

APPENDIX

A

SITE DATA



APPENDIX

A-1 *PERMITS*

AMENDED PERMIT TO TAKE WATER

Surface and Ground Water

NUMBER 7725-AACS54

Pursuant to Section 34.1 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Walker Aggregates Inc.
Post Office Box 100
Thorold, Ontario, L2V 3Y8
Canada

*For the water
taking from:* Sump #1

Located at: Lot 24, Concession 12, Geographic Township of Nottawasaga
Clearview, County of Simcoe

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

- (a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34.1, OWRA.
- (b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.
- (c) "Ministry" means Ontario Ministry of the Environment and Climate Change.
- (d) "District Office" means the Barrie District Office.
- (e) "Permit" means this Permit to Take Water No. 7725-AACS54 including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA.
- (f) "Permit Holder" means Walker Aggregates Inc..
- (g) "OWRA " means the *Ontario Water Resources Act*, R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

- 1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated August 12, 2014 and signed by Kevin Kehl, and all Schedules included in this Permit.
- 1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.
- 1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.
- 1.4 This Permit is not transferable to another person.
- 1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.
- 1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.
- 1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

- 2.1 Inspections
The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act*, S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act* , and the *Environmental Protection Act* , and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 Expiry

This Permit expires on **December 31, 2026**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	Sump #1	Pond Dugout	Pits and Quarries	Dewatering	15,000	24	21,600,000	365	17 559860 4914550
						Total Taking:	21,600,000		

Notes:

- This Permit allows water taking for quarry de-watering purposes at the "existing" quarry located on Lot 24, concession 12, Clearview as well as Phase 1 of the "expansion" quarry located on Lot 25, concession 12, Clearview.
 - Dewatering of the quarry is achieved by pumping from Sump # 1. Water management at the site also includes pumping for various **on-site** uses including: aggregate washing, dust suppression and watering of landscaped areas. Water is also pumped from the sump locations to the on-site reservoir for storage. Pumps at the new sump established within Phase 1 of the "expansion" area (Sump 3) are used to transfer water from Phase 1 of the expansion area to the sump locations within the "existing" quarry (Sump 1 and Sump 2). In addition, water collecting in various parts of the quarry may be directed to the sump locations by temporary pumps and/ or via gravity.
 - The rate and amount restrictions reflected in Table 1 above apply only to the taking of water from Sump 1 **for off-site discharge** purposes. All other internal uses and transfers of water within the quarry are not considered water takings for purposes of this Permit and are not required to be metered as a condition of this Permit. The rate and amount of water taken and discharged off-site is monitored using a meter installed on the pipe that conveys the dewatering effluent to the off-site discharge location, within the adjacent wetland designated as Rob Roy Wetland 6 (RR6). The outflow from RR6 joins a small headwater tributary to the Beaver River.
- 3.3 Notwithstanding Table A, the taking of water from Sump 1 for purposes of discharge into the RR6 wetland shall be adjusted as necessary, in accordance with any recommendation resulting from the assessments required under Condition 4.4 of this Permit (below). The adjustment may include lowering of the maximum rate, amount and/ or duration of taking from those shown in Table A. Seasonally adjusted rates and amounts may also be applied, if necessary.

4. Monitoring

- 4.1 The Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter installed on the discharge pipe. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder shall submit, on or before March 31st in every year, the daily water taking data collected and recorded for the previous year to the Ministry's Water Taking Reporting System.
- 4.2 The Permit Holder shall implement the the groundwater monitoring and well interference investigation & mitigation programs as described in Items 2 (i) and 2 (ii) of Schedule A of this Permit.
- 4.3 The Permit Holder shall monitor stream flows and water levels at appropriate locations, including locations SW1, SW2, SW02 and SW4 (a historical stream flow monitoring location on the tributary stream, located upstream of SW02) and drive point piezometers DP2 and DP4 within the wetland designated as RR6. The monitoring type and frequency shall be consistent with the descriptions provided in Table 3.4 of Item No. 4 of Schedule A of this Permit (i.e. the Adaptive Management Plan or AMP).
- 4.4 The Permit Holder shall engage relevantly qualified persons to periodically analyse the water taking and discharge, stream flow and groundwater monitoring data, along with any other relevant information/ data, to:
- i) evaluate if conditions within the RR6 wetland receiving the discharge and within the Beaver River tributary stream have been altered beyond their historical ranges as a result of the taking and discharge. The assessment shall consider the historical range of flows in the stream as described in Table 3.5 of Item No. 4 of Schedule A of this Permit (the AMP). If values significantly different from those in the AMP are used to describe historical ranges, the rationale shall be provided. A record of the evaluation undertaken by the qualified person(s) shall be maintained; and
 - ii) determine the significance of any observed changes and make recommendations on necessary adjustments to lower the the rate, amount and/ or duration of the taking and discharge from those shown in Table A. Seasonally adjusted rates and amounts may also be recommended, if necessary.
- 4.5 The Permit Holder shall prepare an annual monitoring report which includes the following:
- i) all monitoring data collected under this Permit. The data shall be presented in

appropriate format (graphical and tabular) along with the historical data. Maps prepared at appropriate scales that clearly identify the various monitoring locations, including historical ones, shall also be included;

- ii) details of the periodic evaluations undertaken by qualified persons and the recommendations made as well as details on how the recommendations were implemented;
- iii) any proposed changes to the monitoring program or the Permit, along with the justification for the modification;
- iv) an evaluation of the quarry operation and analysis and interpretation of all monitoring data collected under this Permit to determine if the operation has resulted in any undesirable environmental impacts. The report shall contain conclusions with respect to any effects of quarry operation on groundwater resources; surface water resources and wells.

The report shall be prepared by qualified individual(s), and submitted to the Director and the District no later than May 31st of the each year.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Surface-Water Takings

The taking of water (including the taking of water into storage and the subsequent or simultaneous withdrawal from storage) shall be carried out in such a manner that streamflow is not stopped and is not reduced to a rate that will cause interference with downstream uses of water or with the natural functions of the stream.

For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their

reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act*, Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.
2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.
3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Permit to Take Water number;
6. The date of the Permit to Take Water;
7. The name of the Director;
8. The municipality within which the works are located;

This notice must be served upon:

*The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5*

Fax: (416) 326-5370

Email: ERTTribunalsecretary@ontario.ca

AND

*The Director, Section 34.1, Ministry of the
Environment and Climate Change
8th Floor*

5775 Yonge St

Toronto ON M2M 4J1

Fax: (416) 325-6347

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by Telephone at

(416) 212-6349

Toll Free 1(866) 448-2248

by Fax at

(416) 326-5370

Toll Free 1(844) 213-3474

by e-mail at

www.ert.gov.on.ca

This Permit cancels and replaces Permit Number 1168-665NHB, issued on 2005/11/21.

Dated at Toronto this 22nd day of September, 2016.



Karoly Tajnay

Director, Section 34.1

Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule "A" forms part of Permit To Take Water 7725-AACS54, dated September 22, 2016.

1. Application for Permit To Take Water, signed signed by Kevin Kehl on August 8, 2014.
2. Report entitled "Permit To Take Water Amendment Application, Duntroon Quarry..." prepared by WSP and dated July 2014. Section of this report have been revised by the following documents:
 - i. "Permit To Take Water Amendment Application, CLARIFICATION DOCUMENT, Duntroon Quarry..." prepared by WSP and dated April 2016;
 - ii. "Permit To Take Water Amendment Application, CLARIFICATION DOCUMENT, Duntroon Quarry..." prepared by WSP and dated May 2016;
3. E-mail from Sara Watts of WSP to Ted Belayneh of MOECC dated June 16, 2016 and containing responses to questions regarding pumping rates and proposed PTTW conditions.
4. Report entitled: "Adaptive Management Plan (AMP), Duntroon Expansion Quarry...", Prepared for Walker Aggregates Inc., and dated December 6, 2013.

ENVIRONMENTAL COMPLIANCE APPROVALNUMBER 1521-A4VJ4X
Issue Date: October 17, 2016Walker Aggregates Inc.
Post Office Box, No. 100
Thorold, Ontario
L2V 3Y8Site Location: Duntroon Quarry
9881 County Road 91
Township of Clearview, County of Simcoe
L9Y 3Z7

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

proposed and existing sewage Works for collection, transmission, treatment and disposal of up to 130 L/s of water that accumulates within the confines of existing 47.1 hectares the Duntroon Quarry (a total land area of approximately 57.5 hectares located on Part Lot 24 and Expansion Property located on Lot 25, Concession XII in the Township of Clearview (former Township of Nottawasaga), County of Simcoe) aggregate extraction area from direct precipitation, surface runoff, snow melt and groundwater inflow, discharging to a wetland located at the west side of the property, and then to the twin culverts at Grey Road 31 and ultimately to Beaver River South Tributary, consisting of the following:

Proposed Works

- a future sump no. 3 equipped with a submersible pump, located on the quarry floor within the Phase 1 of the expansion property discharging via a gravity sewer line to sump no.1 and/or sump no.2 as described below.

Existing Works

- sump no. 2 equipped with a submersible pump, located at the western part of the aggregate extraction area (near the water storage reservoir) discharging via a gravity sewer line to sump no.1, or pumped directly to the adjacent water storage reservoir during extreme wet weather events;
- sump no. 1, approximately 17,050 m³ in capacity and located south of the sump no. 2, equipped with a submersible pump and a 300 mm diameter forcemain laid on ground and traversing in a westerly direction, discharging to a wetland located and then to the twin culverts at Grey Road 31 which drains to Beaver River

South Tributary,

all other controls, electrical equipment, instrumentation, piping, valves and appurtenances essential for the proper operation of the aforementioned sewage Works.

all in accordance with the supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document and any schedules attached to it, and the application;

"District Manager" means the District Manager of the Barrie District Office of the Ministry;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Walker Aggregates Inc. and its successors and assignees;

"OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

"Works" means the sewage works described in the Owner's application and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the Conditions in this Approval shall take precedence, and

where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNR or any other agency necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this Approval's number.

3. OPERATION AND MAINTENANCE

(1) The Owner shall ensure that at all times, the Works and related equipment and appurtenances which are installed or used to achieve compliance with this Approval are properly operated and maintained. The Owner shall also ensure that all monitoring programs and maintenance schedules for the Works and related equipment are complied with.

(2) The Owner shall ensure that the maximum discharge rate from these Works does not exceed 250 L/s.

(3) Within three (3) months of the issuance date of this Approval, the Owner shall prepare an operations manual for the operation of the Works that includes, but is not necessarily limited to, the following information:

- (a) operating procedures for routine operation of the Works; including reduction or termination of discharge during major rain events, if necessary;
- (b) inspection programs, including frequency of inspection for the Works and the methods or tests employed to detect when maintenance is necessary, as well as downstream receiver inspections for the occurrence of erosion and flooding;
- (c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;
- (e) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager; and
- (f) complaint procedures for receiving and responding to public complaints.

(4) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage Works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

4. EFFLUENT LIMITS

(1) The Owner shall design, construct, operate and maintain the Works such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent discharge from the Works.

Table 1 Effluent Limits	
Effluent Parameter	Concentration Limit (milligrams per litre unless otherwise indicated)
Column 1	Column 2
Oil & Grease	15
Total Suspended Solid (TSS)	25
pH of the effluent maintained between 6.0 to 9.5, inclusive, at all times	

(2) For the purposes of determining compliance with and enforcing subsection (1):

- (a) For purposes of determining compliance with and enforcing subsection (1), non-compliance with respect to the parameters concentration limit as outlined in Column 1 is deemed to have occurred

when any single sample analyzed for Oil & Grease and Total Suspended Solids, (along with a follow-up confirmation sample collected within 7 days of the receipt of the original sample result that indicated that an exceedance had occurred), is greater than the corresponding maximum concentration set out in Column 2 of subsection (1).

(b) non-compliance with respect to pH is deemed to have occurred when any single measurement is outside of the indicated range.

5. EFFLUENT - VISUAL OBSERVATIONS

Notwithstanding any other condition in this Approval, the Owner shall ensure that the treated effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

6. EFFLUENT QUALITY MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the Works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected and analyzed at the following sampling locations, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 2 - Effluent Monitoring	
Sampling Location	The outlet channel discharge point to the wetland
Sampling Frequency	once each month during periods of effluent discharge
Sampling Type	Grab
Sampling Parameters	Total Suspended Solids, Oil and Grease, Nitrite Nitrogen, Nitrate Nitrogen, Total Ammonia Nitrogen, pH (field), Temperature (field), Total Phosphorus, Conductivity (field), Chloride, Sulphate, Sodium, Potassium, Boron, Cadmium, Total Chromium, Cobalt, Copper, Iron, Lead, Nickel, Silicon, Silver, Zinc, Alkalinity, Total Dissolved Solids, Phenols (4AAP), Hardness and Turbidity

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

(5) Conductivity, Temperature and pH shall be measured and recorded in the field at the time of sampling. The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives (PWQO)" dated July 1994, as amended, for ammonia (un-ionized).

(6) The Owner shall measure, record and calculate the discharge rate and volume of water pumped from the quarry sump on a daily basis during the discharging period and separately water not discharged from the Works but taken for other uses on a daily basis.

(7) The Owner shall undertake monthly inspections of the pumping sump and the outlet channel, and have excess settled material cleaned-out on a regular basis with results recorded in a log book to be made available for review by the Ministry upon request. The log shall include the name of the inspector, date of inspection and description of cleaning and maintenance measures undertaken for the sewage Works.

(8) The measurement frequencies and analytical parameters specified in subsections (2), in respect of any parameter are minimum requirements which may, after twelve (12) months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(9) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

7. REPORTING

(1) The Owner shall report to the District Manager or designate, of any exceedence of any parameter specified in Conditions 4 or 5 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedence, as defined in Condition 4(2).

(2) In addition to the obligations under Part X of the *Environmental Protection Act*, the Owner shall, within 10 working days of the occurrence of a reportable spill, bypass or loss of any product, by product, intermediate product, oils, solvents, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The Owner shall prepare and submit a performance report to the District Manager on an annual basis within ninety (90) days following the end of the period being reported upon. The reports shall contain, but shall not be limited to, the following information:

- (a) a summary and interpretation of all monitoring data collected pursuant to Condition 6 and a comparison to the effluent limits outlined in Condition 4 and the Provincial Water Quality Objective and/or Ontario Drinking Water Objective for the monitored parameter, including an overview of the success and adequacy of the Works and recommendations of monitoring program changes. The report should provide an interpretation of the data as to the impact of the discharge of treated effluent from the quarry to the receiver with respect to water quality and quantity during periods of low/high flows and periods of discharge/no discharge;
- (b) a tabulation of the total daily discharge rate and volume from the quarry sump and the total daily volume of water not discharged from the Works but taken for other uses;
- (c) a description of any operating problems encountered and corrective actions taken;
- (d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- (e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment; and
- (f) any other information the District Manager may require from time to time.

Schedule 'A' forms part of this Approval and contains a list of supporting documentation/information received, reviewed and relied upon in the issuance of this Approval.

SCHEDULE 'A'

1. Environmental Compliance Approval Application submitted by Was Foebel, Environmental Specialist Walker Aggregates Inc. dated June 3, 2013
2. Design Report entitled "Environmental Protection Act (R.S.O. 1990) Environmental Compliance Approval Application (Industrial Sewage Works) Duntroon Quarry, Part of Lot 24, Concession XII, Township of Clearview, County of Simcoe" dated May 2013 submitted under covering letter dated May 29, 2013 signed by Was Foebel, Environmental Specialist, Walker Aggregates Inc. and supporting information.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which Approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is imposed to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
3. Condition 3 is imposed to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Work.
4. Conditions 4 and 5 are imposed to ensure that the effluent discharged from the Works meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.
5. Condition 6 is imposed to require the Owner to demonstrate on a continual basis that the quality of the effluent from the approved Works is consistent with the effluent limits specified in the Approval and that the approved Works do not cause any impairment to the receiving watercourse.
6. Condition 7 is imposed to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;

6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

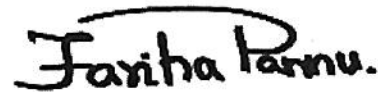
AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 17th day of October, 2016



Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

HV/
c: District Manager, MOECC Barrie
Jason Murchison, GENIVAR Inc.

APPENDIX

A-2 *MONITORING NETWORK DETAILS*

Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
Old Quarry Monitoring Wells									
1. 98-8	4914120	559613	O	102	517.25	516.50	Open Hole 35.1 m	Amabel/Fossil Hill	LTT
2. 98-9	4914583	559358	O	102	526.35	525.90	Open Hole 48.5 m	Amabel/Fossil Hill	LTT
98-10	4914492	559752	O	102	519.55	519.40	Open Hole 37.9 m	Amabel/Fossil Hill	Historical
98-11	4914574	560010	O	102	522.58	522.20	Open Hole 41.2 m	Amabel/Fossil Hill	Historical
3. 98-12	4914863	560341	O	102	527.22	526.70	Open Hole 42.4 m	Amabel/Fossil Hill	LTT
98-13	4914597	560372	O	102	522.44	522.30	Open Hole 38.0 m	Amabel/Fossil Hill	Historical
OW99-1	4914564	559559	O	102	519.38	519.10	Open Hole 29.5 m	Amabel	Historical
OW99-2	N/A	N/A	O	102	500.78	500.60	Open Hole 19.7 m	Amabel/Fossil Hill	Historical
4. PW99-1	4914157	559609	O	152	513.98	513.90	Open Hole 32.9 m	Amabel/Fossil Hill	LTT
PW99-2	4914568	559532	O	152	519.33	519.20	Open Hole 34.4 m	Amabel	Historical
PW99-3	N/A	N/A	O	152	501.13	500.90	Open Hole 21.4m	Amabel/Fossil Hill	Historical
MW2	4914171	559742	O	102	524.86	523.20	Open Hole 20.8 m	Amabel	Historical
MW3 (R)	4914369	560327	O	102	514.98	514.40	Open Hole 15.4 m	Amabel	Historical
MW4	4914697	560216	O	102	522.45	521.90	Open Hole 39.9 m	Amabel/Fossil Hill	Historical
MW5	4914857	560257	O	102	529.43	529.40	Open Hole 46.1 m	Amabel/Fossil Hill	Historical
5. MW6	4914673	559635	O	102	534.87	533.60	Open Hole 36.4 m	Amabel	LTT
E2	4914561	559937	O	203	520.97	521.00	Open Hole	Amabel	Historical
QUARRY HOUSE	4915096	560251	O	102	529.38	528.72	Open Hole 14.6m	Amabel	Historical
SHOP WELL	4914801	560018	O	102	523.50	522.49	Not Measured	Amabel	Historical
OFFICE WELL	4915061	560149	O	152	532.52	532.40	Open Hole 24.7m	Amabel/Fossil Hill	Historical
OFFICE WELL (NEW)	4915083	560156	O	152	532.04	531.35	Open Hole 37.2m	Amabel	Historical

Notes: • PITM - Performance Indicator Trigger Monitoring
 • LTTWM - Long Term Groundwater and Surface Water Monitoring
 • Elevations provided in metres above sea level (mASL)

• Type 'O' indicates Open Hole
 • Type 'S' indicates Standpipe
 • Shading indicates well is decommissioned / no longer monitored.
 • (R) indicates Replacement Monitoring Well
 • N/A indicates information not available

Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
Extension Quarry Monitoring Wells									
BH02-1	4915021	560321	O	102	523.30	522.64	Open Hole 39.5 m	Amabel/Fossil Hill	LTT
1. BH02-2	4915314	559904	O	102	523.18	522.46	Open Hole 39.5 m	Amabel/Fossil Hill	LTT
BH02-3	4915082	559869	O	102	530.58	529.64	Open Hole 9.5 m *	Amabel/Fossil Hill	LTT
BH02-4	4915100	559862	O	102	530.70	530.02	Open Hole 50.1 m	Amabel/Fossil Hill	LTT
2. BH02-5	4915356	559577	O	102	513.89	513.24	Open Hole 31.9 m	Amabel/Fossil Hill	LTT
3. BH02-5 (mid)	4915356	559577	O	102	514.20	513.24	Open Hole 12.4 m	Amabel	LTT
4. BH02-5 (shallow)			O	102	514.17			Overburden	LTT
5. BH02-6	4914782	559692	O	102	530.25	529.50	Open Hole 48.5 m	Amabel/Fossil Hill	LTT
6. BH03-7-I	4915281	559331	O	102	511.01	510.27	502.9 - 501.1	Amabel	LTT
7. BH03-7-II	4915283	559331	O	102	511.03	510.27	508.7 - 504.8	Overburden	LTT
8. BH03-7-III	4915293	559354	O	102	511.72	510.56	Open Hole 30.7 m	Amabel/Fossil Hill	LTT
9. BH03-8	4915099	558963	O	102	520.79	520.22	Open Hole 37.9 m	Amabel/Fossil Hill	LTT
10. BH03-9	4914674	559088	O	102	518.93	518.45	Open Hole 39.5 m	Amabel/Fossil Hill	LTT
11. TW04-1	4914910	559084	O	152	517.53	517.05	Open Hole 34.1 m	Amabel/Fossil Hill	LTT
12. TW04-2	4914934	559082	O	152	518.11	517.46	Open Hole 34.1 m	Amabel/Fossil Hill	LTT
13. TW04-3	4914909	559098	O	152	518.63	517.97	Open Hole 37.5 m	Amabel/Fossil Hill	LTT
14. BH08-1	4915197	560471	O	102	512.32	511.51	Open Hole 27.4 m	Amabel/Fossil Hill	LTT
15. BH08-2	4915175	560484	O	102	512.00	511.15	Open Hole 25.8 m	Amabel/Fossil Hill	LTT
16. BH08-3	4915198	560447	O	102	513.41	512.57	Open Hole 28.8 m	Amabel/Fossil Hill	LTT
17. IW1	4915051	560555	O	152	512.12	511.52	Open Hole 27.3 m	Amabel/Fossil Hill	LTT
18. IW1a	4915052	560552	O	152	511.96	511.35	Open Hole 27.3 m	Amabel/Fossil Hill	N/A
19. IW2	4915272	560522	O	152	509.22	508.66	Open Hole 24 m	Amabel/Fossil Hill	LTT
20. IW3	4915702	560215	O	152	519.13	518.53	Open Hole 33.7 m	Amabel/Fossil Hill	LTT
21. IW4	4915999	560024	O	152	511.02	510.36	Open Hole 25.4 m	Amabel/Fossil Hill	LTT
22. NW1	4914907	560060	O	152	526.19	525.67	Open Hole 42.7 m	Amabel/Fossil Hill	LTT
NW2	4915094	560110	O	152	531.99	531.35	Open Hole 54.7 m	Amabel/Fossil Hill	LTT

Notes: • PITM - Performance Indicator Trigger Monitoring
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 • Elevations provided in metres above sea level (mASL)

• Type 'O' indicates Open Hole
 • Type 'S' indicates Standpipe
 • Shading indicates well is decommissioned / no longer monitored.
 • (R) indicates Replacement Monitoring Well
 • N/A indicates information not available

Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
Extension Quarry Monitoring Wells (continued)									
23. NW3	4915248	560219	O	152	515.13	514.44	Open Hole 29.6 m	Amabel/Fossil Hill	LTT
NW4	4915011	559675	O	152	529.86	529.00	Open Hole 48.9 m	Amabel/Fossil Hill	LTT
24. NW5	4915189	559642	O	152	521.68	520.95	Open Hole 39.7 m	Amabel/Fossil Hill	LTT
25. NW6	4915137	559516	O	102	521.99	520.68	Open Hole 41.2 m	Amabel/Fossil Hill	LTT
26. NW7	4914958	559467	O	152	523.92	523.18	Open Hole 42.1 m	Amabel/Fossil Hill	LTT
27. NW8	4914792	559246	O	152	531.87	531.07	Open Hole 43 m	Amabel/Fossil Hill	LTT
28. NW9	4914749	559032	O	152	521.45	520.86	Open Hole 41.7 m	Amabel/Fossil Hill	LTT
29. NW10-Shallow	-	-	O	152	510.31	509.69	Open Hole 3.8 m	Amabel	LTT
30. NW10-Deep	4915376	558940	O	152	510.45	509.69	Open Hole 29.5 m	Amabel/Fossil Hill	LTT
HA1							-	Overburden	N/A
HA2							-	Overburden	N/A
HA3							-	Overburden	N/A
Drivepoints									
1. DP1	4914116	559465	S	51	513.05	511.80	511.3 - 510.8	Overburden	LTT
2. DP2	4914373	559287	S	51	512.94	512.10	511.3 - 510.8	Overburden	PITM
3. DP3	4914013	560290	S	51	514.65	513.60	511.9 - 511.4	Overburden	LTT
4. DP4	4914013	559067	S	51	512.11	511.40	510.4 - 509.9	Overburden	PITM
5. DP5	4915342	559086	S	51	510.49	509.66	509.6 - 508.7	Overburden	PITM
6. DP6	4915513	559774	S	51	512.20	511.45	511.0 - 510.1	Overburden	PITM
7. DP7	4915351	559345	S	51	509.91	509.18	507.4 - 506.9	Overburden	PITM
8. DP8	4914360	559094	S	51	511.88	511.12	510.9 - 510.5	Overburden	PITM
9. DP9	4915407	560273	S	51	508.88	507.74	507.2 - 506.6	Overburden	PITM
10. DP10			S	51			-	Overburden	PITM
DP11			S	51			-	Overburden	PITM
11. NW10-DP	-	-	S	152	511.18	509.69	509.6 - 509.1	Overburden	LTT
12. BRIDSON DP	4915303	560360	S	38	511.30	510.40	509.6 - 508.8	Overburden	PITM

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 • Type 'S' indicates Standpipe
 • Type 'DW' indicates Domestic Well
 • Shading indicates well is decommissioned / no longer monitored.
 • (R) indicates Replacement Monitoring Well
 • N/A indicates information not available
 • ND indicates Not Determined

Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
Domestic Wells									
1. RW1	4915265	560619	DW	Drilled 152	508.75	508.57	Depth: 16.1 m	Amabel	LTT
2. RW2	4915112	560930	DW	Drilled 152	505.20	504.50	Depth: 29.0 m	Amabel	LTT
3. RW3	4915977	559243	DW	Drilled 152	519.00	518.70	Depth: 16.5 m	Amabel	LTT
RW4	4915918	559593	DW	Drilled 152	510.50	509.80	Depth: 55.5 m	Amabel/Fossil Hill/	LTT
4. RW5	4915152	561404	DW	Drilled 152	478.60	478.00	Depth: 35.0 m	Manitoulin/Shale	LTT
5. RW6	4914852	561652	DW	Dug 800	451.00	451.00	Depth: 8.2 m	Overburden	LTT
6. RW7	4914725	561691	DW	Drilled 152	453.00	452.30	Depth: 10.1 m	Overburden/Shale	LTT
7. RW8	4916820	560662	DW	Dug 750	431.00	431.00	Depth: 3.5 m	Overburden	LTT
RW9	4914687	558916	DW	Drilled 152	524.00	524.00	Depth: 27.4 m	Amabel	LTT
RW10	4916387	560013	DW	Dug 750	494.50	Not surveyed	N/A	N/A	Historical
RW11	4914464	561761	DW	Drilled 152	453.10	453.00	Depth: 48.8 m	Overburden/Shale	Historical
RW11 DUG	4914468	561763	DW	Dug 750	453.00	453.00	Depth: 6.0 m	Overburden	Historical
8. RW12	4958180	561821	DW	Dug	Not Surveyed	Not surveyed	Depth 3.7 m	Overburden	Historical
9. RW13	4958180	561821	DW	Dug	Not Surveyed	Not surveyed	Depth 3.7 m	Overburden	Historical
RW15	4914844	560194	DW	Drilled 152	529.74	529.19	Depth: 24.4 m	Amabel	Historical
10. RW16	4915178	560459	DW	Drilled 152	513.32	512.48	Depth: 16.2 m	Amabel	LTT
11. RW17	4915446	558987	DW	Drilled 127	Not Surveyed	Not surveyed	Depth: 8.5 m	N/A	LTT
12. RW18	4915299	560150	DW	Dug 1000	513.80	513.00	Depth: 2.7 m	Overburden/Amabel	LTT
RW19	4915355	560221	DW	Drilled 152	Not Surveyed	Not Surveyed	Depth: 36.3 m	Amabel	LTT

Notes: • PITM - Performance Indicator Trigger Monitoring
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 • Elevations provided in metres above sea level (mASL)

• Type 'O' indicates Open Hole
 • Type 'S' indicates Standpipe
 • Type 'DW' indicates Domestic Well
 • Shading indicates well is decommissioned / no longer monitored.
 • (R) indicates Replacement Monitoring Well
 • N/A indicates information not available
 • ND indicates Not Determined

Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
Carmarthen Lake Farms Monitoring Wells									
CLF1	4913728	559343	DW	152	521.05	520.76	Open Hole 36.6 m	Amabel/Fossil Hill	LTT
CLF2	4913713	559284	DW	152	519.23	519.57	Open Hole 49.4 m	Amabel/Fossil Hill	LTT
1. CLF3	4912910	559144	DW	152	517.62	517.11	Open Hole ND	Amabel	LTT
2. CLF4	4913050	559369	DW	152	509.96	509.48	Open Hole 15.2 m	Amabel	LTT
3. CLF5	4913128	559517	DW	152	509.16	508.80	Open Hole ND	Amabel	LTT
Offsite Monitoring Wells									
1. 101-B	4913891	557900	O	152	502.98	502.51	Open Hole 6.1 m	Amabel	LTT
2. 102-C	4914250	558331	O	102	511.39	510.53	Open Hole 7.0 m	Amabel	LTT
3. 103-D	4913962	558506	O	152	513.40	513.18	Open Hole 7.9 m	Amabel	LTT
4. 104-A	4913796	558198	O	152	517.67	516.89	Open Hole 9.6 m	Amabel	LTT
5. OW1-4	4914034	558465	O	102	514.40	513.21	Open Hole 28.6 m	Amabel/Fossil Hill	LTT
OW1-6	4913928	558508	O	102	514.96	513.92	Open Hole 30.0 m	Amabel/Fossil Hill	N/A
OW3-1	4913737	558085	O	102	508.75	508.01	Open Hole 29.3 m	Amabel/Fossil Hill	LTT
6. OW5-2	4914015	557876	O	102	504.21	502.84	Open Hole 27.9 m	Amabel/Fossil Hill	LTT
7. OW6-3	4914244	558346	O	102	511.12	510.63	Open Hole 5.3 m	Amabel	LTT

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Table A-1 Monitoring Well Details

Well ID	Coordinates (NAD 27)		Type	Well Pipe Diameter mm	Measuring Point Elevation mASL	Ground Elevation mASL	Screened Interval	Geologic Formation Monitored	Monitoring Program
	Northing	Easting					mASL or m		
St. Mary's Cement Osprey Quarry Monitoring Wells									
1. OW1-I	4749636	638430			513.29	512.22	507.7 - 506.2	Amabel	
2. OW1-II	4749636	638430			513.29	512.22	503.1 - 501.6	Amabel	
3. OW1-III	4749631	638430			513.21	512.18	487.0 - 485.5	Amabel	
4. OW1-IV	4749631	638430			513.21	512.18	482.8 - 481.3	Fossil Hill	
5. OW2-I	4749615	638911			523.42	522.24	512.2 - 510.7	Amabel	
6. OW2-II	4749615	638911			523.42	522.24	503.1 - 501.6	Amabel	
7. OW2-III	4749617	638927			523.18	522.14	500.3 - 498.8	Amabel	
8. OW2-IV	4749617	638927			523.18	522.14	480.2 - 478.7	Fossil Hill/Cabot Head	
9. OW3-I	4749929	639172			516.34	515.57	511.1 - 509.6	Amabel	
10. OW3-II	4749929	639172			516.34	515.57	500.2 - 498.7	Amabel	
11. OW3-III	4749928	639167			516.58	515.53	494.7 - 493.2	Amabel	
12. OW3-IV	4749928	639167			516.58	515.53	486.5 - 485.0	Amabel	
13. OW4-I	4749646	639558			519.76	518.87	513.4 - 511.9	Amabel	
14. OW4-II	4749646	639558			519.76	518.87	510.8 - 509.3	Amabel	
15. OW4-III	4749646	639562			519.72	518.85	498.3 - 496.8	Amabel	
16. OW4-IV	4749646	639562			519.72	518.85	492.9 - 491.4	Amabel	
17. OW5-I	4750150	639570			510.75	510.01	503.5 - 502.0	Amabel	
18. OW5-II	4750150	639570			510.75	510.01	499.3 - 497.8	Amabel	
19. OW5-III	4750151	639573			510.85	510.06	493.8 - 492.3	Amabel	
20. OW5-IV	4750151	639573			510.85	510.06	481.8 - 480.3	Fossil Hill/Cabot Head	
21. OW6-I	4750126	638558			528.51	526.28	514.6 - 513.1	Amabel	
22. OW6-II	4750126	638558			528.51	526.28	503.1 - 501.6	Amabel	
23. OW6-III	4750123	638555			528.08	526.21	482.4 - 480.9	Amabel	
24. OW6-IV	4750123	638555			528.08	526.21	477.3 - 475.8	Fossil Hill/Cabot Head	

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 • Type 'S' indicates Standpipe
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 • N/A indicates information not available
 • ND indicates Not Determined

Table A-2 Surface Water Station Details

Designation	Coordinates (NAD 27)		Ground Elevation mASL	Description	Culvert Dimensions	Monitoring Program	Measurement Type
	Northing	Easting					
1. SW1	4914051	559102	513	Twin culverts located at southwest corner of quarry wetland at Grey County Road 31 (Townline Road)	South culvert dia. 0.62m, North culvert dia. 0.60m	PITM	V, M
2. SW2	4914546	559063	515	Single culvert located at northwest corner of quarry wetland	Oblong shaped culvert	PITM	V,M
SWB-1	4914187	559491	513	Single culvert located at southwest corner of quarry; outlet into quarry wetland	Oblong shaped culvert	Historical	-
QFSW1	4914389	559487	500	Quarry floor influx from west face	Stream Channel Flow	Historical	-
3. QFSW2	4914354	559810	499	Quarry floor surface water flow in channel prior to main sump pond	Stream Channel Flow	LTTWM	V
4. SWO-2	4914264	558414	510	Stream Channel west of SW1 on Osprey Quarry Property	Stream Channel Flow	PITM	V,M
5. SW3	4915721	558875	510	Single culvert located across Grey Rd 31 at north edge of proposed quarry property	Oblong shaped culvert	PITM	V,M,E
6. SW3A	4915721	558805	511	Single culvert located under Grey Rd 31, just south of intersection with 26/27 Sideroad	Oblong shaped culvert	Historical	V,B,E
7. SW4	4913736	558876	515	Single culvert located on Osprey 10th Line, east of Kenwell farm buildings	Culvert Diameter: 0.57 m	Historical	E,V
8. SW5	4913070	556683	499	Single concrete culvert located on Osprey 10th Line	4.91 m wide square concrete culvert	Historical	V
9. SW6	4912881	556103	500	Single concrete culvert located on Osprey 10th Line	4.78 m wide square concrete culvert	Historical	V
10. SW6A	4912472	555237	495	Double culvert on Osprey Sideroad 30, south of Osprey 10th Line	Stream Channel Flow	PITM	V
11. SW7	4915307	560196	512	Millar pond outlet	Stream Channel Flow	LTTWM	V,E
12. SW8	4915276	560343	510	Bridson pond outlet	Bucket Capture of Flow out of partial culvert	LTTWM	V,E
13. SW9	4915421	560440	508	Channel flow beneath walking path into sinkhole on Bridson property	Stream Channel Flow	PITM	V,M,E
14. SW10	4915418	561192	477	Seep uphill of B. Franks' well tile catchment	Stream Channel Flow	PITM	V,M,E

Notes:

- PITM - Performance Indicator Trigger Monitoring
- LTTWM - Long Term Groundwater and Surface Water Monitoring
- Elevations provided in metres above sea level (mASL)
- Ground Elevation data approximated from Ontario Base Map elevation contours
- * indicates historical surface water station that is not included in the PITM
- Shading indicates surface water station is no longer monitored

- V indicates Valeport Electronic Flow Velocity Meter measurement
- M indicates manual velocity measurement
- - indicates SW location not currently monitored for discharge volumes
- E indicates visual estimate velocity measurement
- B indicates bucket collection velocity measurement

Table A-2 Surface Water Station Details

Designation	Coordinates (NAD 27)		Ground Elevation mASL	Description	Culvert Dimensions	Monitoring Program	Measurement Type
	Northing	Easting					
15. SW11	4915780	561128	445	Culmination of B. Franks' seeps into a stream; taken near toe of scarp where stream passes beneath path	Stream Channel Flow	PITM	V,M,E
16. SW11A	4915809	561081	446	B. Franks' seep, located near toe of scarp in rock talus	Stream Channel Flow	PITM	V,M,E
17. SW11B	4915819	561065	446	B. Franks' seep, located near toe of scarp in rock talus	Stream Channel Flow	PITM	V,M,E
18. SW11C	4915838	561048	446	B. Franks' seep, located near toe of scarp in rock talus	Stream Channel Flow	PITM	V,M,E
19. SW11D	4915866	561038	446	B. Franks' seep, located near toe of scarp in rock talus	Stream Channel Flow	PITM	V,M,E
20. SW11E	4915760	561219	435	Stream from B. Franks' seeps into pond; downstream from SW11 and just upstream of pond	Stream Channel Flow	PITM	V,E,B
21. SW12	4915694	561273	435	Single culvert into B. Franks' pond from south	Bucket capture of flow out of culvert	Historical	V,E,B
22. SW12A	4915441	561471	450	Single culvert near B. Franks' barn	Stream Channel Flow	Historical	V,E
23. SW13	4915824	561283	427	B. Franks' pond outlet	Bucket capture of flow out of culvert	LTTWM	V,E,B
24. SW14	4916032	561574	410	Channel flow east of Conc. 10, from culvert crossing Conc. 10 south of H. Franks' driveway	Stream Channel Flow	PITM	V
25. SW15	4916204	561481	420	Channel flow east of Conc. 10, from culvert crossing Conc. 10 north of H. Franks' driveway	Stream Channel Flow	PITM	V
26. SW16	4916433	560955	415	Single culvert under 26/27 Sideroad east of F. Sestito's property	Stream Channel Flow	PITM	E
27. SW17	4916314	560592	431	Sestito pond outlet channel on south side of 26/27 Sideroad, measured just west Sestito property driveway	Stream Channel Flow	PITM	V,M,E
28. SW17A	4916324	560595	430	Stream channel on north side of 26/27 Sideroad, measured across from Sestito property driveway	Stream Channel Flow	PITM	V
29. SW17B	4916314	560593	431	Stream channel on south side of 26/27 Sideroad, measured west of Sestito property driveway, upstream of where 17/17B join.	Stream Channel Flow	Historical	V
30. SW18	4916787	561392	390	Single culvert on Concession 10, north of 26/27 Sideroad	Stream Channel Flow	PITM	V
31. SW19	4915281	564260	335	Single large diameter culvert for Batteaux Creek on County Rd. 124	Stream Channel Flow	LTTWM	V
32. SW20	4916161	560010	495	Concrete crib north of 26/27 sideroad adjacent to Pretty River Provincial Park/Bruce Trail	Stream Channel Flow	LTTWM	V,E

Notes:

- PITM - Performance Indicator Trigger Monitoring
- LTTWM - Long Term Groundwater and Surface Water Monitoring
- Elevations provided in metres above sea level (mASL)
- Ground Elevation data approximated from Ontario Base Map elevation contours
- * indicates historical surface water station that is not included in the PITM
- Shading indicates surface water station is no longer monitored

- V indicates Valeport Electronic Flow Velocity Meter measurement
- M indicates manual velocity measurement
- - indicates SW location not currently monitored for discharge volumes
- E indicates visual estimate velocity measurement
- B indicates bucket collection velocity measurement

Table A-2 Surface Water Station Details

Designation	Coordinates (NAD 27)		Ground Elevation mASL	Description	Culvert Dimensions	Monitoring Program	Measurement Type
	Northing	Easting					
33. SW21	4916061	561298	430	H. Franks' pond outlet	Bucket capture of flow out of culvert	LTTWM	V,E,B
34. SW21A	4916039	561236	433	H. Franks' pond inlet	Stream Channel Flow	LTTWM	V,E,B
35. SW21B	4915969	561013	449	Cistern overflow channel uphill of H. Franks' pond, feeds pond inlet	Stream Channel Flow	LTTWM	V,M,E
36. SW21C	4916021	560703	470	H. Franks' water supply system cistern inlet/overflow culvert	Stream channel Flow	PITM	V,E
37. SW21D	4915928	560949	450	Single culvert under H. Franks field access trail at base of scarp	Bucket capture of flow out of culvert	Historical	V,B,E
38. SW22	4914445	560645	492	Single culvert under ski trail west of Sampson fields	Bucket capture of flow out of culvert	LTTWM	V,B
39. SW22A	4914876	560950	485	Seep feeding small stream in northwest corner of Sampson fields	Stream Channel Flow	LTTWM	B,E
SW22B	4914711	560804	477	Swamp/seep area on north side of access trail from Sampson fields to ski trails	Stream Channel Flow	Historical	-
40. SW22C	4914701	560800	477	Culvert on south side of access trail from Sampson fields to ski trails. Culvert is infilled with sediment and channel is relatively flat. Treated as stream flow.	Stream Channel Flow just downstream of culvert	LTTWM	V
SW23	4916509	561197	410	Single culvert crossing 26/27 Sideroad west of Concession 10	Bucket capture of flow out of culvert	Historical	-
41. SW24	4916157	560603	445	F. Sestito's pond inlet from H. Franks' property	Stream Channel Flow	Historical	V,M,E
42. SW24A	4916124	560487	460	F. Sestito's water supply: barrel overflow and pipe discharges (below Manitoulin formation outcrop)	Bucket capture of flow out of pipes, Valeport measurement of stream channel	PITM	V,B,E
43. SW24B	4916169	560569	445	Seep channel just up from F. Sestito's garden	Bucket capture of flow out of pipes, Valeport measurement of stream channel	Historical	V,B,E
44. SW24C	4916150	560600	442	Stream just east of where SW24A and SW24B combine and upstream of outlet into Sistito pond.	Stream Channel Flow	Historical	V
SW25	4912202	559425	507	Single culvert outlet into swamp southwest of Edward Lake; fed by Edward Lake and open grate in the ditch north of SW25	Culvert Diameter: 0.62 m	Historical	-
SW25A	4912359	559435	508	Channel outlet from Edward Lake into a culvert which crosses beneath Grey Road 31. Only monitored when input from open grate/ditch is observed when monitoring SW25.	Stream Channel Flow	Historical	-

Notes:

- PITM - Performance Indicator Trigger Monitoring
- LTTWM - Long Term Groundwater and Surface Water Monitoring
- Elevations provided in metres above sea level (mASL)
- Ground Elevation data approximated from Ontario Base Map elevation contours
- * indicates historical surface water station that is not included in the PITM
- Shading indicates surface water station is no longer monitored

- V indicates Valeport Electronic Flow Velocity Meter measurement
- M indicates manual velocity measurement
- - indicates SW location not currently monitored for discharge volumes
- E indicates visual estimate velocity measurement
- B indicates bucket collection velocity measurement

Table A-2 Surface Water Station Details

Designation	Coordinates (NAD 27)		Ground Elevation mASL	Description	Culvert Dimensions	Monitoring Program	Measurement Type
	Northing	Easting					
SW26	4913072	560781	507	Channel flow upstream of sinkhole on ski trails near unopened road allowance for 21/22 Sideroad	Stream Channel Flow	Historical	-
SW26A	4913095	560745	512	Two culverts upstream of SW26 sinkhole	East Culvert Diameter: 0.38 m West Culvert: Oblong Shaped	Historical	-
SW27	4916323	560266	462	Culmination of SW27A and SW27B	Stream Channel Flow	Historical	-
SW27A	4916333	560021	492	Groundwater seep, located east of SW28, east of Bruce Trail	Stream Channel Flow	Historical	-
SW27B	4916364	559989	497	Groundwater seep, located north-west of SW27A, east of Bruce Trail	Stream Channel Flow	Historical	-
45. SW77	4916284	560149	494	Groundwater seep, located south-east of SW20, west of Bruce Trail	Stream Channel Flow	PITM	V
46. SW3B	4915346	558854	510	RR3 Wetland Karst Sink Point Channel, west of Grey County Road 31, downstream of SW3 and SW3C.	Stream Channel Flow	PITM	V
47. SW3C	4915347	558875	510	RR3 Wetland outflow from pond that is downstream of SW3. West of Grey County Road 31.	Stream Channel Flow	LTTWM	V
48. PR Control	4918002	558052	360	Pretty River Control Station on 30/31 Sideroad. Flow measured on south side of road, upstream of culvert.	Stream Channel Flow	PITM	V
49. BC Control	4913957	563207	405	Batteaux Creek Control Station on 21/22 Sideroad. Flow measured on north side of road, downstream of culvert.	Stream Channel Flow	PITM	V

Notes:

- PITM - Performance Indicator Trigger Monitoring
- LTTWM - Long Term Groundwater and Surface Water Monitoring
- Elevations provided in metres above sea level (mASL)
- Ground Elevation data approximated from Ontario Base Map elevation contours
- * indicates historical surface water station that is not included in the PITM
- Shading indicates surface water station is no longer monitored

- V indicates Valeport Electronic Flow Velocity Meter measurement
- M indicates manual velocity measurement
- - indicates SW location not currently monitored for discharge volumes
- E indicates visual estimate velocity measurement
- B indicates bucket collection velocity measurement

APPENDIX

A-3 *BOREHOLE LOGS*

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

<u>Soil Classification *</u>		<u>Terminology</u>	<u>Proportion</u>
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (eg. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (eg. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (eg. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (eg. and sand)	35% - 50%
Boulders	>200 mm	noun (eg. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

<u>COHESIONLESS SOIL</u>		<u>COHESIVE SOIL</u>	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

<u>COHESIONLESS SOILS</u>		<u>COHESIVE SOILS</u>	
Dry		DTPL	- Drier Than Plastic Limit
Moist		APL	- About Plastic Limit
Wet		WTPL	- Wetter Than Plastic Limit
Saturated		MWTPL	- Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.

	Standpipe and Designation		Cement Seal
	Piezometer and Designation		Granular Pack
	Gas Monitor and Designation		Granular Backfill
	Borehole Seal (Peltonite, Bentonite or Hole Plug)		Native Soil Backfill/Cave

Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS = Split Spoon	GS = Grab Sample
ST = Thin Walled Shelby Tube	CS = Channel Sample
AS = Auger Flight Sample	WS = Wash Sample
CC = Continuous Core	RC = Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD ClassificationRQD (%)

Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60° steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{x \text{ Blows}}{\text{mm}}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BOREHOLE NO. 98-8

Page 1 of 2

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRYPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.DATE: DECEMBER 14,15 1998BOREHOLE TYPE: HQ SIZED (64 mm) ROCK COREGEOLOGIST: KJFGROUND ELEVATION: ESTIMATED 516 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec E ⁻¹¹ E ⁻⁴	REMARKS
				TYPE	% RECOVERY	RQD (%)			
0									
2	OVERBURDEN: MEDIUM TO DARK BROWN CLAYEY SILT TILL, BECOMING SANDY BELOW 3.1 m. - CUTTING RETURNS WET BELOW 1.8 m	OVERBURDEN	102 mm ID CASING	AS					ORIGINAL GROUND SURFACE ELEVATION HAS CHANGED DUE TO QUARRY OPERATIONS. LOCATED IN SOUTHWEST CORNER OF EXISTING QUARRY. 108 mm ID HOLLOW STEM AUGERS USED IN OVERBURDEN. CASING STICKUP 165 mm. 102 mm CASING SET TO 8.4 m.
4									
6									
7.6									
8	DOLOSTONE: LIGHT BROWNISH GREY TO VERY LIGHT GREY COLOUR, CHALKY APPEARANCE, MEDIUM GRAINED, FOSSIL REMNANTS. (AMABEL FORMATION, UNIT 2) - 230 mm VERTICAL FRACTURE AT 9.1 m. - VUGS 1-2% UNIFORMLY DISTRIBUTED - HORIZONTAL TO SUBHORIZONTAL BEDDING	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE	RC	100	69	N/A		NOTE: AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FORMATION CH: CABOT HEAD FORMATION
10				RC	100	16	0.29	1.7X10 ⁻⁵	
				RC	100	88	0.28		
12				RC	100	83	0.28	7.8X10 ⁻⁷	
14				RC	100	100	0.29		
				RC	100	97	0.31	1.5X10 ⁻⁷	
16				RC	100	100	0.31		
18				RC	100	97	0.27	1.3X10 ⁻⁶	
20				RC	100	97	0.32		

BOREHOLE NO. 98-8

Page 2 of 2

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 14, 15 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: ESTIMATED 516 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec E ⁻¹¹ E ⁻⁴	REMARKS
				TYPE	% RECOVERY	RQD (%)			
20									
	DOLOSTONE: (CONT)	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE						ORIGINAL GROUND SURFACE ELEVATION HAS CHANGED DUE TO QUARRY OPERATIONS. LOCATED IN SOUTHWEST CORNER OF EXISTING QUARRY.
	150 mm REEFAL FACIES BED AT 19.9 m								
22				RC	100	95	0.28	1.3x10 ⁻⁶	
				RC	100	100	0.26	3.0x10 ⁻⁶	
24									
				RC	100	87	0.28		
26				RC	100	100	N/A	8.0x10 ⁻⁷	
				RC	100	82	0.26		
28	— GRADATIONAL LOWER CONTACT OVER ±1 m.	FOSSIL HILL FORMATION							
	— FIRST STYLOLITE AT 28.3 m.								
29.1				RC	100	63	N/A	2.6x10 ⁻⁷	
30	DOLOSTONE: CREAMY GREY TO GREY BROWN COLOURED, FINE TO MEDIUM GRAINED, STYLOLITES AND SHALE 1 mm TO 10 mm THICK INCREASING FREQUENCY WITH DEPTH.			RC	100	89	N/A		
				RC	100	68	0.15		
32		CH							
				RC	100	83	0.13	6.9x10 ⁻⁸	
				RC	100	11	0.13		
34	34.0								
	SHALE: GREENISH GREY, CALCAREOUS. (CABOT HEAD FORMATION)								
35.1									
36	BOREHOLE TERMINATED AT 35.1 m IN SHALE.								
38									
40									

NOTE:

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-9

Page 1 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 15,16 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 525.9 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec					REMARKS
				TYPE	% RECOVERY	RQD (%)		E ⁻¹¹				E ⁻⁴	
0													
0.6	OVERBURDEN: MEDIUM BROWN CLAYEY SILT TILL.		102 mm ID CASING	RC	47	0	N/A						LOCATED IN NORTHWEST CORNER OF EXISTING QUARRY. 102 mm CASING SET AT 1.7 m.
2	DOLOSTONE: LIGHT BROWNISH GREY TO VERY LIGHT GREY, MEDIUM TO COARSE GRAINED WITH A CRAGGY APPEARANCE, IRREGULAR BEDDING. (AMABEL FORMATION, UNIT 1)			RC	95	65	0.26						
	- FOSSILS THROUGHOUT												
	- IRREGULARLY SHAPED VUGS 2-3%			RC	100	55	0.23						
4	- OCCASIONAL FLANK FACIES UNITS INTERBEDDED UP TO 300 mm THICK.			RC	100	66	0.24						
	- BROWN CLAYEY SILT INFILLING WITH RUSTY STAINING ON FRACTURES AND VUGS												
6				RC	100	88	0.23						
8				RC	100	88	0.24					6.7X10 ⁻⁶	
10				RC	100	100	0.25						
12				RC	100	93	0.28					7.8X10 ⁻⁶	
14				RC	100	73	0.27						
16				RC	100	88	0.28					2.2X10 ⁻⁶	
18				RC	100	89	0.37						
20				RC	100	79	0.23					1.0X10 ⁻⁶	
				RC	100	85	0.27						
				RC	100	92	0.27					3.2X10 ⁻⁷	

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-9

Page 2 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 15,16 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 525.9 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec						REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹					E ⁻⁴	
20														
20.1	DOLOSTONE: (CONT)	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE											LOCATED IN NORTHWEST CORNER OF EXISTING QUARRY.
	DOLOSTONE: LIGHT GREY, MEDIUM GRAINED WITH A DULL CHALKY APPEARANCE, SLIGHT RUSTY STAINING THROUGHOUT, UNIFORM DISTRIBUTION OF VUGS, 1-2%, HORIZONTAL TO SUBHORIZONTAL BEDDING. (AMABEL FORMATION, UNIT 2)			RC	100	95	0.22						3.2X10 ⁻⁷	
22														
	- BECOMING DARKER GREY WITH DEPTH			RC	100	95	0.25							
24													8.5X10 ⁻⁸	
				RC	100	89	0.20							
	- 0.2 m REEFAL FACIES AT 25.9 m AND 34.7 m.			RC	100	100	0.28							
26														
				RC	100	90	0.34						8.5X10 ⁻⁷	
28														
				RC	100	92	0.29							
30														
				RC	100	85	0.26						6.3X10 ⁻⁷	
32														
				RC	100	90	0.29							
34														
				RC	100	95	0.28						3.4X10 ⁻⁷	
36														
				RC	100	93	0.31							
38														
				RC	100	92	0.26						1.4X10 ⁻⁶	
40														
				RC	100	100	0.23							
				RC	100	95	N/A						1.7X10 ⁻⁷	

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-9

Page 3 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 15,16 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 525.9 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec								REMARKS
				TYPE	% RECOVERY	RQD (%)		E ⁻¹¹							E ⁻⁴	
40																
41.8	DOLOSTONE: (CONT) - GRADATIONAL LOWER CONTACT OVER ±1 m INTERVAL	UNIT 2	OPEN HQ BOREHOLE	RC	100	85	0.22								1.7X10 ⁻⁷	LOCATED IN NORTHWEST CORNER OF EXISTING QUARRY. FIRST STYLOLITE AT 40.6 m.
42				RC	100	73	0.17									
44	DOLOSTONE: MEDIUM GREY TO BUFF GREY WITH A CREAMY APPEARANCE, FINE GRAINED. - STYLOLITES AND OCCASIONAL THIN SHALE INTERBEDS UP TO 2 mm THICK	FOSSIL HILL FORMATION		RC	100	75	0.17								3.1X10 ⁻⁸	
46				RC	43	41	0.19									
48.0	- 105 mm SHALE BED AT 47.5 m.			RC	N/A	N/A	0.01								4.1X10 ⁻⁸	
48.5	SHALE: GREENISH GREY, CALCAREOUS. (CABOT HEAD FORMATION)	CH														
50	BOREHOLE TERMINATED AT 48.5 m IN SHALE.															
52																
54																
56																
58																
60																

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-10

Page 1 of 2

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: JANUARY 18, 19 1999

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 519.4 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %		REMARKS
				TYPE		% RECOVERY	ROD (%)		10 20 30		
0									W _P	W _L	
2	2.3	OVERBURDEN	102 mm ID CASING	AS							LOCATED IN CENTRAL PART OF EXISTING QUARRY ON QUARRY FLOOR.
4		AMABEL FORMATION UNIT 2/1	OPEN HQ BOREHOLE	RC		100	0	N/A			102 mm ID CASING SET TO 3.1 m.
6				RC		100	58	N/A			CASING STICKUP 230 mm.
8				RC		100	100	0.17			BROKEN BEDROCK AT SURFACE 1.8 m TO 2.3 m.
10				RC		100	97	0.29			
12				RC		100	68	0.30			
14				RC		100	92	0.26			
16				RC		100	90	0.37			
18				RC		100	82	0.28			
20				RC		100	82	0.27			
				RC		100	95	0.25			
		AMABEL FORMATION UNIT 2		RC		100	88	0.34			
				RC		100	100	0.32			
				RC		100	81	0.31			

NOTE:
 AMABEL FORMATION:
 UNIT 1: REEFAL FACIES
 UNIT 2: FLANK FACIES
 FH: FOSSIL HILL FORMATION
 CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-10

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PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: JANUARY 18,19, 1999

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 519.4 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %			REMARKS	
					TYPE			% RECOVERY		ROD (%)	10	20		30
											W _P			W _L
20														
	DOLOSTONE: (CONT)	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE										LOCATED IN CENTRAL PART OF EXISTING QUARRY ON QUARRY FLOOR.	
				RC			100	100	0.29					
22														
				RC			100	95	0.29					
24				RC			100	92	0.37					
26				RC			100	98	0.27					
				RC			100	92	N/A					
28														
		RC			100	94	0.22							
30														
	— FIRST STYLOLITE AT 30.6 m.	RC			100	100	0.26							
32	31.9 GRADATIONAL LOWER CONTACT OVER ±1 m.	RC			100	93	N/A							
	DOLOSTONE: LIGHT TO MEDIUM GREY TO CREAMY BUFF GREY, BECOMING DARKER WITH DEPTH, FINE GRAINED.	FOSSIL HILL FORMATION												
	— OCCASIONAL STYLOLITES AND THIN SHALE BEDS UP TO 2 mm			RC			100	87	0.14					
34	— ARGILLACEOUS BELOW 37.5 m													
				RC			100	88	0.17					
36														
		RC			98	55	0.26							
37.8	— 110 mm SHALE BED AT 37.3 m.	CH												
38	37.9 SHALE: GREENISH GREY, CALCAREOUS. (CABOT HEAD FORMATION)													
	BOREHOLE TERMINATED AT 37.9 m IN SHALE.													
40														

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-11

Page 1 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 22,23 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 522.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					DRILL PENETRATION m/min	WATER CONTENT %			REMARKS	
				TYPE			% RECOVERY	ROD (%)		10	20	30		
										W _p		W _L		
0														
	OVERBURDEN: GRAVEL FILL, LIGHT GREY, DRY TO MOIST. (FOUNDATION FOR PLANT)	OVERBURDEN	102 mm ID CASING	AS									LOCATED IN CENTRAL PART OF EXISTING QUARRY ON QUARRY FLOOR. 102 mm ID CASING SET TO 5.6 m.	
2														
4														
4.9														
	DOLOSTONE: LIGHT GREY BROWN TO BUFF GREY WITH A MOTTLED APPEARANCE, MEDIUM TO COARSE GRAINED. (AMABEL FORMATION, UNIT 1) – IRREGULAR SHAPED VUGS INCREASING TO 5–6% BELOW 17.4 m. – BROWN CLAYEY SILT INFILLING WITH RUSTY STAINING ON FRACTURES AND VUGS. – FOSSILS THROUGHOUT	AMABEL FORMATION UNIT 1	OPEN HQ BOREHOLE	RC			73	0	N/A				BROKEN BEDROCK SURFACE.	
6														
8														
10														
12														
14														
16														
18														
20														
							</							

BOREHOLE NO. 98-11

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PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 22,23 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 522.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %			REMARKS
				TYPE	N ^o VALUE	% WATER	% RECOVERY		10	20	30	
20												
22												
22.9	DOLOSTONE: (CONT)	AMABEL UNIT 1		RC			100	55	N/A			LOCATED IN CENTRAL PART OF EXISTING QUARRY ON QUARRY FLOOR.
24												
24.9				RC			100	68	N/A			
26	DOLOSTONE: LIGHT BUFF GREY TO A MEDIUM GREY WITH A CHALKY APPEARANCE, MEDIUM TO FINE GRAINED, HORIZONTAL TO SUBHORIZONTAL BEDDING. (AMABEL FORMATION, UNIT 2) - FAINT RUSTY STAINING THROUGHOUT	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE	RC			100	48	0.23			
28				RC			100	84	0.26			
30				RC			98	95	0.27			
32	-VUGS 1-2% WITH A UNIFORM DISTRIBUTION			RC			100	93	0.23			
34				RC			98	94	0.26			
36	- FOSSIL REMNANTS THROUGHOUT			RC			98	95	0.25			
38	- GRADATIONAL LOWER CONTACT OVER ±1 m - FIRST STYLOLITE AT 32.7 m.			RC			100	55	0.22			
40				RC			100	100	0.20			
	DOLOSTONE: LIGHT GREY TO MEDIUM CREAMY GREY TO BROWN, FINE TO MEDIUM GRAINED.	FOSSIL HILL FORMATION		RC			100	87	0.19			NOTE: AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FORMATION CH: CABOT HEAD FORMATION
	- OCCASIONAL STYLOLITES AND SHALE INTERBEDS UP TO 2 mm THICK			RC			100	98	0.29			
	- PYRITE CRYSTALS AT 39.0 m.			RC			100	N/A	0.20			

BOREHOLE NO. 98-11

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 22,23 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 522.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					DRILL PENETRATION m/min	WATER CONTENT %			REMARKS
				TYPE			% RECOVERY	RQD (%)		10	20	30	
										W _p		W _L	
40													
	40.6	DOLOSTONE: (CONT) — 80 mm SHALE BED AT 40.1 m.	FH CH	OPEN HQ BOREHOLE									LOCATED IN CENTRAL PART OF EXISTING QUARRY ON QUARRY FLOOR.
	41.2	SHALE: GREY GREENISH, CALCAREOUS. (CABOT HEAD FORMATION)											
42		BOREHOLE TERMINATED AT 41.2 m IN SHALE.											
44													
46													
48													
50													
52													
54													
56													
58													
60													

NOTE:

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-12

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PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 21, 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 526.7 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %			REMARKS	
				TYPE		% RECOVERY	ROD (%)		10	20	30		
									W _p		W _L		
0													
	OVERBURDEN: CLAYEY SILT, MEDIUM BROWN.	OVERBURDEN	102 mm ID CASING	AS								LOCATED IN NORTHEAST CORNER OF EXISTING QUARRY. 102 mm ID CASING SET TO 5.6 m. BOREHOLE SET INTO BERM	
2													
4				4.0		RC		77	0	N/A			
	DOLOSTONE: LIGHT GREYISH BROWN TO MOTTLED GREYISH BUFF BROWN APPEARANCE. MEDIUM TO COARSE GRAINED, CRAGGY APPEARANCE, FOSSILS THROUGHOUT. (AMABEL FORMATION, UNIT 1) — IRREGULARLY SHAPED VUGS 2–3% — SOME CLAYEY SILT INFILLING AND RUSTY STAINS ON FRACTURES	AMABEL FORMATION UNIT 1	OPEN HQ BOREHOLE	RC		100	46	N/A					
6					RC		100	82	0.29				
8					RC		100	83	0.16				
10					RC		100	93	0.16				
12					RC		100	80	0.30				
14					RC		100	88	0.30				
16					RC		100	97	0.31				
16.7				RC		100	95	0.26					
18	DOLOSTONE: LIGHT TO MEDIUM BROWN GREY WITH FAINT RUSTY STAINING THROUGHOUT, MEDIUM GRAINED, CHALKY APPEARANCE. (AMABEL FORMATION, UNIT 2)	AMABEL FORMATION UNIT 2		RC		100	100	0.31					
			RC		100	100	0.26						
20				RC		100	97	N/A				NOTE: AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FORMATION CH: CABOT HEAD FORMATION	

BOREHOLE NO. 98-12

Page 2 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 21, 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 526.7 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					DRILL PENETRATION m/min	WATER CONTENT %		REMARKS
				TYPE			% RECOVERY	RQD (%)		10	30	
20												
	<u>DOLOSTONE: (CONT)</u>	AMABEL FORMATION UNIT 2	OPEN HQ BOREHOLE									LOCATED IN NORTHEAST CORNER OF EXISTING QUARRY.
				RC			100	96	0.37			
22												
	– VUGS 1–2% WITH A UNIFORM DISTRIBUTION			RC			100	90	0.34			
	– FOSSIL REMNANTS											
24	– HORIZONTAL TO SUBHORIZONTAL BEDDING											
				RC			100	52	0.29			
				RC			100	52	0.37			
26												
				RC			100	80	0.29			
28												
				RC			100	95	0.32			
30												
				RC			100	87	0.29			
	– FIRST STYLOLITE AT 30.9 m.											
32				RC			100	97	0.28			
	– BECOMING FINER GRAINED AND LESS VUGGY BELOW 32.5 m.											
				RC			100	92	0.25			
34												
				RC			100	90	0.28			
36	36.0											
	– GRADATIONAL LOWER CONTACT OVER ±2 m INTERVAL											
		FOSSIL HILL FORMATION		RC			100	97	0.17			NOTE: AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FORMATION CH: CABOT HEAD FORMATION
38	DOLOSTONE: MEDIUM GREY TO LIGHT CREAMY GREY, MEDIUM TO FINE GRAINED, OCCASIONAL THIN SHALE LAMINAE OR STYLOLITE UP TO 2 mm THICK.											
	– INCREASING SHALE CONTENT BELOW 37.5 m.			RC			100	89	N/A			
	– MINOR PYRITE MINERALIZATION AT 39.5 m AND 40.8 m.											
				RC			100	97	N/A			
40												

BOREHOLE NO. 98-12

Page 3 of 3

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 21, 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 526.7 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %			REMARKS
				TYPE			% RECOVERY	ROD (%)	10	20	30	
40												
42	DOLOSTONE: (CONT) — 50 mm SHALE BED AT 41.6 m. — PYRITE CRYSTALS AT 41.8 m IN 20 mm VUG.	FH	OPEN HQ BH	RC			97	97	N/A			LOCATED IN NORTHEAST CORNER OF EXISTING QUARRY.
42.1												
42.4	SHALE: GREENISH GREY, CALCAREOUS. (CABOT HEAD FORMATION) BOREHOLE TERMINATED AT 42.4 m IN SHALE.	CH		RC			100	0	0.17			
44												
46												
48												
50												
52												
54												
56												
58												
60												

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-13

Page 1 of 2

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 17,18,19 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 522.3 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE				DRILL PENETRATION m/min	WATER CONTENT %		REMARKS			
				TYPE			% RECOVERY		ROD (%)	10		20	30	
										W _p			W _L	
0														
	OVERBURDEN: MEDIUM BROWN SILTY CLAY TILL, OCCASIONAL BOULDERS.	OVERBURDEN	102 mm ID CASING	AS							LOCATED ON EAST SIDE OF EXISTING QUARRY. 102 mm ID CASING SET TO 9.7 m.			
2														
4														
6														
8	BOULDERS ENCOUNTERED 0.5 m ABOVE BEDROCK.													
8.6														
	DOLOSTONE: LIGHT GREY TO VERY LIGHT GREY, MEDIUM TO COARSE GRAINED. (AMABEL FORMATION, UNIT 1) - IRREGULAR BEDDING WITH AN OVERALL CRAGGY AND WEATHERED APPEARANCE - FOSSILS AND FOSSIL REMNANTS - RUST STAINED FRACTURES WITH CLAYEY SILT INFILLING - IRREGULARLY SHAPED VUGS 3–5% WITH LOCAL ZONES TO 10% - 250 mm VOID AT 14.3 m. - SOME FLANK FACIES INTERBEDDED, 0.6 m BED AT 13.7 m AND 1.2 m BED AT 17.1 m, LIGHT GREY WITH A CHALKY APPEARANCE	AMABEL FORMATION UNIT 1	OPEN HQ BOREHOLE	RC			66	41	N/A		NOTE: AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FORMATION CH: CABOT HEAD FORMATION			
10				RC			96	50	0.22					
				RC			80	100	N/A					
12							RC			100		88	0.20	
							RC			83		61	N/A	
							RC			100		92	N/A	
14														
16														
18														
20														

NOTE:
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FORMATION
CH: CABOT HEAD FORMATION

BOREHOLE NO. 98-13

Page 2 of 2

PROJECT NAME: ROCK QUALITY INVESTIGATION - DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: DECEMBER 17,18,19 1998

BOREHOLE TYPE: HQ SIZED (64 mm) ROCK CORE

GEOLOGIST: KJF

GROUND ELEVATION: 522.3 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					DRILL PENETRATION mm/sec	WATER CONTENT %			REMARKS
				TYPE	N° VALUE	% WATER	% RECOVERY	ROD (%)		10	20	30	
										W _P		W _L	
20													
	DOLOSTONE: (CONT)	UNIT 1	OPEN HQ BOREHOLE	RC			93	43	0.18				LOCATED ON EAST SIDE OF EXISTING QUARRY.
22	22.1	AMABEL FORMATION UNIT 2		RC			100	78	0.23				
				RC			100	45	0.27				
				RC			100	68	0.30				
24				RC			100	62	0.19				
				RC			100	53	0.30				
				RC			100	75	0.26				
26				RC			100	85	0.28				
				RC			100	76	0.28				
				RC			100	98	0.23				
28		RC			100	65	N/A						
30													
32													
34													
36													
38													
40													

BOREHOLE NO. OW99-1

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: MAY, 1999

BOREHOLE TYPE: 150 mm AIRTRACK HOLE

GEOLOGIST: _____

GROUND ELEVATION: 519.0 mASL

CONTRACTOR: GEORGIAN AGGREGATES

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS
					TYPE	N' VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20	30	
0																
	DOLOSTONE BEDROCK														100 mm ø PVC PROTECTIVE CASING	
5																
10																
15																
20																
25																
29.5																
30	HOLE TERMINATED AT 29.5 m BELOW GRADE															
35																
40																
45																
50																

BOREHOLE NO. OW99-2

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: MAY, 1999

BOREHOLE TYPE: 100 mm AIRTRACK HOLE

GEOLOGIST: _____

GROUND ELEVATION: 500.6 mASL

CONTRACTOR: GEORGIAN
AGGREGATES

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS	
				TYPE	N ⁱ VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE							
									10	20	30	10	20	30		
0										SHEAR STRENGTH			W_P W_L			
	DOLOSTONE BEDROCK														100 mm Ø PROTECTIVE CASING	
5																
10															100 mm Ø OPEN HOLE	
15																
20	19.7															
	HOLE TERMINATED AT 19.7 m BELOW GRADE															
25																
30																
35																
40																
45																
50																

BOREHOLE NO. PW99-1

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: JULY 09, 1999

BOREHOLE TYPE: 150 mm ROTARY WATER WELL

GEOLOGIST: _____

GROUND ELEVATION: 513.9 mASL

CONTRACTOR: HIGHLAND WATERWELLS

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS
				TYPE	N ¹ VALUE	% WATER	% RECOVERY	RQD (%)	"N" VALUE			CONTENT %			
									10	20	30	10	20	30	
0	WELL DRILLERS LOG														
	BROWN SANDY CLAY WITH GRAVEL													150 mm Ø STEEL CASING	
4.3														BENSEAL PLUG	
5	LIGHT BROWN BROKEN LIMESTONE (OVERBURDEN)														
9.4															
10	LIGHT BROWN LIMESTONE, HARD													150 mm Ø OPEN HOLE WELL	
15															
20															
25															
29.0															
30	GREY LIMESTONE														
31.4															
	BROWN LIMESTONE														
32.9															
35	WELL TERMINATED AT 32.9 m BELOW GRADE														
40															
45															
50															

BOREHOLE NO. PW99-2

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: MAY, 1999

BOREHOLE TYPE: 150 mm AIRTRACK HOLE

GEOLOGIST: _____

GROUND ELEVATION: 519.2 mASL

CONTRACTOR: GEORGIAN AGGREGATES

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE				CONE PENETRATION			WATER CONTENT %			REMARKS	
					TYPE	"N" VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE			WATER CONTENT %			
										10	20	30	10	20		30
0																
5	DOLOSTONE BEDROCK														150 mm Ø PROTECTIVE CASING	
10															150 mm Ø OPEN HOLE	
15																
20																
25																
30																
34.4																
35	HOLE TERMINATED AT 34.4 m BELOW GRADE															
40																
45																
50																

BOREHOLE NO. PW99-3

PROJECT NAME: DUNTROON QUARRY

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

BOREHOLE TYPE: 150 mm AIRTRACK HOLE

GROUND ELEVATION: 500.9 mASL

PROJECT NO.: 930521.08

DATE: MAY, 1999

GEOLOGIST:

CONTRACTOR: GEORGIAN
AGGREGATES

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS	
					TYPE	N' VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE			10 20 30				
										10	20	30	10	20	30		
																	SHEAR STRENGTH
0																150 mm ø PROTECTIVE CASING	
5																	150 mm ø OPEN HOLE
10																	
15																	
20																	
20.8																	
21.4	SHALE BEDROCK																SHALE INTERPOLATED FROM BH98-1
	HOLE TERMINATED AT 21.4 m BELOW GRADE IN SHALE																
25																	
30																	
35																	
40																	
45																	
50																	

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: DECEMBER 4, 2002

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 522.6 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
0										
2	SILT: BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST.	OVERBURDEN	H.Q. CASING							LOCATED IN S.E. CORNER OF EXPANSION PROPERTY
3.6										
4	DOLOSTONE: WHITE TO CREAMY, UNIFORM MEDIUM GRAINED WITH SACCHAROIDAL TEXTURE. WEAKLY BEDDED. 2%-5% VUGS UP TO 16 mm IN SIZE.	AMABEL FORMATION UNIT 2	5.2 m	RC	98	98	0.15			
6	— 5.5 m TO 5.7 m LIGHT GREY TO CREAMY, CHAOTIC BEDDED MEDIUM TO COARSE GRAINED DOLOSTONE WITH CHRINOIDAL FOSSIL FRAGMENTS UP TO 4 cm.			RC	98	73	0.15			
8			OPEN H.Q. BOREHOLE	RC	100	100	0.13			
8.2	DOLOSTONE: LIGHT GREY, WITH WHITE "SPECKLED" APPEARANCE, MEDIUM TO COARSE TEXTURE. WEAKLY BEDDED CRINOIDAL FOSSIL FRAGMENTS UP TO 3 cm.	AMABEL FORMATION UNIT 1		RC	98	76	0.18			
10	— 9.0 m TO 9.9 m IRREGULAR VERTICAL FRACTURE WITH SLIGHT RUST STAINING			RC	98	90	0.22	4.3E-6		
12	—BELOW 10.7 m LIGHT GREY TO CREAMY WHITE, CHAOTIC BEDDING, FOSSILIFEROUS, 2%-3% VUGS UP TO 3 cm WITH CRYSTALLINE CALCITE INFILL.			RC	100	100	0.27	2.5E-6		
12.6										
14	DOLOSTONE: MOTTLED LIGHT/ MEDIUM GREY, UNIFORM MEDIUM GRAINED WITH SACCHAROIDAL TEXTURE. WEAKLY DEVELOPED BEDDING. 3%-5% VUGS UP TO 9 mm WITH BROWN SEDIMENT INFILL. BECOMING FINE GRAINED WITH DEPTH.	AMABEL FORMATION UNIT 2		RC	98	100	0.24	5.1E-08		
16	FRACTURES HAVE BROWN SEDIMENT ON FACES.			RC	100	100	0.23	7.0E-08		
18	—BELOW 17.4 m UNIFORM FINE TO MEDIUM GRAINED, AND OCCASIONAL POORLY DEVELOPED BROWN STYLOLITE.			RC	100	100	0.19	2.4E-07		
				RC	100	100	0.23	5.8E-08		
20				RC	100	97	0.17	7.6E-08		

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 4, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 522.6 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
20										
22	DOLOSTONE CONTINUED			RC	100	100	0.25		1.1E-07	LOCATED IN S.E. CORNER OF EXPANSION PROPERTY
				RC	97	95	0.25			
	-21.9 m GREY, UNIFORM MEDIUM GRAINED WITH SACCHAROIDAL TEXTURE AND "SPECKLED" APPEARANCE. UP TO 5% CRINOIDAL FOSSIL FRAGMENTS, WEAKLY BEDDED.								4.0E-7	
24				RC	100	78	0.30			
	- 24.0 TO 24.8 m VERTICAL FRACTURES WITH WEAK RUSTY ORANGE STAINING, PARTIALLY RESEALED WITH CARBONATE. FRACTURES OCCUR DOMINANTLY PARALLEL TO BEDDING.								5.8E-7	
				RC	100	100	0.27			
26				RC	98	100	0.25		7.9E-7	
28				RC	100	100	0.13		6.9E-08	
30				RC	100	100	0.19		8.1E-08	NOTE AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FM CH: CABOT HEAD FM
	- 30.4 m TO 31.1 m MOTTLED MEDIUM GREY TO BROWN FINE GRAINED DOLOSTONE									
				RC	97	100	0.22			
32										
				RC	98	100	0.19		1.3E-07	
33.4										
34	DOLOSTONE: MOTTLED BLUE-GREY/ GREY FINE GRAINED WITH SACCHAROIDAL TEXTURE. INCREASING STYLOLITES, BECOMING GREY IN COLOUR WITH DEPTH. OCCASIONAL PARTING OF PALE GREEN TO GREY SHALE UP TO 2 mm THICK. OCCASIONAL PINCH-AND-SWELL TYPE BEDS AND NODULES OF WHITE TO LIGHT GREY CHERT. BECOMING PINKISH-BROWN BELOW 35.7 m WITH UP TO 2% PATCHY MASSIVE PYRITE.			RC	100	100	0.15		2.9E-09	
36				RC	100	100	0.12			
	FRACTURES OCCUR DOMINANTLY AT STYLOLITES/ PARTINGS.								9.0E-09	
37.4				RC	100	100	0.12			
38	SHALE: GREENISH-GREY SHALE, VARIABLE SOFT TO HARD, FISSILE.									CIRCULATION MAINTAINED FOR ENTIRE BOREHOLE.
				RC	100	100	0.15		4.8E-08	
39.5	BOREHOLE TERMINATED AT 39.5 m IN SHALE.									
40										

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: DECEMBER 10, 2002

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 522.5 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
0										
2		OVERBURDEN	H.Q. CASING							LOCATED IN NE QUADRANT OF PROPERTY
4										
6										
6.2										
7.0	DOLOSTONE: MOTTLED LIGHT GREY/ LIGHT BROWN, MEDIUM GRAINED UNIFORM TEXTURE, WEAKLY BEDDED.	UNIT 2	7.0 m	RC	92	96	0.78			
8	DOLOSTONE: PATCHY LIGHT GREY/ LIGHT BROWN, MEDIUM GRAINED WITH "SPECKLED" APPEARANCE. CRINOIDAL FOSSIL FRAGMENTS UP TO 5%, WEAKLY DEVELOPED BEDDING.	AMABEL FORMATION UNIT 1	OPEN H.Q. BOREHOLE	RC	93	100	0.28			
10	FRACTURES MAINLY PARALLEL TO BEDDING.			RC	98	100	0.20			
12				RC	100	100	0.27		1.1E-7	
14				RC	100	98	0.28		3.1E-7	
14.7		UNIT 2		RC	100	100	0.23			
16	DOLOSTONE: MOTTLED LIGHT GREY/ MEDIUM GREY, MEDIUM GRAINED WITH SACCHAROIDAL TEXTURE. NUMEROUS CRINOIDAL FOSSIL FRAGMENTS WITH WEAKLY DEVELOPED BEDDING.			RC	100	97	0.22		1.1E-6	
16.6				RC	98	92	0.24		4.7E-7	
18	DOLOSTONE: MOTTLED LIGHT GREY/ MEDIUM GREY, MEDIUM TO COARSE GRAINED WITH CHAOTIC APPEARANCE AND FOSSIL FRAGMENTS. OVERALL "ROUGH" APPEARANCE, BRITTLE. OCCASIONAL BROWN STYLOLITE.			RC	100	100	0.26		2.7E-7	
20		AMABEL UNIT 1		RC	100	100	0.25		1.2E-7	

NOTE

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 10, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 522.5 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
20										
21.2	DOLOSTONE CONTINUED	UNIT 1						1.2E-7		LOCATED IN NE QUADRANT OF PROPERTY
22	DOLOSTONE: PATCHY LIGHT GREY/ LIGHT BROWN MEDIUM TO FINE GRAINED, WITH SACCHAROIDAL TEXTURE. MODERATE TO WEAKLY DEVELOPED BEDDING WITH 1-2 mm CRINOIDAL FOSSIL FRAGMENTS PRODUCING LOCAL "SPECKLED" TEXTURE. OCCASIONAL BROWN MODERATE TO WELL DEVELOPED STYLOLITE, INCREASING WITH DEPTH.	AMABEL FORMATION UNIT 2	OPEN H.Q. BOREHOLE	RC	98	100	0.24	4.7E-7		
24				RC	100	95	0.30	5.0E-7		
26				RC	100	100	0.24	2.4E-7		
28				RC	98	100	0.29	5.8E-7		
30				RC	98	100	0.26	2.7E-7		
32				RC	100	100	0.21	3.7E-7		
32.6				RC	100	100	0.20	1.8E-07		
34				RC	100	100	0.18	5.9E-09		
36				RC	100	100	0.14	1.2E-07		
38										
38.4										
39.5	SHALE: GREENISH-GREY, SOFT TO HARD, FISSILE.	CH								CIRCULATION MAINTAINED FOR ENTIRE BOREHOLE. <u>NOTE</u> AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FM CH: CABOT HEAD FM
40	BOREHOLE TERMINATED AT 39.5 m IN SHALE.									

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: DECEMBER 12, 2002

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 529.7 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					RATE OF DRILL PENETRATION m / min	WATER CONTENT %			REMARKS
				TYPE			% RECOVERY	RQD (%)		10	20	30	
0										W _P		W _L	
2	SILT: BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST.	OVERBURDEN	H.Q. CASING										LOCATED NEAR CENTRE OF PROPERTY.
3.1													
4	DOLOSTONE: LIGHT GREY MEDIUM TO COARSE GRAINED DOLOSTONE, CHAOTIC APPEARANCE WITH UP TO 10% WHITE FOSSIL FRAGMENTS, "HONEYCOMB" TEXTURE (CORAL) UP TO 30 mm. 2%–3% VUGS UP TO 13 mm. – 5.8 m TO 6.7 m IRREGULAR VERTICAL FRACTURE WITH MODERATE ORANGE RUSTY STAINING ON FACES.	AMABEL FORMATION UNIT 1	4.6 m	RC			88	96	0.24				NO CORE RECOVERY IN LAST RUN. LOST CIRCULATION AT 9.5 m BELOW GROUND SURFACE.
6			OPEN H.Q. BOREHOLE (64 mm)	RC			98	86	0.30				
8				RC			100	93	0.33				
10				RC			100	88	0.35				
12				RC			56	76	0.41				
12.0				RC			0	N/A	0.53				
14	BOREHOLE TERMINATED AT 12.0 m IN DOLOSTONE.		DRY										NOTE AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FM CH: CABOT HEAD FM
16													
18													
20													

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: DECEMBER 13, 2002

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 530.0 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
0										
1.3	SILT: BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST.	OVER- BURDEN	H.Q. CASING							LOCATED NEAR CENTRE OF PROPERTY
2	DOLOSTONE: LIGHT GREY, MEDIUM TO COARSE GRAINED DOLOSTONE, CHAOTIC BEDDING WITH LOCALLY UP TO 7% WHITE FOSSIL FRAGMENTS (POSSIBLY CORAL) WITH "HONEYCOMB" TEXTURE, UP TO 30 mm. 3%-5% VUGS UP TO 30 mm.	AMABEL FORMATION UNIT 1	3.0 m	RC	100	67	0.22			
4	FRACTURES DOMINANTLY SUBHORIZONTAL, IRREGULAR.			RC	100	100	0.25			
6										
8				RC	100	100	0.31			
10										
12				RC	100	90	0.26			
13.1				RC	98	100	0.30			
14				RC	97	100	0.31			
16				RC	94	98	0.30			
18				RC	94	100	0.30			
20				RC	100	100	0.31			
		AMABEL FORMATION UNIT 2		RC	100	100	0.28			
				RC	100	100	0.30			
				RC	100	35	0.30			
				RC	100	100	0.30			

AT 11.0 m TEMPORARY LOSS
OF CIRCULATION. (RECOVERED)

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 13, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 530.0 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
20										
22	DOLOSTONE CONTINUED FRACTURES BECOMING DOMINANTLY PARALLEL TO SUB-HORIZONTAL BEDDING.			RC	100	62	0.35	4.8E-07		LOCATED NEAR CENTRE OF PROPERTY
24	— 22.4 m TO 22.6 m GREY FINE GRAINED DOLOSTONE WITH WEAKLY DEVELOPED, CREAMY "STRIPED" APPEARANCE, BRITTLE.			RC	98	100	0.30	8.5E-06		
26	— AT 23.2 m BECOMING UNIFORM WITH SACCHAROIDAL TEXTURE.			RC	100	100	0.30	1.2E-05		
28	— 27.5 m TO 27.6 m DIAGONAL FRACTURE WITH WEAK RUSTY STAINING.			RC	100	97	0.31	1.3E-06		
30	— 30.1 m TO 31.0 m GREY FINE GRAINED DOLOSTONE WITH POORLY DEVELOPED, DISCONTINUOUS CREAMY "STRIPES". BRITTLE, CRUMBLY. LOCALLY UP TO 10% PATCHY VUGS WITH CALCITE CRYSTALS UP TO 2 mm.			RC	100	100	0.30	9.0E-08		
32	— 33.1 m TO 35.3 m MOTTLED BROWN/ LIGHT BROWN FINE GRAINED DOLOSTONE WITH OCCASIONAL WISPY PARTING OF DULL GREEN SHALE. OCCASIONAL POORLY DEVELOPED BROWN STYLOLITE. INCREASING FREQUENCY WITH DEPTH.			RC	100	100	0.21	1.5E-06		
34	— 35.3 TO 37.0 m GREY, UNIFORM, MEDIUM GRAINED DOLOSTONE WITH "SPECKLED" APPEARANCE. OCCASIONAL CRINOID FOSSIL FRAGMENTS, WEAKLY BEDDED.			RC	100	95	0.23	7.4E-06		
36				RC	98	100	0.23	1.2E-05		
38				RC	100	100	0.26	9.3E-06		
40				RC	100	100	0.30	8.1E-07		
				RC	100	100	0.24	9.9E-07		NOTE AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FM CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 13, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 530.0 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY	REMARKS
					TYPE	% RECOVERY	ROD (%)		m / sec	
40										
	<u>DOLOSTONE CONTINUED</u>	AMABEL UNIT 2	OPEN H.Q. BOREHOLE	RC	100	100	0.31		LOCATED NEAR CENTRE OF PROPERTY	
	FRACTURES OCCUR DOMINANTLY AT PARTINGS/LAMINAE.			RC	100	85	0.24	7.6E-08		
42										
	— 43.2 m TO 44.0 m MOTTLED BROWN/ GREY-BROWN FINE GRAINED DOLOSTONE. OCCASIONAL GREY SHALE PARTINGS UP TO 2 mm THICK.	RC		98	100	0.21	5.4E-08			
44	44.0									
	<u>DOLOSTONE:</u> MOTTLED BLUE-GREY/GREY FINE GRAINED DOLOSTONE, OCCASIONAL GREY SHALE PARTINGS UP TO 3 mm THICK INCREASING WITH DEPTH. OCCASIONAL PINCH-AND-SWELL TYPE BEDS UP TO 3 cm THICK, OCCASIONAL NODULES OF LIGHT GREY CHERT TO 30 mm.	FOSSIL HILL FM		RC	100	100	0.18			
			RC	100	100	0.20	6.1E-09			
							8.0E-09			
46										
	— AT 46.3 m BECOMING PINKISH-BROWN DOLOSTONE WITH 1%-2% PATCHY PYRITE.			RC	100	100	0.11	2.8E-08		
48										
	48.8									
	<u>SHALE:</u> GREENISH-GREY, SOFT TO HARD, FISSILE.	CH								
50	50.1									
	BOREHOLE TERMINATED AT 50.1 m IN SHALE.									
52										
54										
56										
58										
60										

NOTE

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

NOTE
 AMABEL FORMATION:
 UNIT 1: REEFAL FACIES
 UNIT 2: FLANK FACIES
 FH: FOSSIL HILL FM
 CH: CABOT HEAD FM

LOG OF BOREHOLE BH02-5 (deep)



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559585 N: 4915584 (17T, Geodetic)

rig type | CME 75, track-mounted
method | Rock coring
coring | HQ core, OD=96mm, ID=64mm

project no. | 111-53312-00
date started | 2014/10/09
supervisor | BTC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments	
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		X Dynamic Cone	10	20	30					40
						Core Recovery										
0	513.3	GROUND SURFACE														
1		OVERBURDEN														
2																
3																
4																
5																
6																
7																
8																
9	504.3 9.0	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, strong core with a rough cut texture, thickly bedded, scratched by a knife; slightly weathered with muddy reddish brown staining on fracture surfaces, ~5%, vugs typically 1 mm to 3 mm, poor to fair RQD. (Flank facies)		R1	TCR = 100% RQD = 63%											
10				R2	TCR = 96% RQD = 80%											
11	502.6			R3	TCR = 92% RQD = 34%											
12	500.9 12.4	END OF BOREHOLE														
Borehole was open upon completion.																
Open hole well installed in borehole. Casing cemented in bedrock at 9.24 m depth.																

LOG OF BOREHOLE BH02-5 (mid)



project | Duntroon Quarry

client | Walker Aggregates Inc.

location | Duntroon, Ontario

position | E: 559585 N: 4915584 (17T, Geodetic)

project no. | 111-53312-00

date started | 2014/10/09

supervisor | BTC

reviewer | KJF

rig type | CME 75, track-mounted

method | Rock coring

coring | HQ core, OD=96mm, ID=64mm

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		SPT N-Value	X Dynamic Cone						
							Core Recovery	10	20	30	40			
0	513.3	GROUND SURFACE												
0		OVERBURDEN												
1														
2														
3														
4														
5														
6														
7														
8														
9	504.3 9.0	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, strong core with a rough cut texture, thickly bedded, scratched by a knife; slightly weathered with muddy reddish brown staining on fracture surfaces, ~5%, vugs typically 1 mm to 3 mm, poor to fair RQD. (Flank facies)			R1	TCR = 100% RQD = 63%								
10					R2	TCR = 96% RQD = 80%								
11	502.6				R3	TCR = 92% RQD = 34%								
12	500.9 12.4													
END OF BOREHOLE														
Borehole was open upon completion.														
Open hole well installed in borehole. Casing cemented in bedrock at 9.24 m depth.														

Library: genivar - library.gib report: gen log v1 file: bh logs.gpj

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: DECEMBER 18, 2002

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 513.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec		REMARKS
				TYPE	% RECOVERY	ROD (%)		E ⁻¹¹	E ⁻⁴	
0										
2	<u>SILT:</u> BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST.	OVERBURDEN	H.Q. CASING							LOCATED IN NORTH-CENTRAL PART OF PROPERTY
4										
6										
8										
9.3										
10	<u>DOLOSTONE:</u> LIGHT GREY, MEDIUM TO COARSE GRAINED DOLOSTONE, CHAOTIC BEDDING, OCCASIONAL WHITE FOSSIL FRAGMENTS WITH "HONEYCOMB" TEXTURE UP TO 30 mm. 2%-5% VUGS UP TO 20 mm.	AMABEL UNIT 1	13.4 m	RC	100	93	0.23			LOST CIRCULATION AT 11.2 m AND 12.8 m, ADVANCED CASING TO 13.4 m. CIRCULATION RECOVERED
12				RC	100	44	0.27			
				RC	100	100	0.27			
14	<u>DOLOSTONE:</u> PATCHY LIGHT GREY/LIGHT BROWN, UNIFORM, MEDIUM GRAINED DOLOSTONE WITH SACCHAROIDAL TEXTURE. OCCASIONAL CRINOIDAL FOSSIL FRAGMENT, WEAKLY BEDDED. 1%-2% VUGS UP TO 2 cm. OCCASIONAL BROWN STYLOLITE, INCREASING FREQUENCY WITH DEPTH.	AMABEL UNIT 2	OPEN H.Q. BOREHOLE	RC	100	92	0.29	2.9E-06		
16				RC	100	100	0.29	2.9E-06		
								3.6E-07		
18				RC	98	100	0.28	2.8E-07		
20	- 19.5 m TO 20.7 m WHITE "SPECKLED" APPEARANCE WITH INCREASING CRINOIDAL FOSSIL FRAGMENTS, WEAKLY BEDDED.			RC	100	97	0.28	4.5E-07		NOTE AMABEL FORMATION: UNIT 1: REEFAL FACIES UNIT 2: FLANK FACIES FH: FOSSIL HILL FM CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 18, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 513.2 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY	REMARKS	
				TYPE	% RECOVERY	ROD (%)		m / sec		
20								E ⁻¹¹ E ⁻⁴		
	<u>DOLOSTONE CONTINUED</u>	AMABEL UNIT 2	OPEN H.Q. BOREHOLE	RC	100	100	0.31	3.7E-07	LOCATED IN NORTH-CENTRAL PART OF PROPERTY	
22										
				RC	100	100	0.38	1.3E-06		
		RC		100	100	0.32				
24	24.0									5.1E-08
	<u>DOLOSTONE:</u> MOTTLED BLUE-GREY/ GREY FINE GRAINED DOLOSTONE. STYLOLITES BECOMING GREY IN COLOUR. OCCASIONAL WISPY PARTING OF GREY SHALE UP TO 2 mm THICK, INCREASING FREQUENCY WITH DEPTH. - AT 24.9 m DISCOLORED BROWN HALO AT FRACTURE.			RC	100	100	0.31			
26		FOSSIL HILL FORMATION			RC	100	95	0.28		4.1E-08
	FRACTURES OCCUR DOMINANTLY AT SHALE PARTINGS WITH GREY SEDIMENT ON FACES.				RC	100	73	0.24		6.8E-08
28										
					RC	100	88	0.26		3.8E-06
30	- AT 29.6 m BECOMING PINKISH-BROWN WITH 2%-3% PATCHY MASSIVE PYRITE. LOCALLY UP TO 15% WHITE FOSSIL FRAGMENTS AT UPPER CONTACT.				RC	100	76	0.16		
30.9	- 30.4 m TO 30.5 m GREEN SHALE INTERBED.			CH						
32	31.9 <u>SHALE:</u> GREENISH-GREY, SOFT TO HARD, FISSILE. BOREHOLE TERMINATED AT 31.9 m IN SHALE.									
34										
36										
38										
40										

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 20, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 529.5 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY	REMARKS	
				TYPE	% RECOVERY	ROD (%)		m / sec		
0								E⁻¹¹ E⁻⁴		
	SILT: BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST.	OVERBURDEN	H.Q. CASING						LOCATED SOUTH CENTRAL PROTION OF PROPERTY	
2	2.0									
	DOLOSTONE: GREY, MEDIUM TO COARSE GRAINED WITH WHITE FOSSIL FRAGMENTS, "HONEYCOMB" TEXTURE AND CHAOTIC BEDDING. 2%-3% VUGS WITH WHITE CHALKY APPEARANCE.	AMABEL FORMATION UNIT 1		RC	100	88	0.29			
4					RC	98	98	0.30		
	- 3.3 m TO 4.2 m CREAMY WHITE, UNIFORM, MEDIUM GRAINED DOLOSTONE WITH OCCASIONAL CRINOIDAL FOSSIL FRAGMENTS, WEAKLY BEDDED.									
6					RC	98	80	0.30		
	WEAK BROWN SEDIMENT STAIN ON FRACTURE FACES.									
8									LOST CIRCULATION AT 7.0 m. ADVANCE CASING TO 8.2 m.	
8.8										
	- 8.7 m TO 9.1 m VERTICAL UNDULATING FRACTURE WITH WEAK RUSTY STAINING AND BROWN SEDIMENT ON FACES.									
10										
	DOLOSTONE: MOTTLED GREY/ LIGHT GREY, UNIFORM, MEDIUM GRAINED WITH UP TO 10% WHITE CRINOIDAL FOSSIL FRAGMENTS, WEAKLY BEDDED. "SPECKLED" APPEARANCE. 3%-5% VUGS UP TO 9 mm.	UNIT 2	RC	100	82	0.29				
				RC	98	100	0.26			
12										
13.1										
14										
	DOLOSTONE: GREY, FINE GRAINED DOLOSTONE. HARD, BRITTLE WITH PATCHY VUGS UP TO 11 mm WITH FINE GRAINED CALCITE ± DOLOMITE INFILL.	AMABEL FORMATION UNIT 1	RC	100	100	0.31	1.0E-06			
	- 13.6 m TO 17.9 m BECOMING MOTTLED LIGHT BROWN/ LIGHT GREY.									
16				RC	98	56	0.31	1.7E-06		
18			RC	100	100	0.34	1.3E-06			

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 20, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 529.5 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec E ⁻¹¹ E ⁻⁴	REMARKS
				TYPE	% RECOVERY	ROD (%)			
20									
20.7	<u>DOLOSTONE CONTINUED</u>	1						1.0E-06	LOCATED SOUTH CENTRAL PROTION OF PROPERTY
22	<u>DOLOSTONE:</u> MOTTLED LIGHT BROWN/ LIGHT GREY DOLOSTONE, UNIFORM, FINE GRAINED WITH SACCHAROIDAL TEXTURE. OCCASIONAL CRINOIDAL FOSSIL FRAGMENTS, WEAKLY BEDDED. <2% VUGS UP TO 20 mm. OCCASIONAL POORLY DEVELOPED BROWN STYLOLITE, INCREASING FREQUENCY WITH DEPTH. - 23.4 m TO 23.7 m IRREGULAR VERTICAL, FRACTURE WITH BROWN RUSTY STAINING ON FACES. FRACTURES DOMINANTLY PARALLEL TO SUB-HORIZONTAL BEDDING. - 32.1 m TO 32.7 m MOTTLED LIGHT GREY/ GREY FINE GRAINED, HARD, BRITTLE.	UNIT 1		RC	100	84	0.27	7.3E-07	
24				RC	100	76	0.37	1.5E-06	
26				RC	100	100	0.35	2.0E-06	
28				RC	100	100	0.28	5.8E-07	
30				RC	100	100	0.24	4.1E-07	
32				RC	100	100	0.28	1.3E-06	
34				RC	100	73	0.32	2.7E-06	
36				RC	100	100	0.37	2.0E-06	
38				RC	100	100	0.30	2.0E-06	
40				RC	100	100	0.29	1.2E-06	
				RC	100	100	0.31	7.8E-07	
				RC	100	100	0.29		

NOTE
 AMABEL FORMATION:
 UNIT 1: REEFAL FACIES
 UNIT 2: FLANK FACIES
 FH: FOSSIL HILL FM
 CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSIONPROJECT NO.: 930521.50CLIENT: GEORGIAN AGGREGATES LIMITEDDATE: DECEMBER 20, 2002BOREHOLE TYPE: H.Q. (64 mm) ROCK CORESUPERVISOR: PFRGROUND ELEVATION: 529.5 mASLREVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec E ⁻¹¹ E ⁻⁹	REMARKS
				TYPE	% RECOVERY	ROD (%)			
40									
41.8	DOLOSTONE CONTINUED	UNIT 2	OPEN H.Q. BOREHOLE	RC	100	100	0.26	6.4E-07	LOCATED SOUTH CENTRAL PROTION OF PROPERTY
42				RC	100	100	0.22		
44	DOLOSTONE: MOTTLED BLUE-GREY/ GREY, FINE GRAINED DOLOSTONE. OCCASIONAL WISPY GREY SHALE PARTINGS INCREASING WITH DEPTH, UP TO 3 mm THICK. OCCASIONAL PINCH-AND-SWELL TYPE BEDS, NODULES OF LIGHT GREY CHERT UP TO 30 mm THICK. FRACTURES OCCUR DOMINANTLY AT STYLOLITE/ PARTINGS WITH GREY SHALE. - 43.7 m TO 44.2 m LIGHT BROWN DISCOLORATION, WITH WEAKLY DEVELOPED HALO.	FOSSIL HILL FORMATION		RC	100	100	0.17	2.7E-09	
46				RC	100	100	0.17	1.7E-08	
47.3				RC	100	100	0.16	9.0E-09	
48	SHALE: GREENISH-GREY, SOFT TO HARD, FISSILE.	CH							
48.5	BOREHOLE TERMINATED AT 48.5 m IN SHALE.								
50									
52									
54									
56									
58									
60									

NOTE

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

LOG OF BOREHOLE BH03-7 (deep)



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559353 N: 4915510 (17T, Geodetic)

rig type | CME 75, track-mounted
method | Rock coring
coring | HQ core, OD=96mm, ID=64mm

project no. | 111-53312-00
date started | 2014/10/03
supervisor | BTC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
0	510.6	GROUND SURFACE										
1		OVERBURDEN										
2												
3												
4												
5												
6												
7	504.0											
8	502.6	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; thickly bedded; fossiliferous (fossil debris); strong core with a rough cut texture, scratched with a knife; slightly weathered appearance with minor rusty staining on fracture surfaces; vugs up to 5%, typically 1 mm to 2 mm. Poor to very poor RQD to 10.1 m depth, then good RQD. (Flank facies)			R1 TCR = 100% RQD = 11%							
9					R2 TCR = 100% RQD = 16%							
10	501.2	Reefal facies with an open vuggy appearance from 6.4 m to 10.1 m depth, broken core recovered as fragments and numerous vertical fractures. Reddish brown muddy infilling to 13.1 m depth.			R3 TCR = 95% RQD = 52%							
11	499.6	Core becoming darker bluish grey with a decrease in vugs below 16.2 m and finer textured.			R4 TCR = 100% RQD = 78%							
12		Thin stylolites (<1 mm) below 22.9 m depth, 2 to 3 per 0.3 m.			R5 TCR = 100% RQD = 63%							
13	498.1	White chert bed 25 mm thick at 24.6 m depth and 50 mm nodule at 25.3 m depth.			R6 TCR = 100% RQD = 78%							
14	496.6	Gradational lower contact at 25.6 m depth at change in colour and texture.			R7 TCR = 100% RQD = 98%							
15	495.1											
16	493.6											

(continued next page)

LOG OF BOREHOLE BH03-7 (deep)



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559353 N: 4915510 (17T, Geodetic)

rig type | CME 75, track-mounted
method | Rock coring
coring | HQ core, OD=96mm, ID=64mm

project no. | 111-53312-00
date started | 2014/10/03
supervisor | BTC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		Dynamic Cone 10 20 30 40	Undrained Shear Strength (kPa) 40 80 120 160				
17		(continued)										
18	492.0			R8	TCR = 98% RQD = 86%	493						
19				R9	TCR = 98% RQD = 98%	492						
20	490.5					491						
21				R10	TCR = 98% RQD = 98%	490						
22	489.0					489						
23				R11	TCR = 100% RQD = 100%	488						
24	487.4					487						
25				R12	TCR = 100% RQD = 95%	486						
26	486.0					485						
27	485.0 25.6	DOLOSTONE (Fossil Hill Formation) Light pinkish brown to greyish brown; fine grained, stylolites 10 to 12 per 0.3 m, 1 mm thick. Sharp lower contact on change in texture.		R13	TCR = 100% RQD = 88%	484						
28	484.5			R14	TCR = 50% RQD = 97%	483						
29	482.9					482						
30	482.2 28.4	SHALE (Cabot Head Formation) Greenish grey calcareous shale; completely weathered, plastic texture. Some reddish coloured beds up to 0.3 m thick, very poor RQD.		R15	TCR = * RQD = *	481						Dark coloured fine grained dolostone bed from 28.6 m to 28.9 m depth.
	481.4			R16	TCR = * RQD = *	480						* Core barrel not catching core.
	479.9 30.7											

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in bedrock at 10.51 m depth.

WATER LEVEL MONITORING

Date | Oct 8, 2014
Depth (m) | 0.7
Elevation (m) | 509.9

BOREHOLE NO. BH03-7

Page 1 of 1

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: APRIL 10, 2003

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 510.3 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE					RATE OF DRILL PENETRATION m / min	WATER CONTENT %			REMARKS
			I	II	TYPE	N _v VALUE	% WATER	% RECOVERY	RQD (%)		10	20	30	
0											W _p		W _L	
1.4	CLAYEY SILT: LIGHT BROWN, MOTTLED BROWN, TRACE SAND, TRACE GRAVEL. OCCASIONAL LAMINAE OF FINE TO MEDIUM SAND.	OVERBURDEN			SS	3		50		0.21				LOCATED NEAR WETLAND NORTHWEST QUADRANT OF PROPERTY
					SS	6		42						
2	SILTY SAND: LIGHT BROWN, TRACE GRAVEL, TRACE CLAY. WET, COMPACT. OCCASIONAL LAMINAE OF FINE TO MEDIUM SAND.				SS	10		54						
					SS	23		58						
4					SS	19		75						
					SS	27		71						
5.5		UNIT 2			SS	11		75		0.15				
6	SANDY SILT TILL: GREY SANDY SILT, TRACE CLAY. VERY STIFF TO HARD.				SS	35		54						
6.6					SS	24		79						
7.5	DOLOSTONE: LIGHT BROWN TO LIGHT GREY, MEDIUM GRAINED WITH SACCHAROIDAL TEXTURE, WEAKLY BEDDED, 3-5% VUGS UP TO 20 mm, BROKEN.				RC	-		100	90					
8					RC	-		81	77					
9.2	DOLOSTONE: PATCHY GREY TO LIGHT GREY, FINE GRAINED DOLOSTONE, UNIFORM TEXTURE, BROKEN TO BLOCKY. - AT 8.0 m FRACTURE WITH 5 mm THICK RED-BROWN SEDIMENT INFILL.													
10	BOREHOLE TERMINATED AT 9.2 m IN DOLOSTONE.	UNIT 1												
12														
14														
16														
18														
20														

NOTE

AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

BOREHOLE NO. BH03-8

Page 1 of 2

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: APRIL 11, 2003

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 520.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec						REMARKS
				TYPE	% RECOVERY	RQD (%)		E ⁻¹¹					E ⁻⁴	
0														
2	SILT TILL: DARK BROWN, SILT SOME SAND, SOME GRAVEL, TRACE CLAY, OCCASIONAL COBBLE/BOULDER, VERY STIFF, DTPL.	OVERBURDEN	H.Q. CASING	SS	41									LOCATED ON WEST SIDE OF PROPERTY
4				SS										
6				SS										
6.2				SS										
8	DOLOSTONE: PATCHY GREY/LIGHT GREY, MEDIUM TO COARSE GRAINED DOLOSTONE, CHAOTIC TEXTURE, 3-5% VUGS UP TO 40 mm.	AMABEL FM. UNIT 1	7.3 m	RC	84	75	0.29							
10				RC	95	51	0.14					1.7E-06		
11.8				RC	98	81	0.16							
12				RC	82	87	0.18					2.0E-07		
14	DOLOSTONE: MOTTLED LIGHT BROWN/LIGHT GREY, UNIFORM MEDIUM GRAINED DOLOSTONE WITH SACCHAROIDAL TEXTURE, MODERATE TO WELL DEVELOPED BEDDING.	AMABEL FM. UNIT 2	OPEN H.Q. BOREHOLE	RC	100	100	0.29					2.5E-07		
16				RC	100	83	0.25					3.4E-07		
16.3				RC	98	92	0.30					9.0E-07		
18				RC	100	100	0.15					1.9E-07		
20	DOLOSTONE: PATCHY GREY/LIGHT GREY, FINE GRAINED DOLOSTONE, CHAOTIC TEXTURE, 1-2% VUGS UP TO 50 mm.	AMABEL FM. UNIT 1		RC	100	93	0.21							
				RC	100	100	0.18					2.2E-06		

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: APRIL 11, 2003

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 520.2 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec	REMARKS	
				TYPE	% RECOVERY	RQD (%)		E ⁻¹¹ E ⁻⁴		
20										
	DOLOSTONE: CONTINUED.	AMABEL FM. UNIT 1	OPEN H.Q. BOREHOLE	RC	98	100	0.25		LOCATED ON WEST SIDE OF PROPERTY	
22				RC	97	100	0.22			
		RC		100	97	0.26				
24										
		RC		100	97	0.29				
26	25.8									
	DOLOSTONE: LIGHT GREY, UNIFORM, MEDIUM GRAINED DOLOSTONE WITH "SPECKLED" APPEARANCE, WEAKLY BEDDED, 3-5% WHITE CRINOIDAL FOSSIL FRAGMENTS, BROKEN TO MASSIVE, RARE BROWN STYOLITES, OCCASIONAL GREY SHALE LAMINAE/PARTING UP TO 2 mm.	AMABEL FM. UNIT 2		RC	100	100	0.31			
				RC	100	89	0.31			
28	- BELOW 31.4 m INCREASING BROWN STYLOLITES.			RC	100	95	-			
30			RC	98	88	0.29				
			RC	100	100	0.22				
32										
33.2										
34	DOLOSTONE: BLUE-GREY, FINE GRAINED WITH SACCHAROIDAL TEXTURE, INCREASING STYLOLITES, BECOMING GREY IN COLOUR.	FOSSIL HILL FM	RC	93	100	0.22				
	- AT 34.1 m BECOMING PINKISH-BROWN WITH OCCASIONAL cm SCALE PINCH-AND -SWELL TYPE BEDS AND NODULES OF GREY CHERT, OCCASIONAL PYRITE		RC	93	100	-				
36	- AT 34.7 m FRACTURE WITH LIGHT BROWN HALO ± 30 mm.									
37.4										
38	37.9 SHALE: GREENISH-GREY, SOFT TO HARD, FISSILE.	CH								
	BOREHOLE TERMINATED AT 37.9 m IN SHALE.									
40										

CIRCULATION MAINTAINED
FOR ENTIRE HOLE.

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

Page 1 of 2

PROJECT NO.: 930521.50

DATE: APRIL 14, 2003

SUPERVISOR: PFR

REVIEWER: AJC

[illegible]

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES LIMITED

DATE: APRIL 14, 2003

BOREHOLE TYPE: H.Q. (64 mm) ROCK CORE

SUPERVISOR: PFR

GROUND ELEVATION: 518.5 mASL

REVIEWER: AJC

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE			RATE OF DRILL PENETRATION m / min	HYDRAULIC CONDUCTIVITY m / sec					REMARKS
				TYPE	% RECOVERY	RQD (%)		E ⁻¹¹				E ⁻⁴	
20													
22	DOLOSTONE: CONTINUED. - 21.0 TO 21.3 m VERTICAL FRACTURE WITH MODERATE ORANGE STAINING.	UNIT 1	OPEN H.Q. BOREHOLE	RC	100	100	0.21					4.3E-07	LOCATED IN SOUTHEAST PART OF PROPERTY.
24	DOLOSTONE: LIGHT GREY, MEDIUM GRAINED DOLOSTONE, UNIFORM WITH "SPECKLED" TEXTURE. WEAKLY BEDDED, 3-5% CRINOIDAL FOSSIL FRAGMENTS (CRINOIDS), RARE BROWN STYLOLITES. - BREAKS DOMINANTLY PARALLEL TO BEDDING, MODERATE ORANGE STAINING, 23.8 m AND 26.5 m.	AMABEL FORMATION UNIT 2		RC	100	95	0.19					5.3E-06	
26				RC	100	95	0.18					5.2E-06	
28				RC	100	100	0.19					1.7E-06	
30				RC	100	88	0.18					7.3E-07	
32				RC	100	100	0.20					1.5E-05	
34	DOLOSTONE: BLUE-GREY, FINE TO MEDIUM GRAINED DOLOSTONE WITH SACCHAROIDAL TEXTURE, INCREASING STYLOLITES, BECOMING GREY. - AT 33.7 m FRACTURE WITH LIGHT BROWN HALO ±100 mm. - AT 34.6 m PINKISH-BROWN, FINE GRAINED DOLOSTONE WITH SACCHAROIDAL TEXTURE, OCCASIONAL SHALE LAMINAE UP TO 3 mm THICK, OCCASIONAL PINCH-AND-SWELL TYPE BED OR NODULE OF GREY CHERT, OCCASIONAL PYRITE. - AT 33.7 m FRACTURE WITH LIGHT BROWN HALO ±100 mm.	FOSSIL HILL FORMATION		RC	100	100	0.21					1.3E-06	
36				RC	100	95	0.16					5.2E-07	
38				RC	95	100	0.13					7.9E-09	
40	SHALE: GREENISH-GREY, SOFT TO HARD, FISSILE. BOREHOLE TERMINATED AT 39.5 m IN SHALE	CH										4.9E-09	

NOTE
AMABEL FORMATION:
UNIT 1: REEFAL FACIES
UNIT 2: FLANK FACIES
FH: FOSSIL HILL FM
CH: CABOT HEAD FM

BOREHOLE NO. BH08-1

PAGE 1 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

DATE COMPLETED: Dec 02, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 511.5 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES	REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						UTM Zone: 17 NAD: 27 Easting: 560471 Northing: 4915197	
									10	20	30	10	20			30
									SHEAR STRENGTH			W _P W _L				
0.0																
1.0	SILT: BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST. 50 mm SEAM OF COARSE GRAVEL AT 1.8 m.			SS1	29		54									
				SS2	18		46									
2.0				SS3	63		54									
2.1	DOLOSTONE: LIGHT GREY TO WHITE DOLOSTONE BANDED IN DARK GREY, MEDIUM HARD, FRACTURED TO VERY BROKEN, WEATHERED. - VUGGY - FOSSILIFEROUS			RC4			75	0						AUGER REFUSAL AT 2.1 m. ASSUMED BEDROCK. CASING SEATED TO 2.6 m. OPEN HOLE INSTALLATION.		
3.0				RC5			100	54								
4.0																
4.3	DOLOSTONE: GREY DOLOSTONE, BECOMING YELLOW TINGED WITH DEPTH, MEDIUM HARD, FRACTURED TO MASSIVE, SOME WEATHERING AND SEDIMENT INFILLING IN FRACTURES. - VUGGY - FOSSILIFEROUS			RC6			100	92								
5.0																
6.0				RC7			100	97								
7.0																
7.4	DOLOSTONE: LIGHT GREY TO WHITE DOLOSTONE WITH DARK GREY MOTTLING, MEDIUM HARD, FRACTURED TO MASSIVE, SLIGHT WEATHERING. - NUMEROUS SMALL VUGS - FEW FOSSILS			RC8			100	79								
8.0																
9.0				RC9			97	95								
10.0																
11.0																
12.0																
13.0																
13.7	DOLOSTONE: GREY DOLOSTONE WITH INCREASING DARK GREY BANDING AND MOTTLING WITH DEPTH. BRONZE COLOURED, INCLUSIONS BEGINNING AT 18 m. MEDIUM HARD, FRACTURED TO MASSIVE, SOME STAINING AND WEATHERING IN FRACTURES. - VUGGY			RC10			98	99								
14.0																
15.0				RC11			100	95								
16.0																
17.0																
18.0																
19.0																
20.0																

AUGER REFUSAL AT 2.1 m.
ASSUMED BEDROCK.
CASING SEATED TO 2.6 m. OPEN
HOLE INSTALLATION.

GENIVAR GEOLOGIC BW (M) WITH UTM 4-930521.52 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

BOREHOLE NO. BH08-1

PAGE 2 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

DATE COMPLETED: Dec 02, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 511.5 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES UTM Zone: 17 NAD: 27 Easting: 560471 Northing: 4915197		
				TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	"N" VALUE						
									10	20	30	10		20	30
									SHEAR STRENGTH			W _p W _L			
20.0													REMARKS		
20.4	DOLOSTONE: CONTINUED.														
21.0	DOLOSTONE: BLUE-GREEN MOTTLED DOLOSTONE, WHITE INCLUSIONS, MEDIUM HARD, TEXTURE IS SMOOTH, FRACTURED TO MASSIVE. (FOSSIL HILL FORMATION) - VUGS (MINOR)			RC16			100	93							
22.0				RC17			100	92							
23.0															
24.0				RC18			100	89							
25.0															
24.8															
24.9	SHALE: BLUE-GREEN GREY SHALE, VARIABLE SOFT TO HARD.			RC19			100	70							
26.0	DOLOSTONE: BLUE-GREEN MOTTLED DOLOSTONE, MEDIUM HARD, FRACTURED TO MASSIVE.														
27.0	SHALE: BLUE-GREEN GREY SHALE, VARIABLE SOFT TO HARD. (CABOT HEAD FORMATION)			RC20			100	20							
27.4	BOREHOLE TERMINATED AT 27.4 m IN SHALE.												BOREHOLE TERMINATED AT 27.4 m IN BLUE-GREEN SHALE.		
28.0													WATER LEVEL 2.49 mBGL MEASURED ON DEC. 5, 2008.		
29.0													FINAL STICK-UP 1.83 m ABOVE GROUND LEVEL.		
30.0															
31.0															
32.0															
33.0															
34.0															
35.0															
36.0															
37.0															
38.0															
39.0															
40.0															

BOREHOLE TERMINATED AT 27.4
m IN BLUE-GREEN SHALE.

WATER LEVEL 2.49 mBGL
MEASURED ON DEC. 5, 2008.

FINAL STICK-UP 1.83 m ABOVE
GROUND LEVEL.

GENIVAR GEOLOGIC B/W (M) WITH UTM 4-93052152 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

BOREHOLE NO. BH08-2

PAGE 1 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

DATE COMPLETED: Dec 03, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 511.2 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE		10 20 30				
									10	20	30	10		20	30
0.0															
1.0	SILT: DARK BROWN TO BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST, DENSE. ORGANIC MATTER AT GROUND SURFACE.			SS1	33		38								
				SS2	43		21								
				SS3	50		100								
2.0	DOLOSTONE: CREAMY WHITE DOLOSTONE, MOTTLED WITH LIGHT AND DARK GREY, MEDIUM HARD, BROKEN BECOMING MASSIVE WITH DEPTH, WEATHERED FRACTURES. - FOSSILIFEROUS - VUGGY - SOME CALCITE INFILL WITHIN LARGER VUGS			RC4			100	0					AUGER REFUSAL AT 1.8 m. ASSUMED BEDROCK.		
3.0				RC5			100	0					CASING SEATED TO 2.7 m. OPEN HOLE INSTALLATION.		
4.0				RC6			100	52							
5.0				RC7			100	60							
6.0				RC8			100	84							
7.0				RC9			100	89							
7.5	DOLOSTONE: LIGHT GREY DOLOSTONE BANDED AND MOTTLED WITH DARK GREY, SOME RUST COLOURED MOTTLING, MEDIUM HARD, FRACTURED TO MASSIVE. FRACTURES SHOWING RUST STAINING WITH DEPTH. - NUMEROUS SMALL VUGS - FEW FOSSILS			RC10			100	79							
8.0				RC11			100	100							
9.0				RC12			100	98							
10.0				RC13			100	92							
10.5				RC14			100	97							
11.0	DOLOSTONE: LIGHT GREY DOLOSTONE MOTTLED WITH DARK GREY, BROWN SPOTS, MEDIUM HARD, SMOOTH TEXTURE, MASSIVE. - VUGS (MINOR)			RC15			100	98							
12.0				RC16			100	98							
12.3	DOLOSTONE: LIGHT GREY DOLOSTONE, VERY DARK GREY MOTTLING AND BANDING, MEDIUM HARD, MASSIVE. - VUGGY														
13.0															
14.0															
15.0															
16.0															
16.6	DOLOSTONE: LIGHT GREY TO MEDIUM GREY DOLOSTONE, DARK GREY MOTTLING, RUST COLOURED THIN BANDING, MEDIUM HARD, MASSIVE TO FRACTURED. - VUGGY														
17.0															
18.0															
19.0															
19.7	DOLOSTONE:														
20.0															

UTM CO-ORDINATES
UTM Zone: 17 NAD: 27
Easting: 560484
Northing: 4915175

AUGER REFUSAL AT 1.8 m.
ASSUMED BEDROCK.

CASING SEATED TO 2.7 m. OPEN
HOLE INSTALLATION.

GENIVAR GEOLOGIC BW (M) WITH UTM 4-93052152 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

BOREHOLE NO. BH08-2

PAGE 2 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

DATE COMPLETED: Dec 03, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 511.2 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		<u>UTM CO-ORDINATES</u> UTM Zone: 17 NAD: 27 Easting: 560484 Northing: 4915175		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
									10	20	30	10		20	30
									SHEAR STRENGTH			W _p W _L			
20.0												REMARKS			
21.0	DOLOSTONE; CONTINUED. BLUE GREEN MOTTLED GREY DOLOSTONE, DARKER BLUE-GREEN THIN BANDING, BROWN SPOTS AND MOTTILING, WHITE INCLUSIONS, SMOOTH TEXTURE, MEDIUM HARD, MASSIVE TO FRACTURED. (FOSSIL HILL FORMATION) - VUGS (MINOR)			RC17			100	83					BOREHOLE TERMINATED AT 25.8 m IN BLUE-GREEN SHALE. WATER LEVEL 2.26 mBGL MEASURED ON DEC. 5, 2008. FINAL STICK-UP 1.82 m ABOVE GROUND LEVEL.		
22.0				RC18			100	80							
23.0															
24.0				RC19			100	78							
25.0															
25.0	25.0			RC20			100	40							
26.0	25.8														
26.0	BOREHOLE TERMINATED AT 25.8 m IN SHALE.														
27.0															
28.0															
29.0															
30.0															
31.0															
32.0															
33.0															
34.0															
35.0															
36.0															
37.0															
38.0															
39.0															
40.0															

GENIVAR GEOLOGIC B/W (M) WITH UTM 4-93052152 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

BOREHOLE NO. BH08-3

PAGE 1 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

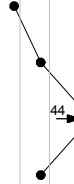
DATE COMPLETED: Dec 04, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 512.6 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES	REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						UTM Zone: 17 NAD: 27 Easting: 560447 Northing: 4915198	
									10	20	30	10	20			30
									SHEAR STRENGTH			W _P W _L				
0.0	SILT: DARK BROWN TO BROWN SILT, SOME SAND, TRACE GRAVEL, TRACE CLAY, MOIST, DENSE. ORGANIC MATTER AT GROUND SURFACE.			SS1	18		42									
1.0				SS2	27		50									
2.0				SS3	44		58									
3.0				SS4	27		58									
3.0	DOLOSTONE: CREAMY WHITE DOLOSTONE, MOTTLED WITH LIGHT AND DARK BLUE-GREY, MEDIUM HARD, BROKEN BECOMING MASSIVE WITH DEPTH, WEATHERING OF FRACTURES DECREASING WITH DEPTH. - VUGGY - FOSSILIFEROUS - SOME CALCITE INFILL WITHIN LARGER VUGS			RC5			100	84					AUGER REFUSAL AT 3.0 m. ASSUMED BEDROCK. CASING SEATED TO 3.2 m. OPEN HOLE INSTALLATION.			
4.0				RC6			100	78								
5.0				RC7			100	83								
6.0				RC8			95	91								
7.0	DOLOSTONE: LIGHT GREY DOLOSTONE BANDED AND MOTTLED WITH DARK GREY, MEDIUM HARD, FRACTURED TO MASSIVE. FRACTURES SHOWING STAINING AND SILTY INFILLING WITH DEPTH. - NUMEROUS SMALL VUGS - FEW FOSSILS			RC9			98	84								
8.0				RC10			100	86								
9.0				RC11			100	95								
10.0				RC12			100	93								
11.0	DOLOSTONE: LIGHT GREY DOLOSTONE MOTTLED WITH DARK GREY, BROWN SPOTS, MEDIUM HARD, SMOOTH TEXTURE, MASSIVE. - FEW VUGS			RC13			100	98								
12.0				RC14			100	92								
13.0				RC15			100	93								
14.0				DOLOSTONE: LIGHT TO MEDIUM GREY DOLOSTONE WITH DEPTH, DARK GREY BANDING, MEDIUM HARD, MASSIVE.			RC16			100	98					
15.0	RC17						100	92								
16.0	RC18						100	93								
17.0	RC19						100	93								
18.0	DOLOSTONE: MEDIUM GREY DOLOSTONE BECOMING LIGHT GREY WITH DEPTH. DARK GREY MOTTLING, RUST COLOURED THIN BANDING, MEDIUM HARD, MASSIVE. - NUMEROUS SMALL VUGS			RC20			100	98								
19.0				RC21			100	92								
19.7				RC22			100	93								
20.0	DOLOSTONE:															

GENIVAR GEOLOGIC BW (M) WITH UTM 4-930521.52 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

BOREHOLE NO. BH08-3

PAGE 2 of 2

PROJECT NAME: DUNTROON EXPANSION - BRIDSON MONITORS

PROJECT NO.: 04-930521.52

CLIENT: WALKER INDUSTRIES HOLDINGS

DATE COMPLETED: Dec 04, 2008

BOREHOLE TYPE: HQ CORE

SUPERVISOR: SLW

GROUND ELEVATION: 512.6 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
									10	20	30	10		20	30
									SHEAR STRENGTH			W _P W _L			
20.0															
21.0	DOLOSTONE: CONTINUED. LIGHT GREY DOLOSTONE WITH INCREASING LIGHT/DARK BANDING WITH DEPTH, RUST COLOURED THIN BANDING, MEDIUM HARD, MASSIVE. - NUMEROUS SMALL VUGS			RC16			100	91							
22.0				RC17			100	93							
23.0		DOLOSTONE: BLUE GREEN MOTTLED GREY DOLOSTONE, DARKER BLUE-GREEN THIN BANDING, INCREASING WHITE BANDING WITH DEPTH. WHITE INCLUSIONS AND BROWN SPOTTING WITH DEPTH. SMOOTH TEXTURE, MEDIUM HARD, MASSIVE TO FRACTURED. (FOSSIL HILL FORMATION) - VUGS (MINOR)			RC18			100	88						
24.0					RC19			100	90						
25.0															
26.0				RC20			100	84							
27.0															
27.5	SHALE: BLUE GREEN SHALE, SOFT, VERY BROKEN. (CABOT HEAD FORMATION)														
28.0				RC21			100	11							
28.8	BOREHOLE TERMINATED AT 28.8 m IN SHALE.												BOREHOLE TERMINATED AT 28.8 m IN BLUE-GREEN SHALE. WATER LEVEL 3.53 mBGL MEASURED ON DEC. 5, 2008. FINAL STICK-UP 1.55 m ABOVE GROUND LEVEL.		
29.0															
30.0															
31.0															
32.0															
33.0															
34.0															
35.0															
36.0															
37.0															
38.0															
39.0															
40.0															

GENIVAR GEOLOGIC B/W (M) WITH UTM 4-93052152 BRIDSON MONITORS.GPJ JAGGER HIMS BASIC.GDT 3/10/10

LOG OF BOREHOLE NW1



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560059 N: 4915125 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/26
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
0	525.7	GROUND SURFACE										
1	524.5	OVERBURDEN				525						
2	524.5	DOLOSTONE (Amabel Formation)				524						
3	521.4	Reefal facies texture with more open cavities and increased fossil content from 1.2 m to 5.1 m, 11.0 m to 12.8 m and from 17.0 m to 18.2 m depth.		R1	TCR = 73% RQD = 47%	523						
4	519.3	Core becoming darker bluish grey in colour below 17.1 m. Mottled grey and white appearance from 25.9 m to 37.0 m depth.		R2	TCR = 64% RQD = 31%	522						
5	516.3	Gradational lower contact at change in texture at 37.0 m depth.		R3	TCR = 99% RQD = 85%	521						
6	513.2			R4	TCR = 100% RQD = 99%	520						
7	510.2			R5	TCR = 98% RQD = 96%	519						
8	507.1			R6	TCR = 77% RQD = 74%	518						
9	504.1			R7	TCR = 98% RQD = 94%	517						
10	501.0			R8	TCR = 100% RQD = 70%	516						
11						515						
12						514						
13						513						
14						512						
15						511						
16						510						
17						509						
18						508						
19						507						
20						506						
21						505						
22						504						
23						503						
						502						Vertical fracture from 22.0 m to 22.6 m depth.

(continued next page)

LOG OF BOREHOLE NW1



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560059 N: 4915125 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/26
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Field Vane				
		(continued)					10 20 30 40	+				
24	501.0				R8	501						
25						500						
26					R9	499						
27						498						
28	498.0					497						
29					R10	496						
30						495						
31	494.9					494						
32					R11	493						
33						492						
34	491.9				R12	491						
35	491.0					490						
36					R13	489						
37	488.8					488						
38	488.7	DOLOSTONE (Fossil Hill Formation) Bluish grey fine grained stycolytic typically 3 to 5 per 0.3 m. Cherty lenses, 25 mm thick, 2 per 0.3 m from 37.8 m to 39.0 m depth.			R14	487						
39		Sharp lower contact at change in texture.				486						
40	485.8					485						
41	484.6				R15	484						
42	41.2	SHALE (Cabot Head Formation) Greenish grey shale, calcareous, weathered, plastic texture.				483						
	483.0	0.6 m thick dolostone bed at 41.3 m.										
	42.7											

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in bedrock at 2.24 m depth.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 17, 2014	13.2	512.5

Red mud filled vertical fracture, with enhanced weathering from 33.6 m to 36.8 m depth.

LOG OF BOREHOLE NW2



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560108 N: 4915311 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/12
supervisor | TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
0	531.4	GROUND SURFACE					10 20 30 40	40 80 120 160	PL MC LL			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
1		OVERBURDEN				531						
2						530						
3						529						
4	527.7	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; strong core with a rough cut texture, scratched by a knife; slightly weathered with rusty orange staining on fractures, vuggy typically 5%, thickly bedded, overall good to excellent RQD. (Flank facies)				528						
5	3.7					527						
6					R1	526						
7	524.8					525						
8		Reefal facies texture with vugs and cavities up to 10 cm and increased fossil content from 12.2 m to 13.4 m and 36.7 m to 37.4 m.			R2	524						
9						523						
10	522.4	Core becoming darker bluish grey below 24.2 m. Mottled grey and white to light pinkish brown below 42.1 m.				522						
11		Gradational lower contact on change in texture.			R3	521						
12	519.7					520						
13					R4	519						
14						518						
15	516.9					517						
16					R5	516						
17						515						
18	513.7					514						
19					R6	513						Some reddish mud infilling on vertical fracture from 18.1 m to 18.3 m.
20						512						
21	510.3					511						
22					R7	510						
23						509						
24	507.1					508						
25					R8	507						
26						506						
27	503.8					505						
28					R9	504						
29						503						
	500.7					502						

(continued next page)

LOG OF BOREHOLE NW2



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560108 N: 4915311 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/12
supervisor | TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10 20 30 40	10 20 30 40				
30	500.7	(continued)		R9		501						
31						500						
32				R10	TCR = 98% RQD = 74%	499						Broken core recovery from 32.3 m to 33.1 m.
33	497.5					498						
34						497						
35				R11	TCR = 89% RQD = 76%	496						
36						495						
37	494.0					494						
38				R12	TCR = 96% RQD = 93%	493						
39						492						
40	490.8					491						
41						490						
42				R13	TCR = 89% RQD = 85%	489						
43						488						
44	487.6					487						
45				R14	TCR = 100% RQD = 70%	486						
46						485						
47	484.8 46.6	DOLOSTONE (Fossil Hill Formation) Dark pinkish brown fine grained, stylolites typically 3 to 5 per 0.3 m, typically 3 mm thick, stylolites increasing with depth. 10 cm coral fossil at lower contact. Sharp lower contact at first shale bed.				484						
48				R15	TCR = 100% RQD = 90%	483						
49	481.5					482						
50						481						
51	479.9 51.5	SHALE (Cabot Head Formation) Greenish grey calcareous, weathered, plastic texture. 10 cm thick at contact overlying 0.33 m thick dolostone bed. Reddish fossiliferous sandstone beds 25 mm to 100 mm thick comprise 20% of recovered core.		R16	TCR = 100% RQD = 89%	480						
52						479						
53	478.4					478						
54				R17	TCR = 100% RQD = 82%	477						
55	476.7 54.7					476						

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in bedrock at 3.66 m depth.

WATER LEVEL MONITORING

Date Sep 2, 2014
Depth (m) 25.9
Elevation (m) 505.5

LOG OF BOREHOLE NW3



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560217 N: 4915465 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/12
supervisor | TKC/SLW
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
0	514.4	GROUND SURFACE										
1		OVERBURDEN				514						
2						513						
3						512						
4	510.4	DOLOSTONE (Amabel Formation)				511						
5	4.0	Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, strong core with a rough cut texture, scratched by a knife; porous to vuggy with vugs representing 10% to 20% of recovered core. Reddish muddy infilling to 11.4 m. Minor weathering with rusty stained fracture surfaces, thickly bedded, overall fair to good RQD.			R1	510						
6						509						
7	507.8	Reefal facies appearance from 4.0 m to 13.6 m and from 14.9 m to 15.0 m with a more open vuggy texture and significant fossil debris, lower RQD values.				508						
8		Core darker in colour below 12.2 m. Core becoming mottled grey/white below 23.8 m with a wispy stylolytic texture.			R2	507						
9		Gradational lower contact on change in texture.				506						
10	505.6					505						
11						504						
12						503						
13						502						
14	502.4					501						
15						500						
16	499.2				R4	499						
17						498						
18						497						
19						496						
20	496.1				R5	495						

(continued next page)

LOG OF BOREHOLE NW3



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560217 N: 4915465 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/12
supervisor | TKC/SLW
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		Undrained Shear Strength (kPa)							
						Core Recovery		○ Unconfined ● Pocket Penetrometer	+ Field Vane ■ Lab Vane						
		(continued)					10 20 30 40	10 20 30							GR SA SI CL
16															
17					R5	TCR = 88% RQD = 69%									
18	496.1														
19															
20					R6	TCR = 98% RQD = 78%									
21	493.2														
22															
23					R7	TCR = 98% RQD = 86%									
24	489.9														
25	489.6 24.8	DOLOSTONE (Fossil Hill Formation) Light greyish brown to pinkish brown, fine grained with stylolytic to shaley partings 2 to 5 mm thick, typically 5 per 0.3 m. Sharp lower contact on first shale bed.			R8	TCR = 92% RQD = 80%									
26															
27	486.7														
28	486.1 28.4	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture, thin reddish coloured fossiliferous sandstone beds from 28.7 m to 29.4 m depth.			R9	TCR = 100% RQD = 57%									
29	484.8														

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in at least 1 m of competent bedrock.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 17, 2014	3.4	511.0

LOG OF BOREHOLE NW4



project | Duntroon Quarry

project no. | 111-53312-00

client | Walker Aggregates Inc.

rig type |

date started | 2014/08/28

location | Duntroon, Ontario

method | Rock coring

supervisor | KMT

position | E: 559674 N: 4915228 (17T, Geodetic)

coring | PQ core, OD=123mm, ID=85mm

reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10 20 30 40	10 20 30 40				
0	529.0	GROUND SURFACE				529						
1		OVERBURDEN				528						
2						527						
3	526.3 2.7	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, slightly brittle rock core with a rough cut texture, scratched by a knife; porous texture with interconnected vugs up to 50 mm. Reefal facies appearance (fossil debris) with a poorer RQD from contact to 28.5 m. Flank facies appearance below 28.5 m with less vugs and higher RQD. Minor weathering with mud infilling to 13.1 m, thickly bedded, fair to good RQD. (Flank facies)				526						
4						525						
5					R1	524	TCR = 97% RQD = 89%					
6						523						
7	522.1				R2	522	TCR = 98% RQD = 90%					
8						521						
9	520.1	Core becoming darker bluish grey in colour below 14.9 m. Mottled grey/white appearance below 34.1 m, shaley to wispy stylolites (typically 5 per 0.3 m) below 41.5 m.				520						
10						519						
11		Gradational lower contact on change in texture at 43.2 m.			R3	518	TCR = 100% RQD = 87%					
12	517.1					517						
13						516						
14					R4	515	TCR = 100% RQD = 92%					
15	514.0					514						
16						513						
17					R5	512	TCR = 98% RQD = 98%					
18	510.8					511						
19						510						
20					R6	509	TCR = 99% RQD = 87%					
21	507.7					508						
22						507						
23					R7	506	TCR = 100% RQD = 94%					
24	504.5					505						
25						504						
26					R8	503	TCR = 98% RQD = 95%					
27	501.4					502						
28						501						
29					R9	500	TCR = 100% RQD = 100%					
	498.4											

(continued next page)

Sheet No. 1 of 2

LOG OF BOREHOLE NW4



project | Duntroon Quarry **project no.** | 111-53312-00
client | Walker Aggregates Inc. **rig type** | **date started** | 2014/08/28
location | Duntroon, Ontario **method** | Rock coring **supervisor** | KMT
position | E: 559674 N: 4915228 (17T, Geodetic) **coring** | PQ core, OD=123mm, ID=85mm **reviewer** | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value Core Recovery		Dynamic Cone 10 20 30 40	Undrained Shear Strength (kPa) 40 80 120 160				
30	498.4	(continued)			R9		499						
31							498						
32					R10	TCR = 99% RQD = 96%	497						
33							496						
34	495.2						495						
35					R11	TCR = 98% RQD = 98%	494						
36							493						
37	492.3						492						
38					R12	TCR = 98% RQD = 98%	491						
39							490						
40	489.1						489						
41					R13	TCR = 100% RQD = 84%	488						
42							487						
43	486.1 485.8 483.2	DOLOSTONE (Fossil Hill Formation) Light pinkish grey to greenish grey, fine grained, stylolitic to shaley minor pyrite mineralization. Sharp lower contact on first appearance of shale.			R14	TCR = 100% RQD = 94%	486						
44							485						
45							484						
46							483						Vertical fracture from 45.8 m to 47.1 m depth.
47	481.9 47.1	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture, thin reddish coloured fossiliferous sandstone beds below 48.6 m.			R15	TCR = 100% RQD = 49%	482						Dolostone bed from 47.1 m to 47.5 m depth.
48	480.1 48.9						481						

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
Casing cemented in bedrock at 3.66 m depth.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 5, 2014	10.6	518.4

LOG OF BOREHOLE NW5



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559641 N: 4915406 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/27
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		Dynamic Cone 10 20 30 40	Undrained Shear Strength (kPa) 40 80 120 160				
0	521.0	GROUND SURFACE										
1		OVERBURDEN										
2												
3												
4												
5												
6												
7												
8												
9												
10												
11	510.6 10.4	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; strong core with a rough texture, scratched by a knife; slightly weathered with light rusty orange staining on fractures and some reddish mud staining to 27.1 m, thickly bedded, good to excellent RQD. Vugs <5%, typically 2 to 4 mm. (Flank facies)			R1 TCR = 99% RQD = 94%							
12												
13	507.6	Reefal texture with more open cavities and increased fossil content from 15.0 m to 18.0 m and 18.8 m to 19.6 m.			R2 TCR = 100% RQD = 94%							
14		Core becoming darker grey below 17.7 m.										
15	505.5	Mottled appearance below 25.9 m with increasing vugs (15%). Less vuggy below 30.8 m.			R3 TCR = 100% RQD = 97%							
16		Gradational lower contact on change in texture at 34.1 m.										
17												
18	502.4				R4 TCR = 100% RQD = 75%							
19												
20												
21	499.4 496.8				R5							Vertical fracture with red mud infilling from 20.7 m to 23.3 m and 24.0 m 24.6 m.

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LOG OF BOREHOLE NW5



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559641 N: 4915406 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/27
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments	
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		Undrained Shear Strength (kPa)								
						Core Recovery		○ Unconfined ● Pocket Penetrometer ✕ Dynamic Cone 10203040 ✚ Field Vane ■ Lab Vane								
	(continued)															
22																
23																
24	496.8															
25																
26																
27	493.7															
28																
29																
30	490.6															
31																
32																
33	487.5															
34	486.9 34.1	DOLOSTONE (Fossil Hill Formation) Bluish grey, fine grained, stylolites typically 1 to 2 per metre. Rare shale partings up to 1 cm thick. Sharp lower contact at first shale bed.														
35																
36																
37	484.3															
38	483.5 37.5	SHALE (Cabot Head Formation) Greenish grey calcareous, weathered plastic shale, thin reddish coloured fossiliferous sandstone bed below 39.2 m depth.														
39	481.3 39.7															

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
Casing cemented in bedrock at 10.36 m depth.

WATER LEVEL MONITORING

Date **Depth (m)** **Elevation (m)**
 Sep 8, 2014 5.4 515.5

LOG OF BOREHOLE NW6



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559515 N: 4915354 (17T, Geodetic)

rig type | CME 75, track-mounted
method | Rock coring
coring | HQ core, OD=96mm, ID=64mm

project no. | 111-53312-00
date started | 2014/09/29
supervisor | BTC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
0	520.7	GROUND SURFACE					10 20 30 40	40 80 120 160	PL MC LL 10 20 30			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
1		OVERBURDEN				520						
2						519						
3	517.9	DOLOSTONE (Amabel Formation) Creamy white with a chalky dull appearance; uniform; fine to medium grained; strong core with a rough texture, scratched by a knife; slightly weathered with red mud infilling to 12.5 m then light rusty orange staining on fractures, thickly bedded, overall good to excellent RQD, vugs <5% with cavities up to 20 mm, vugs are poorly interconnected. (Flank facies)				518						
4	516.4			R1	TCR = 81% RQD = 44%	517						
5				R2	TCR = 100% RQD = 100%	516						
6	514.5			R3	TCR = 95% RQD = 73%	515						
7		Minor reefal texture 20.7 m to 21.6 m with a more open, fossiliferous appearance.				514						
8	513.1	Core becoming darker blue grey with a mottled appearance below 12.2 m. Less vuggy below 23.3 m. Core has mottled grey/white appearance below 23.3 m.		R4	TCR = 100% RQD = 82%	513						
9	511.5	Gradational lower contact at change in texture at 35.1 m.		R5	TCR = 98% RQD = 80%	512						
10						511						
11	510.0			R6	TCR = 100% RQD = 85%	510						
12	508.5			R7	TCR = 100% RQD = 72%	509						
13						508						
14	507.0			R8	TCR = 100% RQD = 50%	507						
15						506						
16	505.4			R9	TCR = 100% RQD = 87%	505						
17	503.9			R10	TCR = 100% RQD = 100%	504						
18	502.5			R11	TCR = 100% RQD = 0%	503						
19						502						
20	500.9			R12	TCR = 100% RQD = 0%	501						
21	499.4			R13	TCR = 100% RQD = 83%	500						
	497.8			R14	TCR = 100% RQD =	499						

(continued next page)

LOG OF BOREHOLE NW6



project | Duntroon Quarry

project no. | 111-53312-00

client | Walker Aggregates Inc.

rig type | CME 75, track-mounted

date started | 2014/09/29

location | Duntroon, Ontario

method | Rock coring

supervisor | BTC

position | E: 559515 N: 4915354 (17T, Geodetic)

coring | HQ core, OD=96mm, ID=64mm

reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		Undrained Shear Strength (kPa)							
						Core Recovery		40 80 120 160							
		(continued)													
22															
	497.8				R14	TCR = 92% RQD = 100% RQD = 92%									
23					R15	TCR = 100% RQD = 96%									
24	496.5														
					R16	TCR = 98% RQD = 98%									
25															
	494.9				R17	TCR = 100% RQD = 88%									
26															
	493.4				R18	TCR = 100% RQD = 94%									
27															
	491.9				R19	TCR = 100% RQD = 96%									
28															
	490.1				R20	TCR = 100% RQD = 93%									
29															
	488.6				R21	TCR = 100% RQD = 0%									
30															
	487.1				R22	TCR = 100% RQD = 95%									
31															
	485.6				R23	TCR = 100% RQD = 72%									
32															
	484.0				R24	TCR = 100% RQD = 83%									
33															
	482.5				R25	TCR = 35% RQD = 27%									
34															
	482.0				R26	TCR = 93% RQD = 0%									
35															
	481.0														
36															
	479.6														

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole. Casing cemented in bedrock at 4.88 m depth.

WATER LEVEL MONITORING

Date **Depth (m)** **Elevation (m)**
Oct 1, 2014 5.5 515.2

LOG OF BOREHOLE NW7



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559466 N: 4915175 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/04
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		Undrained Shear Strength (kPa)	Dynamic Cone	Field Vane					
						Core Recovery					Pocket Penetrometer				
0	523.2	GROUND SURFACE													
1		OVERBURDEN													
2															
3															
4															
5															
6															
7	516.5 6.7	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; strong core with a rough cut texture, scratched by a knife; slightly weathered with rusty orange staining on fracture surfaces, thickly bedded, good to excellent RQD, vugs typically 5%, 2 to 5 mm. (Flank facies)			R1	TCR = 76% RQD = 43%									
8															
9	513.9														
10		Reefal facies texture with open porous structure slumped biohorns and abundant fossils from 12.5 m to 18.7 m depth.			R2	TCR = 100% RQD = 100%									
11		Core becoming darker bluish grey below 12.5 m. Mottled blue/grey and white below 27.1 m.													
12	510.9	Gradational lower contact on change in texture.													
13															
14					R3	TCR = 100% RQD = 91%									
15	507.9														
16					R4	TCR = 100% RQD = 96%									
17															
18	504.8														
19					R5	TCR = 88% RQD = 74%									
20															
21	502.1				R6	TCR = 98% RQD = 94%									
	499.0														

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LOG OF BOREHOLE NW7



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559466 N: 4915175 (17T, Geodetic)

project no. | 111-53312-00
date started | 2014/09/04
supervisor | KMT
reviewer | KJF

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
22		(continued)										
23												
24	499.0											
25												
26												
27	495.6											
28												
29												
30	492.4											
31												
32												
33	489.5											
34												
35												
36	486.5											
37												
38	485.4 37.8	DOLOSTONE (Fossil Hill Formation) Bluish grey fine grained dolostone, stylolites 2 to 3 per 0.3 m, 2 mm thick.										
39		Chert as 50 mm nodules from 38.3 m to 38.6 m.										
40	483.4	Sharp lower contact at first shale bed.										
41												
42	481.7 41.5 481.1 42.1	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture, rare thin redish fossiliferous sandstone beds up to 20 mm thick.										
END OF BOREHOLE Borehole was open upon completion. Open hole well installed in borehole. Casing cemented in bedrock at 6.71 m depth.												
							WATER LEVEL MONITORING Date Sep 19, 2014 Depth (m) 5.6 Elevation (m) 517.6					

Library: genivar report: gen log v1 file: bh logs.gpj

LOG OF BOREHOLE NW8



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559244 N: 4915009 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/15
supervisor | BTC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
0	531.1	GROUND SURFACE					10 20 30 40	40 80 120 160	PL MC LL 10 20 30			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
1		OVERBURDEN				531						
2						530						
3						529						
4	527.0	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, strong core with a rough cut texture, scratched by a knife; slightly weathered with minor rusty orange staining and pitting, and vugs ~5% with vugs up to 1 cm, but locally greater 15% to 20% from 27.9 m to 33.2 m, 3 mm to 5 mm, thickly bedded, good to excellent RQD, except 37.0 m to 38.7 m where recovered core pieces are smaller. (Flank facies) Reefal facies texture with higher porosity and more fossiliferous from 7.6 m to 9.4 m, 11.3 m to 11.4 m, 13.9 m to 14.3 m and 18.3 m to 20.6 m. Core becoming darker bluish grey below 13.4 m. Becoming less vuggy and mottled grey-white below 27.7 m. Gradational lower contact on change in texture at 37.8 m.			R1	TCR = 95% RQD = 60%	527					
5	4.1					526						
6						525						
7	524.0					524						
8						523						
9						522						
10	521.7					521						
11						520						
12						519						
13	518.6					518						
14						517						
15						516						
16	515.6					515						
17						514						
18						513						
19	512.5					512						
20						511						
21						510						
22	509.5					509						
23						508						
	506.4											

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LOG OF BOREHOLE NW8



project | Duntroon Quarry **project no.** | 111-53312-00
client | Walker Aggregates Inc. **date started** | 2014/09/15
location | Duntroon, Ontario **supervisor** | BTC
position | E: 559244 N: 4915009 (17T, Geodetic) **reviewer** | KJF
rig type | **method** | Rock coring
coring | PQ core, OD=123mm, ID=85mm

Depth (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		10	20				
24	506.4	(continued)										
25												
26												
27												
28	503.4											
29												
30												
31	500.3											
32												
33												
34	497.3											
35												
36												
37	494.2											
38	493.3 37.8	DOLOSTONE (Fossil Hill Formation) Pinkish grey to greenish grey, fine grained, stylolites 3 to 5 per 0.3 m, up to 3 mm thick, glauconite "blebs" associated with stylolites below 41.0 m.										
39												
40	491.2	Sharp lower contact at first shale bed.										
41												
42	489.6 41.5	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture, thin typically 5 to 10 cm reddish coloured fossiliferous sandstone beds below 41.9 m.										
	488.1 43.0											
END OF BOREHOLE Borehole was open upon completion. Open hole well installed in borehole. Casing cemented in bedrock at 3.96 m depth.							WATER LEVEL MONITORING Date Sep 25, 2014 Depth (m) 3.5 Elevation (m) 527.6					

project no. | 111-53312-00
date started | 2014/09/11
supervisor | KMT
reviewer | KJF

library: genivar - **library.glb** **report:** gen log v1 **file:** bh logs.gpj

Sheet No. 1 of 2

LOG OF BOREHOLE NW9



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 559031 N: 4914966 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/11
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
24		(continued)										
25												
26												
27	493.8				R7 TCR = 100% RQD = 97%							
28												
29												
30	490.7				R8 TCR = 101% RQD = 94%							
31												
32												
33	488.3				R9 TCR = 100% RQD = 98%							
34												
35												
36	485.4											
37	484.3 36.6	DOLOSTONE (Fossil Hill Formation) Light bluish grey, fine grained, stylolitic to shaley partings 1 to 5 per 0.3 m up to 3 mm thick.			R10 TCR = 99% RQD = 98%							
38												
39	482.3	Sharp lower contact at first shale bed.										
40												
41	480.4 40.5	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture, thin reddish coloured fossiliferous sandstone beds from 41.2 m to 41.7 m depth.			R11 TCR = 101% RQD = 92%							
	479.2 41.7				R12 TCR = 99% RQD = 90%							

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in bedrock at 8.28 m depth.

WATER LEVEL MONITORING
Date Sep 23, 2014
Depth (m) 4.5
Elevation (m) 516.3

reviewer | KJF

SUBSURFACE PROFILE			SAMPLE			Penetration Test Values (Blows / 0.3m)			Water Content (%) & Plasticity			PID Readings	Well Details	Lab Data and Comments				
Depth Scale (m)	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value	Undrained Shear Strength (kPa)			PL	MC			LL	GR	SA	SI	CL
						Core Recovery	10	20	30									
	509.7	GROUND SURFACE																
0		OVERBURDEN																
1																		
2	507.7 2.0	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; fossiliferous, strong core with a rough cut texture, scratched by a knife; vugs 2% to 3% typically 1 mm to 4 mm, slightly weathered (noticably less weathered than adjacent boreholes), thickly bedded, overall good to excellent RQD. (Flank facies)			R1	TCR = 90% RQD = 53%												
3																		
4		Reefal texture with large vugs and fossiliferous from 4.3 m to 8.8 m.																
5	504.6	Core becoming darker grey in colour below 14.6 m, becoming mottled grey-white below 20.4 m.																
6		Gradational lower contact at change in texture at 25.6 m.			R2	TCR = 100% RQD = 94%												
7																		
8	501.4																	
9	500.4				R3	TCR = 96% RQD = 74%												
10																		
11					R4	TCR = 100% RQD = 89%												
12	497.2																	
13																		
14					R5	TCR = 100% RQD = 97%												
15	494.2																	
	491.2				R6	TCR = 100% RQD =												

LOG OF BOREHOLE NW10



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 558938 N: 4915593 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 0214/09/09
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Field Vane				
16		(continued)					10 20 30 40	40 80 120 160	PL MC LL			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
17												
18	491.2											
19												
20												
21	488.3											
22												
23												
24	485.2											
25												
26	484.1 25.6	DOLOSTONE (Fossil Hill Formation) Bluish grey, fine grained, stylonitic 3 to 5 per 0.3 m up to 3 mm thick, dark shaley partings 5 mm thick at 25 mm to 50 mm intervals below 28.0 m.										
27	482.4	Sharp lower contact at first appearance of a shale bed.										Glauconite as 1 cm blebs at 26.7 m depth.
28												
29	480.3 480.2 29.5	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture.										
END OF BOREHOLE Borehole was open upon completion. Open hole well installed in borehole. Casing cemented in bedrock at 2.59 m depth.												
							WATER LEVEL MONITORING					
							Date	Depth (m)	Elevation (m)			
							Sep 24, 2014	0.7	509.0			

Library: genivar - library.gib report: gen log v1 file: bh logs.gpj



BOREHOLE NO. NW10 Shallow

PAGE 1 of 1

PROJECT NAME: DUNTROON EXPANSION

PROJECT NO.: 111-53312-00 52.1

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Sep 18, 2014

BOREHOLE TYPE: 123 mm OD PQ CORE

SUPERVISOR: BTC

GROUND ELEVATION: 509.7 mASL

REVIEWER: SLW

DEPTH (m)	ELEV (masl)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		REMARKS		
					TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10		20	30
0.0	509.7	OVERBURDEN														
2.0	507.7	DOLOSTONE (AMABEL FORMATION); CREAMY WHITE WITH A DULL APPEARANCE; UNIFORM; FINE TO MEDIUM GRAINED; FOSSILIFEROUS; STRONG CORE WITH A ROUGH CUT TEXTURE.														
3.8	505.9	MONITOR TERMINATED AT 3.82 m IN DOLOSTONE.														

WSP GEOLOGIC (METRIC) WITH MASL 111-53312-00 MONITORING WELL GPJ WSP_ENV_V1.GDT 7/14/16

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 558940
Northing: 4915376



BOREHOLE NO. NW10-DP

PAGE 1 of 1

PROJECT NAME: DUNTROON EXPANSION

PROJECT NO.: 111-53312-00 52.1

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Sep 18, 2014

BOREHOLE TYPE: 1 1/4" HAND AUGER

SUPERVISOR: BTC

GROUND ELEVATION: 509.7 mASL

REVIEWER: SLW

DEPTH (m) ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES UTM Zone: 17 NAD: 83 Easting: 558940 Northing: 4915376	REMARKS	
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
									10	20	30	10			20
0.0 509.7	TOP SOIL														
0.2 509.5	BROWN SILT AND SAND, TRACE GRAVEL. MOIST.														
0.8 508.9	DRIVEPOINT TERMINATED AT 0.8 m.														

LOG OF BOREHOLE IW1



project | Duntroon Quarry

client | Walker Aggregates Inc.

location | Duntroon, Ontario

position | E: 560551 N: 4915269 (17T, Geodetic)

rig type |

method | Rock coring

coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00

date started | 2014/08/05

supervisor | BTC/TKC

reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		SPT N-Value	X Dynamic Cone																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
							Core Recovery	10	20	30					40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
								Undrained Shear Strength (kPa)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
							○ Unconfined	● Pocket Penetrometer	✚ Field Vane	■ Lab Vane																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

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LOG OF BOREHOLE IW1



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560551 N: 4915269 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/05
supervisor | BTC/TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments	
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		SPT N-Value	Undrained Shear Strength (kPa)							
							Core Recovery								
15		(continued)													
16															
17															
18	493.3														
19															
20															
21	491.1 20.4	DOLOSTONE (Fossil Hill Formation) Bluish grey fine grained dolostone, stylolites 2 to 3 per 0.3 m, 2 to 3 mm thick, 12 mm chert nodule at 23.9 m.													
22	490.2	Sharp lower contact at first appearance of shale.													
23															
24	487.2 24.3	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture. 0.3 m dolostone bed at 24.4 m.													
25															
26															
27	484.2														

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
Casing cemented in 3 m of competent bedrock.

WATER LEVEL MONITORING

Date Aug 6, 2014
Depth (m) 8.8
Elevation (m) 502.8

LOG OF BOREHOLE IW1a



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560554 N: 4915269 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/06
supervisor | BTC/TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		10	20				
0	511.4	GROUND SURFACE			SPT N-Value							
		OVERBURDEN			Core Recovery							
4	507.0											
4.4		DOLOSTONE (Amabel Formation)										
		Creamy white with a dull appearance; uniform; fine to medium grained; strong core with a rough cut texture, scratched by a knife; slightly weathered with rusty orange staining on fracture surfaces, thickly bedded, good RQD, vugs typically 5%, 2 to 6 mm. (Flank facies)										
		Reefal facies texture with open cavities and increased and mounded fossil content from 4.6 m to 6.1 m and 10.1 m to 11.9 m.										
		Core becoming darker bluish grey below 7.6 m. Mottled pinkish grey appearance below 17.1 m.										
		Gradational lower contact on change in texture.										
14												

(continued next page)

LOG OF BOREHOLE IW1a



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560554 N: 4915269 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/06
supervisor | BTC/TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type SPT N-Value Core Recovery		10	20				
15		(continued)										
16												
17												
18												
19												
20												
21	491.0 20.4	DOLOSTONE (Fossil Hill Formation) Bluish grey fine grained dolostone, stylolites 2 to 3 per 0.3 m, 2 to 3 mm thick, 12 mm chert nodule at 23.9 m. Sharp lower contact at first appearance of shale.										
22												
23												
24	487.1 24.3	SHALE (Cabot Head Formation) Greenish grey calcareous shale, weathered, plastic texture. 0.3 m dolostone bed at 24.4 m.										
25												
26												
27	484.1 27.3											

END OF BOREHOLE

Borehole was open upon completion.

No samples collected. Stratigraphy inferred from adjacent borehole IW1.

Open hole well installed in borehole. Casing cemented in 3 m of competent bedrock.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 15, 2014	8.8	502.6

LOG OF BOREHOLE IW2



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560521 N: 4915489 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/08/11
supervisor | SLW/TKC
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
0	508.7	GROUND SURFACE										
1		OVERBURDEN										
2												
3												
4												
5	504.0 4.7	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform; fine to medium grained; strong core with a rough texture, scratched by a knife, slightly weathered with minor light rusty orange staining on fracture surfaces; thickly bedded, good to excellent RQD, vugs <5%, typically 2 to 4 mm. (Flank facies) Rare thin reefal facies beds 50 mm thick with open, fossiliferous appearance. Core becoming darker bluish grey in colour below 7.3 m. Becoming mottled grey white below 15.5 m.										
6					R1							
7												
8	500.8											
9					R2							
10												
11												
12					R3							
13	498.9											
14												
15					R4							
16	495.9											
17												
18												
19												
20	492.7											

(continued next page)

LOG OF BOREHOLE IW2



project | Duntroon Quarry

client | Walker Aggregates Inc.

location | Duntroon, Ontario

position | E: 560521 N: 4915489 (17T, Geodetic)

rig type |

method | Rock coring

coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00

date started | 2014/08/11

supervisor | SLW/TKC

reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		Undrained Shear Strength (kPa)							
						Core Recovery		X Dynamic Cone 10 20 30 40 ○ Unconfined + Field Vane ● Pocket Penetrometer ■ Lab Vane 40 80 120 160							
15		(continued)													
16	492.7				R4	TCR = 97% RQD = 78%									
17					R5	TCR = 97% RQD = 87%									
18															
19	489.8														
20	488.9 19.8	DOLOSTONE (Fossil Hill Formation) Bluish grey fine grained stycolytic typically 6 per 0.3 m. Sharp lower contact on first appearance of shale.			R6	TCR = 97% RQD = 56%									Broken core recovery from 20.4 m to 20.4 m depth.
21															
22	486.6 486.3 22.4	SHALE (Cabot Head Formation) Greenish grey calcareous, weathered, plastic shale bed 25 mm thick. Dolostone bed from 22.4 m to 23.2 m depth. Three 25 m reddish coloured fossiliferous sandstone beds below 23.5 m depth.			R7	TCR = 97% RQD = 61%									Vertical fracture from 21.5 m to 21.7 m depth.
23															
24	484.7														

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
Casing cemented in bedrock at 4.27 m depth.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 16, 2014	1.7	507.0

LOG OF BOREHOLE IW3



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560214 N: 4915919 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/05
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
0	518.5	GROUND SURFACE					10 20 30 40	40 80 120 160	PL MC LL			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0		OVERBURDEN				518						
1						517						
2						516						
3						515						
4	514.7 3.8	DOLOSTONE (Amabel Formation) Creamy white with a dull appearance; uniform fine to medium grained; fossiliferous; strong core with rough texture; scratched with a knife; thickly bedded; slightly weathered with minor rusty staining on fracture surfaces; vugs throughout (~5%, 2 to 4 mm; fair to good RQD. (Flank facies)			R1	514						
5						513						
6						512						
7	511.9	Reefal facies with an open vuggy appearance up to 30% vugs, and a chalky texture, minor reddish muddy infilling with poor RQD from 3.8 m to 8.5 m and from 15.6 m to 16.8 m depth.			R2	511						
8		Core becoming darker greyish brown in colour below 24.4 m, finer grained texture with wispy stylolytic contacts and a decrease in vugs (~1%).				510						
9	509.6	Gradational lower contact at change in colour and texture.				509						
10						508						
11						507						
12	506.5					506						
13						505						
14						504						
15	503.4					503						
16						502						
17						501						
	500.3											

(continued next page)

LOG OF BOREHOLE IW3



project | Duntroon Quarry
client | Walker Aggregates Inc.
location | Duntroon, Ontario
position | E: 560214 N: 4915919 (17T, Geodetic)

rig type |
method | Rock coring
coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00
date started | 2014/09/05
supervisor | KMT
reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE		Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)		Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type		Dynamic Cone	Undrained Shear Strength (kPa)				
18		(continued)					10 20 30 40	40 80 120 160	PL MC LL 10 20 30			GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
19												
20												
21	497.3											
22												
23												
24	494.3											
25												
26	492.1 26.4											
27	491.2	DOLOSTONE (Fossil Hill Formation) Light greyish brown to pinkish brown; fine grained with wispy to wavy stylolites (2 to 5 per 0.3 m), up to 2 mm thick, minor pyrite mineralization.										
28												
29												
30	488.1											
31												
32												
33	484.8 33.7											

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
 Casing cemented in bedrock at 6.86 m depth.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 29, 2014	15.7	502.9

Lower 1.8 m of core lost to drilling. Cabot Head Shale not recovered, but confirmed by return water fragments.

LOG OF BOREHOLE IW4



project | Duntroon Quarry

client | Walker Aggregates Inc.

location | Duntroon, Ontario

position | E: 560023 N: 4916216 (17T, Geodetic)

rig type |

method | Rock coring

coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00

date started | 2014/09/08

supervisor | KMT

reviewer | KJF

SUBSURFACE PROFILE				SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity			PID Readings	Well Details	Lab Data and Comments							
Depth Scale (m)	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		X Dynamic Cone				Unconsolidated Shear Strength (kPa)					PL	MC	LL	GRAIN SIZE DISTRIBUTION (%) (MIT)	GR	SA	SI	CL
						Core Recovery		10	20	30	40	40	80	120										
0	510.4	GROUND SURFACE																						
		OVERBURDEN																						
										</														

(continued next page)

LOG OF BOREHOLE IW4



project | Duntroon Quarry

client | Walker Aggregates Inc.

location | Duntroon, Ontario

position | E: 560023 N: 4916216 (17T, Geodetic)

rig type |

method | Rock coring

coring | PQ core, OD=123mm, ID=85mm

project no. | 111-53312-00

date started | 2014/09/08

supervisor | KMT

reviewer | KJF

Depth Scale (m)	SUBSURFACE PROFILE			SAMPLE			Elevation Scale (mASL)	Penetration Test Values (Blows / 0.3m)				Water Content (%) & Plasticity	PID Readings	Well Details	Lab Data and Comments
	Elev Depth (m)	STRATIGRAPHY	Graphic Plot	Number	Type	SPT N-Value		X Dynamic Cone							
						Core Recovery		10 20 30 40							
								Undrained Shear Strength (kPa)							
							○ Unconfined	● Pocket Penetrometer	✚ Field Vane	■ Lab Vane		PL MC LL			
								40 80 120 160				10 20 30			
15		(continued)													
16															
17															
18	492.3					R4	TCR = 100% RQD = 66%								
19															
20															
21	489.7 489.4	DOLOSTONE (Fossil Hill Formation) Light greyish brown to pinkish brown; fine grained with wispy blue stylolytes typically 3 mm to 5 mm thick; minor pyrite mineralization; occasional chert as white crystals 2 mm to 3 mm.				R5	TCR = 100% RQD = 93%								
22		30 mm reddish calcareous sandstone bed at 21.9 m depth.													
23		Sharp lower contact on change in texture.				R6	TCR = 90% RQD = 76%								
24	486.2														
25	485.7 24.7 485.0	SHALE (Cabot Head Formation) Greenish grey calcareous shale; soft, muddy appearance.				R7	TCR = 97% RQD = 77%								

END OF BOREHOLE

Borehole was open upon completion.

Open hole well installed in borehole.
Casing cemented in bedrock at 6.86 m depth.

WATER LEVEL MONITORING

Date	Depth (m)	Elevation (m)
Sep 30, 2014	17.4	493.0

library: genivar - library.gdb report: gen log v1 file: bh logs.gdb

BOREHOLE NO. DP99-1

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

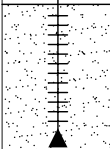
DATE: JUNE 29, 1999

BOREHOLE TYPE: 60 mm ID HAND AUGER

GEOLOGIST: WDN

GROUND ELEVATION: 511.8 mASL

REVIEWER: AGH

DEPTH (m)		STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS
					TYPE	N ^o VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20	30	
0																
	0.4	ORGANICS BLACK SILTY, FIBROUS ORGANICS, SATURATED														
0.5		SILT, SOME CLAY BROWN, MOTTLED WITH ORANGE, RED, AND GREEN SILT, SOME CLAY, STONY, WET														
1.0	1.0															0.45 m SLOT 10 SCREEN 0.50 m SAND PACK
		AUGER REFUSAL AT 1.0 m ON ASSUMED BEDROCK														
1.5																
2.0																
2.5																
3.0																
3.5																
4.0																
4.5																
5.0																

BOREHOLE NO. DP99-2

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

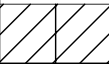
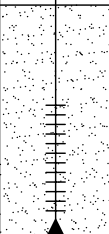
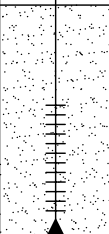
DATE: JUNE 29, 1999

BOREHOLE TYPE: 60 mm ID HAND AUGER

GEOLOGIST: WDN

GROUND ELEVATION: 512.1 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS	
				TYPE	N' VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE			CONTENT %				
									10	20	30	10	20	30		
0										SHEAR STRENGTH			W _p W _L			
	ORGANICS DARK BROWN TO BLACK SILTY FIBROUS ORGANICS, BECOMES PEATY WITH DEPTH, SATURATED															
0.5																
																
1.0																0.45 m SLOT 10 SCREEN
	1.3	CALCAREOUS AUGER CUTTINGS														0.50 m SAND PACK
1.5	AUGER REFUSAL AT 1.0 m ON ASSUMED BEDROCK															
2.0																
2.5																
3.0																
3.5																
4.0																
4.5																
5.0																

BOREHOLE NO. DP99-3

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: JULY 21, 1999

BOREHOLE TYPE: 60 mm ID HAND AUGER

GEOLOGIST: AGH

GROUND ELEVATION: 513.6 mASL

REVIEWER: _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %			REMARKS		
				TYPE	N ^o VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE							
									10	20	30	10	20		30	
0										SHEAR STRENGTH			W _p W _L			
	ORGANICS DARK BROWN TO BLACK SILTY FIBROUS ORGANICS, SOME ORGANIC SILT, ROOTLETS AND WOOD VEGETATION, SOFT, MOIST TO WET, BECOMING SATURATED AT ABOUT 1.5 m															
0.5																
1.0																0.45 m SLOT 10 SCREEN 0.50 m SAND PACK
1.5																
2.0																
2.14 2.20	GREY SILTY SAND, SATURATED															
	HOLE TERMINATED AT 2.20 m IN GREY SILTY SAND															
2.5																
3.0																
3.5																
4.0																
4.5																
5.0																

BOREHOLE NO. DP99-4

PROJECT NAME: DUNTROON QUARRY

PROJECT NO.: 930521.08

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

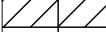
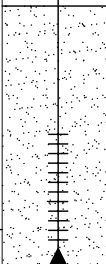
DATE: JUNE 30, 1999

BOREHOLE TYPE: 60 mm ID HAND AUGER

GEOLOGIST: WDN

GROUND ELEVATION: 511.4 mASL

REVIEWER: AGH

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS	
				TYPE	N° VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE			CONTENT %				
									10	20	30	10	20	30		
0										SHEAR STRENGTH			W _p W _L			
	ORGANICS BLACK FIBROUS ORGANICS, PEAT, SATURATED															
0.5																
1.0																0.45 m SLOT 10 SCREEN 0.50 m SAND PACK
1.35	SILT, SOME FINE SAND: GREENISH GREY SILT, SOME FINE SAND, RANDOM PEBBLES, SATURATED															
1.5	AUGER REFUSAL AT 1.5 m ON ASSUMED BEDROCK															
2.0																
2.5																
3.0																
3.5																
4.0																
4.5																
5.0																

BOREHOLE NO. DP5

PAGE 1 of 1

PROJECT NAME: PROPOSED DUNTROON QUARRY EXPANSION

PROJECT NO.: 04 930521.52

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Jul 03, 2007

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: SLW

GROUND ELEVATION: 509.5 NOT DETERMINED

REVIEWER: MJL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES UTM Zone: 17 NAD: 83 Easting: 559086 Northing: 4915559	REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE							
									10	20	30	10			20	30
									SHEAR STRENGTH			W _p W _L				
0.0																
0.2	<u>ORGANIC SILT:</u> DARK BROWN ORGANIC SILT, TRACE CLAY, ORGANICS, WET TO SATURATED.			AS1			100						ROB ROY PSW WETLAND COMPLEX UNIT 2			
	<u>CLAYEY SILT:</u> LIGHT BROWN CLAYEY SILT, TRACE SAND, WTPL.			AS2			100									
0.4	<u>SAND:</u> LIGHT BROWN FINE SAND, TRACE TO SOME SILT TO FINE TO MEDIUM SAND, TRACE TO SOME SILT WITH DEPTH, SATURATED.			AS3			100									
				AS4			100									
				AS5			100									
1.0	HAND AUGER HOLE TERMINATED AT 1.0 m DUE TO REFUSAL.															
				</												

BOREHOLE NO. DP6

PAGE 1 of 1

PROJECT NAME: PROPOSED DUNTROON QUARRY EXPANSION

PROJECT NO.: 04 930521.52

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Jul 03, 2007

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: SLW

GROUND ELEVATION: 511.3 NOT DETERMINED

REVIEWER: MJL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES UTM Zone: 17 NAD: 27 Easting: 559774 Northing: 4915513	REMARKS		
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE							
									10	20	30	10			20	30
									SHEAR STRENGTH			W _p W _L				
0.0																
0.1	ORGANIC SILT: DARK BROWN ORGANIC SILT, ORGANICS, MOIST. SILT: LIGHT BROWN SILT, SOME TO TRACE FINE SAND, TRACE CLAY, DTPL TO APL AT 0.6 m.			AS1			100						EXPANSION LANDS ESCARPMENT ANSI A WETLAND			
				AS2			100									
				AS3			100									
				AS4			100									
				AS5			100									
				AS6			100									
				AS7			100									
				AS8			100									
1.0																
1.4	HAND AUGER HOLE TERMINATED AT 1.4 m DUE TO REFUSAL.															
2.0																
3.0																
4.0																
5.0																

JHL GEOLOGIC B/W (METRIC) WITH UTM 4-93052152 DRIVE POINTS.GPJ JAGGER HIMS BASIC.GDT 9/7/07



BOREHOLE NO. DP7

PAGE 1 of 1

PROJECT NAME: DUNTROON EXPANSION

PROJECT NO.: 111-53312-00 52.1

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Jul 10, 2014

BOREHOLE TYPE: 1 1/4" HAND AUGER

SUPERVISOR: TKC

GROUND ELEVATION: 509.2 mASL

REVIEWER: SLW

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE						CONE PENETRATION		WATER CONTENT %			REMARKS
					TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20	30	
0.0	509.2	TOPSOIL														
0.2	509.0	FINE SAND, SOME SILT														
0.8	508.4	SILTY TILL, TRACE SAND														
2.5	506.7	DRIVEPOINT TERMINATED AT 2.5 m.														

UTM CO-ORDINATES
UTM Zone: 17 NAD: 83
Easting: 559345
Northing: 4915351



BOREHOLE NO. DP8

PAGE 1 of 1

PROJECT NAME: DUNTROON EXPANSION

PROJECT NO.: 111-53312-00 52.1

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Jul 10, 2014

BOREHOLE TYPE: 1 1/4" HAND AUGER

SUPERVISOR: BTC

GROUND ELEVATION: 511.1 mASL

REVIEWER: SLW

DEPTH (m) ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %		UTM CO-ORDINATES UTM Zone: 17 NAD: 83 Easting: 559094 Northing: 4914360	REMARKS	
				TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
									10	20	30	10			20
0.0 511.1	TOPSOIL														
0.5 510.6	DARK BROWN SOIL														
0.9 510.2	DRIVEPOINT TERMINATED AT 0.9 m.														



BOREHOLE NO. DP9

PAGE 1 of 1

PROJECT NAME: DUNTROON EXPANSION

PROJECT NO.: 111-53312-00 52.1

CLIENT: WALKER AGGREGATES INC.

DATE COMPLETED: Sep 10, 2014

BOREHOLE TYPE: 1 1/4" HAND AUGER

SUPERVISOR: KMT

GROUND ELEVATION: 507.7 mASL

REVIEWER: KJF

DEPTH (m)	ELEV (mASL)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE						CONE PENETRATION		WATER CONTENT %		REMARKS	
					TYPE	N VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20		30
										SHEAR STRENGTH			W _p W _L			
0.0	507.7															
0.1	507.6	BROWN SATURATED TOPSOIL														
		BROWN AND GREYISH CLAYEY SILT, SATURATED. RUST STAINING.													WATER PONDED AT 0.12 m ABOVE GROUND.	
0.5	507.2	BROWN CLAYEY SILT TO SILTY CLAY. TRACE GRAVEL.														
1.3	506.4	DRIVEPOINT TERMINATED AT 1.33 m.														

BOREHOLE NO. DP-5 (BRIDSON PROPERTY)

PAGE 1 OF 1

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: SEPTEMBER 26, 2003

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: AGH

GROUND ELEVATION: ESTIMATED 510 mASL

REVIEWER: _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS		SAMPLE					CONE PENETRATION		WATER CONTENT %			REMARKS	
					TYPE	IN VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20		30
										SHEAR STRENGTH			W _p W _L			
0															LOCATED ON BRIDSON PROPERTY	
	<u>SILT:</u> DARK BROWN ORGANIC SILT, TOPSOIL, ROOTLETS, APL TO WTPL.		AS													
0.2				AS												
	0.26															
	<u>SILT:</u> LIGHT BROWN/MOTTLED GREYISH BROWN SILT, TRACE TO SOME SAND, TRACE CLAY, TRACE GRAVEL, MOIST.		AS													
0.4																
	0.67		AS													
0.6																
	0.8		AS													
			AS													
	1.06		AS													
1.0			AS													
	1.2		AS													
	1.4		AS													
	1.6		AS													
	1.72		AS													
1.8	HAND AUGER HOLE TERMINATED AT 1.72 m IN SILT.															
2.0																

BOREHOLE NO. HA1

PAGE 1 OF 1

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: SEPTEMBER 11, 2003

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: MJL

GROUND ELEVATION: ESTIMATED 510 mASL

REVIEWER: AGH

[illegible]

BOREHOLE NO. HA2

PAGE 1 OF 1

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: SEPTEMBER 26, 2003

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: AGH

GROUND ELEVATION: ESTIMATED 511 mASL

REVIEWER: _____

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION		WATER CONTENT %			REMARKS	
				TYPE	N' VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
									10	20	30	10	20		30
									SHEAR STRENGTH			W _p W _L			
0															
	0.15	SILT; DARK BROWN TO BROWN ORGANIC SILT (PEATY), MOIST BECOMING APL.		AS										LOCATED IN WETLAND, NORTHWEST CORNER OF EXPANSION LANDS	
				AS											
0.2	0.2	SILT; BROWN/MOTTLED BROWN-GREY ORGANIC SILT, TRACE CLAY BECOMING SILT, TRACE TO SOME CLAY, APL TO WTPL. -GRADES TO FINE SANDY SILT, TRACE TO SOME CLAY		AS											
0.4															
	0.50														
0.6	0.6	SILTY SAND; BROWN SILTY SAND, TRACE CLAY, WET TO SATURATED. THIN LAYER OF CLAYEY SILT AT BASE.													
				AS											
0.8					AS										
	0.90	REFUSAL ON BOULDER OR BEDROCK		AS											
1.0		HAND AUGER HOLE TERMINATED AT 0.90 m DUE TO AUGER REFUSAL ON BOULDER OR BEDROCK.													
1.2															
1.4															
1.6															
1.8															
2.0															

BOREHOLE NO. HA3

PAGE 1 OF 1

PROJECT NAME: DUNTROON QUARRY EXPANSION

PROJECT NO.: 930521.50

CLIENT: GEORGIAN AGGREGATES AND CONSTRUCTION INC.

DATE: SEPTEMBER 26, 2003

BOREHOLE TYPE: HAND AUGER

SUPERVISOR: AGH

GROUND ELEVATION: ESTIMATED 511 mASL

REVIEWER: _____

DEPTH (m)		STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE					CONE PENETRATION			WATER CONTENT %			REMARKS
					TYPE	N' VALUE	% WATER	% RECOVERY	ROD (%)	"N" VALUE						
										10	20	30	10	20	30	
										SHEAR STRENGTH			W _p W _L			
0																LOCATED IN WETLAND, NORTHWEST CORNER OF EXPANSION LANDS
	0.15	<u>SILT:</u> DARK BROWN ORGANIC SILT (PEATY), BECOMING BROWN-GREY ORGANIC SILT (LESS PEATY), MOIST.			AS											
	0.2	<u>SILT:</u> BROWN GREY SILT, SOME CLAY, TRACE SAND, APL TO WTPL.														
	0.35				AS											
	0.4	<u>SILTY SAND:</u> MOTTLED BROWN TO BROWN SILTY SAND, TRACE TO SOME CLAY, TRACE GRAVEL AT BASE, APL TO WTPL, WET TO SATURATED.														
					AS											
	0.6															
					AS											
	0.8															
					AS											
	1.0				AS											
	1.2	1.20	SILT LAYERS AT DEPTH.													
	1.4															
	1.6															
	1.8															
	2.0															

GRAIN SIZE SAMPLE
MIT CLASSIFICATION
GRAVEL 11 %
SAND 61 %
SILT 23 %
CLAY 5 %

FINE SAND 31 %
MED. SAND 18.5 %
COARSE SAND 11.5 %

OW1 NEST

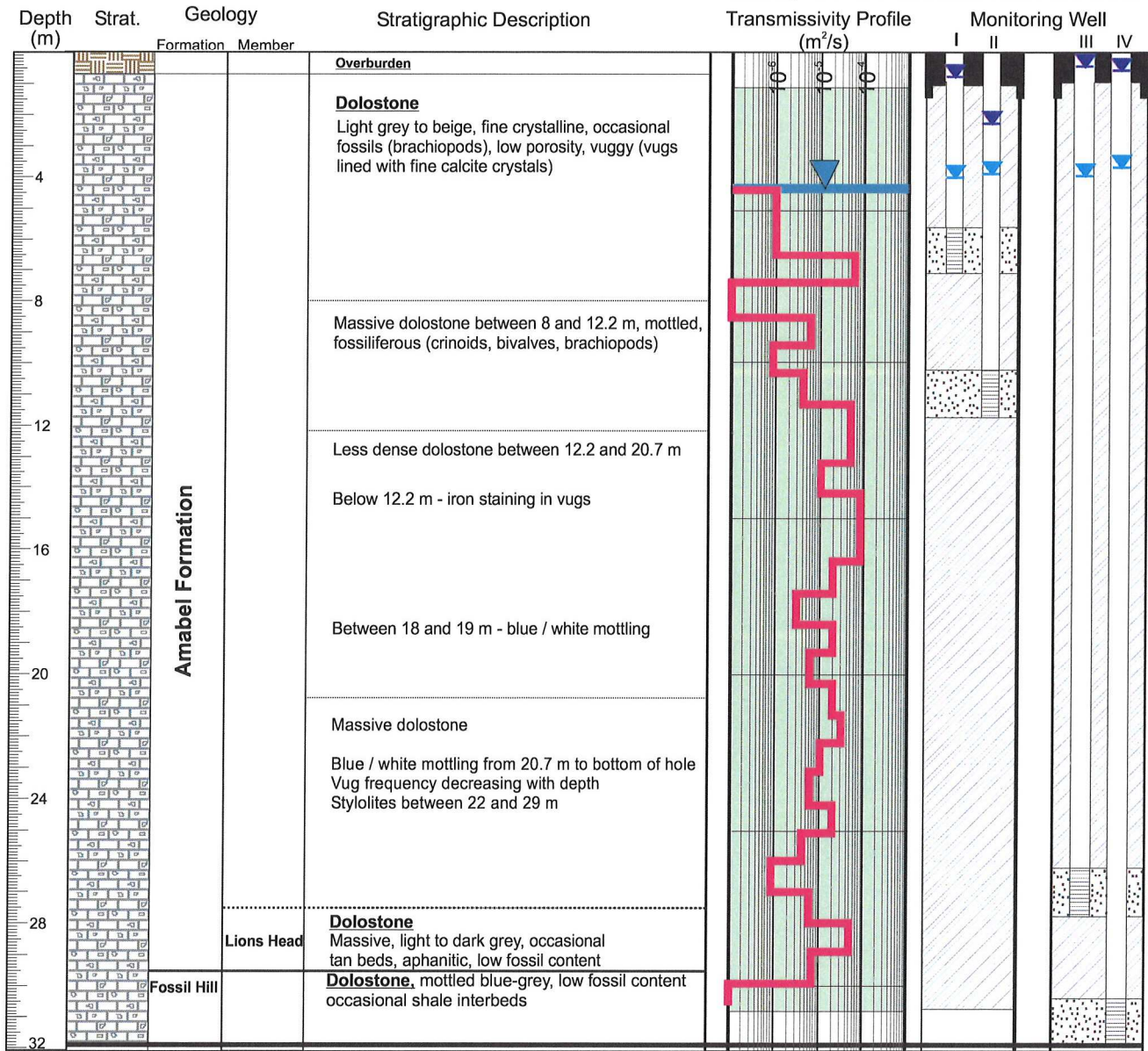
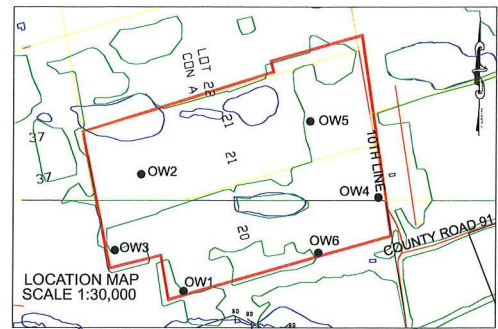
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 512.2 masl

**NOTES:**

Borehole OW1-04 was logged by John Emery Geotechnical Engineering Limited
For a detailed description of the geological units refer to Section 5.0 of the report
Information on well construction details refer to Appendix A: Methodology
Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
Information on transmissivity profiles refer to Appendix F: Packer Testing Data

Water levels measured on:

April 13, 2005

November 15, 2005

**Observation Well Nest 1**

Date Issued: December 2005

Geologist: TLW

Project No.: 04-015

File Name: OW1-page 1.cdr

Highland Quarry
Hydrogeological Assessment

OW2 NEST

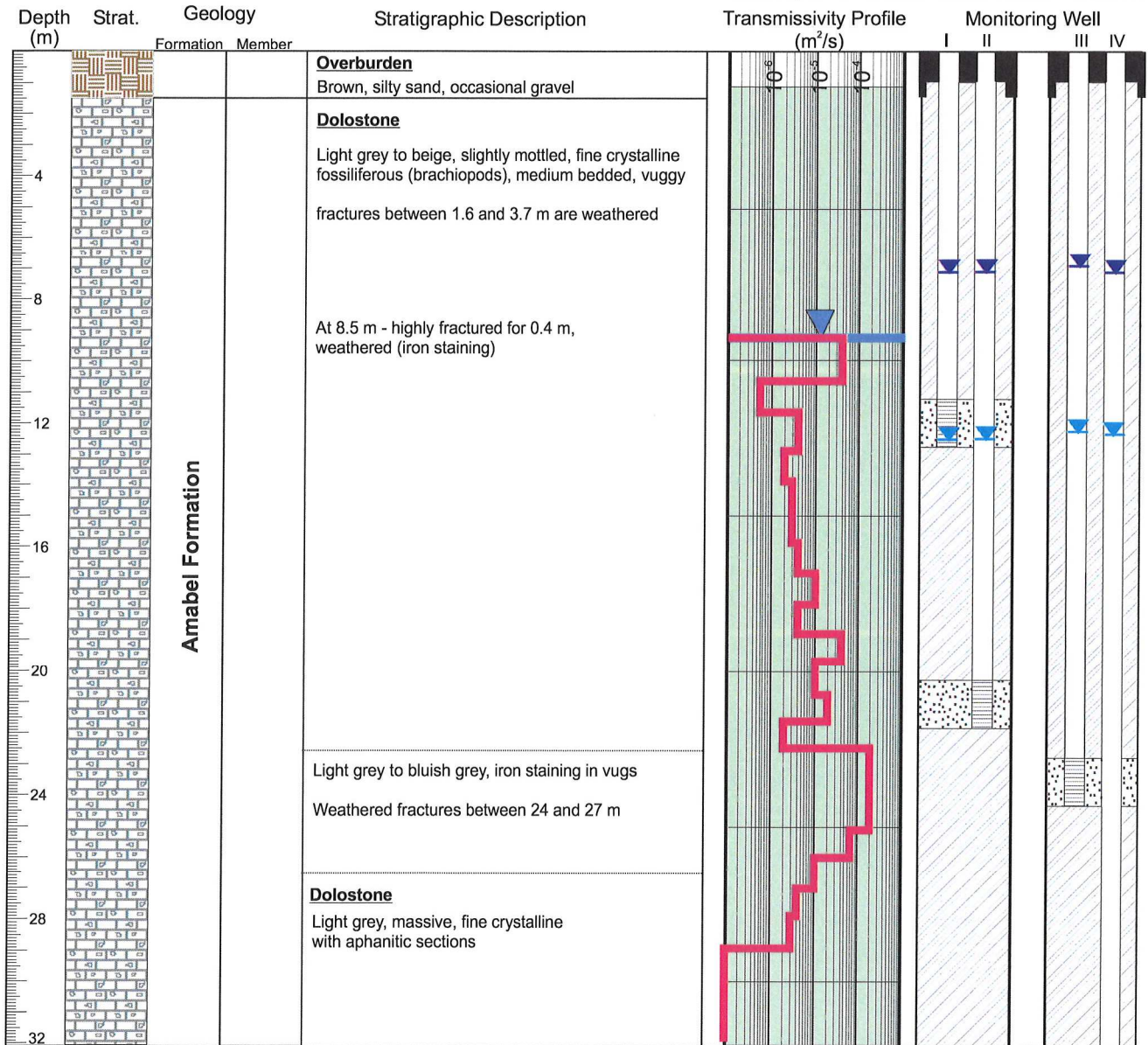
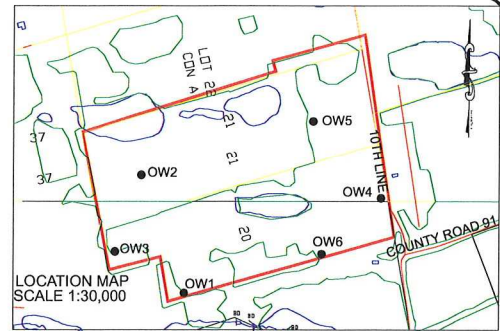
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 522.2 masl

**NOTES:**

Borehole OW2-04 was logged by John Emery Geotechnical Engineering Limited
For a detailed description of the geological units refer to Section 5.0 of the report
Information on well construction details refer to Appendix A: Methodology
Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
Information on transmissivity profiles refer to Appendix F: Packer Testing Data

Water levels measured on:

▼ April 13, 2005

▼ November 15, 2005

**Observation Well Nest 2**

Date Issued: December 2005

Geologist: TLW

Project No. 04-015

File Name: OW2-page 1.cdr

Highland Quarry
Hydrogeological Assessment

OW2 NEST

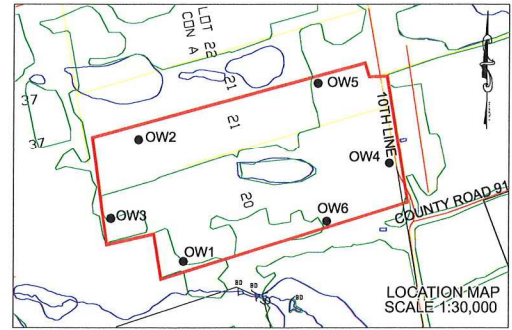
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 522.2 masl



Depth (m)	Strat. Formation	Geology Member	Stratigraphic Description	Transmissivity Profile (m ² /s)	Monitoring Well	
			(Continued from previous page)		III	IV
36	Amabel Formation					
40		Lions Head	Dolostone Light grey, stylolites, occasional pyrite, filled fracture and tan beds			
		Fossil Hill	Dolostone Mottled blue-grey, low fossil content, occasional shale interbed			
44		Cabot Head	Shale Dark green, thin bedded, massive to brittle			
			Bottom of Borehole = 44.46 mbgl			
48						
52						
56						
60						
64						

NOTES:

Borehole OW2-04 was logged by John Emery Geotechnical Engineering Limited
 For a detailed description of the geological units refer to Section 5.0 of the report
 Information on well construction details refer to Appendix A: Methodology
 Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
 Information on transmissivity profiles refer to Appendix F: Packer Testing Data

Water levels measured on:

▼ April 13, 2005

▼ November 15, 2005

**Observation Well Nest 2**

Date issued: December 2005

Geologist: TLW

Project No.: 04-015

File Name: OW2-page 2.cdr

Highland Quarry
Hydrogeological Assessment

OW3 NEST

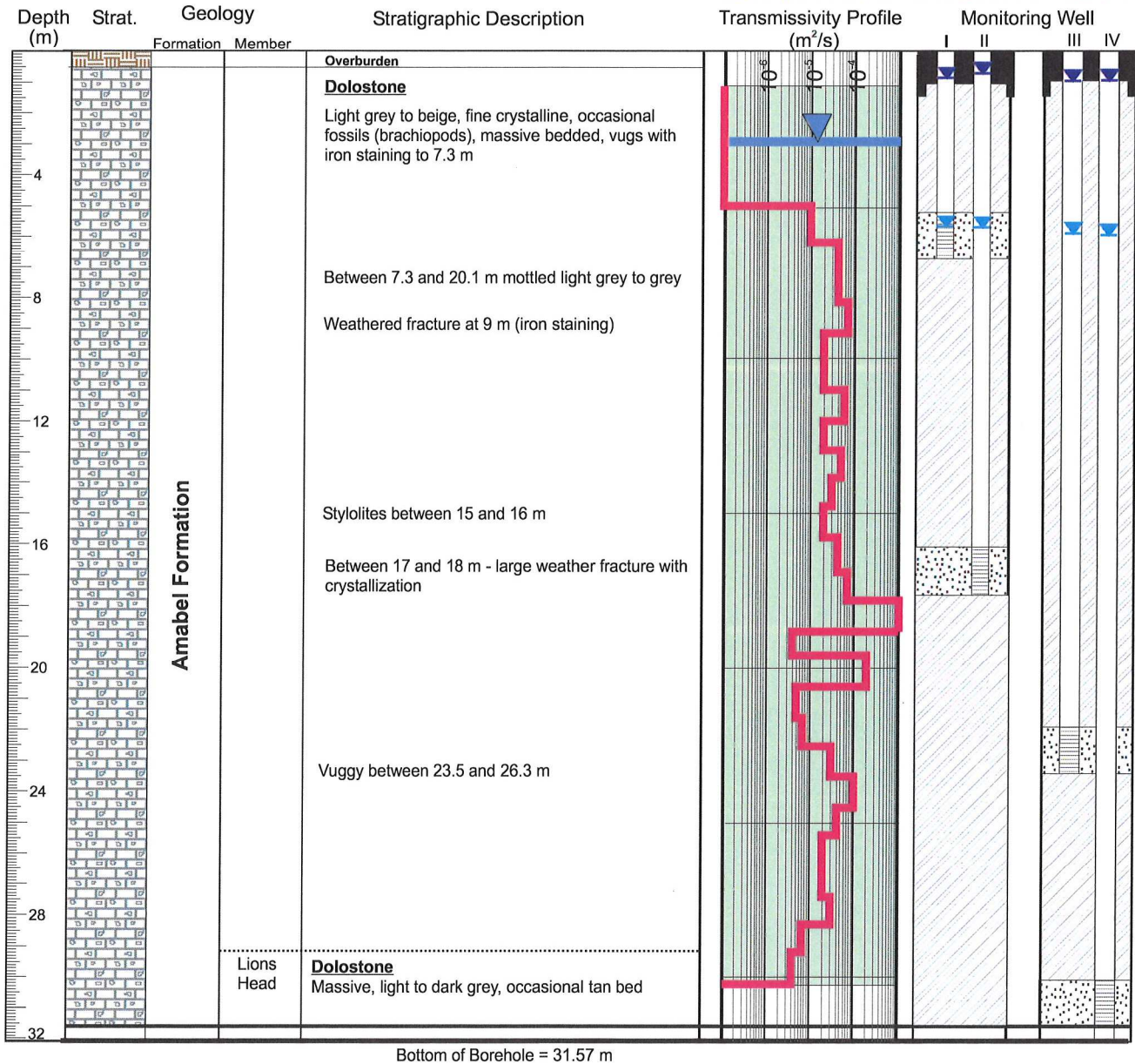
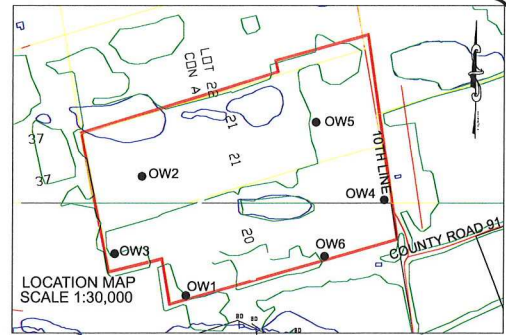
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 515.5 masl



NOTES:

For a detailed description of the geological units refer to Section 5.0 of the report
 Information on well construction details refer to Appendix A: Methodology
 Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
 Information on transmissivity profiles refer to Appendix F: Packer Testing Data

Water levels measured on:

▲ April 13, 2005

▲ November 15, 2005



Observation Well Nest 3

Date issued: December 2005

Geologist: TLW

Project No. 04-015

File Name: OW3-page 1.cdr

**Highland Quarry
Hydrogeological Assessment**

OW4 NEST

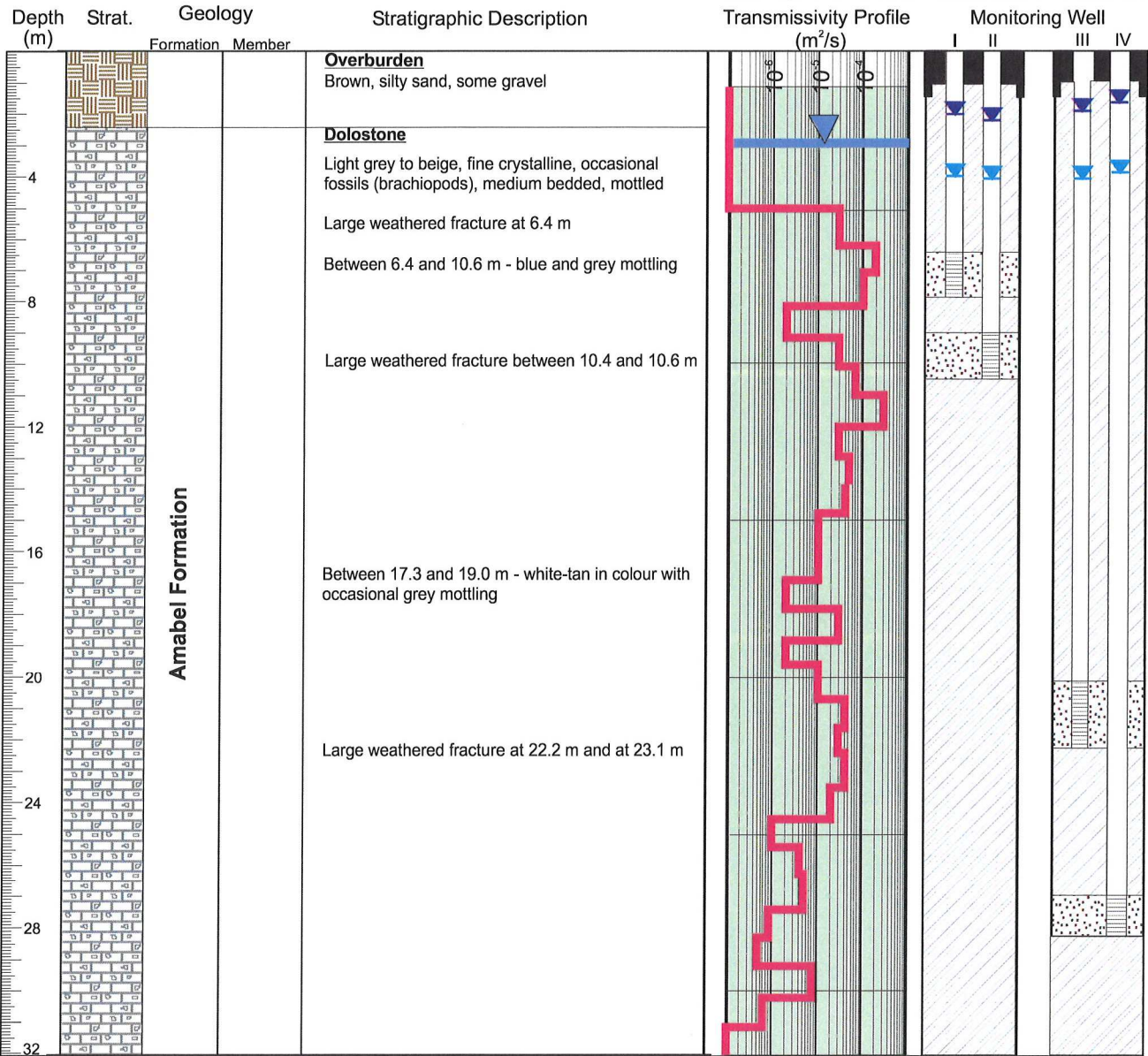
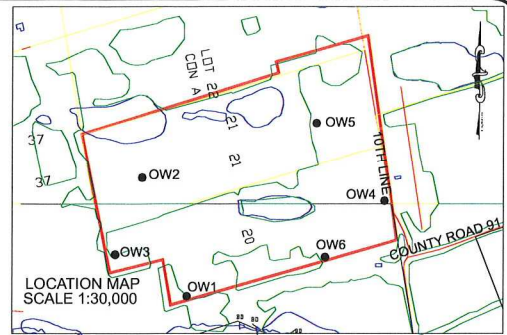
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 518.8 masl



NOTES:

Borehole OW4-04 was logged by John Emery Geotechnical Engineering Limited. For a detailed description of the geological units refer to Section 5.0 of the report. Information on well construction details refer to Appendix A: Methodology. Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics. Information on transmissivity profiles refer to Appendix F: Packer Testing Data.

Water levels measured on:

▲ April 13, 2005

▲ November 15, 2005



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Observation Well Nest 4

Date Issued: December 2005

Geologist: TLW

Project No.: 04-015

File Name: OW4-page 1.cdr

**Highland Quarry
Hydrogeological Assessment**

OW5 NEST

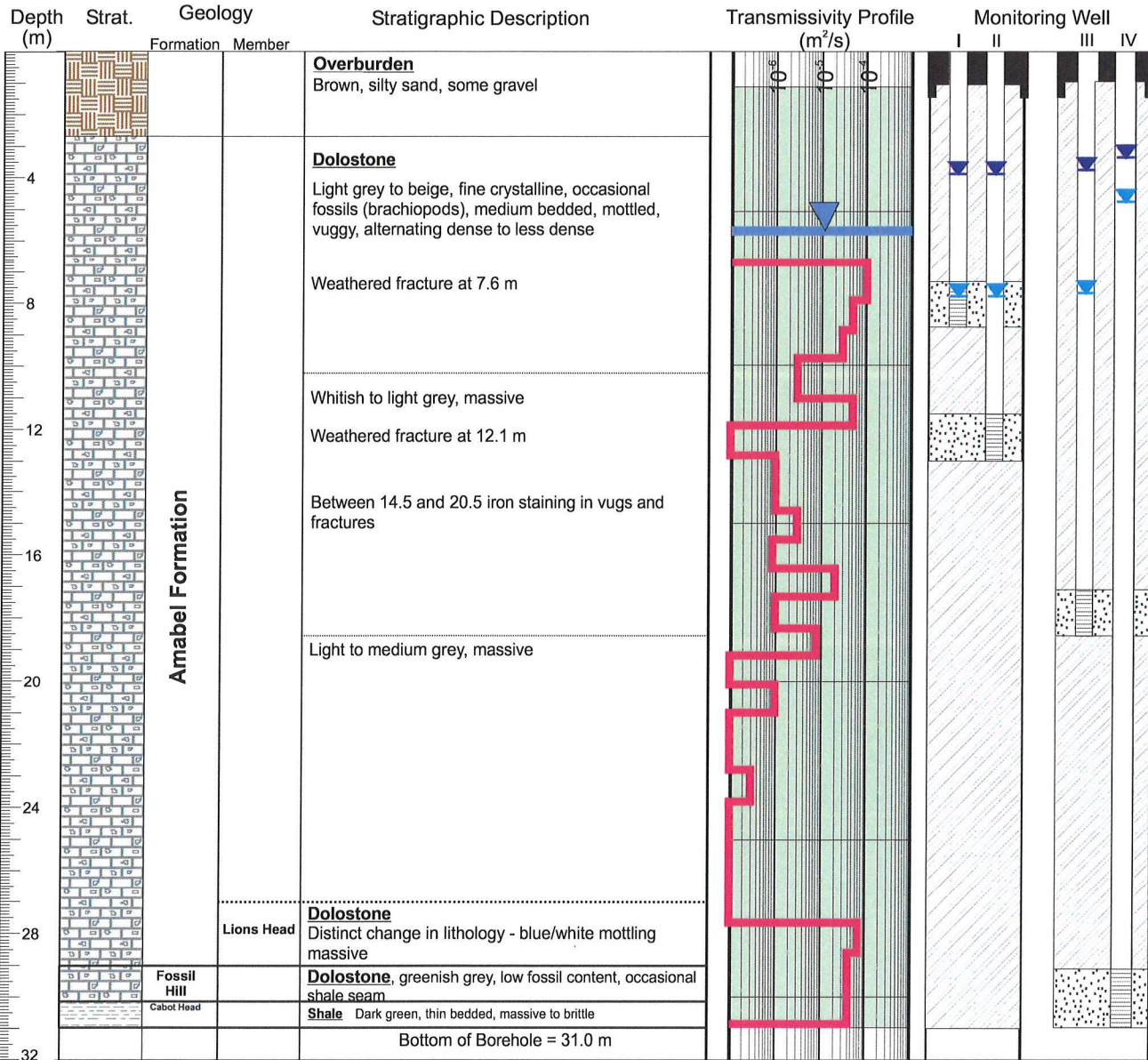
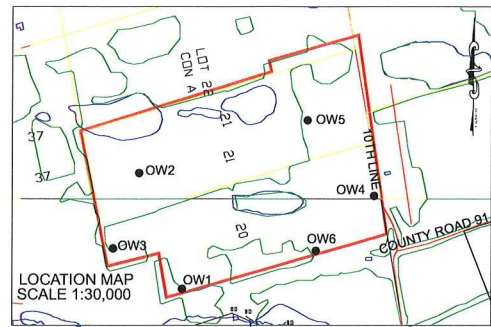
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 510.8 masl

**NOTES:**

For a detailed description of the geological units refer to Section 5.0 of the report
 Information on well construction details refer to Appendix A: Methodology
 Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
 Information on transmissivity profiles refer to Appendix F: Packer Testing Data

Water levels measured on:

- ▲ April 13, 2005
- ▲ November 15, 2005



AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Observation Well Nest 5

Date Issued: December 2005

Geologist: TLW

Project No. 04-015

File Name: OW5-page 1.cdr

Highland Quarry
Hydrogeological Assessment

OW6 NEST

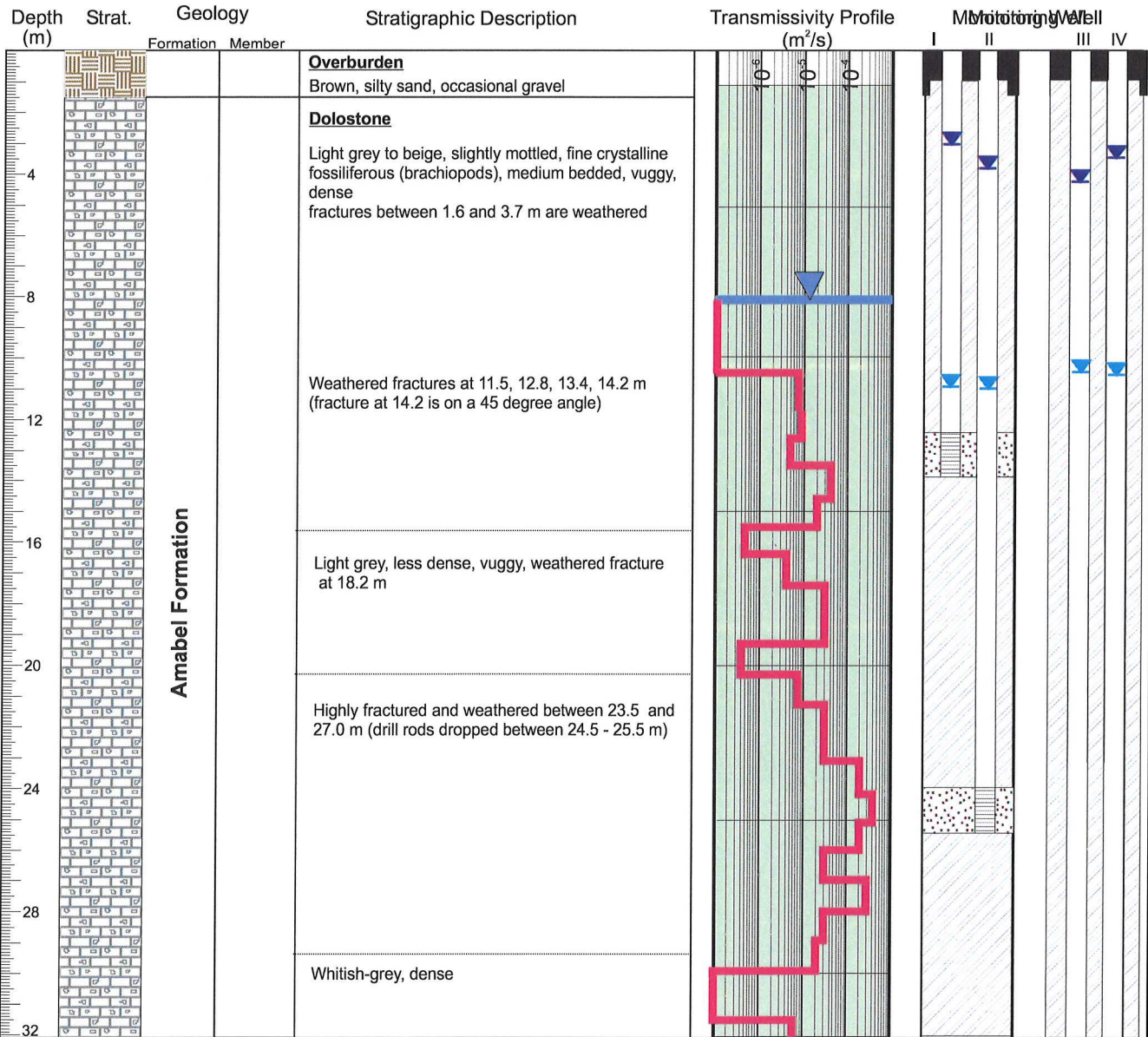
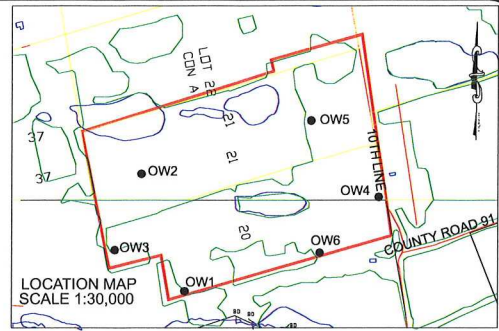
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 526.2 masl



NOTES:

For a detailed description of the geological units refer to Section 5.0 of the report
Information on well construction details refer to Appendix A: Methodology
Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
Information on transmissivity profiles refer to Appendix F: Packer Testing Data
Water levels measured on:

▼ April 13, 2005

▼ November 15, 2005

* Represents zone of packer communication t
no analysis possible



AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Observation Well Nest 6

Date Issued: December 2005

Geologist: TLW

Project No.: 04-015

File Name: OW6-page 1.cdr

**Highland Quarry
Hydrogeological Assessment**

OW6 NEST

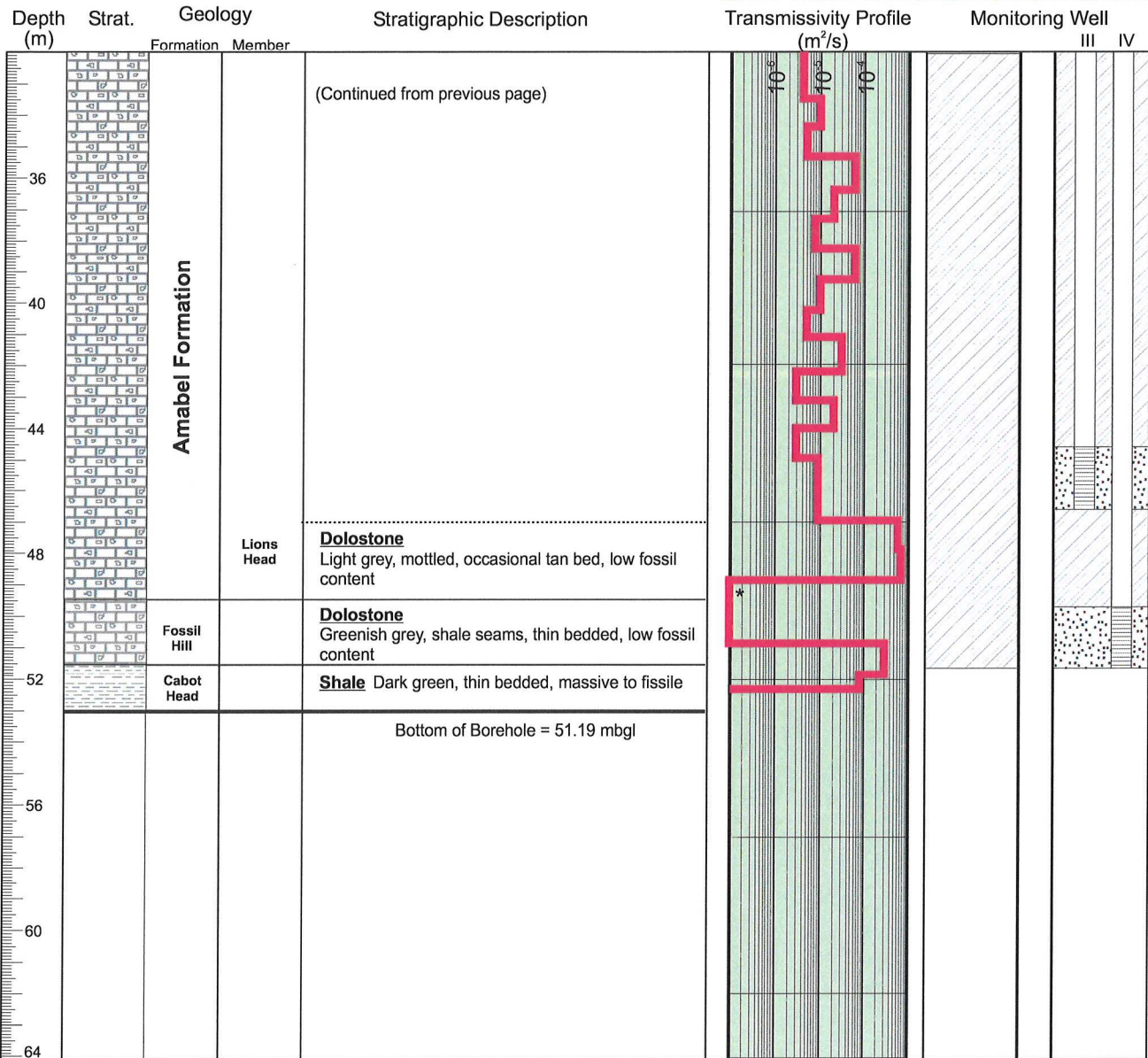
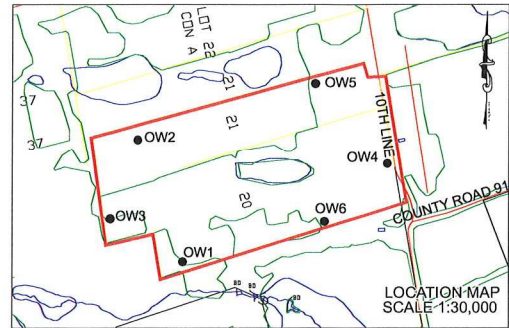
Drill Date: August 2004

Drilling Method: Continuous Core

Driller: Lantech Drilling

Geologist: TLW

Ground Surface Elevation: 526.2 masl

**NOTES:**

For a detailed description of the geological units refer to Section 5.0 of the report
 Information on well construction details refer to Appendix A: Methodology
 Information on stratigraphic contacts refer to Appendix D: Borehole Geophysics
 Information on transmissivity profiles refer to Appendix F: Packer Testing Data
 Water levels measured on:

▼ April 13, 2005

▼ November 15, 2005

* Represents zone of packer communication t
 no analysis possible



ENVIRONMENTAL CONSULTING, INC.

Observation Well Nest 6

Date issued: December 2005

Geologist: TLW

Project No. 04-015

File Name: OW6-page 2.cdr

Highland Quarry
Hydrogeological Assessment