 5 - QUARRIES, WELLINGTON COUNTY

Quarry No.	Owner/Operator	Licenced Area (Hectares)	Face Height (Metres)	Remarks
GUELPH TOWNSHIP				
Licenced Quarries				
Q1	Guelph Dolime Limited	52.6	13	
Q2	Lafarge	132.7		
PUSLINCH TOWNSHIP				
Licenced Quarries				
Q3	Guelph Dolime Limited	78.9	18	
Q4	Lafarge	60.0	-	
Unlicenced Quarries				
Q6	Abandoned		3 above groundwater	nearly water filled
Q7	Abandoned		9-14 above groundwater	nearly water filled
CITY OF GUELPH				
Unlicenced Quarries				
Q5	Abandoned		9	
ERAMOSA TOWNSHIP				
Unlicenced Quarries				
Q8	Abandoned			

TABLE 6 - SELECTED BEDROCK RESOURCE AREAS, WELLINGTON COUNTY

1 AREA NO.	2 DEPTH OF OVERBURDEN (Metres)	3 UNLICENCED AREA (Hectares)*	4 CULTURAL SETBACKS (Hectares)**	5 EXTRACTED AREA (Hectares)***	6 POSSIBLE RESOURCE AREA (Hectares)	7 ESTIMATED WORKABLE THICKNESS (Metres)	8 POSSIBLE BEDROCK RESOURCES (Million Tonnes)****
MINTO TOWNSHIP							
				NONE			
ARTHUR TOWNSHIP							
				NONE			
WEST LUTHER TOWNSHIP							
Guelph Formation							
1	1-8	131	31	0	100	18	49
Subtotal		131	31	0	100		49
MARYBOROUGH TOWNSHIP							
				NONE			
PEEL TOWNSHIP							
				NONE			
PILKINGTON TOWNSHIP							
				NONE			
NICHOL TOWNSHIP							
Guelph Formation							
2	1-8	230	62	0	168	18	81
Subtotal		230	62	0	168		81
WEST GARAFRAXA TOWNSHIP							
				NONE			
CITY OF GUELPH AND GUELPH TOWNSHIP							
Guelph Formation							
3	1-8	461	107	0	354	18	168
4	1-8	740	160	0	580	18	284
Subtotal		1201	267	0	934		452
ERAMOSA TOWNSHIP							
5	1-8	1054	136	0	918	18	440
Subtotal		1054	136	0	918		440
ERIN TOWNSHIP							
6	1-8	1488	295	0	1193	18	580
Subtotal		1488	295	0	1193		580
PUSLINCH TOWNSHIP							
7	0-8	620	111	4	505	9	120
8	1-8	269	59	0	210	15	84

TABLE 6 - SELECTED BEDROCK RESOURCE AREAS, WELLINGTON COUNTY

1 AREA NO.	2 DEPTH OF OVERBURDEN (Metres)	3 UNLICENCED AREA (Hectares)*	4 CULTURAL SETBACKS (Hectares)**	5 EXTRACTED AREA (Hectares)***	6 POSSIBLE RESOURCE AREA (Hectares)	7 ESTIMATED WORKABLE THICKNESS (Metres)	8 POSSIBLE BEDROCK RESOURCES (Million Tonnes)****
9	1-8	152	23	0	129	18	62
Subtotal		1041	193	4	844		266
COUNTY TOTAL		5145	984	4	4157		1868

N.B. Minor variations in above table are due to rounding of data.

* Excludes areas licenced under the Aggregate Resources Act.

** Cultural setbacks include heavily populated urban areas, road (including a 100 m wide strip centered on each road), 1 ha for individual houses. NOTE: this provides a preliminary and generalized constraint application only. Additional environmental and social constraints will further reduce the bedrock resource area.

*** Extracted area is a rough estimate of areas that are not licenced but largely depleted such as abandoned quarry sites.

**** Further environmental, resource, social and economic constraints will greatly reduce the selected resource quantity realistically available for potential extraction.

TABLE 7 - SUMMARY OF TEST HOLE DATA, WELLINGTON COUNTY

TEST HOLE NUMBER	LOCATION	ELEVATION (masl)	DEPTH (Metres)	DESCRIPTION
PEEL TOWNSHIP				
PE-TH-1	NW of Pit No. 75	373.0	0 - 0.4	Topsoil
			0.4 - 0.8	Brown sandy silt, minor clay
			0.8 - 4.1	Brown cobbly sandy gravel, 30-60% greater than 150 mm in size
			4.1 - 4.9	Brown silt, trace clay and sand, moist
ERAMOSA TOWNSHIP				
ER-TH-1	Lot 1, Conc. 6		0-1.0	Light brown, sandy, gravelly loam
			1.0-6.0	Light brownish grey, coarse to medium silty gravel, coarse and fine sand, some small boulders
			6.0-10.0	Light brown, gravelly, silty sand till, 30-40% coarse and medium sand, 30% fine sand and silt, occasional boulders
			10.0-29.0	Light to medium blue-grey, coarse and medium porosity, very fossiliferous dolostone, prominent coral fragments and shell moulds at 22 m, Amabel Formation
				Initial groundwater level at 12 m.
			29.0 - 45.0	Medium to light grey, coarse reefy porosity leading to fine porosity, fine to medium crystalline dolostone, Amabel Formation
			45.0 - 56.0	Light to medium bluish grey, fine crystalline, fine porosity, thin dark grey shale seams between beds, very fossiliferous dolostone, Amabel Formation
			56.0 - 58.0	Medium grey to medium greenish grey, frequent bundles of dark grey, irregular, shale seams, containing grains and thin seams of pyrite, Reynales Formation
			58.0 - 60.0	Green to medium greenish grey and dark grey interbedded shale and calcareous shale, Cabot Head Formation

TABLE 8 - SUMMARY OF GEOPHYSICAL DATA, WELLINGTON COUNTY

- NONE -

TABLE 9 - AGGREGATE QUALITY TEST DATA, WELLINGTON COUNTY

PIT NO. AND SAMPLE NO.	PETROGRAPHIC NUMBER		SHALE (%)	CHERT/CHERTY CARBONATES CONTENT (%)		SILTSTONE CONTENT (%)
	Granular 16mm crushed	Hot Mix and Concrete		Unleached	Leached	
MARYBOROUGH TOWNSHIP						
Pit No. 68 95-ZLK-1006	101.8	208	0.2	53.1	0	0
PEEL TOWNSHIP						
Pit No. 75 95-ZLK-1005	100.0	130.6	0	15.3	0	0
PILKINGTON TOWNSHIP						
Pit No. 97 95-ZLK-1004	103.6	119.8	0.4	8.1	0	0
ERIN TOWNSHIP						
Pit No. 162 95-ZLK-1007	109.0	128.5	0	3.0	0	4.5

NOTE: The quality test data refers strictly to a specific sample. Because of the inherent variability of sand and gravel deposits, care should be exercised in extrapolating such information to the rest of the deposit.

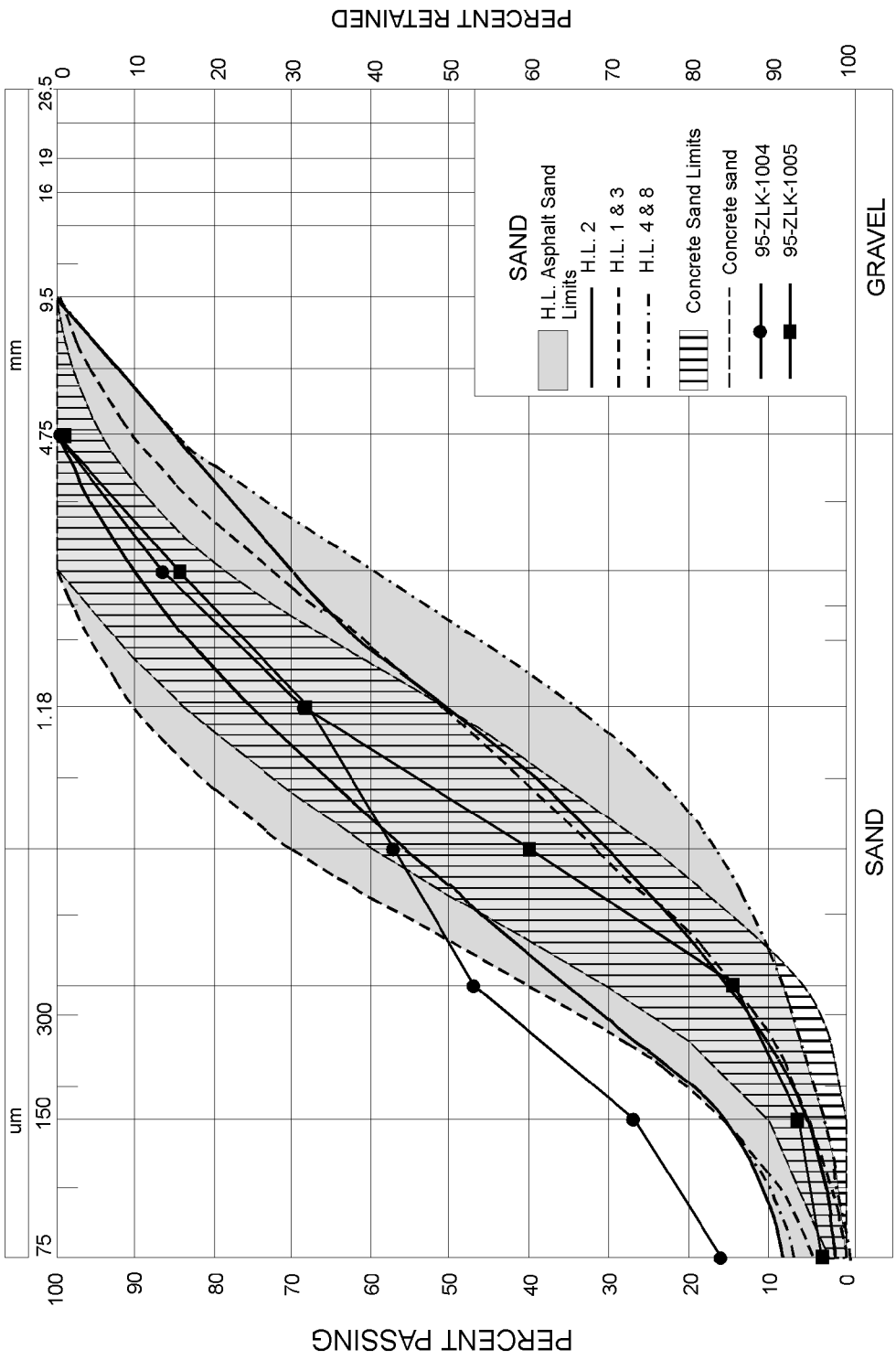


FIGURE 2a AGGREGATE GRADING CURVES, WELLINGTON COUNTY

Based on analysis of the sand fraction of the aggregate contained in unprocessed samples (gradation envelopes adapted from Ontario Provincial Standard Specifications OPSS 1002, 1988 and 1003, 1988).

NOTE:
Information portrayed by grading curves refers strictly to a specific sample taken at the time of field investigation. Due to the inherent variability of sand and gravel deposits care should be exercised in extrapolating such information to the rest of the deposit.

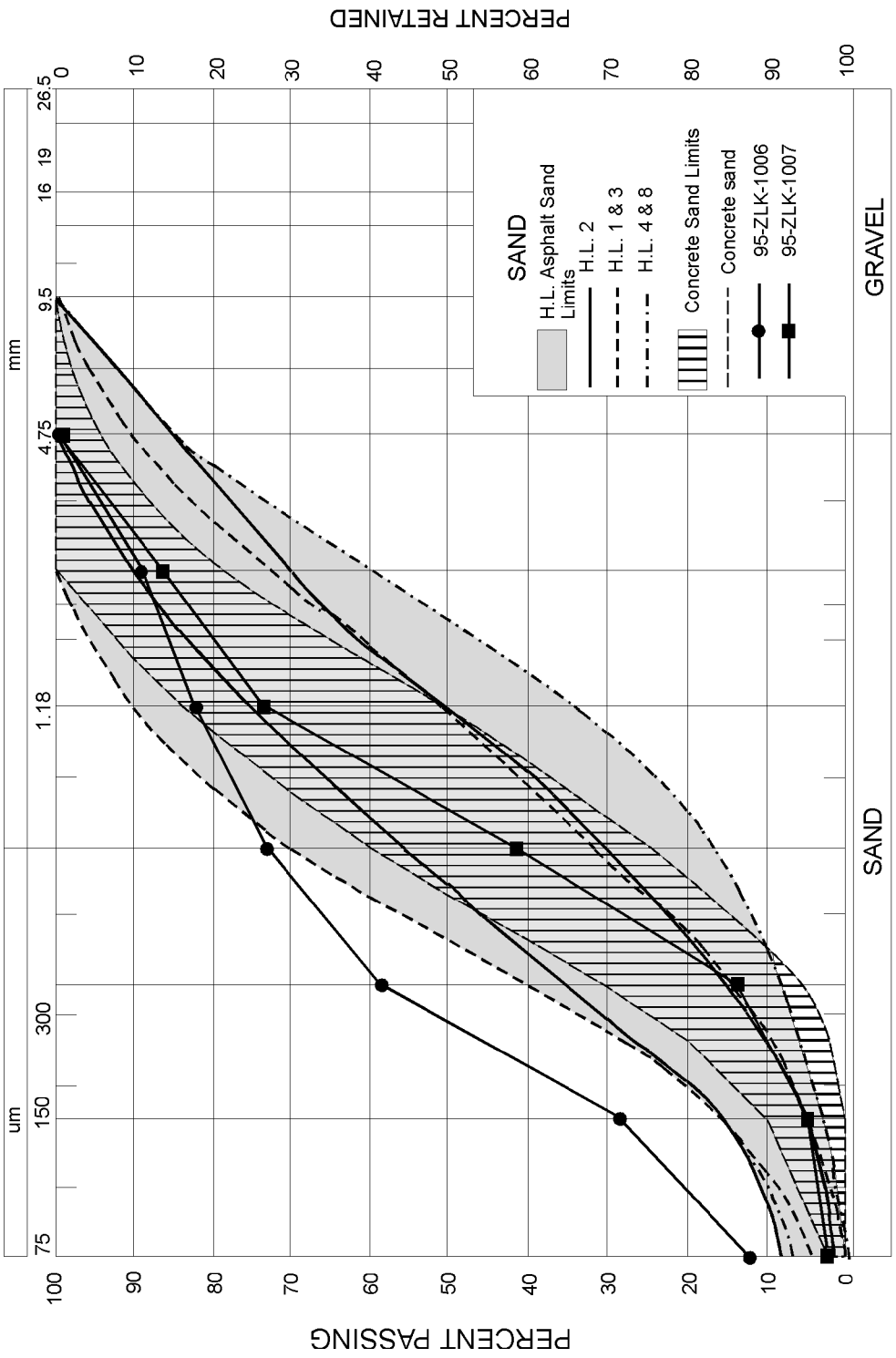


FIGURE 3a AGGREGATE GRADING CURVES, WELLINGTON COUNTY

Based on analysis of the sand fraction of the aggregate contained in unprocessed samples (gradation envelopes adapted from Ontario Provincial Standard Specifications OPSS 1002, 1988 and 1003, 1988).

NOTE:
Information portrayed by grading curves refers strictly to a specific sample taken at the time of field investigation. Due to the inherent variability of sand and gravel deposits care should be exercised in extrapolating such information to the rest of the deposit.

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Appendix B – Glossary

Abrasion resistance: Tests such as the Los Angeles abrasion test are used to measure the ability of aggregate to resist crushing and pulverizing under conditions similar to those encountered in processing and use. Measuring resistance is an important component in the evaluation of the quality and prospective uses of aggregate. Hard, durable material is preferred for road building.

Absorption capacity: Related to the porosity of the rock types of which an aggregate is composed. Porous rocks are subject to disintegration when absorbed liquids freeze and thaw, thus decreasing the strength of the aggregate.

Acid-Soluble Chloride Ion Content: This test measures total chloride ion content in concrete and is used to judge the likelihood of re-bar corrosion and susceptibility to deterioration by freeze-thaw in concrete structures. There is a strong positive correlation between chloride ion content and depassivation of reinforcing steel in concrete. Depassivation permits corrosion of the steel in the presence of oxygen and moisture. Chloride ions are contributed mainly by the application of de-icing salts.

Aggregate: Any hard, inert, construction material (sand, gravel, shells, slag, crushed stone or other mineral material) used for mixing in various-sized fragments with a cement or bituminous material to form concrete, mortar, etc., or used alone for road building or other construction. Synonyms include mineral aggregate and granular material.

Aggregate Abrasion Value: This test directly measures the resistance of aggregate to abrasion with silica sand and a steel disk. The higher the value, the lower the resistance to abrasion. For high quality asphalt surface course uses, values of less than 6 are desirable.

Alkali-aggregate reaction: A chemical reaction between the alkalies of Portland cement and certain minerals found in rocks used for aggregate. Alkali-aggregate reactions are undesirable because they can cause expansion and cracking of concrete. Although perfectly suitable for building stone and asphalt applications, alkali-reactive aggregates should be avoided for structural concrete uses.

Beneficiation: Beneficiation of aggregates is a process or combination of processes which improves the quality (physical properties) of a mineral aggregate and is not part of the normal processing for a particular use, such as routine crushing, screening, washing, or classification. Heavy media separation, jigging, or application of special crushers (e.g., "cage mill") are usually considered processes of beneficiation.

Blending: Required in cases of extreme coarseness, fineness, or other irregularities in the gradation of unprocessed aggregate. Blending is done with approved sand-sized aggregate in order to satisfy the gradation requirements of the material.

Bulk Relative Density: The density of a material related to water at 4ºC and atmospheric pressure at sea level. An aggregate with low relative density is lighter in weight than one with a high relative density. Low relative density aggregates (less than about 2.5) are often non-durable for many aggregate uses.

Cambrian: The first period of the Paleozoic Era, thought to have covered the time between 570 and 505 million years age. The Cambrian precedes the Ordovician Period.

Chert: Amorphous silica, generally associated with limestone. Often occur as irregular masses or lenses but can also occur finally disseminated through limestones. It may be very hard in unleached form. In leached form, it is white and "chalky" and is very absorptive. It has deleterious effect for aggregates to be used in Portland cement concrete due to reactivity with alkalies in Portland cement.

Clast: An individual constituent, grain or fragment of a sediment or rock, produced by the mechanical weathering of larger rock mass. Synonyms include particle and fragment.

Crushable Aggregate: Unprocessed gravel containing a minimum of 35% coarse aggregate larger than the No. 4 sieve (4.75 mm) as well as a minimum of 20% greater than the 26.5 mm sieve.

Deleterious lithology: A general term used to designate those rock types which are chemically or physically unsuited for use as construction or road-building aggregates. Such lithologies as chert, shale, siltstone and sandstone may deteriorate rapidly when exposed to traffic and other environmental conditions.

Devonian: A period of the Paleozoic Era thought to have covered the span of time between 408 and 360 million years ago, following the Silurian Period. Rocks formed in the Devonian Period are among the youngest Paleozoic rocks in Ontario.

Dolostone: A carbonate sedimentary rock consisting chiefly of the mineral dolomite and containing relatively little calcite (dolostone is also known as dolomite).

Drift: A general term for all unconsolidated rock debris transported from one place and deposited in another, distinguished from underlying bedrock. In North America, glacial activity has been the dominant mode of transport and deposition of drift. Synonyms include overburden and surficial deposit.

Drumlin: A low, smoothly rounded, elongated hill, mound, or ridge composed of glacial materials. These landforms were formed beneath an advancing ice sheet, and were shaped by its flow.

Eolian: Pertaining to the wind, especially with respect to landforms whose constituents were transported and deposited by wind activity. Sand dunes are an example of an eolian landform.

Fines: A general term used to describe the size fraction of an aggregate which passes (is finer than) the No. 200 mesh screen (0.075 mm). Also described informally as "dirt", these particles are in the silt and clay size range.

Glacial lobe: A tongue-like projection from the margin of the main mass of an ice cap or ice sheet. During the Pleistocene Epoch several lobes of the Laurentide continental ice sheet occupied the Great Lakes basins. These lobes advanced then melted back numerous times during the Pleistocene, producing the complex arrangement of glacial material and landforms found in Ontario.

Gneiss: A coarse-textured metamorphic rock with the minerals arranged in parallel streaks or bands. Gneiss is relatively rich in feldspar. Other common minerals found in this rock include quartz, mica, amphibole and garnet.

Gradation: The proportion of material of each particle size, or the frequency distribution of the various sizes which constitute a sediment. The strength, durability, permeability and stability of an aggregate depend to a great extent on its gradation. The size limits for different particles are as follows:

Boulder	more than 200 mm
Cobbles	75-200 mm
Coarse Gravel	26.5-75 mm
Fine Gravel	4.75-26.5 mm
Coarse Sand	2-4.75 mm
Medium Sand	0.425-2 mm
Fine Sand	0.075-0.425 mm
Silt, Clay	less than 0.075 mm

Granite: A coarse-grained, light-coloured rock that ordinarily has an even texture and is composed of quartz and feldspar with either mica, hornblende or both.

Granular Base and Subbase: Components of a pavement structure of a road, which are placed on the subgrade and are designed to provide strength, stability and drainage, as well as support for surfacing materials. Four types have been defined: Granular A consists of crushed and processed aggregate and has relatively stringent quality standards in comparison to Granular B which is usually pit-run or other unprocessed aggregate; Granular M is a shouldering and surface dressing material with quality requirements similar to Granular A; Select Subgrade Material has similar quality requirements to Granular B and it provides a stable platform for the overlying pavement structure. (For more specific information the reader is referred to Ontario Provincial Standard Specification OPSS 1010).

Heavy Duty Binder: Second layer from the top of hot mix asphalt pavements, used on heavily travelled (especially by trucks) expressways, such as Highway 401. Coarse and fine aggregates are to be produced from high quality bedrock quarries, except when gravel is permitted by special provisions.

Hot-laid (or Asphaltic) Paving Aggregate: Bituminous, cemented aggregates used in the construction of pavements either as surface or bearing course (HL 1, 3 and 4), or as binder course (HL 2, 4 and 8) used to bind the surface course to the underlying granular base.

Limestone: A carbonate sedimentary rock consisting chiefly of the mineral calcite. It may contain the mineral dolomite up to about 40%.

Lithology: The description of rocks on the basis of such characteristics as colour, structure, mineralogic composition and grain size. Generally, the description of the physical character of a rock.

Los Angeles Abrasion and Impact Test: This test measures the resistance to abrasion and the impact strength of aggregate. This gives an idea of the breakdown that can be expected to occur when an aggregate is stockpiled, transported and placed. Values less than about 35% indicate potentially satisfactory performance for most concrete and asphalt uses. Values of more than 45% indicate that the aggregate may be susceptible to excessive breakdown during handling and placing.

Magnesium Sulphate Soundness Test: This test is designed to simulate the action of freezing and thawing on aggregates. Those aggregates which are susceptible to freezing and thawing will usually break down and give high losses in this test. Values greater than about 12 to 15% indicate potential problems for concrete and asphalt coarse aggregate.

Medium Duty Binder: Second layer from the top of hot mix asphalt pavements used on heavily travelled, usually four lane highways and municipal arterial roads. It may be constructed with high quality quarried rock or high quality gravel with a high percentage of fractured faces or polymer modified asphalt cements.

Meltwater Channel: A drainage way, often terraced, produced by water flowing away from a melting glacier margin.

Ordovician: An early period of the Paleozoic Era thought to have covered the span of time between 505 and 438 million years ago.

Paleozoic Era: One of the major divisions of the geologic time scale thought to have covered the time period between 570 and 230 million years ago, the Paleozoic Era (or Ancient Life Era) is subdivided into six geologic periods, of which only four (Cambrian, Ordovician, Silurian and Devonian) can be recognized in southern Ontario.

Petrographic Examination: An aggregate quality test based on known field performance of various rock types. In Ontario the test result is a Petrographic Number (PN). The higher the PN, the lower the quality of the aggregate.

Pleistocene: An epoch of the recent geological past including the time from approximately 2 million years ago to 7000 years ago. Much of the Pleistocene was characterized by extensive glacial activity and is popularly referred to as the "Great Ice Age".

Polished Stone Value: This test measures the frictional properties of aggregates after 6 hours of abrasion and polishing with an emery abrasive. The higher the PSV, the higher the frictional properties of the aggregate. Values less than 45 indicate marginal frictional properties, while values greater than 55 indicate excellent frictional properties.

Possible Resource: Reserve estimates based largely on broad knowledge of the geological character of the deposit and for which there are few, if any, samples or measurements. The estimates are based on assumed continuity or repetition for which there are reasonable geological indications, but do not take into account many site-specific natural and environmental constraints that could render the resource unaccessible.

Precambrian: The earliest geological period extending from the consolidation of the earth's crust to the beginning of the Cambrian Period.

Sandstone: A clastic sedimentary rock consisting chiefly of sand-sized particles of quartz and minor feldspar, cemented together by calcareous minerals (calcite or dolomite) or by silica.

Shale: A fine-grained, sedimentary rock formed by the consolidation of clay, silt or mud and characterized by well-developed bedding planes, along which the rock breaks readily into thin layers. The term shale is also commonly used for fissile claystone, siltstone and mudstone.

Siltstone: A clastic sedimentary rock consisting chiefly of silt-sized particles, cemented together by calcareous minerals (calcite and dolomite) or by silica.

Silurian: An early period of the Paleozoic era thought to have covered the time between 438 and 408 million years ago. The Silurian follows the Ordovician Period and precedes the Devonian Period.

Soundness: The ability of the components of an aggregate to withstand the effects of various weathering processes and agents. Unsound lithologies are subject to disintegration caused by the expansion of absorbed solutions. This may seriously impair the performance of road-building and construction aggregates.

Till: Unsorted and unstratified rock debris, deposited directly by glaciers, and ranging in size from clay to large boulders.

Wisconsinan: Pertaining to the last glacial period of the Pleistocene Epoch in North America. The Wisconsinan began approximately 100 000 years ago and ended approximately 7000 years ago. The glacial deposits and landforms of Ontario are predominantly the result of glacial activity during the Wisconsinan Stage.

Appendix C – Geology of Sand and Gravel Deposits

The type, distribution and extent of sand and gravel deposits in Ontario are the result of extensive glacial and glacially influenced activity in Wisconsinan time during the Pleistocene Epoch, approximately 100 000 to 7000 years ago. The deposit types reflect the different depositional environments that existed during the melting and retreat of the continental ice masses, and can readily be differentiated on the basis of their morphology, structure and texture. The deposit types are described below.

GLACIOFLUVIAL DEPOSITS

These deposits can be divided into two broad categories: those that were formed in contact with (or in close proximity to) glacial ice, and those that were deposited by meltwaters carrying materials beyond the ice margin.

Ice-Contact Terraces (ICT): These are glaciofluvial features deposited between the glacial margin and a confining topographic high, such as the side of a valley. The structure of the deposits may be similar to that of outwash deposits, but in most cases the sorting and grading of the material is more variable and the bedding is discontinuous because of extensive slumping. The probability of locating large amounts of crushable aggregate is moderate, and extraction may be expensive because of the variability of the deposits both in terms of quality and grain size distribution.

Kames (K): Kames are defined as mounds of poorly sorted sand and gravel deposited by meltwater in depressions or fissures on the ice surface or at its margin. During glacial retreat, the melting of supporting ice causes collapse of the deposits, producing internal structures characterized by bedding discontinuities. The deposits consist mainly of irregularly bedded and crossbedded, poorly sorted sand and gravel. The present forms of the deposits include single mounds, linear ridges (crevasse fillings) or complex groups of landforms. The latter are occasionally described as "undifferentiated ice-contact stratified drift" (IC) when detailed subsurface information is unavailable. Since kames commonly contain large amounts of fine-grained material and are characterized by considerable variability, there is generally a low to moderate probability of discovering large amounts of good quality, crushable aggregate. Extractive problems encountered in these deposits are mainly the excessive variability of the aggregate and the rare presence of excess fines (silt- and clay-sized particles).

Eskers (E): Eskers are narrow, sinuous ridges of sand and gravel deposited by meltwaters flowing in tunnels within or at the base of glaciers, or in channels on the ice surface. Eskers vary greatly in size. Many, though not all eskers, consist of a central core of poorly sorted and stratified gravel characterized by a wide range in grain size. The core material is often draped on its flanks by better sorted and stratified sand and gravel. The deposits have a high probability of containing a large proportion of crushable aggregate, and since they are generally built above the surrounding ground surface, are convenient extraction sites. For these reasons esker deposits have been traditional aggregate sources throughout Ontario, and are significant components of the total resources of many areas.

Some planning constraints and opportunities are inherent in the nature of the deposits. Because of their linear nature, the deposits commonly extend across several property boundaries leading to unorganized extractive development at numerous small pits. On the other hand, because of their form, eskers can be easily and inexpensively extracted and are amenable to rehabilitation and sequential land use.

Undifferentiated Ice-Contact Stratified Drift (IC): This designation may include deposits from several ice-contact, depositional environments which usually form extensive, complex landforms. It is not feasible to identify individual areas of coarse-grained material within such deposits because of their lack of continuity and grain size variability. They are given a qualitative rating based on existing pit and other subsurface data.

Outwash (OW): Outwash deposits consist of sand and gravel laid down by meltwaters beyond the margin of the ice lobes. The deposits occur as sheets or as terraced valley fills (valley trains) and may be very large in extent and thickness. Well-developed outwash deposits have good horizontal bedding and are uniform in grain size distribution. Outwash deposited near the glacier's margin is much more variable in texture and structure. The probability of locating useful crushable aggregates in outwash deposits is moderate to high depending on how much information on size, distribution and thickness is available.

Subaqueous Fans (SF): Subaqueous fans are formed within or near the mouths of meltwater conduits when sediment-laden meltwaters are discharged into a standing body of water. The geometry of the resulting deposit is fan- or lobe-shaped. Several of these lobes may be joined together to form a larger, continuous sedimentary body. Internally, subaqueous fans consist of stratified sands and gravels which may exhibit wide variations in grain size distribution. As these features were deposited under glacial lake waters, silt and clay which settled out of these lakes may be associated in varying amounts with these deposits. The variability of the sediments and presence of fines are the main extractive problems associated with these deposits.

Alluvium (AL): Alluvium is a general term for clay, silt, sand, gravel, or similar unconsolidated material deposited during postglacial time by a stream as sorted or

semi-sorted sediment, on its bed or on its floodplain. The probability of locating large amounts of crushable aggregate in alluvial deposits is low, and they have generally low value because of the presence of excess silt- and clay-sized material. There are few large postglacial alluvium deposits in Ontario.

GLACIOLACUSTRINE DEPOSITS

Glaciolacustrine Beach Deposits (LB): These are relatively narrow, linear features formed by wave action at the shores of glacial lakes that existed at various times during the deglaciation of Ontario. Well developed lacustrine beaches are usually less than 6 m thick. The aggregate is well sorted and stratified and sand-sized material commonly predominates. The composition and size distribution of the deposit depends on the nature of the source material. The probability of obtaining crushable aggregate is high when the material is developed from coarse-grained materials such as a stony till, and low when developed from fine-grained materials. Beaches are relatively narrow, linear deposits, so that extractive operations are often numerous and extensive.

Glaciolacustrine Deltas (LD): These features were formed where streams or rivers of glacial meltwater flowed into lakes and deposited their suspended sediment. In Ontario such deposits tend to consist mainly of sand and abundant silt. However, in near-ice and ice-contact positions, coarse material may be present. Although deltaic deposits may be large, the probability of obtaining coarse material is generally low.

Glaciolacustrine Plains (LP): The nearly level surface marking the floor of an extinct glacial lake. The sediments which form the plain are predominantly fine to medium sand, silt and clay, and were deposited in relatively deep water. Lacustrine deposits are generally of low value as aggregate sources because of their fine grain size and lack of crushable material. In some aggregate-poor areas, lacustrine deposits may constitute valuable sources of fill and some granular subbase aggregate.

GLACIAL DEPOSITS

End Moraines (EM): These are belts of glacial drift deposited at, and parallel to, glacier margins. End moraines commonly consist of ice-contact stratified drift and in such instances are usually called kame moraines. Kame moraines commonly result from deposition between two glacial lobes (interlobate moraines). The probability of locating aggregates within such features is moderate to low. Exploration and development costs are high. Moraines may be very large and contain vast aggregate resources, but the location of the best areas within the moraine is usually poorly defined.

EOLIAN DEPOSITS

Windblown Deposits (WD): Windblown deposits are those formed by the transport and deposition of sand by winds. The form of the deposits ranges from extensive, thin layers to well-developed linear and crescentic ridges known as dunes. Most windblown deposits in Ontario are derived from, and deposited on, pre-existing lacustrine sand plain deposits. Windblown sediments almost always consist of fine to coarse sand and are usually well sorted. The probability of locating crushable aggregate in windblown deposits is very low.

Appendix D – Geology of Bedrock Deposits

The purpose of this appendix is to familiarize the reader with the general bedrock geology of southern Ontario (Figure D1) and, where known, the potential uses of the various bedrock formations. The reader is cautioned against using this information for more specific purposes. The stratigraphic chart (Figure D2) is intended only to illustrate the stratigraphic sequences in particular geographic areas and should not be used as a regional correlation table.

The following description is arranged in ascending stratigraphic order, on a group and formation basis. Precambrian rocks are not discussed. Additional stratigraphic information is included for some formations where necessary. The publications and maps of the Ontario Geological Survey (e.g. Johnson et al. 1992) and the Geological Survey of Canada should be referred to for more detailed information. The composition, thickness and uses of the formations are discussed. If a formation may be suitable for use as aggregate and aggregate suitability test data are available, the data have been included in the form of ranges. The following short forms have been used in presenting this data: PSV = Polished Stone Value, AAV = Aggregate Abrasion Value, $MgSO_4$ = Magnesium Sulphate Soundness Test (loss in percent), LA = Los Angeles Abrasion and Impact Test (loss in percent), Absn = Absorption (percent), BRD = Bulk Relative Density, PN (Asphalt & Concrete) = Petrographic Number for Asphalt and Concrete use. The ranges are intended as a guide only and care should be exercised in extrapolating the information to specific situations. Aggregate suitability test data has been provided by the Ontario Ministry of Transportation.

Covey Hill Formation (Cambrian)

STRATIGRAPHY: lower formation of the Potsdam Group. COMPOSITION: interbedded non-calcareous feldspathic conglomerate and sandstone. THICKNESS: 0 to 14 m. USES: has been quarried for aggregate in South Burgess Township, Leeds County.

Nepean Formation (Cambro-Ordovician)

STRATIGRAPHY: part of the Potsdam Group. COMPOSITION: thin- to massive-bedded quartz sandstone with some conglomerate interbeds and rare shaly partings. THICKNESS: 0 to 30 m. USES: suitable as dimension stone; quarried at Philipsville and Forfar for silica sand; alkali-silica reactive in Portland cement concrete. AGGREGATE SUITABILITY TESTING: PSV = 54-68, AAV = 4-15, $MgSO_4$ = 9-32, LA = 44-90, Absn = 1.6-2.6, BRD = 2.38-2.50, PN (Asphalt & Concrete) = 130-140.

March Formation (Lower Ordovician)

STRATIGRAPHY: lower formation of the Beekmantown Group. COMPOSITION: interbedded quartz sandstone, dolomitic quartz sandstone, sandy dolostone and dolostone. THICKNESS: 6 to 64 m. USES: quarried extensively for aggregate in area of subcrop and outcrop; alkali-silica reactive in Portland cement concrete; lower part of formation is an excellent source of skid-resistant aggregate. Suitable for use as facing stone and paving stone. AGGREGATE SUITABILITY TESTING: PSV = 55-60, AAV = 4-6, $MgS0_4$ = 1-17, LA = 15-38, Absn = 0.5-0.9, BRD = 2.61-2.65, PN (Asphalt & Concrete) = 110-150.

Oxford Formation (Lower Ordovician)

STRATIGRAPHY: upper formation of the Beekmantown Group. COMPOSITION: thin- to thick-bedded, microcrystalline to medium-crystalline, grey dolostone with thin shaly interbeds. THICKNESS: 61 to 102 m. USES: quarried in the Brockville and Smith Falls areas and south of Ottawa for use as aggregate. AGGREGATE SUITABILITY TESTING: PSV = 47-48, AAV = 7-8, $MgSO_4$ = 1-4, LA = 18-23, Absn = 0.7-0.9, BRD = 2.74-2.78, PN (Asphalt & Concrete) = 105-120.

Rockcliffe Formation (Middle Ordovician)

STRATIGRAPHY: divided into lower member and upper (St. Martin) member. COMPOSITION: interbedded quartz sandstone and shale; interbedded shaly bioclastic limestone and shale predominating in upper member to the east. THICKNESS: 0 to 125 m. USES: upper member has been quarried east of Ottawa for aggregate; lower member has been used as crushed stone; some high purity limestone beds in upper member may be suitable for use as fluxing stone and in lime production. AGGREGATE SUITABILITY TESTING: PSV = 58-63, AAV = 10-11, $MgSO_4$ = 12-40, LA = 25-28, Absn = 1.8-1.9, BRD = 2.55-2.62, PN (Asphalt & Concrete) = 122-440.

Shadow Lake Formation (Middle Ordovician)

STRATIGRAPHY: eastern Ontario - the basal unit of the Ottawa Group; central Ontario - overlain by the Simcoe Group. COMPOSITION: in eastern Ontario - silty and sandy dolostone with shale partings and minor interbeds of sandstone; in central Ontario - conglomerates, sandstones, and shales. THICKNESS: eastern Ontario - 2 to 3 m; central Ontario - 0 to 12 m. USES: potential source of decorative stone; very limited value as aggregate source.

Gull River Formation (Middle Ordovician)

STRATIGRAPHY: part of the Simcoe Group (central Ontario) and Ottawa Group (eastern Ontario). In eastern Ontario the formation is subdivided into upper and lower members; in central Ontario it is presently subdivided into upper, middle and lower members. COMPOSITION: in central and eastern Ontario the lower member consists of alternating units of limestone, dolomitic limestone and dolostone, the upper member consists of thin-bedded limestones with thin shale partings; west of Lake Simcoe the lower member is thin- to thick-bedded, interbedded, grey argillaceous limestone and buff to green dolostone whereas the upper and middle members are dense microcrystalline limestones with argillaceous dolostone interbeds. THICKNESS: 7.5 to 136 m. USES: quarried in the Lake Simcoe, Kingston, Ottawa and Cornwall areas for crushed stone. Rock from certain layers in eastern and central Ontario has proven to be alkali-reactive when used in Portland cement concrete (alkali-carbonate reaction). AGGREGATE SUITABILITY TESTING: PSV = 41-49, AAV = 8-12, $MgSO_4$ = 3-13, LA = 18-28, Absn = 0.3-0.9, BRD = 2.68-2.73, PN (Asphalt & Concrete) = 100-153.

Bobcaygeon Formation (Middle Ordovician)

STRATIGRAPHY: part of the Simcoe Group (central Ontario) and the Ottawa Group (eastern Ontario), subdivided into upper, middle and lower members; members in eastern and central Ontario are approximately equivalent. COMPOSITION: homogeneous, massive to thin-bedded fine-crystalline limestone with numerous shaly partings in the middle member. THICKNESS: 7 to 87 m. USES: quarried at Brechin, Marysville, and in the Ottawa area for crushed stone. Generally suitable for use as granular base course aggregate. Rock from certain layers has been found to be alkali-reactive when used in Portland cement concrete (alkali-silica reaction). AGGREGATE SUITABILITY TESTING: PSV = 47-51, AAV = 14-23, $MgSO_4$ = 1-40, LA = 18-32, Absn = 0.3-2.4, BRD = 2.5-2.69, PN (Asphalt & Concrete) = 100-320.

Verulam Formation (Middle Ordovician)

STRATIGRAPHY: part of Simcoe and Ottawa Groups. COMPOSITION: fossiliferous, pure to argillaceous limestone interbedded with calcareous shale. THICKNESS: 32 to 65 m. USES: quarried at Picton and Bath for use in cement manufacture. Quarried for aggregate in Ramara Township, Simcoe County and in the Belleville–Kingston area. May be unsuitable for use as aggregate in some areas because of its high shale content. AGGREGATE SUITABILITY TESTING: PSV = 43-44, AAV = 9-13, $MgSO_4$ = 4-45, LA = 22-29, Absn = 0.4-2.1, BRD = 2.59-2.70, PN (Asphalt & Concrete) = 120-255.

Lindsay Formation (Middle Upper Ordovician)

STRATIGRAPHY: part of Simcoe and Ottawa Groups; in eastern Ontario is divisible into an unnamed lower member and the Eastview Member; in central Ontario is divisible into the Collingwood Member (equivalent to portions of the Eastview Member) and a lower member. COMPOSITION: eastern Ontario - the lower member is interbedded, very fine- to coarse-crystalline limestone with undulating shale partings and interbeds of dark grey calcareous shale, whereas the Eastview Member is an interbedded dark grey to dark brown calcareous shale and very fine- to fine-crystalline, petroliferous limestone; central Ontario - Collingwood Member is a black, calcareous shale whereas the lower member is a very fine- to coarse-crystalline, thin-bedded limestone with very thin, undulating shale partings. THICKNESS: 25 to 67 m. USES: eastern Ontario - lower member is used extensively for aggregate production; central Ontario - quarried at Picton, Ogden Point and Bowmanville for cement. May be suitable or unsuitable for use as concrete and asphalt aggregate. AGGREGATE SUITABILITY TESTING: $MgSO_4$ = 2-47, LA = 20-28, Absn = 0.4-1.3, BRD = 2.64-2.70, PN (Asphalt & Concrete) = 110-215.

Blue Mountain and Billings Formations (Upper Ordovician)

STRATIGRAPHY: central Ontario - Blue Mountain Formation includes the upper and middle members of the former Whitby Formation; eastern Ontario - Billings Formation is equivalent to part of the Blue Mountain Formation. COMPOSITION: Blue Mountain Formation - blue-grey, noncalcareous shales; Billings Formation - dark grey to black, noncalcareous to slightly calcareous, pyritiferous shale with dark grey limestone laminae and grey siltstone interbeds. THICKNESS: Blue Mountain Formation - 43 to 61 m; Billings Formation - 0 to 62 m. USES: Billings Formation may be a suitable source for structural clay products and expanded aggregate; Blue Mountain Formation may be suitable for structural clay products.

Georgian Bay and Carlsbad Formations (Upper Ordovician)

COMPOSITION: central Ontario - Georgian Bay Formation composed of interbedded limestone and shale; eastern Ontario - Carlsbad Formation composed of interbedded shale, siltstone and bioclastic limestone. THICKNESS: Georgian Bay Formation - 91 to 170 m. Carlsbad Formation - 0 to 186 m. USES: Georgian Bay Formation - used by several producers in Metropolitan Toronto area to produce brick and structural tile, as well as for making Portland cement; at Streetsville, expanded shale was used in the past to produce lightweight ag-

gregate. Carlsbad Formation - used as a source material for brick and tile manufacturing, has potential as a lightweight expanded aggregate.

Queenston Formation (Upper Ordovician)

COMPOSITION: red, thin- to thick-bedded, sandy to argillaceous shale with green mottling and banding. THICKNESS: 45 to 335 m. USES: There are several large quarries developed in the Queenston Formation in the Toronto–Hamilton region and one at Russell, near Ottawa. All extract shale for brick manufacturing. The Queenston Formation is the most important source material for brick manufacture in Ontario.

Whirlpool Formation (Lower Silurian)

STRATIGRAPHY: lower formation in the Cataract Group in the Niagara Peninsula and the Niagara Escarpment as far north as Duntroon. COMPOSITION: massive, medium- to coarse-grained, argillaceous white to light grey quartz sandstone with thin grey shale partings. THICKNESS: 0 - 8 m. USES: building stone, flagstone.

Manitoulin Formation (Lower Silurian)

STRATIGRAPHY: part of the Cataract Group, occurs north of Stoney Creek. COMPOSITION: thin-bedded, blue-grey to buff-brown dolomitic limestones and dolostones. THICKNESS: 0 to 25 m. USES: extracted for crushed stone in St. Vincent and Sarawak townships, Grey County, and for decorative stone on Manitoulin Island.

Cabot Head Formation (Lower Silurian)

STRATIGRAPHY: part of the Cataract Group, occurs in subsurface throughout southwestern Ontario and outcrops along the length of the Niagara Escarpment. COMPOSITION: green, grey and red shales. THICKNESS: 10 to 39 m. USES: potential source of coated lightweight aggregate and raw material for use in manufacture of brick and tile. Extraction limited by lack of suitable exposures.

Grimsby Formation (Lower Silurian)

STRATIGRAPHY: upper formation of the Cataract Group, is identified on the Niagara Peninsula as far north as Clappison's Corners. COMPOSITION: interbedded sandstone and shale, mostly red. THICKNESS: 0 to 15 m. USES: no present uses.

Thorold Formation (Middle Silurian)

STRATIGRAPHY: lower formation in the Clinton Group on the Niagara Peninsula. COMPOSITION: thick-bedded quartz sandstone. THICKNESS: 2 - 3 m. USES: no present uses.

Neagha Formation (Middle Silurian)

STRATIGRAPHY: part of the Clinton Group on the Niagara Peninsula. COMPOSITION: dark-grey to green shale with minor interbedded limestone. THICKNESS: 0 to 2 m. USES: no present uses.

Dyer Bay Formation (Middle Silurian)

STRATIGRAPHY: on Manitoulin Island and northernmost Bruce Peninsula. COMPOSITION: highly fossiliferous, impure dolostone. THICKNESS: 0 to 7.5 m. USES: no present uses.

Wingfield Formation (Middle Silurian)

STRATIGRAPHY: on Manitoulin Island and northernmost Bruce Peninsula. COMPOSITION: olive green to grey shale with dolostone interbeds. THICKNESS: 0 to 15 m. USES: no present uses.

St. Edmund Formation (Middle Silurian)

STRATIGRAPHY: occurs on Manitoulin Island and northernmost Bruce Peninsula, upper portion previously termed the Mindemoya Formation. COMPOSITION: pale grey to buff-brown, micro- to medium-crystalline, thin- to medium-bedded dolostone. THICKNESS: 0 to 25 m. USES: quarried for fill and crushed stone on Manitoulin Island. AGGREGATE SUITABILITY TESTING: $MgSO_4$ = 1-2, LA = 19-21, Absn = 0.6-0.7, BRD = 2.78-2.79, PN (Asphalt & Concrete) = 105.

Fossil Hill and Reynales Formations (Middle Silurian)

STRATIGRAPHY: Fossil Hill Formation occurs in the northern part of the Niagara Escarpment and is approximately equivalent in part to the Reynales Formation which occurs on the Niagara Peninsula and the Escarpment as far north as the Forks of the Credit. COMPOSITION: Fossil Hill Formation - fine- to coarse-crystalline dolostone with high silica content; Reynales Formation - thin- to thick-bedded shaly dolostone and dolomitic limestone. THICKNESS: Fossil Hill Formation 6 to 26 m; Reynales Formation 0 to 3 m. USES: both formations quarried for aggregate with overlying Amabel and Lockport Formations. AGGREGATE SUITABILITY TESTING: (Fossil Hill Formation on Manitoulin Island) $MgSO_4$ = 41, LA = 29, Absn = 4.1, BRD = 2.45, PN (Asphalt & Concrete) = 370.

Irondequoit Formation (Middle Silurian)

STRATIGRAPHY: part of Clinton Group on the Niagara Peninsula south of Waterdown. COMPOSITION:

massive, coarse-crystalline crinoidal limestone. THICKNESS: 0 to 2 m. USES: not utilized extensively.

Rochester Formation (Middle Silurian)

STRATIGRAPHY: part of Clinton Group along the Niagara Peninsula. COMPOSITION: black to dark grey calcareous shale with numerous limestone lenses. THICKNESS: 5 to 24 m. USES: not utilized extensively. AGGREGATE SUITABILITY TESTING: PSV = 69, AAV = 17, $MgSO_4$ = 95, LA = 19, Asbn = 2.2, BRD = 2.67, PN (Asphalt & Concrete) = 400.

Decew Formation (Middle Silurian)

STRATIGRAPHY: part of Clinton Group south of Waterdown along the Niagara Peninsula. COMPOSITION: sandy to shaly dolomitic limestone and dolostone. THICKNESS: 0 to 5 m. USES: too shaley for high quality uses, but is quarried along with Lockport Formation in places. AGGREGATE SUITABILITY TESTING: PSV = 67, AAV = 15, $MgSO_4$ = 55, LA = 21, Absn = 2.2, BRD = 2.66, PN (Asphalt & Concrete) = 255.

Lockport and Amabel Formations (Middle Silurian)

STRATIGRAPHY: Lockport Formation occurs from Waterdown to Niagara Falls, subdivided into 3 formal members: Gasport, Goat Island and Eramosa Members, and an informal member (the "Vinemount shale beds"); the approximately equivalent Amabel Formation, found from Waterdown to Cockburn Island, has been subdivided into Lions Head, Wiarton/Colpoy Bay and Eramosa Members. On the Bruce Peninsula and in the subsurface of southwestern Ontario the Eramosa Member is considered to be part of the overlying Guelph Formation. COMPOSITION: Lockport Formation is thin- to massive-bedded, fine- to medium-crystalline dolostone; Amabel Formation is thin- to massive-bedded, fine- to medium-crystalline dolostone with reef facies developed near Georgetown and on the Bruce Peninsula. The Eramosa Member is thin bedded and bituminous. THICKNESS: (Lockport/Amabel) 3 to 40 m. USES: both formations have been used to produce lime, crushed stone, concrete aggregate and building stone throughout their area of occurrence, and are a resource of provincial significance. AGGREGATE SUITABILITY TESTING: PSV = 36-49, AAV = 10-17, $MgSO_4$ = 2-6, LA = 25-32, Absn = 0.4-1.54, BRD = 2.61-2.81, PN (Asphalt & Concrete) = 100-105.

Guelph Formation (Middle Silurian)

STRATIGRAPHY: exposed south and west of the Niagara Escarpment from the Niagara River to the tip of the Bruce Peninsula, mostly present in the subsurface of southwestern Ontario. COMPOSITION: fine- to medium-crystalline, medium- to thick-bedded, porous dolostone, characterized in places by extensive vuggy, porous reefal facies of high chemical purity. THICKNESS: 4 to 100 m. USES: some areas appear soft and unsuitable for use in the production of load-bearing aggregate. This unit requires additional testing to fully establish its aggregate suitability. Main use is for dolomitic lime for cement manufacture. Quarried near Hamilton and Guelph.

Salina Formation (Upper Silurian)

STRATIGRAPHY: present in the subsurface of southwestern Ontario; only rarely exposed at surface. COMPOSITION: grey and maroon shale, brown dolostone and, in places, salt, anhydrite and gypsum; consists predominantly of evaporitic-rich material with up to eight units identifiable. THICKNESS: 113 to 330 m. USES: gypsum mines at Hagersville, Caledonia and Drumbo. Salt is mined at Goderich and Windsor and is produced from brine wells at Amherstburg, Windsor and Sarnia.

Bertie and Bass Islands Formations (Upper Silurian)

STRATIGRAPHY: Bertie Formation found in southern Niagara Peninsula; Bass Islands Formation, the Michigan Basin equivalent of the Bertie Formation, rarely outcrops in Ontario but is present in the subsurface in southwestern Ontario; Bertie Formation represented by Oatka, Falkirk, Scajaquanda, Williamsville and Akron Members. COMPOSITION: medium- to massive-bedded, micro-crystalline, brown dolostone with shaly partings. THICKNESS: 14 to 28 m. USES: quarried for crushed stone on the Niagara Peninsula; shaly intervals are unsuitable for use as high specification aggregate because of low freeze-thaw durability. Has also been extracted for lime. AGGREGATE SUITABILITY TESTING: PSV = 46-49, AAV = 8-11, $MgSO_4$ = 4-19, LA = 14-23, Absn = 0.8-2.8, BRD = 2.61-2.78, PN (Asphalt & Concrete) = 102-120.

Oriskany Formation (Lower Devonian)

STRATIGRAPHY: basal Devonian clastic unit, found in Niagara Peninsula. COMPOSITION: thick- to massive-bedded, coarse-grained, grey-yellow sandstone. THICKNESS: 0 to 5 m. USES: has been quarried for silica sand, building stone and armour stone. May be acceptable for use as rip rap, and well-cemented varieties may be acceptable for some asphaltic products. AGGREGATE SUITABILITY TESTING: (of a well-cemented variety of the formation) PSV = 64, AAV = 6, $MgSO_4$ = 2, LA = 29, Absn = 1.2-1.3, BRD = 2.55, PN (Asphalt & Concrete) = 107.

Bois Blanc Formation (Lower Devonian)

STRATIGRAPHY: Springvale Sandstone Member forms the lower portion of formation. COMPOSITION: a cherty limestone with shale partings and minor interbedded dolostones; Springvale Sandstone Member is a medium- to coarse-grained, green glauconitic sand-

stone with interbeds of limestone, dolostone and brown chert. THICKNESS: 3 to 40 m. USES: quarried at Hagersville, Cayuga and Port Colborne for crushed stone. Material generally unsuitable for concrete aggregate because of high chert content. AGGREGATE SUITABILITY TESTING: PSV = 48-53, AAV = 3-7, $MgSO_4$ = 3-18, LA = 15-22, Absn = 1.3-2.8, BRD = 2.50-2.70, PN (Asphalt & Concrete) = 102-290.

Onondaga Formation (Lower - Middle Devonian)

STRATIGRAPHY: correlated to part of the Detroit River Group; occurs on the Niagara Peninsula from Simcoe to Niagara Falls; contains the Edgecliff, Clarence and Moorehouse Members. COMPOSITION: medium-bedded, fine- to coarse-grained, dark grey-brown or purplish-brown, variably cherty limestone. THICKNESS: 8 to 25 m. USES: quarried for crushed stone on the Niagara Peninsula at Welland and Port Colborne. High chert content makes much of the material unsuitable for use as concrete aggregate and asphaltic concrete. Has been used as a raw material in cement manufacture. AGGREGATE SUITABILITY TESTING: (Clarence and Edgecliff Members) $MgSO_4$ = 1-6, LA = 16.8-22.4, Absn = 0.5-1.1, PN (Asphalt & Concrete) = 190-276.

Amherstburg Formation (Lower - Middle Devonian)

STRATIGRAPHY: part of Detroit River Group; correlated to Onondaga Formation in Niagara Peninsula; contains Sylvania Sandstone Member and Formosa Reef Limestone. COMPOSITION: bituminous, bioclastic, stromatoporoid-rich limestone with grey chert nodules; Formosa Reef Limestone - high purity (calcium-rich) limestone; Sylvania Sandstone Member - quartz sandstone. THICKNESS: 0 to 60 m; Formosa Reef Limestone - up to 26 m. USES: cement manufacture, agricultural lime, aggregate. AGGREGATE SUITABILITY TESTING: PSV = 57, AAV = 19, $MgSO_4$ = 9-35, LA = 26-52, Absn = 1.1-6.4, BRD = 2.35-2.62, PN (Asphalt & Concrete) = 105-300.

Lucas Formation (Middle Devonian)

STRATIGRAPHY: part of the Detroit River Group in southwestern Ontario; includes the Anderdon Member which, in the Woodstock–Beachville area, may constitute the bulk of the formation. COMPOSITION: light brown or grey-brown dolostone with bituminus laminations and minor chert; Anderdon Member consists of very high purity (calcium-rich) limestone and locally, sandy limestone. THICKNESS: 40 to 75 m. USES: most important source of high-purity limestone in Ontario. Used as calcium lime for metallurgical flux and for the manufacture of chemicals. Rock of lower purity is used for cement manufacture, agricultural lime and aggregate. Anderdon Member is quarried at Amherstburg for crushed stone. AGGREGATE SUITABILITY TESTING: PSV = 46-47, AAV = 15-16, $MgSO_4$ = 2-60, LA = 22-47, Absn = 1.1-6.5, BRD = 2.35-2.40, PN (Asphalt & Concrete) = 110-160.

Dundee Formation (Middle Devonian)

STRATIGRAPHY: few natural outcrops, largely in the subsurface of southwestern Ontario. COMPOSITION: fine- to medium-crystalline, brownish-grey, medium- to thick-bedded, dolomitic limestone with shaly partings, sandy layers, and chert in some areas. THICKNESS: 15 to 45 m. USES: quarried near Port Dover and on Pelee Island for crushed stone. Used at St. Marys as a raw material for Portland cement. AGGREGATE SUITABILITY TESTING: $MgSO_4$ = 1-28, LA = 22-46, Absn = 0.6-6.8, PN (Asphalt & Concrete) = 125-320.

Marcellus Formation (Middle Devonian)

STRATIGRAPHY: subsurface unit, mostly found below Lake Erie and extending into the eastern USA, pinches out in the Port Stanley area. COMPOSITION: black, bituminous shales. THICKNESS: 0 to 12 m. USES: no present uses.

Bell Formation (Middle Devonian)

STRATIGRAPHY: lowest formation of the Hamilton Group, no outcrop in Ontario. COMPOSITION: soft, blue and grey calcareous shale. THICKNESS: 0 to 14.5 m. USES: no present uses.

Rockport Quarry Formation (Middle Devonian)

STRATIGRAPHY: part of the Hamilton Group; no outcrop in Ontario. COMPOSITION: grey-brown, very fine-grained limestone with occasional shale layers. THICKNESS: 0 to 6 m. USES: no present uses.

Arkona Formation (Middle Devonian)

STRATIGRAPHY: part of the Hamilton Group. COMPOSITION: blue-grey, plastic, clay shale with occasional thin and laterally discontinuous limestone lenses. THICKNESS: 5 to 37 m. USES: has been extracted at Thedford and near Arkona for the production of drainage tile.

Hungry Hollow Formation (Middle Devonian)

STRATIGRAPHY: part of the Hamilton Group. COMPOSITION: grey crinoidal limestone and soft, fossiliferous calcareous shale. THICKNESS: 0 to 2 m. USES: suitable for some crushed stone and fill with selective quarrying.

Widder Formation (Middle Devonian)

STRATIGRAPHY: part of the Hamilton Group. COMPOSITION: mainly soft, grey, fossiliferous calcareous

shale interbedded with blue-grey, fine-grained fossiliferous limestone. THICKNESS: 0 to 21 m. USES: no present uses.

Ipperwash Formation (Middle Devonian)

STRATIGRAPHY: upper formation of the Hamilton Group; very limited distribution. COMPOSITION: medium- to coarse grained, grey-brown, bioclastic limestone. THICKNESS: 2 to 14 m. USES: no present uses.

Kettle Point Formation (Upper Devonian)

STRATIGRAPHY: occurs in a northwest-trending band between Sarnia and Erieau; small part overlain by Port Lambton Group rocks in extreme northwest. COMPOSITION: black, highly fissile, organic-rich shale with minor interbeds of grey-green silty shale. THICKNESS: 0 to 75 m. USES: possible source of material for use as sintered lightweight aggregate or fill.

Bedford Formation (Upper Devonian or Mississippian)

STRATIGRAPHY: lower formation of the Port Lambton Group. COMPOSITION: soft, grey shale. THICKNESS: 0 to 30 m. USES: no present uses.

Berea Formation (Upper Devonian or Mississippian)

STRATIGRAPHY: middle formation of the Port Lambton Group; not known to occur at surface in Ontario. COMPOSITION: grey, fine- to medium-grained sandstone, often dolomitic and interbedded with grey shale and siltstone. THICKNESS: 0 to 60 m. USES: no present uses.

Sunbury Formation (Upper Devonian or Mississippian)

STRATIGRAPHY: upper formation of the Port Lambton Group; not known to occur at surface in Ontario. COMPOSITION: black shale. THICKNESS: 0 to 20 m. USES: no present uses.

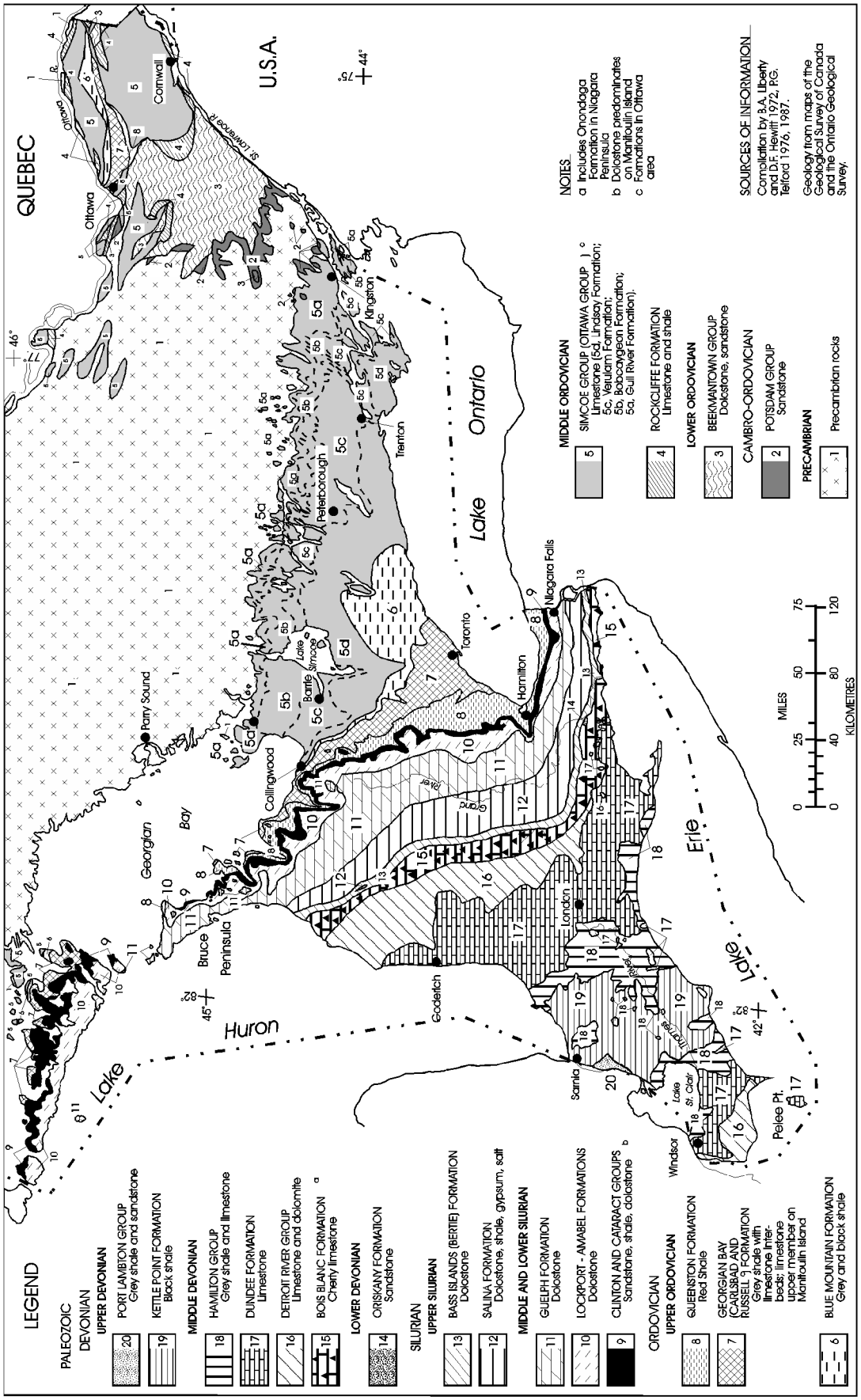


Figure D1. Bedrock geology of southern Ontario.

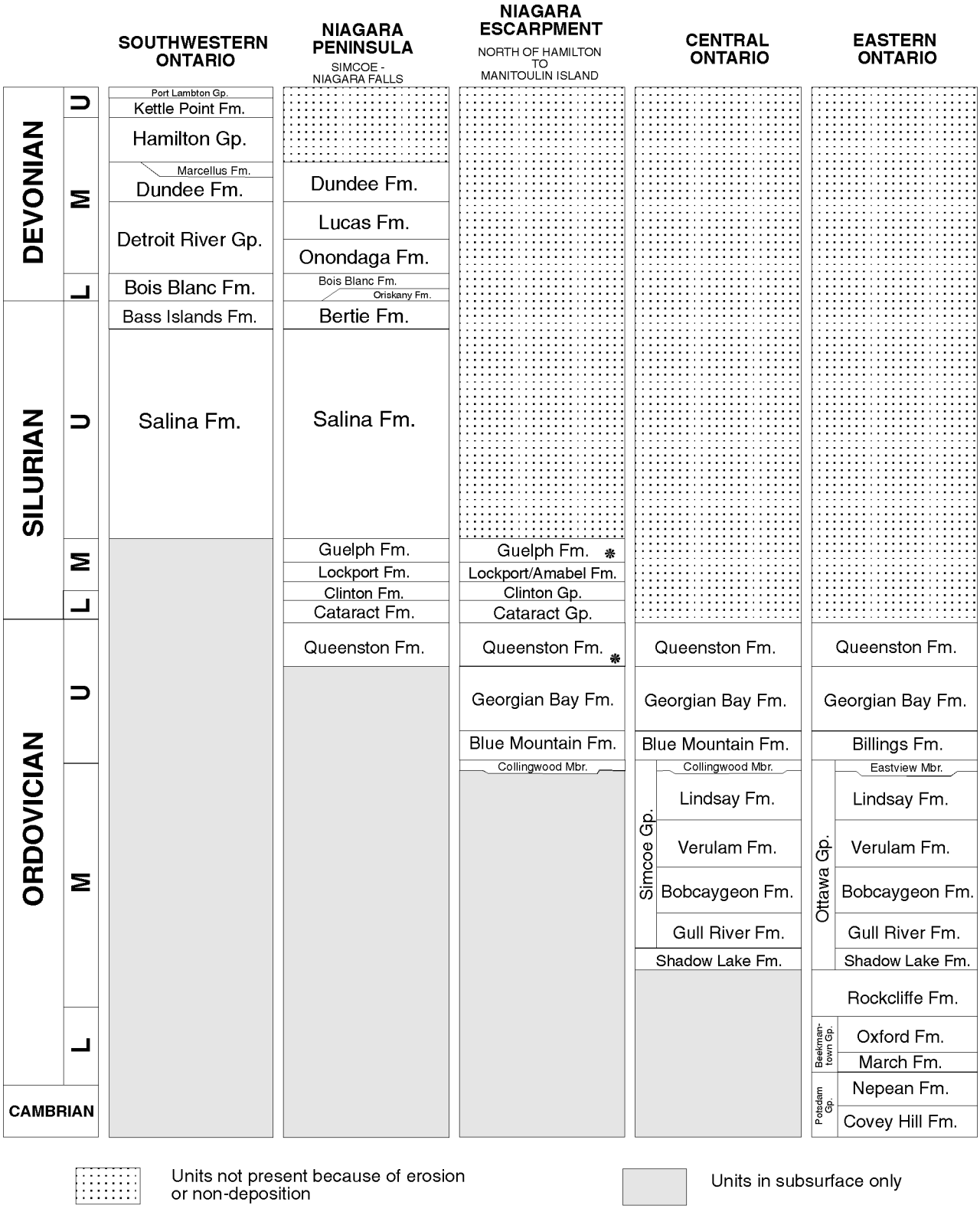


Figure D2. Exposed Paleozoic stratigraphic sequences in southern Ontario (*adapted from*: Bezys, R.K. and Johnson, M.D. 1988. The geology of the Paleozoic formations utilized by the limestone industry of Ontario; The Can. Mining and Metallurgical Bulletin,v.81, no. 912, p.49-58.)

Appendix E – Aggregate Quality Test Specifications

Six types of aggregate quality tests are often performed by the Ontario Ministry of Transportation on sampled material. A description and the specification limits for each test are included in this appendix. Although a specific sample meets or does not meet the specification limits for a certain product, it may or may not be acceptable for that use based on field performance. Additional quality tests other than the six tests listed in this appendix can be used to determine the suitability of an aggregate. The tests are performed by the Ontario Ministry of Transportation.

Absorption Capacity: Related to the porosity of the rock types of which an aggregate is composed. Porous rocks are subject to disintegration when absorbed liquids freeze and thaw, thus decreasing the strength of the aggregate. This test is conducted in conjunction with the determination of the sample's relative density.

Los Angeles Abrasion and Impact Test: This test measures the resistance to abrasion and the impact strength of aggregate. This gives an idea of the breakdown that can be expected to occur when an aggregate is stockpiled, transported and placed. Values less than about 35% indicate potentially satisfactory performance for most concrete and asphalt uses. Values of more than 45% indicate that the aggregate may be susceptible to excessive breakdown during handling and placing.

Magnesium Sulphate Soundness Test: This test is designed to simulate the action of freezing and thawing on aggregate. Those aggregates which are susceptible will usually break down and give high losses in this test. Values greater than about 12 to 15% indicate potential problems for concrete and asphalt coarse aggregate.

Micro-Deval Abrasion Test: The Micro-Deval Abrasion test is an accurate measure of the amount of hard, durable materials in sand-sized particles. This abrasion test is quick, cheap and more precise than the fine aggregate Magnesium Sulphate Soundness test that suffers from a wide multilaboratory variation. The maximum loss for HL 1/HL 3 is 20%, for HL 2 and HL 4/HL 8 it is 25% and for structural and pavement concrete it is 20%. It is anticipated that this test will replace the fine aggregate Magnesium Sulphate Soundness test.

Mortar Bar Accelerated Expansion Test: This is a rapid test for detecting alkali-silica reactive aggregates. It involves the crushing of the aggregate and the creation of standard mortar bars. For coarse and fine aggregates, suggested expansion limits of 0.10 to 0.15% are indicated for innocuous aggregates, greater than 0.10% but less than 0.20% indicates that it is unknown whether a potentially deleterious reaction will occur, and greater than 0.20% indicates that the aggregate is probably reactive and should not be used for Portland cement concrete. If the expansion limit exceeds 0.10% for coarse and fine aggregates, it is recommended that supplementary information be developed to confirm that the expansion is actually because of alkali-reactivity. If confirmed deleteriously reactive, the material should not be used for Portland cement concrete unless corrective measures are undertaken such as the use of low- or reduced-alkali cement.

Petrographic Examination: Individual aggregate particles in a sample are divided into categories good, fair, poor and deleterious, based on their rock type (petrography) and knowledge of past field performance. A petrographic number (PN) is calculated. The higher the PN, the lower the quality of the aggregate.

Table E1. Selected quality requirements for major aggregate products.

TYPE OF TEST						
	COARSE AGGREGATE				FINE AGGREGATE	
TYPE OF MATERIAL	Petrographic Number Maximum	Magnesium Sulphate Soundness Maximum% Loss	Absorption Maximum%	Los Angeles Abrasion Maximum% Loss	Micro-Deval Abrasion Maximum % Loss	Magnesium Sulphate Soundness Maximum % Loss
Granular A	200	-	-	60		-
Granular B Type 1	250*	-	-	-		-
Granular B Type 2	250	-	-	60		-
Granular M	200	-	-	60		-
Granular S	200	-	-	-		-
Select Subgrade Material	250	-	-	-		-
Open Graded Drainage Layer (1)	160	15	2.0	35		-
Hot Mix-HL 1, DFC, OFC	See OPSS 1149 and Special Provision No. 313S10					
Surface Treatment Class 1	135	12	1.75	35		-
Surface Treatment Class 2	160	15	-	35		-
Surface Treatment Class 3	160	12	2.0	35		-
Surface Treatment Class 4	-	-	-	-		20
Surface Treatment Class 5	135	12	1.75	35		-
Hot Mix - HL 1	100	5	1.0	15	20	16
Hot Mix - HL 2	-	-	-	-	25	20
Hot Mix - HL 3	135	12	1.75	35	20	16
Hot Mix - HL 4	160	12	2.0	35	20	20
Hot Mix - HL 8	160	15	2.0	35	25	20
Structural Concrete, Sidewalk, Curb, Gutter and Base	140	12	2.0	50	20	16
Pavement Concrete	125	12	2.0	35	20	16

*** requirement waived if the material has more than 80% passing the 4.75 mm sieve**
(1) Hot mix and concrete petrographic number applies
(Ontario Provincial Standard Specifications OPSS 304, OPSS 1002, OPSS 1003, OPSS 1010 and OPSS 1149)

Metric Conversion Table

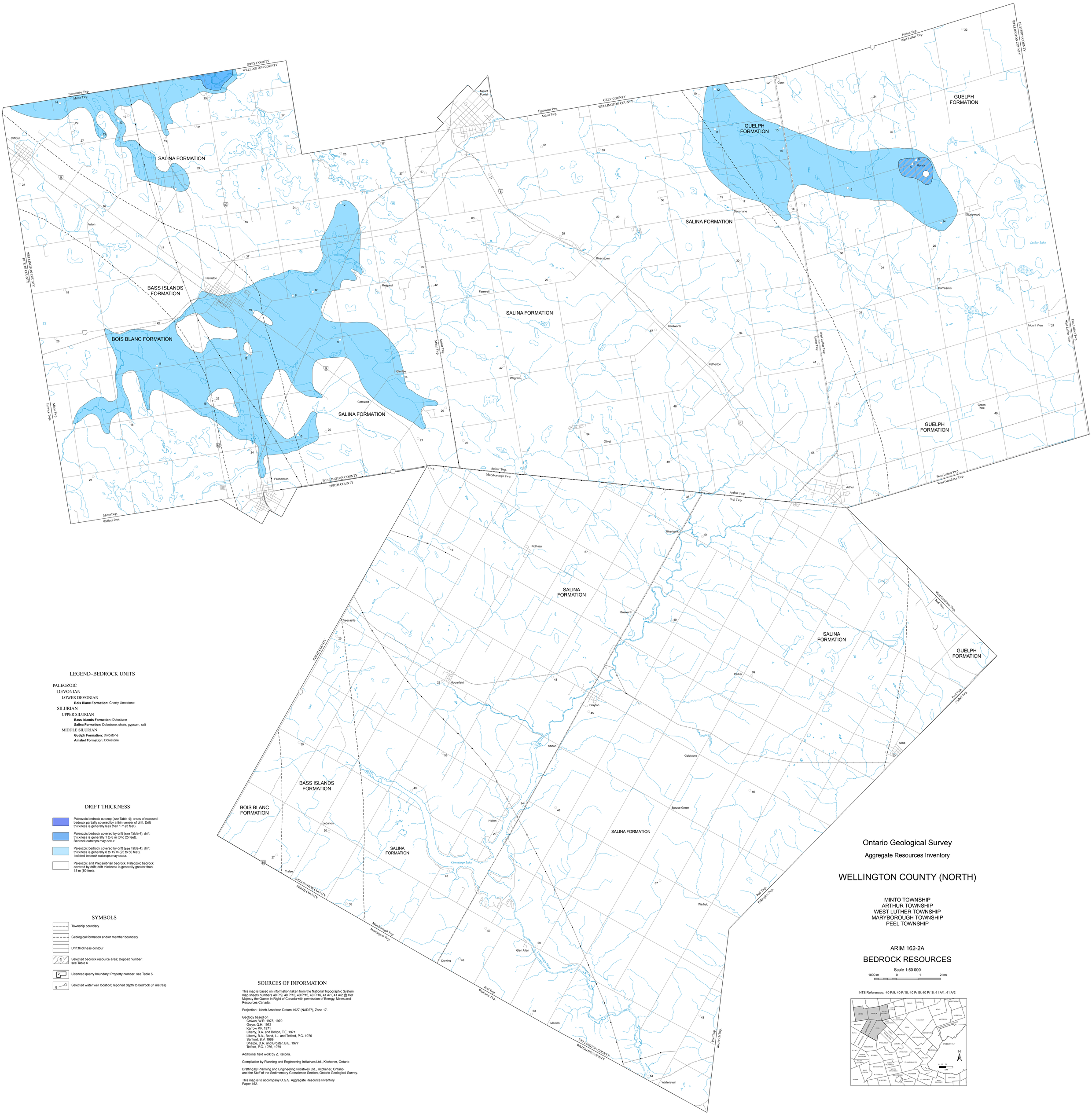
Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

ISSN 0708-2061
ISBN 0-7778-8162-4



LEGEND–BEDROCK UNITS

PALEOZOIC
- DEVONIAN
  - LOWER DEVONIAN
    - **Bois Blanc Formation:** Cherty Limestone
- SILURIAN
  - UPPER SILURIAN
    - **Bass Islands Formation:** Dolostone
    - **Salina Formation:** Dolostone, shale, gypsum, salt
  - MIDDLE SILURIAN
    - **Guelph Formation:** Dolostone
    - **Amabel Formation:** Dolostone

DRIFT THICKNESS

- Paleozoic bedrock outcrop (*see* Table 4); areas of exposed bedrock partially covered by a thin veneer of drift. Drift thickness is generally less than 1 m (3 feet).
- Paleozoic bedrock covered by drift (*see* Table 4); drift thickness is generally 1 to 8 m (3 to 25 feet). Bedrock outcrops may occur.
- Paleozoic bedrock covered by drift (*see* Table 4); drift thickness is generally 8 to 15 m (25 to 50 feet). Isolated bedrock outcrops may occur.
- Paleozoic and Precambrian bedrock. Paleozoic bedrock covered by drift; drift thickness is generally greater than 15 m (50 feet).

SYMBOLS

- Township boundary
- Geological formation and/or member boundary
- Drift thickness contour
- 1 — Selected bedrock resource area; Deposit number: see Table 6
- 2 — Licenced quarry boundary: Property number: see Table 5
- 8 — Selected water well location; reported depth to bedrock (in metres)

SOURCES OF INFORMATION

This map is based on information taken from the National Topographic System map sheets numbers 40 P/9, 40 P/10, 40 P/15, 40 P/16, 41 A/1, 41 A/2 @ Her Majesty the Queen in Right of Canada with permission of Energy, Mines and Resources Canada.

Projection: North American Datum 1927 (NAD27), Zone 17.

Geology based on
- Cowan, W.R. 1976, 1979
- Gwyn, Q.H. 1972
- Karrow P.F. 1971
- Liberty, B.A. and Bolton, T.E. 1971
- Liberty, B.A., Bond, I.J. and Telford, P.G. 1976
- Sanford, B.V. 1969
- Sharpe, D.R. and Broster, B.E. 1977
- Telford, P.G. 1976, 1979

Additional field work by Z. Katona.

Compilation by Planning and Engineering Initiatives Ltd., Kitchener, Ontario

Drafting by Planning and Engineering Initiatives Ltd., Kitchener, Ontario and the Staff of the Sedimentary Geoscience Section, Ontario Geological Survey.

This map is to accompany O.G.S. Aggregate Resource Inventory Paper 162.

Ontario Geological Survey

Aggregate Resources Inventory

WELLINGTON COUNTY (NORTH)

MINTO TOWNSHIP
ARTHUR TOWNSHIP
WEST LUTHER TOWNSHIP
MARYBOROUGH TOWNSHIP
PEEL TOWNSHIP

ARIM 162-2A

BEDROCK RESOURCES

Scale 1:50 000

1000 m 0 1 2 km

NTS References: 40 P/9, 40 P/10, 40 P/15, 40 P/16, 41 A/1, 41 A/2

Ontario Geological Survey

Aggregate Resources Inventory

WELLINGTON COUNTY (SOUTH)

PILKINGTON TOWNSHIP
NICHOLS TOWNSHIP
WEST GARAFRAXA TOWNSHIP
GUELPH TOWNSHIP
ERAMOSA TOWNSHIP
ERIN TOWNSHIP
PUSLINCH TOWNSHIP
CITY OF GUELPH

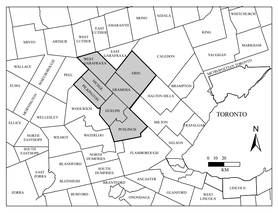
ARIM 162-2B

BEDROCK RESOURCES

Scale 1:50 000

1000 m 0 1 2 km

NTS References: 30 M/12, 40 P/7, 40 P/8, 40 P/9, 40 P/10



SYMBOLS

- Township boundary
- Geological formation and/or member boundary
- Drift thickness contour
- 1 — Selected bedrock resource area; Deposit number: see Table 6
- 2 — Licenced quarry boundary: Property number: see Table 5
- Q5 — Unlicenced quarry*: Property number: see Table 5 *Abandoned quarry or wayside quarry operating on demand
- 8 — Selected water well location; reported depth to bedrock (in metres)

LEGEND–BEDROCK UNITS

PALEOZOIC
- DEVONIAN
  - LOWER DEVONIAN
    - **Bois Blanc Formation:** Cherty Limestone
- SILURIAN
  - UPPER SILURIAN
    - **Bass Islands Formation:** Dolostone
    - **Salina Formation:** Dolostone, shale, gypsum, salt
  - MIDDLE SILURIAN
    - **Guelph Formation:** Dolostone
    - **Amabel Formation:** Dolostone

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- Paleozoic and Precambrian bedrock. Paleozoic bedrock covered by drift; drift thickness is generally greater than 15 m (50 feet).

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Geology based on

Cowan, W.R. 1976, 1979
Hewitt, D.F. 1969
Karrow P.F. 1968, 1971
Liberty, B.A., Bond, I.J. and Telford, P.G. 1976
Sanford, B.V. 1969
Telford, P.G. 1976, 1979

Additional field work by Z. Katona.

Compilation by Planning and Engineering Initiatives Ltd., Kitchener, Ontario.

Drafting by Planning and Engineering Initiatives Ltd., Kitchener, Ontario and the staff of the Sedimentary Geoscience Section, Ontario Geological Survey.

This map is to accompany O.G.S. Aggregate Resource Inventory Paper 162.

LEGEND

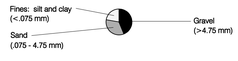
(Some map units and symbols may not apply to this map)

- Selected sand and gravel resource area, primary significance; deposit number; see Table 3.
- Selected sand and gravel resource area, secondary significance.
- Sand and gravel deposit, tertiary significance.
- Other surficial deposits or exposed bedrock.

SYMBOLS

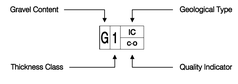
- Township boundary
- Project area boundary
- Park, reserve boundary
- Geological and aggregate thickness boundary of sand and gravel deposits
- Buried geological and aggregate thickness boundary of sand and gravel deposits
- Licenced property boundary: Property number: see Table 2
- Unlicenced sand or gravel pit*. Property number: see Table 2 *Abandoned pit or wayside pit operating on demand under authority of a permit
- Test hole location; Identification number; see Table 7
- Selected sample site: Identification number
- Selected water well location. Layers of materials are described by reported thickness of material (in m); reported type of material (number only - overburden. G - gravel, S - sand, C - clay, T - till, B - boulders, Bk - bedrock, Hpan - hardpan, Stn - stones, Slt - silt)
- Moraine
- Texture symbol; see below
- Deposit symbol; see below

TEXTURE SYMBOL



The Texture Symbol provides quantitative assessment of the grain size distribution at a sampled location. The relative amounts of gravel, sand, silt and clay in the sampled material are shown graphically by the subdivision of a circle into proportional segments. The above example shows a hypothetical sample consisting of 45% gravel, 35% sand and 20% silt and clay.

DEPOSIT SYMBOL



Deposits are identified by Gravel Content, Thickness Class, Geological Type and Quality Indicator. Gravel Content is expressed as a percentage of gravel-sized material (i.e., material retained on the 4.75 mm sieve). Thickness Class is based on potential aggregate tonnage per hectare. Geological Type refers to geological origin. Quality indicator describes objectionable grain size and lithology.

Gravel Content

G	Greater than 35% gravel
S	Less than 35% gravel

Thickness Class

Class	Average Thickness in Metres	Tonnes per Hectare
1	greater than 6	greater than 106 000
2	3 - 6	53 000 - 106 000
3	1.5 - 3	26 500 - 53 000
4	less than 1.5	less than 26 500

Geological Type

AL	Older Alluvium	LB	Lacustrine Beach
E	Esker	LD	Lacustrine Delta
M	Moraine	LP	Lacustrine Plain
IC	Undifferentiated Ice-Contact Stratified Drift	OW	Outwash
ICT	Ice-Contact Terrace	SF	Subaqueous Fan

(see Appendix C for descriptions of Geological Types.)

Quality Indicator

	If blank, no known limitations present.
C	Clay and/or silt (fines) present in objectionable quantities.
L	Deleterious lithologies present.
O	Oversize particles or fragments present in objectionable quantities.

SOURCES OF INFORMATION

This map is based on information taken from the National Topographic System map sheet numbers 30M/12, 40P/B,40 P/9, 40 P/10, 40 P/15, 40 P/16, 41 A/1, 41 A/2 @Her Majesty the Queen in Right of Canada with permission of Energy, Mines and Resources Canada.

Geology based on:
B.V. Sanford, 1969.
W.R. Cowan, 1976,1979.
P.G. Telford, 1976,1979.
D.R. Sharpe, 1977.
B.A. Liberty, 1971.
T.E. Bolton, 1971.
Q.H. Gwyn, 1972.
I.J. Bond, 1976.
P.F. Karrow, 1971.

Additional field work by: Z. Katona.

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Drafting by: Planning and Engineering Initiatives Ltd., Kitchener, Ontario and the Staff of the Sedimentary Geoscience Section, Ontario Geological Survey.

This map is to accompany O.G.S. Aggregate Resource Inventory Paper 162.

Ontario

Ontario Geological Survey

Aggregate Resources Inventory

WELLINGTON COUNTY (NORTH)

MINTO TOWNSHIP
ARTHUR TOWNSHIP
WEST LUTHER TOWNSHIP
MARYBOROUGH TOWNSHIP
PEEL TOWNSHIP

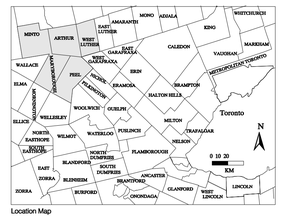
ARIM 162-1A

SAND AND GRAVEL RESOURCES

Scale 1:50 000

1000 m 0 1 2 km

NTS Reference: 30 M/12, 40 P/B, 40 P/9, 40 P/10 40 P/15, 40 P/16, 41 A/1, 41 A/2



Location Map

Ontario

Ontario Geological Survey

Aggregate Resources Inventory

WELLINGTON COUNTY (SOUTH)

PILKINGTON TOWNSHIP
NICHOL TOWNSHIP
WEST GARAFRAXA TOWNSHIP
GUELPH TOWNSHIP
ERAMOSA TOWNSHIP
ERIN TOWNSHIP
PUSLINCH TOWNSHIP
CITY OF GUELPH

ARIM 162-1B

SAND AND GRAVEL RESOURCES

Scale 1:50 000

1000 m 0 1 2 km

NTS Reference: 30 M/12, 30 M/13, 40 P/8, 40 P/9, 40 P/10, 40 P/15, 40 P/16, 41 A/2

LEGEND

(Some map units and symbols may not apply to this map)

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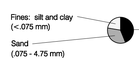
- 3 — Unlicenced sand or gravel pit*. Property number: see Table 2 *Abandoned pit or wayside pit operating on demand under authority of a permit
- BL-TH-16 — Test hole location; Identification number; see Table 7
- EW-SS-1 — Selected sample site: Identification number
- 8 46S — Selected water well location. Layers of materials are described by reported thickness of material (in m); reported type of material (number only - overburden. G - gravel, S - sand, C - clay, T - till, B - boulders, Bk - bedrock, Hpan - hardpan, Stn - stones, Silt - silt)
- Moraine
- Texture symbol; see below
- G 1 IC c-o — Deposit symbol; see below

TEXTURE SYMBOL



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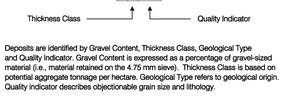

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D.F. Hewitt, 1969.
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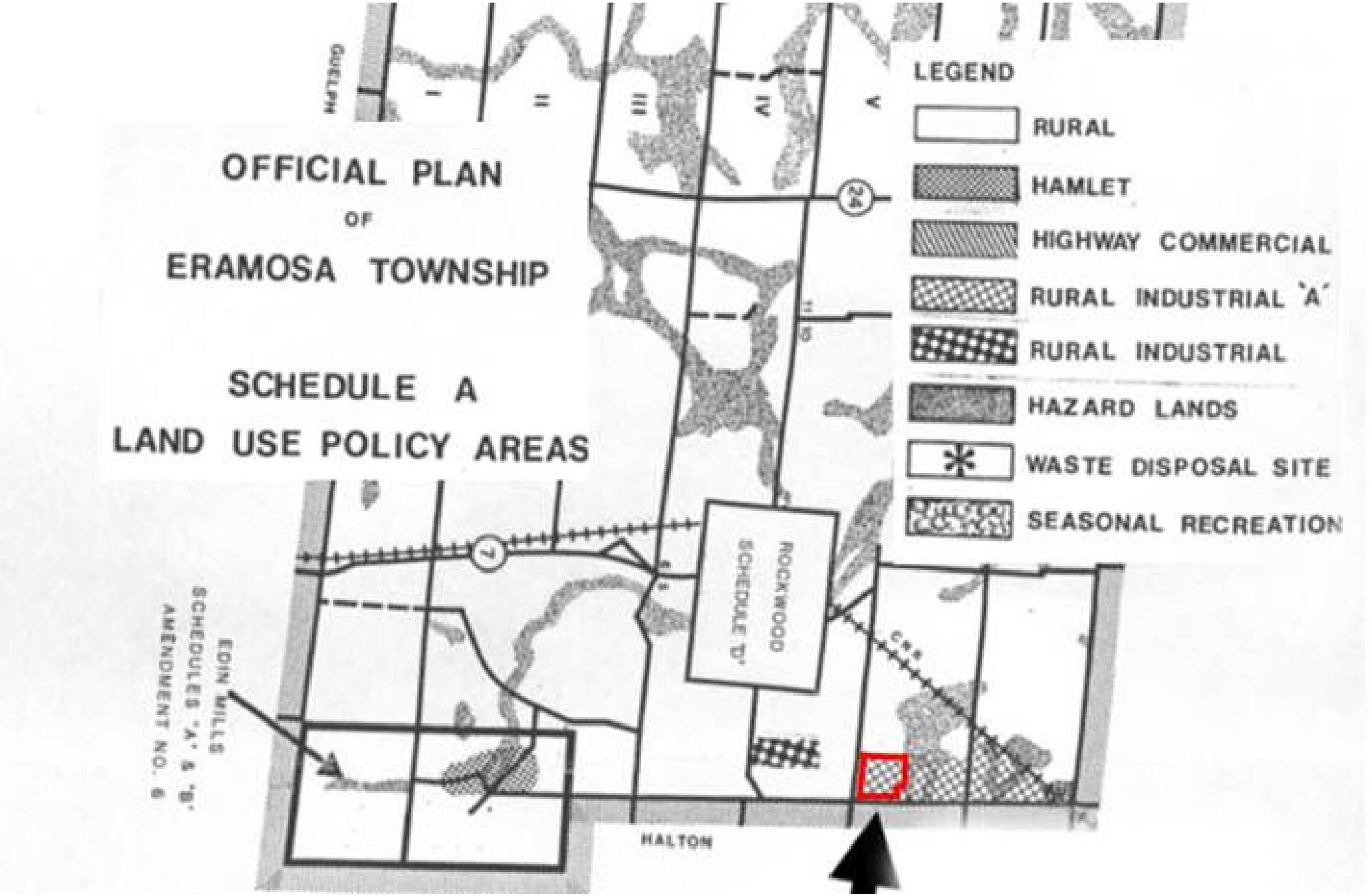

OFFICIAL PLAN
OF
ERAMOSA TOWNSHIP
SCHEDULE A
LAND USE POLICY AREAS
LEGEND
RURAL
HAMLET
HIGHWAY COMMERCIAL
RURAL INDUSTRIAL 'A'
RURAL INDUSTRIAL
HAZARD LANDS
WASTE DISPOSAL SITE
SEASONAL RECREATION
GUELPH
ROCKWOOD
SCHEDULE 'D'
EDIN MILLS
SCHEDULES 'A' & 'B'
AMENDMENT NO. 9
HALTON

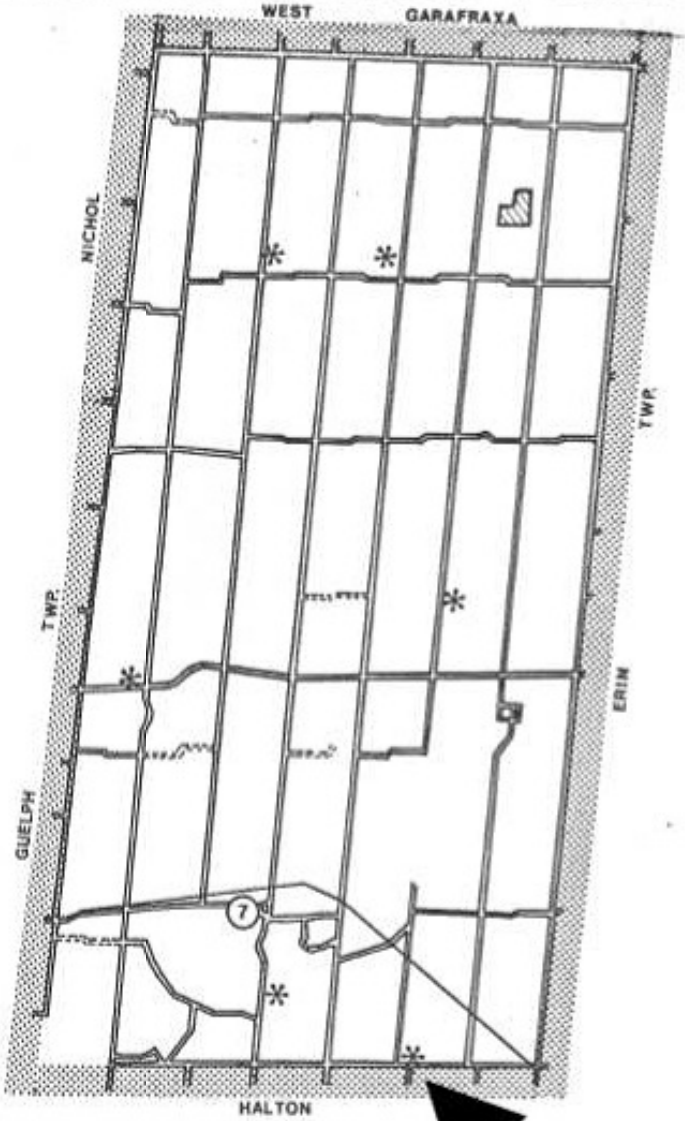
OFFICIAL PLAN

OF

ERAMOSA TOWNSHIP

SCHEDULE C

EXTRACTIVE INDUSTRY POLICY AREAS



LEGEND

* EXISTING GRAVEL PIT OPERATIONS

POTENTIAL GRAVEL PIT AREAS

0 1 2 3 Miles

Ministry of Natural Resources

Ministère des Richesses naturelles

Guelph District
1 Stone Road West
Guelph, Ontario
N1G 4Y2

Telephone: (519) 826-4912
Facsimile: (519) 826-4929

Ontario

November 6, 2013

Greg Sweetnam
James Dick Construction
P.O. Box 470
Bolton, ON
L7E 5T4

REGISTERED LETTER

Re: Hidden Quarry – License Application for a Category 2, Class A License under the Aggregate Resources Act – Part Lot 1, Concession 6, Township of Guelph/Eramosa in the County of Wellington

Dear Mr. Sweetnam

Thank you for the opportunity to review the information that was been submitted in reply to our April 15, 2013 comments. We sent a letter to you dated July 11, 2013 at which time Karolyne Pickett our Species at Risk Biologist reviewed the file and provided comments. Since then we have had a staff change and Graham Buck reviewed the file and reported that based on the site investigation record (Table 1) the team did a very detailed and robust study of all taxa.

Level II Natural Environment Technical Report

The Ministry has no further concerns with the Natural Environment Report.

Level I and II Hydrogeological Investigation

The Ministry has no further concerns in regards to the Hydrogeological Investigation.

Site Plans – Rehabilitation Plans

Vegetation Monitoring- the Ministry approves the details given on reforestation procedures and follow-up monitoring.

After review, Ministry staff are satisfied that the outstanding objections noted on July 11, 2013 have been satisfactorily resolved.

Respectively submitted,

Lorraine Norminton
A/District Planner

cc. Sarah DeBortoli, MNR
Al Murray, MNR
Art Timmerman, MNR
Oleg Ivanov, MNR
Graham Buck, MNR

Leigh Mugford, James Dick Construction Ltd.

Ministry of the Environment
West Central Region
Technical Support Section

119 King Street West
12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement
Région du Centre-Ouest
Section d'appui technique

119 rue King ouest
12e étage
Hamilton (Ontario) L8P 4Y7
Tél. : 905 521-7640
Téléc. : 905 521-7820

Ontario

October 10, 2013

Sent via e-mail to sdenhoed@hardenv.com

Harden Environmental Services Ltd.
4622 Nassagaweya-Puslinch Townline Road
R.R. 1, Moffat, Ontario
L0P 1J0

Dear Mr. Stan Denhoed,

RE: Proposed Hidden Quarry – James Dick Construction Ltd.
Part of Lot 1, Concession 6, Township of Guelph-Eramosa
County of Wellington

In a letter dated July 3, 2013, from C. Slater of the MOE to G. Sweetnam of James Dick Construction Ltd. (JDCL), this Ministry provided review comments on the supporting documentation to the Aggregate Resources Act License application for the proposed Hidden Quarry.

To address outstanding items in the MOE comments, Harden Environmental Services Ltd. (Harden) prepared the following:

- Letter report with Appendices A to D, dated July 15, 2013, prepared by S. Denhoed of Harden to G. Sweetnam of JDCL, RE: MOE Comments Hidden Quarry.
- Email dated October 9, 2013, from S. Denhoed of Harden to R. Stewart of MOE. RE: M16

The MOE has reviewed the above noted additional information and have the following comments:

Surface Water Comments:

1. It is the opinion of the MOE that the response to surface water comments from April 22, 2013 have been addressed and further comment to the aforementioned report is not required.

2. Based on the surface water evaluation provided and proposed mitigation measures, the risk for significant environmental impact in regards to Tributary B and the Northwest Wetland are perceived to be low, which is attributable to the length of hydrological and hydrogeological data that is available and the conceptual understanding of the site.

3. Further to the previous comment, the proposed monitoring program is appropriate for ascertaining and addressing potential surface water impacts attributable to quarry activities.

Groundwater Comments:

1. The MOE agrees with Harden‘s assessment of the groundwater thermal impacts of the proposed quarry on the Brydson Spring and the Blue Spring Creek.

2. Based on the information presented in Appendix B – Summary of Drilling and Testing of New Well M15 at Hidden Quarry Site – the MOE agrees with Harden’s assessment that the groundwater movement in the bedrock is mainly controlled by fractures and not by karst features.

3. The Revised Monitoring Program presented in Appendix D, and the information presented in the email dated October 9, 2013, has incorporated the groundwater MOE recommendations to the monitoring program for the site. These changes should be included in the Site Plans.

In summary, the surface water and groundwater outstanding items have been addressed to MOE satisfaction.

Respectfully,

Rosa C. Stewart, P.Geo.
Hydrogeologist
T: (905) 521-7592
E: rosa.stewart@ontario.ca

C G. Sweetnam, L. Mugford / James Dick Construction Ltd.
Lorraine Norminton, Sarah DeBortoli, Ministry of Natural Resources
L. Armour, Guelph District Office, MOE
C. Slater, C. Fowler / Technical Support Section, MOE
File WE GE 04/ IDS TSP Ref No: 3776-96LHPQ

Ministry of Tourism, Culture and Sport

Culture Programs Unit
Programs and Services Branch
Culture Division
401 Bay Street, Suite 1700
Toronto, ON, M7A 0A7
Telephone: 416-314-2120
Facsimile: 416-314-7175
Email: Andrea.Williams@ontario.ca

Ministère du Tourisme, de la Culture et du Sport

Unité des programmes culturels
Direction des programmes et des services
Division de culture
401, rue Bay, Bureau 1700
Toronto, ON, M7A 0A7
Téléphone: 416-314-2120
Télécopieur: 416-314-7175
Email: Andrea.Williams@ontario.ca

Ontario

November 7, 2012

Mrs. Patricia Dibb
York North Archaeological Services, Inc
1264 Bathurst Street
Peterborough, ON
K9H 6X8

RE: Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, *"A Stage I-II Archaeological Assessment of the Proposed James Dick Construction Ltd. Hidden Quarry: Located in Part Lot 1 W1/2, Concession 6, Eramosa Township, County of Wellington, Ontario,"* Dated August 31, 2012, Revised Report Dated October 22, 2012, Revised Report Received by MTCS Toronto Office on October 24, 2012, MTCS Project Information Form Number P156-133-2012, MTCS RIMS Number 23AG067

Dear Mrs. Dibb:

This office has reviewed the above-mentioned report, which has been submitted to this Ministry as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c 0.18. This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the Ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report recommends the following:

> YNAS recommended in Stage I that based on (i) the archaeological/heritage background research, (ii) the presence of a potable water source, and (iii) both elevated and lowland areas that possess potential for the existence of prehistoric and/or historic heritage resources, that a Stage II investigation should be conducted. The results of Stage 2 have found a mid to late 19th century farmstead likely associated with the Ramshaw family. The results of the Stage 2

assessment were inconclusive given the occupation history of the site. YNAS recommends that a Stage 3 assessment be undertaken on AjHa-50 to establish the historic significance and value of AjHa-50. The alternative option is to erect the fencing around the site at the 20-meter to protect the site and impose a 50-meter monitoring buffer out from the edge of the 20-meter buffer that must be monitored by a licensed archaeologist during any soil disturbance. The area within the 20-meter buffer is a no go zone by construction crews at any time. No activities within the confines of this site are allowed until after the Stage 3 assessment has been completed to the satisfaction of the Ministry of Tourism, Culture and Sport and the report has been entered into the Ontario Registry of Reports. A partial clearance is requested and a letter from the ministry confirming that there are no further concerns for the area outside of archaeological site AjHa-50, its 20 and 50 meter buffers and those areas characterized by any development setbacks (Section 7.8.5 –a - e).

James Dick Construction Ltd. has agreed to conduct a Stage 3 assessment of the AjHa-50 James D. site once the Ministry of Natural Resources has signed off on their application for the Category 2 Class “A” quarry (Supplementary Section). A partial clearance is requested under section 7.8.5 of the Standards and Guidelines (Supplementary Section). (a) Stage 2 has been completed for all of the property, (b) the recommendation forms part of the final report, (c) See Recommendation 6.0 above. (d)The Stage II recommends further work on all sites that meet the criteria requiring Stage 3 assessment. The following can be found in the Supplementary Section,(e) – sub section (i) development map with setbacks both 20 and 50-m buffers (Supplementary section). (e)- subsection, (ii) detailed avoidance strategy, written confirmation from the proponent regarding their commitment to implementing the strategy and that ground alterations (e.g. servicing, landscaping) will avoid archaeological sites with outstanding concerns and their protective buffers areas. (iii) Construction monitoring schedule, written confirmation from the proponent that a licensed consultant archaeologist will monitor construction in area within 50-m monitoring buffer zone, and that the consultant archaeologist is empowered to stop construction if there is a concern for impact to an archaeological site. (iv)The proponent provides a timeline for completing the remaining archaeological fieldwork.

The strategy used in Stage 3 will document the presence and extent of buried artifacts, structures, stratigraphy and cultural features and to collect a representative sample of artifacts, from across the entire archaeological site. To this end Stage 3 will result in the excavation of a series of 1 m square units, across the length and breadth of the positive test pits identified in Map. The placement of the grid will be based on the permanent datum to at least the accuracy of transit and tape measurements. All test units will be excavated by hand. Heavy machinery will not be used. Test units will be excavated in systematic levels (either stratigraphic or standardized). All excavated test units will be excavated into the first 5 cm of subsoil, unless excavation uncovers a cultural feature(s). If unit excavation uncovers a cultural feature that feature will not be excavated but will have the portion of the feature plan view recorded and the floor covered by geotextile fabric and backfilled. Screen all excavated soil through mesh with an aperture of no greater than 6mm. Unless otherwise specified in Table 6.1 and 6.2 in section 6 or in the site specific requirements

stated in section 4.2, YNAS will collect and retain all artifacts. Theses artifacts will be recorded and catalogued by their corresponding grid unit designation.

Since the number of test units required varies depending on the site Table 3.1 will be used. The placement of the test units will provide a uniform level of data collection across the site Section 3.1 (under “Other contexts (e.g., 19th century villages industrial complexes # 15). It will focus on testing key areas in and around the foundation, well and concrete structure and any other areas as may be appropriate. The strategy will gather a representative sample from across the site, determine the nature of subsurface deposits determine the extent of the site and support any recommendation for a Stage 4 if necessary.

The area shown in Map 10 which was not assessed and has a high archaeological potential should be assessed by Stage 2 shovel testing if and when there is any future impact to this area.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment is consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences.This report will be entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Andrea K. Williams

Andrea K. Williams
A/ Archaeology Review Officer

cc. Archaeology Licensing Officer
Greg Sweetnam, James Dick Construction Limited
Gaetanne Kruse, Planning Administrator, Township of Guelph/Eramosa

In no way will the Ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.

From: Joknic, Sonja (MTO)
Sent: Febuary 3 2014 8:34 AM
To: 'Joseph Gowrie'; 'Imugford@jamesdick.com'
Cc: Khan, Khalid M. (MTO); gitkow,alex; Gaetanne Kruse'
Subject: James Dick Hidden Quarry - Eramosa

Hi Joseph we have no objections with re-zoning the property from Agricultural/hazard land to Extractive Industrial to permit the establishment of a mineral aggregate operation. However, should the re-zoning be approved, all MOE, MNR, MTO and Aggregate Resources Act rules and regulation and polices must be adhered to. MTO will require written proof from municipality that the zoning has been approved or disapproved. Should the zoning be approved, MTO would than need the following for further review. This was originally sent to you on December 10, 2013.

SITE PLAN:

All pages; clearly show MTO property line and 14m setback.
Page 2 - Monitoring wells to be setback 14m from MTO property line.
Page 2 & 3 - Stockpile to be setback 8m from MTO property line Page 1-4. Existing westerly residential access via Hwy 7 must be shown as private residential access only, no trucks, no direct access via hwy 7 for the Quarry pit. All access to be obtained from 6th concession Line.
Berm details to show elevation, if elevation differs, show 4 cross-sections adjacent to Highway 7. Slopes a 1:1 are unstable, recommended 3:1 on both sides of the berm. Toe of slope can be located 0.3m from MTO property line.
To show all phases of excavation.
Blasting locations closest to the Highway 7 right-of-way.

GEOMETRIC DESIGN:

Submit geotechnical report/borehole locations for construction of the RTL. An encroachment permit will be required to undertake the borehole samples. Encroachment permit application can be found on line along with the fee. Please contact Alexander Gitkow, Corridor Management Officer for more information at 416 235-4387.

Construction staging and a Traffic Management Plan will have to be prepared and submitted for MTO review and approval.

Cross sections indicating intended widening (if warranted), step joint detail and pavement structure.

Engineering drawings showing plan, profile, cross section 1;500 scale.

Pavement markings/signage plan

Show the left turn lane at highway 7 & 6th Line with dimensions based on a 100km/h design speed storage 25m, parallel 160m and taper at 70m as presented in the TIS dated Dec 5, 2013.

Show the right turn lane of 25m storage, 85m parallel and 80m taper.

Cost estimate to be submitted to MTO for review/approval and to include removals/new construction and traffic control, staging, pavement markings and any other costs associated with the work.

Quality Assurance (QA/QC) plan and documents

Construction schedule/timing for each phase of construction

Lane closure times (if required) will be provided by MTO.

LEGAL AGREEMENT & LETTER OF CREDIT, covering all necessary highway improvements will be required.

STORM WATER MANAGEMENT REPORT with Site servicing and grading plans (4 copies)

How will well water be safe guarded, if contaminated what mitigation measures will you employ.

UPDATED TRAFFIC REPORT;

Traffic report should include but not be limited to the following:

Any negative impacts to Highway 7 ROW, structural, dust, noise, traffic
Haul rates
Haul routes
number of trucks per day
operating window
will there be any night work?
Blasting, when and how often
What measures will you employ to ensure flyrock does not enter the Hwy 7 ROW?
Property owners along Highway 7 to be notified in writing prior to any blasting operations.
Should any of the above pose a problem, the owner shall be responsible for providing measures to ensure Highway 7 and motorists are protected.

400 Clyde Road, P.O. Box 729 Cambridge, ON N1R 5W6

Phone: 519.621.2761 **Toll free:** 866.900.4722 **Fax:** 519.621.4844 **Online:** www.grandriver.ca

July 29, 2014

Ms. Kimberly Wingrove
Township of Guelph/Eramosa
8348 Wellington Road 124
P.O Box 124
Rockwood, ON
N0B 2K0

Mr. Jason McLay
Ministry of Natural Resources
1 Stone Road West
Guelph, ON
N1G 4Y2

Dear Ms. Wingrove & Mr. McLay:

Re: Review of Revised Materials
Proposed Hidden Quarry - 634745 Ontario Limited (James Dick Construction)
Class A, Category 2 Pit and Quarry License Application and Zoning By-law Amendment Application ZBA 09/12 (Hidden Quarry)
Lot 1, Concession 6, Former Township of Eramosa
8352 Highway 7, Township of Guelph/Eramosa

Grand River Conservation Authority (GRCA) staff has reviewed the following revised materials provided in support of the proposed Hidden Quarry:

- Response Letter to GRCA Comments, prepared by James Dick Construction Limited, dated July 10, 2014;
- Pages 1 to 5, Hidden Quarry Site Plans, prepared by Stovel & Associates, dated July 14, 2014.

Based on the submission of the above noted materials, our comments dated July 8, 2014 have been addressed as follows:

1. The notes on the revised Operations Plan now include the appropriate fisheries timing window for the culvert construction.

2. The established Trigger Levels and Contingency Measures have been added to the plans under a single table on Page 4.

3. We note that reference to White Ash species has been removed from the plans. We also note that tree protection fencing has been added under the Sediment and Erosion Control section and a note has been added to the Operations Plan indicating that no tree removals will take place during the bird breeding period of May 15-July 31.

At this time, GRCA has no further comments on the application. As such, GRCA has no objection to the application being taken forward for consideration.

GRCA would be open to review and comment on any additional information circulated by the Township.

Member of Conservation Ontario, representing Ontario's 36 Conservation Authorities ■ The Grand – A Canadian Heritage River

Please contact Jason Wagler at 519-621-2763 ext. 2320 if you have any questions or require clarification of the above.

Yours truly,

Jason Wagler MCIP RPP
Resource Planner
Grand River Conservation Authority

cc. MSH Planning c/o Liz Howson
County of Wellington c/o Aldo Salis
Regional Municipality of Halton c/o Adam Huycke
Burnside c/o Carley Dixon
James Dick Construction c/o Greg Sweetnam & Leigh Mugford – Box 470 Bolton ON L7E 5T4

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