Puslinch Industrial Development (Lambda Properties) Functional Servicing Report for Lambda Properties Rezoning Application c/o Black, Shoemaker, Robinson & Donaldson Ltd.

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

November 2014
300032929.0000

Functional Servicing Report for Lambda Properties Rezoning Application
c/o Black, Shoemaker, Robinson & Donaldson Ltd.
November 2014

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Disclaimer

1.0 Introduction

1.1 Background

R. J. Burnside & Associates Limited (Burnside) is the Consulting Engineer retained by Lambda Properties to prepare a Functional Servicing Report in support of an application to rezone an agricultural parcel to rural industrial zoning. The site is located on McLean Road West between Kerr Crescent and Concession 7 in the Township of Puslinch.

The purpose of this functional servicing report is to:

- Evaluate the sanitary servicing opportunities and implications.
- Evaluate the supply and distribution of private well water to meet the domestic water and firefighting water needs of this proposed development.
- Evaluate the Stormwater Management opportunities and constraints including determining suitable methods for attenuation and treatment of stormwater runoff.

All of the above will be done in accordance with accepted engineering practices and criteria from the governing approval agencies, and in order to address the Condition of Approval.

1.2 Reference Documents

- "Subsurface Investigation Report, Proposed Development, Part of Northeast Half of Parcel 26, Concession 7, Township of Puslinch, County of Wellington" Chung & Vander Doelen Engineering Ltd., March 1, 2007.

1.3 Site Description

The legal description of the site is "Part of Northeast Half of Parcel 26, Concession 7, Township of Puslinch, County of Wellington. The adjacent land uses are industrial to the east and resource extraction to the north. The third side of this triangular parcel being bounded by Highway 401.

Although the site area is approximately 29.4 ha, the developable area of the property is 17.8 ha with the remaining 11.6 ha being designated for possible highway expansion. The majority of the site is farmland with a small gravel pit and sparsely-wooded area along the east limit. The site is currently vacant and was historically used for agricultural purposes and aggregate extraction.

The site topography falls approximately 11 m at typical grades of 2.5% to a low lying area in the southwest corner of the site.

1.4 Proposed Development Concept

In order to demonstrate feasibility, a concept was developed for three industrial designation parcels of varying sizes in the existing A Agricultural Zone. The allowed land uses in the Industrial zone are as follows:

- Body shop
- Building or construction contractor's yard
- Business office
- Concrete plant
- Factory outlet
- Feed mill
- Grain storing, weighing and drying operation
- Fuel depot
- Home occupation accessory to a permitted existing single dwelling
- Industrial use
- Public use, including a Municipal Airport and related activities
- Retail lumber and building supply yard
- Restaurant
- Sawmill
- Service trade
- Transport terminal
- Warehouse

As a wide variety of uses are available to potential developers and the parcels have yet to be created, there are no defined uses for the conceptual parcels at this time.

In order to assess the functional serviceability of the parcels, the Report will review the potential impact of a "Dry Industry" on all parcels with respect to sanitary and stormwater servicing facilities dependent upon the scope of the development. Refer to Drawing Concept Plan 1 (CP-1) in Appendix B. Many of the above uses could generate the largest potential parcel coverage (40%), stormwater runoff volume and sanitary demand on the 10.3 ha Parcel 1. Based upon the assumed coverage, the Township's Zoning By-Law 19/85 Section 3 Subsection 16 would require 412 parking spaces results in the parking area shown for the purposes of determining a conceptual impervious area consistent with the rest of the parcel concept. Assuming one occupant per car, the population of Parcel 1 would be 412 noting that a lower population was used for the purposes of sanitary service as explained later in Section 3 of this Report. As each parcel is developed, the servicing demand and site servicing capacity should be confirmed for each proposed use and parcel coverage.

2.0 Stormwater Management

2.1 Design Criteria

The minimum Township standards require peak flow quantity mitigation from predevelopment to post development conditions for all rain events up to and including the 100-year storm. In addition, stormwater quality treatment be should achieve MOE "Enhanced" level design standards. Because this site may be developed as many separate parcels, each parcel must have its own stormwater management.

2.2 Background/Existing Storm Drainage

The existing drainage direction is from east to west, eventually discharging into a low lying area located on Parcel 3. According to the Subsurface Investigation Report, below the topsoil layer is a 3 to 4 m thick gravel layer with a t-time <1 min/cm. Due to this extremely high infiltration rate and the topography, it is anticipated that there is no off-site runoff in existing conditions.

2.3 Conceptual Stormwater Quantity Controls

The proposed stormwater concept is illustrated on Drawing CP1. Since the existing site does not produce any runoff, quantity control can be provided by infiltration basins on each parcel with sufficient storage for the 100-year storm event. A MIDUSS model was created determine the storage volume requirements of these infiltration basins. Outflow rates were determined based on an infiltration rate of 600 mm/hr. (1 min/cm) multiplied by the bottom area of the facility. The storage volume requirements for each parcel are summarized in Table 1 and the MIDUSS output is included in Appendix A.

Table 1: Infiltration Basin Storage Requirements

Parcel	Basin Area (m^2)	Percolation Rate (Mm/hr.)	Basin Infiltration Rate (m^3/s)	Volume Required (m^3)	Volume Available (m^3)
1	5000	600	0.833	3224	3562
2	3390	600	0.565	1713	2208
3	1390	600	0.232	652	972

The conceptual infiltration basins are shown at the required area to provide the required volume shown in Table 1 at a depth 0.6 m per MOE criteria for infiltration basins. Given the relatively high percolation rate of the subsurface soil it may be possible to decrease the area of the ponds by increasing the ponding depth.

2.4 Conceptual Stormwater Quality Controls

Stormwater quality measures must be implemented on an individual parcel basis. Flow from the rooftop area should be isolated from the parking parcel runoff and discharge via grassed swales directly into the infiltration basins. Paved parking parcel areas must be treated with oil-grit separators, located upstream of their respective quantity controls.

Gravel parking parcels should be graded with slopes not in excess of 1% and terraced as necessary with landscaped areas to minimize silt migration. For several of the land uses involving heavy equipment, transportation or vehicle servicing, an oil capture device should be included as part of the stormwater quality controls.

During site construction, it is recommended that a silt fence be constructed along the perimeter of each site and additional sediment control measures such as diversion swales, check dams and temporary sedimentation basins be constructed on each parcel.

2.5 External Flows

Based on topographic information, there is the potential for external flows to drain onto the site from the existing industrial development to the east. As such, a swale should be constructed along the east parcel line to convey flows through the site.

3.0 Sanitary Servicing

3.1 Existing Sanitary Sewer Infrastructure

Presently there is no municipal sanitary service to the site and site investigations have found no evidence of existing septic systems.

3.2 Conceptual Sanitary Servicing

Once more detailed site plans are developed for each particular parcel and the proposed usage, more detailed analysis of sewage system requirements can be carried out. For the purposes of this report, it has been assumed that each parcel will be serviced with an individual onsite sewage treatment and disposal system, which will generally consist of a septic tank, pump chamber and subsurface disposal bed.

3.3 Estimated Wastewater Flows

The wastewater flows per parcel are based on a dry industrial use, and are calculated using Ontario's Building Code (OBC) value of 75 L/employee per 8-hour shift for a factory (with no showers). The daily wastewater flows have been estimated using the conceptual parcel layout (refer to Drawing CP-1 in Appendix B), as well as the results of the hydrogeologic evaluation (refer to Appendix C), and are summarized below:

Table 2: Daily Wastewater Flow Rates by Parcel

Parcel	Area (m^2)	Number of Employees	Total Flow (L/day)
1	103,000	130	9,750
2	54,800	130	9,750
3	20,000	60	4,500

The above flow estimates have been used to estimate the required disposal area. It is assumed that the wastewater will be domestic strength, and will not require any advanced pre-treatment to accommodate higher than typical domestic waste strength.

When the daily sewage flow for a property is less than 10,000 L/day, a building permit is required under the Ontario Building Code. For properties that have a daily sewage flow of 10,000 L/day or greater, the sewage system would require an Environmental Compliance Approval (ECA) from the Ministry of the Environment (MOE). Based on the nitrate analysis undertaken as part of the hydrogeologic assessment, Parcels 1and 2 could potentially support a daily flow in excess of 10,000 L/day. However, in order to maintain consistency between all three parcels (in terms of the approvals regime), the daily flows for Parcels 1 and 2 are assumed to be limited to 9,750 L/day by limited the number of employees to 130. Once site specific uses are proposed, any potential

facilities that would accommodate more than 130 employees would require an impact assessment in accordance with current MOE guidelines, and it can be expected that some type of wastewater treatment would be required in order to reduce the nitrate concentration and meet MOE's Reasonable Use guidelines.

3.4 Subsurface Conditions

Subsurface soil and groundwater conditions for the site were investigated by Chung & Vander Doelen in 2007 (refer to Appendix D). Based on the 25 test pits excavated, the site is generally underlain with sandy gravel with frequent to numerous cobbles and boulders, classified as GW (well-graded gravel) and GP (poorly-graded gravel) soils under the Unified Soil Classification System (USCS). The sandy gravel is overlain with deposits of silt, sandy silt, silt and sand and silty sand from 0.1 to 1.05 below the ground surface. At three of the test pits (TP 10, 11 and 12) the deposits were thicker, extending to 4.3 to 5.0 m below grade. These three test pits were located at the very southeast corner of the property. It is not expected that leaching beds will be located in this corner due to the variable and hilly topography in this area.

The estimated percolation rates (T-times) for GW (well-graded gravel) and GP (poorly-graded gravel) soils is less than 1 min/cm. The estimated T-times for the deposits of silt, sandy silt, silt and sand and silty sands range from 8 to 20 min/cm.

Groundwater was not encountered in 24 of the 25 test pits. Seepage was encountered at Test Pit 12 at 1.0 m below existing grade. Ten standpipes were also installed to a maximum of 3 m depth in order to measure water levels. At one test pit (TP 12), groundwater was measured at 0.66 and 0.89 m below the ground surface.

3.5 Sewage System Design

Each parcel will require a septic system permit under Ontario's Building Code. The Code does not permit the installation of an in-ground leaching bed in soils with a percolation time of less than 1 min/cm or greater than 50 min/cm; therefore the area requirements have been estimated assuming a conventional raised leaching bed, constructed in imported sand fill. An imported sand fill with a T-time of 10 to 12 min/cm should be used to slow the flow of effluent to improve treatment before entering the gravel soils. More advanced treatment systems, as opposed to a conventional septic tank and leaching bed, could be employed to reduce the size of the disposal bed and improve the quality of effluent being discharged to the groundwater.

In order to meet OBC requirements, the septic tank must have a working volume of at least three times the daily flow, and will require an effluent filter on the outlet of the tank, with access at grade for inspection and maintenance purposes.

Using the maximum daily flows in Table 1 above, we have estimated the area requirements for a fully raised leaching bed using the relationship:

L = QT/200

where: L = length of distribution piping required (m)
Q = daily design flow (L/day)
T = T-time of the imported sand fill for the bed, assumed to be 12 min/cm

Additional area beyond the leaching bed piping has been added to accommodate side slopes, since the bed will be raised using imported sand. In order to maximize the layout of the leaching bed and spread the effluent over a greater area, it is recommended that the distribution pipes within the bed have a spacing of 2 m (as compared to the minimum code-required pipe spacing at 1.6 m).

The required area footprints for disposal are summarized in Table 3 below.

Table 3: Estimated Area Requirements for Parcels

Parcel	Total Flow (L/day)	Minimum Required Septic Tank Size (L)	Disposal Bed Area (m^2)	Approximate Dimensions (m)	Length of Distribution Piping (m)
1	9,750	29,250	2,244	66 x 34	588
2	9,750	29,250	2,244	66 x 34	588
3	4,500	13,500	1,173	35 x 38	270

Since the total length of distribution piping in the bed exceeds 150 m, the disposal bed will need to be dosed by a pumping system to ensure good dispersal of effluent throughout the bed (in accordance with OBC 8.6.1.3.). There may be additional pump chambers required to overcome grades, equalize flows or to dose treatment units, depending on the site specific requirements.

3.6 Summary

In general, the proposed industrial subdivision can be serviced with individual onsite sewage treatment and disposal systems. Once site specific uses are determined, more specific sewage system sizing will need to be done; however, we have demonstrated that there is adequate land area available on each parcel to accommodate subsurface disposal of the effluent based on a conservative approach.

4.0 Water Supply and Distribution

4.1 Existing Water Supply

There are currently no municipal water services to the site and there are no records of existing wells.

4.2 Conceptual Water Supply

The Hydrogeological Evaluation included in Appendix C reviewed the suitability of a private well for each parcel to be created. The water supply can be derived from single or multiple groundwater supply well(s) on the property. Depending on per Parcel conditions an overburden well or bedrock well may be suitable. Please note that the groundwater quality found in the Guelph-Amabel aquifer is generally suitable for domestic consumption. However, hardness concentrate often exceeds the Ontario Drinking Water Objectives operational guidelines of 80 to 100 mg/l of $CaCO_3$. High concentrations of iron or total dissolved solids are also possible for wells within local aquifer. The potential for high capacity wells in the Guelph-Amabel aquifer is good.

Fire suppression water can be provided by a dry hydrant and water storage tank to be constructed on each parcel as necessary and to Township standards.

5.0 Utilities

There are existing gas, hydro and Bell utilities on McLean Road West. The conceptual parcels can be served by the existing utilities in the area. As each parcel use is finalized, the adequacy of the existing utilities should be reviewed to ensure that they can meet the proposed demand.

6.0 Road Access

The existing site currently has a single agricultural access from McLean Road.

Each proposed parcel will require an entrance onto McLean Road (see Drawing CP-1) that will meet municipal standards. A 10 m setback has been established for all the parcels frontages. An access to Highway 401 will not be allowed for any proposed parcel.

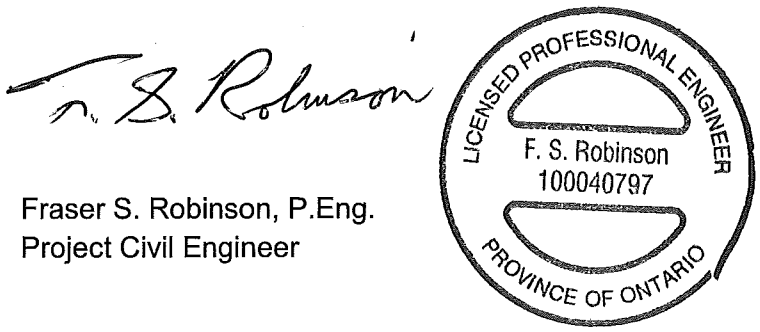
7.0 Conclusions and Recommendations

Based on review of the available background information, the site can be rezoned and future rural industrial parcels can be independently serviced subject to site-specific detailed design of water supply, septic system and stormwater management facilities. All utilities are available to the site and vehicular access to each parcel will be from McLean Road.

We recommend the adoption of this report as it applies to the rezoning application for this property.

Prepared by:

R. J. Burnside & Associates Limited



Fraser S. Robinson, P.Eng.
Project Civil Engineer

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Appendix A

Conceptual Stormwater Management Assessment and Supporting Calculations

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                       Monday, February 08, 2010"
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"                Licensee name:                              Katie Rooyakkers"
"                Company                                           RJBURNSIDE"
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" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      210.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     4688.000   Coefficient A"
"       17.000   Constant B"
"        0.962   Exponent C"
"        0.400   Fraction R"
"      210.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           213.574    mm/hr"
"             Total depth                  88.830    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            2   Horton equation"
"          101   No description"
"       55.000   % Impervious"
"       10.300   Total Area"
"      200.000   Flow length"
"        1.000   Overland Slope"
"        4.635   Pervious Area"
"      200.000   Pervious length"
"        1.000   Pervious slope"
"        5.665   Impervious Area"
"      200.000   Impervious length"
"        1.000   Impervious slope"
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"      110.000   Pervious Max.infiltration"
"       30.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.013   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.001   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                     3.082     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           4.635      5.665      10.300     hectare"
"             Time of concentration  45.976     5.775      14.264     minutes"
"             Time to Centroid       130.760    103.222    109.037    minutes"
"             Rainfall depth         88.830     88.830     88.830     mm"
"             Rainfall volume        4117.26    5032.21    9149.47    c.m"
"             Rainfall losses        60.423     1.997      28.289     mm"
"             Runoff depth           28.407     86.833     60.541     mm"
"             Runoff volume          1316.67    4919.07    6235.74    c.m"
"             Runoff coefficient     0.320      0.978      0.682      "
"             Maximum flow           0.422      3.017      3.082      c.m/sec"
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```
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"        0.833   Target outflow    c.m/sec"
"       6235.7   Hydrograph volume    c.m"
"           3.   Number of stages"
"        0.000   Minimum water level    metre"
"        1.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
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"                  Level Discharge    Volume"
"                  0.000    0.8330     0.000"
"                 0.6000    0.8330  3562.000"
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"             Maximum level                 0.543    metre"
"             Maximum storage            3224.207    c.m"
"             Centroidal lag                3.005   hours"
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"        1.000   Overland Slope"
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"       30.000   Pervious Min.infiltration"
"        0.250   Pervious Lag constant (hours)"
"        5.000   Pervious Depression storage"
"        0.013   Impervious Manning 'n'"
"        0.000   Impervious Max.infiltration"
"        0.000   Impervious Min.infiltration"
"        0.001   Impervious Lag constant (hours)"
"        1.500   Impervious Depression storage"
"                    1.689     0.000     0.754     0.000 c.m/sec"
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"             Surface Area           2.466      3.014      5.480      hectare"
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"             Time to Centroid       124.395    101.963    106.704    minutes"
"             Rainfall depth         88.830     88.830     88.830     mm"
"             Rainfall volume        2190.54    2677.33    4867.87    c.m"
"             Rainfall losses        60.416     2.099      28.342     mm"
"             Runoff depth           28.413     86.731     60.488     mm"
"             Runoff volume          700.67     2614.07    3314.74    c.m"
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"             Maximum flow           0.260      1.642      1.689      c.m/sec"
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"            4   Add Runoff "
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"       3314.7   Hydrograph volume    c.m"
"           3.   Number of stages"
"        0.000   Minimum water level    metre"
"        1.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
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"                 0.6000    0.5650  2208.000"
"                  1.000    0.5650  6386.000"
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"             Maximum level                 0.466    metre"
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"             Centroidal lag                2.864   hours"
"                  1.689     1.689     0.438     0.000 c.m/sec"
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"            5   Next link "
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"            2   Start - New Tributary"
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"        0.300   Pervious Manning 'n'"
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"       30.000   Pervious Min.infiltration"
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"             Rainfall volume        799.47     977.13     1776.60    c.m"
"             Rainfall losses        60.422     3.190      28.944     mm"
"             Runoff depth           28.407     85.640     59.885     mm"
"             Runoff volume          255.67     942.04     1197.71    c.m"
"             Runoff coefficient     0.320      0.964      0.674      "
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"        0.232   Target outflow    c.m/sec"
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"           3.   Number of stages"
"        0.000   Minimum water level    metre"
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"        0.000   Starting water level    metre"
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"                  Level Discharge    Volume"
"                  0.000    0.2320     0.000"
"                 0.6000    0.2320   972.000"
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"            5   Next link "
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"             Total Impervious area                    9.779    hectare"
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" 19          EXIT"
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Appendix B

Drawings

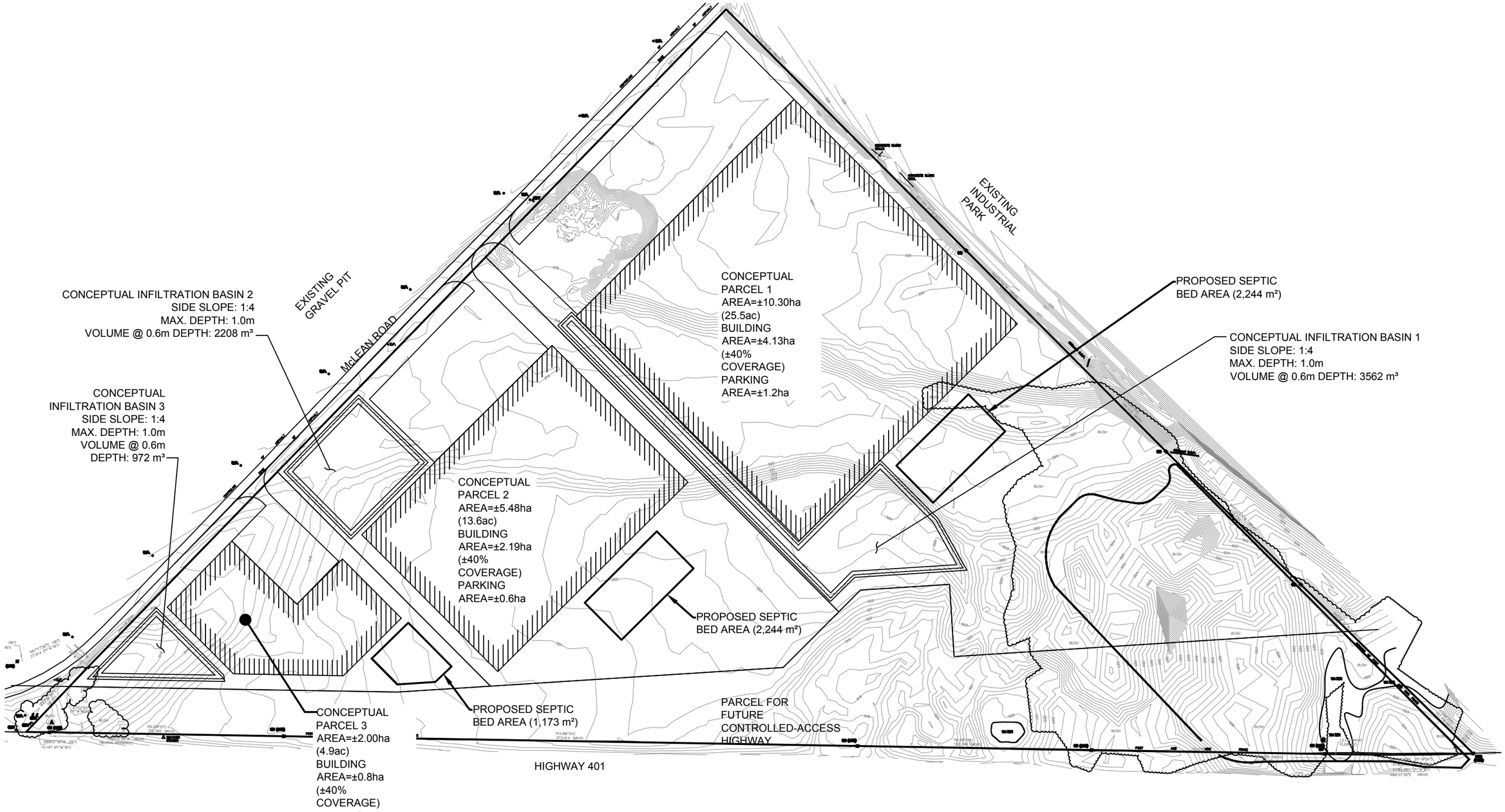

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Figure Title

CONCEPT PLAN

Client

LAMBDA PROPERTIES

Drawn	Checked	Date	Figure No.
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Appendix C

Hydrogeological Report

Puslinch Industrial Development (Lambda Properties)

Hydrogeological Evaluation c/o Black, Shoemaker, Robinson & Donaldson Ltd.

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

October 6, 2014
300032929.0000

Hydrogeological Evaluation
c/o Black, Shoemaker, Robinson & Donaldson Ltd.
October 6, 2014

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Revision	Date	Description

R.J. Burnside & Associates Limited

Report Prepared By:

David Marks. P.Geo., QPESA
Senior Hydrogeologist
DM:sd

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Hydrogeological Evaluation
c/o Black, Shoemaker, Robinson & Donaldson Ltd.
October 6, 2014

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained to complete a preliminary hydrogeological study to characterize the geological conditions in the area of the Site and assess the potential impact of septic effluent on local groundwater receptors.

The work was completed in accordance the Ministry of the Environment's (MOE) 1995 "*Hydrogeological Technical Information Requirements for Land Development Applications*", the 1996 Procedure D-5-4 "*Technical Guideline for Individual On-Site Sewage Systems: Water Quality Risk Assessment*" and the 1996 Procedure D-5-5 "*Technical Guideline for Private Wells: Water Supply Assessment*".

2.0 General Site Characteristics

2.1 Property Description

The proposed development is located in the Township of Puslinch, north of Highway 401 and just west of Highway 6 South. The legal description is Part of Lot 26 and 27, Concession 7 in the Township of Puslinch. Figure 1 illustrates the location of the property.

The site is bounded by Highway 401 on the south, MacLean Road to the northwest and an industrial subdivision to the northeast. The total area of the property is approximately 50 ac. The land is currently vacant and was historically was used for agricultural purposes. A wooded area is located in the east corner of the site.

The topography of the property is gently rolling to hummocky with a general southwesterly slope. The highest elevations on the property are located in southeast area of the site (325 masl) and lowest on the southwest side of the site (318 masl). A low lying channel shaped area is present in the middle of the Site.

2.2 Development Description

Preliminary plans include the creation of three industrial lots that will be used for dry industries such as warehousing. The Site refers to the industrial development. Figure 2 illustrates the proposed lots. The lots have the following characteristics:

Lot Number	Size
Lot 1	103,000 m^2
Lot 2	54,800 m^2
Lot 3	20,000 m^2

2.3 Surrounding Land Uses

Land uses in the area include industrial, commercial, agricultural and natural lands. The southwestern boundary of the Site is Highway 401 with agricultural and natural lands located on the south side of the Highway. On the eastern boundary of the site is a large industrial subdivision. On the north side of MacLean Road is a large aggregate extraction operation.

2.4 Soil Types

The soil on the site is classified as Burford Loam. The soil materials come from gravel and are well drained and slightly stoney (Hoffman et. al., 1963). The southeast side of the property is overlain by soils classified as Dumfries Sandy Loam. The soil material comes from a stoney, sandy loam till and is well drained and very stoney.

A review of the Subsurface Investigation Report (2007) prepared by Chung & Vander Doelen Engineering (CVD) was completed. The subsurface investigation included the excavation of 25 test pits. The test pit logs and locations are provided in Appendix A.

CVD described the Site stratigraphy as consisting of 100 to 522 mm of topsoil overlying thin deposits of silt, sandy silt, sand and silty sand. Underlying the finer grained deposits is a thicker stratum of coarse grained sandy gravel.

2.5 Regional Geology

The Site is located in the physiographic region known as the Horseshoe Moraines. The region is characterized by high relief, hummocky terrain and associated old spillway systems with broad gravel and sand terraces (Chapman & Putnam, 1984).

A review of the Ontario Department of Mine's Map 2508 "*Quaternary Geology of Cambridge Area, Southern Ontario*" indicates that the overburden sediments in the area of the Site consist mostly of outwash gravel. The site is located on an outwash fan located on the northwest side of the Galt Moraine. Stone-poor silty to sandy till sediments of the Galt Moraine are mapped on the southeast corner of the site. Figure 3 illustrates the surficial geology of the area.

The outwash sands and gravels of the area overlie Wentworth or older till in some areas and in other places rest directly on the Guelph Formation Bedrock. The Galt Moraine is composed of a cap of Wentworth Till overlying a complex sequence of interlayered till, silt, sand and gravel (Golder, 2006). The Galt Moraine is a regionally significant recharge area that supports base flow in the nearby spring fed watercourses.

Bedrock in the area consists of the Guelph Formation overlying the Amabel Formation.

The Guelph Formation consists of cream coloured to yellowish grey, porous dolostone with a massive and irregularly bedded nature. Reefal structures and fracturing are common. The Guelph Formation has a highly variable thickness ranging from 4.0 m to 100 m (Singer et al., 2003). The un-subdivided Amabel is a massive white to grey-brown dolostone. The upper zones of the Amabel are only weakly fractured, while the middle zone contains large cavities, reefal structures, bedding planes and fractures that contribute to the high permeability of the rock. This middle zone is considered to be a highly productive aquifer (Golder Assoc. 2006). Figure 4 illustrates the bedrock geology of the area.

2.6 Paris and Galt Moraines

According to EBR Review Response: Paris and Galt Moraines April 2009, Ontario Ministry of the Environment:

The Paris and Galt moraines extend from north to south west from Caledon to Norfolk County, a distance of about 560 km. The location of the moraine on the property is illustrated on Figure 4. Generally, a snake like formation of mixed tills, the moraines are at their widest (about 10 km) near Aberfoyle. Much of the surficial expression of the moraines is discontinuous throughout Brant County. The Paris and Galt moraines are significantly lower in relief than the Waterloo moraine and the overburden thickness can be as high as 30 to 40 m in the Guelph and Cambridge area.

The hummocky nature combined with a relatively permeable surficial geology give rise to high levels of recharge into the Paris and Galt moraines, known to support various cold water streams and wetlands. Early observations indicate the presence of locally important aquifers along the southern portions of the moraines. Study by the Ontario Geologic Survey (OGS) also indicates the potential for significant aquifers beneath the moraines and above the bedrock between Cambridge and Paris as well as significant bedrock aquifers between Guelph and Cambridge.

Detailed hydrogeology is available only where development (urban, rural residential, major groundwater takings, aggregate extraction) has occurred or is planning to occur. Significant aggregate operations occur in Puslinch Township in the outwash materials between the Paris and Galt moraines.

The moraines are at their widest near Aberfoyle, in the vicinity of the site. A very small portion of the south eastern corner of the south is mapped as part of the moraine. This is the location of the wetland feature identified during the EIS. Wetland features are a common occurrence on the moraine due to the presence of aquifers and cold water streams.

The moraine is protected on the Puslinch Industrial site within the proposed buffer to the wetland feature and adjacent upland forest. The development proposal will maintain the existing ground and surface water balance to the wetland feature, which will also preserve the water balance within the portion of the moraine that intersects with the site.

2.7 Regional Hydrogeology

The main bedrock aquifer in the area is the Guelph-Amabel aquifer. The Guelph-Amabel aquifer is an extensive dolostone aquifer with a maximum thickness of 60 m. Well yields in the aquifer are variable as they depend on the degree of fracturing and available drawdown. Generally most domestic wells obtain water from the upper 15 m of the aquifer while municipal and industrial wells may drill to depths of 30 to 188 m (Singer et al, 2003). The potential for high capacity wells in the aquifer is good. Overburden wells that access groundwater in gravel and sand deposits are also found in the area.

In Ontario, drilling contractors are required to submit a water well record to the Ministry of Environment (MOE) following the construction of a water supply well. The well record includes information about the well location, construction details, depth, geology and, pumping rate. The information in the well record is dependent on the skill and experience of the driller. Where a number of drillers report the same geological conditions, the information can be considered more reliable. A review of the MOE water well records within a 1 km radius of the Site indicated that out of 38 water supply wells records reviewed, 21 wells were completed in the bedrock, 13 wells were completed in the overburden. Information for 4 wells was not available. Records for 3 of the water supply wells indicated abandonment due to water quality.

A summary of information based on the reviewed MOE water well records is included in Table 1. Water well records are provided in Appendix B.

Table 1: MOE Water Well Record Summary

	Overburden Wells	**Bedrock Wells**	**All Wells**
	Range (Average)		
Depth of Wells (m)	6.1 – 55.8 (30.8)	22.3 – 79.2 (46.6)	6.1 – 79.2 (40)
Depth to Bedrock (m)	-	4.3 – 30.5 (21.3)	4.3 – 30.5 (21.3)
Pumping Rate (L/s)	22.7 – 456 (124.6)	12 - 113.7 (72)	12 – 454 (92.3)
Specific Capacity (L/s/m)	5.6 – 75.3 (27.5)	0.9 – 54.1 (14.9)	0.9 – 151.7 (24.7)
Theoretical Yield (L/s)	42.2 – 4,688 (992)	6.3 – 4,013 (361.7)	6.3 – 4688 (602.7)

Using the coordinates on the well records, water wells in the area of the site are shown in Figure 5. Overburden and bedrock wells are both used in the area and both have sufficiently high theoretical yields. Most of the wells servicing the industrial subdivision adjacent to the site on the northeast are bedrock wells. The bedrock wells in the area have an average depth of 21 m and a maximum depth of 30.5 m. Figures 6 and 7 provide geological cross-sections depicting the stratigraphy of the study area.
The geological data from the water well records indicates that the bedrock beneath the site is fairly flat lying. The overburden consists of coarse grained outwash deposits and fine grained silty to sandy silt till deposits.

During the subsurface investigations completed in 2007, shallow groundwater was identified in one test pit (TP12) at a depth of approximately 3.7 m below grade or 316.5 m above mean seal level. Based on the data, the shallow water is anticipated to be present between 4 and 5 m below grade.

Groundwater flow in the overburden reflects local topography with flows converging at and discharging to local water courses (Golder, 2006). In the bedrock, regional groundwater flow is in the south southwest direction. The groundwater table is likely consistent with the level of nearby aggregate ponds.

2.7.1 Regional Groundwater Quality

The groundwater quality found in the Guelph-Amabel aquifer is generally suitable for domestic consumption. The water is typically hard (high calcium and bicarbonate), with hardness concentrations often exceeding the Ontario Water Quality Objectives operational guideline of 80 to 100 mg/L of $CaCO_3$. Elevated levels of hardness can produce scales of calcium and magnesium when heated. Depending on the use of the water, a water softener may be required. Sampling from 48 well located in the Guelph Formation resulted in a mean hardness concentration of 469 mg/L (Singer et al, 2003). High concentrations of iron or total dissolved solids are also possible for wells within the Guelph-Amabel aquifer.

The Wellington County Groundwater Protection Report identified elevated chloride and sodium concentrations in overburden and bedrock wells near the intersection of Hwy 6 and the Hwy 401 as a result of road salt application and storage (Golder, 2006). Given that the Site borders onto Highway 401, there is potential that elevated chlorides and sodium may also be encountered. Water quality samples should be collected from test wells to ensure water is suitable for drinking.

3.0 Water Supply Impact Assessment

Based on the hydrogeological information collected, a suitable potable water supply can be obtained by way of a groundwater supply well on each of the proposed lots.

Depending on the conditions found during drilling, an overburden well or bedrock well may be suitable. A test pumping program should be completed to confirm well yields.

The well(s) should be drilled by a certified well contractor and a pumping test should be completed to confirm that the capacity of the well will meet the needs of the proposed development. If the pumping rate is to exceed 50,000 L/day, a Permit to Take Water application will be required.

3.1 Groundwater Uses and Local Public Water Wells

The groundwater in the area is mostly used by privately drilled water supply systems. The Guelph-Puslinch Groundwater Protection Study (2006) indicates that there are no active municipal wells near the Site. Wells in the area obtain water from granular deposits in the overburden as well as the bedrock. Near-by aggregate operations are also large users of groundwater. The amount of water required on the Site would be small compared to the amounts of water used at the aggregate operations and potential for impact from water extraction at the Site is minimal.

3.1.1 Source Water Protection

Based on mapping provided in the Grand River Source Water Protection Region Assessment Report the Site is not located within a vulnerability area associated to a municipal water supply system (LERSPC, 2012). The intrinsic aquifer vulnerability of the site is mapped as medium vulnerability and the site is in a Significant Groundwater Recharge Area.

3.1.2 Surface Water Impacts

The Site is located in the Upper Mill Creek sub-catchment. Drainage from the site travels in a western direction towards Maclean Road. There are a number of artificial ponds created by aggregate extraction below the water table north and west of the site. Water from the Site and these ponds eventually drain into Mill Creek on the west side of Concession Road 6. Impacts on surface water due to groundwater pumping are not anticipated.

4.0 Sewage Impact Assessment

The MOE's 1995 "*Hydrogeological Technical Information Requirements for Land Development Applications*" provides information requirements of existing MOE policies and guidelines for hydrogeological studies in support of development activities. This guideline is used to support applications for plans of subdivisions, condominiums, official

plan amendments, and any other forms of development reliant on individual subsurface sewage disposal.

The MOE Procedure D-5-4, "*Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment*" provides a suitable method for assessing the nitrate impact from proposed on-site systems. The general purpose of the procedure is to ensure that the effluent from on-site systems will have a minimal effect on the present or potential use of groundwater on the adjacent property.

4.1.1 Contaminant Attenuation

One of the primary methods for assessing potential septic systems effects is to complete a nitrate mass balance to calculate the infiltration capacity on the development to attenuate nitrates to a concentration below the Ontario Drinking Water Objectives of 10 mg/L. As a result, the lot size plays an important role in determining the overall carrying capacity of the proposed development.

The development concept being considered includes the creation of three dry operation industrial lots. To calculate the carrying capacity of each lot we have assumed a dry industry with no showers, a recharge rate of 250 mm/year and an effluent nitrate concentration of 40 mg/L. The calculation also assumes the use of class IV systems with no nitrate treatment.

The calculation for Lot 1 is provided below:

C = (QeCe + QpCp) / (Qe + Qp)

C = the concentration of nitrate after dilution
Qe = the volume of effluent (3,559 m^3/year - 130 employees at 75 L/day)
Ce = the nitrate concentration in the sewage effluent (40 mg/L)
Qp = the volume of infiltration (25,750 m^3/year – 250 mm/year x 103,000 m^2)
Cp = the nitrate concentration in the infiltrating precipitation (0.1 mg/L)

C = 4.94 mg/L

Note that the infiltration rate of 250 mm used based upon the rationale provided in Section 22.5.8 of the MOE's 2008 "*Design Guidelines for Sewage Works*". The flow rate of 75 L/day/employee is for Dry Industrial Operations as detailed in the Ontario Building Code Table 8.2.1.3B.

Mass balance calculations indicate that Lot 1 which covers an area of 103,000 m^2 has the capacity to attenuate the waste from approximately 130 employees. The resulting nitrate concentration (4.94 mg/L) from Lot 1 is below the Ontario Drinking Water Quality Standards of 10 mg/L. The above calculation is considered conservative and that further

reduction of nitrate will occur as a result of de-nitrification and the uptake of the nutrients by vegetation.

We have kept the maximum daily flow rates below 10,000 L/day so that the systems are not considered large subsurface disposal systems (LSDS). For daily flow rates greater than 10,000 L, a MOE Environmental Compliance Approval would be required to operate the system and the proponents would have to undertake a Reasonable Use Assessment in accordance with MOE Guideline B-7 "*Incorporation of the Reasonable Use Concept into MOE Groundwater Management Activities*". Since the flow rates are below 10,000 L/day, approval of each system would fall to the Township.

The following provides a summary of the employee capacity numbers, effluent flow rates and nitrate loading for each of the proposed lots:

Lot Number	Size	Calculated Employee Capacity	Flow Rates (L/day)	Nitrate Loading mg/L
Lot 1	103,000 m^2	130	9,750	4.94
Lot 2	54,800 m^2	130	9,750	8.42
Lot 3	20,000 m^2	60	4,500	9.97

Calculation worksheets are provided in Appendix C.

The above are employee levels are provided for discussion purposes. It should be noted that additional employees can be supported on the lands; however this will cause flow rates to exceed 10,000 L/day and an MOE Environmental Compliance Approval would be required. To meet the MOE reasonable use requirements the septic effluent would have to be treated to reduce nitrates.

5.0 Summary

The Lambda Property is located on Part of Lot 26 and 27, Concession 7 in the Township of Puslinch. The proposed development for the site consists of three lots to be used for dry industrial activities. The lots will need to be privately serviced for water and sewage. To supply water and sewage services to the development the use of private groundwater wells and private septic systems has been investigated.

The Guelph-Amabel bedrock aquifer and localized overburden aquifers in the area are both highly productive aquifers and should be capable of producing enough water to supply the proposed development. The depth of the wells will depend on the geological conditions found during drilling.

Nitrate loading calculations were completed to ensure the feasibility of on-site private septic systems. The sewage carrying capacity for each of the lots was calculated to

ensure that the concentration of contaminants is below maximum allowable concentrations at the property limits. Assuming that the entire lot is used for attenuation, Lot 1 and Lot 2 may have industries with up to 130 employees and Lot 3 may have an industry with up to 60 employees. The use of on-site sewage systems should have negligible effects on local groundwater resources including local water supply wells and natural heritage features.

A small portion of the south east corner of the property occupies the Paris-Galt Moraine. The moraine is located within the proposed buffer to the wetland feature and adjacent upland forest. The development proposal will maintain the existing ground and surface water balance to the wetland feature, which will also preserve the water balance within the portion of the moraine that intersects with the site.

6.0 Limitations

Services provided by Burnside were conducted in a manner consistent with the level of care and skill ordinarily exercised by member of the Environmental Engineering and Geoscience Consulting Profession. No other representations, expressed or implied as to the accuracy of the information, conclusions or recommendations is included, or intended in this report.

It should be recognized that the passage of time might affect the views, conclusions and recommendations provided in this report because environmental conditions of a property can change. Should additional or new information become available, Burnside recommends that it be brought to our attention in order that we may re-assess the contents of this report.

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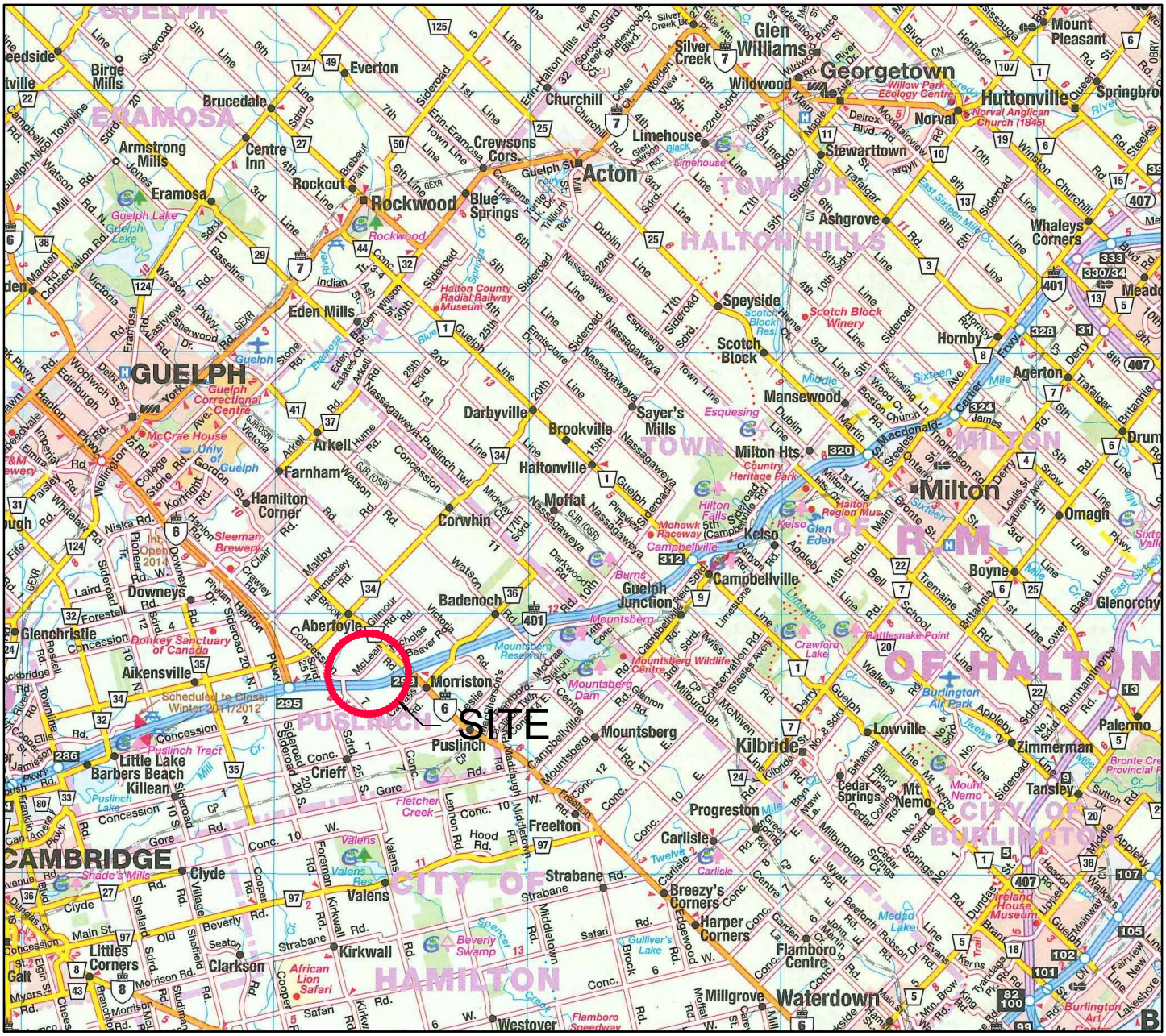
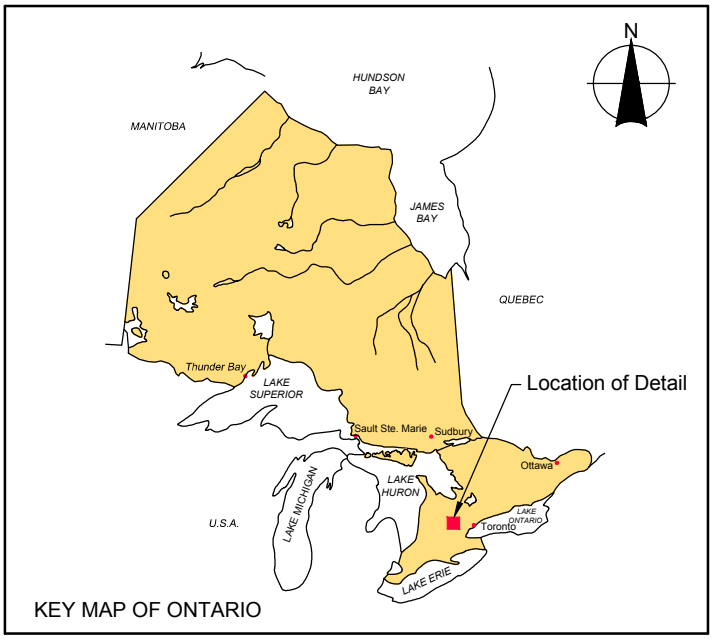
Figures



Map Reference:
Map Art Publishing
Ontario Road Atlas



KEY MAP OF ONTARIO

FIGURE 1 - SITE LOCATION MAP

BSR&D LTD.

PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

March 2013
Project Number: 300032929

Prepared by: C. Dickie

Verified by: S. Charity

BURNSIDE

032929 HG SL.DWG

LAYOUT: MODEL

PRINTED: March 28, 2013, 2:13 PM

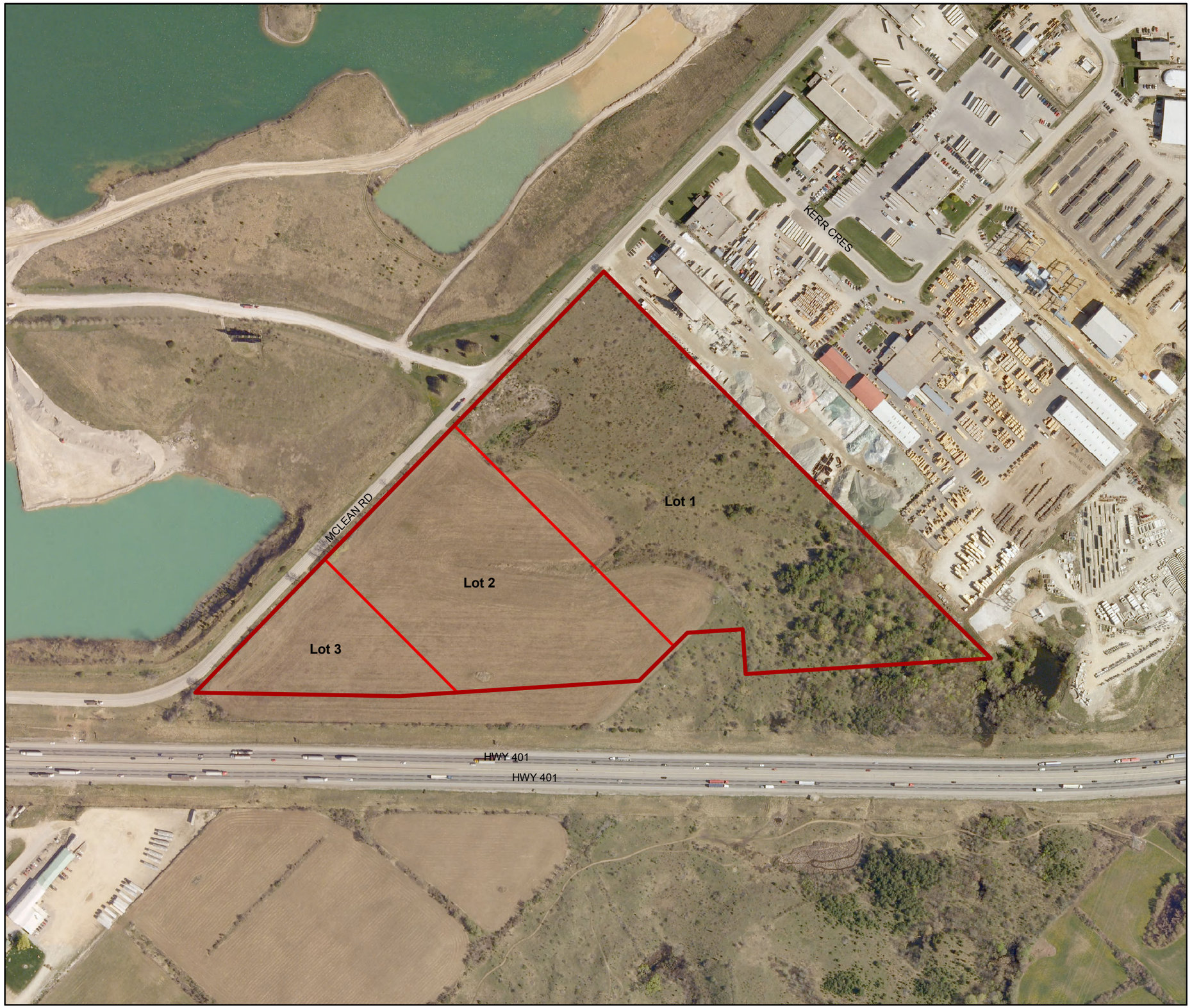


FIGURE 2

BSR&D LTD.

PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

SITE PLAN

LEGEND

- Approximate Property Boundary
- Proposed Lot Boundaries

N

0 60 120 180 240 300

Metres

1:4,000
March 2013
Project Number: 300032929

Projection: UTM Zone 17
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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032929 HG SITE PLAN.mxd

Printed: March 28, 2013, 1:48 PM

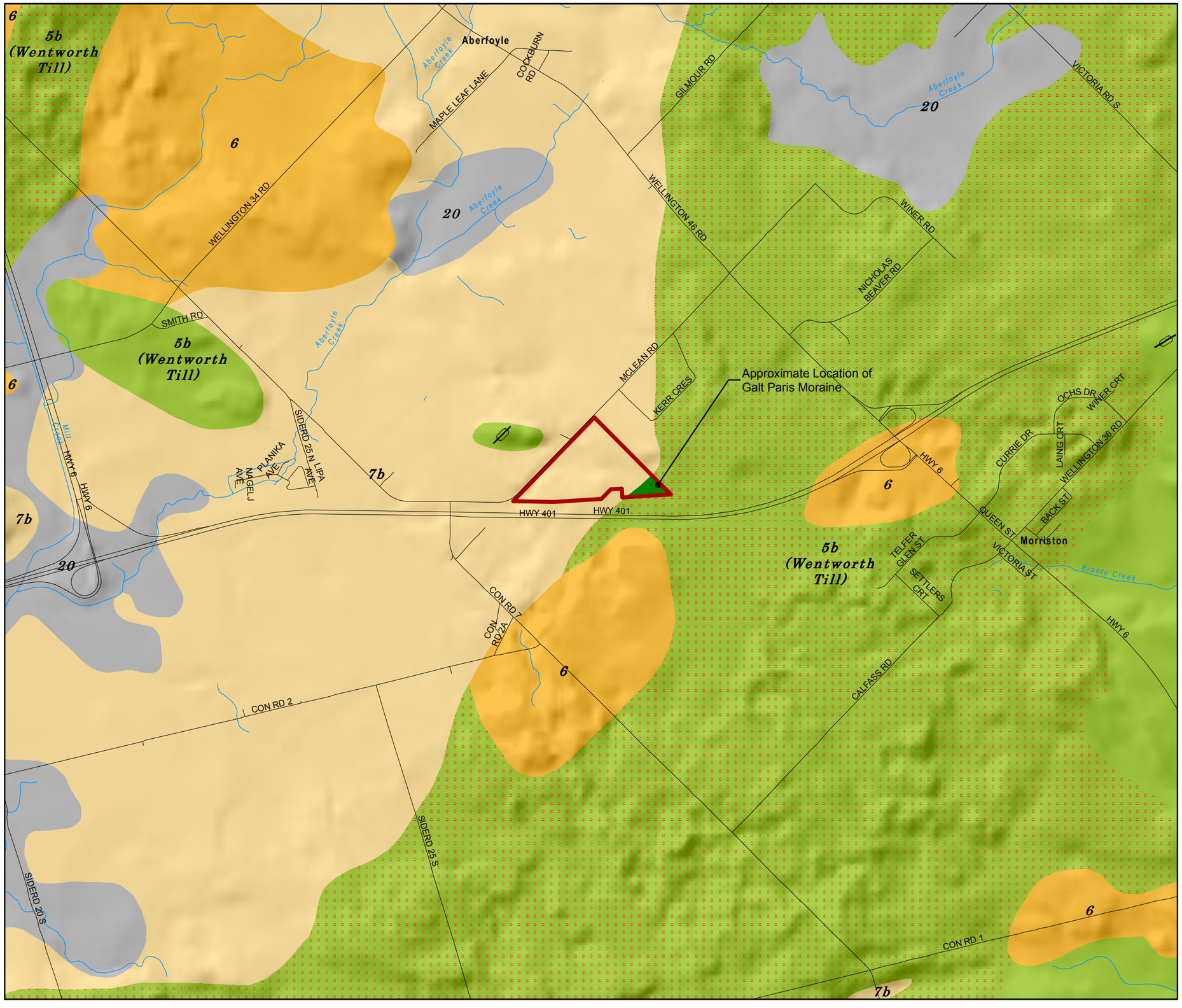

FIGURE 3

BSR&D LTD.

PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

SURFICIAL GEOLOGY

LEGEND

- Approximate Property Boundary
- Approximate Location of Galt Paris Moraine
- Watercourse: Permanent
- Drumlin
- Hummocky Topography

Surficial Geology Unit

- 5b: Stone-poor, carbonate-derived silty to sandy till
- 6: Ice-contact stratified deposits
- 7b: Gravelly deposits
- 20: Organic deposits

Credit:
Ontario Geological Survey 2003. Surficial Geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128.

N

0 300 600 900 1,200 1,500

Metres

1:20,000
March 2013
Project Number: 300032929

Projection: UTM Zone 17
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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032929 HG SURFICAL GEOLOGY.mxd

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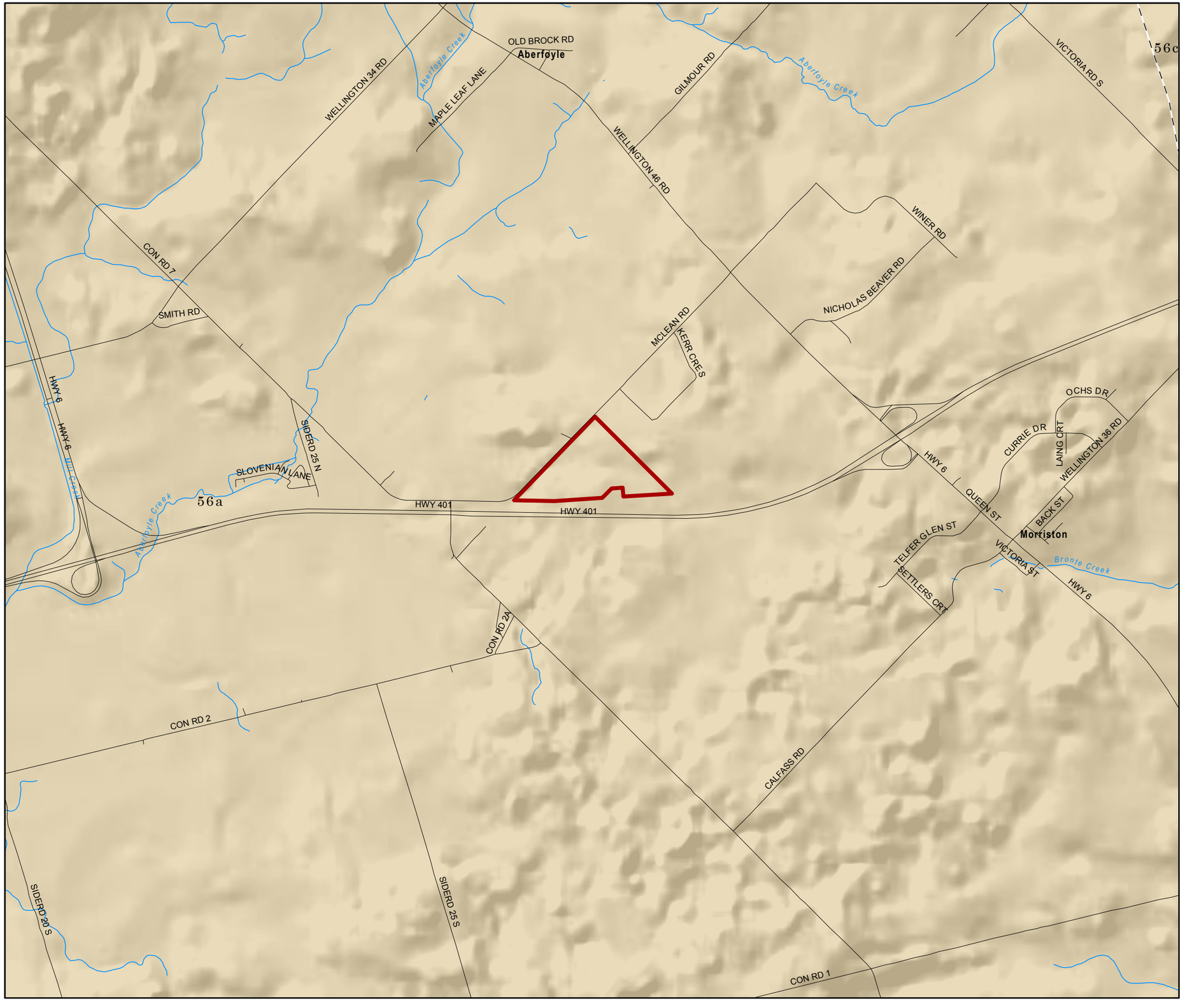

FIGURE 4

BSR&D LTD.

PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

BEDROCK GEOLOGY

LEGEND

- Approximate Property Boundary
- Watercourse: Permanent
- 56a - Guelph Fm. : Sandstone, Shale, Dolostone, Siltstone
- 56c - Amabel Fm. : Sandstone, Shale, Dolostone, Siltstone
- Bedrock Geology Unit Boundary

Credit:
Ontario Geological Survey (OGS); Bedrock Geology of Ontario; Miscellaneous Release – Data 126 Revised 2006; Scale 1:250,000.

N

0 300 600 900 1,200 1,500

Metres

1:20,000
March 2013
Project Number: 300032929

Projection: UTM Zone 17
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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032929 HG BEDROCK GEOLOGY.mxd

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FIGURE 5

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PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

WELL LOCATION PLAN

LEGEND

- Approximate Property Boundary
- MOE Bedrock Well Location (Depth m)
- MOE Overburden Well Location (Depth m)
- MOE Well Location - Unknown Stratigraphy (Depth m)
- Test Pit Location (By Chung & Vander Doelen, 2007)
- Cross Section Orientation
- Freeway, Paved
- Highway, Paved
- Road: Arterial or Collector: Paved
- Road: Local or Other: Paved
- Road: Local or Other: Unpaved
- Building
- Contour (masl)
- Watercourse: Permanent
- Wetland
- Waterbody: Natural: Permanent
- Pit Area
- Lot & Concession
- Wooded Area

Credit:
CanVec Data - Natural Resources Canada (c) Her Majesty the Queen in Right of Canada

N

0 190 380 570 760 950

Metres

1:12,500
March 2013
Project Number: 300032929

Projection: UTM Zone 17
Datum: NAD83

Prepared by: C. Dickie

Verified by: S. Charity

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032929 HG WELL PLAN.mxd

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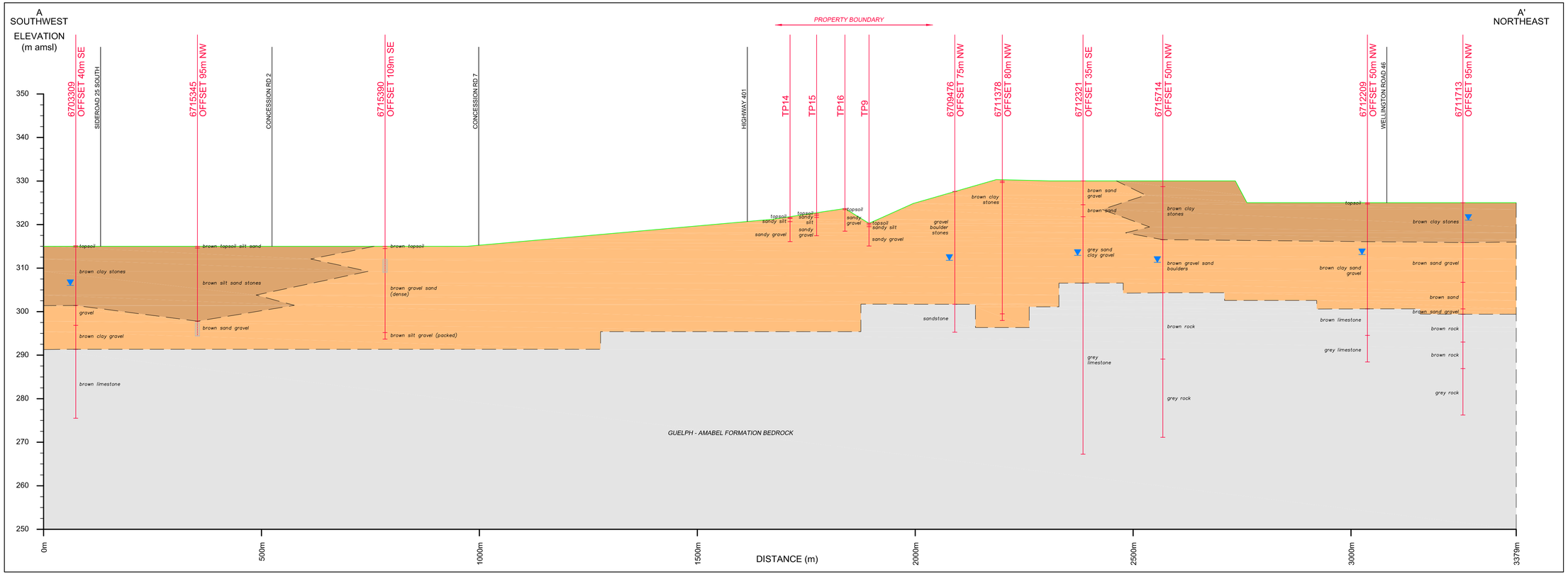

FIGURE 6

BSR&D LTD.
PUSLINCH INDUSTRIAL DEVELOPMENT
HYDROGEOLOGICAL EVALUATION
INTERPRETED CROSS SECTION A-A'

LEGEND

- 5893 — WELL LOCATION & NUMBER
- EXISTING GROUND PROFILE
- silty sand — GEOLOGICAL STRATIGRAPHY
- STATIC WATER LEVEL *(At time of Drilling)*
- WELL SCREEN
- DOMINANTLY FINE-GRAINED MATERIALS
- DOMINANTLY COARSE-GRAINED MATERIALS

Horizontal Scale: 1:5000
Vertical Scale: 1:500
Vertical Exageration: 10X
March 2013
Project Number: 300032929

Prepared by: C. Dickie
Verified by: S. Charity

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032929 HG XSA.DWG
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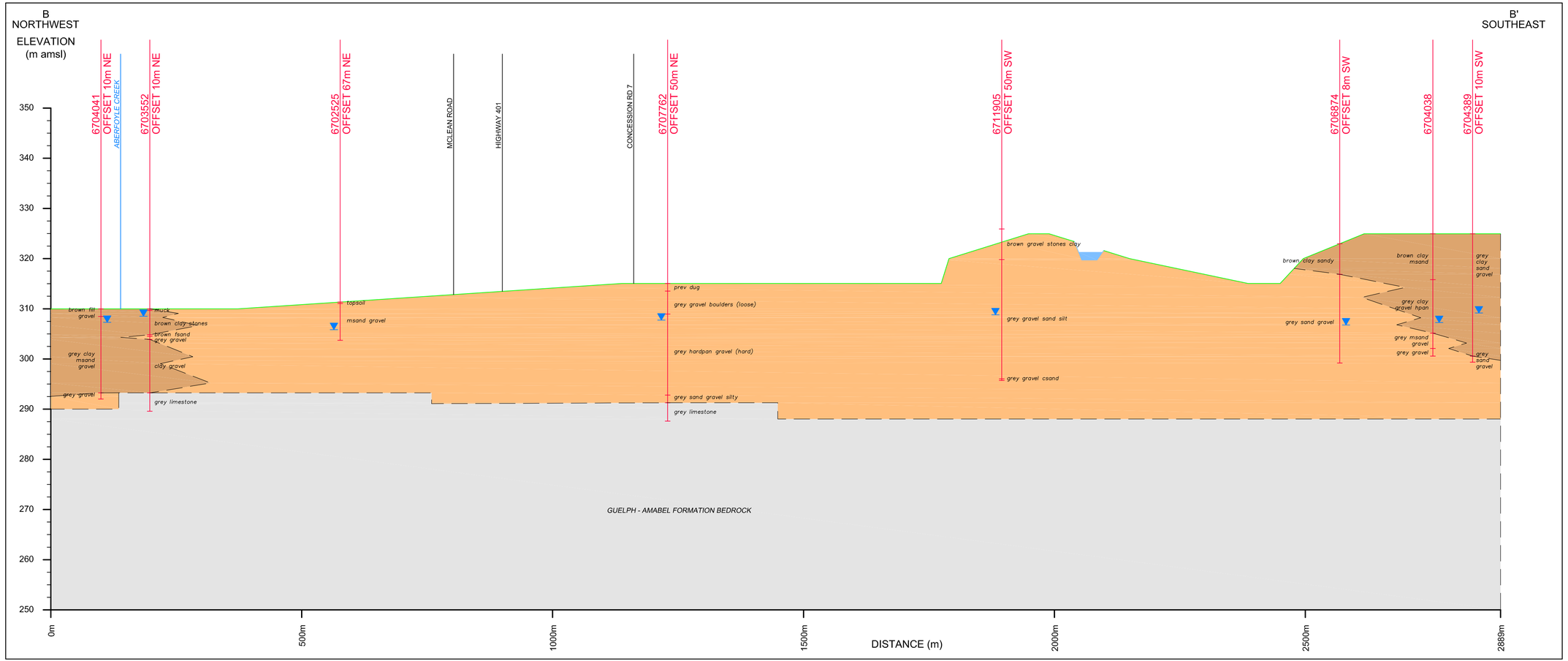

FIGURE 7

BSR&D LTD.

PUSLINCH INDUSTRIAL DEVELOPMENT

HYDROGEOLOGICAL EVALUATION

INTERPRETED CROSS SECTION B-B'

LEGEND

5803 — WELL LOCATION & NUMBER

EXISTING GROUND PROFILE

silty sand — GEOLOGICAL STRATIGRAPHY

STATIC WATER LEVEL
(At time of Drilling)

WELL SCREEN

DOMINANTLY FINE-GRAINED MATERIALS

DOMINANTLY COARSE-GRAINED MATERIALS

Horizontal Scale: 1:5000
Vertical Scale: 1:500
Vertical Exageration: 10X
March 2013
Project Number: 300032929

Prepared by: C. Dickie

Verified by: S. Charity

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032929 HG XSB.DWG

LAYOUT: MODEL

PRINTED: March 28, 2013, 2:03 PM

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Appendix A

Test Pit Logs

MUNICIPALITY CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR:MN	WATER USE	SCREEN DEPTH FEET	SCREEN LENGTH FEET	OWNER DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CONTINUING... PUSLINCH TOWNSHIP																	
10	024	67-15337	573671 4816979		2005/04	2336	06	FR	0090	0050	0051	0015	1 :	DO			--- BRWN CLAY STNS 0018 BRWN SAND GRVL 0082 BRWN ROCK 0090
10	035	67-08694	576235~ 4813088		1985/10	4207	06	FR	0076	0018		0015	1 :0	DO			--- BRWN CLAY GRVL 0018 GREY GRVL 0062 GREY LMSN SHLE 0065 GREY LMSN 0076
10	036	67-08118	576530~ 4812798		1984/03	4208	06	FR	0080	0023	0082	0004	1 :0	DO			--- GREY CLAY STNY 0051 GREY LMSN 0082
10	038	67-09409	577012~ 4812311		1988/07	4207	06	FR	0195	0130	0197	0040	1 :0	DO			--- BRWN CLAY STNS 0030 GREY CLAY GRVL STNS 0088 BRWN LMSN 0100 GREY LMSN 0197
11	011	67-15284	571587 4819259		2005/02	2663	06	FR	0103	0098	0135	0007	1 :	DO			--- BRWN CLAY STNS 0061 BRWN LMSN FCRD 0063 BRWN LMSN 0103
11	015	67-15423	571306 4819562		2005/07	2663	06	FR	0200	0213	0220	0007	1 :0	DO			--- BRWN CLAY 0060 BRWN LMSN 0066 BRWN LMSN 0120 GREY LMSN 0200
11	027	67-15370	574723 4815955		2005/06	2663	06	FR	0123	0066	0072		1 :0	DO			--- BLCK LOAM 0002 BRWN CLAY STNS 0060 GREY LMSN 0065 GREY LMSN 0123
11	034	28-10381	576580 4814209		2005/10	2663	06	FR	0100	0089	0118	0020	1 :	DO			--- BRWN CLAY 0033 GREY LMSN 0075 LMSN 0100
CON 048		67-14293	571843 4811398		2002/11	2663	06	FR	0095	0064	0078	0018	1 :0	DO			--- BRWN CLAY STNS 0088 CGVL 0095
CON 01	030	67-06875	570520 4808600	1080	1978/06	4208	06	FR	0145	0085	0225	0001	2 :0	DO			--- GREY CLAY STNS 0035 GREY CLAY SNDY 0135 GREY LMSN 0225
CON 01	030	67-12976	570368~ 4808754		1999/05	2663	06	FR	0143	0101	0120	0020	1 :	DO			--- LOAM 0001 BRWN CLAY STNS SAND 0015 BRWN CLAY SAND GRVL 0030 SAND GRVL 0125 BRWN CLAY SAND GRVL 0135 CGVL 0143
CON 01	030	67-12977	570368~ 4808754		1999/05	2663							:	NU			---
CON 04	021	67-09268	570740 4816060	1082	1988/04	4207	06	FR	0045	0003	0040	0100	1 :	DO			--- GREY GRVL STNS 0025 GREY CLAY 0040 GREY GRVL 0045
CON 06		67-14887	571075 4812140		2004/05	7238	02	UK	0007				:	NU	0003	10	--- BRWN SILT SAND GRVL 0005 SAND GRVL 0010 BRWN SILT TILL GRVL 0013
CON 07	014	67-09781	570732 4810515	1082	1989/05	2336	06	FR	0145	0074	0093	0007	:30	DO			--- BRWN CLAY SAND STNS 0015 BRWN CLAY SAND GRVL 0115 BRWN ROCK 0120 BRWN ROCK 0145
CON 07	015	67-11545	570809 4810545	1082	1994/09	2336	06	FR	0120	0060	0085	0015	1 :	DO			--- BRWN CLAY STNS 0018 BRWN SAND GRVL 0065 GREY CLAY GRVL 0090 BRWN SAND GRVL 0103 BRWN ROCK 0121
CON 07	020	67-11125	570894 4810466	1076	1993/03	2336	06	FR	0139	0065		0010	1 :	DO			--- BRWN CLAY STNS 0020 BRWN SAND 0060 BRWN SAND GRVL 0109 BRWN ROCK 0140
CON 07	022	67-11417	570874 4810372	1082	1994/05	2336	06	FR	0140	0065	0086	0020	1 :0	DO			--- BRWN CLAY STNS 0020 BRWN CLAY GRVL 0038 BRWN SAND GRVL 0090 GREY CLAY GRVL 0105 BRWN ROCK 0115 BRWN ROCK 0140
CON 07	024	67-09784	570950 4810412	1082	1989/05	2336	06	FR	0173	0067	0073	0027	30:	DO			--- BRWN CLAY STNS 0035 BRWN SAND GRVL CLAY 0065 BRWN CLAY SAND GRVL 0095 BRWN SAND CGVL 0110 BRWN ROCK 0125 BRWN ROCK 0155 GREY ROCK LYRD 0165 GREY ROCK 0174

MUNICIPALITY CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR:MN	WATER USE	SCREEN DEPTH FEET	SCREEN LENGTH FEET	OWNER DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CONTINUING... PUSLINCH TOWNSHIP																	
CON	07	027	67-09102	570442 4811681	1082	1987/06	4207	06	FR	0108	0042	0112	0100	1 :0	IN		--- BRWN CLAY STNS GRVL 0015 GREY SAND GRVL 0062 GREY GRVL STNS CLAY 0084 BRWN LMSN 0112
CON	07	027	67-02531	570415 4811620	1070	1961/05	2414	05	FR	0091	0049	0060	0010	1 :30	CO		--- FILL 0002 LOAM 0003 STNS CLAY 0010 CLAY BLDR 0038 HPAN STNS 0070 FSND 0074 GRVL 0088 BRWN LMSN 0115
CON	07	027	67-02530	570390 4811652	1065	1960/10	4208	06	FR	0095	0021	0025	0010	1 :0	PS		--- CLAY STNS 0015 GRVL 0075 MSND GRVL 0095 GRVL 0100
CON	07	030	67-04817	571330 4810701	1040	1973/10	4005	06	FR	0079	0022	0040	0030	3 :0	DO		--- BRWN CLAY SAND STNS 0030 BRWN SAND CLAY GRVL 0070 BRWN SAND 0079
CON	07	030	67-11484	570536~ 4810152		1994/03	2663	06	FR	0100	FLW	0024	0030	1 :0	DO		--- LOAM 0001 GRVL STNS 0020 GRVL SAND 0040 GRVL SAND 0051 BRWN LMSN 0059 BRWN LMSN 0100
CON	07	030	67-10719	570914 4810698	1062	1991/06	2803	06	FR	0106	0045	0061	0025	2 :0	DO		--- BRWN SAND STNS 0040 BLUE CLAY 0080 GRVL 0105 GREY LMSN 0106
CON	07	030	67-11487	570536~ 4810152		1994/03	2663	06	FR	0100	FLW	0024	0030	1 :0	DO		--- LOAM 0001 GRVL STNS 0020 GRVL SAND 0040 GRVL SAND PEAT 0046 BRWN LMSN FCRD 0050 BRWN LMSN 0100
CON	07	030	67-10596	571078 4810765	1066	1990/12	2803	06	FR	0108	0050	0050	0030	3 :0	DO		--- BRWN SAND STNS 0040 BLUE CLAY 0091 GRVL 0099 GREY LMSN 0114
CON	07	030	67-13014	570536~ 4810152		1999/05	2663	06	FR	0087	0073	0078	0015	1 :0	DO		--- BRWN CLAY STNS SAND 0015 BRWN CLAY SAND GRVL 0080 GRVL SAND 0082 CGVL 0087
CON	07	030	67-11569	571121 4810828	1082	1994/10	2663	06	FR	0122	0047	0080	0030	1 :0	DO		--- SAND GRVL 0038 BRWN CLAY HPAN 0110 BLDR STNS 0120 BRWN GRVL LMSN 0122
CON	07	030	67-12021	571006 4810361	1076	1996/06	6865	06	FR	0105	0055	0070	0010	2 :0	DO		--- BRWN CLAY SAND STNS 0010 GREY GRVL SAND CLAY 0093 BRWN LMSN 0111
CON	07	030	67-12204	571013 4810409	330	1997/03	2336	06	FR	0118	0059	0060	0015	1 :0	DO		--- BRWN CLAY STNS 0030 BRWN SAND GRVL 0090 GREY CLAY GRVL 0102 BRWN ROCK 0120
CON	07	030	67-12203	570994 4810439	330	1997/03	2336	06	FR	0118	0060	0070	0015	1 :0	DO		--- BRWN CLAY STNS 0025 GREY CLAY STNS 0040 BRWN GRVL SAND 0085 GREY CLAY STNS GRVL 0102 BRWN ROCK 0120
CON	07	030	67-05510	570961 4810361	1070	1975/04	5469	05	FR	0090	0018	0020	0016	1 :30	DO		--- BRWN CLAY GRVL BLDR 0024 BRWN CLAY GRVL 0084 BRWN ROCK 0100
CON	07	030	67-14291	570439 4809834		2002/11	2663	06	FR	0165	0098	0099	0016	1 :0	DO		--- LOAM 0002 BRWN CLAY STNS 0095 GRVL CLAY 0120 BRWN CLAY GRVL SOFT 0142 BRWN LMSN SOFT FCRD 0145 BRWN LMSN 0165
CON	07	030	67-02532	571165 4810664	1040	1965/09	4208	06	FR	0084	0024	0030	0030	0 :30	DO		--- PRDG 0004 CLAY GRVL 0060 CLAY SILT MSND 0083 LMSN 0085
CON	07	030	67-02533	570669 4810017	1085	1966/07	4208	06	FR	0116	0070	0080	0020	1 :0	DO		--- CLAY MSND 0035 MSND GRVL CLAY 0110 LMSN 0119
CON	07	030	67-10770	570965 4810753	1062	1991/10	2336	06	FR	0112	0040	0065	0015	1 :0	DO		--- BRWN CLAY STNS GRVL 0038 GREY CLAY STNS 0080 BRWN SAND GRVL 0110 BRWN ROCK FCRD 0112

MUNICIPALITY CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR:MN	WATER USE	SCREEN DEPTH FEET	SCREEN LENGTH FEET	OWNER DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CONTINUING... PUSLINCH TOWNSHIP																	
CON	08	023	67-02651	570731 4814226	1110	1956/06	2414	04	FR	0100	0040	0042	0007	4 :0	DO		--- GRVL CLAY BLDR 0042 MSND GRVL 0094 CLAY MSND 0097 BRWN LMSN 0118
CON	08	023	67-08373	570408 4814028	1082	1985/10	2564	05	FR	0190	0030	0150	0012	2 :	DO		--- CLAY STNS 0025 GRVL 0060 SILT 0088 LMSN 0190
CON	08	023	67-04730	570679 4814288	1110	1973/07	2406	05	FR	0071	0048	0060	0010	1 :0	DO		--- PRDG 0005 BRWN CLAY STNS 0035 BRWN CLAY GRVL 0070 GRVL 0072
CON	08	023	67-03501	570680 4814160	1100	1969/08	4208	06	FR	0043	0029	0032	0015	1 :0	DO		--- PRDG 0004 GREY CLAY GRVL 0014 GREY CLAY 0036 GREY CLAY GRVL STNS 0040 GRVL 0043
CON	08	023	67-09413	570381 4813709	1059	1988/10	5469	05	FR	0116	0054	0054	0008	:45	DO		--- BRWN CLAY SAND LOOS 0006 GRVL LOOS 0109 LMSN 0120
CON	08	023	67-03154	570710 4814210	1108	1968/11	2406	04	FR	0128	0035	0045	0010	:	DO		--- LOAM 0001 BRWN CLAY STNS 0038 BRWN CLAY GRVL 0090 BRWN LMSN 0134
CON	08	023	67-03907	570540 4814250	1058	1971/04	2406	05	FR	0152	0027	0029	0020	1 :30	DO		--- BRWN BLDR CLAY GRVL 0018 BRWN MSND SILT 0025 BRWN GRVL CLAY 0065 GREY GRVL CLAY 0085 GREY MSND GRVL 0099 GREY GRVL 0100 BRWN ROCK 0152 GREY ROCK 0155
CON	08	025	67-09238	571271 4813837	1059	1988/04	2336	06	FR	0089	0014	0055	0020	1 :	DO		--- BRWN GRVL CLAY SAND 0030 BRWN CSND GRVL 0075 BRWN CLAY SAND GRVL 0085 BRWN ROCK 0089
CON	08	026	67-07517	571480 4813420	1060	1981/10	2336	05	FR	0077	0012	0030	0015	1 :0	DO		--- BRWN CLAY GRVL STNS 0032 GREY CLAY GRVL STNS 0070 GREY STNS 0075 BRWN STNS 0078
CON	08	027	67-14339	571005 4810508		2002/11	2663	06	FR	0103	0068	0073	0015	1 :	DO		--- BRWN CLAY STNS 0102 GRVL 0103
CON	08	027	67-02658	570425 4811720	1070	1960/06	2414	04	FR	0084	0046	0051	0015	1 :0	CO		--- BRWN CLAY STNS 0020 BRWN HPAN GRVL 0052 CSND GRVL 0069 BRWN LMSN 0095
CON	08	027	67-08923	570538 4811968	1072	1987/08	2336	06	FR	0193	0070	0095	0025	1 :0	DO		--- BRWN CLAY SAND GRVL 0012 BRWN CLAY SAND GRVL 0037 GREY CLAY SAND 0055 GREY CLAY SAND GRVL 0083 GREY ROCK 0102 BRWN ROCK 0124 BRWN ROCK 0138 GREY ROCK 0145 BRWN ROCK 0160 GREY ROCK 0187 GREY ROCK 0193
CON	08	027	67-07298	570700 4811840	1060	1980/07	2336	05	FR	0146	0037	0065	0008	1 :0	CO		--- BRWN CLAY STNS GRVL 0030 BRWN CLAY GRVL 0080 BRWN STNS LTCL 0118 GREY STNS 0132 BRWN STNS DKCL 0146
CON	08	027	67-10387	571023 4812773	1049	1990/06	2336	06	FR	0160	0100	0125	0010	1 :	DO		--- BRWN CLAY SAND STNS 0020 BRWN CLAY GRVL 0097 BRWN ROCK 0120 BRWN ROCK 0161
CON	08	027	67-02659	571596 4813195	1056	1967/07	4208	06	FR	0060	0006	0025	0025	1 :0	DO		--- CLAY MSND STNS 0015 GREY CLAY MSND GRVL 0055 LMSN 0064
CON	08	027	67-07576	570420 4811760	1070	1981/11	4868	06	FR	0068	0018		0018	1 :0	IN		--- BRWN SAND STNS BLDR 0062 BRWN GRVL SAND PCKD 0080
CON	08	027	67-12227	570982 4812348	337	1997/03	2336	06	FR	0260	0065	0092	0013	1 :0	IN CO		--- PRDR 0183 GREY ROCK 0280
CON	08	027	67-09101	570852 4812118	1108	1987/05	4207	06	FR	0139	0068	0140	0010	1 :0	CO		--- BRWN CLAY STNS 0080 GREY GRVL CLAY 0117 WHIT LMSN 0142

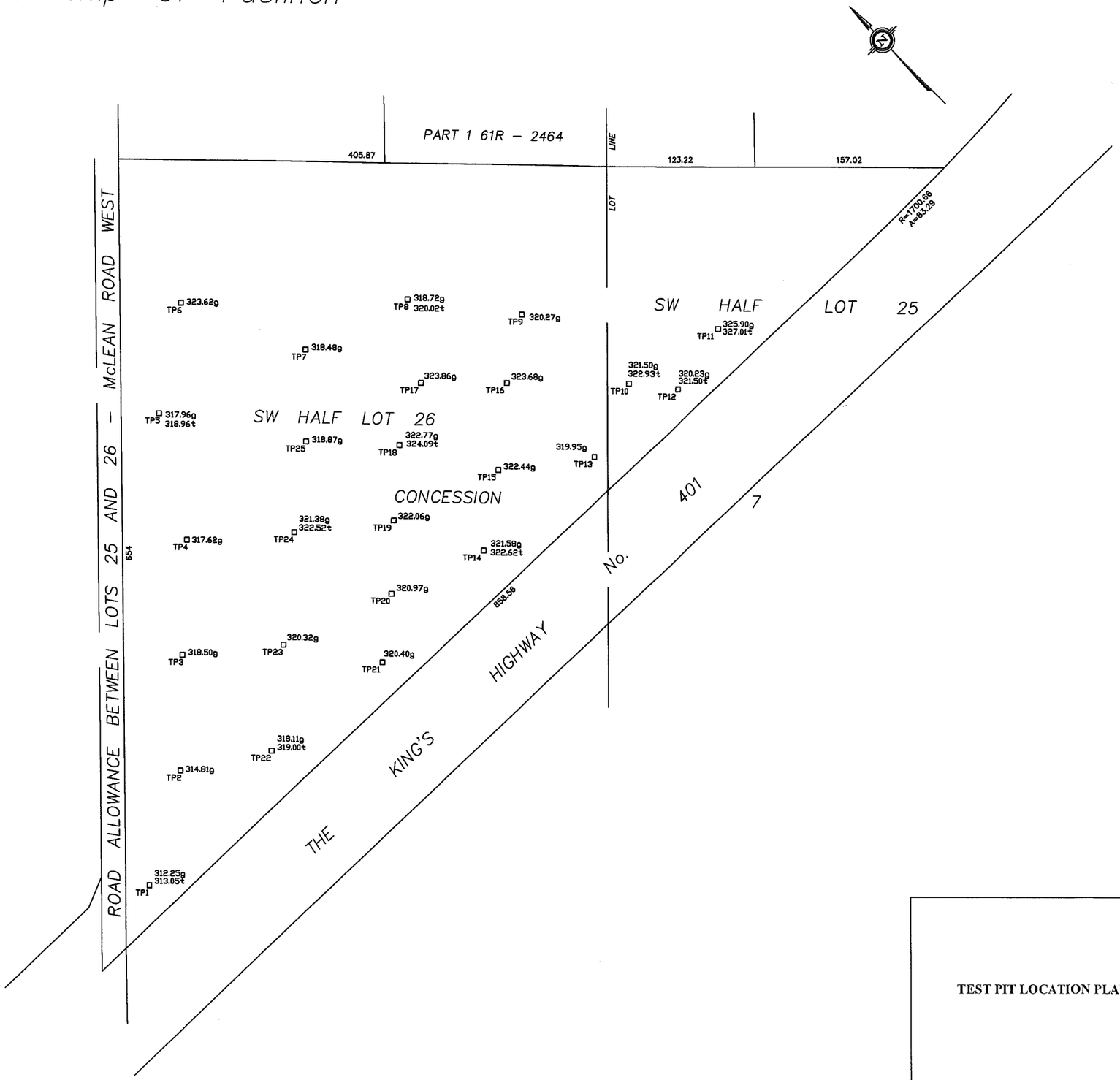
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

MOE Water Well Records

Township of Puslinch



TEST PIT LOCATION PLAN	CHUNG & VANDER DOELEN ENGINEERING LTD.	**CHUNG & VANDER DOELEN ENGINEERING LTD.** 311 Victoria St. North Kitchener,ON,N2H 5E1 Phone:(519) 742-8979 Fax:(519) 742-7739 E-mail:cvd@bellnet.ca	
	Drawn By: IS	**Date:** Feb 20, 2007	**File No.:** 06-11-K10
	Checked By: RVD	**Scale:** NTS	**DRAWING NO.:** 1

FILE No: 06-11-K10

TEST PIT No. 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **312.25 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
	525mm TOPSOIL										
311.72		0.5								0.5	Slotted standpipe installed to 2.9 m depth
0.53	Loose orangy brown SANDY SILT										
311.52											
0.73	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0		1	BS					2.0	
		2.5								2.5	
		3.0								3.0	Standpipe dry on February 1 and 20, 2007
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
		5.0								5.0	
307.05											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

FILE No: 06-11-K10

TEST PIT No. 2

Enclosure No.: 2
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **314.81 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
314.38	425mm TOPSOIL										
0.43	Loose orangy brown SILT, some sand trace clay	0.5		1	BS					0.5	
313.91	damp										
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5		2	BS					3.5	
		4.0								4.0	
	damp	4.5								4.5	
309.81											
5.00	End of Test Pit	5.0								5.0	Test Pit dry at completion
		5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
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Kitchener, Ontario N2H 5E1
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CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

FILE No: 06-11-K10

TEST PIT No. 3

Enclosure No.: 3
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.50 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.20	300mm TOPSOIL										
0.30	Loose orangy brown SANDY SILT	0.5		1	BS					0.5	
317.75	damp										
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
313.30											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
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FILE No: 06-11-K10

TEST PIT No. 4

Enclosure No.: 4
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **317.62 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	WELL DATA	DEPTH (m)	REMARKS
317.34	275mm TOPSOIL							
0.28	Loose orangy brown SANDY SILT damp	0.5					0.5	
316.72								
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0					1.0	
		1.5					1.5	
		2.0					2.0	
			1	BS				
		2.5					2.5	
		3.0					3.0	
		3.5					3.5	
		4.0					4.0	
	damp	4.5					4.5	
		5.0					5.0	
312.42								Test Pit dry at completion
5.20	End of Test Pit	5.5					5.5	
		6.0					6.0	

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

ENGINEER: **RVD**

CHUNG & VANDER DOELEN
ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
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CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

FILE No: 06-11-K10

TEST PIT No. 5

Enclosure No.: 5
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **317.96 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
317.86	100mm TOPSOIL										
0.10	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	0.5								0.5	Slotted standpipe installed to 2.9 m depth
		1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	Standpipe dry on February 1 and 20, 2007
		3.5								3.5	
	damp	4.0								4.0	
		4.5								4.5	
312.96		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/20/07

FILE No: 06-11-K10

TEST PIT No. 6

Enclosure No.: 6
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.62 m**										
323.39	225mm TOPSOIL										
0.23	Loose orangy brown SANDY SILT some gravel	0.5								0.5	
322.87	damp										
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
		5.5								5.5	
317.82											
5.80	End of Test Pit	6.0								6.0	Test Pit dry at completion

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 7

Enclosure No.: 7
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.48 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.20	275mm TOPSOIL										
0.28	Loose to compact brown SANDY SILT some clay damp	0.5		1	BS					0.5	
317.43		1.0								1.0	
1.05	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 1.65 m depth	1.5		2	BS					1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
		5.0								5.0	
313.28											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 8

Enclosure No.: 8
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.72 m**										
318.39	325mm TOPSOIL										
0.33	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 1.8 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1 2	BS BS					0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	Slotted standpipe installed to 2.85 m depth Standpipe dry on February 1 and 20, 2007
	damp										
313.72		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0								5.5 6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 9

Enclosure No.: 9
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **320.27 m**						
319.94	325mm TOPSOIL						
0.33	Loose brown SANDY SILT trace gravel damp	0.5		1	BS		
319.52							
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 2.7 m depth	1.0					
		1.5					
		2.0		2	BS		
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
	damp	5.0					Test Pit dry at completion
315.07							
5.20	End of Test Pit	5.5					
		6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 10

Enclosure No.: 10
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **321.50 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE
321.22	275mm TOPSOIL					
0.28	Compact brown SAND AND SILT some gravel and cobbles	0.5		1	BS	
		1.0				
		1.5				
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
	damp to moist	4.5				
316.50		5.0				
5.00	End of Test Pit	5.5				
		6.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	Slotted standpipe installed to 2.7 m depth
2.5	Standpipe dry on February 1 and 20, 2007
5.0	Test Pit dry at completion

ENGINEER: **RVD**

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TEST PIT No. 11

Enclosure No.: 11
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **325.90 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
325.62	275mm TOPSOIL					
0.28	Compact brown SILTY SAND frequent gravel, cobbles and boulders damp	0.5 1.0 1.5	1	BS		Slotted standpipe installed to 2.8 m depth
324.00 1.90	Compact to dense brown GRAVELLY SAND some silt frequent cobbles and boulders damp	2.0 2.5 3.0 3.5 4.0 4.5	2	BS		Standpipe dry on February 1 and 20, 2007
320.90 5.00	End of Test Pit	5.0 5.5 6.0				Test Pit dry at completion

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 12

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **320.23 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
319.78	450mm TOPSOIL										Slotted standpipe installed to 2.75 m depth
0.45	Compact brown SILTY SAND some gravel and cobbles occ. boulders	0.5								0.5	Water level at 0.66 m depth on February 1, 2007
		1.0		1	BS					1.0	Water level at 0.89 m depth on February 20, 2007
	grades to SAND AND SILT with depth	1.5								1.5	Seepage at 1.0 m depth on January 25, 2007
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	very moist to wet	3.5								3.5	
		4.0								4.0	
315.93 4.30	End of Test Pit	4.5								4.5	
		5.0								5.0	
		5.5								5.5	
		6.0								6.0	

SHEAR STRENGTH (kPa): FIELD VANE: Peak ⊗ Rem. × ; LAB TEST: Unc. ■ P.P. □ ; 50 100 150 200
PENETRATION RESISTANCE: STANDARD ● DYN. CONE ○ ; 20 40 60 80
WATER CONTENT (%): W_P W W_L ; 10 20 30

ENGINEER: **RVD**

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TEST PIT No. 13

Enclosure No.: 13
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CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD)

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **319.95 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
319.65	300mm TOPSOIL						
0.30	Loose to compact brown SILTY SAND trace gravel	0.5					
319.05	damp						
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 3 m depth	1.0					
		1.5		1	BS		
		2.0					
		2.5		2	BS		
		3.0					
		3.5					
		4.0					
	damp	4.5					
314.95							
5.00	End of Test Pit	5.0					Test Pit dry at completion
		5.5					
		6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 14

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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **321.58 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
321.43	150mm TOPSOIL										
0.15	Loose to compact brown SANDY SILT trace gravel	0.5		1	BS					0.5	Slotted standpipe installed to 2.7 m depth
320.68	damp										
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	Standpipe dry on February 1 and 20, 2007
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
316.08		5.5								5.5	Test Pit dry at completion
5.50	End of Test Pit	6.0								6.0	

ENGINEER: **RVD**

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CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/20/07

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TEST PIT No. 15

Enclosure No.: 15
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CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD)

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **322.44 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
322.06	375mm TOPSOIL				
0.38	Loose orangy brown SANDY SILT trace gravel and cobbles	0.5			
321.64	damp				
0.80	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0			
		1.5			
		2.0			
		2.5			
		3.0	1	BS	
		3.5			
		4.0			
	damp	4.5			
317.44					
5.00	End of Test Pit	5.0			
		5.5			
		6.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Test Pit dry at completion

ENGINEER: **RVD**

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TEST PIT No. 16

Enclosure No.: 16
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.68 m**										
323.43	250mm TOPSOIL										
0.25	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.9 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5								0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	
	damp	5.0								5.0	
318.48											Test Pit dry at completion
5.20	End of Test Pit	5.5 6.0								5.5 6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 17

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.86 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 / STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
323.56	300mm TOPSOIL										
0.30	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.7 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1	BS					0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	
	damp										
318.86		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0								5.5 6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 18

Enclosure No.: 18
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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **322.77 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200; PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
322.59	175mm TOPSOIL										
0.18	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth	0.5								0.5	Slotted standpipe installed to 2.75 m depth
		1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
											Standpipe dry on February 1 and 20, 2007
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
317.77		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit										
		5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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TEST PIT No. 19

Enclosure No.: 19
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CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **322.06 m**						
321.88	175mm TOPSOIL						
0.18	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth --- sand seam --- damp	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1	BS		
317.06		5.0					Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 20

Enclosure No.: 20
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **320.97 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
320.74	225mm TOPSOIL										
0.23	Loose to compact orangy brown SILT, some sand trace gravel and cobbles	0.5		1	BS					0.5	
319.92	moist	1.0								1.0	
1.05	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
	damp	4.0								4.0	
		4.5								4.5	
315.97		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

FILE No: 06-11-K10

TEST PIT No. 21

Enclosure No.: 21
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **320.40 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
320.12	275mm TOPSOIL				
0.28	Loose orangy brown SANDY SILT	0.5	1	BS	
319.65	damp				
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0 1.5 2.0	2	BS	
		2.5			
		3.0	3	BS	
		3.5 4.0 4.5			
	damp	5.0			
315.20					
5.20	End of Test Pit	5.5 6.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Test Pit dry at completion

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
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CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

FILE No: 06-11-K10

TEST PIT No. 22

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **318.11 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE
317.73 / 0.38	375mm TOPSOIL					
317.51 / 0.60	Loose orangy brown SANDY SILT	0.5				
	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0				
		1.5		1	BS	
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
	damp	4.5				
313.11 / 5.00	End of Test Pit	5.0				
		5.5				
		6.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	Slotted standpipe installed to 2.9 m depth
3.0	Standpipe dry on February 1 and 20, 2007
5.0	Test Pit dry at completion

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

FILE No: 06-11-K10

TEST PIT No. 23

Enclosure No.: 23
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **320.32 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
320.04	275mm TOPSOIL										
0.28	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth	0.5								0.5	
		1.0		1	BS					1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	damp	3.5								3.5	
		4.0								4.0	Major collapse of Test Pit sidewalls at 4.3 m depth
316.02											
4.30	End of Test Pit	4.5								4.5	Test Pit dry at completion
		5.0								5.0	
		5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

FILE No: 06-11-K10

TEST PIT No. 24

Enclosure No.: 24
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **321.38 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
321.10	275mm TOPSOIL										
0.28	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.8 m depth	0.5 1.0 1.5 2.0		1	BS					0.5 1.0 1.5 2.0	Slotted standpipe installed to 2.75 m depth
		2.5 3.0 3.5 4.0								2.5 3.0 3.5 4.0	Standpipe dry on February 1 and 20, 2007
	damp	4.5								4.5	
316.38 5.00	End of Test Pit	5.0 5.5 6.0								5.0 5.5 6.0	Test Pit dry at completion

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739

FILE No: 06-11-K10

TEST PIT No. 25

Enclosure No.: 25
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.87 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.62	250mm TOPSOIL										
0.25	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.9 m depth	0.5 1.0 1.5		1	BS					0.5 1.0 1.5	
		2.0 2.5 3.0 3.5 4.0								2.0 2.5 3.0 3.5 4.0	
	damp	4.5								4.5	
313.87											
5.00	End of Test Pit	5.0 5.5 6.0								5.0 5.5 6.0	Test Pit dry at completion

ENGINEER: **RVD**

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
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BURNSIDE

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Appendix C

Calculation Worksheets

Puslinch Development
MOE Mass Balance Equation
Nitrate Loading Calculations
Lot 1 Carrying Capacity

Qt Ct = Qe Ce + Qi Ci

Where:

				INPUT Parameters		
				Daily Sewage Per Employee	75	
				Number of Employees	130	
Qe	3559	**m^3/year**	Sewage Effluent Volume	Daily Design Flow Rate (L/day)	9750	
Qi	25750	**m^3/year**	Infiltration Volume = (recharge * study area)	Study Area (m2)	103000	10.3 ha
Qt	29308.75	**m^3/year**	Total Volume	Recharge (mm/year)	250	
Ce	40000	**mg/m^3**	Concentration of sewage effluent	Concentration of sewage effluent (mg/L)	40	mg/L
Ci	100	**mg/m^3**	Concentration of precipitation	Concentration of precipitation (mg/L)	0.1	mg/L

Ct = (QeCe+QiCi)/Qt

Asssume flow must be <10,000 L per day

QeCe	142350000	**mg/year**
QiCi	2575000	**mg/year**

Ct =	4945	**mg/m^3**	Concentration of nitrate after dilution
	4.94	**mg/L**	

Therefore the carrying capacity of the land, assuming dry industrial uses, is 130 employees.

Puslinch Development
MOE Mass Balance Equation
Nitrate Loading Calculations
Lot 2 Carrying Capacity

Qt Ct = Qe Ce + Qi Ci

Where:

				INPUT Parameters			
				Daily Sewage Per Employee	75		
				Number of Employees	130		
Qe	3559	**m^3/year**	Sewage Effluent Volume	Daily Design Flow Rate (L/day)	9750		
Qi	13500	**m^3/year**	Infiltration Volume = (recharge * study area)	Study Area (m2)	54000		5.4 ha
Qt	17058.75	**m^3/year**	Total Volume	Recharge (mm/year)	250		
Ce	40000	**mg/m^3**	Concentration of sewage effluent	Concentration of sewage effluent (mg/L)	40	mg/L	
Ci	100	**mg/m^3**	Concentration of precipitation	Concentration of precipitation (mg/L)	0.1	mg/L	

Ct = (QeCe+QiCi)/Qt

QeCe	142350000	**mg/year**
QiCi	1350000	**mg/year**

Ct =	8424	**mg/m^3**	Concentration of nitrate after dilution
	8.42	**mg/L**	

Therefore the carrying capacity of the land, assuming dry industrial uses, is 130 employees.

Puslinch Development
MOE Mass Balance Equation
Nitrate Loading Calculations
Lot 3 Carrying Capacity

Qt Ct = Qe Ce + Qi Ci

Where:

				INPUT Parameters			
				Daily Sewage Per Employee	75		
				Number of Employees	60		
Qe	1643	**m^3/year**	Sewage Effluent Volume	Daily Design Flow Rate (L/day)	4500		
Qi	5000	**m^3/year**	Infiltration Volume = (recharge * study area)	Study Area (m2)	20000		2 ha
Qt	6642.5	**m^3/year**	Total Volume	Recharge (mm/year)	250		
Ce	40000	**mg/m^3**	Concentration of sewage effluent	Concentration of sewage effluent (mg/L)	40	mg/L	
Ci	100	**mg/m^3**	Concentration of precipitation	Concentration of precipitation (mg/L)	0.1	mg/L	

Ct = (QeCe+QiCi)/Qt

QeCe	65700000	**mg/year**
QiCi	500000	**mg/year**

Ct =	9966	**mg/m^3**	Concentration of nitrate after dilution
	9.97	**mg/L**	

Therefore the carrying capacity of the land, assuming dry industrial uses, is 60 employees.

BURNSIDE

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Appendix D

Geotechnical Investigation

CHUNG & VANDER DOELEN ENGINEERING LTD.

Geotechnical Engineering, Construction Inspecting
& Testing, Environmental Services

311 Victoria Street North
Kitchener, Ontario, N2H 5E1
Telephone: 519-742-8979
Facsimile: 519-742-7739
E-Mail: cvd@bellnet.ca

SUBSURFACE INVESTIGATION REPORT
PROPOSED DEVELOPMENT
PART OF NORTHEAST HALF OF LOT 26, CONCESSION 7
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

Submitted to:

Lambda Properties
c/o Black, Shoemaker, Robinson & Donaldson Limited
351 Speedvale Avenue West
Guelph, Ontario
N1H 1C6

Attention: Mr. Bruce Donaldson, O.L.S.

Submitted by:

CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario
N2H 5E1

File No.: 06-11-K10
March 1, 2007

CHUNG & VANDER DOELEN ENGINEERING LTD.

Geotechnical Engineering, Construction Inspecting
& Testing, Environmental Services

311 Victoria Street North
Kitchener, Ontario, N2H 5E1
Telephone: 519-742-8979
Facsimile: 519-742-7739
E-Mail: cvd@bellnet.ca

March 1, 2007
File No.: 06-11-K10

Lambda Properties
c/o Black, Shoemaker, Robinson & Donaldson Limited
351 Speedvale Avenue West
Guelph, Ontario
N1H 1C6

Attention: Mr. Bruce Donaldson, O.L.S.

Re: SUBSURFACE INVESTIGATION REPORT
PROPOSED DEVELOPMENT
PART OF NORTHEAST HALF OF LOT 26, CONCESSION 7
TOWNSHIP OF PUSLINCH, COUNTY OF WELLINGTON

We take pleasure in enclosing four (4) copies of our Subsurface Investigation Report carried out at the above-mentioned location and we will be glad to discuss any questions arising from this work.

Soil samples will be retained for a period of three (3) months and will thereafter be disposed of unless we are otherwise instructed.

We thank you for giving us this opportunity to be of service to you.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Robert Vander Doelen, P.Eng.
Senior Engineer

TABLE OF CONTENTS

LIST OF ENCLOSURES

1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by Lambda Properties to conduct a subsurface investigation on a ± 50 acre parcel of land. It is understood that the parcel is located within a Special Policy Area which not only recognizes that there could be a mineral aggregate resource, but also that the after use would need to be rural industrial to provide employment opportunities to the community. A rural industrial subdivision would be privately serviced with onsite wells and wastewater treatment systems.

The purpose of this initial geotechnical investigation was to determine and present the subsurface conditions at the site and, based on these findings, to

- discuss the potential to develop the site as a commercial gravel pit

and

- discuss the development of the property as a rural industrial subdivision, either as an after use or as the primary use, depending on the results of the investigation.

2.0 FIELD WORK

In order to investigate the subsurface conditions at the site, twenty-five (25) test pits were excavated, inspected and sampled at the site. The locations of the test pits and their associated ground surface elevations are illustrated on the enclosed drawing labeled "Sketch Prepared For Severance Application" which was prepared by Black, Shoemaker, Robinson and Donaldson Limited (revised date February 15, 2007).

The twenty-five test pits were excavated to depths between 4.3 and 5.8 m below existing grades by a track-mounted excavator. The test pits were excavated, inspected and sampled during on January 25 and 26, 2007. Ten (10) standpipes were installed to less than 3 m depth at ten of the test pit locations in order to measure potential water levels at these locations.

The field work for this project was performed under the full-time supervision of the field engineer who logged the subsurface conditions in the field, effected the subsurface sampling and monitored the groundwater conditions. Post-excavation water levels were consequently measured on February 1 and 20, 2007.

3.0 LABORATORY TESTING

The soil samples secured in the field were delivered to our laboratory following completion of the field work program. Nine of the twenty-nine representative samples were selected and submitted to our laboratory for grain size distribution analysis testing. The results are plotted in the appended enclosures of this report.

The graphical illustrations of the grain size distribution analyses have been presented in two formats:

a) no specific gradational requirements (Enclosures 26 to 28);

b) plotted against OPSS Granular B Type I specifications (Enclosures 29 to 34).

4.0 EXISTING SITE CONDITIONS

The site currently exists as a mixture of cultivated crop land, grassed area and natural bush land. This triangular-shaped site is bounded by Highway 401 to the south, McLean Road to the northwest and an industrial subdivision to the northeast.

The site topography undulates randomly across the site. The site is topographically high in the southeast area of the site (near Test Pit 11) and is lowest within the southwest area of the site (near Test Pit 1). Test Pits 5, 7, 8, 9 and 25 lie within a low-lying, channel-shaped area.

5.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered in the boreholes and test pits are detailed on the Test Pit Log Sheets, Enclosures 1 to 25, inclusive. The following notes are intended to summarize and comment on the subsurface data obtained at the test pit locations.

5.1 Topsoil

Topsoil measuring between 100 and 525 mm thick was generally encountered at the ground surface of the test pits.

5.2 Silt, Sandy Silt, Sand and Silt, Silty Sand (Enclosures 25 to 27)

The topsoil at thirteen of the twenty-five test pits was underlain by relatively thin deposits of silt, sandy silt, sand and silt, and silty sand which extended to depths between 0.6 and 1.05 m below existing grades.

Locally at Test Pits 10, 11 and 12, these deposits were significantly thicker and extended to at least 4.3 to 5.0 m below existing grades. Test Pits 10, 11 and 12 were terminated within the finer grained deposits at depths between 4.3 and 5.0 m below existing grades.

Three grain size distribution analyses were conducted on representative samples of these soils and the results are graphically presented on Enclosures 25 to 27 of this report. There is no potential value of these deposits from an aggregate perspective.

5.3 Sandy Gravel (Enclosures 28 to 34)

The topsoil at Test Pits 5, 8, 16 to 19, and 23 to 25 and the finer grained soils at the other test pits (with exception to Test Pits 10, 11 and 12) were underlain by a relatively thick stratum of sandy gravel with frequent to numerous cobbles and boulders. Twenty-two of the twenty-five test pits were terminated within this coarse granular deposit at depths typically between 5.0 and 5.8 m below existing grades.

The granular deposit at Test Pits 7, 8, 18, 19 and 23 to 25 contained some silt which extended typically between 0.3 and 1.5 m into the upper portion of the deposit. Locally at Test Pits 9 and 13, the somewhat elevated silt content extended to respective depths of 2.7 and 3.0 m below existing grades.

Six grain size distribution analyses were conducted on samples of the sandy gravel deposit collected from Test Pits 2, 4, 13, 19, 21 and 24 and the results are graphically presented on Enclosures 29 to 34 along with the gradational requirements for OPSS Granular B Type 1.

5.4 Groundwater Conditions

Groundwater conditions were monitored during the excavation and at the completion of each test pit. Seepage was measured at a depth of 1.0 m below existing grade at Test Pit 12. The remaining twenty-four test pits remained dry at completion of their individual excavation.

Potential water levels were consequently measured from the ten standpipes installed to less than 3 m depth at Test Pits 1, 5, 8, 10, 11, 12, 14, 18, 22 and 24. The water level at Test Pit 12 was measured at 0.66 and 0.89 m below the ground surface, respectively, on February 1 and 20, 2007. The other nine standpipes remained completely dry during these two measuring events.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 General

This initial investigation has determined that a significant coarse granular deposit of sandy gravel with frequent to numerous cobbles and boulders exists at twenty-two of the twenty-five excavated test pit locations across the ± 50 acre site. Finer grained overburden deposits of topsoil, silt, sandy silt, silt and sand and silty sand overly the coarse granular deposit and typically extend to depths between 0.1 and 1.05 m below the existing ground surface.

6.2 Potential Aggregate Products

The sandy gravel deposit encountered at the site has potential for extraction and potential processing into a number of aggregate products including but not limited to:

- OPSS Granular B Type I, Type II, Type III
- OPSS Granular A
- CSA Concrete Coarse Aggregate
- Asphalt Coarse Aggregate
- MOE/OBC Filter Sand
- MTO Winter Sand

The six (6) samples of sandy gravel submitted to our laboratory for grain size distribution analysis testing have been plotted against OPSS Granular B Type I specifications and the results are presented on Enclosures 29 to 34. Five of the six samples are considered coarser or meet the gradational requirements.

The sandy gravel at some of the test pit locations contains some silt (see Enclosure 34) in the upper portion of the deposit and the percentage of silt decreases substantially with depth. It is anticipated that if the upper portion with some silt is mixed with the lower portion with much less silt, the combined product will likely meet the gradational requirements of OPSS Granular B Type I at the fine end of the specification.

6.3 Rural Industrial Development

If the site proceeds directly to rural industrial development without being a commercial gravel pit first, site grading including cut and fill procedures would likely be required. The following recommendations are generalized as cut/fill volumes required for site grading are not known at this time.

6.3.1 General Site Grading

As discussed above, cut and fill procedures are anticipated to be adopted to perform site grading.

The cut materials to be used as site grading fill (silt to sandy gravel) should be suitably compacted in order to support future roadways and building structures. The following procedures are recommended for the construction of the fill areas:

1. All topsoil, highly organic and deleterious materials should be stripped from structure and road areas. These excavated materials should be placed in non-structural areas such as berms and green belt areas;

2. The exposed subgrade surface should be proof-rolled with a heavy vibratory compactor and inspected by a qualified geotechnical inspector. Any soft spots encountered during the process should be excavated to the level of competent soil;

3. The required grades can then be achieved by placing approved soil in maximum 200 to 300 mm thick lifts which should be compacted to 95% standard Proctor maximum dry density (SPMDD) in roadway areas and to 98% SPMDD under the future building foundations. The limit of the engineered fill to be placed to support future structural loads and foundations should extend horizontally a distance at least equal to the depth of fill to be placed;

4. The on site silt to sandy gravel soils are considered to be suitable fill materials. Overly wet and organic materials should be placed in non-structural and non-pavement areas where 90% SPMDD is adequate;

5. All backfilling and compaction operations should be supervised by qualified geotechnical inspectors to approve material and ensure the specified degree of compaction has been obtained.

Specific site grading procedures are to also be implemented within future leaching bed areas of onsite wastewater treatment systems and are provided in Section 6.3.2.

6.3.2 Site Grading Procedures in Leaching Bed Areas

Proper control during subdivision site grading will be paramount to ensure that satisfactory soil conditions are maintained and created in the future leaching bed areas of the onsite wastewater treatment systems. Earth moving equipment such as scrapers, trucks and compactors are not to be allowed in the dispersal field envelopes as over-compaction and densification of the soils will occur and may consequently produce a higher percolation rate. Only light track-mounted equipment is to be used in the leaching bed envelopes.

The following procedures are to be adopted during construction planning stages and when site grading is being conducted:

1. Carefully plan out the stages of site grading, routes of construction, topsoil stockpile areas and establish the cut and fill areas;

2. Survey and stake out the leaching bed envelopes and restrict all access of unwanted construction traffic from these areas;

3. Stripping of topsoil and excavation cuts within the leaching bed envelopes are to be carried out by light track-mounted equipment. The exposed subgrade must be fully scarified once construction equipment is no longer crossing leaching bed envelope areas;

4. In leaching bed envelopes where fill will be placed, surficial topsoil is to be removed by light track-mounted equipment and the exposed subgrade be scarified and inspected to ensure that no unwanted compaction exists;

5. Any fill used to raise grades within leaching bed envelopes should have drainage characteristics similar to the native inorganic soils below. The fill soil is to be end-dumped at the edge of the leaching bed envelopes and placed in 0.5 m thick lifts with each lift being gently compacted with light track-mounted equipment. No other compaction should be applied;

6. The finished leaching bed envelopes are to be fenced off to prevent unwanted traffic.

Following site grading procedures, one or more test pits are to be excavated, inspected and sampled in the area of each leaching bed envelope in order to establish the design percolation T-time of the insitu soils prior to the final design of each individual treatment system. This process is to include grain size analysis testing as well as water table evaluation to at least 1.5 m below the proposed finished grade of the leaching bed envelopes.

6.3.3 Roadway Pavement Design and Construction

Based on the results of the field work, the subgrade materials of the industrial subdivision roadway are anticipated to consist of native and re-compacted silt to sandy gravel materials.

The following flexible pavement structure is recommended based on the results of grain size analyses, assumed CBR values, groundwater table, frost susceptibility of silt subgrade soils and traffic volume.

Component	Pavement Thickness (mm)
HL-3 Asphaltic Concrete	40
HL-8 Asphaltic Concrete	60
Granular "A" Base	150
Granular "B" Sub-base	450

Should the subgrade soils consist of sandy gravel and are at least 450 mm thick, the Granular "B" sub-base course may be deleted and should be inspected by the engineer.

The pavement design considers that road construction will be carried out during the drier time of the year and that the subgrade is stable, not heaving under construction equipment traffic. If the subgrade is wet or unstable, additional granular sub-base may be required.

Prior to placement of the granular base, the subgrade should be prepared in accordance with the recommendations outlined in Section 6.3.1, Site Grading.

The base and sub-base materials should be produced in accordance with the current OPSS specifications, and placed and uniformly compacted to at least 100% SPMDD. The asphaltic concrete should be placed and compacted in accordance with OPSS Form 310 and to between 92 and 96.5% of the Marshall Density (MRD). Frequent insitu density testing by this office should be carried out to verify that the specified degree of compaction is being achieved and maintained.

6.3.4 Building Foundations

The deposits of topsoil and **loose** native silt to silty sand encountered at the site are not considered suitable to support future building foundations. Future footings can be founded on the native **compact to dense** deposits of sandy silt to sandy gravel or the well-compacted engineered fill. The competent native soils and approved engineered fill (constructed as per the procedures in Section 6.3.1) can be used to support footing foundations designed to a net soil bearing pressure of up to 150 kPa (3000 psf)

The total and differential settlement of footings designed to the recommended soil bearing pressure will be less than 20 and 12 mm, respectively, and these are considered tolerable for the anticipated building structures.

Spacing between adjacent footing steps should not be steeper than 10 horizontal to 7 vertical. Exterior footings and footings in unheated portions of the building should be provided with a soil cover of not less than 1.2 m for adequate frost protection.

Footing subgrade inspections by this office are recommended to verify the bearing capacity of the soil prior to placement of the forms and concrete for the building foundations.

6.3.5 Percolation "T" Time and Coefficient of Permeability

Silt to sandy gravel soils were contacted beneath the surficial topsoil layer throughout the site. Nine (9) grain size distribution analyses were performed on samples collected from across the site. Graphical presentations of the results are given on Enclosures 26 to 34.

Based on the insitu compactness condition of the soils, the grain size distribution analyses and our experience with similar soils, the percolation "T"-time and coefficient of permeability of the various soil types encountered are estimated and provided in the table below:

Soil Type	Estimated Percolation T-Time (min/cm)	Estimated Coefficient of Permeability (cm/sec)
Silt, some sand	40	$3x10^{-6}$
Sandy Silt	35	$5x10^{-6}$
Sand and Silt	30	$8x10^{-6}$
Silty Sand	20	$1x10^{-5}$
Sandy Gravel	<1	$1x10^{-1}$

6.3.6 Wastewater Treatment Systems

Based upon the soil types delineated at the subdivision site, it is anticipated that various types of leaching beds utilizing conventional septic tanks or advanced treatment units can be used. Treatment systems utilizing advanced treatment unit technology may result in smaller leaching bed envelopes.

A lot by lot assessment must be carried out when the subdivision site grading has occurred and detailed design of the septic systems are required as discussed in Section 6.3.2. This will result in fully establishing the "T" times for design purposes of the insitu soils, especially in filled areas.

It is recommended to place leaching bed systems in higher elevated areas of the lots as this would typically increase the separation distance between the invert of the leaching beds and the groundwater table. The invert of leaching bed trenches must lie at least 900 mm above the observed high groundwater table for systems using conventional septic tank technology.

The individual leaching beds and the treatment tanks must have a horizontal separation distance of at least 15 m from drilled wells sealed and cased to 6 m depth.

If any field drainage tiles are encountered within leaching bed areas, these tiles must be rerouted and removed to 3 m beyond the leaching bed envelope area.

7.0 CLOSURE

The Limitations of Report, as quoted in Appendix "A", is an integral part of this report.

This reporting is limited to the delineation of the subsurface conditions at the site and, based on these findings, to discuss the potential aggregate products that can be developed/processed from the onsite granular deposits encountered. Additional subsurface investigation is recommended to determine the vertical and horizontal extent of the granular deposits and the groundwater table. Additional laboratory testing of these granular deposits is suggested and would provide additional information to assess the quality of the potential aggregate products. We would be pleased to provide this additional testing if so required.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly,
CHUNG & VANDER DOELEN ENGINEERING LTD.

Robert Vander Doelen, P.Eng.
Senior Engineer

Eric Y. Chung, M.Eng., P.Eng.
Principal Engineer

encls.

APPENDIX "A"

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CHUNG & VANDER DOELEN ENGINEERING LIMITED accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

This report does not reflect the environmental issues or concerns unless otherwise stated in the report. The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

FILE No: 06-11-K10

TEST PIT No. 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **312.25 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ (50 100 150 200) PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ (20 40 60 80)	W_P W W_L (10 20 30)			
	525mm TOPSOIL										
311.72		0.5								0.5	Slotted standpipe installed to 2.9 m depth
0.53	Loose orangy brown SANDY SILT										
311.52											
0.73	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0		1	BS					2.0	
		2.5								2.5	
		3.0								3.0	Standpipe dry on February 1 and 20, 2007
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
		5.0								5.0	
307.05											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 2

Enclosure No.: 2
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **314.81 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
314.38	425mm TOPSOIL										
0.43	Loose orangy brown SILT, some sand trace clay	0.5		1	BS					0.5	
313.91	damp										
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5		2	BS					3.5	
		4.0								4.0	
	damp	4.5								4.5	
309.81											
5.00	End of Test Pit	5.0								5.0	Test Pit dry at completion
		5.5								5.5	
		6.0								6.0	

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FILE No: 06-11-K10

TEST PIT No. 3

Enclosure No.: 3
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.50 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.20	300mm TOPSOIL										
0.30	Loose orangy brown SANDY SILT	0.5		1	BS					0.5	
317.75	damp										
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
313.30											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

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FILE No: 06-11-K10

TEST PIT No. 4

Enclosure No.: 4
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **317.62 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	WELL DATA	DEPTH (m)	REMARKS
317.34	275mm TOPSOIL							
0.28	Loose orangy brown SANDY SILT damp	0.5					0.5	
316.72								
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0					1.0	
		1.5					1.5	
		2.0					2.0	
			1	BS				
		2.5					2.5	
		3.0					3.0	
		3.5					3.5	
		4.0					4.0	
	damp	4.5					4.5	
		5.0					5.0	
312.42								Test Pit dry at completion
5.20	End of Test Pit	5.5					5.5	
		6.0					6.0	

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

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FILE No: 06-11-K10

TEST PIT No. 5

Enclosure No.: 5
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **317.96 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
317.86	100mm TOPSOIL										
0.10	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	0.5								0.5	Slotted standpipe installed to 2.9 m depth
		1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	Standpipe dry on February 1 and 20, 2007
		3.5								3.5	
	damp	4.0								4.0	
		4.5								4.5	
312.96		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5								5.5	
		6.0								6.0	

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FILE No: 06-11-K10

TEST PIT No. 6

Enclosure No.: 6
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.62 m**										
323.39	225mm TOPSOIL										
0.23	Loose orangy brown SANDY SILT some gravel	0.5								0.5	
322.87	damp										
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
		5.5								5.5	
317.82											
5.80	End of Test Pit	6.0								6.0	Test Pit dry at completion

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FILE No: 06-11-K10

TEST PIT No. 7

Enclosure No.: 7
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.48 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.20	275mm TOPSOIL										
0.28	Loose to compact brown SANDY SILT some clay damp	0.5		1	BS					0.5	
317.43		1.0								1.0	
1.05	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 1.65 m depth	1.5		2	BS					1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
		5.0								5.0	
313.28											Test Pit dry at completion
5.20	End of Test Pit	5.5								5.5	
		6.0								6.0	

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FILE No: 06-11-K10

TEST PIT No. 8

Enclosure No.: 8
Sheet 1 of 1

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Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.72 m**										
318.39	325mm TOPSOIL										
0.33	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 1.8 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1 2	BS BS					0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	Slotted standpipe installed to 2.85 m depth Standpipe dry on February 1 and 20, 2007
	damp										
313.72		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0								5.5 6.0	

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FILE No: 06-11-K10

TEST PIT No. 9

Enclosure No.: 9
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **320.27 m**						
319.94	325mm TOPSOIL						
0.33	Loose brown SANDY SILT trace gravel damp	0.5		1	BS		
319.52							
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 2.7 m depth	1.0					
		1.5					
		2.0		2	BS		
		2.5					
		3.0					
		3.5					
		4.0					
		4.5					
	damp	5.0					Test Pit dry at completion
315.07							
5.20	End of Test Pit	5.5					
		6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 10

Enclosure No.: 10
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **321.50 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE
321.22	275mm TOPSOIL					
0.28	Compact brown SAND AND SILT some gravel and cobbles	0.5		1	BS	
		1.0				
		1.5				
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
	damp to moist	4.5				
316.50		5.0				
5.00	End of Test Pit	5.5				
		6.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	Slotted standpipe installed to 2.7 m depth
2.5	Standpipe dry on February 1 and 20, 2007
5.0	Test Pit dry at completion

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 11

Enclosure No.: 11
Sheet 1 of 1

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **325.90 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
325.62	275mm TOPSOIL					
0.28	Compact brown SILTY SAND frequent gravel, cobbles and boulders damp	0.5 1.0 1.5	1	BS		Slotted standpipe installed to 2.8 m depth
324.00 1.90	Compact to dense brown GRAVELLY SAND some silt frequent cobbles and boulders damp	2.0 2.5 3.0 3.5 4.0 4.5	2	BS		Standpipe dry on February 1 and 20, 2007
320.90 5.00	End of Test Pit	5.0 5.5 6.0				Test Pit dry at completion

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 12

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **320.23 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
319.78	450mm TOPSOIL										Slotted standpipe installed to 2.75 m depth
0.45	Compact brown SILTY SAND some gravel and cobbles occ. boulders	0.5								0.5	Water level at 0.66 m depth on February 1, 2007
		1.0		1	BS					1.0	Water level at 0.89 m depth on February 20, 2007
	grades to SAND AND SILT with depth	1.5								1.5	Seepage at 1.0 m depth on January 25, 2007
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	very moist to wet	3.5								3.5	
		4.0								4.0	
315.93 4.30	End of Test Pit	4.5								4.5	
		5.0								5.0	
		5.5								5.5	
		6.0								6.0	

SHEAR STRENGTH (kPa): FIELD VANE: Peak ⊗ Rem. × ; LAB TEST: Unc. ■ P.P. □ ; 50 100 150 200
PENETRATION RESISTANCE: STANDARD ● DYN. CONE ○ ; 20 40 60 80
WATER CONTENT (%): W_P W W_L ; 10 20 30

ENGINEER: **RVD**

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TEST PIT No. 13

Enclosure No.: 13
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD)

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 25 07** TO **Jan 25 07**

Ground Elevation: **319.95 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
319.65	300mm TOPSOIL						
0.30	Loose to compact brown SILTY SAND trace gravel	0.5					
319.05	damp						
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 3 m depth	1.0					
		1.5		1	BS		
		2.0					
		2.5		2	BS		
		3.0					
		3.5					
		4.0					
	damp	4.5					
314.95							
5.00	End of Test Pit	5.0					Test Pit dry at completion
		5.5					
		6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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TEST PIT No. 14

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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **321.58 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
321.43	150mm TOPSOIL										
0.15	Loose to compact brown SANDY SILT trace gravel	0.5		1	BS					0.5	Slotted standpipe installed to 2.7 m depth
320.68	damp										
0.90	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	Standpipe dry on February 1 and 20, 2007
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
		4.5								4.5	
	damp	5.0								5.0	
316.08		5.5								5.5	Test Pit dry at completion
5.50	End of Test Pit	6.0								6.0	

ENGINEER: **RVD**

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TEST PIT No. 15

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Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD)

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **322.44 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
322.06	375mm TOPSOIL				
0.38	Loose orangy brown SANDY SILT trace gravel and cobbles	0.5			
321.64	damp				
0.80	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0			
		1.5			
		2.0			
		2.5			
		3.0	1	BS	
		3.5			
		4.0			
	damp	4.5			
317.44					
5.00	End of Test Pit	5.0			
		5.5			
		6.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Test Pit dry at completion

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 16

Enclosure No.: 16
Sheet 1 of 1

CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	SHEAR STRENGTH (kPa) FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	WATER CONTENT (%) W_P W W_L 10 20 30	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.68 m**										
323.43	250mm TOPSOIL										
0.25	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.9 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5								0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	
	damp	5.0								5.0	
318.48											Test Pit dry at completion
5.20	End of Test Pit	5.5 6.0								5.5 6.0	

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 17

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **323.86 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 / STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
323.56	300mm TOPSOIL										
0.30	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.7 m depth	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1	BS					0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5	
	damp										
318.86		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0								5.5 6.0	

ENGINEER: **RVD**

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TEST PIT No. 18

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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	SAMPLE N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **322.77 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200; PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
322.59	175mm TOPSOIL										
0.18	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth	0.5								0.5	Slotted standpipe installed to 2.75 m depth
		1.0								1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
											Standpipe dry on February 1 and 20, 2007
		3.0								3.0	
		3.5								3.5	
		4.0								4.0	
	damp	4.5								4.5	
317.77		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit										
		5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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TEST PIT No. 19

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CHUNG & VANDER DOELEN ENGINEERING LTD.

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	REMARKS
	Ground Elevation: **322.06 m**						
321.88	175mm TOPSOIL						
0.18	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth --- sand seam --- damp	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5		1	BS		
317.06		5.0					Test Pit dry at completion
5.00	End of Test Pit	5.5 6.0					

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

ENGINEER: **RVD**

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TEST PIT No. 20

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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **320.97 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
320.74	225mm TOPSOIL										
0.23	Loose to compact orangy brown SILT, some sand trace gravel and cobbles	0.5		1	BS					0.5	
319.92	moist	1.0								1.0	
1.05	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
		3.5								3.5	
	damp	4.0								4.0	
		4.5								4.5	
315.97		5.0								5.0	Test Pit dry at completion
5.00	End of Test Pit	5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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CVD TEST PIT 06-11-K10.GPJ CVD_ENG.GDT 2/19/07

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TEST PIT No. 21

Enclosure No.: 21
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Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **320.40 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE
320.12	275mm TOPSOIL				
0.28	Loose orangy brown SANDY SILT	0.5	1	BS	
319.65	damp				
0.75	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0 1.5 2.0	2	BS	
		2.5			
		3.0	3	BS	
		3.5 4.0 4.5			
	damp	5.0			
315.20					
5.20	End of Test Pit	5.5 6.0			

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)

REMARKS

Test Pit dry at completion

ENGINEER: **RVD**

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TEST PIT No. 22

CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

Ground Elevation: **318.11 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE
317.73 / 0.38	375mm TOPSOIL					
317.51 / 0.60	Loose orangy brown SANDY SILT	0.5				
	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders	1.0				
		1.5		1	BS	
		2.0				
		2.5				
		3.0				
		3.5				
		4.0				
	damp	4.5				
313.11 / 5.00	End of Test Pit	5.0				
		5.5				
		6.0				

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

WATER CONTENT (%)
W_P W W_L
10 20 30

WELL DATA

DEPTH (m)	REMARKS
0.5	Slotted standpipe installed to 2.9 m depth
3.0	Standpipe dry on February 1 and 20, 2007
5.0	Test Pit dry at completion

ENGINEER: **RVD**

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TEST PIT No. 23

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CHUNG & VANDER DOELEN ENGINEERING LTD. CVD

Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **320.32 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
320.04	275mm TOPSOIL										
0.28	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.6 m depth	0.5								0.5	
		1.0		1	BS					1.0	
		1.5								1.5	
		2.0								2.0	
		2.5								2.5	
		3.0								3.0	
	damp	3.5								3.5	
		4.0								4.0	Major collapse of Test Pit sidewalls at 4.3 m depth
316.02											
4.30	End of Test Pit	4.5								4.5	Test Pit dry at completion
		5.0								5.0	
		5.5								5.5	
		6.0								6.0	

ENGINEER: **RVD**

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TEST PIT No. 24

Enclosure No.: 24
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Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **321.38 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
321.10	275mm TOPSOIL										
0.28	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.8 m depth	0.5 1.0 1.5 2.0		1	BS					0.5 1.0 1.5 2.0	Slotted standpipe installed to 2.75 m depth
		2.5 3.0 3.5 4.0								2.5 3.0 3.5 4.0	Standpipe dry on February 1 and 20, 2007
	damp	4.5								4.5	
316.38 5.00	End of Test Pit	5.0 5.5 6.0								5.0 5.5 6.0	Test Pit dry at completion

ENGINEER: **RVD**

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FILE No: 06-11-K10

TEST PIT No. 25

Enclosure No.: 25
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Client: **Lambda Properties c/o BSRD**

Project: **Potential Aggregate Resource/Industrial Subdivision**

Location: **Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch**

EQUIPMENT DATA

Machine: **Excavator**
Method: **Excavator**
Size:
Date: **Jan 26 07** TO **Jan 26 07**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	SAMPLE TYPE	N-VALUE	SHEAR STRENGTH (kPa) / PENETRATION RESISTANCE	WATER CONTENT (%)	WELL DATA	DEPTH (m)	REMARKS
	Ground Elevation: **318.87 m**						FIELD VANE: Peak ⊗ Rem. × LAB TEST: Unc. ■ P.P. □ 50 100 150 200 PENETRATION RESISTANCE STANDARD ● DYN. CONE ○ 20 40 60 80	W_P W W_L 10 20 30			
318.62	250mm TOPSOIL										
0.25	Compact to dense brown SANDY GRAVEL frequent to numerous cobbles and boulders -some silt to 0.9 m depth	0.5 1.0 1.5		1	BS					0.5 1.0 1.5	
		2.0 2.5 3.0 3.5 4.0								2.0 2.5 3.0 3.5 4.0	
	damp	4.5								4.5	
313.87											
5.00	End of Test Pit	5.0 5.5 6.0								5.0 5.5 6.0	Test Pit dry at completion

ENGINEER: **RVD**

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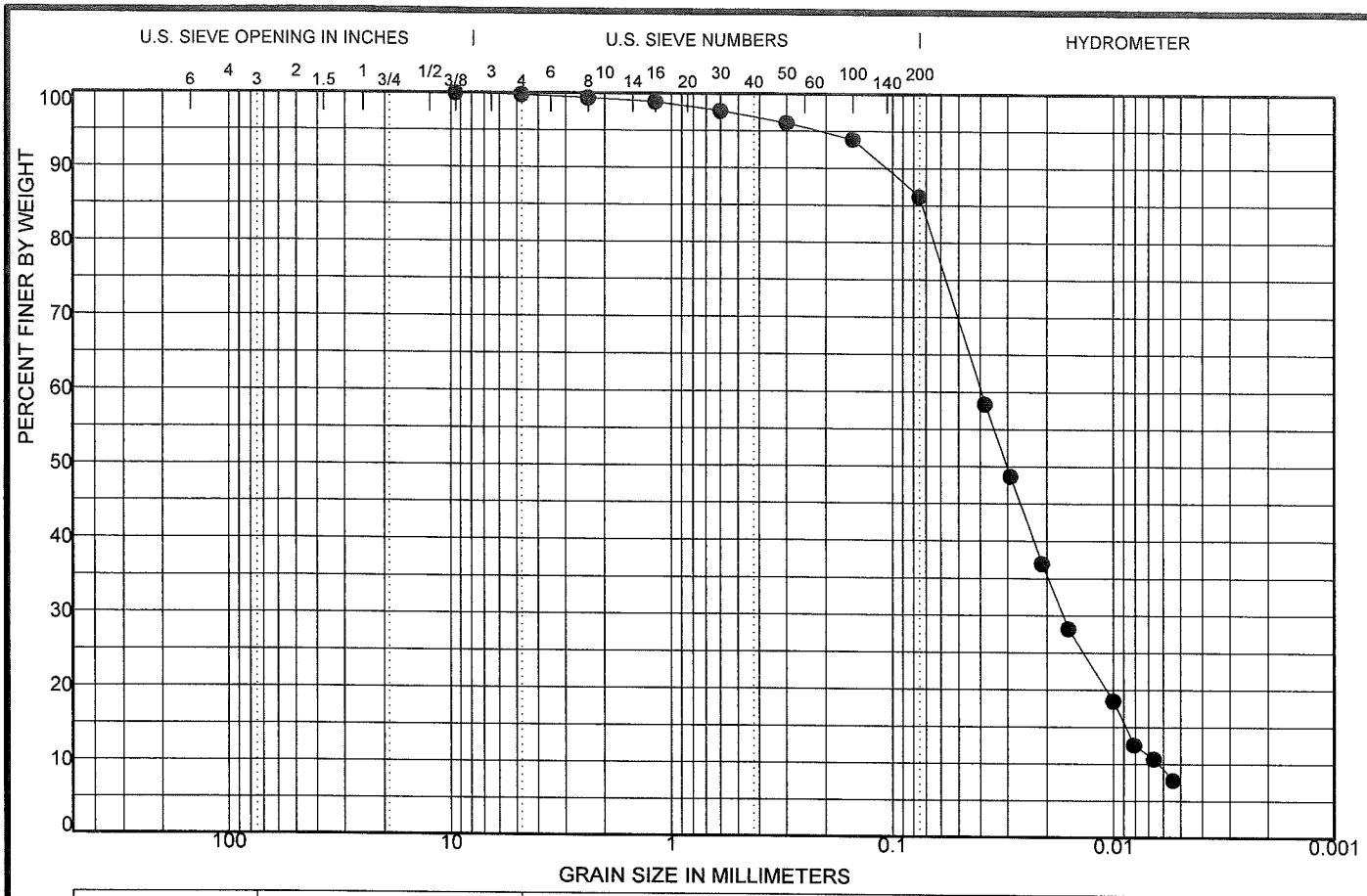
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. 519-742-8979, fx. 519-742-7739



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3875**					**1.15**	**6.28**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.5	**0.04**	**0.017**	**0.006**	**0.2**	**13.6**	**86.2**	

Type of Material: Silt, some sand
Sample No. 1
Source:
Sampled From: TP-2
Date: 2/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 1/25/07
Tested By: DF
Date Tested: 2/1/07

SIEVE SIZES mm	PERCENT PASSING	No Specifications

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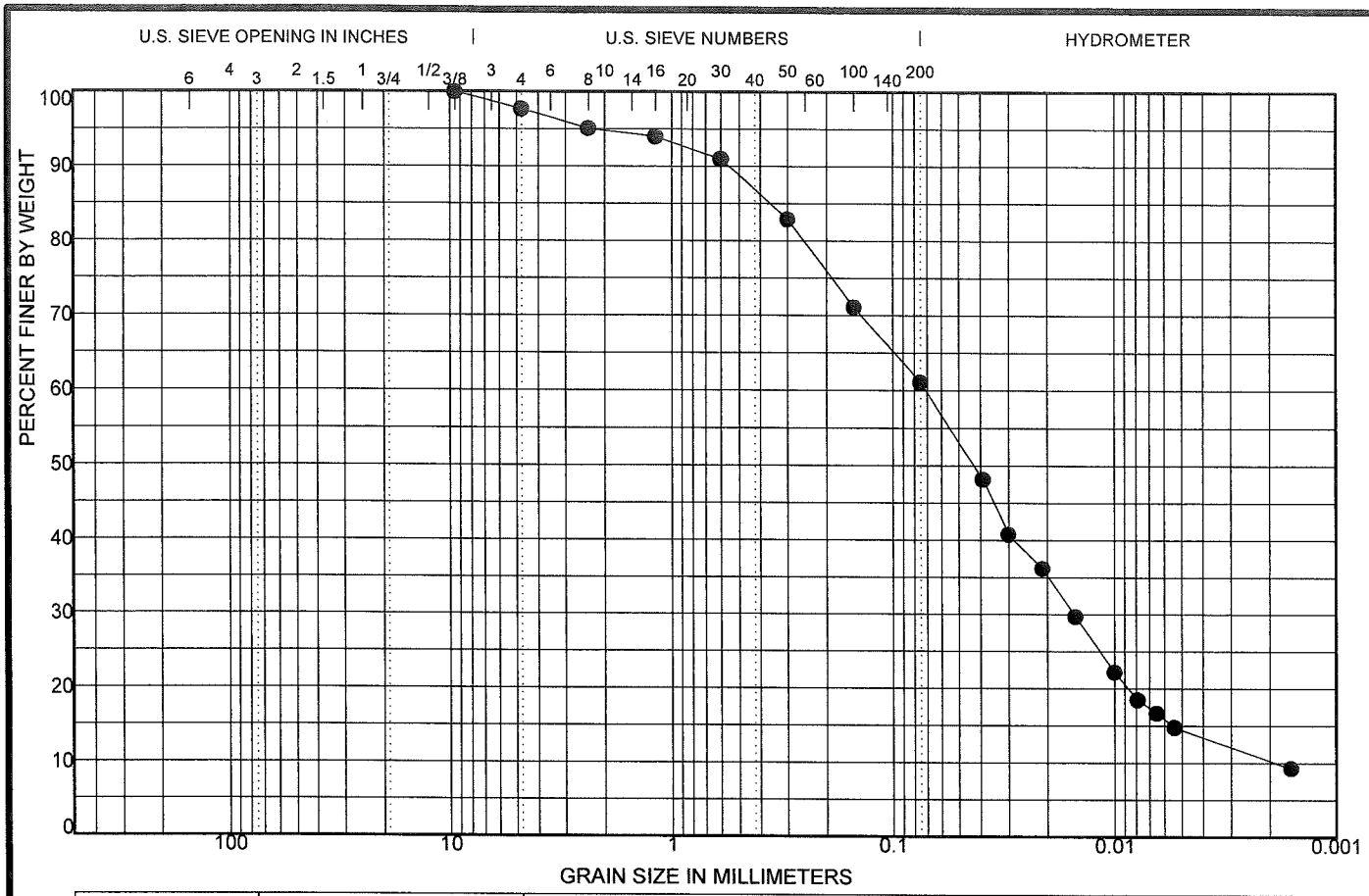
e-mail: cvd@bellnet.ca

GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 26

NO SPECIFICATIONS 06-11-K10.GPJ LAW LNDN.GDT 2/2/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3876**					**1.75**	**37.97**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.5	**0.071**	**0.015**	**0.002**	**2.3**	**36.6**	**61.1**	

Type of Material: Sandy Silt, some clay
Sample No. 1
Source:
Sampled From: TP-7
Date: 2/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 1/25/07
Tested By: DF
Date Tested: 2/1/07

SIEVE SIZES mm	PERCENT PASSING	No Specifications

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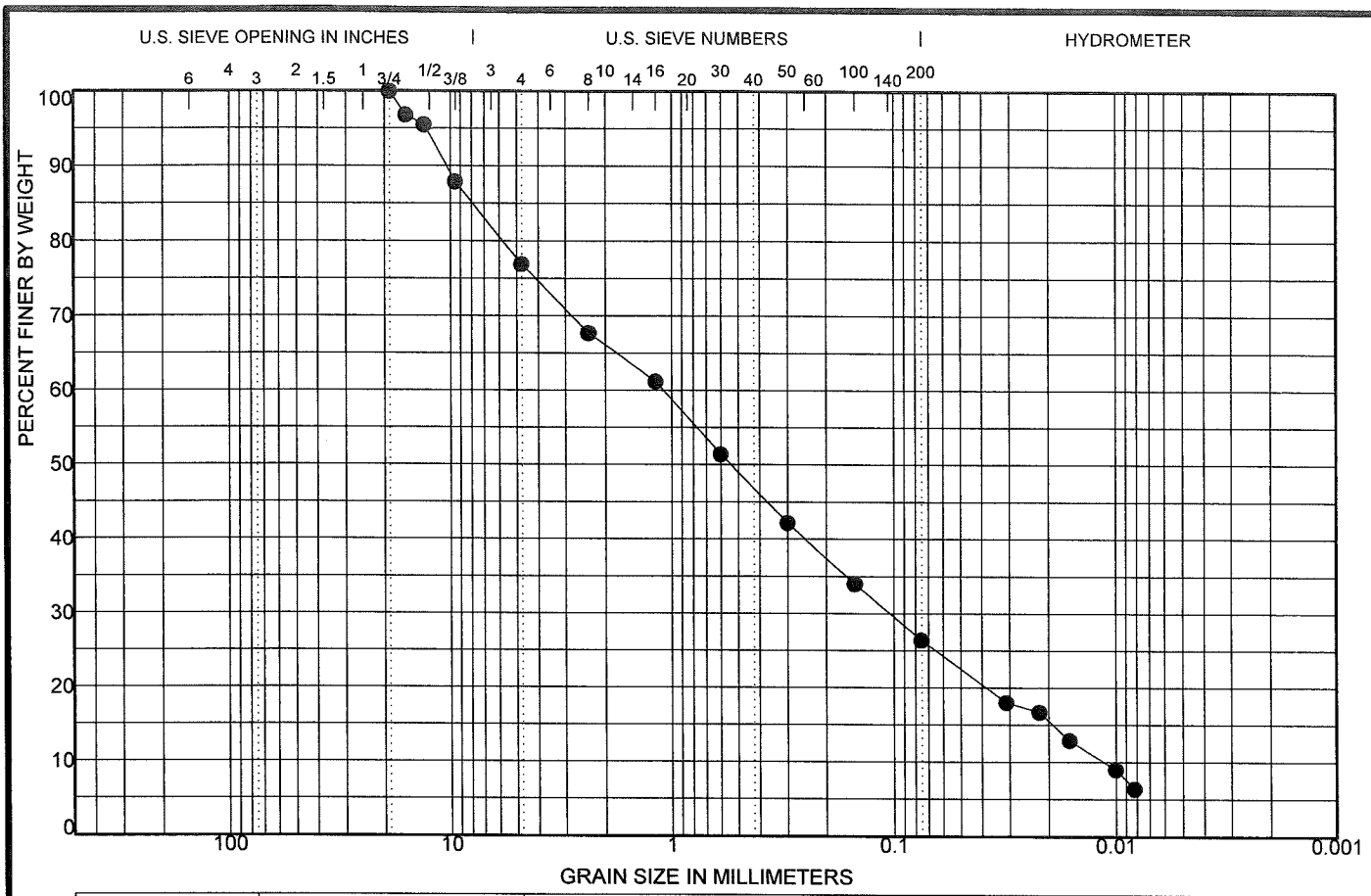
Telephone: 519-742-8979
Fax: 519-742-7739
e-mail: cvd@bellnet.ca

GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 27

NO SPECIFICATIONS 06-11-K10.GPJ LAW LNDN.GDT 2/2/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3877**					**0.89**	**96.29**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	**1.086**	**0.104**	**0.011**	**23.1**	**50.5**	**26.4**	

Type of Material: Silty Sand, some gravel
Sample No. 1
Source:
Sampled From: TP-12
Date: 2/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 1/25/07
Tested By: DF
Date Tested: 2/1/07

SIEVE SIZES mm	PERCENT PASSING	No Specifications

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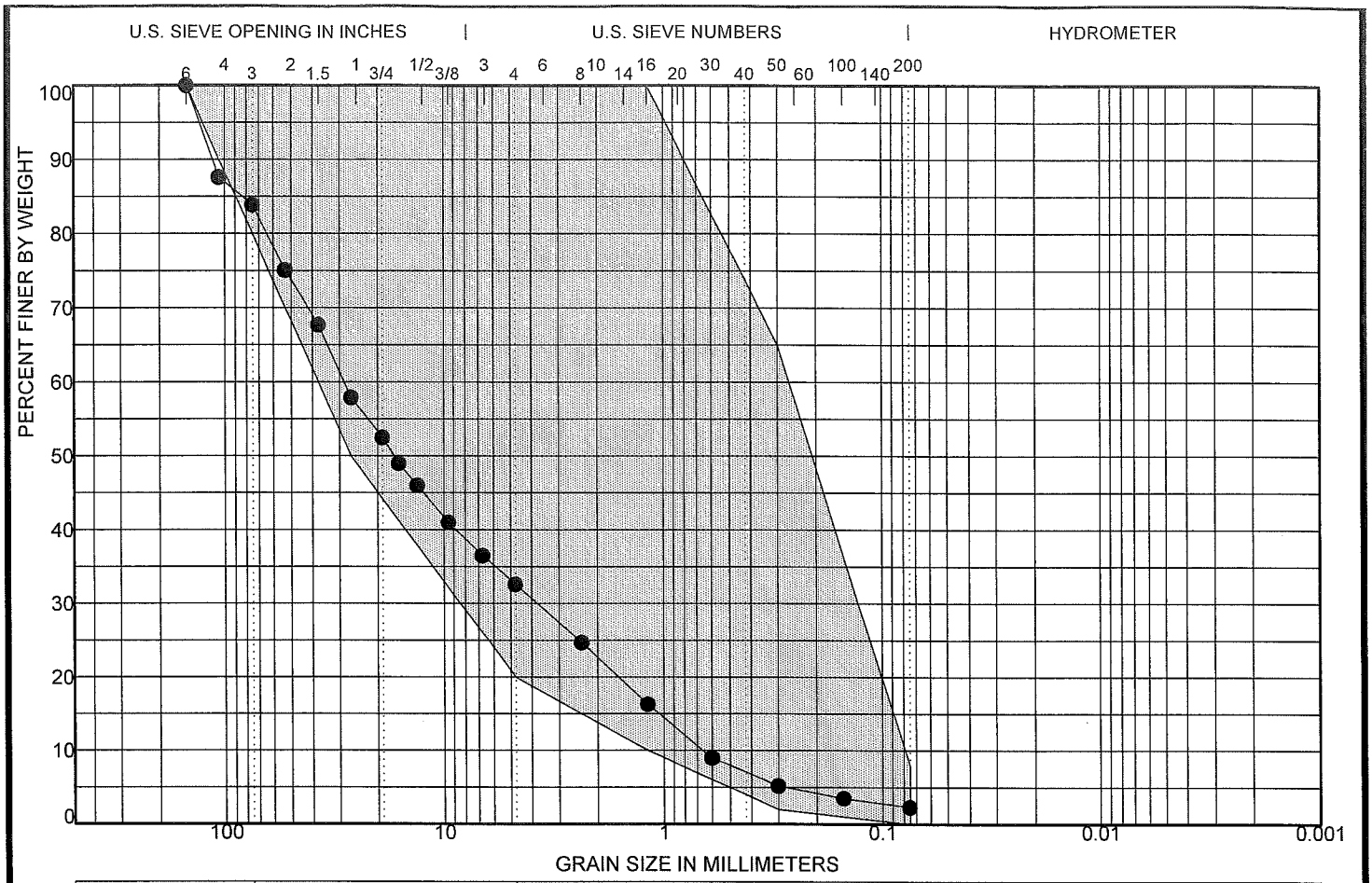
e-mail: cvd@bellnet.ca

GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 28

NO SPECIFICATIONS 06-11-K10.GPJ LAW LNDN.GDT 2/2/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3870**	**POORLY GRADED GRAVEL with SAND GP**				**0.76**	**43.37**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	150	**28.547**	**3.773**	**0.658**	**51.3**	**30.3**	**2.3**	

Type of Material: Sandy Gravel
Sample No. **2**
Source: TP-2
Sampled From:
Date: 2/5/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 01/30/07
Tested By: D.F.
Date Tested: 02/02/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0	100.0	100
26.5	57.9	50-100
4.75	32.6	20-100
1.18	16.3	10-100
0.3	5.2	2-65
0.075	2.3	0-8

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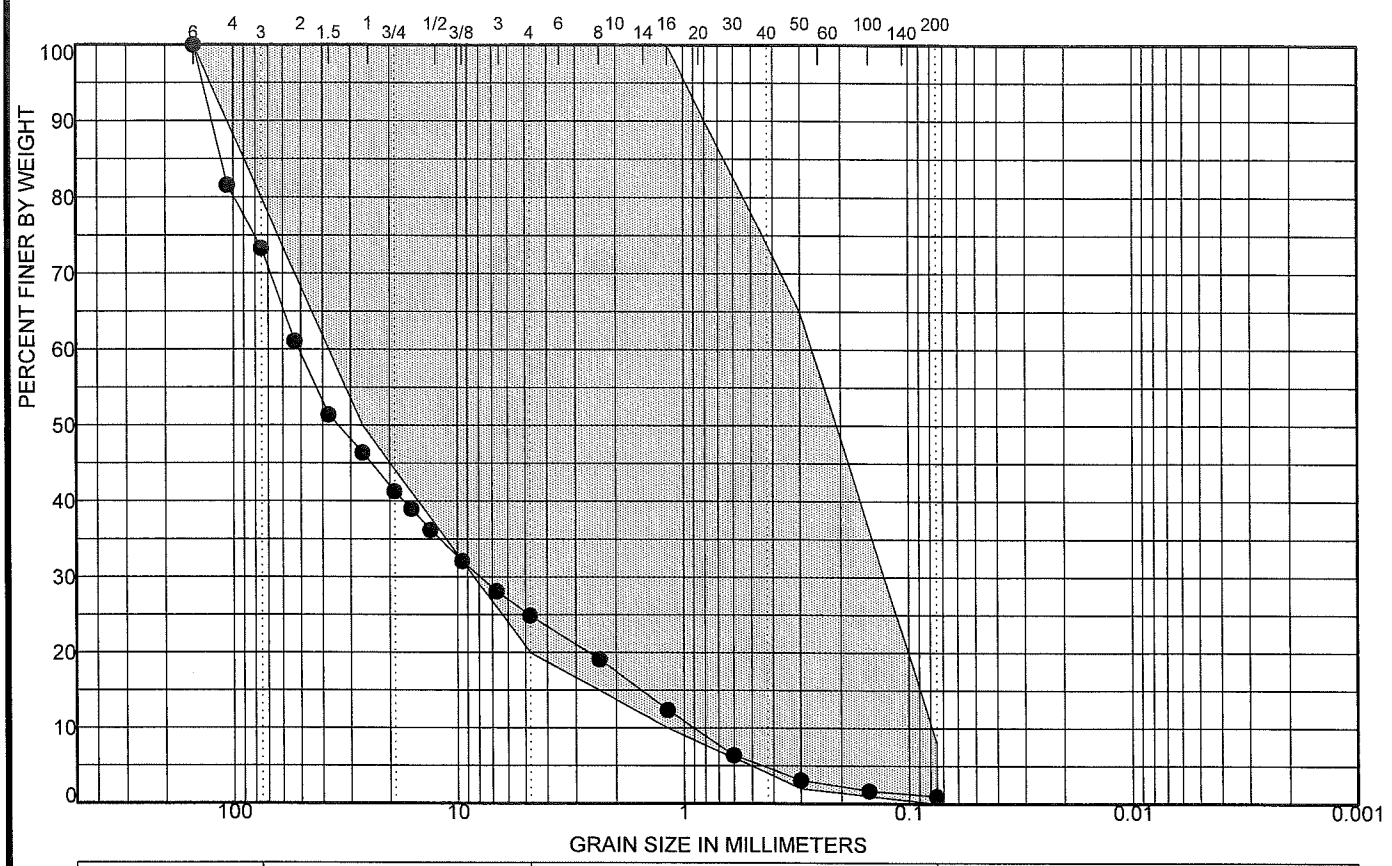
GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 29

OPSS 1001 GRAN B TYPE 1 06-11-K10.GPJ LAW LNDN.GDT 2/8/07



Specimen Identification		Classification				LL	PL	PI	Cc	Cu
LAB. NO.:	**3871**	**WELL-GRADED GRAVEL with SAND GW**							**1.36**	**56.60**
FM		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
		150	**50.961**	**7.909**	**0.9**	**48.4**	**23.9**		**1.0**	

Type of Material: Sandy Gravel
Sample No. 1
Source: TP-4
Sampled From:
Date: 2/5/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 1/30/07
Tested By: D.F.
Date Tested: 02/02/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0	100.0	100
26.5	46.4	50-100
4.75	24.9	20-100
1.18	12.4	10-100
0.3	3.1	2-65
0.075	1.0	0-8

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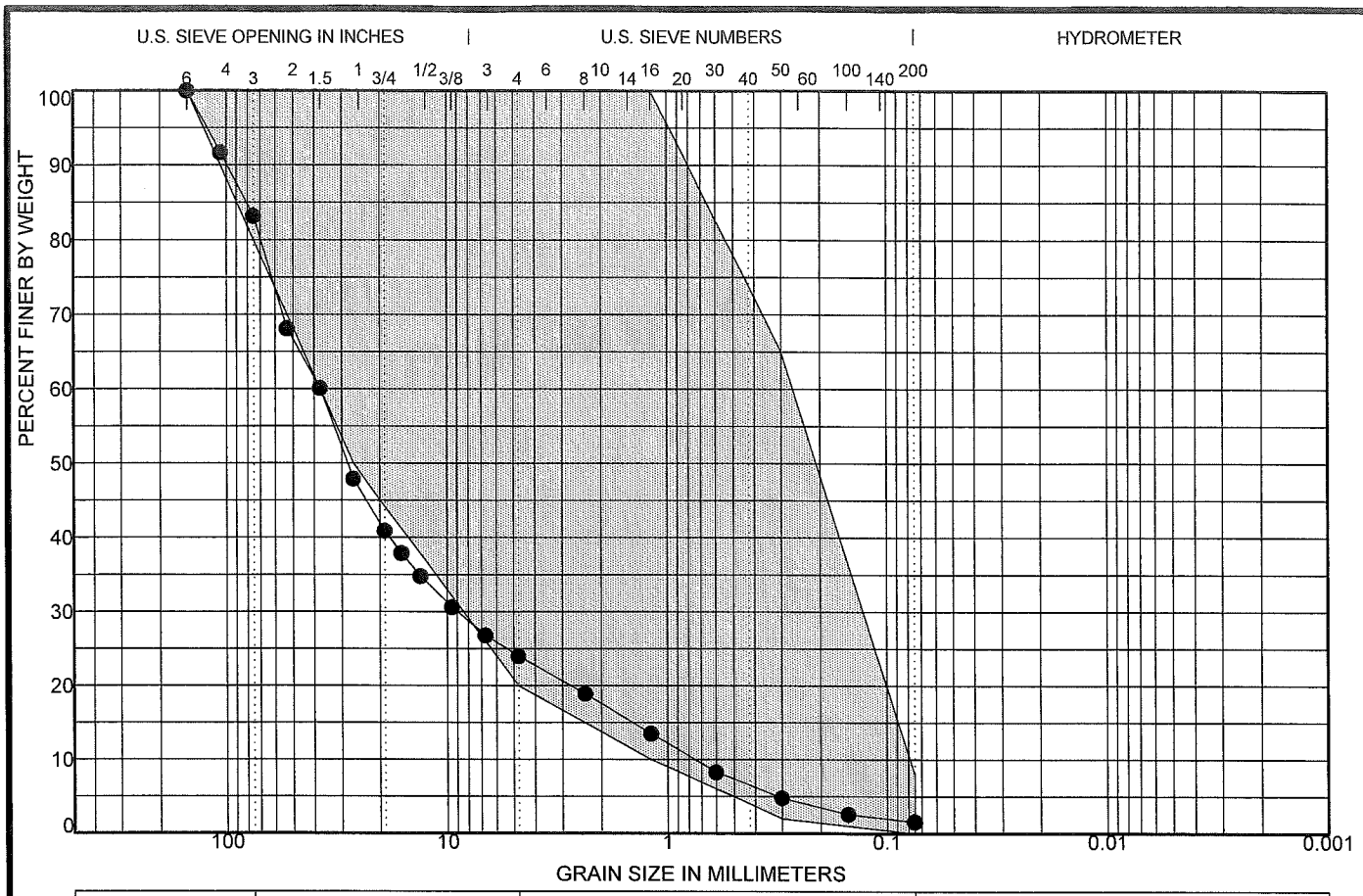
Telephone: 519-742-8979
Fax: 519-742-7739
e-mail: cvd@bellnet.ca

GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 30

OPSS 1001 GRAN B TYPE I 06-11-K10.GPJ LAW LNDN.GDT 2/8/07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
LAB. NO.:	**3872**	**WELL-GRADED GRAVEL with SAND GW**				**2.89**	**49.96**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	150	**37.393**	**8.99**	**0.748**	**59.2**	**22.4**		**1.6**

Type of Material: Sandy Gravel
Sample No. **1**
Source: TP-19
Sampled From:
Date: 6/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 30/01/07
Tested By: D.F.
Date Tested: 02/02/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0	100.0	100
26.5	47.9	50-100
4.75	24.0	20-100
1.18	13.5	10-100
0.3	4.8	2-65
0.075	1.6	0-8

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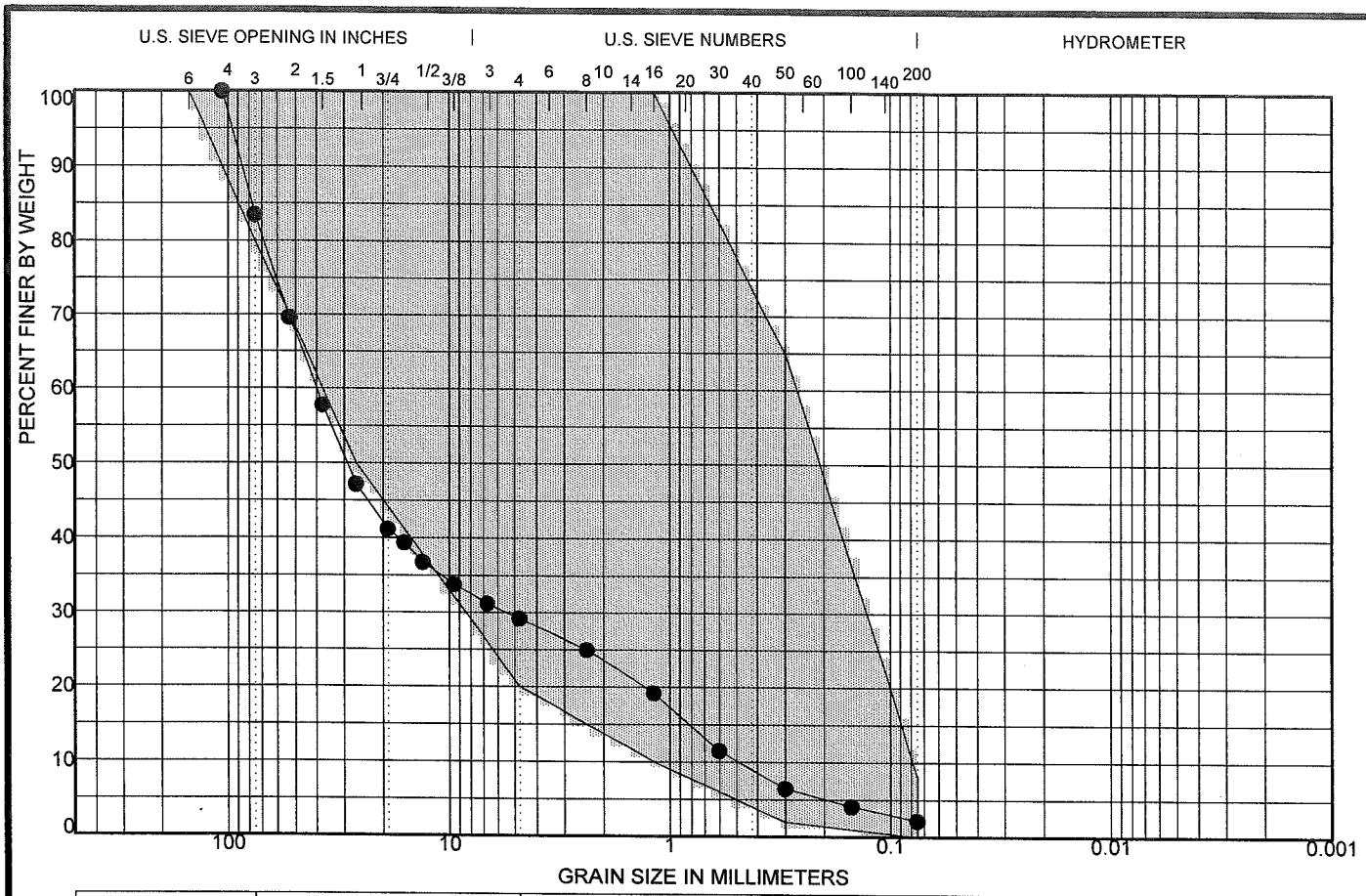
GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 31



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification			LL	PL	PI	Cc	Cu
LAB. NO.:	**3873**	**WELL-GRADED GRAVEL with SAND GW**						**1.52**	**82.07**
FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
	106	**39.998**	**5.451**	**0.487**	**54.3**	**27.0**	**2.2**		

Type of Material: Sandy Gravel
Sample No. **2**
Source: TP-21
Sampled From:
Date: 6/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 30/01/07
Tested By: D.F.
Date Tested: 02/02/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0		100
26.5	47.2	50-100
4.75	29.2	20-100
1.18	19.2	10-100
0.3	6.5	2-65
0.075	2.2	0-8

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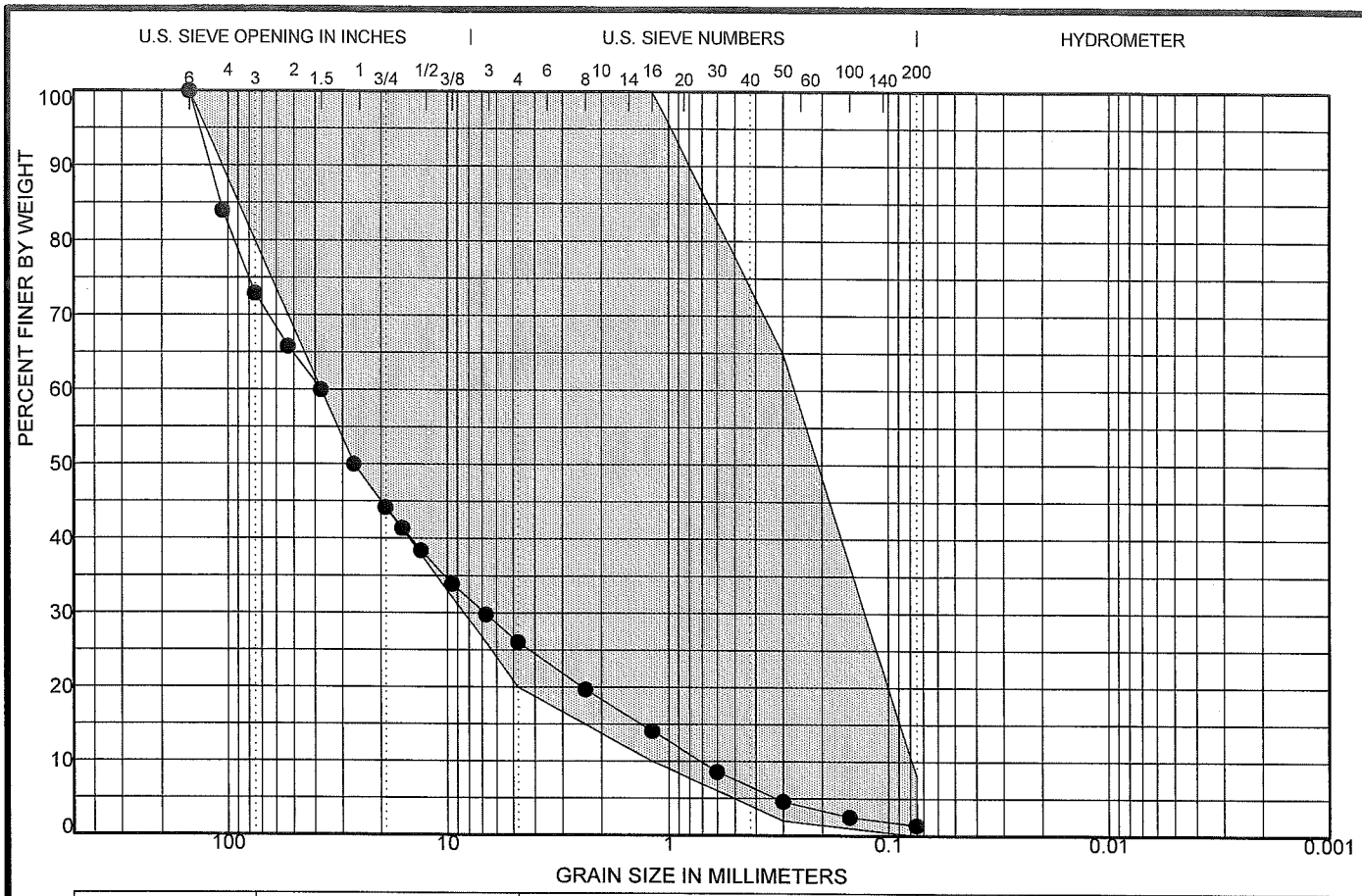
GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 32



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3874**	**WELL-GRADED GRAVEL with SAND GW**				**1.74**	**52.62**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	150	**37.5**	**6.815**	**0.713**	**46.8**	**24.7**	**1.4**	

Type of Material: Sandy Gravel
Sample No. 1
Source: TP-24
Sampled From:
Date: 6/2/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 30/01/07
Tested By: D.F.
Date Tested: 02/02/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0	100.0	100
26.5	50.0	50-100
4.75	26.1	20-100
1.18	14.1	10-100
0.3	4.6	2-65
0.075	1.4	0-8

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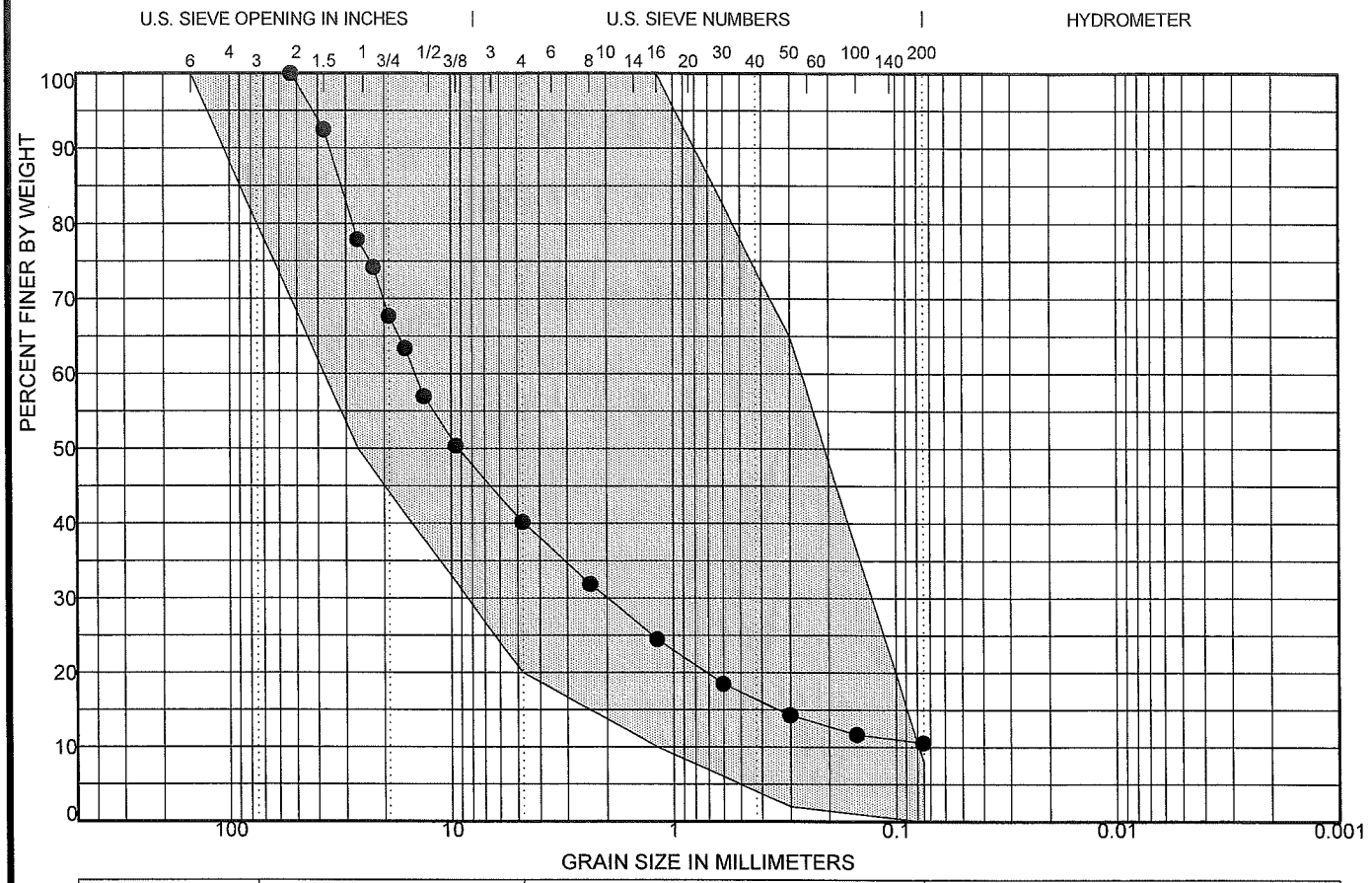
GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 33



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
LAB. NO.: **3880**					**5.26**	**281.11**

FM	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	53	**14.446**	**1.975**		**59.8**	**29.6**	**10.6**	

Type of Material: Sandy Gravel, some silt
Sample No. 2
Source:
Sampled From: TP-13
Date: 2/6/2007
Client: Lambda Properties c/o BSRD
Contractor:
Sampled By: RVD
Date Sampled: 1/25/07
Tested By: DF
Date Tested: 2/5/07

SIEVE SIZES mm	PERCENT PASSING	OPSS 1010 Granular 'B' Type I Specifications
150.0		100
26.5	77.9	50-100
4.75	40.2	20-100
1.18	24.5	10-100
0.3	14.3	2-65
0.075	10.6	0-8

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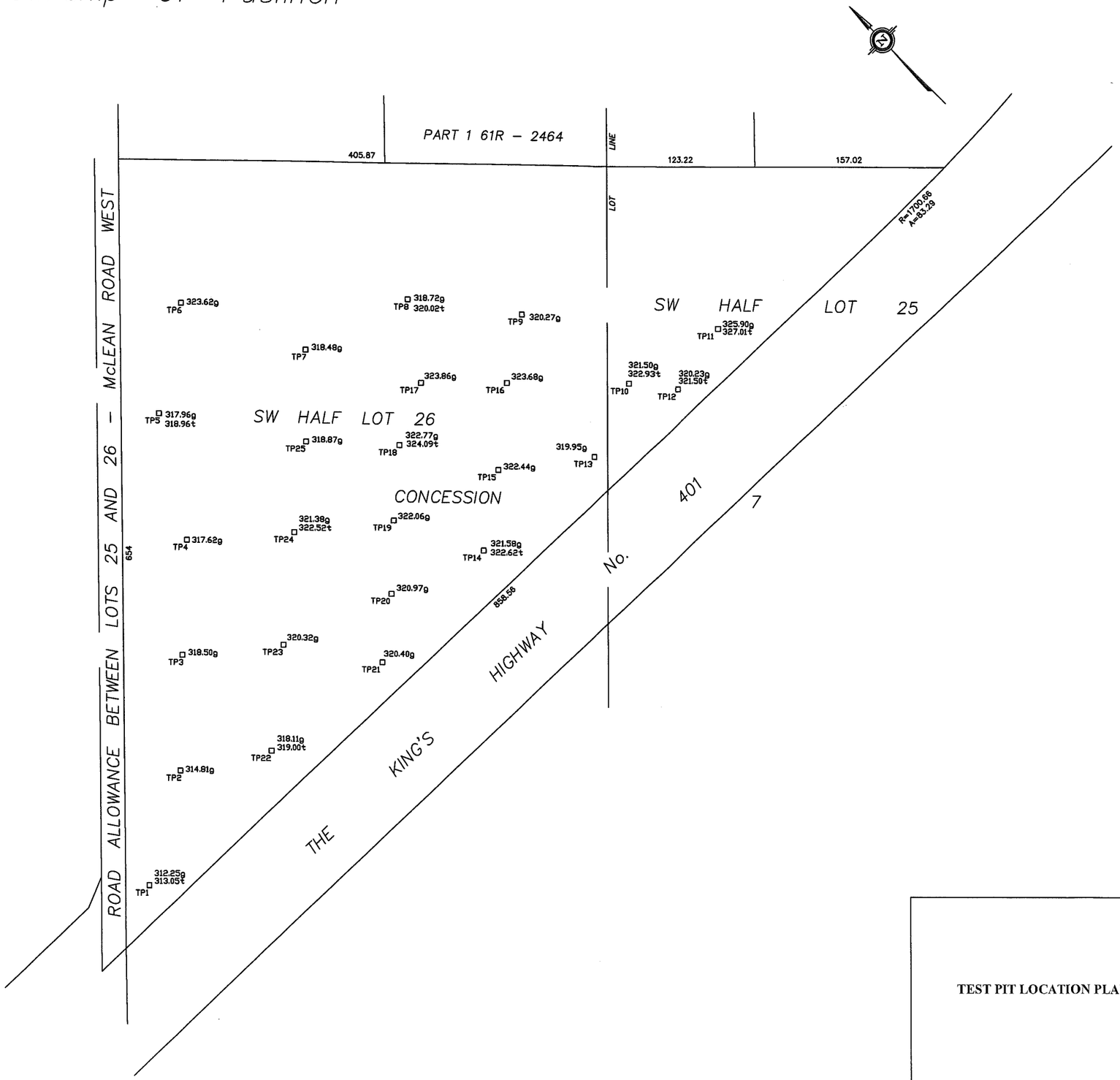
GRAIN SIZE DISTRIBUTION

Project: Potential Aggregate Resource/Industrial Subdivision
Location: Pt of NE Half of Lot 26, Conc. 7, Twp of Puslinch
File No.: 06-11-K10
Enclosure No.: 34

Township of Puslinch



TEST PIT LOCATION PLAN	CHUNG & VANDER DOELEN ENGINEERING LTD.	**CHUNG & VANDER DOELEN ENGINEERING LTD.** 311 Victoria St. North Kitchener,ON,N2H 5E1 Phone:(519) 742-8979 Fax:(519) 742-7739 E-mail:cvd@bellnet.ca	
	Drawn By: IS	**Date:** Feb 20, 2007	**File No.:** 06-11-K10
	Checked By: RVD	**Scale:** NTS	**DRAWING NO.:** 1