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July 24, 2019

New Brunswick Department of Environment and Local Government
Marysville Place
20 McGloin Street, 3rd Floor
P. O. Box 6000
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E3B 5H1

Attention: Ms. Cassandra Colwell
Project Manager, Environmental Impact Assessment Branch

RE: Hammond River Holdings' Response to Technical Review Committee (TRC) Questions and Comments Round #4 – Proposed Upham East Gypsum Quarry (EIA Registration Document File No. 4561-3-1508)

Hammond River Holdings Limited (Hammond River Holdings) has reviewed and addressed the latest comments provided by the Technical Review Committee (TRC) in its letter dated May 28, 2019 in relation to the Proposed Upham East Gypsum Quarry Environmental Impact Assessment (EIA) registration document (registered on November 2, 2018). Hammond River Holdings' responses are provided below.

QUESTION FROM TRC:

The following question was provided to Hammond River Holdings by the TRC:

"22. It has been identified that there are wells located within 600 metres of the proposed project location. Have you obtained written permission from those well owners within 600 metres of the proposed project location? If owner consent is not obtainable, a report from a professional engineer/geoscientist providing sound rationale as to why the quarry operation (all aspects including construction, operation, blasting, etc.) will not impact those wells within 600 metres will be required. Can you please provide this report?"

HAMMOND RIVER HOLDINGS' RESPONSE:

Based on further conversations with NBDELG representatives, it has been clarified that the generic 600 m setback is intended to mitigate potential impacts to domestic water wells potentially caused by ground vibration arising from blasting activities. In discussing the Project with some residents, it was brought to our attention that there were at least some residents who felt that they were not provided sufficient information to them to give an informed opinion on blasting within 600 m of their wells. Hammond River Holdings thus decided to proceed with a third-party report as mentioned in the question, prepared by a professional geotechnical engineer, to examine the risks of a project of this nature, to help inform residents of the area. The attached Blast Control

and Monitoring Plan provide additional scientific information concerning blasting effects.

Studies have concluded that domestic water wells can withstand a peak particle velocity (PPV) greater than 50 mm/s without incurring structural damage. Therefore, the current NBDELG limit of 12.5 mm/s is protective of water wells. Blasts will be designed by a professional blasting contractor to meet this 12.5 mm/s threshold. Blasting will initially occur greater than 600 m from the nearest off-site receptor. This will provide an opportunity to refine the blast design before the offset distances become closer to residential wells throughout the project life.

Compliance with the 12.5 mm/s will be measured at multiple locations around the perimeter of the quarry including the nearest residential receptor. A meeting has been scheduled to review the Blast Control and Monitoring Plan with homeowners within 600 m of the site. The exact locations of seismographs will be confirmed based on input from homeowners.

QUESTION FROM TRC:

The following question was provided to Hammond River Holdings by the TRC:

"28. Based on knowledge of existing quarries in the province, it has been determined that dust can be an issue. The information provided indicates that you are proposing to pave the first 30 metres of the access road at the entrance to the quarry. Has it been determined that 30 metres of paving is sufficient to prevent dust from being tracked onto Route 111 and becoming airborne? Have you considered paving a longer section of the access road? How are you going to mitigate dust from the paved section of the access road and prevent dust on Route 111?"

HAMMOND RIVER HOLDINGS' RESPONSE:

Neither Dillon nor Hammond River Holdings are aware of any requirements under the New Brunswick Highway Act or the regulations or standards developed under it that specifically require paving of the apron of a driveway or internal site road. NBDTI determines specific requirements on a site-by-site basis, and to our knowledge, where NBDTI has recommended paved aprons in the past, they tend to recommend that aprons to highways be paved 10 m or less from the highway, which appears to be intended to protect snow plows from damage and to accommodate the turning radius for trucks entering a public road rather than for dust control.

However, the following important references supporting the decision to pave the initial 30 m of the site access road are provided for your consideration.

- A literature review conducted by Golder Associates on behalf of The Centre for Excellence in Mining Innovation titled "Literature Review of Current Fugitive Dust Control Practices within the Mining Industry" (Golder 2010, p. 2) indicates that "Studies have demonstrated that more than 80% of the dust generated by truck movements is greater than 10 µm and concentrations decrease to nearly background levels within 30.5 metres of a roadway".
- In a paper titled "Characterization of Mud/Dirt Carryout onto Paved Roads from Construction and Demolition Activities" (USEPA 1996, p. 4), the United States Environmental Protection Agency observed that a 100 foot (30 m) long gravel buffer can reduce the transport of particulate matter greater than 10 microns (PM_{10}) by an estimated 57 to 68%.
- A report prepared by Cheminfo Services for Environment Canada's Transboundary Issues Branch titled "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" (Cheminfo 2005, p. 20) identifies that a best practice to manage carryout of dust onto public highways include paving at least the first 30 m into a site, among other best practices.
- Although the Project site is located in an unincorporated area with no municipal or rural plan, it is worth noting that the nearby City of Saint John's Zoning Bylaws require that every private access road roads to a pit or quarry shall be paved for the first 30 metres from its intersection with a public street (City of Saint John 2016, p. 183).

Additionally, Hammond River Holdings has committed to maintaining an on-site speed limit of 30 km/h in order to reduce the generation of fugitive dust from unpaved roadways.

Given this information, Hammond River Holdings believes that paving the first 30 m of the site entrance constitutes best practice, and therefore paving beyond the first 30 m of the access road will not significantly reduce airborne dust. However, Hammond River Holdings will place crushed rock on the surface of the access road between the storage pads and the paved area in order to minimize tracking of mud onto roads and subsequently the generation of airborne fugitive dust. Note that this is the minimum commitment made by Hammond River Holdings and that this 30 m could be extended upon further study through the operational planning stage of the Project.

Additionally, the following mitigation measures have been committed to in Section 5.2.3.2 of the EIA registration document in order to control the generation and transport of airborne fugitive dust:

- "Maintaining a tree buffer where possible between on-site activities and nearby receptors to mitigate the effect of sound and emissions;

- Application of dust suppressants during dry periods when appropriate;
- Instituting and following a non-idling policy;
- Vehicles and equipment will be maintained in proper working order;

Further dust control measures may be identified in the environmental protection plan (EPP) that is being developed for the Project.

Closing

We trust this meets your present requirements. Should you have any questions regarding the above responses and Blast Control and Monitoring Plan, please do not hesitate to contact the undersigned, at your convenience.

Sincerely,
DILLON CONSULTING LIMITED

Denis L. Marquis, M.Sc.E., P.Eng.
Associate

DLM:dlm

Enclosure

Our file: 18-8346

References:

Cheminfo (Cheminfo Services Inc.). 2005. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities. Prepared by Cheminfo Services Inc. in conjunction with the Construction and Demolition Multi-stakeholder Working Group for Environment Canada's Transboundary Issues Branch, Markham, ON. March 2005. Available online at: http://www.bv.transports.gouv.qc.ca/mono/1173259.pdf.

City of Saint John. 2016. The City of Saint John Zoning By-Law 2014 (Office Consolidation October 2016). City of Saint John, Saint John, NB. October 2016. Available online at: https://www.saintjohn.ca/en/home/cityhall/developmentgrowth/communityplanning/zonesj/default.aspx.

Golder (Golder Associates Ltd.). 2010. Literature Review of Current Fugitive Dust Control Practices within the Mining Industry. Prepared for The Centre of Excellence in Mining Innovation by Golder Associates Ltd., Report Number 09-1192-0105. August 11, 2010. Available online at: https://www.cemi.ca/wp-content/uploads/2017/06/Literature.pdf.

USEPA (United States Environmental Protection Agency). Characterization of Mud/Dirt Carryout onto Paved Roads from Construction and Demolition Activities. United States Environmental Protection Agency, National Risk Management Research laboratory, Research Triangle Park, North Carolina. January 1996. Available online at: https://nepis.epa.gov/Exe/ZyNET.exe/P1000I74.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000020%5CP1000I74.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL#.

Hammond River Holdings Limited

Blast Control and Monitoring Plan
PROPOSED UPHAM EAST GYPSUM QUARRY

UPHAM, NB

Prepared by:
Conquest Engineering Ltd.
575 Crown Street, Saint John, N.B.
July 18, 2019

Project No. 191048

Conquest Engineering
Experience commitment.
Geotechnical and Materials Engineers

Saint John
Moncton
Fredericton
Bedford

1.0 INTRODUCTION

Hammond River Holdings Limited (HRH) is currently in the planning and approval stage for a proposed Gypsum Quarry located in Upham East, New Brunswick. On November 2, 2018, HRH has submitted an Environmental Impact Assessment (EIA) registration document #1508 for a determination review under NB Reg 87-83. The determination review is being undertaken by the Environmental Impact Assessment Branch for New Brunswick Department of Environment and Local Government (NBDELG), who have assembled a multidisciplinary Technical Review Committee (TRC) to independently review the EIA registration document. During the review process the TRC have requested that HRH provide a Blasting Control and Monitoring Plan. More specifically, the TRC are particularly interested in the potential blast impacts on domestic water wells within 600m of the Quarry.

The following plan provides a rationale for the blast monitoring criteria, which need to be protective of buildings, water wells and residential dwelling located on adjacent properties. It also outlines the planned pre-blast surveys and proposed locations for seismographs (accelerometers).

2.0 BACKGROUND ON BLAST EFFECTS

The origin of modern day blasting methods can be traced back to the invention of the detonator by Alfred Nobel in 1863. Since then extensive research has been conducted to develop acceptable standards for blast design and monitoring to control ground vibration and air-overpressure. The three primary standards currently employed in Canada were developed by the Unites States Department of the Interior, Bureau of Mines:

1. RI-8507: **Structure Response and Damage Produced by Ground Vibration From Surface Mine Blasting**, D. E. Siskind, M. S. Stagg, J. W. Kopp, and C. H. Dowding, 1980
2. RI-8485:**Structural Response and Damage by Airblast from Surface Mining,** D. E. Siskind, M. S. Stagg, J. W. Kopp, and C. H. Dowding, 1980
3. RI-8896: **Effects of Repeated Blasting on a Wood-Frame House**. Stagg, M.S., D.E. Siskind, M.G. Stevens and C.H. Dowding. 1984

As outlined in the papers above, there are several variables and site specific constants that need to be considered by professional blasters. Some key findings that provide additional context in relation to the potential effects resulting from blasting activities at the Upham East site are summarized below:

- The particle velocity (PPV) and frequency are reliable parameters for establishing safe level thresholds for ground vibrations;
- Gypsum board (drywall) walls can withstand higher vibrational forces than older, plaster on lathe construction;
- Ground vibrations can be reduced by distributing the required quantity of blasting agent into a series of blast holes drilled into the rock mass being excavated. The series of blast holes then can be detonated in a controlled sequence using delays to manage PPV and the frequency of the blast.
- The weight of explosives fired per delay and the distance to the structure (house, water well etc.) are the primary parameters that determine the ground vibration levels;
- Humans can perceive air blast and vibrations at levels far below levels that produce minor cosmetic damage to structures;
- The dissipation of ground vibrations with increasing distance from a quarry is non-linear. Vibrational energy dissipates radially from the blast area, resulting in a square root empirical scaling factor for PPV at distance greater than 30m from the nearest residential dwelling or structure.

Upon detonation of a blast hole the resulting energy is transmitted to the surrounding rock mass. Physical fracturing or brittle deformation of the bedrock occurs within 20-40 times the diameter of the blast hole (US Department of Transportation, 1991). At Upham the blast hole diameter will be 200mm or less, limiting the fracturing to within an 8m radius of each detonation point within a blast. As noted above, the intensity of the stress wave attenuates rapidity with increasing distance and there is typically no permanent deformation of the rock beyond 20-40 times the diameter of the blast hole. Instead the remaining energy travels through the unbroken rock as pressure waves, generating ground vibrations measured as PPV.

Some of the energy from the blast is also transmitted into the air as a result of minor explosive venting through cracks or voids in the rock and the physical fragmentation of the rock mass. This produces an audible pressure wave that is measured on a logarithmic scale in dB(L), which should not be confused with other more common scales such as dB(A), dB(B) or dB(C).

The NBDELG guidelines for regulating blasting activities in quarries are among the most stringent in North America and are protective of older, plaster on lathe construction. The NBDELG limits measured at the receptor or structure are as follows:

- Vibration: 12.5mm/s PPV
- Air overpressure: 128 dB(L)

Blasting activities conducted near fish bearing water courses will also be completed in compliance with the "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (1998). It should be noted that the Department of Fisheries and Oceans Canada (DFO) have determined that offsetting is required for a portion of the watercourse located to the east of the project. Any requirements identified by DFO will need to be incorporated into this plan.

Tables 1a and 1b Provide typical vibration and sound levels for various activities to illustrate their relative intensities.

Table 1a
Strain Levels Induced by Household Activities
Environmental Changes and Blasting

Loading Phenomena	Site[a]	Microstrain Induced by Phenomena (µin./in.)	Corresponding Blast Level Vibration[b] (mm/s)
Daily Environmental Changes	K_1 K_2	149 385	30.0 76.0
NBDELG Established Safe Limit	**Not Applicable**	**Not Available**	**12.5**
Household Activities 1. Walking 2. Heel Drops 3. Jumping 4. Door Slams 5. Pounding Nails	 S_2 S_2 S_2 S_1 S_{12}	 9.1 16.0 37.3 48.8 88.7	 0.8 0.8 7.1 12.7 22.4

[a] K_1 and K_2 were placed across a taped joint between two sheets of gypsum wallboard
[b] Blast equivalent based on envelope line of strain vs. ground vibration
Source: Bender (1985)

Table 1b
Relationship of dB(L) to Pressure and Probable Result of Various Air Overpressure Intensities

Air overpressure Intensity		Probable Result or Outcome[b]	Average Human Response[d]
dB(L)	**psi[a]**		
180	2.900	Structural damage	Ear drum rupture possible
176	2.0	Plaster cracks[c]	
170	0.917	Many windows break	Intolerable
155	0.163	Poorly mounted windows can break	
150	0.092	equal to a 154 km/hr wind gust	
140	0.029	equal to a 64 km/hr wind gust	Distinctly unpleasant
130	0.0092	equal to a 37 km/hr wind gust	
128	**0.007**	**NBDELG Established Safe Limit or equal to a 32 km/hr wind gust**	
120	0.0029		Mildly unpleasant
110	0.00092	equal to a 12 km/hr wind gust	
70	0.0000092		Distinctly perceptible
60	0.0000029		Perceptible

[a] dB(L) = 20 log (psi / 2.9 x 10 -9)
[b] psi = 1.78 x 10-5 x V2; where V is the wind speed in miles per hour
[c] Supplemental information from Konya et. al. (1991)
[d] People's tolerance to noise can be variable; the information is provided as a guide. Humans cannot reliably estimate the intensity levels of vibration and airblast.
Source: Bender (2007)

The recommendations included herein are based on a literature review and experience with quarry blasting in New Brunswick.

3.0 LOCATION OF PROPOSED QUARRY

The location of the proposed quarry is on property in the Hammond River valley in East Upham, NB which is bounded by Highway 820 to the north, by Crossing Road to the east, by Highway 111 (St. Martins Road) to the southeast and south and by Myron Road to the west.

The location of the proposed quarry and site configuration is shown on the attached map prepared by Dillon Consulting. In addition to presenting the proposed quarry boundary within the property the map also presents, among other features, the following:

- The operation perimeter of the proposed quarry,
- The 600 m buffer of the operational perimeter,
- The 600 m buffer of the quarry boundary perimeter,
- The location of fifteen (15) residential properties with structures (identified by the location of water samples collected from domestic water wells - "PW-#") in the area

There is also a fish bearing watercourse that runs near the eastern perimeter of the quarry. Surface water quality monitoring is addressed in a separate environmental protection plan.

4.0 PRE-BLAST SURVEYS

Prior to the commencement of quarry operations, a letter will be provided to the owners of the fifteen (15) identified residential properties offering to have a pre-blast survey carried out of the structures. Contact names and phone numbers will be provided for residences to arrange for the pre-blast survey to be conducted at a mutually-convenient time.

The pre-blast survey will be carried out in accordance with Article 5.2 of the *Blasting Code – New Brunswick Regulation 89-108 under the Municipalities Act (O.C. 89-606).* The surveys will consist of high definition photos accompanied by hand drawn sketches of existing conditions and defects. Copies of the pre-blast surveys will be provided to the property owners at their request.

The letter will also serve as initial notification of the planned quarry activities. Notification during active quarry operations, prior to and immediately following each blast event, will be by way of an audible warning (air horn) as described in Section 6.0.

5.0 WATER WELLS

Industry studies have shown that the vibrations below 50 mm/sec do not cause structural damage to wells and do not negatively impact the well yield. However blast vibrations may cause some turbidity, which is temporary (Philip R. Berger & Associates, 1980; Konya et. al. 1991; Explotech, 2016). For comparison purposes, a similar sized quarry operation located the in Faraday Township of Ontario received zoning approval to proceed earlier this year. This quarry will be conducting blasting operations within 100m of water wells (Explotech, 2016).

The offset from the final perimeter of the proposed Upham East Quarry is presented in Table 2. During Year One blasting activities will be conducted at distances greater than 600m from any domestic water wells or structures, providing an opportunity to refine the blast design based on blast monitoring data to account for site specific conditions.

Table 2
Offset Distances from the Final Upham East Quarry Perimeter to Surrounding Domestic Water Wells

Location Relative to Quarry	Civic Address	Approximate Distance (m) of water well from Quarry Area[a,b]
➢ Northwest	(redacted)	520
➢ Northwest	(redacted)	780
➢ North	(redacted)[c]	360
➢ North	(redacted)[c]	300
➢ North	(redacted)[c]	260
➢ Northeast	(redacted)	590
➢ West	(redacted)	590
➢ Southwest	(redacted)	>1000
➢ South	(redacted)	>1000
➢ South	(redacted)	>1000
➢ South	(redacted)	700
➢ South	(redacted)	750
➢ South	(redacted)	640
➢ South	(redacted)	580
➢ Southeast	(redacted)	1000
➢ East	No water wells within 1.5 km	

[a] The offset distances to be verified by a professional blaster prior to conducting blasting activities at the site
[b] The "quarry area" is defined as the area where blasting is required for rock removal. The "operational perimeter" is larger and encompasses both the quarry and material stockpile areas.
[c] Datalogger has been installed in the domestic well at this location to record water levels

Pending homeowner consent, water wells will be sampled from fifteen (15) active domestic water supply wells and tested for water quality as background data. Dataloggers have already been installed to record water levels in the three closest domestic water wells to the final quarry perimeter at the following locations:

- 2341 Highway Route 820
- 2337 Highway Route 820
- 2349 Highway Route 820

Water levels will continue to be monitored while the site is operational. Additional water quality testing will also be completed on an annual basis for domestic wells within 600m of the operational perimeter of the site and the perimeter monitoring wells while the quarry remains active.

6.0 AUDIBLE WARNING PROCEDURES

Prior to each blast event an audible warning signal will be given by use of a compressed air whistle or horn audible to the closest residents to the quarry. The signal sequence will be as follows:

WARNING SIGNAL (5 minutes prior to the blast) -	A 1-minute series of long, audible signals
BLASTING SIGNAL (1 minute prior to the blast) -	A series of short, audible signals
ALL-CLEAR SIGNAL (following inspection of the blast area) -	A prolonged audible signal

7.0 Vibration and Air Blast Monitoring

Effects from rock blasting operations are principally in the form of ground vibration and air over-pressure (air blast). Regulations have been established and put in place to limit ground vibrations and air over-pressure to safe levels and prevent damage to property and injury to people.

Seismographs will be deployed by an independent agency in the area surrounding a blasting operation to record levels of blast-induced ground vibration and air blast. The data recorded will be used to establish compliance with regulations and also to evaluate the performance of blasting agents. The seismographs are self-triggering and record the date and precise time of each blast event, the vibration velocity in 3 perpendicular directions (longitudinal, vertical and transverse) in units of mm/sec, and the air-overpressure in units of decibels.

Following each blast the information recorded from the seismographs will be reported to the Regulating Authority. Ground Vibrations and Air Blast (air overpressure) will be monitored in accordance with the CSA Standard CAN3-Z107.54-M85 (Reaffirmed 2001) *"Procedure for Measurement of Sound and Vibration Due to Blasting Operations".*

Seismographs will initially be positioned at the following locations, as identified by the water sample location on the attached Map,

- PW-01 on Myron Road
- PW-03 on Highway 820
- PW-05 on Highway 820
- PW-07 on Highway 820
- PW-09 on Highway 111
- PW-11 on Highway 111
- PW-13 on Highway 111
- PW-15 on Myron Road at intersection with Highway 820
- PW-16 on Myron Road

Monitoring at each location identified above will be conducted at the residential dwelling or water well that is closest to the planned blasting activities. Seismographs may be re-positioned periodically as required due to concerns expressed by owners of properties not previously monitored

or for optimization of seismograph deployment based on vibration and air overpressure data developed over time.

An additional seismograph will also be deployed to collect data at the perimeter monitoring wells, which are planned to be installed between the quarry operations and the adjacent residential receptors. Each monitoring well will undergo single well response testing (slug testing) prior to initiating quarry activities and will be instrumented with data loggers to record water levels while the site is operational. It is anticipated that the perimeter wells will experience higher PPV (at times possibly greater than 12.5mm/s) than the domestic water wells located on the adjacent properties. The exact location of the perimeter monitoring wells at the time of drafting this document was unknown.

8.0 Reporting Procedures

Reports of Vibration and Air Overpressure Monitoring will be submitted to the New Brunswick Department of Environment and Local Government (NBDELG) by the end of the business day following each blast event.

In the event a complaint is received by the Quarry Operator (Approval Holder) a report of the complaint will be sent by facsimile to the NBDELG Regional Office within one business day of receiving the complaint.

Within 30 days of the end of each month, the Quarry Operator (Approval Holder) will submit to the NBDELG a monthly report containing a summary of the blasting reports for all blasts that occurred during the previous month including the date and time of each blast, the trigger settings of the monitors (seismographs) and the monitoring results

Yours truly,
CONQUEST ENGINERING LTD.

G. Ross Whitcomb, P. Eng.
Director – Materials Engineering and
Construction Services

Attachment: Figure 1- Dillon Consulting Site Plan

REGISTERED PROFESSIONAL ENGINEER
Province of New Brunswick
#3264
G.R. Whitcomb
SIGNATURE
DATE
Province du Nouveau-Brunswick
INGÉNIEUR ENREGISTRÉ

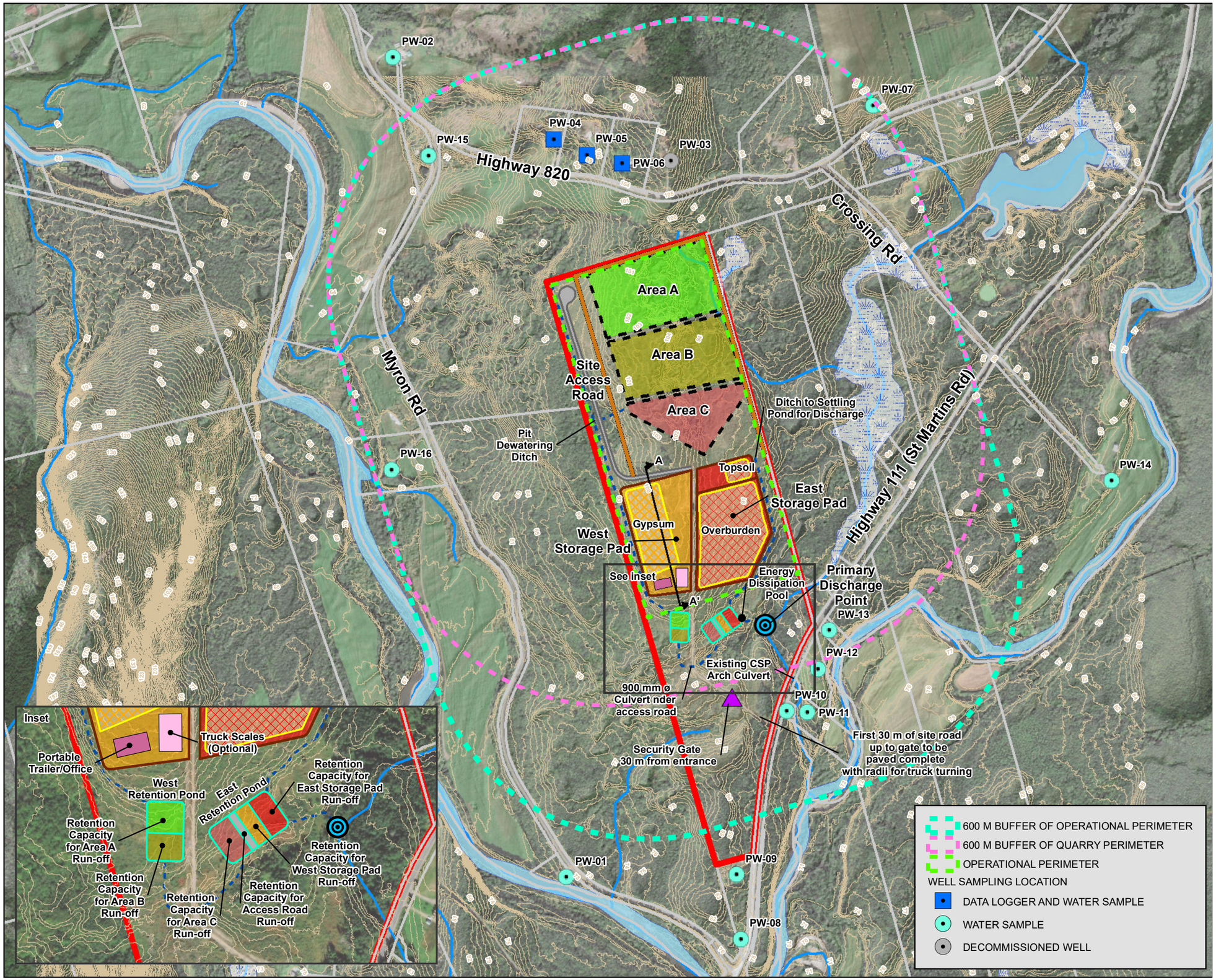
ADDITIONAL REFERENCES

Philip R. Berger & Associates, Inc. 1980. **Survey of Blasting Effects on Ground Water Supplied in Appalachia.** Prepared for the US States Department of Interior Bureau of Mines.

Calvin J. Konya, Ph.D.,and Edward J. Walter, Ph.D. (1991), **Rock Blasting and Overbreak Control.** Prepared for the US Department of Transportation, Federal Highways Administration, Publication No FHWA-HI-92-001. NHI Course No. 132 11

Explotech Engineering Ltd. (2016). **Blast Impact Analysis Freymond Quarry Part of Lots 51 & 51, Concession** W.H.R. Township of Faraday County of Hastings. Submitted to the Ontario Ministry of Environment and Climate Change by Freymond Lumber Ltd

Wright, D.G., and G.E. Hopky. 1998. **Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters**. Can. Tech. Rep. Fish. Aquat. Sci. 2107: iv + 34p.



HAMMOND RIVER HOLDINGS LIMITED
PROPOSED UPHAM EAST GYPSUM QUARRY

WELL SAMPLING LOCATIONS
FIGURE 1

- PROPERTY BOUNDARY
- PROJECT DEVELOPMENT AREA
- WATERBODY
- WATERCOURSE
- REGULATED WETLAND

PROPOSED SITE FEATURES

- DITCH
- TRUCK SCALE (OPTIONAL)
- SITE AREAS
- DISCHARGE POINT
- SECURITY GATE
- PORTABLE TRAILER/OFFICE
- ACCESS ROAD
- STOCKPILE
- STORAGE PAD
- RETENTION POND
- CROSS SECTION
- QUARRY BERM CONSTRUCTED FROM TOPSOIL AND OVERBURDEN (OFFSET MINIMUM 7m FROM PROPERTY BOUNDARY)
- HATCHING INDICATES MATERIAL STOCKPILE AREA ON TOP OF STORAGE PAD

0 50 100 200 m

SCALE 1:10,000

N W E S

MAP DRAWING INFORMATION:
DATA PROVIDED BY DILLON CONSULTING LIMITED, CANVEC
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MAP CREATED BY: BQS
MAP REVISED BY: JAB
MAP CHECKED BY: DM
MAP PROJECTION: NAD_1983_CSRS_New_Brunswick_Stereographic

FILE LOCATION: \\DILLON.CA\DILLON_DFS\FREDERICTON\FREDERICTON CAD\CAD\GIS\188346 UPHAM GYPSUM QUARRY\MXD

DILLON CONSULTING

PROJECT: 18-8346
STATUS: DRAFT
DATE: JAN 2019