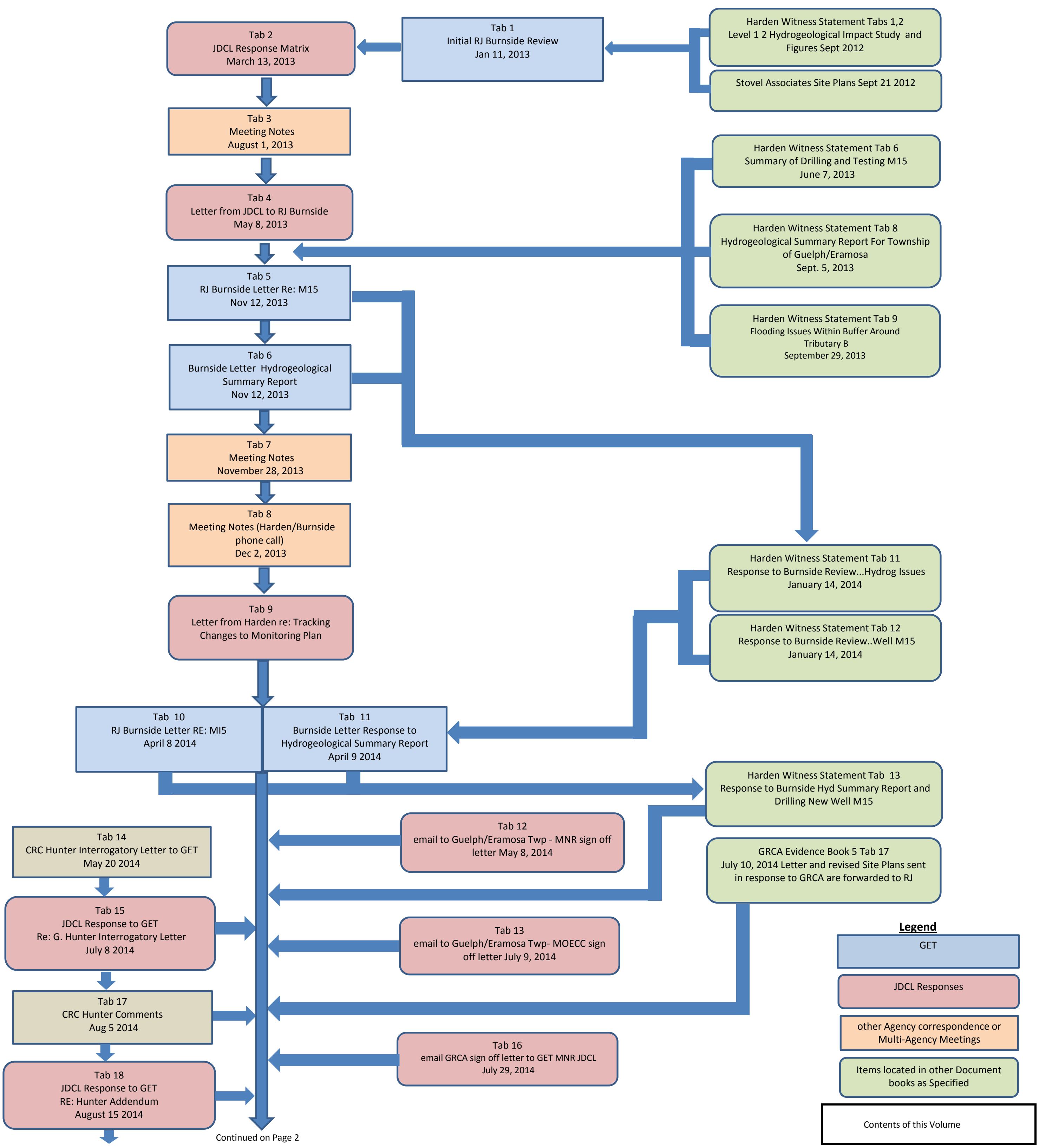
Evidence Book 8 Volume 3

Guelph/Eramosa Township Hydrogeology
Agency Review Document Book



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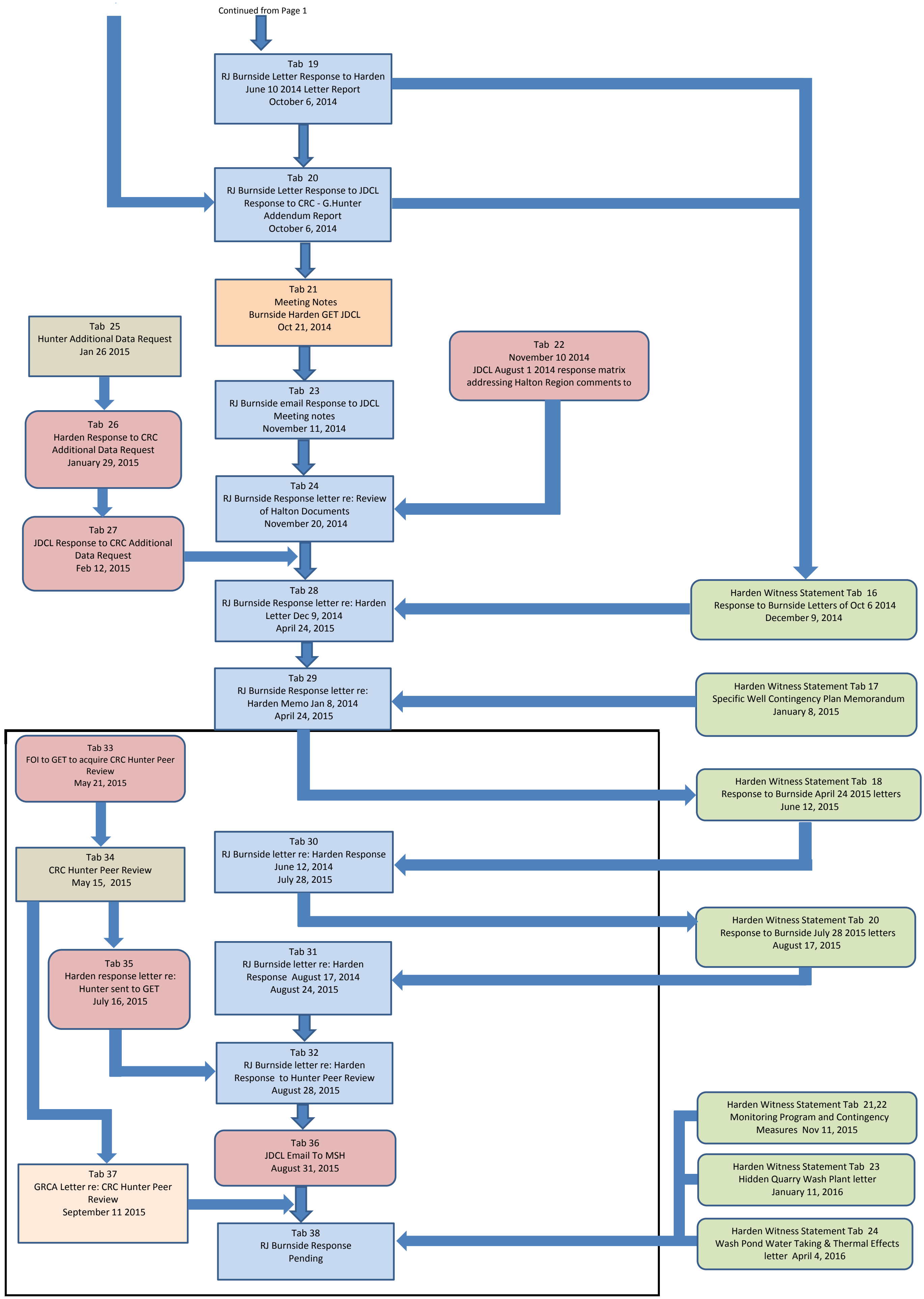

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Township of Guelph/Eramosa

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BURNSIDE
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July 28, 2015

Via: Email

Ms. Kimberley Wingrove
Township of Guelph/Eramosa
P.O. Box 700
Guelph ON N1G 5B4

Dear Ms. Wingrove:

Re: Harden Response Letter Dated June 12, 2015
Project No.: 300032475.0000

R.J Burnside & Associates Limited (Burnside) has reviewed the Harden Environmental Services Ltd. (Harden) letter of June 12, 2015 which provides a response to the two Burnside letters of April 24, 2015. One of the Burnside letters (referenced here as Letter 1) responded to the December 9, 2014 Harden letter which addressed comments provided by Burnside on October 6, 2014. The second Burnside letter (Letter 2) provided comments to the well contingency plans provided by Harden in a January 8, 2015 memorandum.

1.0 Response to Letter 1

The majority of the Burnside comments acknowledged agreement with the Harden responses. As a result, there were only a few Burnside comments that required a Harden response. These are found below.

4.11 Private Well Sample

Harden agreed to collect additional water quality samples in advance of any quarry activities. Harden indicated that the average nitrate concentration upgradient of the quarry is 3.89 mg/L vs. 1.39 mg/L elsewhere.

Burnside Response

There are a number of existing domestic wells that are located downgradient of the proposed quarry site and as a result, it is possible that future changes in water quality may be attributed to quarry activities by the homeowners. A number of domestic wells downgradient of the proposed quarry have been sampled and some have elevated nitrate. As indicated in Letter 1, it will be important that the probable cause of the elevated nitrate be established prior to the onset of quarrying activities.

4.2 Recent Research and Susceptibility of Local Wells to Contamination

Harden indicates that on-site monitor M2 is upgradient of the proposed quarry activities and will be used to monitor nitrate impacts from agricultural activities.

Burnside Response

Burnside recommends that new well M17 be used in conjunction with M2 to monitor nitrate impacts from upgradient agricultural activities. Similarly, M3 (following reconstruction) should be used as a part of the monitoring network for upgradient agricultural impacts. These wells should be added to the monitoring plan.

4.4 Water Quality and Early Warning and Mitigation

Harden agreed to Burnside's recommendations for testing and completion of wells M16 through M19.

Burnside Response

No response needed.

7.0 Brydson Spring and Blue Springs Creek

Harden has begun monitoring of SW3, SW4, SW5, SW8 and Brydson Spring and has provided flow results for two dates in 2015.

Burnside Response

On-going monitoring of SW3, SW4, SW5 and SW8 will allow for the current relationships of flow in Tributary B to Brydson Spring flows to be quantified under current conditions.

8.0 Rock Extraction Water Level Change Monitoring

Harden has agreed to deepen M3 in advance of any quarry activities.

Burnside Response

M3 will provide important water level and water quality information following reconstruction. And as a result, water quality/quantity monitoring should begin as soon as possible.

8.1 Historic Low Water Level

Harden indicates that James Dick Construction Limited (JDCL) will conduct additional investigations in upgradient wells post approval including pumping tests. The data will be used to update the well-specific contingency plans.

Burnside Response

Additional Investigations will establish baseline conditions and will assist in ensuring that wells that may be impacted due to water level declines are identified. The data will be used to update the preliminary and well specific contingency plans that have been prepared.

8.2 Monitoring Plan Revisions

Harden indicates that JDCL has agreed to a detailed private well monitoring program.

Burnside Response

A detailed private well monitoring program will allow for an expedited resolution to any future well interference claims. Specific wells cannot be identified in the proposed monitoring program until the land owners agree to have their wells included. However, the monitoring program should be updated to indicate that private off site wells will be included.

2.3 Trigger Levels for Sinking Cut

Harden indicates that JDCL will provide data from the automatic water level recording device to the Township on a bi-weekly basis until data indicates that water levels are remaining consistently above the trigger level.

Burnside Response

No comment necessary.

9.0 Additional Work

Harden has agreed to conduct testing of M16 through M19 in the manner recommended by Burnside.

Burnside Response

Testing and completion of M16 through M19 as recommended by Burnside will provide additional information on the bedrock and will assist in providing an "early warning" of domestic well impacts.

2.0 Response to Letter 2 – Well Specific Contingency Plans

1. Status of W7

Harden indicates that they have not been allowed to access the well which is located on the Ball property.

Burnside Response

The MOECC database does not indicate a well on the Ball property. It appears that Harden has made a number of attempts to investigate the well. Ideally this well will be included in the monitoring program; Burnside recommends that JDCL obtain written confirmation from the Ball family that they do not wish to have their well monitored.

2. Wells W2 and W3 on the Mushroom Farm Property

Harden has provided detailed information for wells W2 and W3.

Burnside Response

W2 is being used as an injection well for cooling water. W3 appears to be the main well supplying the mushroom farm and should be included in the monitoring program.

3. Short Term Tests for W2, W3, W4, W5, W6, W7 and W8

Harden indicates that short term tests will be conducted post approval for W3, W4, W5 and W8. Harden indicates that short term tests cannot be conducted in W2, W6 and W7 for the following reasons:

- W2 is a shallow well as indicated above and is often dry. W6 is a dry well that has not been used for decades and was dry in November 2014.
- The owners did not allow access to W7 for safety reasons.

Burnside Response

It may be possible to access W7 if the property is sold in the future. Short term tests at W3, W4, W5 and W8 will be helpful in finalizing contingency plans for these wells.

4. Source Water for W31

Harden provides significant detail regarding well W31 (located on the DeGrandis property) and suggests that the springs that feed the well and ponds on site are derived from permeable overburden deposits that are underlain by silt till deposits. Harden suggests that flow in the overburden is primarily lateral and the source area for the unconfined overburden aquifer is somewhere to the north.

Burnside Response

W31 has limited available drawdown and therefore is susceptible to changes in water levels. If the well obtains some of its water from the bedrock, the predicted change in bedrock water levels as a result of the quarry could have a significant impact on the well.

Harden has visited the DeGrandis property on numerous occasions and it is their opinion that W31 and the nearby ponds are fed from a shallow overburden aquifer with a source to the north. However, the wells and spring may also be fed from a bedrock fracture which comes to the top of the rock and is accessed by fractures in the till.

Burnside recommends that on-site investigations be completed to confirm the source of water for W31 and the ponds on the DeGrandis property. Since the well reportedly supplies water for a number of livestock it is important that the contingency plan be able to maintain the water supply.

5. Additional Information for Wells W20, W35, W38, W42 and W43

Harden indicates that JDCL will provide additional information on the wells as a condition of the development.

Burnside Response

No comment necessary.

Should you have any questions regarding the above, please contact the undersigned.

Yours truly,

R.J. Burnside & Associates Limited

Dave Hopkins, P.Geo.
Senior Hydrogeologist
DH:mp

cc: Mr. Stan Denhoed, Harden Environmental Services Ltd. (Via: Email)
Mr. Greg Sweetnam, B.Sc., James dick construction (via: Email)
Ms. Liz Hawson, Macaulay Shiami Hawson Ltd. (Via: Email)

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BURNSIDE
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August 24, 2015

Via: Email

Mr. Greg Sweetnam, B.Sc.
James Dick Construction Limited
P.O. Box 470
Bolton ON L7E 5T4

Dear Mr. Sweetnam:

Re: Harden Environmental Letter of August 17, 2015
Project No.: 300032475.0000

In the Burnside letter of July 20, 2015 we requested that additional investigations be undertaken (subject to owner approval) on the DeGrandis property in order to provide additional data on the source (bedrock or overburden) of the springs that feed the pond. Burnside concurs with the proposed approach described in the August 17, 2015 Harden Environmental letter.

Yours truly,

R.J. Burnside & Associates Limited

David Hopkins, P.Geo.
Senior Hydrogeologist
DH:sd

cc: Mr. Stan Denhoed, Harden Environmental Limited (enc.) (Via: Email)
Ms. Kim Wingrove, Township of Guelph Eramosa (Via: Email)
Ms. Liz Houson, MSH Plans (Via: Email)
Mr. Leigh Magford, James Dick Construction Limited (Via: Email)
Mr. Don McNalty, R.J. Burnside & Associates Limited (Via: Email)

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BURNSIDE
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August 28, 2015

Via: Email

Ms. Kim Wingrove
CAO
The Township of Guelph/Eramosa
P.O. Box 700
Rockwood, ON N0B 2K0

Dear Ms. Wingrove:

Re: JDCL Response to Hunter and Associates May 15, 2015 Peer Review
Project No.: 300032745.0000

The Concerned Residents Coalition (CRC) retained Hunter and Associates (Hunter) to provide peer review services of the James Dick Construction Limited (JDCL) documentation associated with the proposed Hidden Quarry. The Hunter review is contained in a May 15, 2015 report. JDCL's Hydrogeological Consultant Harden Environmental Services Ltd. (Harden) responded to the Hunter comments in a letter dated July 16, 2015. R.J. Burnside & Associates Limited (Burnside) reviewed the Hunter letter and the Harden response and offers the following comments using the same numbering as the Harden/Hunter letters.

A recurrent theme in the Hunter review is that the site plans indicate a pit floor elevation of 349 AMSL in Phases 1 and 3 which is below the historical bedrock water levels necessitating dewatering to maintain a "dry" pit floor.

Harden has recognized that there is an issue and as a result has recommended that the site plans be revised to reflect a new pit floor of 354 AMSL which will allow the quarry to operate in dry conditions without any dewatering.

2.1 Applicants Mixed Seasons Bedrock Contour Water Levels

Hunter expresses concern with the use of a mixture of wet season and dry season water level data to create bedrock water table contours. At the end of the section Hunter states "furthermore, the applicants Tributary B hydrogeological conclusions are suspect".

Burnside is satisfied with the Harden response; however we are 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.

2.2 Groundwater Modelling

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.

Harden provides a satisfactory response to the Hunter concerns, but does not respond to the specific examples raised by Hunter. Harden indicates that the model represents an average condition. Harden does not challenge the 2x factor of safety proposed by Hunter.

1.0 Adaptive Management

This section of the Hunter review provides proposed trigger levels for both water levels and water quality.

Harden indicates that the discussion of trigger levels should occur once additional groundwater monitors have been installed and seasonal data obtained. Similarly Harden indicates that the details on water quality triggers can be developed after additional samples are obtained and prior to commencement of active quarrying.

Burnside concurs with the Harden recommendations to wait until additional data is available to set specific trigger levels, however the approach to develop the trigger levels should be agreed upon.

Should you have any questions, please contact the undersigned.

Yours truly,

R.J. Burnside & Associates Limited

Dave Hopkins, P.Geo.
Senior Hydrogeologist
DH:sd

cc: Ms. Liz Howson, Macaulay Shiomi Howson Ltd. (Via: Email)

Guelph/Eramosa Township

The Township of Guelph/Eramosa
Request for Information
Municipal Freedom of Information and Protection of Privacy Act

Request for:	**Please Note:**
☒ Access to General Records ☐ Access to Own Personal Information ☐ Access to Access and Correction	All applications must be accompanied by payment of $5.00 (payable in cash, cheque, debit or money order) Additional fees apply for photocopying and administrative research time (listed at bottom of page)

Address:	☐ Mr. ☐ Mrs. ☐ Ms. ☐ Miss
14442 Regional Rd 50 #, Street Name	Last Name: Sweetnam
Fire #, RR#	First Name: Greg
Bolton ON L7E 5T4 City, Prov., Postal Code	Middle Name:

Daytime Telephone Number:	Evening Telephone Number:
905-857-3500	

Please provide a detailed description of the records requested. Please include all information such as year, month, full name, subject etc…
James Dick Construction Ltd. would like to request a copy of the latest report by G Hunter regarding the Hidden Quarry application submitted to GET by the CRC.
The May 19 2015 delegation presentation to GET Council by the CRC referred to information from this report.
An electronic copy sent by email would be appreciated.

Preferred method of access to records: ☐ Examine Original ☒ Receive Copy	
Signature	Date (dd/mm/year) 21/05/2015

For Institution Use Only		
Date Received:	Request Number:	Comments:

Personal information contained on this form is collected pursuant to the Municipal Freedom of Information and Protection of Privacy Act, *M.56, R.S.O. 1990,* and will be used for the purpose of responding to your request. Questions about this collection should be directed to the Township Clerk, 8348 Wellington Road 124, P.O. Box 700, Rockwood, ON N0B 2K0, (519) 856-9596.

Additional Fees:
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* Photocopying or computer printouts	$0.20 per page	*CDs	$10.00 each
* Searching for records	$7.50 per 15 minutes	*Developing computer program	$15.00 per 15 minutes

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* Photocopying or computer printouts	$0.20 per page	*CDs	$10.00 each
*Developing computer program	$15.00 per 15 minutes		

Alternate formats of this form are available upon request

HUNTER AND ASSOCIATES
Environmental and Engineering Consultants

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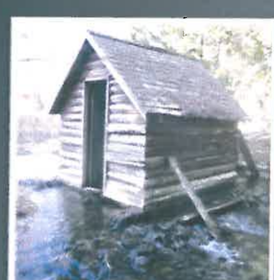

PEER REVIEW

MAY 15 2015

Proposed Hidden Quarry Zoning By-law Amendment and Aggregate Resources Application

Pt W½ Lot 1, Conc 6 (Eramosa), Guelph/Eramosa Township

concerned residents coalition
CRC

HUNTER and ASSOCIATES
Environmental and Engineering Consultants

www.hunter-gis.com
gisinfo@hunter-gis.com

35 Years of Service

May 15, 2015

Our File No.: 14-401

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

HAND DELIVER

Re: Peer Review on behalf of the Concerned Residents Coalition
Proposed Hidden Quarry Zoning By-law Amendment and Aggregate Resources Application
Pt W½ Lot 1, Conc 6 (Eramosa), Guelph/Eramosa Township

Dear Ms. Wingrove,

I have now completed my Peer Review of the extensive Hidden Quarry Applicant (James Dick Construction Ltd) document stack as described in my enclosed project bibliography. This Peer Review as you are aware follows my formal requests for clarification issued to the Township May 20 and August 5, 2014.

The Applicant's formal responses to my hydrogeological questions were received through the Township on August 21 and December 1, 2014 respectively. Additional still missing information and clarifications were requested and provided directly by JDCL during the period December 9, 2014 to February 12, 2015 when the response was determined to be reasonably complete. Since that date there have been Site Plan revisions and more correspondence. This review is based on the Applicant's March 19, 2015 Site Plan version.

The reader should understand the following hydrogeological context of the proposed Hidden Quarry Site:

- The Applicant is proposing to extract quarry rock for the most part below the water table in a subaqueous environment. Extraction will take place from above the water table to remove the granular overburden and create a dry work area at the top of the unweathered bedrock to enable drilling, blasting, subaqueous excavation, stockpiling, drainage and loading of shotrock into rock haul trucks for transport to the Site Plan designated processing area.

- The extraction process will 'flatten' the existing water table gradients lowering the water levels on the northern upgradient side and increasing water levels on the south downgradient side of the operating quarry excavation. Lowered water levels on the north side of the quarry will increase the groundwater capture from catchments to the north and increase flow through the quarry. Passive and active (pumping) dewatering will reduce the dry season base flows and alter the seasonal recharge water balance.

2285 DUNWIN DRIVE, UNIT 18, MISSISSAUGA, ON CANADA L5L 3S3 TEL: (905) 607-4120 FAX. (905) 607-1132

- The surface watershed of Tributary B includes a portion of the south slope of Paris Moraine on and north of the De Grandis farm (Lot 2, Conc 6 Eramosa). However, the bedrock catchment for Tributary B extends further north under the Moraine and under the Tributary A headwater as well. In contrast, Tributary C bedrock catchment is smaller than the Tributary C surface watershed. The Bedrock catchments have not been determined to date.

- Groundwater quarry interference effects with nearby domestic wells (quality and quantity must be minimized).

- Loss of flow (infiltration recharge) in Tributary A, B and C, Conc 6 (Eramosa) is considered a 'good thing' and beneficial to maintenance of dry season groundwater upwelling and base flow in the permanently flowing Brydson Creek.

- A preferential groundwater flow convergence zone occurs through the proposed quarry site in the general vicinity of Tributary B to the Brydson Creek headwater springs.

- Brydson 'spring' is a series of springs and groundwater upwellings beginning west of the barn on the Brydson property. Brydson Creek is excellent cold water Brook Trout habitat (Schieffer, 2015).

- Brydson Creek headwater brook trout habitat is dependent on receiving groundwater upwellings. Groundwater flowing through the proposed quarry and adjacent environments supports these upwellings. It is critical that the groundwater derived baseflows are maintained to sustain the Brook Trout habitat.

My peer review will focus on an in-depth review of the significant hydrogeological deficiencies in the Applicant's Hydrogeology reports as well as comments concerning the site plans, blasting study and the noise study. I have provided a brief summary of my concerns and the rationale for my conclusions in Sections 2.0 through 6.0 of this letter.

My conclusions and recommendations are included in Sec 7.0 and 8.0 of this report. Sample Site Photos, Tables, annotated Figures and a Bibliography are enclosed. The reader may wish to review these documents prior to reading the more technical Sec 1.0 to 6.0 of this letter.

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Illustrative Figures and Photos are enclosed and listed on the final page of this letter.

1.0 SITE PLANS

I will address the Site Plan deficiencies initially as the Site Plans are the enforceable regulatory instruments governing the future operation of the proposed quarry. The Site Plans and referenced supporting documents must be clear and unambiguous. This is not presently the case. Therefore, these Site Plans cannot be approved in their current form. I recommend council not approve the rezoning of the proposed site at this present time due to the issues listed above and described in detail below.

1.1 Regulatory Site Plans

The latest version of the proposed Site Plans provided by the Applicant through the Township web site are dated March 19, 2015. The supporting site specific reports referenced on Page 1 of 5 of these Site Plans are for the most part dated 2012. The document stack and correspondence contain inconsistent and sometimes contradictory conclusions to the March 19, 2015 Site Plans. For example, **the blasting impact analysis contradicts the blasting direction shown in the noise impact analysis.**

My conclusion is that each individual study component has presented optimal operational plan and recommendations without sufficient 'balancing' of other discipline operational

requirements. In many cases, agency reviews and peer review consultants also follow this 'silo' approach. As a result the March 19, 2015 Site Plans are not consistent with and supported by the underlying fundamental Noise, Blasting and Hydrogeology Studies. The following issues have not been taken into consideration.

1.2 Extraction Progress Direction

The Noise Impact Study updated May 24, 2013 specified directions of extraction contradicts the September 5, 2014 Blast Impact Analysis directions of extraction. The direction of extraction on the March 19, 2015 Site Plan pg 2 of 5 Operation Plan is not consistent with either of the Blasting and the Noise Studies (Fig 1.2 to 1.4). **This conflict in extraction directions may affect the respective Blasting and Noise receiver calculations and recommendations including noise berm heights.**

Coordination and rationalization are required throughout the document set. A good example of how this type of contradiction affects the operational parameters of the quarry is how the orientation of the aggregate extraction operation will be designed and maintained so that the direction of the overpressure propagation and fly rock from the face will be away from residents' homes (September 5, 2014, Blast Impact Analysis - Recommendation 4, pg 20).

1.3 Maximum Depth of Extraction

The proposed subaqueous floor of the quarry was revised by the Applicant in June 2014 to only allow extraction to 327 m asl instead of the previously proposed 320 m asl. The 327 m asl floor is about 3 m above the central 324 m asl zone of the M15-2 'production aquifer' as monitored by the Applicant at multi-level groundwater monitor M15. The Applicant monitor M15-2 is screened from 326.5 to 322 m asl. The quarry floor is likely to be irregular and fractured due to drilling and blasting. The M15-2 production aquifer will be the primary influence on the final extracted quarry lake levels.

This extraction depth limit (327 m asl) is expressed throughout the March 19, 2015 Site Plan versions. The maximum extraction depth below the top of bedrock is about 25 m. However, the Noise and Blast Impact Analysis Update Reports and Peer Reviews do not recognize this 327 m asl extraction depth limit and are based on the Applicant's earlier proposed 320 m asl extraction depths. Similarly, the Hydrogeology Reports prior to June 2014 are based on extraction to the proposed 320 m asl elevation.

The Noise, Blasting and Hydrogeology Reports need to be updated to reflect the actual extraction depth limit of 327 m asl as agreed by the Township Peer Review Consultant and the Applicant and as now contained on the March 19, 2015 version of the regulatory site plans. Blast loading calculations will potentially be affected.

1.4 Recommendations and Operational Pit Floor (Top of Bedrock)

The November 19, 2012 Noise Report and Update of May 24, 2013 (pg 6 of 13) states:

> *'The permanent processing plant area should be established at an elevation of 349 m (asl) and a truck haul route connecting the processing plant area to the Stage 1 Phase 1 extraction area should be excavated to the same 349 m (asl) elevation.'*

- *Processing Plant* 349 m asl
- *Shipping Loader* 349 m asl
- *Shipping Truck* 349 m asl
- *Drill* 350 m asl
- *Extraction Loader* 350 m asl
- *Rock Truck* 350 m asl
- *Rock Trucks* 349.5 m asl

The March 19, 2015 Site Plans (Fig 1.2, 1.3, 1.6 and 1.8 enclosed) do not show the processing area operational pit floor and internal haul roads at 349 m asl as recommended by the Noise Study. The Noise Report sample noise calculations for Receiver R3 (W5) utilizes the operational pit floor staging area elevations. These elevations are illustrated in more detail on Fig 1.5. The presumption, although not stated, is that these are dry pit floor elevations.

Furthermore, the internal haul route at 349 m asl is located along the west noise berm and will impose maximum groundwater drawdowns (say at 348 m asl) immediately on initiation of full depth overburden excavation notwithstanding the frequent Applicant Hydrogeology Study statements that draw-downs will be imposed gradually over a number of years.

There is no evidence that the Noise studies consider the internal inclined ramp haul route proposed to cross Tributary 'B' at 360 ± m asl. The Rock Haul Truck noise source is 2.5 m above ground, nearly equal to the surrounding noise berm heights. It is questionable if the acoustic berms at the proposed heights will actually perform effectively as a noise barrier and/or a visual impact barrier for this condition.

Sample calculations for additional sensitive Noise Receptors R16 (W19) and R12 (W10) should also be included in the Noise Report (Fig 1.1A) so these nearby residents are aware of the predictions for their homes.

1.5 Brook Trout Spawning

Active Brook Trout spawning beds were identified by Dr. Karl Schiefer during an aquatic ecosystem and fish survey of the Brydson Creek headwater. The Creek headwaters are located within 225 m of the Hidden Quarry licence boundary, 350 m of the overburden extraction and 425 m of the Site Plan bedrock extraction limits. The note below should be included in the Site Plan Blasting Notes on pg 2 of 5 with reference to the Schiefer Fisheries Study (January 2015).

> ***'.......spawning beds within a 300 m radius surrounding the site may be subjected to vibrations in excess of the DFO limit of 13 mm/s. In the event that active spawning beds are identified within 400 m of any planned quarry blast, vibration monitoring will be required at the shoreline adjacent to the spring area, or closer to the blast, in order to ensure compliance with DFO limits for ground vibration.'*** (from the September 5, 2014 Blast Impact Analysis Update Report)

In addition, potential extraction within the 165 m receptor R16 setback limits will encroach on the 400 m buffer distance and have adverse implications for Brydson Creek Brook Trout spawning areas (Fig 1.1A). It is unclear from the Site Plan if the 165 m Blasting Impact Analysis line is the true extraction limit. The Site Plans (pg 3) state

> ***'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.'*** (pg 3 of 5, March 19, 2015 Site Plans)

This Quarry Operation Note is conflicting and more permissive than the Site Plan legend note for R16. Extraction within 165 m of R16 would trigger requirements for vibration monitoring. The second sentence of this Site Plan note should be deleted. Dolostone extraction within 165 m of receptors should require a Site Plan amendment.

1.6 Liquefaction of Hydraulic Barrier and Geotechnical Stability of Intercell Rock Pillar

William Hill Mining Consultants Limited in a January 31, 2015 Appraisal of the Applicant's Blasting Impact Analysis Studies and Peer Reviews, expressed concern about possible 'liquefaction' of the Applicant's proposed Northwest Wetland hydraulic barrier impervious core as a result of nearby blasting shockwaves. The applicant has provided examples of hydraulic barriers that have been used to confirm the utility of its proposed barriers. However, the Three Hydraulic Barrier analogues referenced by the Applicant (February 2001) for Heritage Lake and Caledon Sand Gravel Pits are constructed adjacent to Sand and Gravel Pits not in Quarries where blasting is required. **The applicant should provide more appropriate examples to justify the utility of the proposed hydraulic barrier.**

The various blasting limits and caution zones as discussed by Mr. Hill and other limits as discussed in this report are illustrated on Fig 1.1A enclosed. These concerns have been partially addressed in the Explotech letter of April 10, 2014 which did not become available to Mr. Hill until March 4, 2015 after issue of his report.

Mr. Hill also expressed concern about the geotechnical stability of the intercell rock pillar supporting Tributary B between Phase 1 and 2 area of the quarry.

1.7 Site Plan Blasting Limits

1.7.1 Special Precaution (250 m)

The 250 m encroachment distances need to be shown on the Site Plan together with the note below. Site Plan notes should state what these special precautions might be (see also Golder October 1, 2014 and Hill January 31, 2015) (Fig 1.1A).

> ***'Special precautions must be implemented when operations encroach within 250 m of any sensitive receptor. All blasts shall be monitored at the nearest sensitive receptor as extraction retreats toward the structures to ensure constant compliance with MOE guideline limits....'*** November 16, 2012 Blast Impact Analysis

The March 19, 2015 Site Plan version are not consistent with this recommendation.

1.7.2 Blasting Hygiene

In response to my May 20, 2014 Query No. 58 concerning water quality and the blasting management protocols employed at Guelph Dolime Quarry to minimize spillage, reduce product leaching, reduce undetonated explosives and reduce incomplete combustion the applicant stated that:

> ***'At Guelph Limestone Quarry, JDCL uses waterproof emulsions, blast tubes and excellent hygiene to minimize spillage, leaching and incomplete combustion. Explosives are used within manufacturer's specifications for sleep times.'***

The updated Blasting Report should include similar supportive text and recommendations to protect groundwater quality. The Applicant needs to integrate these protocols into the Site Plan notes.

1.7.3 Updated Site Plan Notes

Subject to the resolution of the William Hill Mining Consultant's Limited issues, the first paragraph on pg 2 of 5 of March 19, 2015 Site Plan 'Blasting' Notes should be revised as follows:

> ***'The following conditions will be applied for all blasting operations at the proposed......'***

The following additional notes should be added to the Site Plan (pg 2 of 5) Blasting Notes:

> ***'9. Special precautions must be implemented when operators encroach within 250 m of any sensitive receptor including the 6th Line and Highway 7.'*** **(Specify precautions?).**
>
> ***'10. The actual point of termination of blasting operations will be governed by the results of the on-site monitoring program and market economies. However, quarrying closer than 165 m to a sensitive receptor will require a Site Plan Amendment.'***
>
> ***'11. A waterproof emulsion will be used for explosives. The emulsion will be placed in drill holes fitted with tubular linings.'***
>
> ***'12. Use of explosives will conform with manufacturer's specifications for sleep times.'***
>
> ***'13. Excellent hygiene will be employed to minimize spillage, leaching and to ensure complete combustion as evidenced by white smoke.'***
>
> ***'14. The presence of yellow orange 'smoke' during blasting will trigger review of protocols and resultant post blast water quality.'***

1.7.4 Contradictory Acoustic Berm Top Elevations

The Blasting Impact Analysis and the Noise Studies show the north berm elevation at 364 m asl whereas the Site Plan Phase 2 (pg 2 of 5) shows this **berm at 363 m asl (Fig 1.7). This may be a drafting error on the Site Plans.**

1.7.5 Blasting Study Water Table Level

The water table level determined by the applicant with respect to the Phase 1 area, at Monitor M2 varies between 350 to 352 m asl (Fig 3.1 and Fig 4.2). In contrast, **the September 5, 2014 Blasting Study assumes the groundwater table elevation is at approximately 349**

m asl. The method of water table lowering to conform to Blasting Study assumptions has not been addressed by the Applicant.

2.0 GROUNDWATER

The locations of most of the ground and surface water monitors and some of the domestic wells referenced in this report are shown on Fig 2.1 originally prepared by the Applicant as its Fig 4. Known water wells are also shown on Fig 1.1A employing the Applicant 'W' terminology. **Well (W50) on the 7th Line** (Eramosa) has been added by this Peer Review as a known bedrock well static water level reference.

2.1 Applicant's Mixed Season Bedrock Contour Water Levels (September 2012, Fig 3.17)

The Applicant's Fig 3.17 Bedrock Contour Water Levels from the September 2012 Level I and II Hydrogeological Investigation have been evaluated with respect to data quality and consistency (Fig 2.2 enclosed). The Applicant Fig 3.17 contains a mixture of wet season (May 31, 2011) and dry season data (November 11, 2011) which distorts the bedrock water level contours as presented and apparently the subsequent groundwater modelling calibration as well.

The Applicant's bedrock water table contours are distorted in the southeast corner of the quarry and no water levels at all are documented east of M4 and suspect M3. These water levels should have been available for the determination of accurate bedrock water level contours. The area east of Tributary B may at best be described as 'inferred', 'extrapolated' or 'improvised'. **The complete absence of dry season water level monitoring and the absence of wet season monitoring in the southerly Phase 2 area together with the improvisation of bedrock water levels distorts the baseline monitoring record and subsequent groundwater model calibration.**

Other technical issues include:

- **Suspect monitor M3** near Tributary 'B' in the north-central setback of the quarry shows little seasonal variability and has lower static water levels than its neighbour monitors (Fig 2.1). This suspect monitor appears to have a 'plugged' screen (Fig 3.1 and 3.2). There are no nearby redundant bedrock water level monitors to the east. This is the only bedrock water level monitor in the Tributary B corridor.
- The Applicants utilized the November 2011 dry season water level of 346.0 m asl observed at the Applicant's rental house well W1 and the Brydson Farm house well W16 at 345.67 m asl in

the construction of its Fig 3.17 (Harden, September 2012). **Suspect M3 and these dry season bedrock water levels are the primary determinants of the contours on the south and east sides of the proposed quarry site in the Phase 2 area.**

- There are no confirmed wet season bedrock water levels in the vicinity of W1, W10 and W16 or considering suspect monitor M3 any bedrock water level contours in all of the Tributary 'B' corridor.

- There are no confirmed wet and dry season bedrock static water levels in the TP8 area in the northeast corner of the proposed quarry.

- At subsequent Monitor M15, the 2014 wet season bedrock water levels are about 1 m higher than shown on Fig 3.17.

In summary, dry and wet season monitoring at W1 and new monitors M16, M20(TP8) and M21 (M3) are required to provide baseline information in the eastern part of the quarry to correct this distorted data, improve the critical groundwater modelling predictions and provide guidance for Phase 2 design and impact assessment.

Furthermore, the Applicant's Tributary B hydrogeological conclusions are suspect.

2.2 Groundwater Modelling

The Applicant places an inordinate amount of faith in its suspect groundwater modelling and resultant overly precise prediction of the final post extraction west quarry lake water level at 348.6 m asl and the east quarry lake at 348.4 m asl (pg 2 of 5 March 19, 2015 Site Plans). No seasonal variation is reported despite the seasonal variations evident in the functioning bedrock aquifer monitors (M1D, M2, M4, M15 etc) (Fig 3.1, 3.2 and 3.3).

2.2.1 Audit of Model Input Data

The Proponent's September 2012 Groundwater Model Report (Appendix H) states:

> *'.....Information gathered from the MOE Water Well Records (WWR) and on site wells were used in the creation and calibration of the model.' (pg 1)*

> *'The purpose of the model is to provide an estimate of the drawdown that will occur in the bedrock aquifer as a result of the quarry development' (pg 1)*

I previously requested the data utilized to create and calibrate the model but the Applicant has never responded.

2.2.2 Adversely Affected Groundwater Model

It is apparent that the Applicant's groundwater model has been adversely affected by the data input including the mixing of wet and dry season site data, MOE water well static levels not corrected to the GRCA 2011 ground elevations and the near complete absence of water level data in the proposed Phase 2 area (Fig 2.2).

- The Applicant's letter to the Region of Halton (August 1, 2014) shows in Fig 4 the Brydson Spring at about 340 m asl, the Allen well at 354 m asl, the Allen Spring at 355 + m asl, the De Grandis Ponds at 358 m asl, the De Grandis Bored Well at 359 m asl and W50 (MOE 67-11476) on the 7th Line at 361 m asl (Fig 1.1A, Fig 2.4A and 2.5).

- Compared to the GRCA 2011 ground surface contours the Brydson Spring is at about 344 m al or about 4 m above the groundwater modelled contour. Similarly, the De Grandis Ponds are 3 to 4 m above the modelled contours. The static water level at W50 (MOE 67-11476 - 4978 7th Line Eramosa) bedrock well after correction to the GRCA 2011 ground elevation is 3.5 m above the Applicant's modelled contours (Fig 2.4B). **An explanation is required.**

- **The Applicant's modelled groundwater contours show nearly 5 m of drawdown at W5 (67-07545), about 1.3 m at W3 (MOE 67-14491) and about 1.5 m at W9 (67-08039).**

- **In contrast, there is a close fit to the W1 (MOE 67-05424) at 0.65 m (345.4 - 346.05) and to W16 (MOE 28-05483) at 0.57 m (345.1 - 345.67) for November 2011 water levels employed in the Applicant's September 2012 Fig 3.17 (Fig 2.2) indicating these data points were used in the model calibration (Fig 2.4A and 2.4B).**

The Applicant produced later model runs with adjustment for the M15-2 hydraulic parameters (Fig 2.3A and 2.3B). The first scenario provided on January 29, 2015 shows a post extraction drawdown of 1.4 m in the vicinity of M2 and about 1.2 m near TP8 in the northeast corner of Phase 2 of the quarry. The second scenario (not illustrated herein) shows a post extraction drawdown of about 0.8 m in the M2 area on the north side of the quarry.

In the alternative, the Applicant could also have updated its September 2012 Fig 3.17 (Fig 2.2) with its more extensive 2014 wet season monitoring including wet season water levels (assume bedrock) for M7, TP2, TP7, TP8 and TP9; an assumed wet season static water level say at 350 m asl at W1. GRCA 2011 water levels for the De Grandis Pond, Allen Spring and the Brydson Creek headwater pond and adjustment of water well static level depths to GRCA 2011 elevation data. Use of this data model calibration would produce a more realistic model result. **However, there is no dry season data to allow the accurate simulation of dry season static water levels in the northeast Phase 2 quarry area.**

The Applicant's hydrogeological model due to calibration inaccuracies, data gaps and absence of data in the proposed Phase 2 quarry area underestimates the drawdown impact north and east of the proposed quarry including the Allen Wetlands and the Allen Springs; the De Grandis Springs, Ponds and W31 Dug Well and on the W7 Dug Well.

Re-running the Applicant's suspect groundwater model is beyond the scope of this Peer Review. For purposes of this Peer Review, I have applied a 2x safety factor to the Applicant's suspect drawdown predictions.

2.3 Predicted Maximum Lake Water Levels (Post-Extraction)

The Applicant continues to place an inordinate amount of faith in groundwater modelling and resultant overly precise prediction of the final west lake quarry level at 348.6 m asl and the east quarry lake at 348.4 (pg 4, March 19, 2015 Site Plans). The Applicant's expectation based on its suspect modelling is that there will be maximum post extraction quarry water level change (drawdown) of 2.45 m at the quarry edge and 1.6 m at the nearest private well (pg 17 June 10, 2014 letter to Township Peer Review Consultant).

The Applicant however has not considered the Phase 1 Operational case where extraction is initially proposed on the upgradient side of the quarry and water levels must be lowered to meet the dry pit floor / top of bedrock as assumed in the Noise and Blasting Reports (Fig 3.1).

The Proponent's groundwater and related wetland ecological impact assessments are all based on these flawed assumptions.

2.4 Drainage Ditch 'Tributary B'

A decades old constructed drainage ditch (SW5 to SW7 area) with inlet invert elevation at about 356 m asl and outlet at about 355 m asl drains flood waters from the Tributary B wetland depression within the proposed quarry site (Fig 2.1).

Prior to drainage ditch construction, flood waters from Tributary B were mainly retained on site, flooding to about the 358 m asl contour with greater recharge to the bedrock aquifer than occurs at present. This ditch through accelerated passage of floods has diminished dry season base flow to the downstream Brydson Springs and the Brydson Creek gaining stream. **Stopping up this ditch would restore the historic dry season base flow to Brydson Creek headwaters.**

2.5 Guelph Limestone Quarry not Valid as an Analogue for Hidden Quarry

The Applicant has reported **the annual volume of water flowing through the Hidden Quarry site at 370,146 m^3 (s 3.2 pg 6, December 9, 2014). This is equivalent to 1,014 m^3/day**. The Applicant reports Permitted Daily Discharge Rates from the Guelph Quarry at 13,750,000 L/day or 13,750 m^3/day at Guelph Limestone Quarry (Fig 2.5). **Pumping during the Applicant's Guelph Limestone Quarry water quality sample events in 2012 and 2014 was at about 10,000,000 L/day or 10,000 m^3/day or about 10x the Applicant's estimated flow through in the proposed Hidden Quarry**.

The Applicant's estimated groundwater inflow at the proposed Hidden Quarry is only about 10% of the pumped groundwater discharge rate at Guelph Limestone quarry at the time of water quality sampling. Therefore the water quality dilution factor is much higher (10x) at Guelph Limestone Quarry (s 3.1, pg 6, December 9, 2014). **The Applicant's use of a volumetric comparison for water quality dilution and the use of this quarry as an analogue for Hidden Quarry is not valid without applying a correction (increase) to the Guelph Limestone Quarry water quality data**.

By comparison on October 16, 2014 the Applicant observed the flow at the 'Brydson Spring' to be 22.4 L/s (December 9, 2014 correspondence). This flow is equivalent to 1,935 m^3/day or about twice the estimated average annual flow through the quarry.

3.0 DRY OPERATIONAL QUARRY FLOOR AND ACTUAL OPERATIONAL DRAWDOWNS

The Applicant has not considered Phase 1 and 3 operational drawdowns required to initially operate the pit and quarry. The Noise Study (updated May 24, 2013), the Blast Impact Analysis (updated September 5, 2014) and the Site Plans (March 19, 2015) each specify the Phase 1 operating pit floor (Bottom of Sand and Gravel / Top of Dolostone) at 349.0 m asl, the Phase 2 Pit Floor at 354.0 m asl, and the Phase 3 Pit Floor at 350.0 m asl. **This operating pit floor is intended to be at the top of bedrock and forms the dry staging platform for quarry drilling, blasting, subaqueous extraction, excavated shot rock stockpiling, shot rock drainage and for loading of quarry rockhaul trucks.**

3.1 Top of Bedrock

The Applicant documents contain the following top of bedrock information. The word 'below' indicates top of bedrock is deeper than the specified base of borehole / test pit elevation.

Top of Bedrock Elevation (m asl)			
West Phase 1 & 3			**Phase 2 East**
M13D	350.2	TP8	below 353.4
M14D	349.8	TP4	below 352
TP2	348.6	TP9	352.1
M1D	350	M3	350.7
M1S	349.8	M11	below 349.3
M2	352.5	W10 (67-05627)	344.4
M12	below 353.2	W1 (67-05424)	344.8
M3	350.7	W16 (28-05483)	340.9
M7	below 349.6		
M4	349.1		
W19 (28-02048)	349.4		
W18 (28-02049)	347.9		
W17 (28-03457)	345.6		

The lower top of bedrock elevations at Water Wells W10, W1 and W16 indicate the Tributary B follows a bedrock depression in this area. This depression likely extends upgradient under the 'drained' wetland depression at the MP1, M9 and SW5 monitoring cluster between the proposed Phase 1 and Phase 2 quarry cells and downgradient to the Brydson Creek Spring(s) groundwater resurgence area.

The available top of bedrock elevations throws into question the Applicant assumed bottom of overburden / top of bedrock Site Plan elevation of ± 354.0 m asl within the proposed Phase 2 Quarry area. The overburden / bedrock interface is more likely to reflect surrounding Boreholes at 351 to 352 m asl and lower towards the W1, W10 and W16 bedrock depression leading to the Brydson Creek headwater.

3.2 Actual Operational Drawdowns (vs Modelled)

For purposes of this Peer Review, based on the Applicant's top of bedrock borehole data and the noise and blasting studies, the Phase 1 and 3 operating pit floors have been assumed at 349 m asl and Phase 2 at 351 m asl (Fig 3.1, 3.2 and 3.3). After allowing for establishment of water table drainage gradients, the minimum operational water levels required are assumed at 348 and 350 m asl respectively.

The Applicant did not provide full year tabular water level data as requested by Hunter for Years 2012, 2013 and 2014. Available values for 2014 are employed below for comparative purposes and adopted in the referenced Figures.

3.2.1 Phase 1 Operations (Fig 3.1)

The initiation of extraction of dolostone at the specified elevation of 349 m asl will require active or passive dewatering to a minimum 348.5 m asl to provide a dry staging area (equal to or below the predicted Final west Quarry Lake level). **Overburden and bedrock water table levels range from about 351 to 354 m asl in Phase 1, Stage 1 area implying required drawdowns of 2.5 to 5.5 m** (Fig 3.1). This data was collected from Borehole M2 (completed May 1990, just north of Phase 1 in the setback area), where bedrock at 352.53 m asl was observed. This borehole was extended to the base of the dolostone deposits.

In addition, M12 installed December 22, 2010 near M2 was extended to 353.16 m asl depth and the base of the installed piezometer screen was at 353.69 m asl above the top of bedrock. The Applicant did not observe an overburden watertable at M12.

The bedrock water levels in deep open hole M2 is similar but slightly higher than the water level in the downgradient M15-3 aquifer zone centred at about 333 m asl above the subaqueous quarry floor elevation at 327 m asl (Fig 3.1). **Monitor M2 should therefore be reasonably representative of water levels in the proposed quarry.**

The following wet season high and dry season low water levels have been observed by the Applicant at long term monitor M2 (two decades):

M2 Wet Season High (m asl)		**Dry Season Low (m asl)**	
May 5, 2014	352.02	Aug 14, 2014	350.38
May 11, 2011	351.88	Sept 26, 2007	349.83
April 21, 2008	**352.55**	Oct 24, 2004	**349.81**
April 7, 2009	352.40	Aug 26, 2003	349.90
April 16, 2004	352.01		

TP2 is located within the Phase 1 overburden extraction area as shown on the Applicant September 2012 Fig 3.17, Fig 2.1 and 2.2. Dolostone was reported at the base of TP2 at 348.62 m asl. The base of the screen was installed at 349.54 m asl above a silt layer. However TP2 and M13D display similar hydrographs in Fig 3.1. The following low and high water levels have been provided by the Applicant for TP2:

TP2 Wet Season High (m asl)		**Dry Season Low (m asl)**	
May 5, 2014	**355.14**	Oct 10, 2014	354.11
May 31, 2011	355.13	Jan 27, 2010	353.60
Apr 7, 2009	355.08	Sept 26, 2007	353.71
		Oct 24, 2005	353.76
		Mar 6, 2003	**353.10**

The water table in the Phase 1 area will need to be lowered to about 348.0 m asl to permit quarry staging operations, haul route and processing to be consistent with Noise and Blasting Study assumptions. This water table is lower than the Applicant's suspect model predicted final water table and lake level at 348.6 m asl. **Notwithstanding the Applicant's contrary claims, the Applicant's Site Plan imposes the full drawdown on the north quarry perimeter during Phase 1 extraction and not progressively through the life of the quarry.**

On May 5, 2014 the actual drawdowns required to lower the water level in Phase 1 to permit quarry operation at M2 is about 4.0 m and at TP2 is 7.0 m. On August 14, 2014 the operational drawdown required at TP2 is about 6 m and at M2 about 2.4 m (Fig

3.1). With the exception of dry season M2, these actual drawdowns are greater than the Applicant predicted 2.45 m drawdown at the north quarry edge (s 2.3).

3.2.1.1 Dewatering (Phase 1)

The March 19, 2015 Site Plans, the Hydrogeology Studies and the extensive documentation do not address how dewatering of the Phase 1 area will be accomplished to lower the water tables to address quarry operations requirements, especially during May and June when water levels throughout the proposed Phase 1 area are significantly higher than 348 m asl.

Even at the M4 location (Fig 2.1) the maximum water level observed at 348.13 m asl on April 21, 2008 indicates the local quarry water levels will not be able to be passively lowered during some spring seasons. Recognizing that W10/W1 wet season water levels are likely about 350 m asl (s 3.2.2), M4 on the south Phase 3 quarry setback is the only area where the existing operating season water level most of the time is below (slightly) the Phase 1 operational drawdown required at 348 ± m asl.

Furthermore, M4 static water levels represents the M15-4 aquifer with lower hydraulic heads than in the underlying M15-3 aquifer zone (see Table A footnote).

The Applicant's longer term (two decades) static water level monitoring from 1994 to 2014 at M4 indicates the following selected wet season high and dry season low water levels:

M4 Wet Season High (m asl)		**Dry Season Low (m asl)**	
May 5, 2014	347.60		
May 31, 2011	347.62	Oct 10, 2014	346.13
April 7, 2009	347.76	Oct 25, 2007	345.58
April 21, 2011	**348.13**	Mar 6, 2003	**345.47**
May 31, 2007	347.62	Dec 17, 1997	345.61

By late July the M4 water levels decrease to about 346 ± m asl (Fig 3.1). The dry seasonal water level at the Applicant house (W1) well in the Tributary B influence area appears to be similar to M4.

The Site Plans (pg 1 of 5) Table 1 'Description of Wells' reports M7 on the south quarry setback east of M4 as a Drivepoint Groundwater Monitor installed in April 1998 with base at 349.61 m asl and revised (deepened) in November 2010 to 349.31 m asl.

The Applicant reported the following wet season high water levels at M7 in the September 12, 2012 Appendix Table B2. No monitoring for M7 has been provided by the Applicant after early 2012.

M7 Wet Season High (m asl)	
Apr 1, 2011	349.51
Mar 16, 2010	**349.84**
Apr 29, 1998	349.48

Unexplained, the April 29, 1998 water level is below the base of drivepoint as reported by the Applicant.

3.2.1.2 Wash Water and Silt Ponds

The March 19, 2015 Operations Plan (Page 2 of 5) proposes wash water and silt ponds upgradient of M4. Recharge mounding from washwater disposal may be anticipated to increase the water table in this area interfering with base line long term monitor M4.

However, the area upgradient of M4, due to normal water levels below 348 m asl, is the only logical area to locate a passive quarry recharge sump area with surface gravity drains from Phase 1 area.

Site Plan Note 18 (pg 2 of 5)

> ***'...Silt may be deposited in quarry ponds. A Permit to Take Water will be obtained from the MOE prior to any washing operations as required.'***

Site Plan Note 16 (pg 2 of 5)

> ***'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.'***

Percolation through the Phase 1 quarry floor is not possible without substantially lowering the water table.

At some of the Applicant's other Pits and Quarries (with approved MOE Permits to Take Water) the high 'spring flood' water is pumped from operating pits with disposal on the waxing and waning spring flood of nearby streams. However, this pumped water is lost to support subsequent dry season stream base flow.

Drainage from the industrial work area (processing area and silt pond) and Phase 1 Stage 1 extraction area will recharge near M4 unless mounding is present. Existing downgradient wells are in harm's way from a water quality viewpoint.

The Applicant has not demonstrated how it intends to dewater the Phase 1 proposed quarry area in the spring season without reducing subsequent dry season base flows in Brydson Creek.

3.2.2 Phase 2 (Fig 3.2)

The proposed Operating Pit Floor (bottom of sand and gravel / top of dolostone) is a consistent 354 m asl in the Noise, Blasting Reports and on the March 19, 2015 proposed Site Plan version. **This Peer Review has assumed a Phase 2 pit floor at 351 m asl pit / quarry dry operational floor with a water table at 350 m asl (Fig 3.2) (see Sec 3.1 this report).**

The Applicant has only three water table elevations in the immediate vicinity of the proposed Phase 2 area. There is no confirmation whether these are bedrock or overburden water levels.

Suspect monitor M3 in the Tributary B corridor shows very little seasonal variation suggesting poor hydraulic connectivity with the bedrock aquifer and / or a plugged monitor (Fig 2.1 and Fig 3.1). M3 data should not be used until the monitor condition may be verified. **There is no bedrock water level monitoring redundancy east of M3 or in the Tributary 'B' corridor**. The Applicant's assumptions about surface water elevations vs bedrock levels in this losing stream corridor can not be confirmed.

Wet season high water levels at Tributary 'C' SW 14 wetland (Fig 2.1) include:

SW14 Wet Season High (m asl)	
June 23, 2014	359.024
May 5, 2014	**359.194**
May 31, 2011	359.18

A water level of 358.22 m asl was observed by the Applicant at SW14 on May 11, 2012 in the wetland east of TP8 on a neighbour property (Fig 2.1). This water level was slightly lower than observed at SW4.

SW4 wet season water high levels at the Tributary 'B' entrance to the Hidden Quarry site include:

SW4 Wet Season High (m asl)	
June 23, 2014	359.02
May 5, 2014	359.19
March 16, 2010	359.31
March 12, 2009	359.32
April 21, 2008	**359.37**

Wet season water high levels at Tributary 'B' SW 5 include:

SW5 Wet Season High (m asl)	
June 23, 2014	355.04
May 5, 2014	355.3
April 2, 2010	356.2
April 3, 2001	**356.27**

Water levels at downstream SW7 on March 16, 2010 were also at **356.15 m asl** (Fig 2.1). This elevation is inferred to be the **current overflow level of the Tributary 'B' central wetland depression** adjacent to the southwest corner of Phase 2. Tributary 'B' is dry at SW4 and SW5 during the dry season.

TP8 (Fig 2.1)Wet Season Water Levels observed subsequent to 2011 include:

TP8 Wet Season High (m asl)		**Dry Season Low (m asl)**
Mar 29, 2012	354.80	No Data
May 11, 2012	354.19	
July 6, 2012	353.73	
May 5, 2014	**355.47**	
June 23, 2014	354.50	
Aug 14, 2014	Dry (?)	

TP8 is screened in the sand and gravel overburden aquifer and TP9 just above the dolostone contact. There is no evidence of an intervening aquitard.

The TP 9 (Fig 2.1) Wet Season High Water Level is reported at:

TP9 Wet Season High (m asl)		**Dry Season Low (m asl)**
Mar 29, 2012	352.25	No Data
May 11, 2012	**352.29**	
May 5, 2014	352.27	

In the absence of data from the Applicant TP8 and TP9 wet season water levels for purposes of this Peer Review have been conservatively assumed to be bedrock water levels. This assumption is further supported by the M13S and M13D near coincident static water levels in the northeast corner of the quarry. This assumption implies a preferential groundwater convergence flow zone through the M2, M15, M4, W1, W10 and W16 monitor areas near Tributary B and towards Brydson Creek.

Based on the base of overburden / top of bedrock staging area floor at 351 m asl and an operational water table at 350 m asl to facilitate dry quarry staging operations, a wet season operational drawdown of about 5 m is required at TP8 and a drawdown of about 2 m at TP9.

The Applicant's suspect model has predicted final lake level at 348.4 m asl. This predicted level would impose a spring time drawdown of up to 7 m at TP8 downgradient of the Allen wetland and 4 m at TP9 on the setback at the southeast corner of Phase 2.

The Applicant shows his bedrock water level contour September 2012 Fig 3.17 (Fig 2.2) more than 4 m below the subsequent wet season water levels at TP9. The actual dry season water levels are unknown, as both TP8 and TP9 are dry through most of the operating season. No dry season water levels are available.

Known water well static water level elevations at W1 and W16 based on the Applicant's ground elevations are summarized below. W16 south of Hwy 7 is downgradient from W1 and W10.

When Completed (m asl)			Dry Season Low (m asl)		
W1	Feb 11, 1975	345.4	W1	Nov 2011	**346.1**
W10	**July 24, 1974**	**348.2**			
W16	Dec 17, 1979	345.1	W16	Nov 2011	**345.7**

The higher late July static water level (348.2 m asl) at W10 suggests wet season highs of about 350 m asl. The Applicant's W1 static level seasonal monitoring is deficient.

- The actual operational drawdown required in the Phase 2 area **at TP8 is 4.5 m and at TP9 2.2 m** assuming an Operating Pit Floor at 351 m asl (not the Site Plan specified 354 m asl) and **operational water table at 350 m asl on May 5, 2014.**

- **The drawdown required to conform to the Applicant predicted final east pond water level on May 5, 2014 was 7.1 m at TP8 and 3.9 m at TP9** based on the conservative assumption these water levels are bedrock water levels.

- **These drawdowns are far in excess of the Applicant's predicted 2.45 m drawdown at the northern quarry edge.**

3.2.3 Phase 3 (Fig 3.3)

The Phase 3 water table lowering is likely to be accomplished (if possible) during the Phase 1 pit excavations and the opening of the proposed quarry for dolostone extraction. Lowered water tables will also drain the shallow aquifers along the Phase 3 north and east perimeters and induce additional recharge from the Tributary 'B' corridor.

The Site Plan required operational drawdown in Phase 3 is to about 348 ± m asl slightly lower than the model predicted post extraction water level 348.6 m asl (Fig 3.3). **M4 static levels are less than 1 m below the required drawdown in the 2014 spring season and nearly 2 m below in the 2014 summer and fall seasons.**

For the required Operating Season drawdown of 348 m asl on May 5, 2014, this operating level would induce a drawdown of 4.2 m at bedrock monitor M1D and on August 14, 2014 a drawdown of 3.3 m (Fig 3.3). **For the Applicant Predicted West Quarry Pond Levels post-extraction drawdowns based on May 5, 2014 data for M1D would be 3.6 m and on August 14 2.7 m.**

These M1D drawdowns exceed the Applicant predicted 2.45 m drawdown for the quarry edge.

4.0 ADAPTIVE MANAGEMENT

This section sets Adaptive Management alert triggers that in a number of cases differ from those of the Applicant as expressed on pg 4 of 5 of the March 19, 2015 Site Plan version. **Amber Alerts are warning that operational parameters are trending outside of a reasonable range and an immediate Applicant response is required. Red Alert indicates that stoppage of quarry extraction operations is necessary until the issue is corrected through mitigation or alternatively until the Quarry operator proves other factors are determinants.**

4.1 Groundwater Monitor - Trigger Levels

This section describes groundwater level and quality Amber and Red Alert Trigger Levels. **These alerts should be incorporated into the Applicant Site Plans.**

4.1.1 Groundwater Monitor M4 (Fig 4.1)

The Applicant has not set trigger levels for M4. Static water levels at Monitor M4 as well as the existing domestic wells W1, W10 and W16 near Tributary B may be considered a surrogate for base flow to the downgradient Brydson Springs and the gaining Brydson Creek. Base flow decreases from the spring high season to the critical late summer and late winter low seasons.

M4 was completed May 1990. The base of M4 is at 337.23 m asl below the M15-4 aquifers with midpoint at 345.3 m asl and above the M15-3 aquifer zone with midpoint at 331.1 m asl. The critical summer / early fall water level in M4 seasonally declined from 347.6 m asl on May 5, 2014 to 346.1 m asl on October 10, 2014. Seasonal hydrographs for M4 are shown for the 2007 and 2008 dry years in Fig 4.1 enclosed.

Wet season passive or active dewatering may reduce subsequent dry season water levels at this monitor and adversely impact water balance and Brydson Creek base flow. **The following dry season Adaptive Management Triggers are proposed at M4 for incorporation on the revised Site Plans.**

Amber Alert	**346.1 m asl**
Red Alert	**345.3 m asl**

Fig 4.1 enclosed shows seasonal Amber and Red Alert hydrograph trend lines to provide early warning of dry season drawdown issues.

However, long term monitor M4 integrity is compromised by the March 19, 2015 Site Plan proposal to locate 'Silt Ponds' with washwater disposal upgradient of this monitor. Pit floor recharge sump(s) upgradient of the monitor may also be required in this area for passive drainage and recharge.

High level seasonal triggers are also required at M4 to avoid root zone flooding of a downgradient kettle depression woodland. The following initial triggers are proposed:

Amber Alert	**348.6 m asl**
Red Alert	**349.2 m asl**

4.1.2 M2 Adaptive Management (Fig 4.2)

The Applicant has set the following trigger levels at M2 (Fig C3 June 10, 2014).

Amber Alert	348.31 m asl
Red Alert	347.81 m asl

These Alerts have been adjusted downwards to reflect the operational Site Plan assumptions (Fig 4.2).

Amber Alert	**348.0 m asl**
Red Alert	**347.7 m asl**

These Alert levels are recommended to 'override' the Applicant's sinking cut trigger operational levels proposed in s 4.1.3.

4.1.3 Phase 1 Sinking Cut

The Applicant has confirmed that the maximum depth of the quarry is achieved during the first blast of the sinking cut and that therefore all fractures to the depth of the subaqueous quarry floor depth will be exposed. The Applicant advises that drawdowns in the sinking cut due to rock removal at the maximum extraction rates will initially be about 900 cm/day decreasing to about 8 cm/day at the full extent of Phase 1 area extraction.

The Applicant has proposed a maximum drawdown of 2.54 m (346.83 m asl) in the sinking cut (pg 17 or 19, June 2014 correspondence). The Applicant has referenced this drawdown to the low water level in M3 at 349.37 m asl. However M3 is a 'suspect' monitor with little seasonal water level variation and is not an appropriate reference.

The minimum allowable water elevation in the sinking cut should be referenced to a new replacement monitor at M3 with similar alerts as at M2 (Fig 4.2) as above:

Amber Alert	**348.31 m asl**
Red Alert	**347.81 m asl**

4.1.4 M13D Adaptive Management

The Applicant has set the following trigger levels (Fig C.4, June 10, 2014) for M13D and pg 4 of 5 March 19, 2015 Site Plan version (Fig 4.3).

Amber Alert	**351.63 m asl**
Red Alert	**351.28 m asl**

These drawdowns imply about 4 m drawdown at adjacent domestic well W5 with static level at 355.4 m asl when completed on May 13, 1981.

4.1.5 Northwest Wetland and SW6

Sample SW6 hydrographs are shown for reference on Fig 4.3. SW6 has been proposed by the Applicant as the water level trigger Alert station for the Northwest Wetland. **A high level overflow to the quarry excavation is proposed at 355.8 m asl.**

The appropriateness of the Northwest Wetland Adaptive Management Trigger levels have not been addressed by this Peer Review.

4.1.6 M1D Adaptive Management (Fig 4.4)

The Applicant's Fig C2 (June 10, 2014) and pg 4 of 5 March 19, 2015 Site Plans provide the following triggers for M1D:

Amber Alert	349.98 m asl
Red Alert	349.78 m asl

These trigger levels do not recognize the adjacent processing operational floor and haul roads estimated at 349 m asl with a seasonal water table drawdown to about 348 ± m asl to conform to noise and blasting protection requirements. Considering the upgradient location, practical operational trigger levels are recommended as follows:

Amber Alert	**348.5 m asl**
Red Alert	**348.0 m asl**

The Red Alert level is at the base of the monitor screen. This Monitor was completed in May 1990. A deeper monitor replacement (M24) is required to ensure that the monitoring range is appropriate (Fig 2.1).

4.2 Groundwater Quality

The Applicant has provided base line and surface water quality both within and adjacent to the proposed Hidden Quarry and at Guelph Limestone Quarry as an analogue (Table A enclosed). However, the Guelph Limestone Quarry sampling is restricted to early season February and April sampling (Fig 2.5) at the time of active quarry discharge. No late operation dry season (Aug/Sept) samples have been provided (Fig 2.5) after a summer period of frequent blasting. **The Guelph Limestone Quarry discharge at the time of sampling was 10x the Applicant's estimated flowthrough at the Hidden Quarry site (s2.5).**

This water quality data demonstrates that the existing Hidden Quarry aquifers are not pristine and contain anthropogenic affects originating from local land uses. The 'reasonable use' capacity of the existing local aquifers to absorb additional adverse quarry water quality impacts is therefore much more limited at Hidden Quarry than at the high flow Guelph Limestone Quarry site. The Applicant's comparisons are not valid.

I do not agree with the Applicant's assumption that it can monopolize the full residual Reasonable Use of the proposed Hidden Quarry aquifers, i.e. the ODWS (2006) or above the 95th Percentile (January 14, 2014 Applicant Letter pg 16). There may be other adverse upgradient water quality trends and downgradient home owner site conditions that may adversely affect the local source drinking water aquifer environment.

Table A enclosed provides a summary of available selected water quality parameters for the proposed Hidden Quarry Area and for Guelph Limestone Quarry. The Applicant's proposed Hidden Quarry water quality sampling is relatively comprehensive. However, the Guelph Limestone Quarry water quality sampling is not comprehensive and biased to single sampling in the spring wet season. The Applicant's November 2014 domestic water quality is only partially available to this Peer Review (see Table A enclosed). No comment is made as to observed water quality at unknown private well locations.

Water quality monitoring should be undertaken in late August / early September each year.

4.2.1 Sodium

A review of the Applicant's and Private Water Quality Data confirms monitored Sodium levels are generally below 10 mg/L except downgradient of Highway 7 at W16 (67 mg/L - November 3, 2014) where Sodium exceeded the Medical Advisory level of 20 mg/L and at Brydson Creek Spring where Sodium increased from 15 mg/L in 1996 to 27.3 mg/L in 2014.

Sodium was also elevated above Medical Advisory levels at 24 mg/L at deep M1D and at 50 mg/L at shallow M5 sampled sites east of the 6th Line Eramosa. Deep M13D had slightly elevated Sodium level at 14 mg/L. **Sodium in the Applicant's Guelph Limestone Quarry was higher at 80 mg/L on February 15, 2012.**

The following trigger Level for Sodium in wells downgradient of the quarry is proposed for wells with existing Sodium below 10 mg/L. These proposed trigger levels, reflecting existing ambient conditions, are lower than the ODWS (2006) Medical Advisory of 20 mg/L.

Amber Alert	**12 mg/L**
Red Alert	**15 mg/L**

4.2.2 Iron

The aesthetic objective for iron, set by appearance effects in drinking water is 0.3 mg/L (ODWS 2006). Iron was non-detectable in the 2014 private well water quality surveys by the Applicant as included in Table A.

Iron was also non-detectable in the 2014 samples for the Hidden Quarry site monitor wells except for the **Applicant rental house W1 at 0.99 mg/L or 3x ODWS (2006). In 2012 W1 had iron at 0.14 mg/L. The chemistry of this well is anomalous.**

Elevated iron was observed in the 1996 Monitor well samples. Based on existing ambient conditions, the following trigger levels for Iron are proposed:

Amber Alert	**0.15 mg/L**
Red Alert	**0.20 mg/L**

4.2.3 Manganese

The colour related aesthetic objective for manganese in drinking water is 0.05 mg/L. Like iron, manganese is objectionable in water supplies because it stains laundry and fixtures black, and at excessive concentrations causes undesirable tastes in beverages.

M1D at 0.058 mg/L slightly exceeded ODWS (2006). Exceedances also occurred at monitors M2, M5 and TP1 in 1996 (Table A). Elevated Manganese was observed at the Guelph Limestone Quarry Pond in 2012 and at anomalous W1 in both 2014 and 2012 sampling. Measurable Manganese was observed at M15-2 and M15-3 monitor in 2014. Measurable (trace) Manganese was observed at W4 in 2014 and at W31 in 2012.

Based on existing ambient conditions, the following triggers for Manganese are proposed:

Amber Alert	**0.15 mg/L**
Red Alert	**0.03 mg/L**

4.2.4 Hardness

Hardness in excess of 500 mg/L in drinking water is unacceptable for most domestic purposes. The following Hardness Trigger Levels are proposed, based on local ambient groundwater conditions as summarized in Table A.

Amber Alert	**420 mg/L**
Red Alert	**450 mg/L**

4.2.5 Total Dissolved Solids (Calculated)

Total Dissolved Solids (TDS) is a measure of the palatability of drinking water. TDS levels less than 500 mg/L are generally considered to be good. The principle constituents of TDS are chloride, sulphates, calcium, magnesium and bicarbonates. Excessive hardness, taste, mineral deposition or corrosion are common properties of highly mineralized water (ODWS 2006).

Based on the Applicant's water quality sampling, most wells have TDS in the range of 360 to 450 mg/L (Table A). **Exceptions include M15-1 (deep) at 470 mg/L, W16 also adversely influenced by road salt at 540 mg/L and anomalous W1 at 600 mg/L on November 3, 2014 and 613 mg/L on May 18, 2012.** Based on existing ambient conditions, the following alerts are recommended:

Amber Alert	**450 mg/L**
Red Alert	**475 mg/L**

Active quarry activity and use of the quarry pond for washwater silt disposal is likely to contribute to increased TDS and Turbidity levels in the domestic wells downgradient of M4.

4.2.6 Turbidity

Control of turbidity in drinking water systems is important for both health and aesthetic reasons. The substances and particles that cause turbidity can be responsible for significant interference with disinfection, can be a source of disease-causing organisms and can shield pathogenic organisms from the disinfection process.

In contrast to the very high turbidity observed in the Guelph Limestone Quarry Pond following blasting, turbidity was very low in SW4, SW8 and SW11 with surface water meeting ODWS (2006) criteria. The Applicant did not analyze for Turbidity in its routine water quality surveys. This is a deficiency.

The following alerts are recommended for Turbidity:

Amber Alert	**3.0 NTU**
Red Alert	**4.0 NTU**

4.2.7 Zinc

Zinc at all sample sites was significantly below the ODWS (2006) taste related aesthetic objective of 5 mg/L for drinking water. **However, Zinc is frequently elevated above Provincial Water Quality Objectives at 0.03 mg/L (PWQO 1999) for both surface water and groundwater (Table A). At Brydson Spring on October 16, 2014 Zinc was at 0.035 mg/L, slightly above the Provincial Objective. Zinc in the proposed Hidden Quarry groundwater monitors in November 2014 ranged from 0.036 at M15-3 to 0.65 at M1D. The single February 2012 Guelph Limestone sample was 0.057 mg/L or about 2x the PWQO (1999).**

The environmental significance of zinc relates to potential dewatering of the Phase 1 extraction area with discharge to Tributary 'B' to reduce high spring water levels. The following trigger values based on the Applicant's water sampling are recommended for zinc. **Reflecting ambient conditions, the operational trigger values proposed are above PWQO (1999) for water discharge to Tributary 'B' of Brydson Creek.**

Amber Alert	**0.03 mg/L**
Red Alert	**0.04 mg/L**

Alerts other than ODWS (2006) do not appear necessary for drinking water, recognizing that piping systems may be the source of zinc in domestic water supply systems.

4.2.8 Cobalt and Lead

Total Cobalt and Total Lead at Guelph Limestone Quarry pond in the February 15, 2012 sample also exceeded Provincial Water Quality Objectives (1999). Cobalt and Lead were non-detectable at proposed Hidden Quarry Groundwater Monitor M15 and in Hidden Quarry surface water.

The Applicant considers that Cobalt and Lead exceedances reflect the influence of the overlying Eramosa formation at Guelph Limestone Quarry. The Applicant has not identified the Eramosa Formation at the Hidden Quarry site however this formation may occur to the north. The Township Peer Review Consultant has also confirmed that the Eramosa Formation does not occur at the Hidden Quarry Site. Therefore, Amber and Red Alerts have not been specified.

4.2.9 Benzene

Measurable Benzene was observed at Guelph Limestone Quarry quarry pond samples. The proposed trigger levels are:

Amber alert	**0.003 mg/L**
Red Alert	**0.005 mg/L**

4.2.10 Un-ionized Ammonia

The Applicant provided only one 'grab' sample analysis in the 2012 wet season for un-ionized Ammonia at Guelph Limestone Quarry. No analysis was performed at the Hidden Quarry site. **Analysis of un-ionized Ammonia will be important if future quarry water discharges are proposed to the Brydson Creek tributaries.**

4.2.11 Nitrate-Nitrogen

Observations of Nitrate (NO_3-N) **on the upgradient side of the quarry** (W½ Lot ½ Conc 6 Boundary) for wells and stream water included the following concentrations:

Upgradient Nitrate Concentrations (mg/L)		
M2	4.0	Nov 11, 2014
M2	4.6	Nov 20, 2013
M2	6.8	Nov 21, 1996
M3	1.1	Nov 11, 2014
M3	5.2	Nov 20, 2013
M3	5.3	Nov 21, 1996
SW4	1.1	Nov 5, 2014
SW4	4.64	Apr 8, 2014
M13D	3.55	Nov 11, 2014
W5	4.66	Nov 5, 2014
W4	2.90	Nov 14, 2014

The Nitrate level in shallow M15-4 (345 m asl) and deeper M15-3 (333 m asl) within the Phase 1 ambient quarry extraction depth zone were:

Extraction Zone Nitrate Concentrations (mg/L)		
M15-4	2.3	Nov 11, 2014
M15-4	2.0	May 5, 2014
M15-3	2.3	Nov 11, 2014
M15-3	3.2	May 5, 2014
M15-2	2.0	Nov 11, 2014
M15-2	2.2	May 5, 2014

On the downgradient side of the proposed quarry, the following Nitrate concentrations were observed by the Applicant:

Downgradient Nitrate Concentrations (mg/L)		
M4	2.5	Nov 11, 2014
M4	2.8	Nov 21, 1996
SW8	4.5	Apr 8, 2014
Stream (Trib 'B')	8.2	Nov 21, 1996
SW3	9.0	Nov 21, 1996
Brydson Spring	2.4	Oct 16, 2014
Brydson Spring	1.8	Nov 21, 1996
W16	1.4	Nov 3, 2014
W19	2.0	Nov 3, 2014
W1 Applicant Well	ND	Nov 3, 2014
W1 Applicant Well	0.13	May 18, 2012

The data is clear that the recent ambient Nitrate (NO_3) concentrations on the north quarry boundary are mainly below 5 mg/L. At shallow M15-4 and deeper M15-3 the Nitrate concentration ranged from 2 to 3 mg/L, along the proposed south quarry boundary from 1 to 3 mg/L and at Brydson Spring at 1.8 mg/L in 1996 increasing to 2.4 mg/L in 2014. Brydson Spring Nitrate concentrations are similar to M15.

The water quality data at W1 is anomalous with very low nitrates compared to all other sampling locations (Table A enclosed). This is not an appropriate monitor to conclude that the ambient aquifer has the capability of naturally reducing nitrogen concentrations (January 14, 2014 Applicant letter, pg 3&4). Similarly, there is little evidence in Table A to support the Applicant conclusions that Nitrogen is being naturally sequestered in the Tributary 'B' and other wetlands. **The SW8 Nitrate concentration at 4.5 mg/L on April 8, 2014 and stream (Trib 'B') at 8.2 mg/L in 1996 and SW3 at 9.0 mg/L in 1996 indicates Tributary 'B' is a Nitrate source to the proposed quarry site.**

The Applicant reported Nitrate concentrations in a Guelph Limestone Quarry sump at 1.2 mg/L on February 15, 2012. The Applicant sampled the quarry pond on April 28 and 29, 2014 prior to and following a blast (12 min, 78 min and 15 hours). The sampled water was noted to be very turbid and Total Ammonia to be non-detectable with Nitrate-N at 0.47 mg/L before and 15 hours following the bast. Total Kjeldahl Nitrogen (TKN) increased from 0.31 mg/L prior to the blast to 0.43 mg/L immediately following the blast returning to 0.29 mg/L after 15 hours (see enclosed Table A) . The Applicant considers these concentrations to be representative of its quarrying practice. However, these samples are wet season samples when quarry inflow and discharge was high. **Late summer dry season sampling after frequent blasting activity would provide more realistic sample values for comparison to Hidden Quarry site (Fig 2.5). Furthermore, the dilution flow at Guelph Limestone Quarry is 10x that at the proposed Hidden Quarry (s2.5). Direct comparisons with Hidden Quarry are not valid.**

The Applicant (December 9, 2014) based on a Nitrogen Balance calculated the resulting Nitrate loading at the proposed Hidden Quarry to be 3.67 mg/L on an annual basis. However, the Applicant observed that its calculation did not make allowance for losses as nitrogen gas. The Applicant has also predicted Nitrate attenuation in the subaqueous quarry environment. The Township's Peer Review Consultant estimated the Nitrogen added from explosives to be about 2 mg/L (April 8, 2014).

Therefore, considering aquifer Reasonable Use principles, the proposed Hidden Quarry should not be permitted to raise Nitrate concentrations in the downgradient ambient groundwater flow system by more than 1 to 2 mg/L. The following Alerts are

recommended for Nitrate (NO_3-N) concentrations on the downgradient side of the quarry.

Amber Alert	**3.5 mg/L**
Red Alert	**5 mg/L**

4.2.12 Organic Nitrogen

ODWS (2006) reports that taste and odour problems are common with organic nitrogen levels greater than 0.15 mg/L.

The Guelph Limestone Quarry Samples documented by the Applicant on February 15, 2012 and April 28, 2014 had organic nitrogen ranging from 0.29 to 0.43 mg/L or 2 to 3x drinking water standards ODWS (2006).

Organic Nitrogen exceeded ODWS (2006) at most on-site Hidden Quarry groundwater monitors by a factor of about 2x. High concentrations were observed at 0.9 mg/L at M15-3 on May 5, 2014 and at 0.77 mg/L at M3 (suspect) on November 23, 2014.

Surface water Organic Nitrogen ranged between 0.11 to 0.56 mg/L. Organic Nitrogen at Brydson Spring on October 16, 2014 was 0.21 mg/L.

In contrast, six (6) domestic wells sampled November/December 2014 , all had Organic Nitrogen below ODWS (2006). The domestic well data suggests inadequate purging of the Applicant's monitor wells prior to water quality sampling.

The following trigger values, based on Table A, are recommended for Organic Nitrogen at the monitors and at domestic wells downgradient of the proposed quarry.

Amber Alert	**0.12 mg/L**
Red Alert	**0.15 mg/L**

4.2.13 Hydrocarbons / Oil and Grease

Hydrocarbon and Oil and Grease should be absent from downgradient monitor and domestic wells. Water quality monitoring is required. Measured values in downgradient monitor wells above method detection limits should be considered Amber and Red Alerts.

Amber Alert	**Detectible**
Red Alert	**Detectible**

4.2.14 Microbiology

The microbiological quality of drinking water is most important because of its association with waterborne diseases. For Escherichia Coli (E. Coli) and for Total coliforms:

Amber Alert	**Detectible**
Red Alert	**Detectible**

5.0 DOMESTIC WATER WELL INTERFERENCE

The applicant in the June 10, 2014 response to Burnside 'Table 9 Private Well Surveys' provides a summary of private well survey dates. The Applicant provided an update for domestic wells within 500 m of the proposed quarry on January 8, 2015. However, it has already been demonstrated that these surveys contain a number of deficiencies, especially beyond the Applicant's arbitrary 500 m distance. **The record confirms that the Applicant did not always observed ground elevations, water levels and well infrastructure including stick-ups, casing diameter, casing depth, depth of well, depth to static level and pumping intake levels to correlate with the MOE water well records.** The arbitrary selected 500 m area of monitoring was also not adequate. The well monitoring should have been extended to 1,000 m from the quarry site. Critical wells include bored and dug wells and those wells within shallow pumps.

Monitoring Well M15 provides the best evidence of actual ambient groundwater quality on the proposed Hidden Quarry site (Table A). The Applicant's 'sand packs' for its high quality multi-level monitoring well M-15 are centred at the following elevations:

Intervals	m asl
M15-4	345.3
M15-3	333.1
M15-2	324.3
M15-1	317.8

Note: The subaqueous quarry floor is proposed at 327 m asl

The 15-2 aquifer is the most productive aquifer and generally has the best water quality. **M15-2 equivalent is the preferred target aquifer for replacement private wells.** M15-3 aquifer has slightly higher Nitrate-N than M15-2 and is located within the quarry extraction depth zone. M15-1 has lower natural quality due to increased hardness and total dissolved solids and is therefore not desirable as a water source.

This section also includes a description of the recommended replacement private wells within the influence area of the quarry.

5.1 Drawdown Impact on Upgradient Private Wells

There are four (4) known upgradient private wells that are vulnerable to Hidden Quarry drawdowns. One of these wells is located outside the Applicant's arbitrary 500 m Well Water Quality Survey distance. All four should be replaced with notes to this effect on the Site Plans.

5.1.1 W5 (MOE 67-07545)

- According to the MOE water well record, this well has a shallow pump set at about 4.5 m depth. The base of the open hole bedrock well is at 341.1 m asl, well above the proposed quarry subaqueous floor at 327.0 m asl.

- The static water level on well completion on August 13, 1981 was 355.4 m asl. This static water level is consistent with the Applicant's levels for nearby M13S at 354.84 m asl and M13D at 354.02 m asl as observed on August 14, 2014 (Fig 4.3).

- The Applicant has predicted drawdown at 0.9 m in this well (Fig 2.3A and 2.3B) and elsewhere advised that drawdowns in domestic wells would not exceed 1.6 m.

- However, the Applicant has also estimated the groundwater contour at 351 m asl or about **4 m of drawdown** at the W5 and M13D well sites (Applicant Fig 4 Response to Halton Region August 1, 2014 and Hunter Fig 2.4A and 2.4B).

- **Drawdown to the Applicant's proposed Amber Alert (351.63 m asl) trigger level at M13D for W5 would be 3.8 m and to the Red Alert Level (351.28 m asl) would be 4.1 m nearly 2x the Applicant's 2.45 m drawdown prediction for the north edge of the quarry (Fig 4.3) .**

- **The Applicant should replace this well to the M15-2 equivalent aquifer depth prior to initiation of Phase 1 extraction preparation work.**

5.1.2 W7 (No MOE Well Record)

- The Applicant has described this dug well (W7) in the E½ Lot 2 Conc 5 as 'inaccessible' and not surveyed (Fig 1.1A). However, the Applicant's Scenario 1 provided January 29, 2015 predicts a drawdown of 0.6 m (2 ft) at this well site (Fig 2.3A and 2.3B). This drawdown is likely underestimated and may be more than 1 m which may leave inadequate depth of water in the well.

- W7 may also be within the drawdown influence area of the Rockwood Municipal Wells.

- **The Applicant should either properly inspect and describe this dug well or provide a new deeper replacement well to the M15-3 or M15-2 aquifer equivalent prior to initiation of Phase 1 extraction preparation.**

5.1.3 W31 (No MOE Well Record)

- This old heritage stone lined dug well is located about 700 m north of TP8 in Phase 2.

- The Applicant has predicted about 50 cm of drawdown at this well in Ground Water Scenario 1 as supplied January 29, 2015 (Fig 2.3A and 2.3B). However, the actual Phase 1 and Phase 2 drawdowns are likely to exceed that estimated in Scenario 1. Bedrock aquifer drawdowns may be as much as 1.0 m (3 ft +) at this dug well.

- The Applicant in its Well Survey Memorandum of January 8, 2015 reported W31 as a shallow 3.8 m deep dug well with a static water level at 3.11 m depth on October 5, 2012. **There was only 69 cm of water in the well or about 39 cm of available drawdown above the pump depth as observed on December 16, 2014 (see below).** The Applicant did not report the pump depth. This well, despite the very limited operational drawdown available, supports more than 80 beef cows and calves and other livestock.

- The Applicant did not include Well W31 in its November 2014 500 m water quality survey apparently because W31 is more than the arbitrary 500 m distance selected for the survey.

- W31 and the adjacent De Grandis pond level was surveyed again on December 12, 2014 for this Peer Review by B. Hietkamp, P.Geo and G. Hunter, M.A.Sc., P.Eng. with the following findings:

	m	m asl
Ground Elevation (estimated from GRCA 2011)		364.4
Measuring Point (Stick Up) above ground level	0.45	364.85
Static Water Level (BMP)	2.95	**361.90**
Pump Intake Depth (BMP)	4.10	360.75
Depth of Water Above Pump Intake (BMP)	**1.15**	
Well Depth (BMP)	4.40	360.45
Surveyed Nearby Pond Water Level (BMP)	3.07	**361.78**

- Water in the dug well was very 'clear' with temperature at 8.5 °C and pH (field) at 7.76 on December 12. A water quality sample was taken and within three hours delivered directly to the Laboratory for analysis (see Table A).

- **The water level in the well on December 12, 2014 was 0.12 m above that in the ponds to the south.**

- **The Applicant's proposed contingency plan on January 8, 2015 for the very first time includes drilling a new well despite the well exceeding the Applicant's arbitrary 500 m distance from the quarry boundary.** The Applicant prior to this date denied any responsibility for this well. **This 'contingency' is not included on the March 19, 2015 Site Plan versions and therefore is not enforceable directly through the Site Plans.**

- **This new replacement well to the M15-2 equivalent aquifer should be installed prior to any pit or quarry preparation and extraction, especially as the Applicant has not proposed any contingency for livestock watering in the event of loss of water.**

- During dry seasons (late summer and late winter) under quarry drawdown conditions other local springs on this farm may be dry and not be available as alternative farm supply water sources for the De Grandis cattle herd.

5.1.4 Domestic Well W24

Domestic well W24 completed August 15, 2004 has an observed static level at 5.1 m depth (350.9 m asl), recommended pump level at 6.0 m depth and total depth of 8.8 m. **The Applicant (January 8, 2015 letter) reported static water level of 5.79 m and pump setting at 6.00 m or only 20 cm of drawdown available.**

This well is located about 500 m from the proposed extraction limit. The Applicant has predicted minimal drawdown at this location (Fig 2.3A and 2.3B). However, the Applicant shows its modelled water level contours 2 m below the static water level as referenced to GRCA (2011) ground elevations (Fig 2.4A and 2.4B).

Based on the Water Well Record, the Applicants January 8, 2015 Well Survey reporting and M1D monitoring (Fig 4.4), this well requires replacement.

5.2 Water Quality Impacts on Downgradient Domestic Wells

The Applicant's extensive water quality sampling confirms that the Hidden Quarry Site has limited tolerance for additional surface and groundwater Nitrogen enrichment due to blasting and other on-site activities.

The following downgradient domestic wells along Highway 7 based on the Applicant's modelled reverse particle tracking Fig 2.4A and 2.4B are cased to top of bedrock with open holes to the following depth elevations:

Domestic Well	MOE #	Top of Bedrock (m asl)	Base of Open Hole (m asl)
W18	28-02049	347.9	330.2
W17	28-03457	345.7	322.5
W19	28-02048	349.4	335.4
W16	28-05483	340.9	338.7
W10	67-05627	343.3	328
W1	67-05424	347.8	Applicant Well 328.0

These open hole bedrock wells are in the direct groundwater flow zone above the 327 m asl subaqueous quarry floor as specified on the March 19, 2015 Site Plan versions.

These wells, with the exception of W1 owned by the Applicant should be replaced with wells cased to about 325 m asl and extended as open holes through the production aquifer as defined by the upgradient M15-2 borehole interval. The Applicant W1 well has anomalous and adverse water quality compared to the other private wells in Table A.

5.3 Drawdown Impacts on Allen Wetlands, Allen Springs, De Grandis Ponds and Brydson Springs

The Applicant has not provided any borehole and water level monitoring or other technical data to support its hypothetical inference that the Allen Wetlands, the Allen Pond and the De Grandis Ponds will not be adversely impacted by quarry drawdown interference.

The presence of higher static water levels (higher hydraulic heads) in deeper M15-3 and M15-2 compared to shallow M15-4 indicates that recharge in M15-3 and M15-2 aquifers is more distant from the quarry or alternatively from the Tributary 'B' stream recharge corridor. Quarry drawdowns will propagate rapidly through these deeper higher conductivity confined aquifers to upgradient areas (see also Township Peer Review Consultant comments November 12, 2013).

5.3.1 Allen Wetlands

The Applicant has no bedrock groundwater levels in the northeast of the proposed Quarry footprint adjacent to or within the Allen wetlands. Nearby monitor well M3 data is 'suspect' based on the absence of seasonal water level variations. Monitor Wells TP8 and TP9 may or may not be 'perched' overburden water tables. More likely, the overburden and bedrock water levels are nearly coincident similar to M13S and 13D in the northwest corner of the quarry and significant drawdowns (up to 7 m) will occur in the TP8 area (Fig 3.2) compared to the Applicant's prediction of 2.45 m on the north quarry edge.

5.3.2 Allen Springs and Farm Pond

The Allen Springs are the source of Tributary A to the north of the Quarry and sustain the downstream Allen farmstead ponds. The Applicant has predicted 80 cm of bedrock aquifer drawdown at Allen Springs for its Scenario 1 (Fig 2.3A and 2.3B).

However, after application of a factor of safety of 2 the drawdown maybe as much as 1.6 m.

The Applicant has postulated that the Allen Springs are overburden springs and separated from the bedrock aquifers by an aquitard. However, the Applicant has not provided any technical proof.

5.3.3 De Grandis Farm Ponds (W31)

The De Grandis Ponds north of TP8 are reported to be excavated to a shallow bedrock platform (pers comm S. De Grandis 2014) which limited the depth of pond excavation. No boulders are apparent in the excavated spoil disposal areas around the pond. Springs are obvious within the pond and the ponds do not entirely freeze over even in the coldest winter (see Photos A to F enclosed). Tributary B surface catchment area is much less than Tributary C to the east, however the downstream surface flows are similar. The April 8, 2014 water chemistry in Tributary 'B' reflects bedrock groundwater discharges (Hardness 320 mg/L at SW4) whereas Tributary 'C' water is softer (Hardness 210 mg/L at SW11) reflecting surface runoff (Table A).

5.3.4 Brydson Springs

The Brydson Creek and Springs are a groundwater 'resurgence area' for upgradient Tributary B and C recharge and for a portion of the shallower groundwater flow through the proposed Hidden Quarry site. Elevated sodium and chlorides in the Brydson Springs indicate road salt influences from Highway 7 confirming a shallow groundwater flow system.

The Applicant has consistently advised that the Brydson 'Springs' flow will be increased due to the higher post extraction water levels predicted in the quarry lakes at indicator monitor M4. For the condition of increased flow at the Springs and considering that evaporation losses from the quarry lakes will be greater than from the existing dry forest evapo-transpiration rates on the undisturbed quarry site, **the only source of this new water gain is increased recharge from Tributary 'B' through the proposed Hidden Quarry site and/or the expansion of the upgradient drawdown catchment to gather more recharge from the north, thereby decreasing upgradient groundwater upwelling spring flows in the Allen and De Grandis Springs and Wetlands (Fig 1.1B).**

5.3.5 Summary

After the application of a 'factor of safety' of 2, to allow for distortions in the Applicant's Model calibration, the drawdown at Allan Springs and at the De Grandis Ponds (and well) is estimated to approach 1 m. These drawdowns may be anticipated to stress flows in Tributary A, B and C and pond water levels at both the De Grandis and Allen Farms and water well levels on the De Grandis Farm.

The Applicant has not proposed any contingency replacement for loss of spring flow to the De Grandis and Allen Ponds and Wetlands.

Brydson Creek dry season flow may also be decreased in the dry season due to excessive wet season passive or active dewatering and shifting of the seasonal recharge water balance to permit spring season quarry operation during Phase 1. The low level adaptive management triggers in s4.1.1 address this issue.

6.0 PROPOSED MONITOR WELL LOCATION DEFICIENCIES AND NEW MONITOR WELLS RECOMMENDED

6.1 New Groundwater Monitoring Wells

The Applicant has nearly two decades of groundwater monitoring data at M1S, M1D, M2 and M4 in the proposed Hidden Quarry Phase 1 and 3 Areas. This long term record was further supplemented in 2012 and in 2014 with the installation of monitoring of four separate aquifer depth intervals at M15. However, the M15 Monitor cluster for unknown reasons was located within the Phase 1 proposed extraction area and will be destroyed as Phase 1 is extracted. Monitor M4 will be compromised by the proposed upgradient washwater Silt Pond and / or recharge sump location, M3 is a suspect monitor, M1D screen is too shallow and W1 has anomalous water quality compared to any other monitored well (Table A).

The Applicant's Fig C1 (November 2014) in December 9, 2014 correspondence includes new monitoring well locations added as a result of Region of Halton and Township of Guelph / Eramosa Peer Review Comments (also Fig 2.1). Multi-level monitors are proposed screened in the M15-4, M15-3 and M15-2 equivalent aquifers - except as noted.

Multi-level M16 - South of Phase 2 Bedrock Extraction Limit

Open Hole (to 327 m asl)	M17	-	North of Phase 1 Bedrock Extraction Limit, near M2 (may be redundant)
Multi-level	M18	-	West of M4 on the new Highway 7
Multi-level	M19	-	South of the Applicant House Well (W1) near the Tributary 'B' corridor and near Highway 7

In addition, the following additional monitor wells are proposed by this Peer Review (Fig 2.1):

Multi-level	**M20**	**-**	**at TP8 adjacent to Allen Wetland**
Multi-level	**M21**	**-**	**Tributary 'B' corridor to replace M3 and M15**
Multi-level	**M22**	**-**	**in the vicinity of the De Grandis Ponds and Springs**
Multi-level	**M23***	**-**	**in the vicinity of Allen Springs**
Open Hole (to 327 m asl)	**M24***	**-**	**Replacement of monitor well M1D**
Open Hole (to 340 m asl)	**M25***	**-**	**Upgradient of Brydson Creek headwater pond**

* *Note: Sentry wells subject to owner permission.*

The M2 water levels have been shown to correlate with water levels for M15-3 and M15-2 aquifer zones (Fig 3.1). Therefore, the proposed open hole M17 to quarry depth would appear to be redundant.

There is still no bedrock monitoring well at the northeasterly limit of Phase 2 near TP8 adjacent to the Allen Wetland. With the exception of TP9, there are no boreholes at all in the Phase 2 (East Pond) area to support the Applicant's Site Plan assumed base of overburden and top of bedrock. **New multi-level Monitor Well M20 near existing TP8 and M21 is proposed to replace suspect M3 and MW15 scheduled for destruction during Phase 1 extraction. Multi-level wells M16, M19, M20 and M21 are required now prior to Site Plan Approval to confirm the proposed Phase 2 Site Plan top of bedrock and bedrock water level assumptions and properly calibrate the groundwater model.**

Suspect monitor M3 should be replaced with multi-level wells similar to M15. At least two years of undisturbed data overlap is required between M15 and M21. All new onsite monitor wells should be located in protected areas outside the proposed pit and quarry extraction and disturbed (berm) setback limits.

Prior to the initiation of the Phase 1 extraction, sentry multi-level monitor wells M22 and M23 are also required, in the vicinity of the Allen Spring and the De Grandis Ponds and about 500 m upgradient of the proposed Hidden Quarry. **There is no groundwater monitoring data in this water level sensitive area.**

South of the proposed Hidden Quarry monitoring of the upper bedrock water level elevations upgradient of the Brydson Creek headwater pond is proposed at a new sentry monitor M25 subject to owner permission . No off-site downgradient sentry monitor wells are proposed additional to the quarry site perimeter wells at M4, M18 and M19 and Brydson headwater M25 sentry well described above. **M25 will provide an elevation analogue for Brydson Creek base flows. Dry season headwater pond levels (geodetic) are also initially required for comparison.**

Long term (two decades) shallow bedrock monitoring well M4 will be compromised by the Applicant March 19, 2015 Site Plan Proposal to establish washwater silt ponds immediately upgradient with associated watertable recharge mounding. This monitor well function will be replaced by new multi-level monitors M18 and M19. At least 12 months of overlapping monitoring data is required prior to pit excavation and disturbance.

Monthly manual observation of static water levels should be adequate with bi-weekly monitoring during the months of August, September and October

7.0 CONCLUSIONS

This Peer Review in addition to hydrogeology issues addresses Site Plan deficiencies, inconsistencies and contradictions. Site Plans are the enforceable regulatory instruments governing the future operation of the proposed quarry. The Site Plans and referenced supporting documents must be clear and unambiguous. This is not presently the case.

7.1 Site Plan / Technical Document Synchronization

- The Applicant's Noise, Blasting, and Groundwater Studies and Site Plans have not been synchronized with respect to depths of extraction, direction of extraction, operating floor elevations and height of berms. Each study component and recommendations have been independently prepared and internally optimized (siloes) without sufficient regard for the other technical component studies (Fig 1.2 to 1.8).

- Intercell rock wall stability between Phase 1 and Phase 2 (Fig 1.7), and the northwest wetland hydraulic barrier liquefaction concerns as identified by William Hill Mining Consultants Limited (January 31, 2015) have not been addressed.

- The Applicant has not considered the Noise impact of rock haul trucks operating on the inclined ramps and haul road crossing of Tributary B required to support extraction in Phase 2 area (Fig 1.7). The Noise source height at the top of the incline will be nearly equivalent to the specified berm heights.

- In addition to its noise calculations for receptor R3 (W5 as shown on Fig 1.5), the Applicant should also provide similar calculations for nearby homes at R12 (W10) and R16 (W19).

7.2 Processing Area and Phase 1 Dolostone Extraction

- The Applicant has elected to initiate Phase 1 dolostone subaqueous extraction in the upgradient high water table area on the north side the quarry (Fig 2.2). The Site Plans specify the operational staging pit floor at the approximate top of bedrock at 349 m asl elevation (Fig 1.6).

- The Noise impact analysis is also based on the processing plant and access haul roads established at 349 m asl elevation (Fig 1.5).

- Initiation of granular overburden extraction to the recommended and specified pit floor (top of bedrock) at 349 m asl in the Phase 1 and 3 areas (Fig 1.6 and 1.8) will induce immediate passive dewatering and drawdowns (lowering the water table).

- To operate on the pit floor (top of bedrock) under dry conditions, water tables will have to be lowered to about 348 m asl throughout the Phase 1 and 3 areas.

- The Site Plan notes assume that water will be able to percolate from the quarry floor to the underlying water table (s3.2.1.2).

- Based on the Applicant bedrock water level monitoring, the only areas of the proposed pit floor where infiltration (percolation) can occur in Phase 1 and Phase 3 areas is in a limited area of quarry floor north of M4 (Fig 1.6).

- All other pit floor / top of bedrock areas will be underwater especially in the spring of the year and will prevent early season start-up of operations (Fig 2.2).

- Even at M4 water levels in the spring may approach or even exceed 348 m asl (s3.2.1.1). Wet season water levels at W10 to the southeast of the proposed quarry are estimated at about 350 m asl (s3.2.2). The Applicant did not observe four season water levels in the W1 or W10 area so wet season water levels are unknown.

- The area north of M4 is the logical location for a quarry floor recharge sump (Fig 1.6). The Applicant has further complicated usage of the area north of M4 as a quarry sump through establishing his wash and silt ponds in this area.

- Notwithstanding the Applicant Hydrogeologist's frequent statements that drawdowns will be gradually established, the Applicant's Operational Site Plan imposes maximum water table drawdowns in the north and west area of the quarry during overburden and weathered surface rock extraction prior to even initiating Phase 1 dolostone extraction (Fig 3.1).

7.3 Distorted Bedrock Water Level Contours

- The bedrock water level contours as presented in the Applicant's Fig 3.7 September 2012 Hydrogeology Report are based on mixed wet and dry season contours (Fig 2.2). The Bedrock Water Level Contours are unduly influenced by the selected November 11, 2011 dry season static water levels at W1 (346.05 m asl) and at downgradient W16 (345.67 m asl) near Tributary B at Highway 7. M3 to the north is a suspect monitor.

- The Applicant bedrock water level contours are, at best, extrapolated and improvised in the proposed Phase 2 quarry area (Fig 2.2) where it has no confirmed bedrock water level data.

7.4 Post Extraction Ground Water Modelling Drawdown Predictions

- The Applicant's groundwater model calibration has been influenced by these improvised distorted bedrock water level contours (s2.2.1). **The Applicant has refused to provide us with its calibration data input to its groundwater model for audit.**

- The Applicant's groundwater modelling in the proposed Phase 2 extraction area is unsupported by bedrock groundwater level monitoring (s2.2.2). The modelling calibration is therefore suspect.

- The Applicant advised in response to the Hunter August 5, 2014 'Query No. 88' that maximum water level decline is 2.45 m at the northern edge of the proposed quarry with a rise of 2.81 m at the southern edge. The March 19, 2015 Site Plans specify the final west pond level at 348.6 m asl and the east pond at 348.4 m asl. These levels are suspect due to the suspect groundwater modelling calibration.

- Furthermore, these drawdown predictions are based on the Applicant's post extraction groundwater model and do not consider the initial operational extraction conditions in Phase 1 and 3 (Fig 1.6 and Fig 3.1).

- These groundwater model derived final post extraction pond levels and drawdowns are presented as precise numbers. It is inconceivable that these pond levels do not have seasonal and estimate variability.

- The Applicant has also predicted that there will be a maximum water level change (drawdown) of 1.6 m at the nearest private well (Burnside, October 6, 2014 letter, pg 1 and 11, Sec 8.1).

- Based on the Applicant's actual monitoring and specified pit operational floor, the required operational seasonal drawdowns vary from 2 to more than 5 m on the westerly, northerly and easterly boundaries of the proposed quarry (Fig 3.1, 3.2 and 3.3). These operational drawdowns are significantly greater than the post extraction drawdowns of 2.45 m predicted by the Applicant.

- Review of the Applicant's operation pit floor / top of bedrock assumptions together with the Applicant's groundwater monitoring data indicates that these operational drawdowns are underestimated by a factor of 2x or more, especially in the northwest (M13D) and northeast (TP8) corners of the proposed quarry.

- For the above reasons and for purposes of this Peer Review, I have applied an expedient 2x factor of safety to the predicted drawdown estimates outside the proposed quarry site.

- The Applicant's suspect groundwater model needs to be re-run and re-calibrated to both local wet and dry season water levels based on a more inclusive bedrock water level monitoring network in the Phase 2 area of the proposed quarry.

- The Applicant's water well ground elevation also need to be adjusted to GRCA (2011) contour elevation data in support of the model calibration.

- **It is critical that the bedrock water level contours are accurately modelled as errors in these estimates may have significant impacts on the Applicant's predictions of operational and final quarry lake levels and impacts on nearby domestic water wells, springs and wetlands.**

7.5 Requirement for Phase 1 Dewatering Not Addressed

- **Perhaps most significant, the Applicant has not considered how the Phase 1 area will be dewatered and water tables lowered below the Phase 1 and Processing Area Site Plan operational floor as specified at 349 m asl on the Site Plans and in its Blasting and Noise Reports (Fig 2.2 and Fig 3.1).** Water levels will need to be lowered to about 348 m asl in late April to permit top of bedrock dry staging for drilling, blasting and excavation operations.

- Lowering water tables in the Phase 1 areas will require passive dewatering through drainage to surface recharge sumps at the M4 Phase 3 area and/or alternatively pumping to Tributary B with discharge on the waxing and waning spring flood contrary to the March 19, 2015 Site Plan notes.

- In some years water table levels at M4 are at 348 m asl early in the operational season, passive dewatering to support operations will not be possible (Fig 3.1 and 4.1).

7.6 Compliance Permits to Take Water and to Discharge Effluent Required

- Increased spring seasonal recharge in M4 area by passive dewatering (No MOECC Compliance Permit to Take Water and Discharge Effluent required) may reduce water available for dry season recharge and base flow maintenance in Brydson Creek. Direct pumping to Tributary B (MOECC Compliance Permit to Take Water and Discharge Effluent required) to lower water tables to permit spring operation in Phase 1 area will also reduce water available for subsequent dry season base flow maintenance in Brydson Creek.

- Pit floor recharge in the M4 Phase 3 area is further complicated by the Applicant location of Operational Wash and Silt Ponds in the M4 area (Fig 1.8).

- **The Applicant, based on its proposed Site Plan Design, will find it necessary to obtain MOECC Compliance Permits to Take Water for Dewatering and for Discharge of Effluent to Tributary B and Brydson Creek in contradiction to the proposed Site Plan notes and to various undertakings to the agencies.**

7.7 Phase 2 Area Investigations and Monitoring Deficiencies

- The Applicant has a deficiency of base of overburden / top of bedrock observations, no bedrock groundwater level monitoring and limited overburden water level monitoring in Phase 2 area. There is no technical support for the top of bedrock dry operating pit and quarry floor at 354 m asl as specified on the Site Plan (Fig 1.7).

- For my analysis I have assumed the Pit floor in the Phase 2 area at a more realistic 351 m asl. A lower operating dry staging platform offers greater acoustic protection for neighbours (Fig 3.2).

7.8 Additional New Monitor Wells

- Sec 6.1 of this Review contains a summary of new multi-level and open hole Site and Sentry Monitor Wells recommended. A number of these wells are required to define the Phase 2 Site Plan operational parameters prior to Township Zoning and Aggregate Licence Approval (Fig 2.1). Others are required to replace existing non-functional wells and wells which will be destroyed by extraction.

- All new monitor wells (Fig 2.1) must be installed and monitored for a minimum of four seasons prior to initiation of overburden extraction and passive or active water table lowering.

7.9 Unsuitability of Guelph Limestone Quarry as a Valid Analogue for Hidden Quarry

- The Applicant's estimated groundwater inflow at the proposed Hidden Quarry is only about 10% of the pumped groundwater discharge rate at Guelph Limestone quarry at the time of the Applicant's wet season water quality sampling (s2.5). Therefore the water quality dilution factor is much higher (10x) at Guelph Limestone Quarry.

- **The Applicant's use of a volumetric comparison for water quality dilution and the use of the Guelph Limestone Quarry as a direct analogue without adjustment of water quality sample results is not valid. Furthermore, the Applicant's water quality sampling is seasonally biased towards optimal results (s2.5).**

7.10 Adaptive Management Triggers

- S4.0 of this report contains a detailed review of desirable Adaptive Management Trigger including Early Warning (Amber Alert) and Stop Work (Red Alert).

- Amber Alerts provide early warning that operational parameters are trending outside of a reasonable range and an immediate Applicant response is required. Red Alert indicates that stoppage of quarry extraction operations is necessary until the issue is corrected through mitigation or alternatively until the Quarry operator proves other factors are primary determinants.

- Monitoring will be increased to weekly when Amber Alerts are in effect. Red Alerts are a signal for immediate stop work action, not just for increased monitoring as often contemplated by the Applicant (December 9, 2014).

- Amber and Red Alerts will be reported immediately to the agencies, to the affected citizens and to the Concerned Residence Coalition.

7.10.1 Water Levels

- Additional New or revised Amber and Red Alerts have been proposed as appropriate for water levels (s4.1) . Wherever there is adequate water level monitoring, Alerts have been constructed as a seasonal hydrograph to provide advance warning of impending low or high water levels.

- It has not been possible to set water level Amber and Red Alerts in the proposed Phase 2 quarry area due to the absence of baseline water level monitoring data.

7.10.2 Water Quality

- Yellow and Red Amber Alerts have been recommended for selected Provincial Water Quality Objectives (1999), Ontario Drinking Water Standards (2006) and on ambient local conditions in s4.2 of this report.

- I do not agree with the Applicant's assumption that it can monopolize the full residual Reasonable Use of the proposed Hidden Quarry aquifers, i.e. the ODWS (2006) or above the 95th Percentile (January 14, 2014 Applicant Letter pg 16). There may be other adverse upgradient water quality trends and downgradient home owner site conditions that adversely affect the local source drinking water aquifer environment.

- Based on the Applicant's water quality sampling history, the Amber Alert value for Nitrate-N on the downgradient side of the quarry is recommended at 3.5 mg/L and Red Alert at 5 mg/L (s4.2.11).

- Total Dissolved Solids (TDS) is a measure of the palatability of drinking water. Based on the Applicant's water sampling program, the TDS Amber Alert is recommended at 450 mg/L and Red Alert 475 mg/L (s4.2.5).

- Turbidity Amber Alerts are recommended at 3.0 NTU and Red Alerts at 4.0 NTU (s4.2.6).

- Official Plan General Policies for Wellhead Protection often include a 100 m pathogen protective zone around each wellhead. The Applicant should exercise appropriate cautions in this zone.

- Microbiological parameters E. Coli and Total Coliform should be non-detectable at monitoring wells (s4.2.14).

- Alerts for other significant Water Quality parameters are included in Sec 4.2 of this Peer Review.

7.11 Replacement of Private Wells and Springs due to Quarry Interference

- I do not agree with the Applicant's statement in its January 8, 2015 Memorandum:

  'However there is no indication that any private well is susceptible to loss / reduction of water supply as a result of the quarry development.'

- s5.0 of this Review provides a summary of the nine (9) private well replacements (4 upgradient and 5 downgradient) recommended due to potential quarry water level and quality interference. These new wells should be screened in the M15-2 equivalent aquifer zone. Well construction is to be compliant with O.Reg 903 standards.

- There may also be other wells not adequately surveyed as to pumping levels and/or dug wells beyond the Applicant's arbitrary 500 m distance where groundwater interference may occur.

- After the application of a 'factor of safety' of 2, to allow for distortions in the Applicant's Model calibration, the drawdown at Allan Springs and at the De Grandis Ponds (and dug well) is estimated to approach 1 m. These drawdowns may be anticipated to adversely stress flows in Tributary A and B, Allen Wetland water levels, pond water levels at both the De Grandis and Allen Farms and water well levels on the De Grandis Farm.

- A dry season drawdown of only 40 cm in the De Grandis dug well will result in a dry well (s5.1.3).

- The impact of site dewatering on the Brydson Creek and the Allen wetlands has not been addressed by the Applicant Site Plans.

- The Applicant has not proposed any contingency measures for loss of spring flow to the De Grandis and Allen Ponds and Wetlands and loss of well water for watering of the De Grandis 80 cow and calf herd and other livestock.

7.12 Brook Trout Spawning

Active Brook Trout spawning beds were identified by Dr. Karl Schiefer during an aquatic ecosystem and fish survey of the Brydson Creek. The Creek headwater is located within 225 m of the licence boundary, 350 m of the overburden extraction limits and 425 m of the Site Plan bedrock extraction limits.

> *'.......spawning beds within a 300 m radius surrounding the site may be subjected to vibrations in excess of the DFO limit of 13 mm/s. In the event that active spawning beds are identified within 400 m of any planned quarry blast, vibration monitoring will be required at the shoreline adjacent to the spring area, or closer to the blast, in order to ensure compliance with DFO limits for ground vibration.'* (from the September 5, 2014 Blast Impact Analysis Update Report)

Potential extraction within the receptor R16 165 m setback limits as permitted in the March 19, 2015 Site Plans, will encroach on the 400 m quarry blast buffer distance and require ground vibration monitoring adjacent to Brydson Creek headwater. Extraction within 165 m of Receptors should not be permitted without a Site Plan Amendment (s1.5). The Site Plans should be amended to this effect.

8.0 RECOMMENDATIONS

I have concluded and recommend that the corresponding Township of Guelph / Eramosa Zoning By-law Amendment and the Ministry of Natural Resources and Forestry Aggregate

Resources Act Site Plans should not be approved until the Applicant resolves the outstanding conflicts between the component technical studies and Site Plans, installs additional perimeter monitoring in the proposed Phase 2 quarry area, observes four season water levels in these monitors, updates the Groundwater Model predictions, updates the wetland ecological assessments to conform to the updated hydrogeological work, and updates the deficient March 19, 2015 Site Plan versions.

The independent Applicant Blasting, Noise, Groundwater and Ecological component reports need to be harmonized with and support the ultimate regulatory Site Plan Instrument. The Applicant must resolve how dewatering will be accomplished to lower the operational water tables in the Phase 1 area to support the proposed Site Plan Operational Plan without active dewatering . The Site Plans must capture the Applicant commitments in the document stack.

All of the above information is required to complete the Site Plans as a clear, efficient, enforceable regulatory instrument with coordinated supportive technical documentation.

Yours truly,

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

cc: S. De Grandis
Concerned Residents Coalition (CRC)

Enclosures:
- Table A Annotation
- Table A (3 pages): Water Quality at Proposed Quarry Site and Existing Guelph Limestone Quarry
- Site Photos A to H
- Bibliography
- Figure Annotations
- Figures:
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  - 1.1B Applicant's Fig 8, Watersheds of Tributaries B and C
  - 1.2 Applicant Blast Impact Analysis

1.3	Applicant Noise Impact Study
1.4A&B	Applicant Noise Berm Elevations
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1.7	Applicant Site Plan - Phase 2
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2.1	Monitoring Locations
2.2	Applicant's Fig 3.17, Mixed Wet and Dry Season Bedrock Water Level Contours
2.3A&B	Applicant Maximum Predicted Water Level and MOE Water Well Static Levels
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2.5	Guelph Limestone Quarry Water Discharge from Sump 3, 4, 5, 2001 to Jan 2014
3.1	Phase 1 and Processing Plant Area Monitoring Station Hydrographs, May to Oct 2014
3.2	Phase 2 Area Monitoring Station Hydrographs, May to Oct 2014
3.3	Phase 3 Area Monitoring Station Hydrographs, May to Oct 2014
4.1	Adaptive Management Trigger Levels, M4 Hydrographs 2007, 2008 and 2014
4.2	Adaptive Management Trigger Levels, M2 Hydrographs 2007, 2008 and 2014
4.3	Adaptive Management Trigger Levels, M13S/D and SW6 Hydrographs 2011 and 2014
4.4	Adaptive Management Trigger Levels, M1-D Hydrographs 2007, 2008 and 2014

Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
May 15, 2015

TABLE A and Annotations: Water Quality at Proposed Hidden Quarry Site and Existing Guelph Limestone Quarry

Proposed Hidden Quarry
Hunter Peer Review

Table A Annotations

Table A provides a summary of Key Water Quality parameters as contained in the Applicant's documents. The Table is divided into:

A. Groundwater Monitors within the proposed Hidden Quarry site.

B. Private Wells

C. Guelph Historic Quarry Pond

D. Surface Water

Not all the November 14, 2014 private well water quality survey data was made available for this peer review. However, the data included in Table A appears to be representative of ambient site conditions.

The water quality in Table A is compared to Provincial Water Quality Objectives (1999), Ontario Drinking Water Standards (2006) and to local ambient values (Hardness). Exceedances are shown with grey shading. Bold values are considered key comparative water quality parameters.

The Guelph Limestone Quarry sampling was undertaken in late winter (February 15) and early spring (April 28) when groundwater discharge was about 10,000 m^3/day (10x) compared to the Applicant's estimated groundwater throughflow at the proposed Hidden Quarry at 1,000 m^3/day (10%). Therefore, parameters at Guelph Limestone Quarries are significantly diluted and are not valid for direct comparison to Hidden Quarry. Dry season water quality sampling (August / September) would have indicated higher water quality parameter concentrations at the Guelph Limestone Quarry.

Table A
Water Quality at Proposed Hidden Quarry Site and Existing Guelph Limestone Quarry

Sample Location	Date	Sodium	Hardness ($CaCO_3$)	TDS	Zinc	Iron	Manganese	Un-ionized Ammonia	NH3-N	NO2-N	NO3-N	TKN	Total Nitrogen	Calculated Organic Nitrogen	Total Organic Nitrogen	Dissolved Organic Carbon
Criteria					(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
PWQO (1999)					**0.03**											
ODWS (2006)		**20**				**0.3**	**0.05**			**1.0**	**10.0**			**0.15**	**0.15**	**5.0**
Local			**400**													
A. Groundwater Monitors (On Site)																
M15-4	Nov 11, 2014	**7.7**	390	**430**	**0.059**	ND	ND	-	ND	ND	**2.25**	0.14	**2.4**	0.14	-	1.2
M15-3	Nov 11, 2014	**5.3**	360	**410**	**0.036**	ND	ND	-	ND	ND	**2.33**	0.25	**2.6**	**0.25**	-	1.1
M15-2	Nov 11, 2014	**8.9**	390	**450**	**0.047**	ND	0.0045	-	ND	ND	**1.99**	0.24	**2.2**	**0.24**	-	1.2
M15-1	Nov 11, 2014	**8.8**	**410**	**470**	**0.043**	ND	ND	-	ND	ND	**2.01**	0.15	**2.2**	**0.15**	-	1.1
M4	Nov 11, 2014	**8.3**	390	**450**	**0.048**	ND	ND	-	ND	ND	**2.48**	0.18	**2.7**	**0.18**	-	0.98
M3	Nov 11, 2014	**8.5**	340	**360**	**0.038**	ND	ND	-	0.16	ND	**1.12**	0.26	**1.5**	0.1	-	1.3
M2	Nov 11, 2014	**7.1**	350	**400**	**0.043**	ND	ND	-	0.079	ND	**3.99**	0.26	**4.3**	**0.18**	-	1.4
M13D	Nov 11, 2014	**14**	350	**400**	**0.098**	ND	ND	-	0.082	ND	**3.55**	ND	**3.6**	-	-	1.2
M1D	Nov 11, 2014	**24**	**510**	**610**	**0.65**	**ND**	**0.058**	-	0.064	ND	**ND**	0.37	**0.4**	**0.31**	-	2.9
W1	Nov 3, 2014	**5.3**	**510**	**600**	0.018	**0.99**	0.033	-	ND	ND	**ND**	ND	**ND**	0.0	-	0.61
M15-4	May 5, 2014	**5.4**	340	**370**	**0.034**	ND	ND	-	ND	ND	**1.96**	0.19	**2.15**	**0.19**	-	0.85
M15-3	May 5, 2014	**2.3**	340	**450**	0.017	ND	0.0080	-	ND	ND	**3.17**	0.9	**4.07**	**0.9**	-	2.1
M15-2	May 5, 2014	**8.3**	370	**440**	**0.040**	ND	0.0024	-	ND	ND	**2.19**	0.28	**2.47**	**0.28**	-	0.85
M15-1	May 5, 2014	**8.0**	390	**470**	0.028	ND	ND	-	ND	ND	**1.62**	0.22	**1.84**	**0.22**	-	0.83
M3	Nov 20, 2013	-	-	-	-	-	-	-	ND	ND	**5.2**	0.77	**5.97**	**0.77**	-	-
M2	Nov 20, 2013	-	-	-	-	-	-	-	ND	ND	**4.6**	1.3	**5.9**	**1.3**	-	-
M13D	Nov 20, 2013	-	-	-	-	-	-	-	ND	ND	**0.9**	0.38	**1.28**	**0.38**	-	-
M15	May 24, 2013	**6.9**	390	439	0.062	ND	0.0022	-	0.060	ND	**2.0**	0.20	**2.3**	0.14	-	1.0

Sample Location	Date	Sodium	Hardness ($CaCO_3$)	TDS	Zinc	Iron	Manganese	Un-ionized Ammonia	NH3-N	NO2-N	NO3-N	TKN	Total Nitrogen	Calculated Organic Nitrogen	Total Organic Nitrogen	Dissolved Organic Carbon
Criteria					(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
PWQO (1999)					0.03											
ODWS (2006)		20				0.3	0.05			1.0	10.0			0.15	0.15	5.0
Local			400													
W1	May 18, 2012	5.9	500	613	0.020	0.14	0.02	-	ND	ND	0.13	-	0.13+	-	-	-
M2	Nov 21, 1996	8.0	-	-	0.23	0.68	0.05	-	-	ND	6.8	-	6.8 +	-	-	-
M3	Nov 21, 1996	6.4	-	-	0.06	ND	ND	-	-	ND	5.3	-	5.3 +	-	-	-
M4	Nov 21, 1996	6.6	-	-	0.14	0.14	0.01	-	-	ND	2.8	-	2.8 +	-	-	-
M5	Nov 21, 1996	50	-	-	2.9	2.1	0.11	-	-	ND	1.6	-	1.6 +	-	-	-
TP1	Nov 21, 1996	18	-	-	0.36	0.43	0.81	-	-	ND	0.94	-	0.94 +	-	-	-
M1	Nov 21, 1996	5.6	-	-	0.07	0.22	0.03	-	-	ND	0.71	-	0.71 +	-	-	-
B. Private Wells																
W31	Dec 12, 2014	9.16	381	444	0.102	<0.01	<0.002	-	<0.02	<0.05	9.63	<0.10	9.7	0.0	-	1.2
W5	Nov 5, 2014	9.1	340	380	0.075	ND	ND	-	ND	ND	4.66	0.11	4.8	0.11	-	0.85
W4	Nov 4, 2014	8.8	360	390	0.12	ND	0.0064	-	ND	ND	2.90	ND	2.9	0.0	-	0.85
W16	Nov 3, 2014	67	380	540	0.034	ND	ND	-	ND	ND	1.44	0.12	1.56	0.12	-	1.4
W19	Nov 3, 2014	9.6	380	420	0.051	ND	ND	-	ND	ND	1.98	ND	2.0	0.0	-	0.72
W31	May 23, 2012	11	370	420	0.26	ND	0.012	-	ND	ND	10.4	-	10.4 +	-	-	1.1
C. Guelph Limestone Quarry Pond	Feb 15, 2012	80	-	-	0.057	ND	0.026	0.005	0.39	0.05	1.2	0.7	2.3	0.31	-	-
S1 Before	Apr 28, 2014	-	-	-	-	-	-	-	ND	ND	0.47	0.31	0.8	0.31	-	-
S2 +12 min	Apr 28, 2014	-	-	-	-	-	-	-	ND	ND	0.46	0.43	0.9	0.43	-	-
S3 + 78 min	Apr 28, 2014	-	-	-	-	-	-	-	ND	ND	0.44	0.43	0.9	0.43	-	-
S4 + 903 min	Apr 28, 2014	-	-	-	-	-	-	-	ND	ND	0.47	0.29	0.8	0.29	-	-

Sample Location	Date	Sodium	Hardness (CaCO$_3$)	TDS	Zinc	Iron	Manganese	Un-ionized Ammonia	NH3-N	NO2-N	NO3-N	TKN	Total Nitrogen	Calculated Organic Nitrogen	Total Organic Nitrogen	Dissolved Organic Carbon
Criteria					(mg/L)	(mg/L)	(mg/L)		(mg/L)	(mg/L)	(mg/L)	(mg/L	(mg/L)	(mg/L)	(mg/L)	(mg/L)
PWQO (1999)					**0.03**											
ODWS (2006)		**20**				**0.3**	**0.05**			**1.0**	**10.0**			**0.15**	**0.15**	**5.0**
Local			**400**													
D. Surface Water																
RSI / Trib A	Nov 5, 2014	**10.1**	350	**380**	0.028	ND	ND	-	0.058	0.017	**6.02**	0.17	**6.3**	0.11	-	2.2
SW4 / Trib B	Nov 5, 2014	**8.5**	340	**350**	0.022	ND	0.0041	-	ND	ND	**1.05**	0.47	**1.5**	0.47	-	6.5
SW7 / Trib B	Nov 5, 2014	**8.3**	320	**340**	0.046	ND	0.0059	-	ND	ND	**0.80**	0.51	**1.3**	0.51	-	6.9
SW11 / Trib C	Nov 5, 2014	**7.0**	370	**360**	0.018	ND	0.0080	-	ND	ND	**ND**	0.56	**0.56**	0.56	-	9.2
Brydson Spring	Oct 16, 2014	27.3	350	**420**	0.035	ND	0.0033	-	0.064	ND	**2.39**	0.27	**2.7**	0.21	-	1.3
SW 4 / Trib B	Apr 8, 2014	**8.5**	320	-	0.032	ND	0.0066	-	ND	ND	**4.64**	0.54	**5.18**	0.54	0.5	2.3
SW8 / Trib B	Apr 8, 2014	**8.3**	300	-	0.032	ND	0.0031	-	ND	ND	**4.53**	0.43	**4.96**	0.43	0.4	2.4
SW11 / Trib C	Apr 8, 2014	**4.7**	210	-	0.076	ND	0.018	-	0.076	ND	**0.9**	0.62	**1.6**	0.54	0.5	5.2
SW3	Nov 21, 1996	**7.5**	-	-	0.03	ND	ND	-	-	ND	**9.0**	-	**9.0 +**	-	-	
Stream (?)	Nov 21, 1996	**8.0**	-	-	0.05	ND	ND	-	-	ND	**8.2**	-	**8.2 +**	-	-	
Brydson Creek	Nov 21, 1996	**15**	-	-	0.01	0.06	0.02	-	-	ND	**1.8**	-	**1.8 +**	-	-	
SW1	Nov 21, 1996	**11**	-	-	0.01	0.06	ND	-	-	ND	**ND**	-	**0.0 +**	-	-	

Notes: 1. Calculated Organic Nitrogen = TKN – Ammonia
2. W4, W5, W16, W19 and W31 test results from individual well owners.
3. S1 Before Blast;
S2, S3, S4 Minutes after Blast
4. Mid Point of Sand Pack: M15-4 345.3 m asl
M15-3 333.1 m asl
M15-2 324.3 m asl
M15-1 317.8 m asl

Source: Proponent's Appendix E September 2012 Hydrogeological Investigation
Proponent's July 15, 2013 Response Letter to MOE
Proponent's June 10, 2014 Response Letter to Burnside
Proponent Groundwater Quality Testing, Water Quality Results, Nov.17, 2014
Proponent's Dec 9, 2014 Response Letter to Burnside

Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
May 15, 2015

Hidden Quarry Peer Review
ANNOTATED SITE PHOTOS: A to H

Photo A De Grandis IMG_20150107_151654 (Jan.7, 2015)

Photo B De Grandis IMG_20150120_134324_hdr (Jan.20, 2015)

Photo A and B: De Grandis Brydson Creek Tributary B headwater groundwater fed pond with abundant waterfowl, on Jan. 7 and Jan 20, 2015 (Photos by S. De Grandis).

Photo C De Grandis IMG_20150221_123005 (Feb. 21, 2015)

Photo D De Grandis IMG_20150221_122921 (Feb. 21, 2015)

Photo C and D: De Grandis Tributary B groundwater fed pond with open water over emergent spring areas on Feb.21, 2015 after very cold winter weather without thaws. Low 'dry season' water levels (Photos by S. De Grandis).

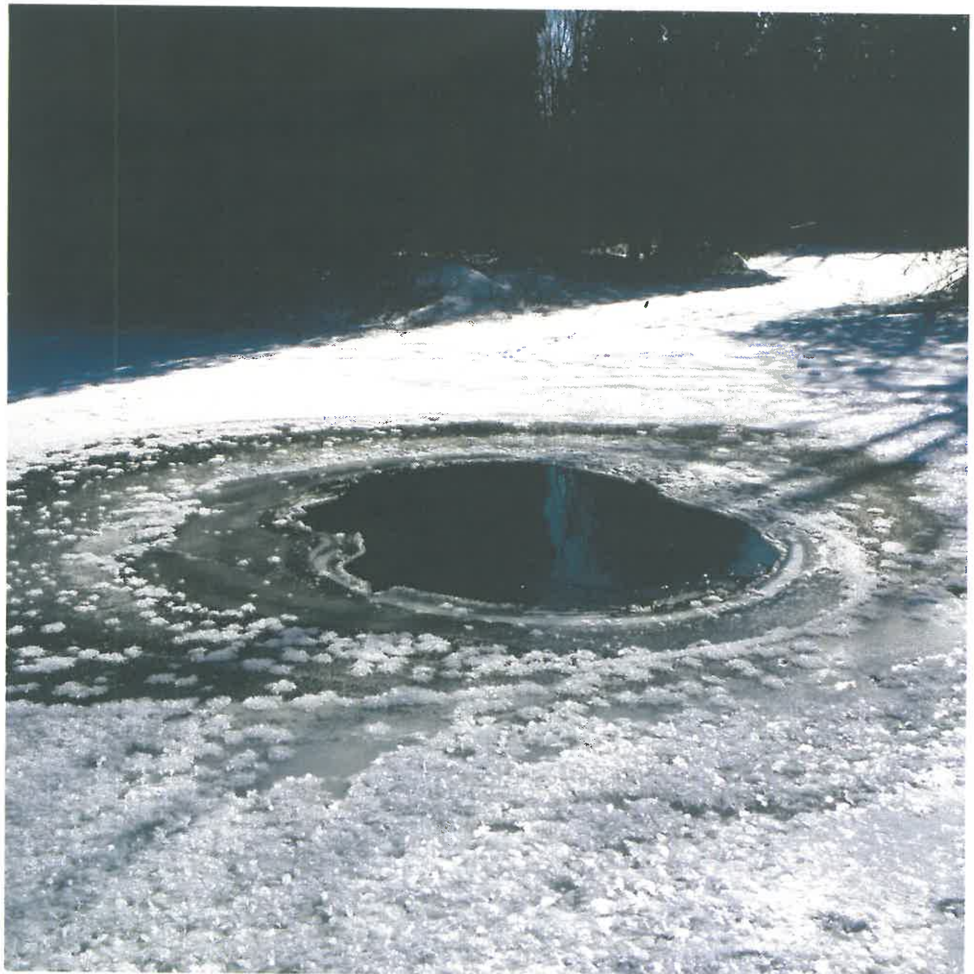

Photo E De Grandis IMG_20150228_103248 (Feb. 28, 2015)

Photo F De Grandis IMG_20150303_101933 (Mar.3, 2015)

Photo E and F: De Grandis Tributary B headwater pond after the severe cold month of February 2015 without thaws ('dry season' low flow conditions). Frozen water vapours from warm springs forms ringlets around poind. Minimal open water over emergent warm springs on Feb 28 and Mar 3, 2015 (Photos by S. De Grandis).

Photo G Hunter IMG 5635 (April 11, 2014)

Photo H Hunter IMG 5633 (April 11, 2014)

Photo G and H: Brydson Creek Weirs.

Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
May 15, 2015

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Ms. Kim Wingrove
Chief Administrative Officer
Township of Guelph/Eramosa
May 15, 2015

Hidden Quarry Peer Review
FIGURES WITH ANNOTATIONS

Proposed Hidden Quarry
Hunter Peer Review

Figure Annotations

Fig 1.1A Various Blasting and other Buffer Zone distances contained in the Applicant documents and Peer Reviews have been superimposed on the Hunter Hidden Quarry base mapping. Domestic well sites included. The spring fed pond at the Brydson Creek headwater is 225 m from the licence limit, 350 m distant from the overburden extraction limit and 425 m from the bedrock extraction limit. Bedrock extraction into the 165 m R16 (W19) receptor setback limit as implied on the Site Plans will reduce the buffer limit from the Brydson Creek headwater.

Fig 1.1B Fig 1.1B illustrates the Tributary B and C surface catchments (watersheds). Tributary A, B and C are intermittent 'losing' streams above Highway 7. Tributary B despite its smaller catchment dominates flow at Highway 7 suggesting the bedrock catchment substantially exceeds the surface catchment.

Fig 1.2 Fig 1.2 shows the direction of extraction (excavation) and Blasting Limit lines as recommended by the Applicant Blasting Study. The Site Plan Note contradicts the Blasting Line Limit (165 m) diagram.

Fig 1.3 Fig 1.3 shows the contradictory directions of extraction (excavation) as recommended by the Applicant Noise Study compared to preceding Fig 1.2.

Fig 1.4A Fig 1.4A shows the contradictory directions of extraction in the Applicant's Noise Study compared to preceding Fig 1.2 and 1.3. Fig 1.4A appears to be the authority for the Site Plan top of acoustical berm elevations.

Fig 1.4B Fig 1.4B shows the contradictory directions of extraction on the superimposed Applicant Site Plans vs the Noise and Blasting Studies as shown on Fig 1.2, 1.3 and 1.4A.

Fig 1.5 Noise reference points and pit floor elevations as utilized by the Applicant to calculate noise impacts at Receptor R3 (W5) have been superimposed on the Hunter Hidden Quarry base mapping. Similar calculations should be provided for nearby receptors R16 (W19) and R12 (W10).

Fig 1.6 The Noise Report recommended establishing the Processing Areas and Internal Haul Roads at 349 m asl (also Fig 1.5). These 349 m asl pit floor elevations are specified in the Phase 1 area but not on the corresponding internal haul road and processing area locations on the Applicant Site Plans.

Wash and silt ponds have been located upgradient of M4 and domestic well W19 (R16). This is the only area of the pit floor where a pit floor sump may be located above the existing wet season water table levels (see also Fig 2.2).

The Site Plan Phase 1 directions of extraction (excavation) are at variance with Fig 1.2, 1.3, 1.4.

Fig 1.7 The north acoustic berm top elevation at 363 m asl is not inconsistent (error) with Fig 1.4A and B.

The Phase 2 directions of extraction (excavation) contradict Fig 1.2 and 1.3.

Fig 1.8 The Phase 3 directions of extraction are not consistent with Fig 1.2, 1.3 and 1.4A.

Processing area and haul road operating Pit Floor have not been specified at 349 m asl as recommended by the Applicant Noise Report (see also Fig 1.5).

Fig 2.1 Fig 2.1 shows the location of recommended new multi-level monitoring wells constructed similar to M15 which will be destroyed by Phase 1 extraction. M16, M19, M20 and M21to M15-2 aquifer are required to support new groundwater model runs prior to aggregate licence approval. M18, M22, M23, M24 and M25 are required well in advance of on-site passive or active water table disturbance. M17 is an optional replacement for deep long term monitor M2. M24 is required to replace Monitor M1-D as an openhole monitor to the proposed quarry floor elevation. M25 provides for monitoring water levels upgradient of the Brydson Creek headwater. See s6.1 for additional information.

Fig 2.2 The Applicant has used mixed May 31, 2011 wet season bedrock water levels for the west part of the proposed quarry and dry season levels (Nov 2011) in the southeast part of the quarry.

The Applicant does not have observed four season bedrock groundwater level data in the entire eastern part of the quarry. M3 is a suspect monitor. The Applicant has inferred the bedrock water level contours in the northeast part of the quarry. These influences compromise its subsequent groundwater model calibration and drawdown predictions, final quarry lake water level prediction and related ecological impact assessments.

Fig 2.3A Furthermore, the drawdowns shown on Fig 2.3A are post-extraction not operational drawdowns. The Applicant's groundwater model predictions are 'flawed' by its inferred model calibration data (Fig 2.2). For purposes of this Peer Review, I have applied a factor of safety of 2x to the Applicants predicted drawdowns north of the proposed quarry, therefore a 0.6 m drawdown is assumed at 1.2 m for impact assessment purposes. The contour 'bulls-eyes' or 'pimples' in the proposed quarry area indicate data anomalies or errors. The Applicant has refused to provide Hunter with its modelling groundwater level datasets for audit. The Model needs to be recalibrated and rerun prior to Site Plan approval.

Fig 2.3B Fig 2.3A is superimposed on Hunter's standard orthophoto base map for the Hidden Quarry site (2.3B). This map shows buffer distances from the proposed quarry licence limit and contains locations of domestic water wells with MOE # and static water levels at the time of well completion. After applying a 2x safety factor, the predicted drawdown at the De Grandis Pond and Springs is about 1 m, at Allen Spring 1.2 m and at W7 about 1.2 m. The drawdown at W5 (Fig 2.3B) is underestimated (see Fig 2.4A and 2.4B).

The above drawdowns are excessive for maintenance of shallow dug wells, wells with shallow pumps, springs and wetlands. The model needs to be recalibrated and rerun.

Fig 2.4A This Figure shows the Applicant's modelled bedrock water level contours and reverse particle tracks showing the predicted flow origins of water to domestic wells. These are post-extraction, not operational drawdowns. At face value the reverse particle tracks show that domestic wells W10, W16, W17, W18 and W19 are within the direct quarry water quality influence zone.

Fig 2.4B The Applicant's (modelled) predicted groundwater contours (Fig 2.4A) are superimposed on the standard Hunter Hidden Quarry base map which contains domestic water wells with MOE #'s and static water levels elevations (m asl). It is noted that at W50 (added by Hunter) a known bedrock well at the front of the De Grandis farm, the Applicant's modelled bedrock water levels plot is about 3.5 m below the static water level when drilled and 3.7 m below the static water level at nearby W32 when completed.

Similarly, the modelled ground water level at the De Grandis dug well is 2.9 m below, the Allen Spring 2.5 m below, W5 about 4 m below, and Brydson Spring 4 m below. The modelled surface at W10 is about 2 m below and at W1 in contrast is similar. This data illustrates that the modelled bedrock groundwater surface is for the most part below the water levels observed at the time of domestic well completion **as referenced to the GRCA 2011 ground elevations**. The model results are again questioned.

Fig 2.5 The Applicant's water quality sampling events at the Guelph Limestone Quarry occurred when discharge (10,000 m^3/day) from the quarry and flow dilution was relatively high at the beginning of the blasting season. Water quality sampling should be undertaken in late summer when quarry groundwater discharge flows are lower and following a continuous period of blasting and extraction history. This water quality sampling is seasonally biassed towards optimal results.

Fig 3.1 The Applicant relied on its groundwater model to predict post-extraction final water levels. The Applicant did not have regard for the groundwater drawdowns required to actually operate the pit / quarry in accordance with its proposed Site Plans. This figure shows the actual operational drawdowns utilizing the Applicant's supplied May to October 2014 groundwater level monitoring as an analogue. Domestic well locations are shown on Fig 1.1 and the Applicant monitor locations on Fig 2.1. The actual drawdowns for the most part, especially during the spring season, significantly exceed the Applicant's post-extraction model estimates.

Drawdown in shallow monitors may not fully develop due to the presence of aquitards or hydraulic barrier influences. M3 is a suspect monitor as demonstrated by the absence of typical seasonal water level variations.

Fig 3.2 The Applicant does not have any confirmed bedrock groundwater levels in the Phase 2 Operating Area. Using spring seasonal water levels monitored at TP8 adjacent to the Allen Wetland, the maximum drawdown assuming absence of underlying aquitards for May 5, 2014 would be 7.1 m and at TP9 3.9 m compared to the Applicant's predicted Final East Pond Water Level at 348.4 m asl.

Nearby Monitor M3 is a suspect monitor as demonstrated by the absence of the typical seasonal water level variations observed at the other monitors.

Fig 3.3 Monitor M4 is the only area in the Quarry where the water tables are known to be below the Applicants proposed Phase 1 and 3 pit operational floor in most spring seasons. Operational drawdowns at M1D based on 2014 water levels are about 4.2 m in the spring of the year.

The Applicant has not provided four season monitoring for W1. W10 when completed in July 1974 had an observed static water level of 348.2 m asl indicating spring wet season levels of 350 m asl or greater.

The drawdowns shown for shallow monitors may not fully develop due to the presence of aquitard layers.

Fig 4.1 These hydrographs have been constructed based on 2014 routine static water levels at M4 and selection of the extreme dry years of 2007 and 2008 in the monitoring record for comparison. A geodetic elevation is required for the Brydson Creek headwater pond.

In the event of passive or active dewatering of the pit / quarry floor during the higher water level spring season, excess wet season dewatering may deplete subsequent dry season water levels important for maintenance of Brydson Creek base flows. Therefore, seasonal low level adaptive management Amber and Red Alerts have been recommended. The Applicant has not proposed any Alert levels for M4.

Fig 4.2 The M2 Adaptive Management Trigger levels are based on the Applicant's Site Plan proposed pit floor and operating water level drawdown requirements. The Amber Alert drawdown level in 2014 decreased from 4.0 m in May to 2.4 m in August.

Fig 4.3 The Applicant proposed Amber and Red Alerts for Monitor Well 13D are plotted on this hydrograph. These alerts show a 4.1 m drawdown at nearby W5 based on static water levels at the time of W5 completion.

Fig 4.4 Actual 2014 year seasonal drawdowns to the Applicant predicted (suspect) final west pond water levels are estimated at 4 m in May and at 3.3 m in August for M1D. The bottom of the screen at M1D is at about 348 m asl. This monitor will have to be replaced with a deeper screened base at about 327 m asl to ensure an appropriate operating range is available for Alert monitoring.

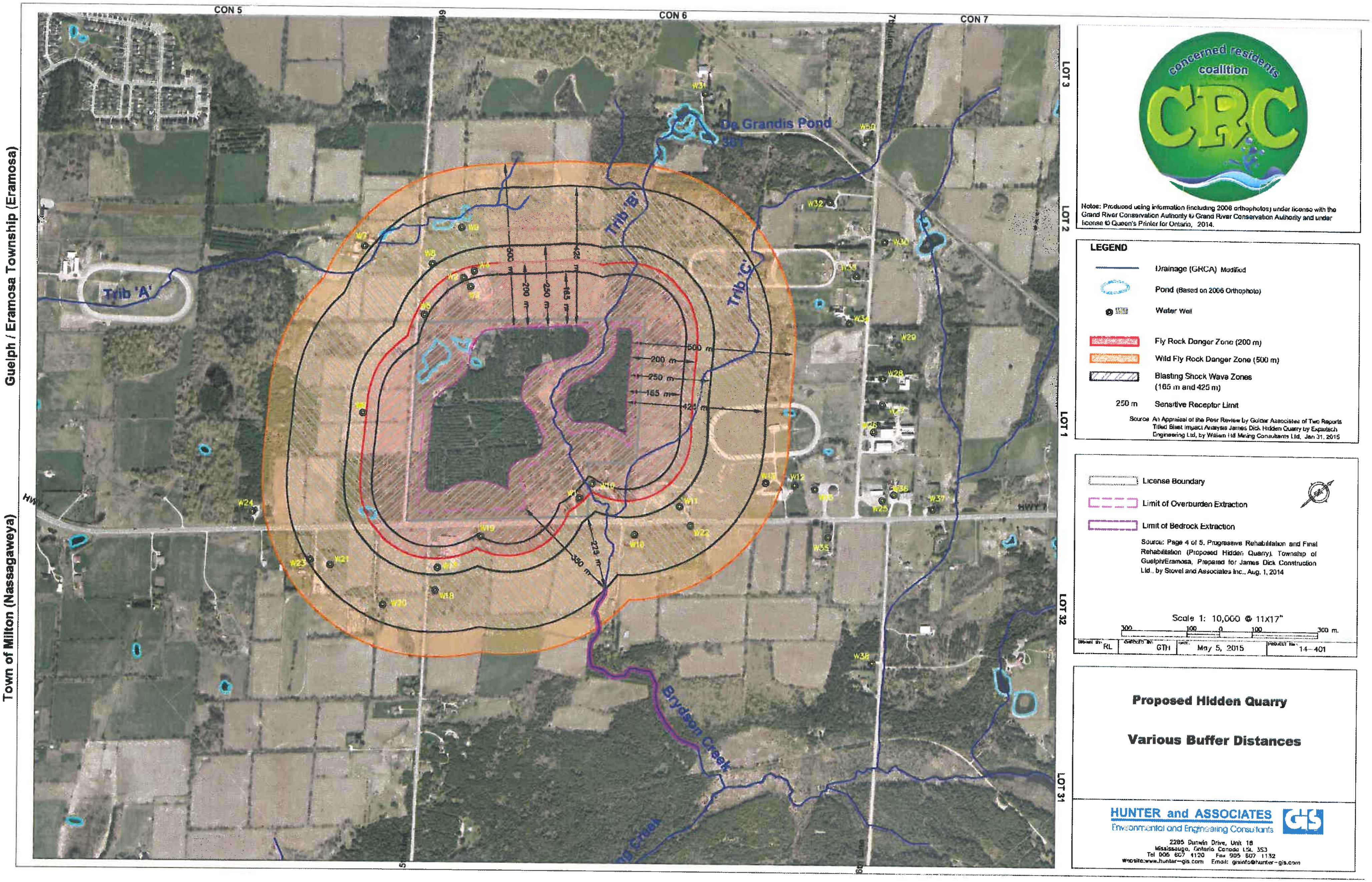
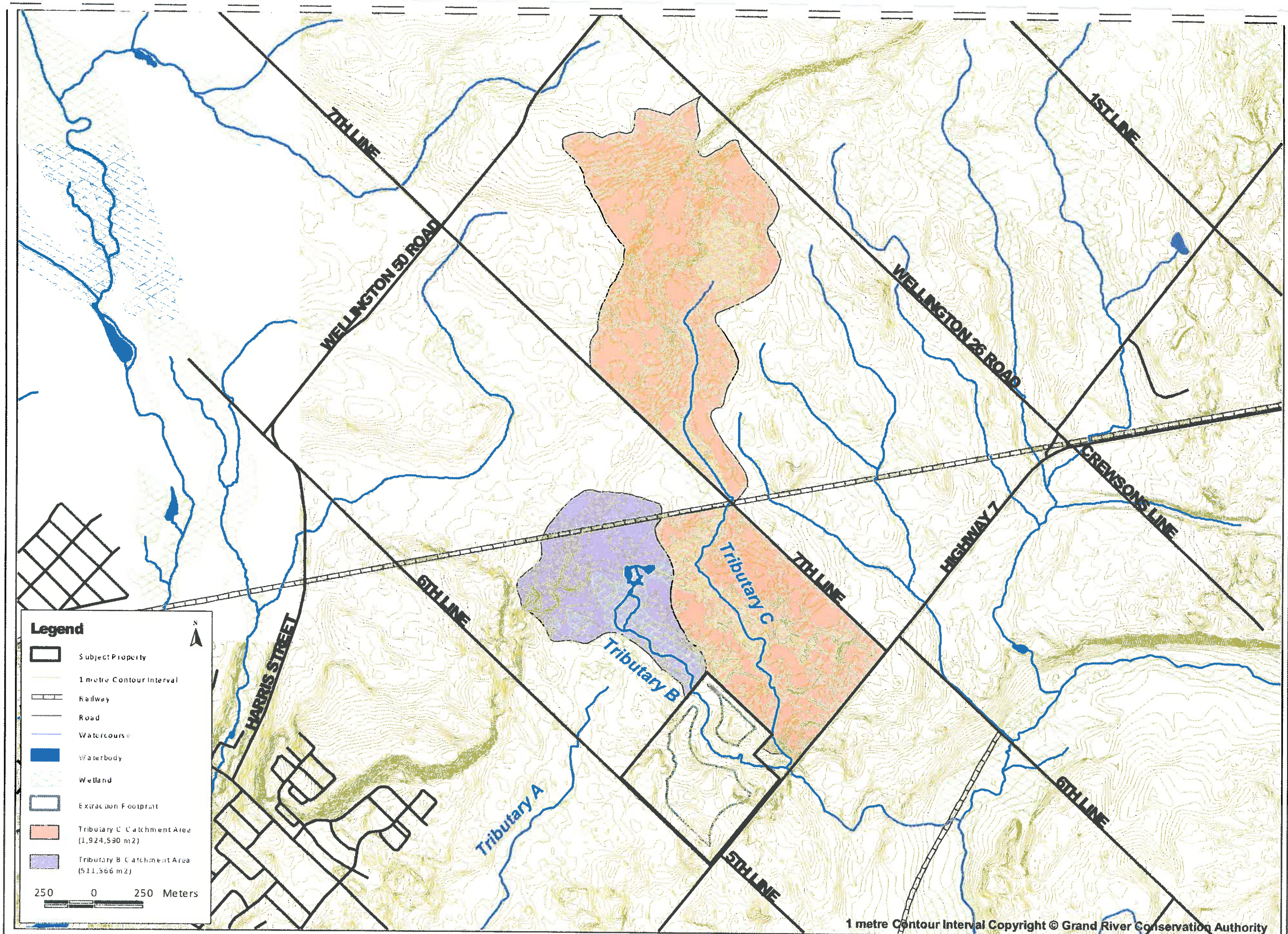


Fig 1.1A

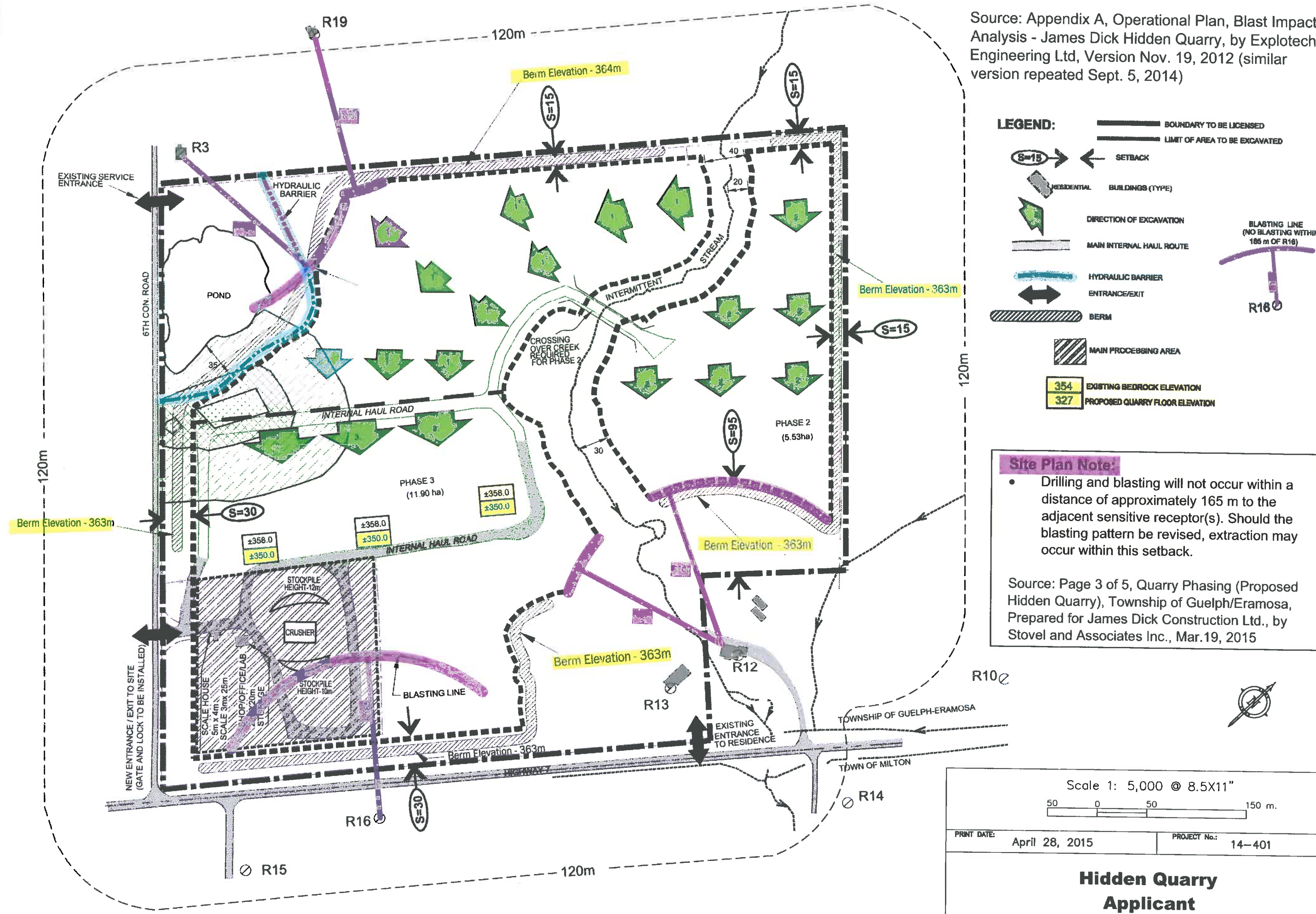
Brydson Creek permanent groundwater upwelling and springs.



Harden Environmental Services Ltd.	Project No: 9506	Hydrogeologic Impact Assessment Proposed Aggregate Extraction	Figure 8: Watersheds of Tributaries B and C
	Date: Apr 2014	Part of Lot 1, Concession 6 Township of Guelph/Eramosa, County of Wellington	
	Drawn By: AR		

Fig 1.1B

Source: Harden Environmental Services Ltd Response Letter to Burnside Review, June 10, 2014



Source: Appendix A, Operational Plan, Blast Impact Analysis - James Dick Hidden Quarry, by Explotech Engineering Ltd, Version Nov. 19, 2012 (similar version repeated Sept. 5, 2014)

Site Plan Note:

- 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.

Source: Page 3 of 5, Quarry Phasing (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar.19, 2015

Scale 1: 5,000 @ 8.5X11"

50 0 50 150 m.

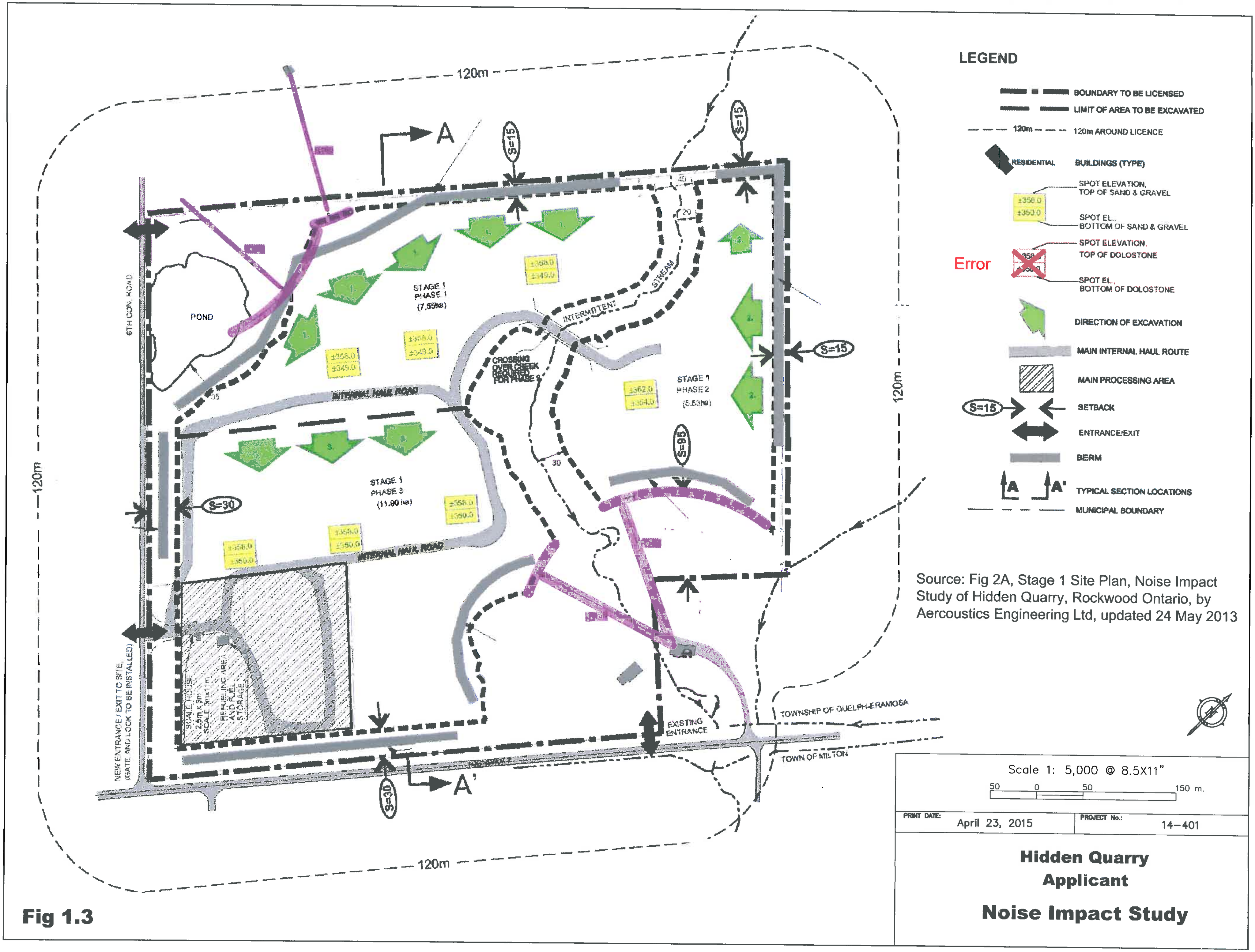
PRINT DATE: April 28, 2015

PROJECT No.: 14–401

Hidden Quarry Applicant

Blast Impact Analysis

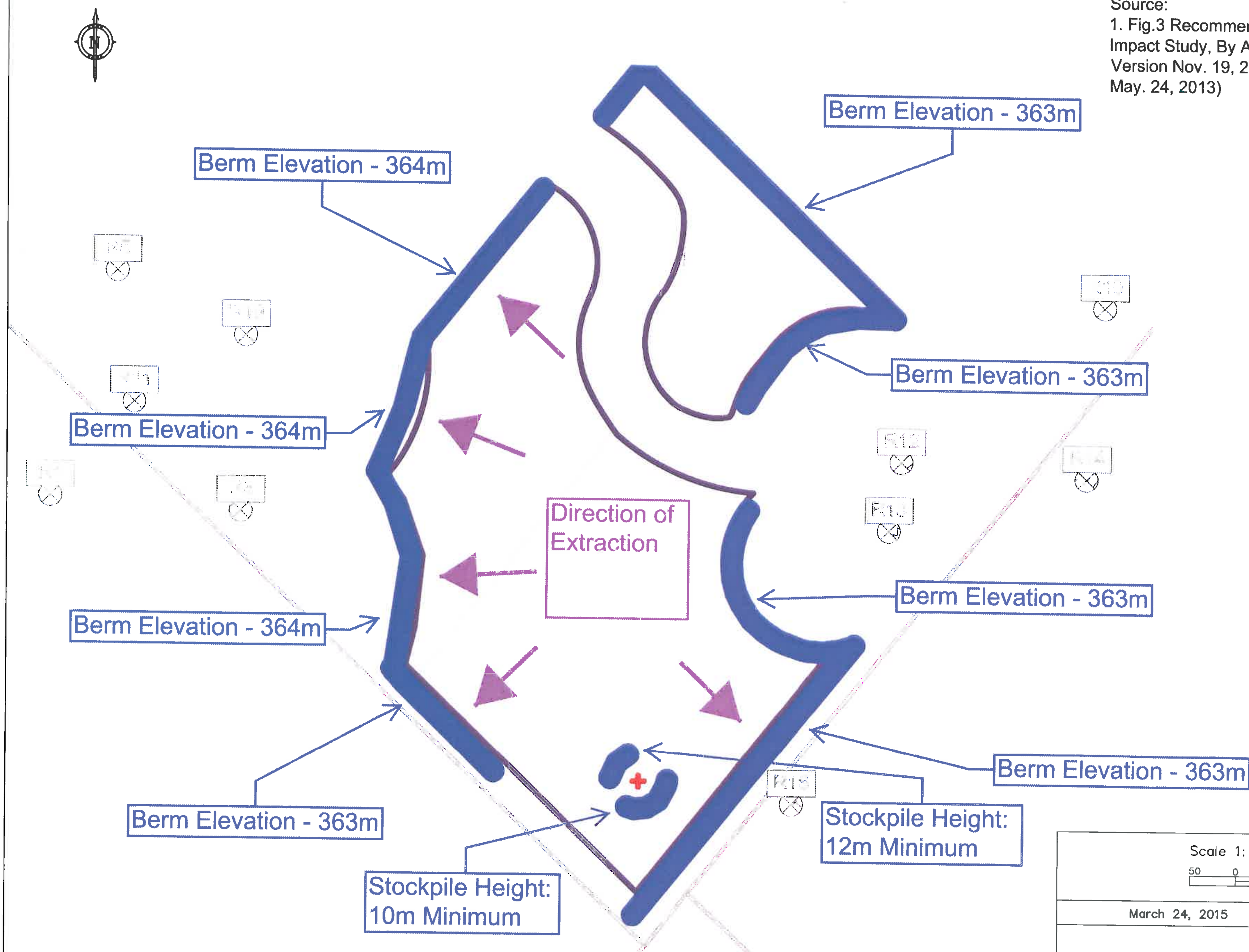
Fig 1.2



Source: Fig 2A, Stage 1 Site Plan, Noise Impact Study of Hidden Quarry, Rockwood Ontario, by Aercoustics Engineering Ltd, updated 24 May 2013

Fig 1.3

Source:
1. Fig.3 Recommended Noise Controls,Noise Impact Study, By Aercoustics Engineering Ltd., Version Nov. 19, 2012 (similar version repeated May. 24, 2013)



Scale 1: 6,000 @ 8.5X11"

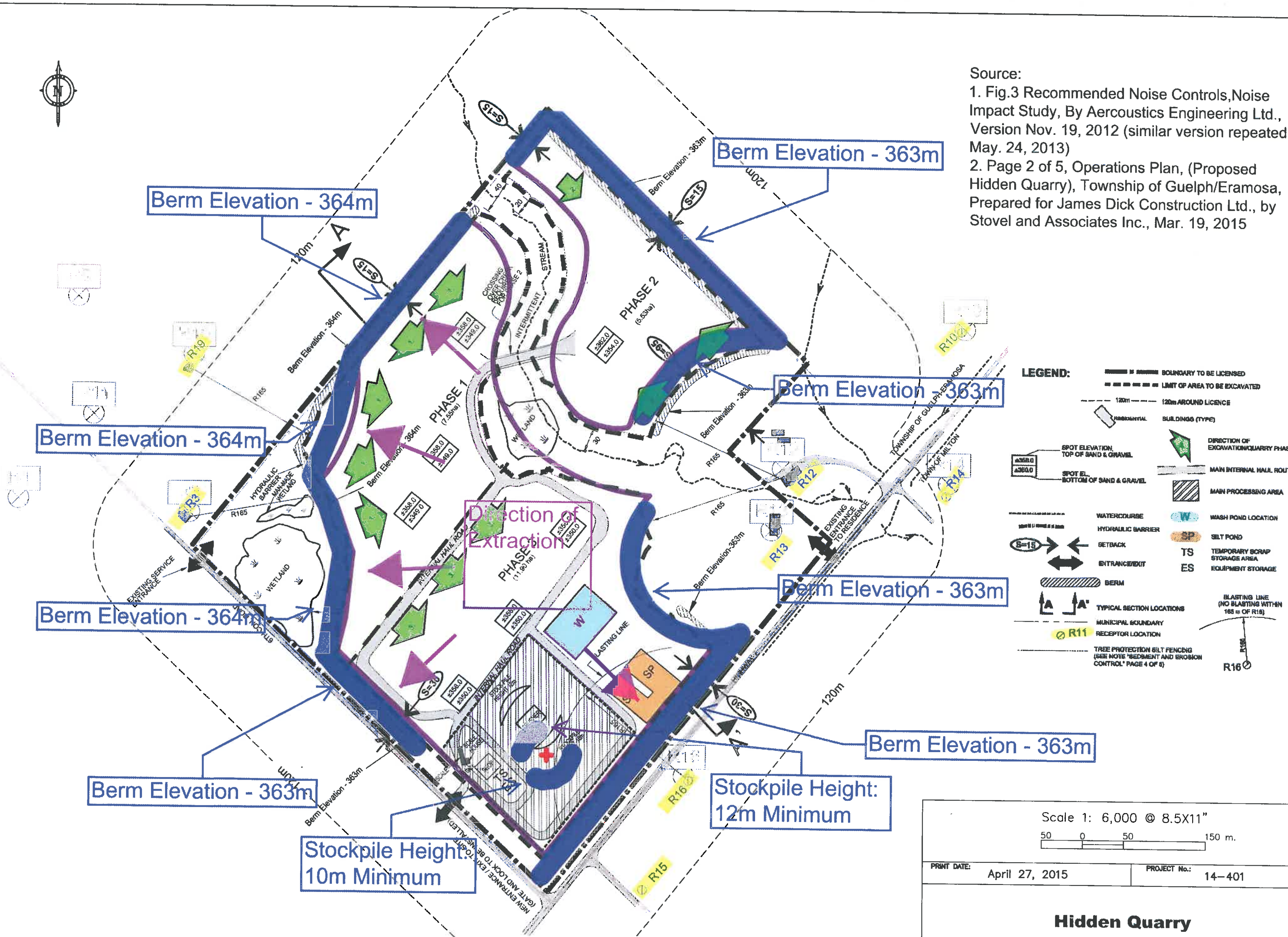
50 0 50 150 m.

March 24, 2015	PROJECT No.: 14–401

Hidden Quarry
Applicant
Noise Berm Elevations

Fig 1.4A

Source:
1. Fig.3 Recommended Noise Controls,Noise Impact Study, By Aercoustics Engineering Ltd., Version Nov. 19, 2012 (similar version repeated May. 24, 2013)
2. Page 2 of 5, Operations Plan, (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar. 19, 2015

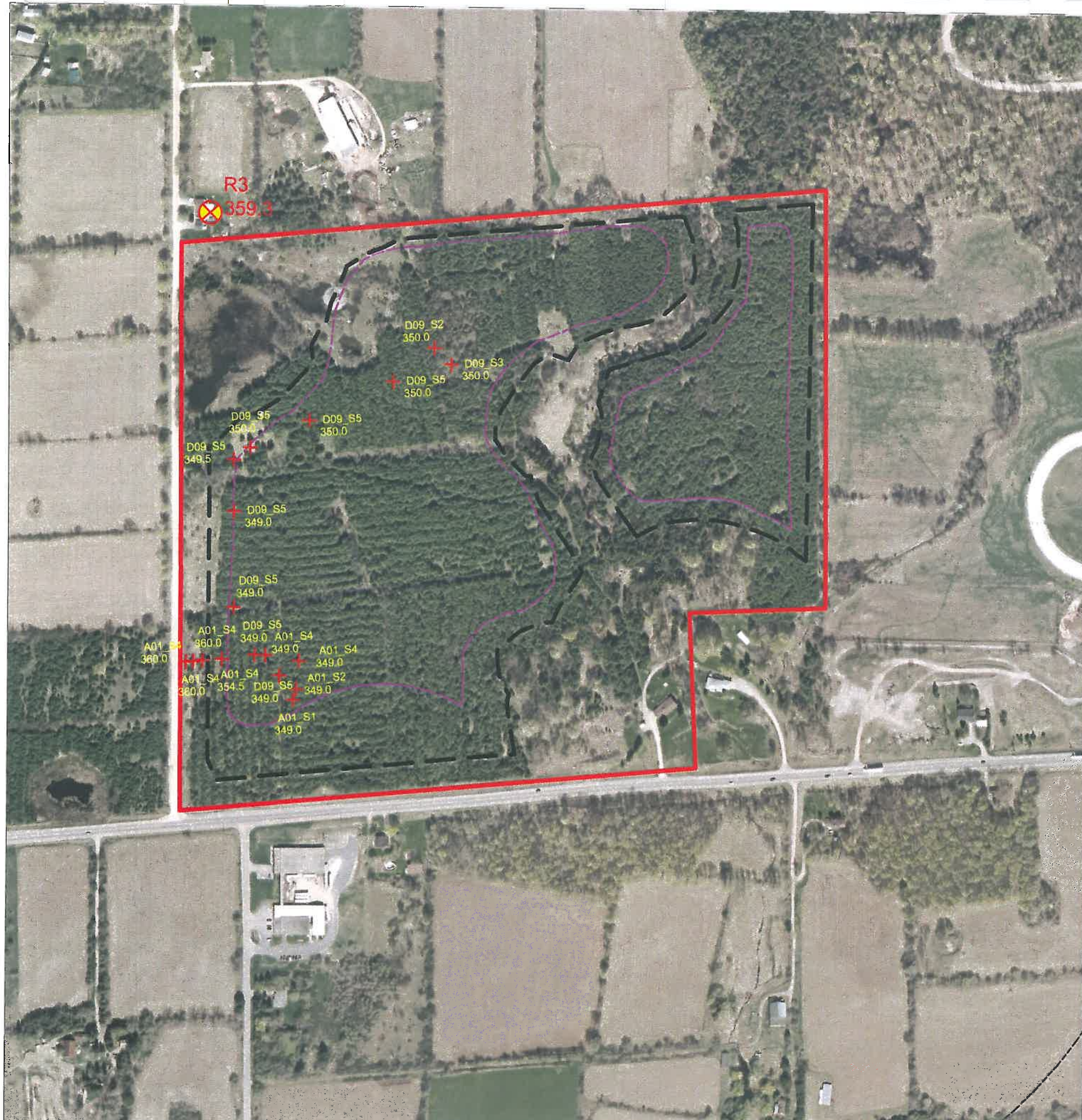


Scale 1: 6,000 @ 8.5X11"
50 0 50 150 m.

PRINT DATE: April 27, 2015
PROJECT No.: 14-401

Hidden Quarry
Applicant
Noise Berm Elevations

Fig 1.4B



Notes: Produced using information (2006 orthophotos) under license with the Grand River Conservation Authority © Grand River Conservation Authority,2015

LEGEND

Noise Source
ID
Ground Elevation

License Boundary

Limit of Overburden Extraction

Limit of Bedrock Extraction

Source

1. Appendix C R3 Sample Calculations, Noise Impact Study, by Aercoustics Engineering Ltd, Updated 24 May, 2013
2. Page 4 of 5, Progressive Rehabilitation and Final Rehabilitation (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Aug. 1, 2014

Scale 1: 6,000 @ 8.5X11"

50 0 50 150 m.

PRINT DATE: April 23, 2015	PROJECT No.: 14-401

Hidden Quarry

Applicant

R3 Noise Sample Calculation Locations

HUNTER and ASSOCIATES
Environmental and Engineering Consultants

2285 Dunwin Drive, Unit 18
Mississauga, Ontario Canada L5L 3S3
Tel 905-607-4120 Fax 905-607-1132
Website:www.hunter-gis.com Email: gisinfo@hunter-gis.com

Fig 1.5

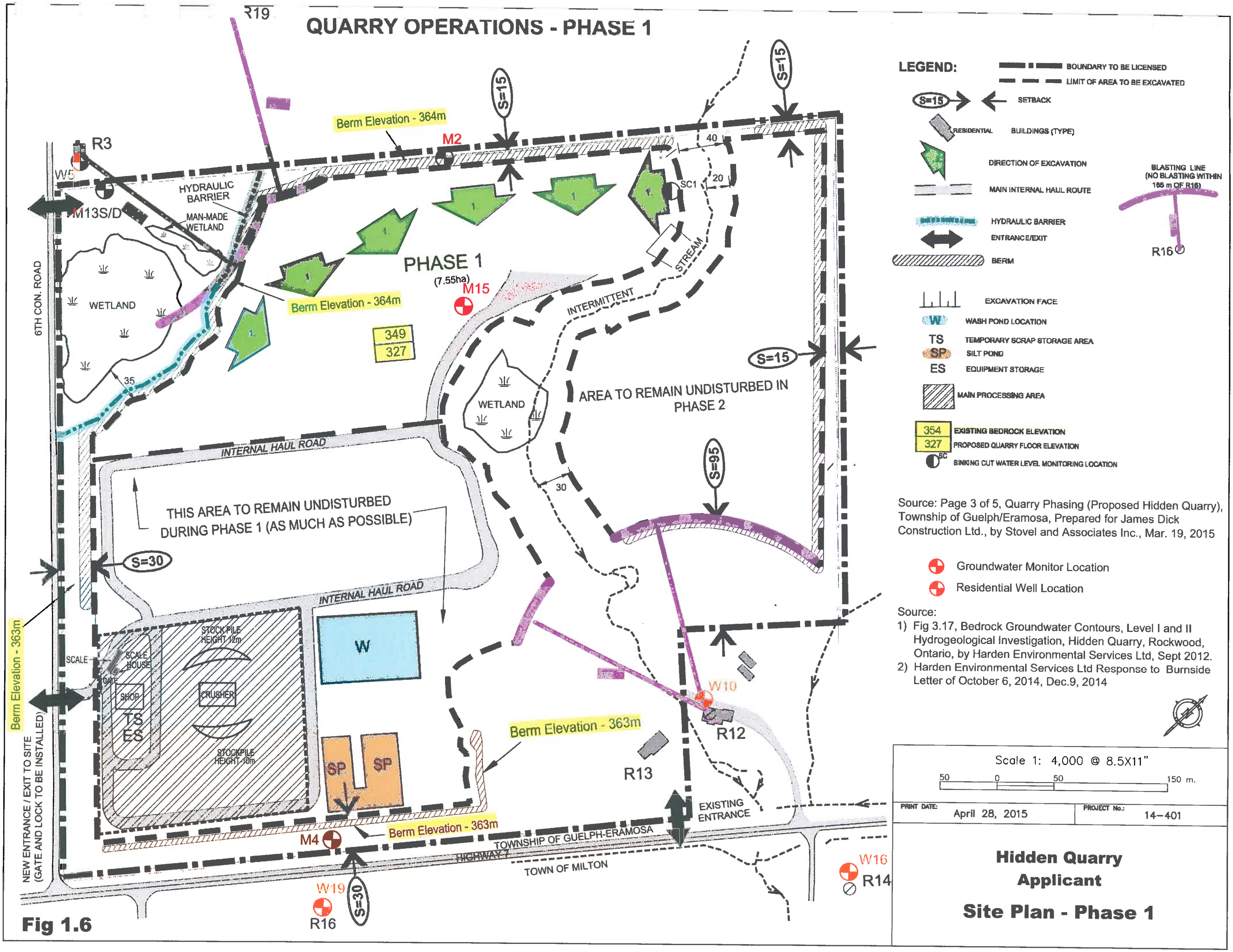

QUARRY OPERATIONS - PHASE 1
LEGEND:
BOUNDARY TO BE LICENSED
LIMIT OF AREA TO BE EXCAVATED
S=15
SETBACK
RESIDENTIAL
BUILDINGS (TYPE)
DIRECTION OF EXCAVATION
MAIN INTERNAL HAUL ROUTE
HYDRAULIC BARRIER
ENTRANCE/EXIT
BERM
EXCAVATION FACE
W
WASH POND LOCATION
TS
TEMPORARY SCRAP STORAGE AREA
SP
SILT POND
ES
EQUIPMENT STORAGE
MAIN PROCESSING AREA
354
EXISTING BEDROCK ELEVATION
327
PROPOSED QUARRY FLOOR ELEVATION
SC
SINKING CUT WATER LEVEL MONITORING LOCATION
BLASTING LINE
(NO BLASTING WITHIN 185 m OF R16)
R16
Source: Page 3 of 5, Quarry Phasing (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar. 19, 2015
Groundwater Monitor Location
Residential Well Location
Source:
1) Fig 3.17, Bedrock Groundwater Contours, Level I and II Hydrogeological Investigation, Hidden Quarry, Rockwood, Ontario, by Harden Environmental Services Ltd, Sept 2012.
2) Harden Environmental Services Ltd Response to Burnside Letter of October 6, 2014, Dec.9, 2014
R19
R3
W5
M13S/D
HYDRAULIC BARRIER
MAN-MADE WETLAND
WETLAND
6TH CON. ROAD
35
Berm Elevation - 364m
M2
S=15
40
20
SC1
STREAM
PHASE 1
(7.55ha)
M15
Berm Elevation - 364m
349
327
INTERMITTENT
S=15
WETLAND
AREA TO REMAIN UNDISTURBED IN PHASE 2
INTERNAL HAUL ROAD
30
S=95
THIS AREA TO REMAIN UNDISTURBED DURING PHASE 1 (AS MUCH AS POSSIBLE)
S=30
INTERNAL HAUL ROAD
Berm Elevation - 363m
SCALE
SCALE HOUSE
GATE
SHOP
TS
ES
STOCK PILE HEIGHT 12m
CRUSHER
STOCKPILE HEIGHT 10m
W
SP
SP
Berm Elevation - 363m
W10
R12
R13
EXISTING ENTRANCE
NEW ENTRANCE / EXIT TO SITE (GATE AND LOCK TO BE INSTALLED)
M4
Berm Elevation - 363m
TOWNSHIP OF GUELPH-ERAMOSA
HIGHWAY 7
TOWN OF MILTON
W19
R16
S=30
W16
R14
Scale 1: 4,000 @ 8.5X11"
50
0
50
150 m.
PRINT DATE: April 28, 2015
PROJECT No.: 14-401
Hidden Quarry
Applicant
Site Plan - Phase 1

Fig 1.6

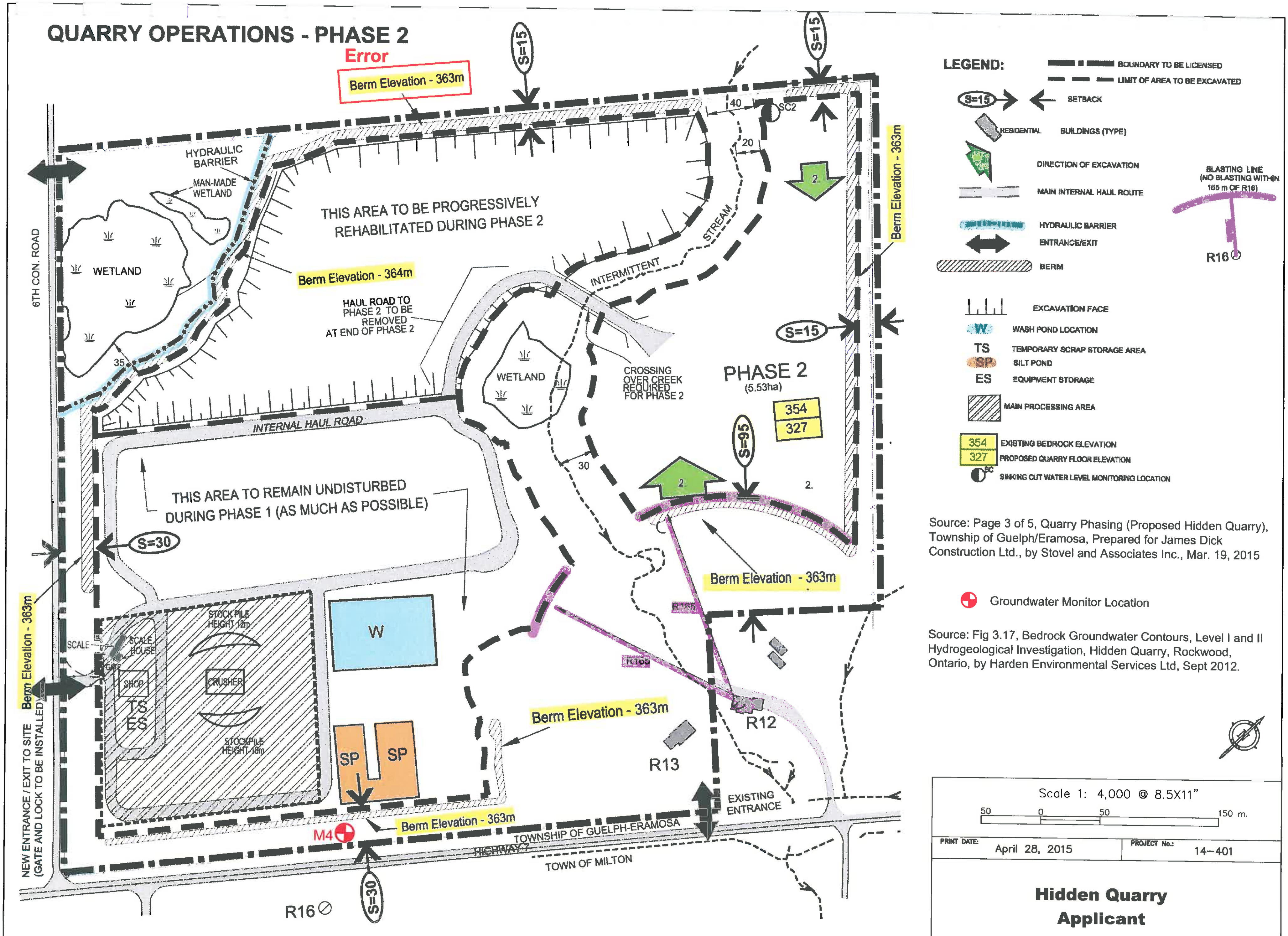

QUARRY OPERATIONS - PHASE 2
Error
Berm Elevation - 363m
S=15
S=15
LEGEND:
BOUNDARY TO BE LICENSED
LIMIT OF AREA TO BE EXCAVATED
S=15
SETBACK
RESIDENTIAL
BUILDINGS (TYPE)
DIRECTION OF EXCAVATION
MAIN INTERNAL HAUL ROUTE
HYDRAULIC BARRIER
ENTRANCE/EXIT
BERM
EXCAVATION FACE
W
WASH POND LOCATION
TS
TEMPORARY SCRAP STORAGE AREA
SP
SILT POND
ES
EQUIPMENT STORAGE
MAIN PROCESSING AREA
354
327
EXISTING BEDROCK ELEVATION
PROPOSED QUARRY FLOOR ELEVATION
SC
SINKING CUT WATER LEVEL MONITORING LOCATION
BLASTING LINE
(NO BLASTING WITHIN 165 m OF R16)
R16
HYDRAULIC BARRIER
MAN-MADE WETLAND
WETLAND
6TH CON. ROAD
35
THIS AREA TO BE PROGRESSIVELY
REHABILITATED DURING PHASE 2
Berm Elevation - 364m
HAUL ROAD TO PHASE 2 TO BE REMOVED AT END OF PHASE 2
INTERMITTENT
STREAM
40
SC2
20
2.
Berm Elevation - 363m
S=15
WETLAND
CROSSING OVER CREEK REQUIRED FOR PHASE 2
PHASE 2
(5.53ha)
354
327
S=95
INTERNAL HAUL ROAD
30
2
2.
THIS AREA TO REMAIN UNDISTURBED
DURING PHASE 1 (AS MUCH AS POSSIBLE)
S=30
Berm Elevation - 363m
Berm Elevation - 363m
SCALE
SCALE HOUSE
GATE
SHOP
TS
ES
STOCKPILE HEIGHT 12m
CRUSHER
STOCKPILE HEIGHT 10m
W
SP
SP
R165
R165
R12
R13
Berm Elevation - 363m
EXISTING ENTRANCE
NEW ENTRANCE / EXIT TO SITE
(GATE AND LOCK TO BE INSTALLED)
M4
Berm Elevation - 363m
TOWNSHIP OF GUELPH-ERAMOSA
HIGHWAY 7
TOWN OF MILTON
R16
S=30
Source: Page 3 of 5, Quarry Phasing (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar. 19, 2015
Groundwater Monitor Location
Source: Fig 3.17, Bedrock Groundwater Contours, Level I and II Hydrogeological Investigation, Hidden Quarry, Rockwood, Ontario, by Harden Environmental Services Ltd, Sept 2012.
Scale 1: 4,000 @ 8.5X11"
50
0
50
150 m.
PRINT DATE:
April 28, 2015
PROJECT No.:
14-401
Hidden Quarry
Applicant
Site Plan - Phase 2

Fig 1.7

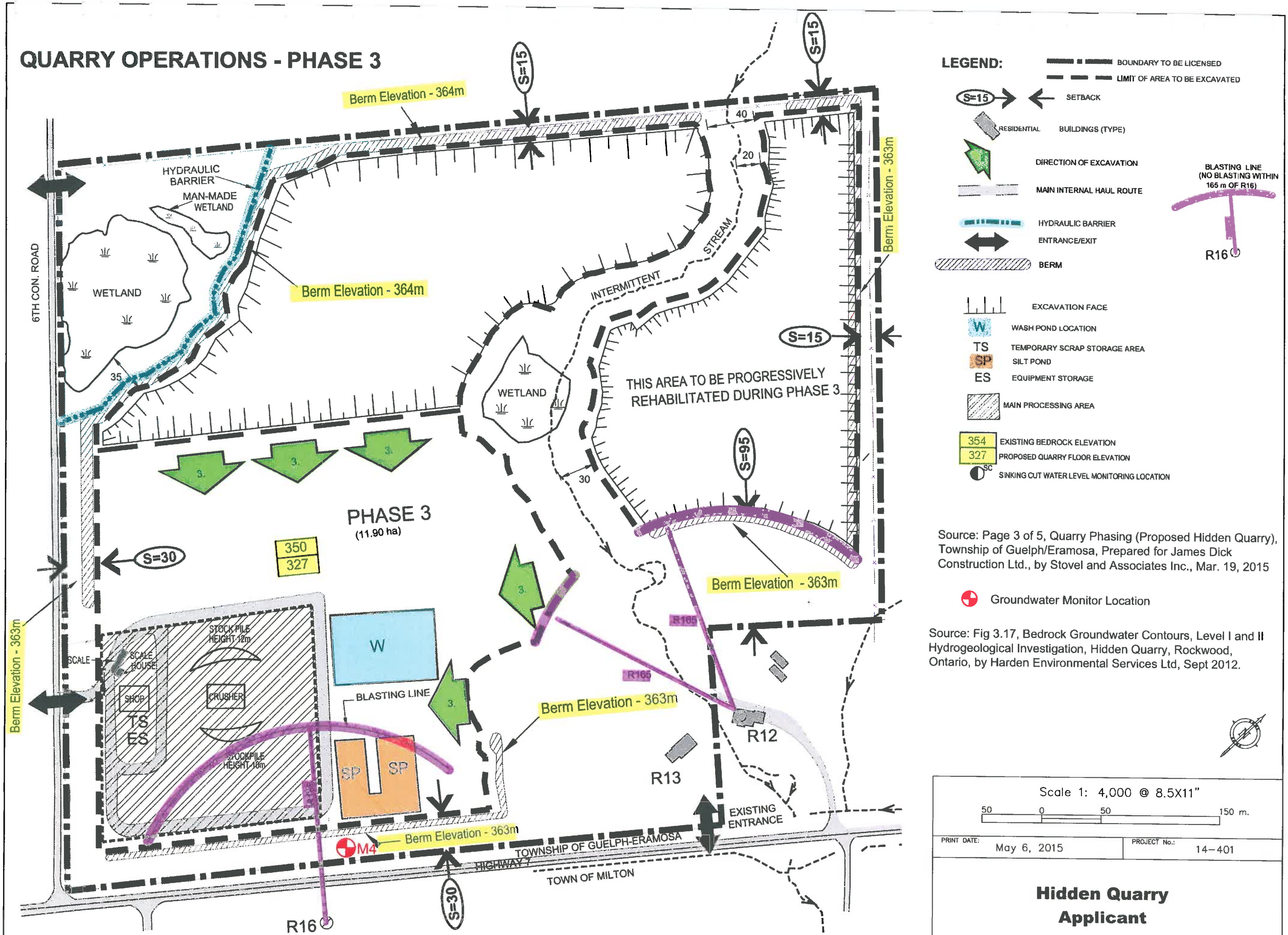
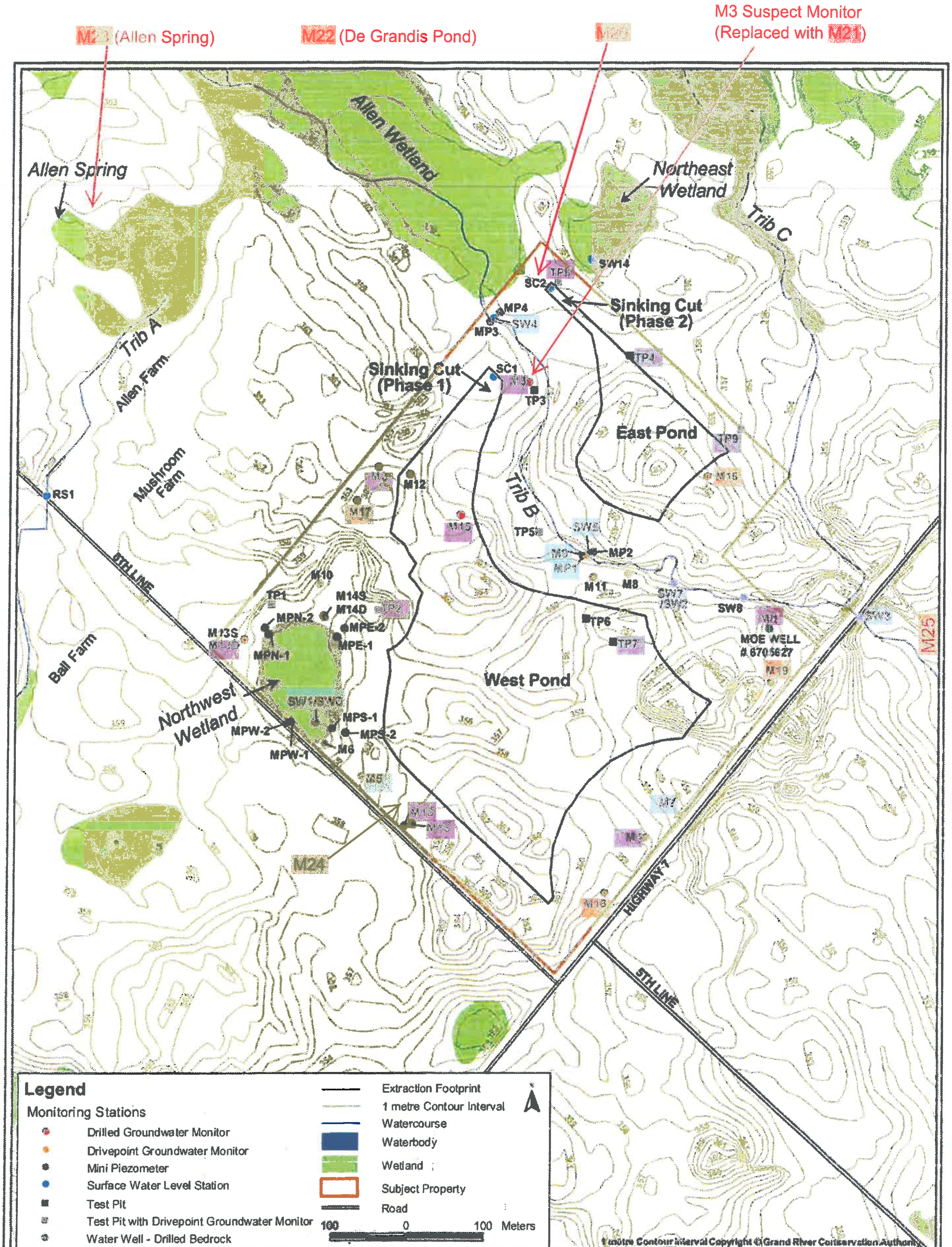

QUARRY OPERATIONS - PHASE 3
Berm Elevation - 364m
S=15
40
20
Berm Elevation - 363m
HYDRAULIC BARRIER
MAN-MADE WETLAND
6TH CON. ROAD
WETLAND
35
Berm Elevation - 364m
INTERMITTENT STREAM
WETLAND
S=15
THIS AREA TO BE PROGRESSIVELY REHABILITATED DURING PHASE 3
S=95
30
PHASE 3
(11.90 ha)
350
327
S=30
Berm Elevation - 363m
Berm Elevation - 363m
SCALE
SCALE HOUSE
SHOP
TS
ES
STOCK PILE HEIGHT 12m
CRUSHER
STOCKPILE HEIGHT 10m
W
BLASTING LINE
SP
SP
Berm Elevation - 363m
R165
R165
R12
R13
EXISTING ENTRANCE
M4
Berm Elevation - 363m
TOWNSHIP OF GUELPH-ERAMOSA
HIGHWAY 7
TOWN OF MILTON
S=30
R16
LEGEND:
BOUNDARY TO BE LICENSED
LIMIT OF AREA TO BE EXCAVATED
S=15
SETBACK
RESIDENTIAL
BUILDINGS (TYPE)
DIRECTION OF EXCAVATION
MAIN INTERNAL HAUL ROUTE
HYDRAULIC BARRIER
ENTRANCE/EXIT
BERM
BLASTING LINE (NO BLASTING WITHIN 165 m OF R16)
R16
EXCAVATION FACE
W
WASH POND LOCATION
TS
TEMPORARY SCRAP STORAGE AREA
SP
SILT POND
ES
EQUIPMENT STORAGE
MAIN PROCESSING AREA
354
EXISTING BEDROCK ELEVATION
327
PROPOSED QUARRY FLOOR ELEVATION
SC
SINKING CUT WATER LEVEL MONITORING LOCATION
Source: Page 3 of 5, Quarry Phasing (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar. 19, 2015
Groundwater Monitor Location
Source: Fig 3.17, Bedrock Groundwater Contours, Level I and II Hydrogeological Investigation, Hidden Quarry, Rockwood, Ontario, by Harden Environmental Services Ltd, Sept 2012.
Scale 1: 4,000 @ 8.5X11"
50 0 50 150 m.
PRINT DATE: May 6, 2015
PROJECT No.: 14-401
Hidden Quarry
Applicant
Site Plan - Phase 3

Fig 1.8



Drivepoint or Surface Water Monitor

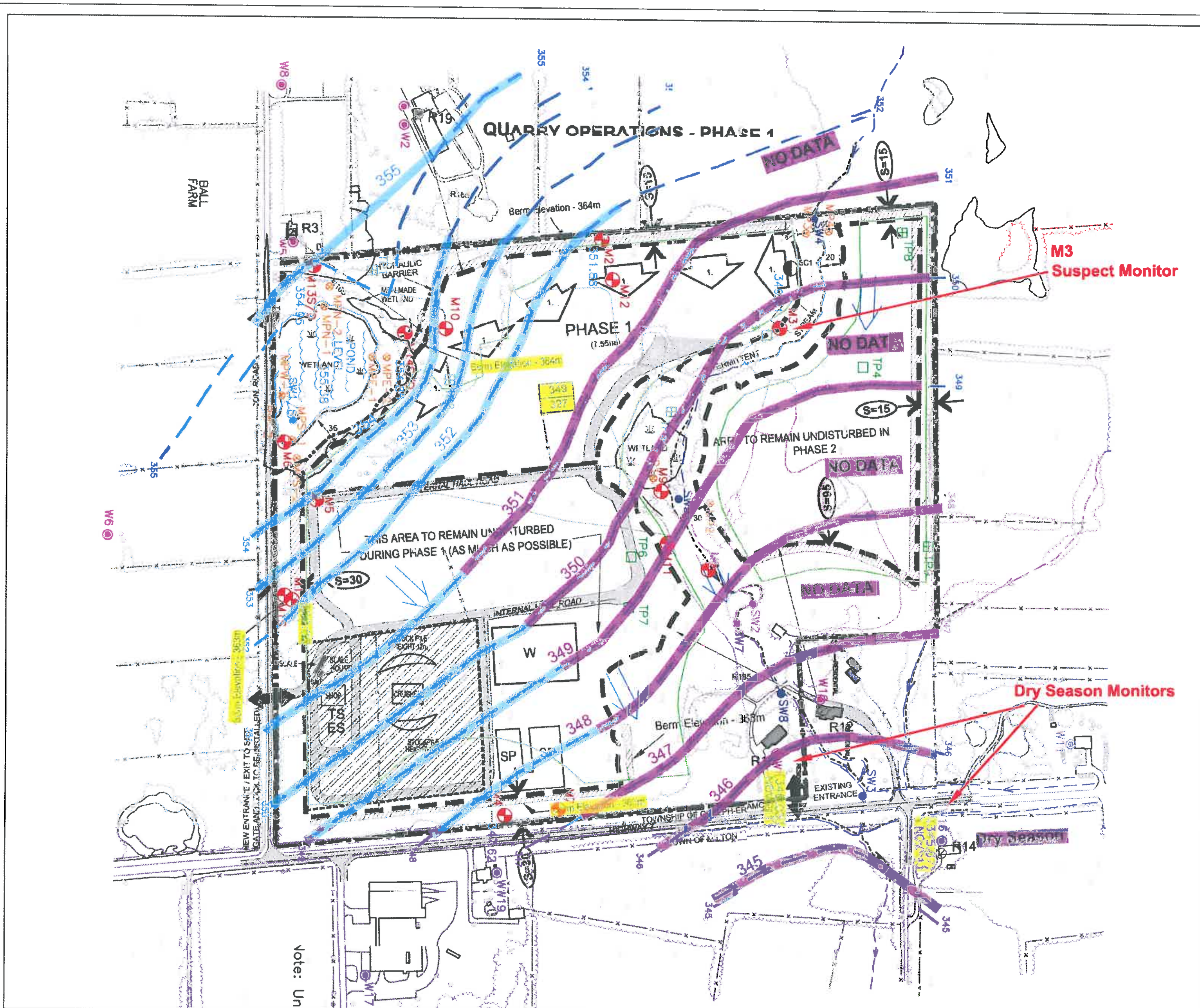
Monitor Well within or near Bedrock

New Monitor Well Recommended

Note: M4 monitor is subjected to interference; M15 will be destroyed; M1D to be replaced.

Harden Environmental Services Ltd.	Project No: 9506 Date: Nov 2014 Drawn By: AR	Hidden Quarry Proposed Aggregate Extraction Response to Burnside Letter of October 6, 2014 Part of Lot 1, Concession 6 Township of Guelph/Eramosa, County of Wellington	Figure 4: **Monitoring Locations**

Fig 2.1



concerned residents coalition

CRC

LEGEND

- Bedrock Water Level Contour Based on Wet Season Data (May 31, 2011)
- Bedrock Water Level Contour Inferred from Dry Season Data or No Data At All (November, 2011)
- ?
- 349 / 327 — Phase I Stage 1 Dry Top of Bedrock Quarry Staging Floor (m asl); Maximum Depth of Subaqueous Bedrock Extraction (m asl)

Source:

1) Page 3 of 5, Quarry Phasing (Proposed Hidden Quarry), Township of Guelph/Eramosa. Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Mar. 19, 2015

2) Fig 3.17, Bedrock Groundwater Contours, Level I and II Hydrogeological Investigation, Hidden Quarry, Rockwood, Ontario, by Harden Environmental Services Ltd, Sept 2012.

Scale 1: 4,000 @ 11X17"

50 0 100 200 m.

Drawn by	Checked by	Date	Project No.
RL	GTH	April 28, 2015	14-401

Proposed Hidden Quarry

Applicant's Fig 3.17
Mixed Wet and Dry Season
Bedrock Water Level Contours

HUNTER and ASSOCIATES
Environmental and Engineering Consultants
2255 Dunwin Drive, Unit 18
Mississauga, Ontario Canada L5L 3S3
Tel 905-607-4120 Fax 905-607-1132
Website: www.hunter-gis.com Email: gisinfo@hunter-gis.com

Fig 2.2

Drawdown in metres for Scenario 1

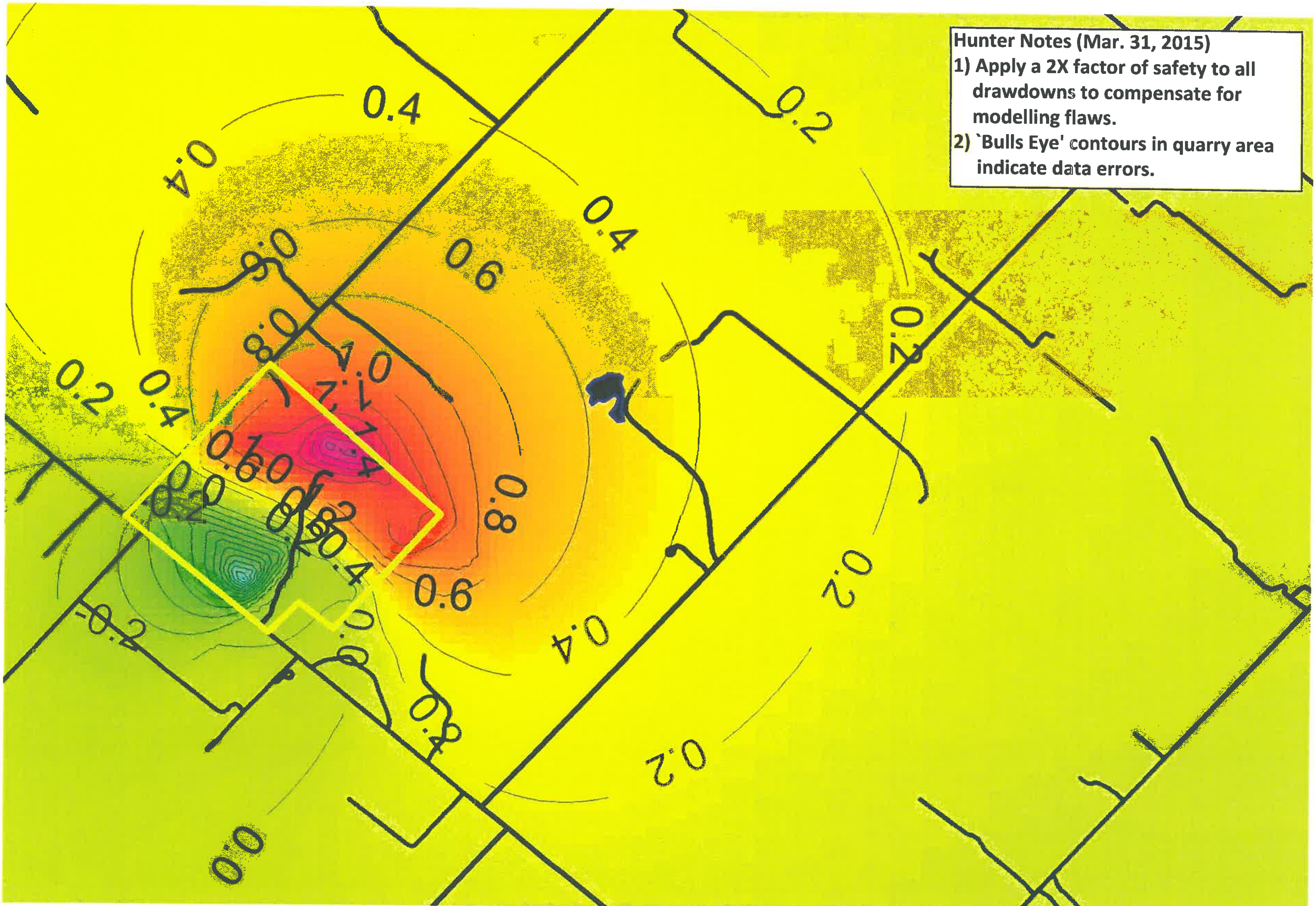


Fig 2.3A

Source: Drawdown in metres for Scenario 1, Response to Request from Hunter and Associates (Jan 26 2015 email to K. Wingrove), by Harden Environmental Services Ltd, January 29, 2015

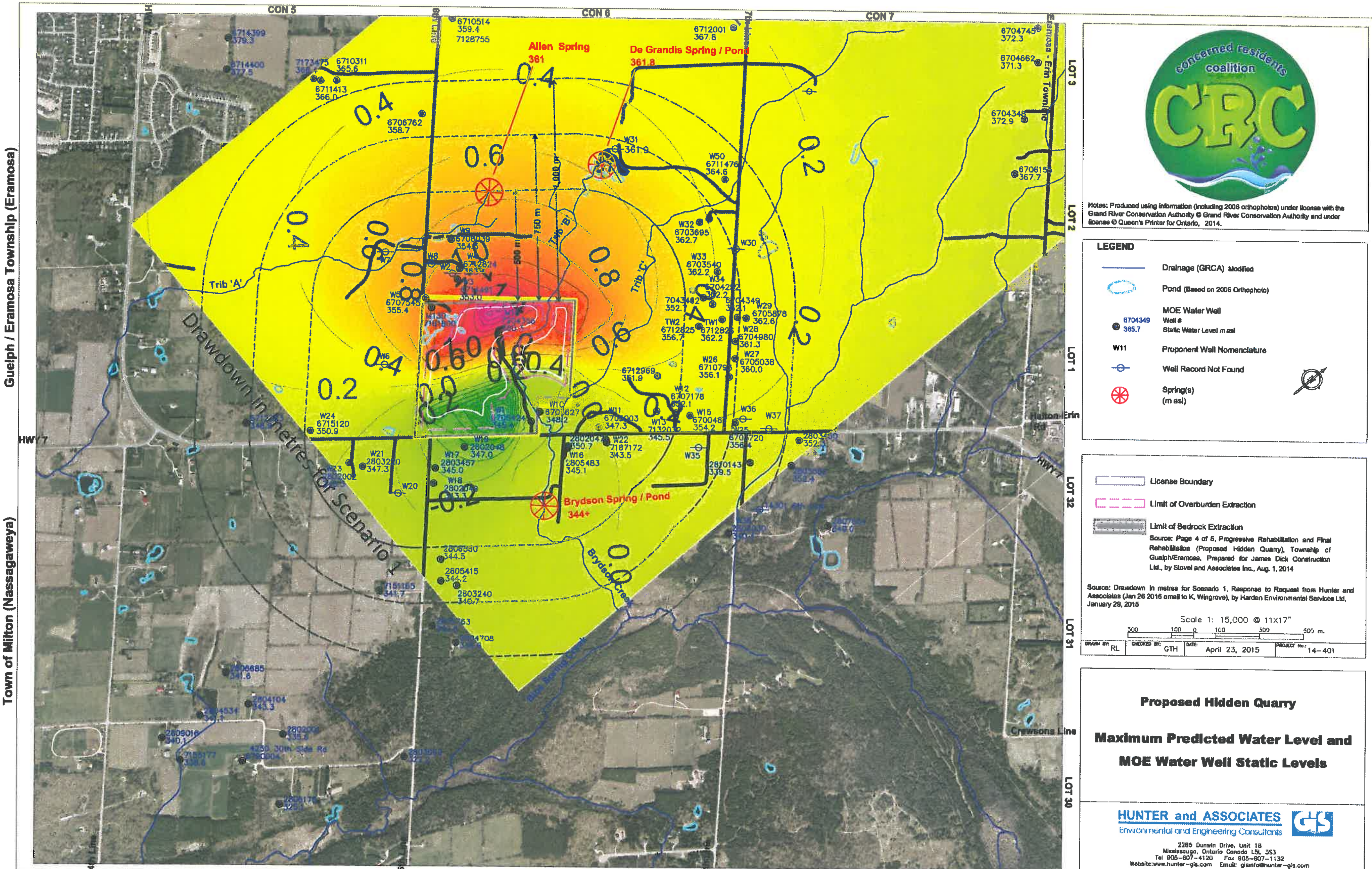
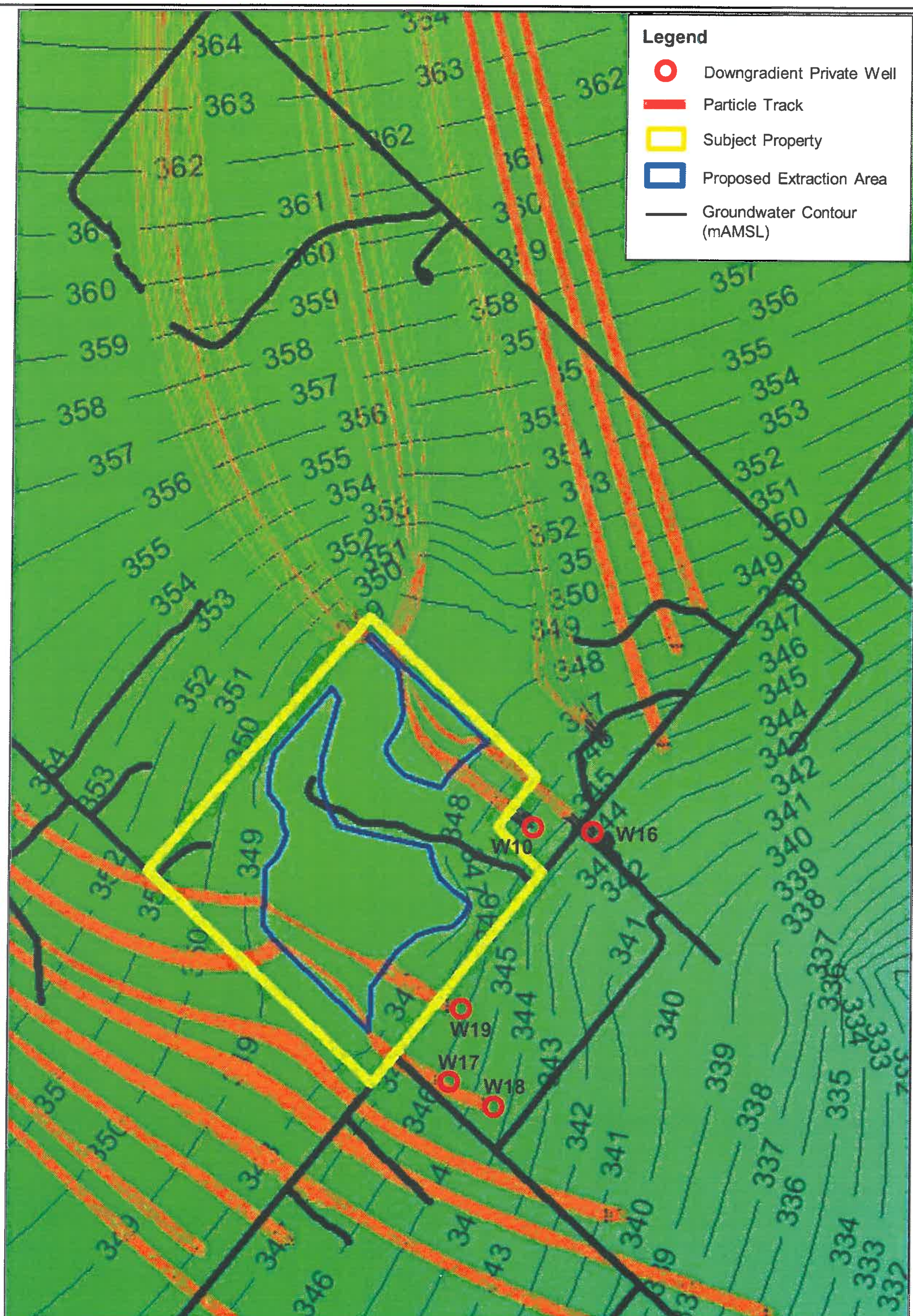

CON 5
CON 6
CON 7
Allen Spring
361
De Grandis Spring / Pond
361.8
Brydson Spring / Pond
344+
Trib 'A'
Trib 'B'
Trib 'C'
Brydson Creek
Drawdown in metres for Scenario 1
750 m
500 m
1,000 m
HWY 7
Halton-Erin
LOT 3
LOT 2
LOT 1
LOT 32
LOT 31
LOT 30
Crewsons Line
Guelph / Eramosa Township (Eramosa)
Town of Milton (Nassagaweya)
Eramosa - Erin Townline
concerned residents coalition
CRC
Notes: Produced using information (including 2006 orthophotos) under license with the Grand River Conservation Authority © Grand River Conservation Authority and under license © Queen's Printer for Ontario, 2014.
LEGEND
Drainage (GRCA) Modified
Pond (Based on 2006 Orthophoto)
MOE Water Well
6704349 Well #
365.7 Static Water Level m asl
W11 Proponent Well Nomenclature
Well Record Not Found
Spring(s) (m asl)
License Boundary
Limit of Overburden Extraction
Limit of Bedrock Extraction
Source: Page 4 of 5, Progressive Rehabilitation and Final Rehabilitation (Proposed Hidden Quarry), Township of Guelph/Eramosa, Prepared for James Dick Construction Ltd., by Stovel and Associates Inc., Aug. 1, 2014
Source: Drawdown in metres for Scenario 1, Response to Request from Hunter and Associates (Jan 26 2015 email to K. Wingrove), by Harden Environmental Services Ltd. January 29, 2015
Scale 1: 15,000 @ 11X17"
DRAWN BY: RL
CHECKED BY: GTH
DATE: April 23, 2015
PROJECT No.: 14-401
Proposed Hidden Quarry
Maximum Predicted Water Level and MOE Water Well Static Levels
HUNTER and ASSOCIATES
Environmental and Engineering Consultants
2285 Dunwin Drive, Unit 18
Mississauga, Ontario Canada L5L 3S3
Tel 905-607-4120 Fax 905-607-1132
Website:www.hunter-gis.com Email: gisinfo@hunter-gis.com

Fig 2.3B



Harden Environmental Services Ltd.	**Project No:** 9506	Hydrogeologic Impact Assessment Proposed Aggregate Extraction	**Figure 4:**
	Date: Dec 2013		**Downgradient Private Wells**
	Drawn By: SD	Part of Lot 1, Concession 6 Township of Guelph/Eramosa, County of Wellington	

Fig 2.4A

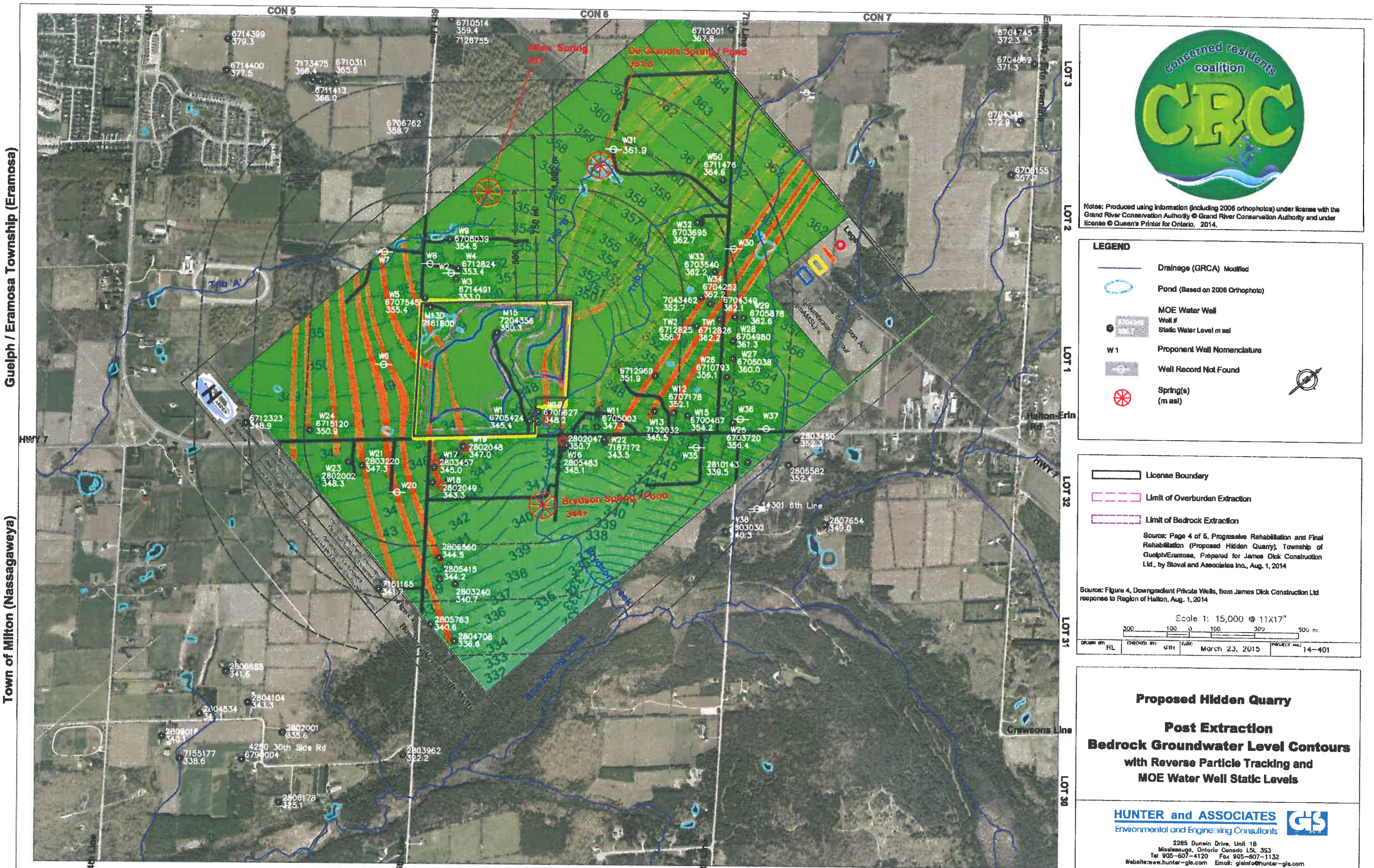
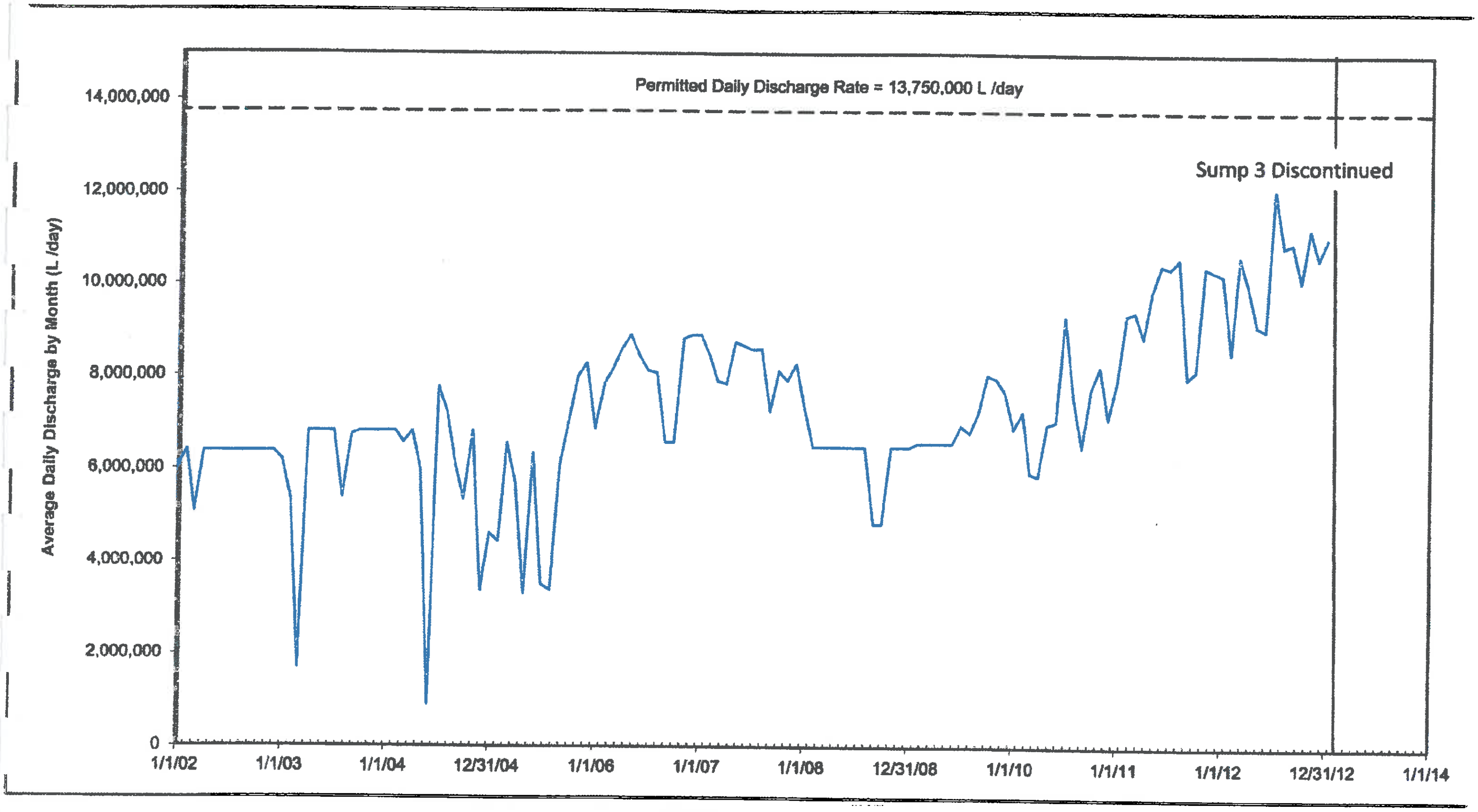
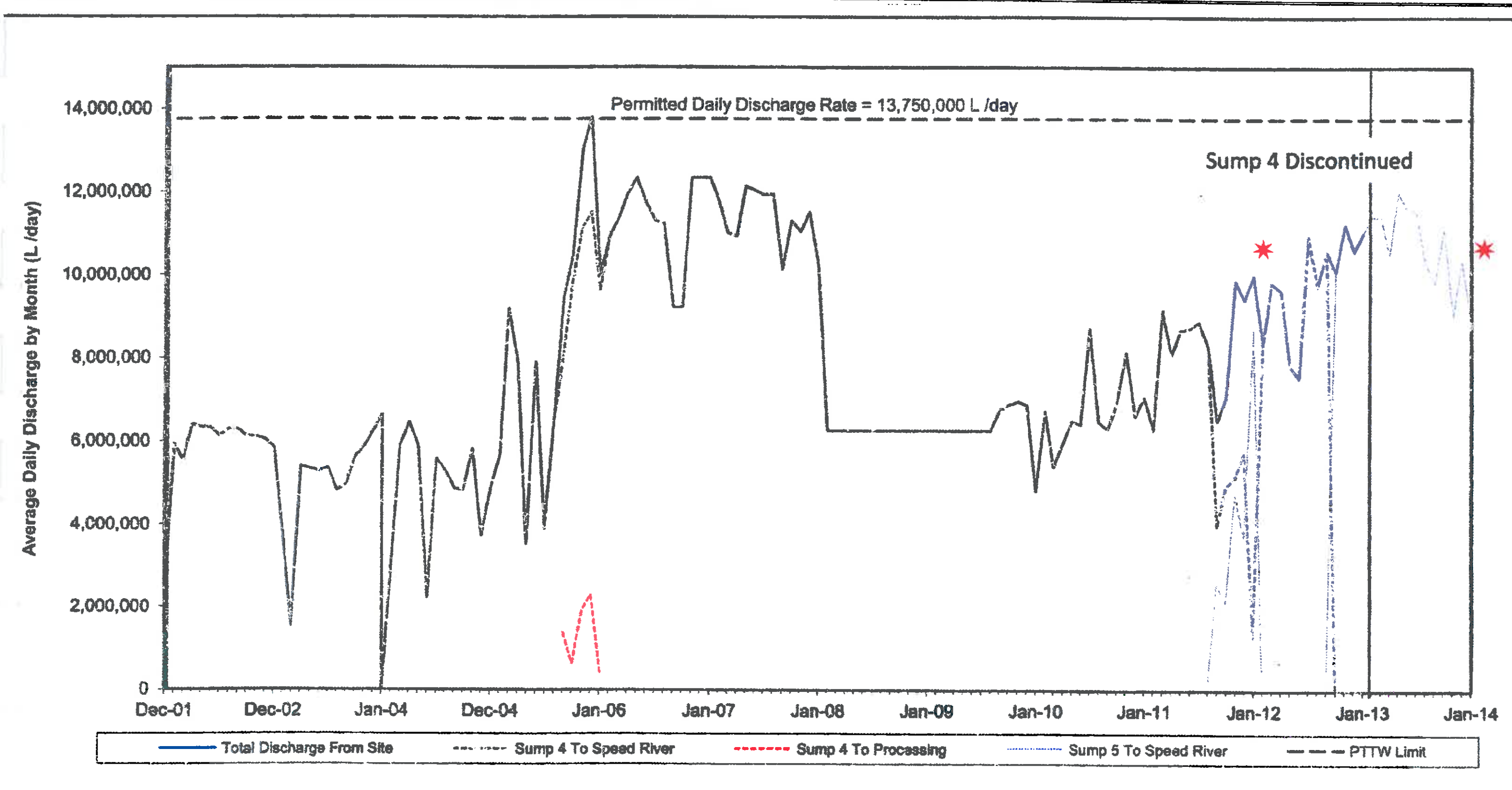


Fig 2.4B Note: Applicant modelled groundwater contours do not coincide with water well static water levels adjusted to GRCA (2011) ground elevations.



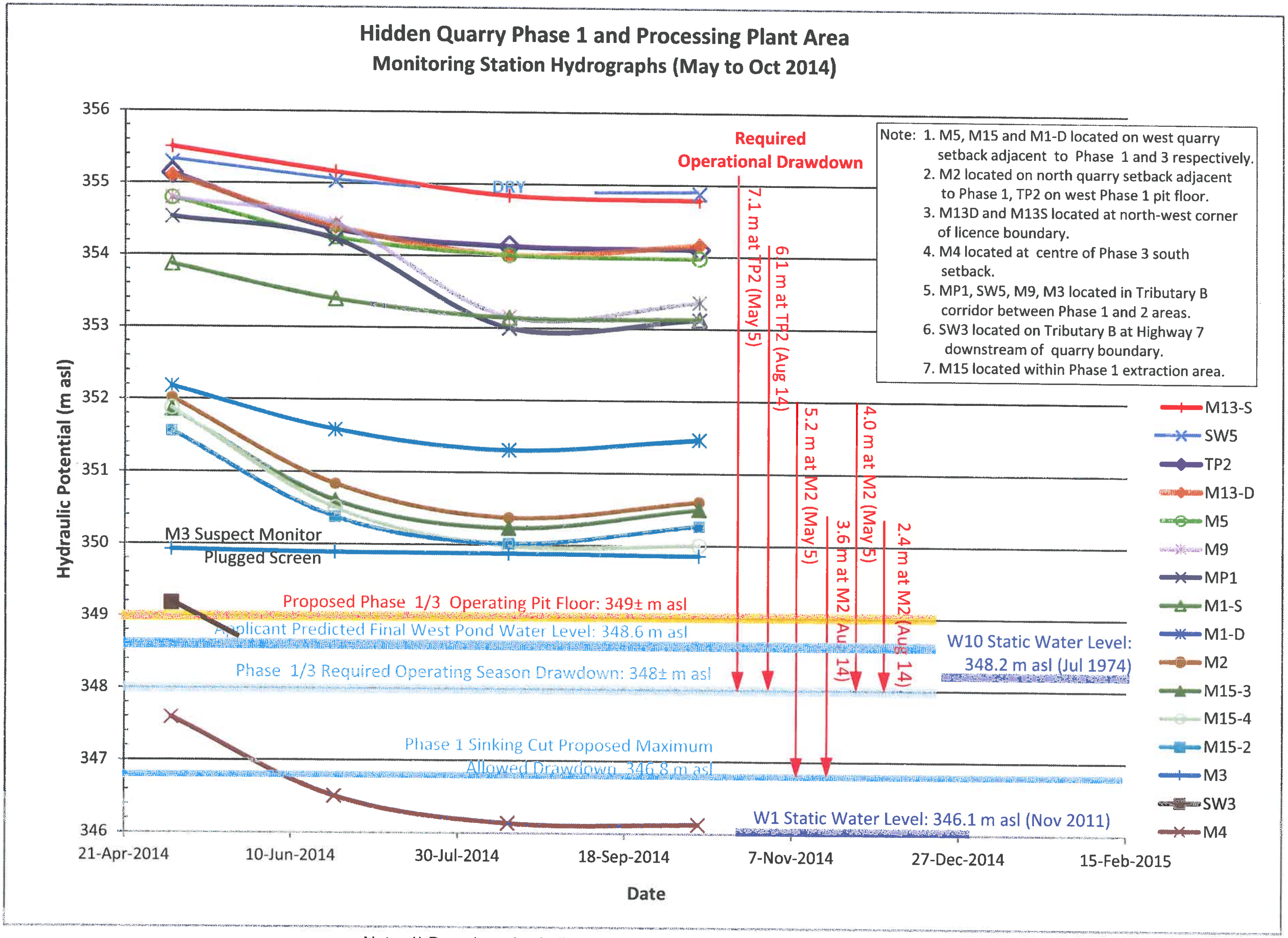


Guelph Quarry Water Discharge from Sump 3, 4, 5 2001-Jan 2014

✶ Water Quality Sample Event

Fig 2.5

Prepared by: Hunter and Associates



Note: 1) Drawdown in shallow monitors may not fully develop because of the presence of underlying aquitards or proposed hydraulic barrier influences.
2) Applicant predicted final pond water level suspect.

Fig 3.1

Mornitoring Station _Hydrograph 20150423.xlsx

Print Date: 4/23/2015

Prepared by: Hunter and Associates

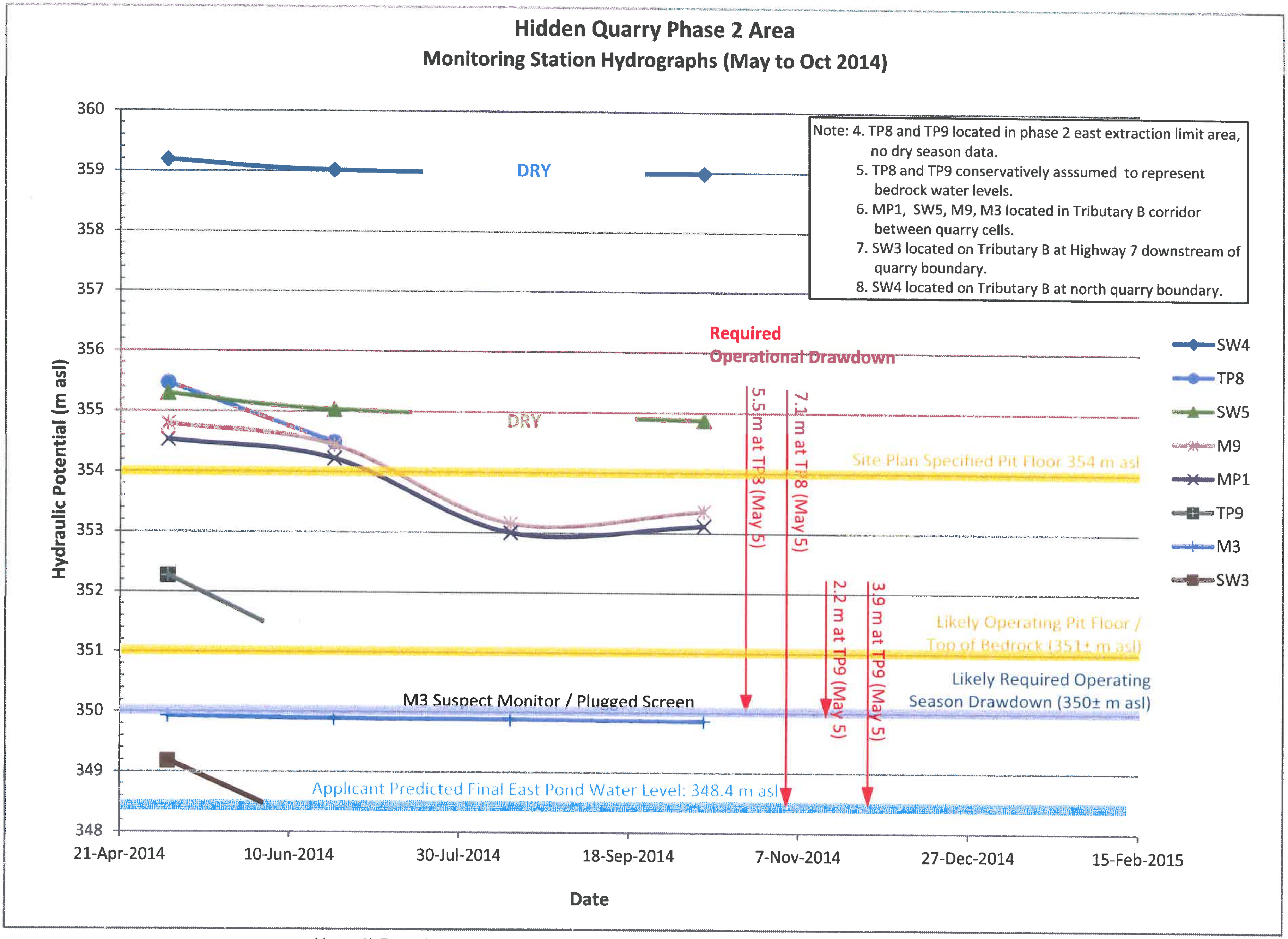


Fig 3.2

Note: 1) Drawdown in shallow monitors may not fully develop due to the presence of underlying aquitards.
2) Applicant predicted final pond water level suspect.

Mornitoring Station _Hydrograph 20150423.xlsx

Print Date: 4/23/2015

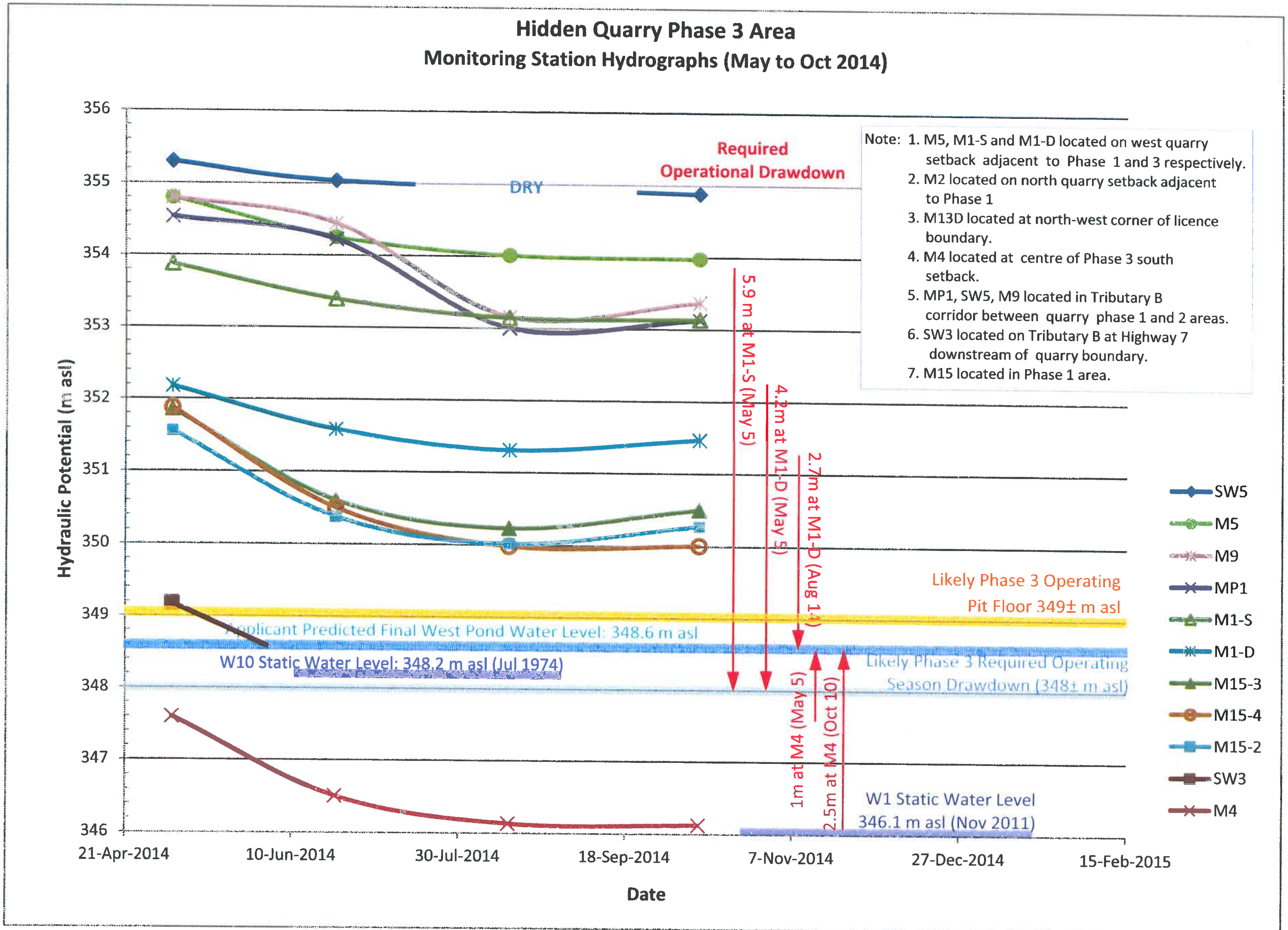


Fig 3.3

Note: 1) Drawdown in shallow monitors may not fully develop due to the presence of underlying aquitards.
2) Applicant predicted final pond water level suspect.

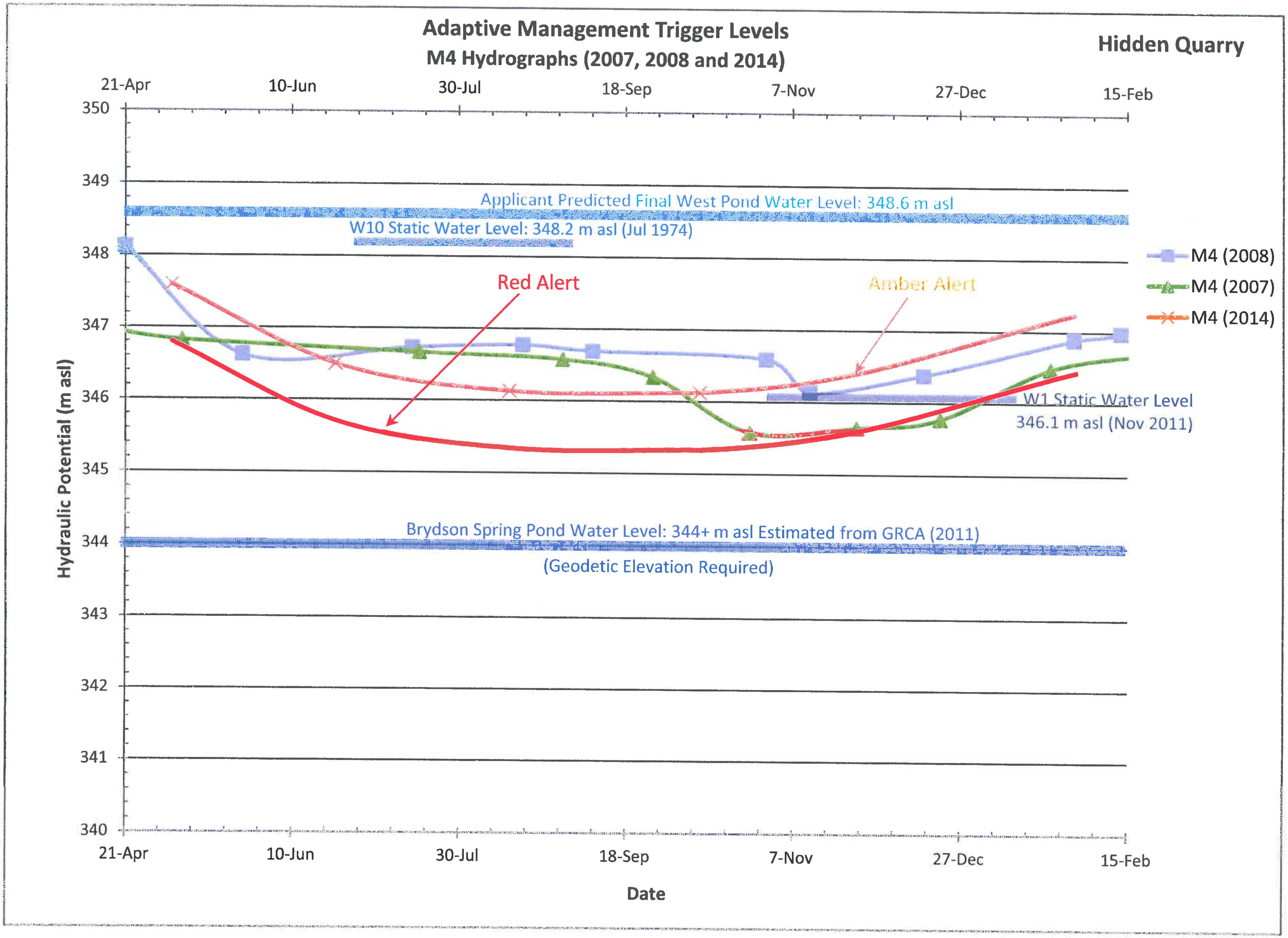


Fig 4.1

Note: Applicant predicted final pond water level suspect.

Prepared by: Hunter and Associates

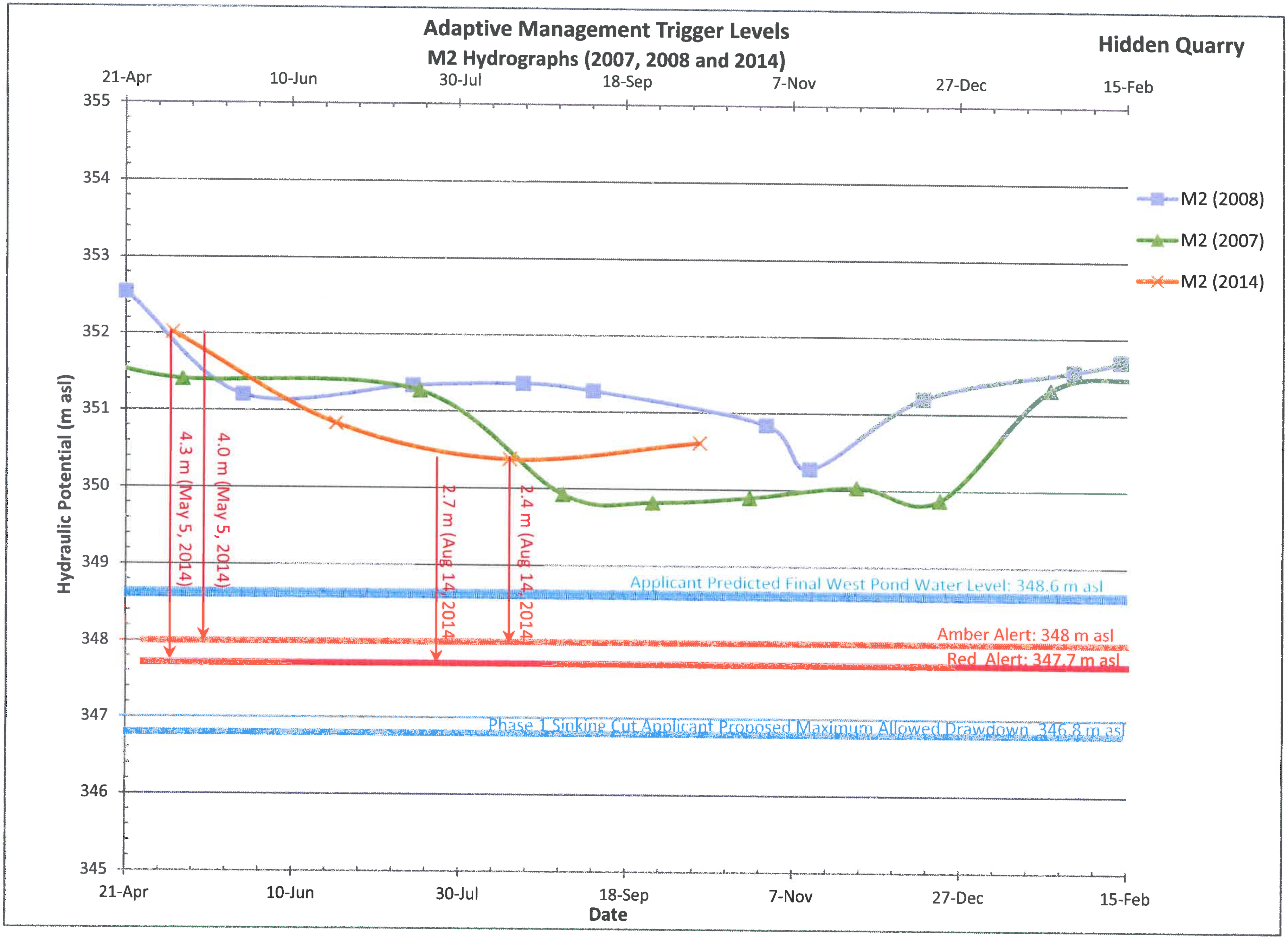


Fig 4.2

Note: Applicant predicted final pond water level suspect.

Prepared by: Hunter and Associates

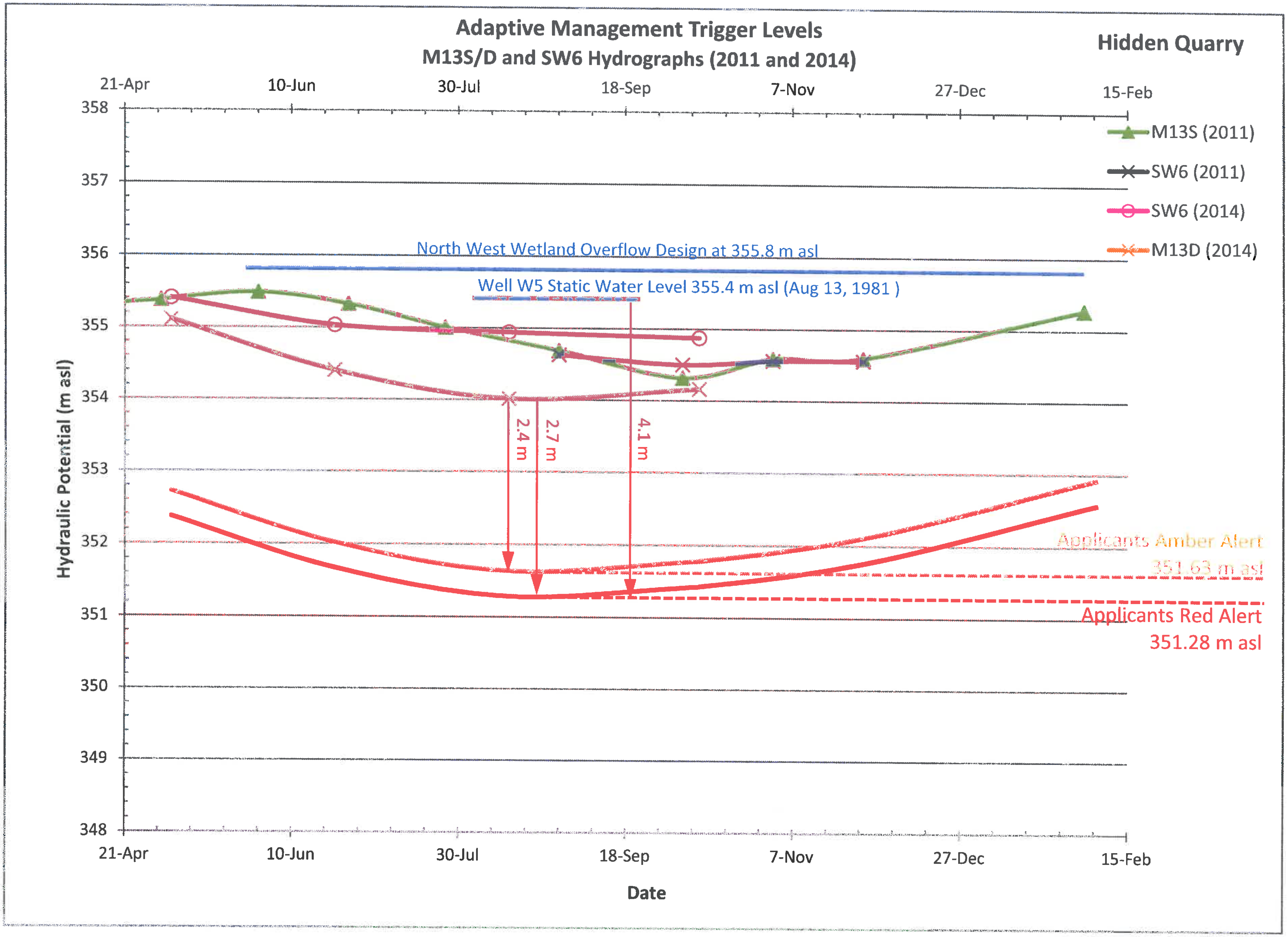


Fig 4.3

Mornitoring Station _Hydrograph 20150423.xlsx

Print Date: 4/23/2015

Prepared by: Hunter and Associates

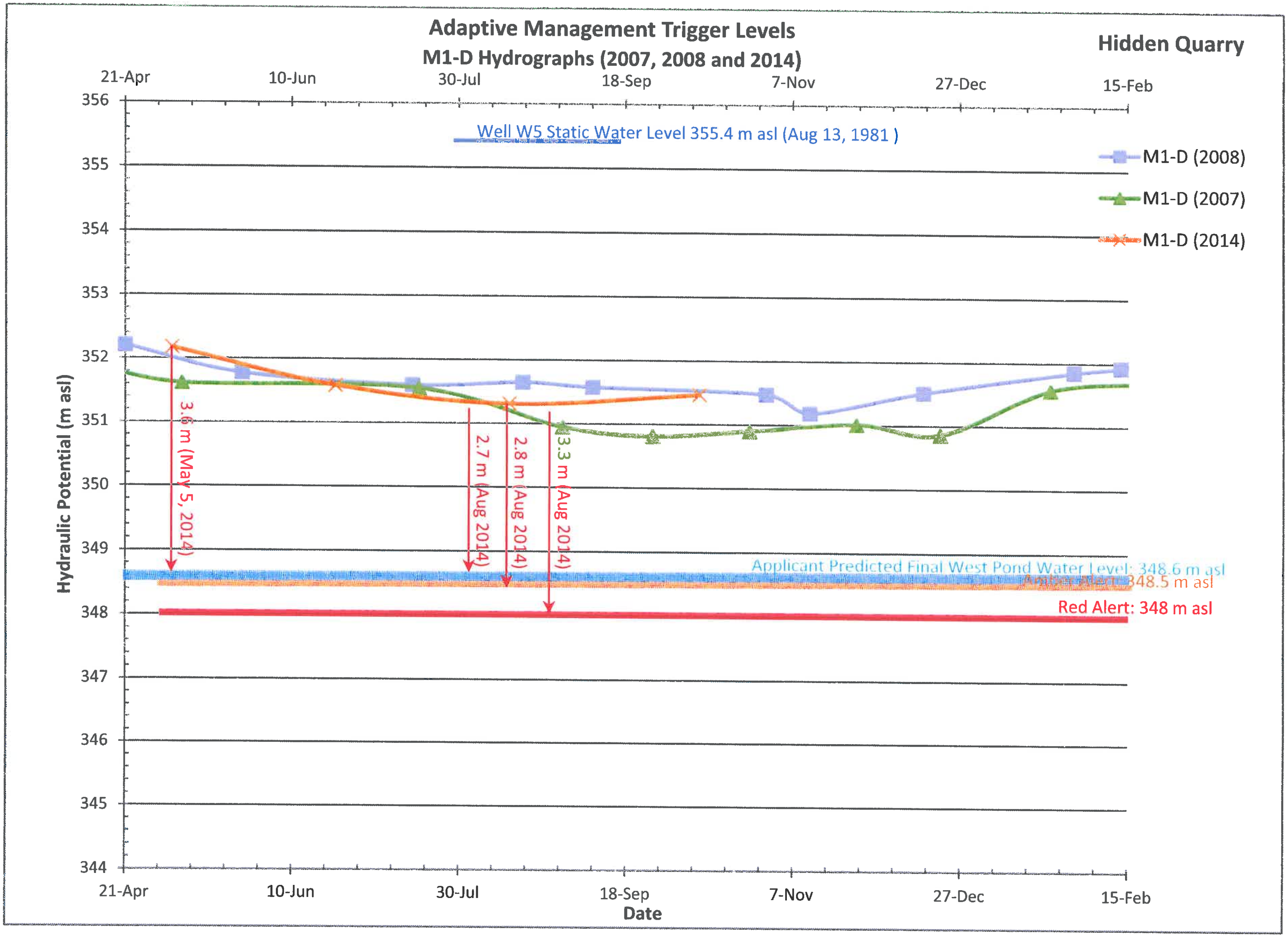


Fig 4.4

Note: Applicant predicted final pond water level suspect.

Mornitoring Station _Hydrograph 20150423.xlsx

Print Date: 4/23/2015

Harden Environmental Services Ltd.
4622 Nassagaweya-Puslinch Townline
Moffat, Ontario, L0P 1J0
Phone: (519) 826-0099 Fax: (519) 826-9099

Groundwater Studies
Geochemistry
Phase I / II
Regional Flow Studies
Contaminant Investigations
OMB Hearings
Water Quality Sampling
Monitoring
Groundwater Protection Studies
Groundwater Modelling
Groundwater Mapping

Our File: 9506

July 16, 2015

James Dick Construction Ltd.
14442 Highway 50
P.O. Box 470
Bolton, Ontario L7E 5T4

Attention: Mr. Greg Sweetnam

Dear Mr. Sweetnam;

Re: Proposed Hidden Quarry
Peer Review on Behalf of the Concerned Residents Coalition
Hunter and Associates May 15 2015

We are pleased to respond to the issues raised by Hunter and Associates Peer Review dated May 15, 2015 regarding the proposed Hidden Quarry.

In summary Mr. Hunter does not use any hydrogeological terms including transmissivity, storativity, porosity or hydraulic conductivity. Mr. Hunter's analysis is mainly statistical, a comparison of one water level or chemical parameter to another or to a standard without any analysis or evaluation of what the measured value represents in either the local or regional hydrogeological context.

There are two areas where the site plans could be improved upon in recognition of Mr. Hunter's comments.

1) A range of water levels for the proposed quarry pond elevations could be shown instead of one value. We recommend showing a range of 347.6 m AMSL to 349.6 m AMSL to reflect seasonal water level changes.

2) A review of the quarry floor elevation relative to high groundwater level should be done to ensure that the working floor is not below the water table. There will be no dewatering, therefore, if the quarry floor is below the high water table, an elevation adjustment will need to be made. I have attached a figure of high groundwater elevations for Rob Stovel to consider.

The following responses address hydrogeological issues raised in the Hunter and Associates May 15 2015 Peer Review. Responses are organized by the same section numbering system.

1.0 SITE PLANS

1.4 Recommendations and Operational Pit Floor (Top of Bedrock)

Due to the sloping water table, the proposed quarry floor elevation of 349 m AMSL will be below the seasonal high water table in portions of Phases 1 and 3. I have attached a figure showing the high water table applicable for Phases 1 and 3 and the quarry floor should be raised to this elevation. The proposed quarry floor of 354 m AMSL in Phase 2 will allow the quarry to operate in dry conditions.

2.0 GROUNDWATER

2.1 Applicant's Mixed Season Bedrock Contour Water Levels (September 2012, Fig 3.17)

The use of November 2011 data for two of the private residential water wells was carefully considered by the project hydrogeologists and deemed to be useful in terms of being reasonably representative of bedrock groundwater elevations and fitting with the overall pattern of groundwater flow established from on-site dedicated groundwater monitors. We expect that the November data used for these two wells are approximately 1.5 metres lower than would have occurred in May of the same year when all other values on Figure 3.17 were obtained. When looking at Figure 3.17 then, the use of November data provides a conservatively high estimate of overall water level change occurring in the bedrock. In efforts to recreate this water level change within the groundwater model, the model will therefore over predict the potential impact of the quarry activity on upgradient wells.

The calibration of the regional groundwater model was achieved by including static water levels from bedrock wells including dedicated groundwater monitors on-site. The purpose being to obtain a reasonable representation of the groundwater flow system in the vicinity of the site. The convergence of groundwater flow along the Tributary B corridor is reasonable given the significant groundwater discharge at the Brydson Spring. Measured static water levels obtained from level-surveyed wells east of the site corroborate this pattern of groundwater flow.

- **Monitor M3**

The water level in monitor M3 has been measured for many years and has a relatively narrow range of seasonal water levels. However, the well has been tested on several occasions and found to respond to the addition and withdrawal of slugs of water, thereby confirming the functioning of the well screen.

The water level in W1 has been measured on three occasions and found to have a range of 0.62 m and found to maintain similar seasonal water level change relative other on-site monitors. A pumping test was performed on W1 and W1 was found to be functioning. The groundwater model is not intended to represent extreme conditions (wet or dry). The main purpose of the model is to provide an estimate of water level change occurring post extraction. With only small natural changes in aquifer transmissivity occurring between spring and fall ("wet and dry") seasons of approximately 4%, the model reasonably predicts potential water level change.

- **Tributary B Corridor Water Levels**

The water levels in the Tributary B corridor are adequately represented by M3, M11, M15 (I, II, III and IV) and sporadically by water levels obtained in W1.

- **Wet and Dry Bedrock Levels in Vicinity of TP8**

We concur that there are no bedrock water levels in the vicinity of TP8. This is a relatively small site and there are nine monitoring locations along the northern property boundary. These are M13S, M13D, TP1, M14S, M14D, M2, M3, SW4 and TP8. These monitors provide adequate background information for overburden and bedrock groundwater systems.

- **Wet Season Monitor M15**

The water levels in each of the monitors vary from season to season and higher water levels in the spring are a normal occurrence. The water levels in M2 were 0.64 meters higher in April 2014 than shown on Figure 3.17 and the water levels in M4 were 0.82 meters higher in April 2014 than shown on Figure 3.17. Therefore a higher water level in M15 compared to the interpolated potentiometric contours shown on Figure 3.17 is expected.

- **Distorted Data in Tributary B Corridor**

The model calibration was conducted on a regional scale and the addition of one or two more data points will not significantly improve the overall accuracy of the model. The model is a reasonable tool to understand the potential impacts of the mining on bedrock groundwater levels. Several variations of the model have been developed with each providing similar results. The nature of groundwater flow in the aquifer is understood adequately to allow for the development of the groundwater model. Multi-level groundwater monitor M15 was installed at the request of the Township of Guelph/Eramosa in the Tributary B corridor and the water levels obtained and aquifer characteristics estimated from in-situ testing proved that the model was using reasonable estimates of aquifer characteristics.

2.2 Groundwater Modelling

The model has been used as a tool to assist in the predictions of change to the water levels in the bedrock groundwater system. The understanding of groundwater flow in this area is based on;

- monitoring groundwater levels for seventeen years
- conducting pumping tests in the Gasport Aquifer in several places east of Rockwood

- observing drilling of bedrock wells
- obtaining streamflow measurements in Tributary A, Tributary B and Tributary C
- working as a professional hydrogeologist in Wellington County for twenty five years with knowledge of other groundwater models, monitoring the water level changes in other quarries and gravel pits, reviewing the monitoring results of other gravel pits and quarries.

Seasonal variation occurs in all of the on-site monitoring wells and when water levels at one well are elevated, they are elevated in all wells. Therefore, during a relatively wet year, all of the water levels in the area will be high and during a dry year, all of the water levels will be lower. The predicted final water levels in the east and west ponds are based on a reasonably calibrated groundwater model using regional groundwater data obtained at different times of the year. As such, the model likely represents average groundwater condition (not dry and not wet season conditions). The final pond levels will also fluctuate seasonally by the same amount as the existing groundwater does (approximately one and a half metres).

The groundwater model uses estimates of transmissivity and saturated thickness in order to calculate groundwater flux and re-calculate groundwater levels. The model is not sensitive to minor changes in transmissivity or saturated thickness, therefore minor seasonal changes will not influence the usefulness of the model to predict water level change.

2.2.2 Adversely Affected Groundwater Model

The groundwater model is a tool to understand groundwater flow in the bedrock aquifer on a regional scale and how the removal of the aquifer rock via quarrying will alter the groundwater flow pattern and level at a local scale. Water levels from 330 wells were used to calibrate the model to industry standards. The regional groundwater pattern is similar to that of other calibrated models and potentiometric maps of water levels obtained from water wells.

The underestimation of predicted water levels at specified locations north of the proposed quarry and overestimation of predicted water levels elsewhere does not translate into an underestimation of predicted drawdown. Drawdown is a function of transmissivity, saturated thickness and time. The transmissivity estimate used in the model has been proven to be a reasonable estimate through the testing conducted in M15 and is similar to other groundwater models prepared for this area. The reviewer is confusing an underestimation of modelled baseline conditions with an underestimation of predicted drawdown conditions.

2.3 Predicted Maximum Lake Water Levels (Post-Extraction)

The bedrock surface and groundwater levels in Phase 1 are higher than the 349 m AMSL quarry floor shown on the site plans. This means that the quarry will have to operate at least temporarily as high as at the 354 m AMSL water level. Noise predictions may need to be updated.

All groundwater and ecological assumptions for worst case scenario are based on the maximum potential impact and therefore are not affected by proposed elevation of pit floor. In order to remain dry during Phase 1, the pit floor will need to be raised to 354 m AMSL.

2.4 Drainage Ditch 'Tributary B'

The peer reviewer is of the opinion that historically, water seasonally retained in Tributary B would have been of benefit to the Brydson Spring. The quarry will provide a similar if not greater benefit through the storage of water in the future ponds.

2.5 Guelph Limestone Quarry not Valid as an Analogue for Hidden Quarry

No volumetric balance/mass balance was prepared for the Guelph Limestone Quarry as an analogue for the Hidden Quarry. The Guelph Limestone Quarry is used as a local example of subaqueous extraction and the potential impact on water quality that can occur from blasting. No analogy was made between the Guelph Limestone Quarry and the proposed Hidden quarry.

The source area for the Brydson Spring incorporates a much larger area than just the proposed Hidden Quarry, therefore, flow in the creek will be greater than that predicted to flow through the quarry.

3.0 DRY OPERATIONAL QUARRY FLOOR AND ACTUAL OPERATIONAL DRAWDOWNS

The assumption made by the reviewer that the quarry needs to operate at the elevation of the bedrock/overburden contact is incorrect.

3.1 Top of Bedrock

No dewatering is required for the operation of the quarry. The quarry does not need to operate at the overburden/bedrock contact. Drilling efforts including that for M3, M15 and M11 in the Tributary B corridor do not corroborate the peer reviewer's supposition that there is a depression in the bedrock surface beneath the Tributary B corridor.

3.2.1 Phase 1 Operations (Fig 3.1)

There will be no active dewatering of the quarry. The quarry floor in Phase 1 will remain above the high bedrock water level. The site plan will be revised.

The hydraulic barrier will be installed in the vicinity of TP2, thereby maintaining overburden water levels beneath the wetland and allowing overburden water levels to decline in the active quarry area.

Full drawdown of the quarry will occur passively over the lifetime of the quarry.

3.2.1.1 Dewatering (Phase 1)

There will be no dewatering of the quarry. Where necessary, the site plans will be revised to show the pit floor above the water table.

3.2.1.2 Wash Water and Silt Ponds

Silt ponds require the retention of water, not the exfiltration of water. Therefore, the ponds can be established in the water table or above. The purpose of the silt ponds is not to infiltrate water. Therefore, mounding of water is not an issue for the silt ponds. Excess water is returned to the source pond in order to maintain water levels and loss of water is not desired.

There will be no dewatering of the quarry and therefore, no loss of baseflow to Brydson Spring.

3.2.2 Phase 2 (Fig 3.2)

The peer reviewer has incorrectly assumed that the quarry must operate at the bedrock/overburden contact. Therefore, the assumed pit floor elevation of 351 m AMSL is incorrect.

Two sets of mini piezometers confirm that Tributary B is a losing stream to the east and to the west.

There will be no dewatering of Phase 2. The ultimate lake level depends entirely on existing groundwater levels. The predicted drawdown at the north end of Phase 2, is approximately 1.4 metres. This is less than on the west side because the quarry excavation has less length in the direction parallel with groundwater flow.

3.2.3 Phase 3 (Fig 3.3)

There will be no dewatering of the quarry. The pit floor will be adjusted to remain above the water table.

4.0 ADAPTIVE MANAGEMENT

4.1 Groundwater Monitor - Trigger Levels

A discussion on trigger levels should occur once additional groundwater monitors have been installed and seasonal data obtained. I have not reviewed Mr. Hunter's suggestions at this time.

4.2 Groundwater Quality

Baseline water quality samples will be obtained prior to quarry activities commencing. Details of water quality triggers can be developed after additional samples are obtained and prior to commencement of active quarrying. A detailed groundwater quality monitoring program has been presented to hydrogeologists representing the Ministry of the Environment and Climate Change and the Township of Guelph Eramosa. Through their comments a stringent protocol for water quality testing has been developed.

5.0 DOMESTIC WATER WELL INTERFERENCE

5.1.1 W5 (MOE 67-07545)

The peer reviewer is confusing predicted water level at baseline conditions with drawdown. There cannot be a four metre drawdown at Well W5 when there is a maximum predicted drawdown of 2.54 m in the quarry. Well W5 is a high producing well which according to the well record had about 1.5m of drawdown at a pumping rate of 1.1 L/s. Water was “found at” a depth of 18.8 m, significantly below the final water elevation in the quarry. The large volume of water stored in the quarry ultimately becomes a positive recharge boundary, thereby improving the overall productivity of the aquifer.

5.1.2 W7 (No MOE Well Record)

The owner has categorically refused entry to both Guelph/Eramosa Township (during pumping test of TW2) and Harden Environmental. The well house is unsafe. Inspection was not allowed in 1998 for the same reason. Nonetheless, James Dick Construction Ltd. is responsible for well replacement if the quarry interferes with the functioning of the well.

5.1.3 W31 (No MOE Well Record)

The water quality presented by Mr. Hunter clearly identifies that the well water quality is being compromised by nearby farming activities. In 2012 the water sample exceeded the Ontario Drinking Water Standard for nitrate and in 2014 the nitrate concentration is 96.3% of the drinking water standard. Nitrate is an indicator of anthropogenic contamination of well water, in this case, barnyard wastes. The resident has been aware of the elevated nitrate issue for some time and should be taking measures to reduce nitrate concentrations through treatment methods. The presence of nitrate in the well is an indication that there may be other undetected contamination in the well.

5.1.4 Domestic Well W24

There is opportunity to lower the pump in the well. James Dick Construction Ltd. will make this adjustment to the well if necessary or provide the residence with a new well if necessary.

5.2 Water Quality Impacts on Downgradient Domestic Wells

The potential mitigation for these wells include deepening or replacement as agreed to by James Dick Construction Ltd.

5.3 Drawdown Impacts on Allen Wetlands, Allen Springs, De Grandis Ponds and Brydson Springs

The minor differences in observed static water levels in M15-II and M15-III compared to M15-IV do not have any relationship to the distance to potential areas of recharge. Greater hydraulic potentials (than occur in any of the M15 multi-level piezometers) occur within the proposed Hidden Quarry site boundaries and can be the source of greater hydraulic potentials observed in M15.

5.3.1 Allen Wetlands

The elevation of the Allen Wetlands is higher than Tributary C (a losing stream), the proposed Hidden Quarry site and depressions immediately west of the wetland. There is no groundwater discharge to the Allen Wetland from these areas. The water levels in TP8 confirm that the water table on the site is at least four metres below that of the wetland. Any drawdown in the bedrock aquifer at the site cannot have an impact on support hydrology for the Allen Wetland. The greatest direct impact to the wetland comes from (a) water retained by the De Grandis ponds and (b) channelization of Tributary B through portions of the Allen Wetland. In the absence of the De Grandis ponds, the spring discharge water would flow from the De Grandis spring for a longer period of time. Provided with a complete application, the GRCA was prepared to issue a permit to Ms. De Grandis to deepen the ponds and thereby allow alteration of the surface water flow to the wetland (delay flow from the ponds in the fall). Although this would potentially have a direct impact to the hydro-period of the Allen wetland the GRCA has deemed this acceptable.

5.3.2 Allen Springs and Farm Pond

The Allen Spring is located immediately downgradient from a prominent topographical feature rising some twenty metres above the Allen Farm. The quaternary geology unit where the spring is found is identified as kame and esker deposits, a relatively permeable formation. The other prominent geological formation identified in this area is the Wentworth Till, a geological formation that is less permeable. The source area for the Allen Spring is north and east of the spring (away from the proposed quarry). Two measurements on the Allen property confirm that there are six to eight metres of overburden overlying bedrock beneath the Allen property. The bedrock well on the Allen Farm has a static water level approximately six metres below that of the Allen Spring confirming that flowing artesian conditions are not prevalent in the area. Therefore, it is not likely that the Allen Spring has a bedrock source. The emergence of groundwater to the ground surface signifies that the preferential flow path (the path of least resistance) is not to remain in the subsurface, suggesting that greater resistance to groundwater flow occurs in the subsurface. The resistance to groundwater flow cannot be affected by the quarry, therefore, groundwater originating from the north and northeast of the Allen Spring will continue to follow the same flow path.

5.3.3 De Grandis Farm Ponds (W31)

The water quality of Tributary B is more reflective of shallow groundwater than surface water and consistently contains elevated nitrate concentrations consistent with farming activities occurring on the De Grandis farm. The spring discharge observed by Ms. De Grandis also confirms that this is groundwater discharge. However, there are no chemical parameters suggestive that the water in Tributary B is of a bedrock origin and in fact, the elevated nitrate and low sulphate concentration suggest a shallow overburden source.

5.3.4 Brydson Springs

There will be no reduction in groundwater levels upgradient of the Brydson Spring, therefore there is no potential for loss of groundwater discharge to the Brydson Spring or associate creek flow.

6.0 PROPOSED MONITOR WELL LOCATION DEFICIENCIES AND NEW MONITOR WELLS RECOMMENDED

6.1 New Groundwater Monitoring Wells

Evaluation by hydrogeologists from the Ministry of the Environment and Climate Change, Halton Region, the Township of Guelph-Eramosa and the Grand River Conservation Authority resulted in the addition of four monitoring wells at the site. In addition, James Dick Construction has agreed to modify/replace monitoring well M3.

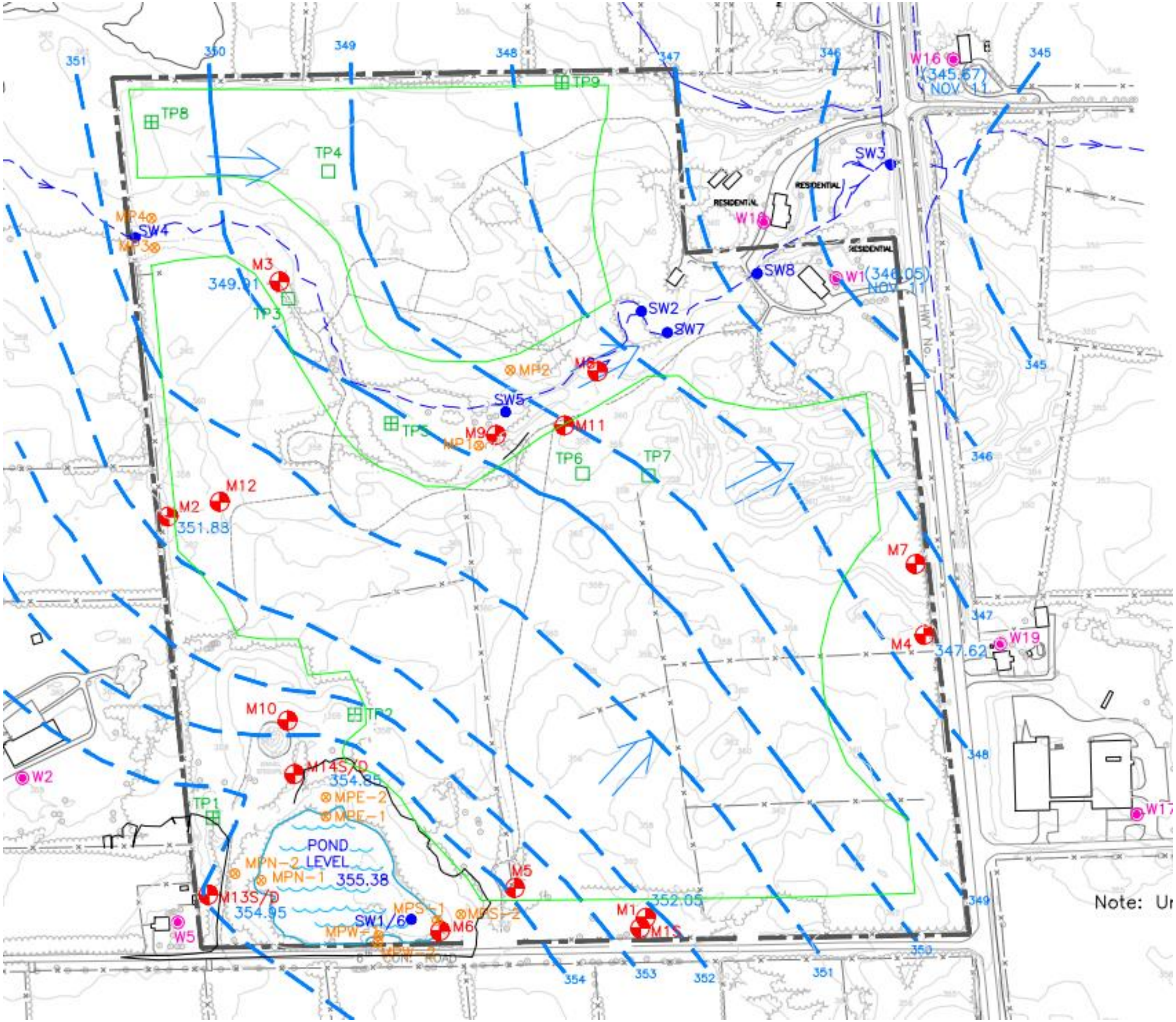
The purpose of the existing and additional monitoring wells is to provide verification of water level change during extraction and verification of the maintenance of water quality standards. Detailed contingency and mitigation plans will be invoked should water levels or water quality changes exceed threshold values.

In addition to the on-site monitoring network, James Dick Construction Limited has agreed to 1) off-site streamflow monitoring of Tributary A and B and 2) include select private wells where accessible and with owner permission.

Where needed, trigger levels will be developed for the monitoring wells and included on the site plans prior to commencement of quarry activities.

Sincerely,
Harden Environmental Services Ltd.

Stan Denhoed, M.Sc., P.Eng
Senior Hydrogeologist



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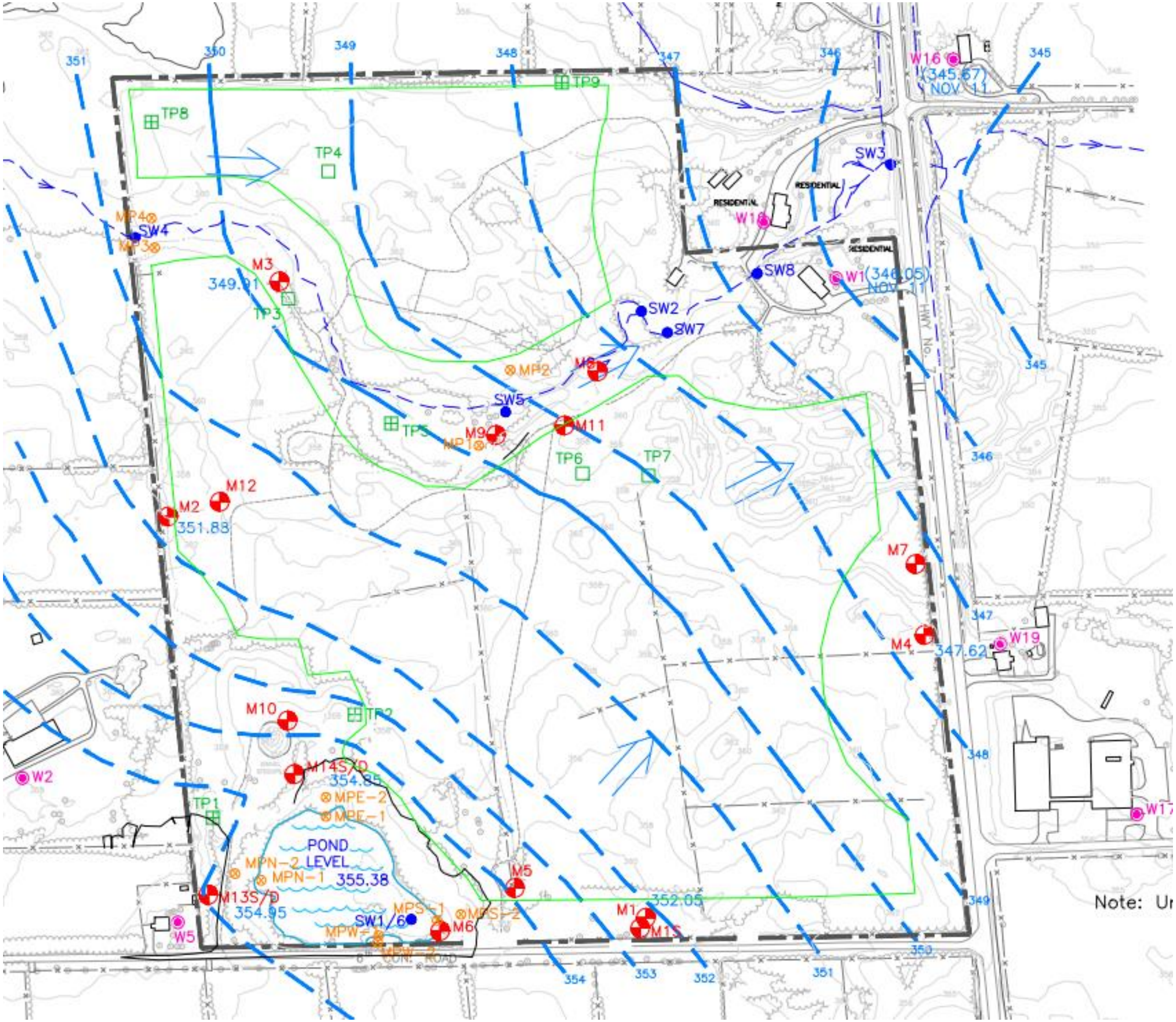

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Leigh Mugford

From: Leigh Mugford
Sent: Monday, August 31, 2015 2:28 PM
To: Liz Howson
Cc: Greg Sweetnam
Subject: Hidden Quarry Hydrogeology latest comment W31
Attachments: 150821_Burnside Response to Harden Letter (Aug 17).pdf; Response to Burnside Hydrogeology Comments dated July 28, 2015; Fwd: Investigation for Water Source of Pond

Hello Ms. Howson,

I am sending you a copy of the response from Ms. De Grandis following Harden Environmental Services' offer to her to carry out an investigation as to the source of well and pond water on her property as had been mentioned by Hunter Associates and later as an optional investigation recommended by RJ Burnside. I will attach the correspondence from RJ Burnside and Harden which clearly indicate that the current 'on site' proposed hydrogeological monitoring program is considered sufficient by RJ Burnside without the additional work on the DeGrandis property should Ms. De Grandis opt not to pursue this investigation, which is currently the case.

This activity and response provides you a resolution to the final outstanding hydrogeological comment from RJ Burnside on this project. It is our understanding that the Burnside Hydrogeological peer review has been given satisfactory responses to all comments.

Leigh Mugford
Resource Manager
James Dick Construction Ltd
lmugford@jamesdick.com
office 905-857-3500
cell 416-579-9426
fax 905-951-5521

Grand River Conservation Authority

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

September 11, 2015

Ms. Kimberly Wingrove
Township of Guelph/Eramosa
8348 Wellington Road 124
P.O Box 124
Rockwood, ON

Dear Ms. Wingrove:

Re: Review of Hunter and Associates Peer Review of Zoning By-law Amendment ZBA09/12 – (James Dick Construction – Hidden Quarry)

In a letter dated June 22, 2015 the Township of Guelph/Eramosa requested that the Grand River Conservation Authority (GRCA) review the submitted Hunter and Associates Peer Review, dated May 15, 2015 and provide any comments to the Township in an advisory capacity.

The above noted report has been reviewed by GRCA technical staff in response to the Township request. Based on our review of the information provided in the Hunter report, we advise that our position as noted in our attached July 29, 2014 correspondence remains unchanged.

Please contact the undersigned if you have any questions.

Yours truly,

Jason Wagler MCIP RPP
Resource Planner
Grand River Conservation Authority

Encl. (1)

cc. MSH Planning, Liz Howson
County of Wellington, Aldo Salis
Regional Municipality of Halton, Adam Huycke
Burnside, Dave Hopkins
James Dick Construction, Greg Sweetnam & Leigh Mugford

RECEIVED

SEP 17 2015

Township of Guelph/Eramosa