North-South Environmental Inc.
Specialists in Sustainable Landscape Planning

21st, May 2009

Graham Flint
Friends of Rural Communities and the Environment (FORCE)
Lawson Park Ltd., Box 15,
RR # 1, Freelton, Ontario
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Dear Graham,

Attached is a review of St. Marys technical reports. The Natural Environment Level 2 Technical Report (Stantec and Savanta February 2009) provides a comprehensive inventory of natural features and functions present within and adjacent to the proposed quarry.

The Natural Environment Level 2 Technical Report has not, in my opinion, adequately integrated its findings on the natural environment with the proposed Groundwater Recirculation System (GRS) and Adaptive Management Plan (AMP) outlined in Volume 1 – Hydrogeological Level 2 Report (AECOM 2009). Further, there has not been a meaningful integration of Stantec and Savanta (2009) information on natural features and functions with the evaluation of the impacts and mitigation associated with noise, blasting and transportation haul routes.

Stantec and Savanta's (2009) assessment of impacts and mitigation to natural features and functions is based largely on successful operation of the GRS and AMP intended to mitigate quarry impacts to surface and ground water. Stantec and Savanta (2009) provide no detailed assessment of the general outline of the GRS and AMP provided by AECOM (2009), nor do they provide guidance in regard to the detailed information that may be needed to adequately inform a GRS and AMP approach to the mitigation of impacts to natural features and functions.

Our conclusions therefore are:

- significant natural features and functions are present within and adjacent to the proposed quarry site;
- direct impacts to some of the significant natural features and functions will occur in areas where quarry development is proposed;
- the available information regarding the GRS and AMP indicates there will be quarry impacts to surface and ground water and these impacts will directly impact adjacent natural features and functions; and
- noise, blasting, dust and transportation haul routes associated with quarry operation will result in impacts to natural features and functions that have not been adequately assessed.

Yours truly,

Brent Tegler PhD

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St. Marys ARA Natural Environment Level 2 Technical Report
Peer Review May 21st, 2009

This peer review is based on an assessment of technical reports provided in support of an Application for a Licence under the Aggregate Resources Act (ARA) by St Marys Cement Inc. The technical reports reviewed include:

- Natural Environment Level 2 Technical Report: St Marys Flamborough Quarry (Stantec and Savanta February 2009)
- Volume 1 Hydrogeological Level 2 Report St Marys Flamborough Quarry (AECOM February 2009)
- Volume 2 Groundwater Flow Model St Marys Flamborough Quarry (AECOM February 2009)
- Volume 3 Appendix E Karst Investigations at the Proposed St Marys Flamborough Quarry (Worthington October 30, 2008)
- Volume 3 Appendix J Literature Review of Artificial Recharge Systems (AECOM 2009)
- Hydrological Level 2 Technical Report St Marys Flamborough Quarry (Stantec January 2009)
- St Marys Flamborough Quarry Noise Impact Study (Aercoustics Engineering Ltd. February 2009)
- Blasting Impact Assessment Proposed Flamborough Quarry St Marys Cement Inc. (Golder Associates November 2008)
- Quarry Bench Height Evaluation Proposed Flamborough Quarry St Marys Cement Inc. (Golder Associates November 2008)

1. Considerable additional field work has been undertaken since the Preliminary Level 2 EIS report dated Sept 7th, 2004. Additional field work conducted in the years 2005 to 2008 has included:
   - winter wildlife survey,
   - winter owl survey,
   - spring breeding bird survey,
   - red side dace survey,
   - benthic invertebrates,
   - salamander egg mass and adult sampling,
   - frog and toad survey,
   - reptile survey,
   - butterfly and odonate survey,
   - three season plant inventory,
   - butternut tree survey and tree health survey,
   - wetland boundary determination with MNR

2. The results of field investigations document highly functioning diverse communities that support rich native biodiversity, including provincially significant wetlands and woodlands, fish habitat, specialized seep habitat and a number of species of concern, including provincially and federally endangered species, federally threatened species, federal and

provincial species of special concern, provincially rare species, locally rare and uncommon species and area demanding species.

3. A complete, consistent and meaningful characterization of creeks and wetlands is particularly important to this quarry application given that the quarry is intended to operate below the existing groundwater level. The technical reports of Stantec and Savanta (2009), Stantec (2009) and AECOM (2009) state natural features and functions of creeks and wetlands (including Provincially Significant Wetlands) on and adjacent to the quarry site will be significantly impacted without successful mitigation.
   - The reports intended to describe natural features and functions and the proposed Groundwater Recirculation System (GRS) mitigation, often uses language such as "may", "likely" "estimated" "minimized" suggesting only a partial understanding of how surface and groundwater currently sustain creeks and wetlands and an inability to provide assurance that these features will be sustained by the proposed GRS during quarry operation and sustained in the post quarry environment.
   - Stantec (2009) provides on-site surface water level measurements for 2006 and 2007 for three locations; Pond 1, Pond 2 and SWF-1. Pond 2 and SWF-1 appear to be located within Lower Mountsberg Creek Provincially Significant Wetland Complex. Two surface water level monitoring stations provide a limited understanding of surface water dynamics within the substantial areas of wetland present. There is no assurance of future access to off-site wetland areas surrounding the proposed quarry to provide greater characterization of water levels within wetlands.
   - Stantec and Savanta (2009) ELC mapping show areas of wetland that are not currently included within the Lower Mountsberg Creek Provincially Significant Wetland Complex. While some wetland boundaries have been mapped with MNR, there is no discussion of wetland complexing that may consider the inclusion of some ELC wetland areas identified by Stantec and Savanta (2009), some of which provide amphibian breeding habitat, within the PSW.
   - The extent and location of wetlands provided by Stantec and Savanta (2009) is not consistently portrayed on the following report figures Vegetation Communities (Figure 9.0), Wetlands and Seeps (Figure 12.0), and Wildlife Habitat (Figure 14.0) suggesting the need to more carefully determine the full extent of wetland areas that may be impacted by the proposed quarry.

4. Stantec and Savanta (2009) have identified areas of Significant Woodlands that are to be excluded from the proposed quarry operations. The approach used to defining Significant Woodlands is generally a two step process, whereby step one identifies "woodlands" that will be assessed for significance and step two which applies a set of criteria to determine those woodlands that meet the criteria to be designated "significant woodlands".

5. The approach taken by Stantec and Savanta (2009) in step one, identifying which areas on the subject property are "woodlands" has used the more general definition of "woodlands" provided in the PPS (2005) and Greenbelt Plan (2005). This raises the following concerns:
   - the City of Hamilton has a more precise definition for "woodlands" based on the Provincial Forestry Act used by the City in their assessment of significant woodlands that would be appropriate for use on the subject property; and

- the Draft Greenbelt Technical Paper 2 "Technical Definitions and Criteria for Significant Woodlands in the Natural Heritage System of the Protected Countryside Area of the Greenbelt Plan (September 16, 2008) provides a more precise definition of "woodlands", that is applicable for the subject property.

6. The approach taken by Stantec and Savanta (2009) in step two, identifying which woodlands are significant, raises the following concerns:
   - the criteria used by Stantec and Savanta (2009) do not make use of criteria for significant woodlands used by the City of Hamilton
   - the criteria used by Stantec and Savanta (2009) do not consider the criteria for significant woodlands provided in Draft Greenbelt Technical Paper 2.
   - some areas that meet the definition of "Significant Woodlands" are excluded based on the fact they meet criteria defined as Peripheral Forest Edge Habitat a term which is not defined in the PPS, Greenbelt Plan or other provincial or municipal policy.

7. When the "Peripheral Forest Edge Habitat" is retained as Significant Woodland and excluded from proposed quarry operations there is the potential for a substantial gain of future interior woodlands as some cultural communities undergo natural succession to woodland and an increase in the width of upland areas buffering the adjacent Lower Mountsberg Creek Provincially Significant Wetland Complex from the proposed quarry operation.

8. The criteria used by Stantec and Savanta (2009) to identify the wooded area occupying the northern part of the subject lands as significant wildlife habitat could equally be applied to areas currently proposed for quarry development. The significant wildlife criteria used to define significant wildlife habitat in the north are as follows:
   - supports a diverse community of locally significant plant, amphibian, mammal and bird species;
   - provides habitat for area sensitive birds; and
   - contains specialized seep habitats.

   Applying the above criteria south of the wooded area within areas proposed for quarry development it is possible to define significant wildlife habitat based on the following:
   - there are diverse areas of successional habitat that provide habitat for provincially and locally rare wildlife;
   - there are core deer wintering areas;
   - there are amphibian breeding areas; and
   - there is habitat supporting up to ten priority bird species listed by Partners in Flight.

   Stantec and Savanta (2009) do not provide a discussion of impacts to this significant wildlife habitat nor are there mitigation measures proposed to avoid or reduce impacts of the proposed quarry on these natural features and functions.

9. The 651 page Natural Environmental Level 2 Technical Report (Stantec and Savanta 2009) contains a considerable amount of information which must be integrated with other technical reports to be adequately assess environmental impacts and mitigation of the proposed quarry. While there are some cross-references made among these reports, there is a lack of detailed and careful assessment of the natural environment in relation to some of the key technical reports such as the hydrogeology and hydrology reports that discuss the proposed

approach to environmental impact mitigation using a Groundwater Recirculation System (GRS) and Adaptive Management Plan (AMP). Three examples that demonstrate a lack of report integration are as follows:

- The quality of Tributary A is characterized in different ways by different reports. Stantec (2009) refers to "stressed benthic communities" associated with Tributary A based on EPT indicator taxa. Stantec and Savanta (2009) note that "many EPT taxa do not inhabit areas with fine-grained bottom substrates" such as areas associated with Tributary A where it flows through a healthy wetland community.
- Referring to a wetland area south of Concession Road 11 Stantec and Savanta (2009) state "effects on the groundwater volume to this portion of the wetland are predicted to be minimized." Volume 1 of AECOM (2009) shows in Figure 6.6 the net water table drawdown to be approximately 5 m in this location suggesting a significant impact on groundwater that may be associated with this wetland
- The Blasting Impact Study competed by Golder (2008) provides an assessment of ground vibration levels that may impact fish spawning depressions as required by Department of Fisheries and Oceans guidelines. In an assessment of fish habitat Stantec and Savanta (2009) do not discuss the potential impact of blasting on fish spawning habitat.

10. The Volume 1 Hydrogeological Level 2 Report (AECOM 2009) describes a GRS and AMP intended to mitigate quarry impacts on surface water and groundwater. Successful operation of the GRS aided by the AMP is critical to the protection of the many natural features and functions associated with the proposed quarry site. For the reasons discussed below there is insufficient information to demonstrate the GRS is capable of mitigating quarry impacts on surface water and groundwater within limits that will sustain the complex features and functions natural areas, particularly creeks and wetland.

11. The technical reports provide insufficient discussion of the ecology of water levels in wetlands as a key determinant of the natural features and functions present. Further information is required in regard to the relationship of water levels to the type, abundance, distribution, quality and diversity of natural features and functions present within wetland, for example some of the relevant questions for the Lower Mountsberg Creek Provincially Significant Wetland Complex:
    - How do water levels create gradients of varying moisture level that define wetland community zones from open water communities to submerged, emergent, marsh, thicket, and swamp communities that grade into adjacent upland communities?;
    - What is the regime of seasonal flooding in terms of specific depths, geographic distribution and flooding duration and how do these relate to the growth of plants, particularly in hummocky terrain where intolerant plants may grow on areas of micro-topographic variation that provide higher drier conditions?;
    - What is the inter-annual variation of the flooding regime and is this variation resulting in the elimination of some plants while encouraging other species to grow creating wetlands with both living and dead plants that characterize some wetlands?;
    - Is there longer term variation in water levels that result in significant dieback of some plant species, such as trees? Dead trees in turn may create important foraging and breeding habitat for some birds within the protected environment afforded by wetlands with higher water levels;

- Is it possible for higher water levels to occur, even for short periods of time, connecting wetlands to neighboring streams and rivers, introducing fish into otherwise isolated wetland areas. Fish may predate on amphibian eggs and larvae thereby reducing adult amphibian populations;
- Do relatively shallow water levels persist in some areas long enough to permit amphibian breeding and egg and larval metamorphosis resulting in adult recruitment to the some amphibian populations? For these areas a relatively small change in water level for a short period of time may have a large impact on amphibian breeding success.

12. The target surface water and groundwater levels are to be based on maintenance of pre-quarry (baseline) seasonal water levels. Natural seasonal and year to year surface water and groundwater fluctuations are part of the dynamic equilibrium of wetland ecosystems. Establishing one pre-quarry baseline target will not mimic natural seasonal and inter-annual fluctuations and will lead to a decline of ecosystem integrity and species diversity. The surface water and groundwater targets should be based on an AMP that correlates on-site GRS operation to continuous monitoring of reference wells outside the zone of quarry drawdown. It is unknown if St Marys has access to areas that may provide suitable reference wells for GRS operation.

13. AECOM (2009) have not stated how closely the GRS can match target surface water and groundwater fluctuations, i.e. will the margin of error be 1 cm, 10 cm, 100 cm or more? Further, Stantec and Savanta (2009) have not established the limit of deviation from target surface water and groundwater fluctuations that would result in an unacceptable impact to natural features and functions. For example, what proportion of amphibian breeding habitat within the Lower Mountsberg Creek Provincially Significant Wetland Complex would be impacted by a 50 cm deviation from target surface water levels during the month of April? Knowledge of water level fluctuations and the sensitivity of plants and animals to deviations from "normal" and the ability of the GRS to match "normal" water levels within acceptable limits based on the biology of the plants and animals protected should be the foundation of an operational GRS.

14. AECOM (2009) have not stated how rapidly the GRS can match target surface water and groundwater levels should monitoring record a water level deviation which, based on prior knowledge would be considered to result in a significant impact to natural features or functions. For example, normal quarry operations such as drilling, blasting, or GRS operation may from time to time result in a significant increase in the rate of drawdown and this event would presumably be measured by continuous monitoring data loggers transmitting surface water and groundwater levels to a central data repository equipped with an alarm system to notify quarry staff. Based on the AMP this should lead to an increase in GRS pumping rates in the affected area to return water levels to the acceptable target level. The lag between when the deviation is recorded and when water levels return to an acceptable target level has not been discussed either in terms of engineering capabilities of the GRS (i.e. is the capacity of the pumps and injection wells to oversupply recycled water if necessary?) or in terms of what would be considered a biologically acceptable lag period (i.e. if surface water levels drop from 50 cm to 10 cm for a period of 12 hours during the amphibian breeding season will egg masses, tadpoles, larval salamanders, and adults

survive?). Performance of the GRS should include engineering requirements that result in response lag times that will not adversely impact natural features and functions.

15. Volume 1 Hydrogeological Level 2 Report (AECOM 2009) states biological monitoring and triggers are provided in Stantec and Savanta (2009). The monitoring protocols proposed by Stantec and Savanta (2009) include annual amphibian surveys, breeding bird surveys, monitoring of fish and benthic invertebrate communities, and monitoring of tree/vegetation structure and health. These protocols may provide trends of declining ecosystem health, but they will not provide timely information used to refine the day to day operation of the GRS in ways that will ensure these declines do not result from unsuccessful maintenance of natural surface water and groundwater levels.

16. While the comments in points 10 through 15 have been made in reference to surface water and groundwater levels, they could equally have been made in reference to surface water and groundwater quality.

17. The GRS mitigation strategy is large and complex undertaking intended to mimic the natural conditions which sustain significant natural features and functions, particularly provincially significant wetlands located in very close proximity to the quarry. To provide an assurance natural features and functions will be protected further information is required in regard to the following:
    - Will the multiple monitoring stations intended to record and analyze surface water and groundwater levels, flows and quality be located at reference sites that provide meaningful information that can be correlated to wetlands areas impacted by quarry drawdown?
    - Will the monitoring data collected be provided in a timely manner to permit the AMP to react with sufficient speed and precision to fine tune the quality and quantity of water which is recycled to various surface water and groundwater re-introduction points located along the periphery of the quarry to ensure the protection of natural features and functions?
    - Given the scale of the GRS with daily pumping rates of up to 93,000 m^3 into approximately 40 injection wells and a variety of surface sites will there be sufficient coordination, reliability, and backup systems among the environmental monitoring equipment, the AMP data retrieval and analysis system and the GRS engineering to guarantee target surface water and groundwater levels and quality will be maintained within limits that sustain the plants and animals that live within and adjacent to the proposed quarry site?

18. The monitoring program proposed by AECOM Volume 1 (2009) has identified what may be considered unexpected or unpredicted effects that will trigger the initiation of specific actions to remedy a potential problem. In regard to surface water the trigger for unexpected or unpredicted effects is defined as "10% below the lowest seasonally equivalent recorded water level." Stantec (2009) provides a measure of surface water level within the Lower Mountsberg Creek Provincially Significant Wetland Complex and for the spring season (March to June) shows water levels that vary from approximately 50 cm to 0 cm in 2006 and 60 cm to 0 cm in 2007 for the spring season. The lowest seasonal water level is therefore 0 cm and based on AECOM Volume 1 (2009), there would therefore be no trigger for remedial

actions should wetland water levels drop to zero during the spring season resulting in a significant impact to amphibians breeding that have been shown to be breeding within this wetland

19. Volume 1 of AECOM (2009) has established actions that will be initiated by a trigger of unexpected or unpredicted effects. A summary of proposed actions is discussed below outlining "if-then" decisions that may mitigate the impact that initiated the trigger and an estimated timeline suggesting environmental impacts associated with unexpected or unpredicted effects may last many days or several weeks if initial efforts fail to correct a problem. The biological consequences of unmitigated impacts for aquatic habitat or wetlands may seriously imperil some plant and animal life.

Actions	***"If-Then" Notes***	***Day***
• take immediate corrective action that can be reasonably taken	• if water levels/flow too high stop GRS • if water levels/flow too low increase GRS pumping rate (if possible) • if water temperature too high/low then use cooler/warmer water (if available) • if water chemistry exceeds acceptable limits then adjust (if possible)	0
• inform MOE and MNR within one business day	• if immediate corrective action ineffective then impact will continue for at least 1 day	1
• repeat monitoring associated with finding as soon as possible and practical and continue on at least a weekly basis	• if immediate corrective action ineffective then impact will continue for an undetermined length of time while monitoring repeated (2 to 7 days)	7
• if intensified monitoring confirms effect develop contingency plan to address impact	• if immediate corrective action ineffective then impact will continue until intensified monitoring completed and contingency plan developed (7 days)	14
• submit contingency plan to MOE and MNR	• if immediate corrective action ineffective then impact will continue while report submitted	14
• if approved by MOE/MNR implement contingency plan	• if immediate contingency plan actions effective then impact may be mitigated when contingency plan approved and implemented	21

20. Volume 1 AECOM (2009) discusses a contingency should water levels in wetlands or flow in streams decrease below the levels necessary to sustain their ecological function. How this may occur and what constitutes a level or flow "below levels necessary to sustain ecological functions" is not discussed. The contingency plan suggests pumping water directly to these features to augment their water level or flow, and that with a GRS in place around the perimeter of the quarry valves, connections and spur lines would all be readily available to quickly distribute water. It is unrealistic and naive to suggest a wetland water balance may be maintained with a series of valves and pipes that when simply turned on will direct water

where it is needed to sustain a large, complex and sensitive ecological system, such as a wetland with a water balance that includes surface water inputs/outputs, groundwater inputs/outputs, precipitation and evapotranspiration and an abundance of plant and animal life dependent on the natural dynamic balance of the water system.

21. Volume 1 AECOM (2009) notes rehabilitation of the quarry will result in a final lake level that will in some areas result in a permanent drawdown of surrounding groundwater levels. Proposed mitigation may include the following:
    - a passive barrier wall;
    - pressure grouting of the bedrock below the passive barrier wall; and
    - selective operation of the GRS in certain locations where water levels may need to be augmented on occasion by drawing water from the lake.

    Should the mitigation measure outlined in the third bullet be required to sustain groundwater levels in some areas, the GRS and an associated AMP would be required to operate in perpetuity to protect natural features and functions in areas impacted by drawdown.

22. In conclusion the Technical Reports provided in support of the Application for a Licence under the Aggregate Resources Act by St. Marys Cement Inc. have not demonstrated that the proposed footprint of the proposed quarry, nor the proposed mitigation measures including a GRS and AMP and nor the proposed rehabilitation plan will operate without significant immediate, long term and in some cases permanent direct and indirect impacts to the natural features and functions of the proposed quarry site and adjacent natural areas.

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May 21st, 2009