August 9, 2007

City Hall – 2nd Floor
71 Main Street West
Hamilton, Ontario
L8P 4Y5

Attention: Mr. Brad Clark, Ward 9 Councillor

Re.: Protection of the Eramosa Karst

Dear Mr. Clark,

During a site visit on July 16th, we discussed the protection of the Eramosa Karst. I would like to summarize some of my thoughts here regarding the future protection of this Area of Natural and Scientific Interest (ANSI).

In April of 2004, Dr. Stephen Worthington, Dr. Derek Ford and I submitted a report to the Ontario Ministry of Natural Resources. The report provided the scientific basis for the designation of the Eramosa Karst as a provincially significant earth science ANSI. In addition, the report delineated approximate boundaries for the ANSI and provided preliminary recommendations for its protection. The nature of the ANSI required an unusual approach, the designation of three subareas: the Core Area that contains the majority of karst features, the Developed Area that is urban and has already sustained considerable impacts, and the Feeder Area where the surface streams flow downstream to the Core area and are essential for maintaining the form and function of karst features within the Core Area. This approach allowed for considerable flexibility regarding protection of the karst features while permitting continued urban development within the majority of the Developed and Feeder Areas. At the time, the largest portion of the Feeder Area, located south of Rymal Road, was privately owned and already approved for urban development. The majority of the Feeder Area on the north side of Rymal Road was managed by the Ontario Realty Corporation and their mandate was primarily to provide land for urban development. Clearly, there was considerable pressure for urban development within the Feeder Area of the ANSI. As a result, the key recommendations of the report were: 1) the establishment of a natural park encompassing the Core Area to protect the majority of the karst features, and 2) a set of conditions required for urban development of the Feeder Area to maintain the streamflow entering the Core Area.

However, this approach was a compromise between the two opposing goals: protecting the karst, and permitting urban development. Urban development within the Feeder Area may impact the karst in a number of ways. For example, the use of road salt in the Feeder Area will result in contamination of the streams that flow into the Core Area. This would significantly alter the solubility of the bedrock, thereby affecting solution rates. The solution rate is an important control on karst development and has the potential to alter the pattern of subsurface flow within the developing karst aquifer. Thus, the pattern of solution channels and caves that form may eventually change as a result of the use of

road salt. Urban development may lead to various impacts to the karst. While some of these impacts may be immediate and apparent, most would be subtle and may not become apparent for many decades. The following are some examples of potential impacts from urban development:

1) Urban development invariably creates impervious surfaces that increases total runoff and also increases hydrograph response to recharge events from rainfall and snowmelt. Storm water management (SWM) systems are designed to minimize these impacts and to maintain the fluvial geomorphology of the streams located downstream from SWM ponds. However, these SWM systems cannot replicate natural conditions entirely since there is always a net gain in total runoff. There is always some alteration of streamflow, hydrograph response and water chemistry as a result of urban development. In the case of the Eramosa Karst, this would have the potential to alter the geochemical controls on caves and conduit development within the karst located farther downstream. Furthermore, sediment erosion, deposition and transport in the sinking streams entering the karst from the Feeder Area play a significant role in shaping the fluvial geomorphology of the karst, both on the surface and within the karst caves and conduits. Thus, any changes to the fluvial characteristics of the sinking streams could impact the geomorphology of the karst.

2) Excavations into bedrock, especially for buried services, could provide avenues for groundwater movement, recharge and discharge that could significantly alter the subsurface flow patterns within the karst. In karst aquifers, there are integrated networks of solutionally enlarged channels that control much of the groundwater flow. Buried services within and adjacent to the ANSI have the potential to intersect these natural channel networks and alter the flow patterns.

3) Litter and other garbage entering the sinking streams have the potential to block sinkpoints and thus alter the hydrology of the karst.

4) Toxic contaminants washed downstream from the Feeder Area into the caves could create extremely hazardous conditions for anyone exploring the caves. Floating liquids such as hydrocarbons are especially dangerous because they can cause long-term contamination of the aquifer. They can also create explosive atmospheres within the caves.

5) Encroachment at the boundaries of the Eramosa Karst Conservation Area may lead to illegal dumping of yard waste, fill, concrete and garbage. At Olmsted Cave, for example, the extent of illegal dumping on City of Hamilton property over the past five years is alarming and one sinkhole has been almost entirely filled with yard waste. The existing boundary of the Conservation Area is extremely convoluted on the south and east sides and this significantly increases the potential for encroachment if urban development proceeds in this area. Furthermore, several karst features are located quite close to the north boundary of the Conservation Area and there is very little buffer to protect these features from encroachment.

Ultimately, the impacts from urban development cannot be predicted entirely and this leads to some uncertainty regarding the protection of the karst. While proper planning for urban development could minimize the impacts, the planning process is complicated and invariably there would be many other factors that need to be considered besides just protection of the karst within the ANSI. Some competing factors would undoubtedly take priority. Indeed, despite the designation of the ANSI in 2004, there have already been impacts from urban development of the adjacent lands, such as extensive dumping of fill within the catchment for Nexus Creek. There is also the potential for some details of any protection strategy to be overlooked or ignored, both during the planning process and during construction.

In summary, I do have concerns regarding the protection of the karst if development plans proceed. The best way to ensure protection of the karst within the ANSI is to create as much natural parkland within the Feeder Area as is feasible. Since the province currently owns a significant portion of the undeveloped lands north of Rymal Road, this presents an opportunity to provide greater protection for the ANSI. The development of natural parkland on these lands would avoid potential impacts and do much to restore natural conditions within the catchment area for several of the sinking streams. Notably, the Nexus Creek catchment is almost entirely within these provincial lands. Nexus Creek is one of the three largest sinking streams within the ANSI, and the only one that still has the potential to be entirely naturalized. The other two large sinking streams, Phoenix and Stuart Creeks have significant portions of their catchments extending south of Rymal Road onto the ROPA 9 lands. Nexus Creek and the associated karst features, including Nexus Cave and the Nexus dry valley, are amongst the most significant earth science features within the ANSI. Creating natural parkland in the entire Nexus Creek catchment and the surrounding provincial lands would guarantee the best protection possible for this provincially significant earth science ANSI.

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