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35 Years of Service

May 20, 2014 Our File No.: 14-401

Ms. Kim Wingrove E-MAIL
Chief Administrative Officer
Township of Guelph/Eramosa
8348 Wellington Road 124
P.O. Box 700
Rockwood, ON N0B 2K0

Re: Request for Supplementary Hidden Quarry ARA Application Data, Clarification and Confirmation
Pt W½ Lot 1, Con 6 (Eramosa), Guelph / Eramosa Township

Dear Ms. Wingrove,

I have undertaken a preliminary review of the ARA Site Plan Application for the Proposed Hidden Quarry ARA Site Plan Application in South Guelph/Ermosa Township and north Town of Milton on behalf of the Concerned Residents Coalition . Prior to preparation and submission of my formal review, I have a number of comments, *questions and requests for clarification for the Applicant with respect to the documents submitted in support of the application.*

A. Vertical Benchmarks (Harden September 2012 Report)

1. *What is the vertical geodetic benchmark used to reference the groundwater monitoring infrastructure and site features?*

2. *Are all infrastructure features, contour mapping and the Site Plan referenced to this same vertical benchmark network?*

B. Water Well Surveys (Harden September 2012 Report)

1. *What is the source of the MOE Water Well Record ground elevations in the Harden 2012 Report Appendix F - Table F1? Have any location corrections been applied?*

2. *Have ground elevations been adjusted for the referenced MOE Well Records in Appendix G - Table G1?*

3. *In Table G1, what is the source of the well depths and static water levels? Where 'btoc' is referenced, what is the 'stick up' to allow equation with the Water Well record ground elevation depth references?*

4. In Table G1 Site W22 (5198 Hwy 7) the well is reported to be in a 'pit' for survey dates of Oct 1995 and Nov 2011.

   How did the Applicant confirm this is MOE well No. 28-02047 ?

   My own inspection of W22 (5198 Highway 7) on April 19, 2014 indicates a front lawn well with Well Tag A126461. The corresponding log MOE 71-87172 was completed May 7, 2012 after the Applicant survey. The UTM coordinates also plot at the W22 location. The address on the record is reported as 5198 Hwy 7, however the driller has incorrectly entered the geographic County, Township and Lot and Con on the well record as submitted to MOE.

5. Well MOE 67-08195 completed June 10, 1985 contains a sketch dimensioned location at 150 ft north of Hwy 7 and 300 ft east of the 6th Line within the proposed Hidden Quarry property The stratigraphy, water founds and static levels are consistent with other wells on the property.

   Is the Applicant aware of this well? I do not see it in monitoring records; please explain.

6. Correspondence with the owner confirms that MOE Well No. 67-0745 is located at 4943 6th Line (W5), not at 4953 6th Line (W8) as indicated in Table G-1. A well record for W8 has not yet been found.

   How does this revised well location impact the Applicant's response to Burnside Hydrogeological Comment No 63 in the Hidden Quarry Comment Documentation?

   Please provide a copy of your Table G-1 well survey notes for the W8 site.

7. Table G1 reports surveying W31 (4970 7th Line) well on Oct 1995 and Mar 2012. A drilled well is reported located in front of the house. Well depth and static level are reported as unknown. No MOE # has been found.

   How is the Table G1 survey consistent with the well in use at the property or with the Harden (2012) Sec 3.6.1.1 pg 19 the and No 63 Response in the Hidden Quarry Comment Documentation which each describe a dug well at the property?

   Please explain and provide your detailed survey inspection field notes and sketches for the well at 4970 7th Line. A survey by an independent MOE licenced well technician may be required to correct the records.

8. Table G1 is unreliable and to be useful requires a rigorous on site well inspection and update including surveyed ground elevations, well depths and static water level observations at each well by an independent MOE licenced well technician.

C. Water Level Monitoring Data - Appendix B

1. *Please provide the digital spreadsheet (.xls) for Table B2 and B4 updated to May 2014. Also corresponding updated Hydrographs as available.*

2. *Please provide a copy of the Harden (1998) Report as referenced in Sec 2.5 Hydraulic Testing pg 7 (Harden 2012).*

D. Surface Water Flow Data - Appendix C

1. Please provide Table C1 with updated monitoring to April 2014 in digital spreadsheet form. Also corresponding Fig C1 Hydrographs as available.

E. Geology

1. *Does the Applicant have any information on the formational dip of the bedrock strata (top of Cabot Head) at the Hidden Quarry site?*

2. The Applicant has identified Goat Island Formation above 350 m asl in Borehole M15 at Hidden Quarry site.

   Is Goat Island present in other site boreholes where the bedrock surface is higher than about 350 m asl?

3. *Please provide a copy of the preliminary assignment of the unsubdivided Ambel Formation in borehole M2 into Goat Island, Gasport, Irondequoit, Rockway and Merritton Formations and any comments from Dr Brunton (Harden 2012, Sec 3.5.1, pg 15).*

4. *Please provide a copy of the MW-08-T3-06 well log as referenced in Harden 2012, Sec 3.5.1, pg 15).*

5. *Will the Goat Island Rock be separated from or blended into the commercial crushed rock aggregate produced in the proposed quarry?*

6. *What preparation of the weathered bedrock surface will be required to provide a staging area for underwater blasting preparation at Hidden Quarry?*

7. The Sept 2012 Site Plan Notes specify maximum extraction depth at 317 m asl (pg 3 of 5) and the figures on pg 4 of 5 specify the floor of the rehabilitated quarry lake at 320 m asl. The

Applicant response in the Hidden Quarry comment documentation says the minimum depth will be 320 m asl.

8. *What quarry depth has the Applicant's Hydrogeologist recommended?*

F. Vertical Hydraulic Gradients (Bedrock)

1. The Applicant's bedrock flow test for Well M15 (Harden July 15, 2013 Letter Appendix B Sec 3.1 pg 6) indicated that approximately one third of the well yield was obtained from various fractures between elevation 350 m asl to above 324 m asl and two thirds of the well yield was obtained from a single set of fractures at 324 m asl and from a fracture at 318 m asl (one third each).

2. The Applicant also reported poor hydraulic connectivity between the shallow bedrock and deeper fractures at M15. The lower part of the borehole below about 315 m asl including the Cabot Head formation contact at 308.5 m asl was described as not an active part of the flow system.

3. *Does the Applicant have any comparative observations of shallow vs deeper aquifer hydraulic heads (vertical gradients) in the proposed Site Plan Extraction Area?*

4. *Will the higher yield deeper aquifer from 324 to 318 m asl be the primary control for quarry pond water levels and the upgradient propagation of quarry drawdown impacts?*

5. *Does the Applicant have any observations at all of the hydraulic heads in the 324 to 318 m asl deep aquifer zone? What aquifer zones do the static levels observed in Monitors M2 and M4 actually represent?*

6. *Is the 324 to 318 m asl fractured rock aquifer zone in M15 coincident with the aquifer discharge zone on the lower slopes and floor of the Blue Spring Creek Valley to the south?*

7. *When will the Hidden Quarry Comment Documentation (Mar 13, 2013) be updated to reflect the results from the M15 hydrogeological testing and the extended on site groundwater monitoring?*

G. Amabel (Gasport) Hydrogeology

1. Brunton (2007) described the Amabel (Gasport) in the Guelph area as containing a high porosity section of cavernous interconnected voids known locally as the "Production Zone". Extensive

groundwater flows in vertical and horizontal karst influenced joints. Groundwater moves upwards from the interface of the Cabot Head shales into the overlying Amabel (Gasport) 'Production Zone' and downward from the interface aquifer zones (overburden bedrock) contact.

2. Brunton (2009) later described the Gasport formation as possessing excellent to poor secondary porosity and permeability and karst conduit development.

3. Gartner Lee (2004) referred to the Amabel Aquifer 'Production Zone' in Fig 2-3 and in the Appendix A cross-sections for 'Rockford' production wells.

4. *Would you agree that the vertical interval from 324 to 318 m asl in borehole M-15 is part of Brunton's and Gartner Lee's regional 'Production Zone' Aquifer?*

5. *What would the Applicant estimate the specific yield of M15 and the potential capacity of a production well if located at Hidden Quarry M15?*

H. Groundwater Modelling

1. *Please provide copies of the database input files. Please also provide the water and observation well files including static water level observation dates for the area within 1500 m of the proposed quarry site boundaries.*

2. *Is it fair to say that the modelling is based primarily on 'kriged' multi season 'open hole' water well static level data with a general bias towards shallower bedrock water wells?*

3. *What is the statistical variability of the 'predicted water levels' and 'maximum predicted water level change' estimated in Fig 10 and Fig 11 of the Modelling Report? Is ± 5 m a fair estimate for Fig 10? What about Fig 11?*

4. *Is there sufficient unique regional hydraulic data to model the hydraulic heads of the deep aquifer as identified in the Hidden Quarry site for the elevation interval between 324 and 318 m asl?*

5. *Considering that there will be a water deficit within the quarry pond footprint due to evaporation increases, where will the water come from that raises the Applicant predicted groundwater levels and increases flows on the downgradient side of the quarry?*

6. *Will the upgradient groundwater divides move away from the quarry with reduced water level elevation to capture more water from adjacent catchments?*

7. The Applicant's M4 and a number of water wells along the Highway 7 southern limit of the proposed Hidden Quarry consistently demonstrate static water levels in the 345± m asl range despite varying depths.

8. The Sept 21, 2012 Site Plan Notes (pg 4 of 5) predicts the west quarry final lake level at 348.6 m asl and the east quarry lake at 348.4 m asl. However the wetland creation Notes (pg 4 of 5) estimate final quarry pond water tables at ± 346 to 349 m asl.

9. *The Harden (2012) Fig 3.17 shows a water level decline across the quarry extraction limits from 354 to 347 m asl (7 m difference). Appendix H Fig 11 shows a drawdown of 1.8 m on the north extraction limit and a rise of about 1.2 m at the south limit. Where did the other 4 m of the pre-quarry vertical gradient go?*

I. Over-Estimated Quarry Pond Levels / Underestimated Upgradient Drawdowns

1. *Has the Applicant overestimated the final quarry pond levels and underestimated the bedrock aquifer drawdowns upgradient of the quarry?*

2. *Are the average late summer / early fall water low levels more likely to be in the 346 m asl range consistent with the lower limit shown in the Site Plan Rehabilitation Notes (pg 4 of 5)?*

3. The Harden (2012) Fig 3.17 plot referenced above is based mainly on spring season (May 31, 2011) high water levels. *Please provide a corresponding late summer / early fall plot using 'same date' data.*

4. *Will the actual drawdowns be sufficient during dry season to interfere with bored and shallow bedrock wells and streams (and ponds) fed by bedrock springs up to 1 km or more upgradient of the quarry?*

5. *Based on the Applicant predicted increased quarry water level at 348.6 m asl, will the forested kettle depression located on private property immediately south of MW4 and Highway 7 experience root zone flooding and dieback?*

J. Dry Quarry Drilling Platform

1. The site boreholes and groundwater modelling for the West pond water level at 248.6 m asl indicate that the bedrock surface in part of the Hidden Quarry may be permanently underwater at the time of phased initiation or during bedrock quarrying.

2. The Harden (2012) Report Sec 3.5.1 pg 16 describes a bedrock low in the southeast corner of the site. MOE Well 28-05483 indicates a bedrock surface at 340.9 m asl far below the Applicant's predicted 348.6 m asl West Pond water level at the south limit of the quarry (Harden 2012 Report Sec 4.2.2 pg 29). The existing groundwater tables are lower than the Site Plan specified minimum water level of 348 m asl (Note 15, pg 2 of 5).

3. *How does the Applicant propose to create a dry staging platform for drilling and blasting? Will positive or passive dewatering be required?*

4. *Has the Applicant considered progressively mining from the southeast upgradient into the higher northwest water tables of the site?*

5. *Will adaptive management based on southerly site quarrying with a more gradual drawdown of northerly boundary groundwater monitors be more effective than initiating quarrying in the deeper water to the north as proposed on the Sept 2012 Site Plans (pg 2 of 5)?*

K. Clean Quarry Water

1. The Sept 2012 Site Plan (Note 18, pg 2 of 5) specifies that wash water silt may be deposited in quarry ponds (Note 18) pg 2 of 5.

2. The Sept 2012 Site Plan Quarry Rehabilitation Notes (pg 3 of 5) propose to push stockpiled soil and overburden from the perimeter berms into the quarried area.

3. The Site Plan Quarry Lake Area and Quarry Face Notes (pg 4 of 5) specify that boulders, stones, screening piles, unsold aggregates and soils may be dumped over the quarry face but at least 20% of the quarry face is to remain barren and untreated.

4. *Does the Applicant propose to waste the silty till overburden spoil or place imported fill in the quarry excavation?*

5. *How does the Applicant propose to maintain clear clean unobstructed groundwater flow to nearby domestic and commercial wells through the life cycle of the quarry excavation ?*

6. *Will the quarry walls become clogged with silt turbidity or be barricaded by lower permeability waste spoil ?*

7. *Will the Site Plans specify that a Permit to Take Water and an Environmental Compliance Approval to Discharge Wash Water is required?*

L. Warnock Lake - Caledon Sand and Gravel Pit - Hydraulic Barriers

1. The Harden Sept 2012 Report Sec 4.2.1 pg 29 holds out Warnock Lake as a successful use of hydraulic barriers.

2. *Please provide Warnock Lake supporting technical information - say pre and post extraction hydroperiod monitoring and historical aerial imagery to support this observation.*

3. *What will stop groundwater flows around the ends of the proposed northwest wetland hydraulic barrier in the proposed Hidden Quarry?*

M. Guelph Dolime Quarry (Appendix E Water Quality Results)

1. The Harden Sept 2012 Appendix E Fig 1 Sampling Location illustrates a rock drill operating from a dry platform.

   Is this dry platform maintained by dewatering (sump reference in the title of Table 1)? What are the depths of rock drilling? Is this dry drilling platform the top of the 'Gasport' Formation?

2. The Applicant has identified the Guelph Limestone Quarry as a positive water quality analogue (Harden (2012) Appendix E Table 1) for underwater quarrying at the proposed Hidden Quarry. This analogue is apparently based on a 'single grab' water sample' from a sump at a location specified in Fig 1 and taken following a blast on Feb 15, 2012.

3. *Please provide a certified copy of the Laboratory Analytical Report(s) for this Feb 15, 2012 sample.*

4. The Applicant has characterized this sample as meeting Ontario Drinking Water Standards (Harden 2012 Sec 5.4.2, pg 40).

5. However this single grab sample (Appendix E Table 1) illustrates Provincial Water Quality Objective criteria exceedances for Cobalt, Lead and Zinc (Note Zinc (revised) as 20 µg/L). Total Ammonia -N concentration is at about 80%, Unionized Ammonia at 25 % and Nitrate at about 12 % of the PWQO. Benzene is reported at a trace amount. *Please comment.*

7. Hardness, Alkalinity, pH, Sulphate, Total Organic Carbon, Organic Nitrogen, Colour, Total Dissolved Solids, Total Suspended Solids, Oil and Grease and Pathogens were not reported in Appendix E Table 1. Many of these parameters are likely to be elevated in an active quarry environment with frequent blasting especially if the underwater quarry is used for washwater silt and overburden disposal.

8. The Total Ammonia and Total Kjeldahl Nitrogen at the Dolime Quarry are elevated above the Hidden Quarry pre-development groundwater at M15 at 0.06 mg/L and 0.20 mg/L) respectively (Appendix B to Harden July 15, 2013 letter to James Dick Construction Ltd).

   Total Ammonia-N is reported as Non-Detectible at Harden W1 (MOE 67-05627)

9. There is a known direct relationship between the ammonia and nitrate levels and the amount of undetonated explosives in the rock through which water flows (Revey 1996).

   Are the Nitrogen parameters in this Dolime Quarry grab sample elevated due to incomplete detonation or combustion of explosives in a wet environment? Was the blast 'smoke' produced orange or white in colour in the Feb 12, 2012 detonation?

10. The difference between Total Kjeldahl Nitrogen (0.7 mg/L) and Total Ammonia N (0.39 mg/L) in Table 1 indicates that Organic Nitrogen in the grab sample is 0.31 mg/L. This value exceeds by 2x the Ontario Drinking Water Standards (2006) of 0.15 mg/L for Organic Nitrogen.

11. *What blasting management protocols are employed at Guelph Dolime Quarry to minimize spillage, reduce product leaching and reduce undetonated explosives and incomplete combustion. How deep are the drill holes? What 'sleep' times typically occur? What is the frequency of blasting? What blasting agents are used?*

12. This single grab sample is not sufficient as an analogue to establish a Water Quality comfort level for underwater blasting and quarrying at the Hidden Quarry.

13. *I request that the Applicant discloses all Water Quality Compliance Monitoring for the Guelph Dolime Quarry and provides additional immediate post blast water quality sampling and analysis for the parameters in para 7 above and the BTEX suite.*

14. *I request a site inspection, together with other CRC members who may be interested, of the Dolime Quarry at the time of and following an underwater blast event.*

N. De Grandis Ponds (Headwater Source of Tributary B - Brydson Creek) and the Provincially Significant Allen Wetlands

1. Ms. De Grandis, based on first hand observational experience, advises that the ponds constructed by her family were limited in depth to 1 to 2 m due to the presence of underlying bedrock (platform). Bedrock outcrop was visible during pond construction. At the time of pond expansion in the mid 1970's the excavation contractor advised that blasting would be required to further deepen the ponds.

2. The presence of a bedrock platform is further evidenced by large angular surface boulder 'float' on the silt till pasture fields to the west of the De Grandis farmstead and ponds. Ms. De Grandis also advises that post hole installation is difficult in this area due to the presence of rock.

3. Ms. De Grandis advises that the pond bottoms have a number of active springs which may be seen bubbling to the surface in the spring and early summer seasons.

4. When the pond was stocked, Rainbow Trout would seek these cool upwelling refugia in summer. The ponds seldom completely freeze over in the winter because of warm upwelling groundwater from the bedrock aquifer. The ponds are used summer and winter by water fowl. Snapping turtles, a species of conservation concern, are also present.

5. In effect precursor springs and the expanded pond excavation breached the surface exposed basal silt till mantle on the bedrock allowing upwelling of bedrock aquifer water and flow to Tributary B.

6. The granular deposits overlying the basal silt till evident at the Hidden Quarry Site are absent from the De Grandis pond area. I have not observed granular deposits or significant water inflow (seepage) around the shores of the De Grandis ponds.

7. The available GRCA contour mapping places the De Grandis Pond water levels at about 362 +/- m asl and therefore the bedrock platform surface at about 360 m asl, slightly lower than that observed along nearby 7th Line to the east.

8. The closest bedrock drilled well to the east (MOE 67-11476) is at a severance at the northeast corner of Lot 2, Conc 6 at the front of the De Grandis township lot where the bedrock surface is reported at 363 +/- and the water level at 364.6 m asl based on the GRCA contour ground elevation of 367.0 m asl.

   The closest bedrock well to the west (MOE 67-06762) in the E1/2 Lot 3, Con 5 just west of the 6th Line reports bedrock at 364 m asl.

   The bedrock surface generally ascends (or steps) northerly from Highway 7 along the 6th and 7th line.

9. The Applicant's groundwater modelling taken at face value predicts an average drawdown of about 60 cm in the bedrock aquifer under the De Grandis Ponds and 'dug well'.

10. This magnitude of drawdown may be anticipated to impact the shallow farm supply (80 cows + calves) well and to significantly diminish the headwater source outflow from the De Grandis ponds to the Allen wetlands and Tributary B. The shallow De Grandis ponds under the Hidden Quarry drawdown regime may be anticipated to quickly convert to wetland versus open water habitat.

11. *Has the bedrock outcrop / subcrop evidence at the De Grandis farm area been considered in the Applicant Hydrogeological Investigation and reporting?*

12. *What evidence does the Applicant have to support its hypothesis apparently based on extrapolated data from the Hidden Quarry site that the De Grandis ponds, the source of Tributary B, are perched above the basal silty till and fed by upper overburden granular aquifers?*

    This condition likely exists on the W½ Lot 3 of the De Grandis Farm where the topographically high Paris Moraine deposits are prominent but not on the E½ of Lot 2 and adjacent Lot 3.

13. *How are the groundwater model predicted bedrock water level contours calibrated in the De Grandis Pond area?*

14. *Similarly what geological evidence does the Applicant have that the Allen Spring is not a bedrock spring?*

15. The Applicant predicts bedrock aquifer drawdowns at 80 cm at the Allen Spring vicinity.

    Is this drawdown likely sufficient to terminate dry season discharge to streamflow at this location?

16. The Allen spring is utilized to maintain water levels in the farmstead landscape ponds as well as to sustain flow to Tributary A.

17. *Is the applicant willing to construct boreholes and sentry observation wells in the vicinity of the Allen Spring and the De Grandis ponds in support of its application?*

O. Stream Corridor Setbacks

1. *Please provide a digital copy of the UTM geographic coordinate string for the GRCA field staked setback base line and the proposed setback limit.*

P. Natural Environment Report (August 2012)

1. *Please verify the last paragraph statements on pg 57 (Sec 6.0) related to total aggregate tonnage resources and that only 20% of the aggregate resource occurring below the water table.*

2. *If site boreholes confirm the evidence of a bedrock platform and bedrock springs at the De Grandis ponds and at the Allen Springs, how would this change the Sec 7.1 (pg 58) statements attributed to Harden Environmental (2012) .*

3. *How would this loss of bedrock spring flow influence the sustainability of the Provincially Significant Allen Wetland and Tributary A and B - Brydson Creek?*

Q. ARA Site Plans

1. The only ARA Site Plans I currently have access to are low resolution uncertified .pdf versions as available from the Township web site. These Site Plans were prepared by Stovel and Associates Inc and plotted about Sept 12, 2012.

2. Pg 5 of 5 is missing from the Site Plans on the Township website.

3. These Site Plan versions are at best difficult to read and in some cases illegible even when enlarged to 'D' size (see Water Well Table on pg 1 of 5).

4. *Please provide us with a complete set of up-to-date digital AutoCAD .dwg or equivalent high resolution Site Plan files or legible hard copy for formal comment.*

Thank you for your consideration and the prompt reply of the Applicant.

Yours truly,

Garry T. Hunter, M.A.Sc., P.Eng.
President
Hunter and Associates

cc:
Concerned Residents Coalition
Greg Sweetnam (JDCL)
Leigh Mugford (JDCL)
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