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Geotechnical Engineering
Environmental Engineering
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Hydrogeology
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Materials Testing
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Attention: **Mr. Abdo El-Arab**

Subject: **Water Supply Assessment for a Proposed Site Plan Approval 6175 Rockdale Road Vars, Ontario**

INTRODUCTION

Further to your request, this firm has conducted a Water Supply Assessment in support of site plan approval of a proposed re-development of the commercial property located at 6175 Rockdale Road, Vars, Ontario. The purpose of these works has been to determine the suitability of the water supply aquifer underlying the site to service a re-development of the existing commercial layout.

DESCRIPTION OF PROPOSED DEVELOPMENT

The subject property is located at the southeast corner of Rockdale Road and Russland Road/Highway Lane in Vars, Ontario. The property consists of approximately 0.9 ha. over two lots. The lot is occupied by two commercial businesses which are serviced by an on site sewage system and a drilled well. The businesses consist of an Esso fuel station and a used car sales lot. There are two parcels at the existing development with the municipal address of 6175 Rockdale Road.

The land is to be re-developed with a new configuration with an upgraded Esso fuel station and convenience store. A drive-through serving only prepared food will be incorporated using paper service only. The existing drilled well will be retained for use. A portable hose for hand washing of cars only will be installed in the well. The well will not be used as a drinking water supply. Washrooms will be key access only to restrict access to non-drinking water. The drive-through / store will only serve pre-packaged food and drinks that are shipped to site. There is no preparation of food or dishwashing required on-site. As such, no potable water supply is necessary for drive-through operations. A holding tank for non-potable use will be located in the building. Public drinking water will be supplied through

bottled water only. There will be no consumption of the non-potable water supply and signs will be posted to indicate there should be no consumption from the bathroom faucets. Refer to Figure 1 below showing the proposed site location.

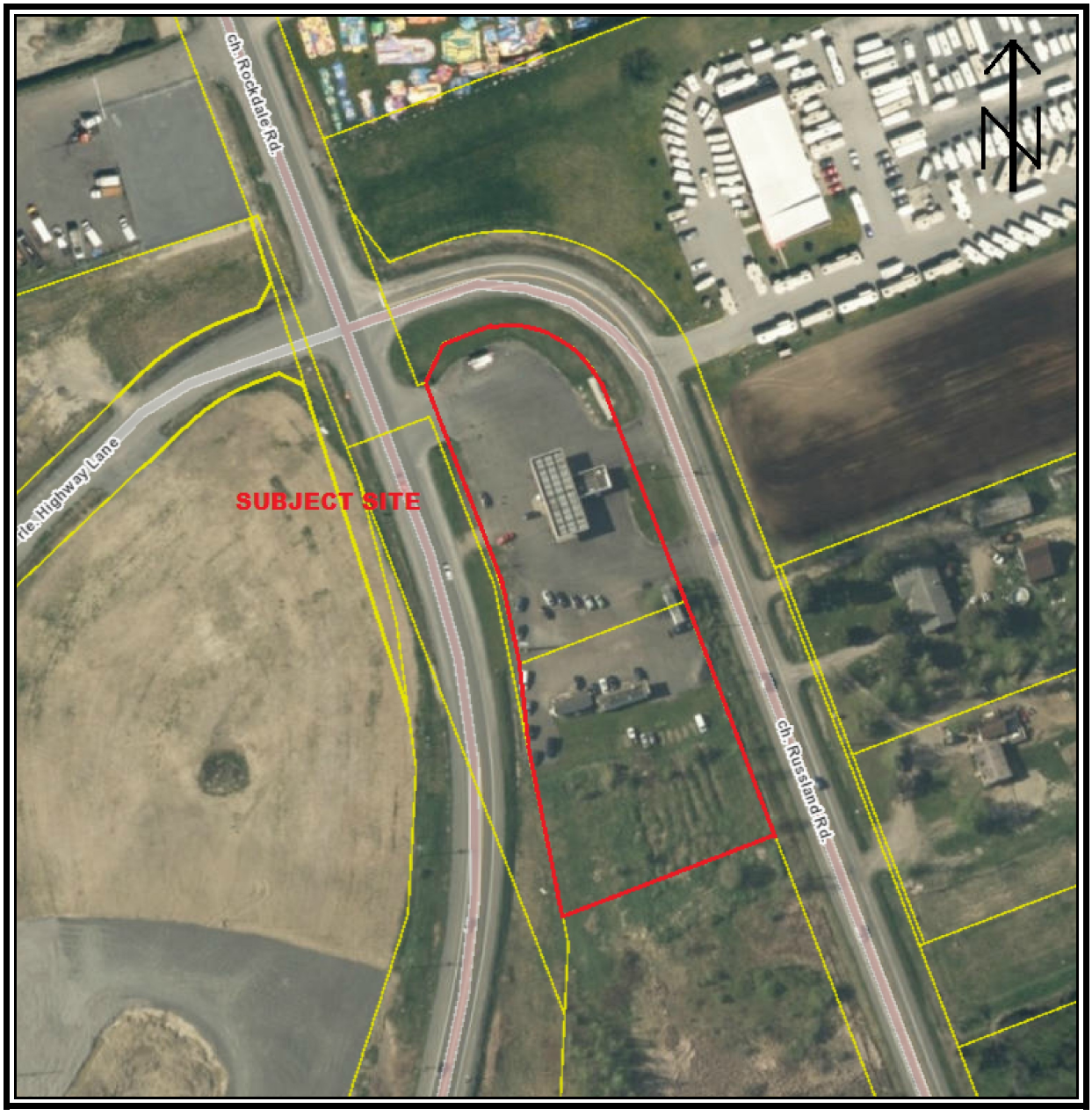


Figure 1: Key Plan

FIELDWORK PROGRAM

As a means to demonstrate the adequacy of the overburden aquifer underlying the subject

lands, with respect to water quality and quantity, a shallow dug well was constructed by Maurice Cayer Ltd on March 16, 2018. The dug well (TW 1) was constructed adjacent to the northwest corner of the subject site and is located greater than 30 m from the proposed fuel tanks and the proposed sewage system. The Ministry of Environment, Conservation and Parks (MECP) Water Well Record (WWR) indicates the well extends 4.9 m below the existing ground surface. The inside diameter of the well is 1.2 m and consisted of three tiles of 1.8 m height. See Paterson Drawing PH3333-3 for the approximate location of TW 1.

The tiles were set into limestone bedrock to a depth of approximately 1.2 m. Bedrock was encountered at 4.3 m depth and the casing extends down to approximately 5.3 m depth. The overburden material around the well casing consisted of a yellow sand to grey sand with some clay. A copy of the WWR can be found attached.

There is an existing drilled well on the site that is located west of the existing fuel bar and convenience store, and is located at the west edge of the asphalt parking area. The well is fully accessible with the 150 mm diameter steel casing extending approximately 200 - 300 mm above the existing ground surface. Due to the poor quality of water supply from the existing drilled well and the known poor water quality of the bedrock aquifer in the area, the owner elected to proceed with the installation of a dug well.

The ground surface surrounding the well is to be mounded appropriately to shed melt water away from it, and it is recommended to dump/stockpile snow away from the well. Existing grading is already designed to shed road water away for the well location along Russland Road. Four bollards should be placed around the well for additional protection and the locations of the bollards are to be determined at the time of construction. The site plan currently indicates evenly spaced bollards around the well, however, alternate spacing may be used at the time of construction to appropriately protect the well.

As a means to evaluate the water supply aquifer intercepted by the new well (TW 1), the well was subjected to a 6 hour constant rate pumping test. The pumping test was conducted on May 1, 2018 under the full-time supervision of Paterson.

Maurice Cayer Ltd. was retained to supply a submersible pump and generator for the pumping test. The submersible pump was placed approximately 0.3 m off the base of the well. The discharge hose was directed to the adjacent ditch along Russland Road in a downgradient direction based upon the slope of the existing landscaping and ditch. The discharge location was approximately 24 m downgradient of the well with the discharged water heading southward along Russland Road.

The pumping test (May 1, 2018) was carried out at a pumping rate of 22.5 L/min for a duration of 6 hours. Thereafter the pumping rate was lowered to 9 L/min for an additional 2.5 hours to determine if the turbidity level could be reduced. Additional pumping was

performed on May 9, 2018, in an attempt, to reduce the turbidity level and to recover a bacteriological sample. During the pumping test, the pumping rate was periodically measured using the timed volume correlation method. The pump rate was maintained within 5% of the selected pump rate. The static water level was recorded and an electronic datalogger (Schlumberger Micro-Diver) was installed in the test well prior to the start of the pumping test. The data logger recorded water levels at 15 second intervals. In addition, manual water level readings were taken at periodic intervals during the test.

Recovery data was collected for the well following the completion of the pumping. The well was noted to have achieved approximately 95% recovery approximately 85 minutes after the completion of the first pumping test. Further development of the well was performed and the water level was monitored for several days after the completion of the pumping.

Groundwater samples were collected at 3 hours and 8.5 hours after the start of pumping. Prior to collection of the groundwater samples, the free chlorine residual was tested and found to be within a range of 7.7 mg/L at the 3 hour mark and dropped to 0.06 mg/L by the end of the 8.5 hour period. The additional pumping, carried out on May 9, 2018, extended for a period of 7 hours, after which the free chlorine residual was verified to be non-detectable. The water samples were submitted for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with the standard 'Subdivision Supply' suite of parameters and additional parameters for VOCs and PHCs F1-F2.

An additional sample was taken of the raw water from the existing drilled well. There is no WWR available at the time of writing this report.

All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to the Eurofins laboratory in Ottawa. All samples were received by the laboratory within 24 hours of collection.

Furthermore, a series of field testing of the pumped water were carried out at the well head. The parameters tested at the well head included: pH, total dissolved solids, conductivity, turbidity and temperature.

AQUIFER ANALYSIS

Water Quantity

Pumping test data was analyzed using AquiferTest Pro (v. 2016.1) aquifer analysis software package by Schlumberger Water Services. Drawdown data was measured using an electronic water level tape and an electronic datalogger unit was also used to monitor drawdown in the test well.

TABLE 1:SUMMARY OF WATER SUPPLY AQUIFER CHARACTERISTICS OF TW1

AQUIFER PARAMETER	RESULT OF ANALYSIS
Transmissivity (m^2/day)	1.33×10^2
Pumping Rate (L/min)	22.5
Pre-test Static Water Level (m)	2.08
Post-test Static Water level (m)	2.83
Available Drawdown (s) (m)	3.41
% Drawdown During Pumping Test	22.0
Specific Capacity (L/min/m drawdown)	30.0

The drawdown data was analyzed using the Theis with Jacob Correction, and the Papadopulos & Cooper methods of analysis. Aquifer transmissivity is estimated to be approximately 133 m^2/day.

The pumping test results show that test well TW1 has a high yield. Drawdown at a pumping rate of 22.5 L/min for 6 hours was 0.75 m and was used for the analysis. 95% recovery was achieved approximately 85 minutes after the end of pumping. Additional pumping was completed subsequent to the 6 hour period in an attempt to reduce turbidity with further development for a total of 8.5 hours. The total volume of water pumped during the 8.5 hour pumping event was approximately 9,450 L. The proposed daily sewage design flow is 9,145 L. As the pumped volume exceeded the maximum daily sewage design flow with minimal drawdown (0.03 m) from the 2.0 hour to the 8.5 hour mark, the well is considered adequate in regards to quantity. Additionally, Part 8 of the Ontario Building Code typically overestimates the daily sewage design flows. As the washroom is based upon keyed access, it is not expected that the design flows will be achieved.

As the pumping test was completed on a dug well, the well storage of the existing dug well must be considered. The well storage of the existing dug well is approximately 3,639 L, equating to 2.6 well volumes being removed from the well prior to the termination of the pumping test.

The suitability of the aquifer to supply the proposed re-development was assessed based upon the methodology provided in MOECC Procedure D-5-5 (MOEE, 1996) and the proposed sewage daily design flows of 9,145 L/day. The usage of the water supply is proposed to be for the Service Station consisting of the gas bar at 560 L/day per gas nozzle (total of 12 nozzles), the convenience store at 155 m^2 at 5 L/day and two staff at 75 L/day. The water supply is intended to be used for hand washing and toilet supply only. The owner intends on importing bottled water for drinking purposes.

Based on the information summarized in Table 1, it is readily apparent that the new water supply well has intercepted a strong water supply aquifer which has more than sufficient quantity to service a fuel service station's needs of pump servicing, hand washing and bathroom facilities. The transmissivity aquifer parameter suggests a strong aquifer which is able to transmit significant quantities of water relatively quickly. It should be noted that the overburden aquifer's quantity may vary seasonally.

As per City comments, further recommendations have been provided related to long term measures related to quantity. It is recommended that the owner measure the water well levels in the well from a consistent location and measuring device. A record should be kept to track historical levels and determine what typical seasonal variations exist. The water usage should be metered to record daily usage and should be maintained in a logbook. These records should be recorded indefinitely.

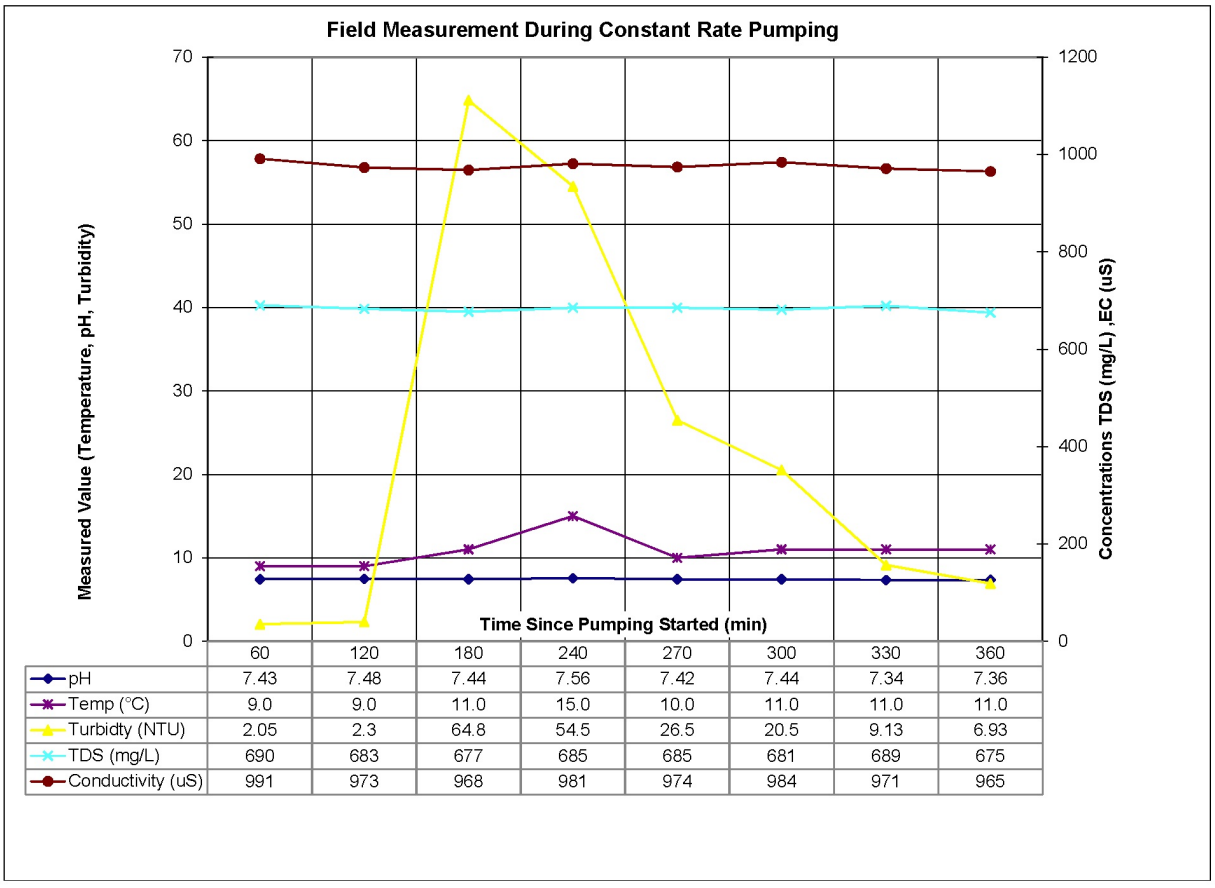
In order to mitigate potential long term water supply issues, a plan should be prepared by the owner to have available a temporary water storage tank. Due to the daily design flows of the sewage system, it is impractical to suggest that the tank should be placed indoors. An exterior area should be made available with plumbing access for a temporary above ground storage tank or a permanent below ground storage tank, if necessary. It is recommended to monitor the groundwater levels to determine a seasonal baseline in conjunction with daily usage.

If the storage volume drops below 50% of the typical seasonal baseline, daily water level readings should be instituted. If the water draw continues to deplete the available water supply, it is recommended to calculate the potential rate of depletion and that additional supply be provided prior to the water level falling below the pump intake.

Water Quality

Field Data

Turbidity, electrical conductivity, total dissolved solids, pH and temperature were measured at the wellhead during the pumping test. The measurements and time intervals for each of these parameters are summarized on the graphical representation in Figure 2. In addition, chlorine test strips and a Hach Colorimeter II were used to measure the chlorine residual level. No chlorine residual was detected in the discharge water prior to the collection of the bacteriological water sample recovered at the end of the May 9 pumping event.



	60	120	180	240	270	300	330	360
pH	7.43	7.48	7.44	7.56	7.42	7.44	7.34	7.36
Temp (°C)	9.0	9.0	11.0	15.0	10.0	11.0	11.0	11.0
Turbidty (NTU)	2.05	2.3	64.8	54.5	26.5	20.5	9.13	6.93
TDS (mg/L)	690	683	677	685	685	681	689	675
Conductivity (uS)	991	973	968	981	974	984	971	965

Figure 2: Field Measurement During Constant Rate Pumping

Laboratory Data

The laboratory water quality, from the standard subdivision package, obtained from the pumping test of TW 1 is provided in Table 2 below and the full laboratory analyses reports that include the VOCs and PHC results can be found attached. The existing drilled well on the property was sampled to determine a comparison of the groundwater aquifer quality and the overburden aquifer quality with the sample WS#3 taken from the existing service

station bathroom tap. There is no water treatment system within the existing Service Station.

The initial pumping test of TW1 contained a free chlorine residual at the completion of the pumping test and bacteriological testing was not performed on samples WS#1 or WS#2. Subsequent pumping to reduce turbidity and the free chlorine residual was performed with the bacteriological analysis results shown in Table 3 under WS#4.

TABLE 2: GROUNDWATER GEOCHEMISTRY (TW 1 AND EXISTING DRILLED WELL)

PARAMETER	UNITS	ODWS		TW # 1		Existing Drilled Well
		LIMIT	TYPE	1-May-18 WS#1 (3hr)	1-May-18 WS#2 (8.5hr)	1-May-18 WS#3
MICROBIOLOGICAL						
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	-	-	-
Total Coliforms	ct/100mL	0	MAC	-	-	-
GENERAL CHEMICAL - HEALTH RELATED						
Fluoride	mg/L	1.5(2.4)	MAC	0.15	<0.10	<0.10
N-NO2 (Nitrite)	mg/L	1	MAC	<0.10	<0.10	<0.10
N-NO3 (Nitrate)	mg/L	10	MAC	0.35	0.22	<0.10
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	18.2	9	8.8
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	45.2	17.4	-
N-NH3 (Ammonia)	mg/L			0.03	0.10	1.2
Total Kjeldahl Nitrogen	mg/L			0.5	0.5	1.6
GENERAL CHEMICAL - AESTHETIC RELATED						
Hardness (as CaCO3)	mg/L	100	OG	568	551	582
Ion Balance	unitless			0.92	0.9	0.9
Total Dissolved Solids	mg/L	500	AO	1,480	1,490	1,850
Alkalinity (as CaCO3)	mg/L	500	OG	330	418	503
Chloride	mg/L	250	AO	567	554	607
Colour	TCU	5	AO	<2	2	5
Conductivity	uS/cm			2,270	2,290	2,850
pH	unitless	6.5-8.5	AO	7.82	7.79	7.74
Sulphide	mg/L	0.05	AO	0.03	<0.02	0.47
Sulphate	mg/L	500	AO	54	82	53
Calcium	mg/L			196	191	177
Iron	mg/L	0.3	AO	0.36	0.22	0.77
Potassium	mg/L			14	7	9
Magnesium	mg/L			19	18	34
Manganese	mg/L	0.05	AO	0.5	0.42	1.22
Sodium	mg/L	200	AO	236	275	313
Phenols	mg/L			<0.001	<0.001	<0.001
Tannin & Lignin	mg/L			<0.1	0.1	0.5
Dissolved Organic Carbon	mg/L	5	AO	3.3	3.7	7.1

1. ODWS identifies the following types of parameters:
   MAC=Maximum Allowable Concentration
   AO = Aesthetic Objective
   OG= Operational Guideline
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective

TABLE 3: GROUNDWATER GEOCHEMISTRY (TW 1)				
PARAMETER	UNITS	ODWS		TW # 1
		LIMIT	TYPE	9-May-18
				WS#4 (7 hr)
MICROBIOLOGICAL				
Escherichia Coli (E.Coli)	ct/100mL	0	MAC	0
Total Coliforms	ct/100mL	0	MAC	0
GENERAL CHEMICAL - HEALTH RELATED				
Fluoride	mg/L	1.5(2.4)	MAC	-
N-NO2 (Nitrite)	mg/L	1	MAC	-
N-NO3 (Nitrate)	mg/L	10	MAC	-
Turbidity (Laboratory)	NTU	1.0 (5.0)	MAC/AO	-
Turbidity (Field)	NTU	1.0 (5.0)	MAC/AO	1.2
N-NH3 (Ammonia)	mg/L			-
Total Kjeldahl Nitrogen	mg/L			-
GENERAL CHEMICAL - AESTHETIC RELATED				
Hardness (as CaCO3)	mg/L	100	OG	-
Ion Balance	unitless			-
Total Dissolved Solids	mg/L	500	AO	-
Alkalinity (as CaCO3)	mg/L	500	OG	-
Chloride	mg/L	250	AO	-
Colour	TCU	5	AO	-
Conductivity	uS/cm			-
pH	unitless	6.5-8.5	AO	-
Sulphide	mg/L	0.05	AO	-
Sulphate	mg/L	500	AO	-
Calcium	mg/L			-
Iron	mg/L	0.3	AO	-
Potassium	mg/L			-
Magnesium	mg/L			-
Manganese	mg/L	0.05	AO	-
Sodium	mg/L	200	AO	-
Phenols	mg/L			-
Tannin & Lignin	mg/L			-
Dissolved Organic Carbon	mg/L	5	AO	-
1. ODWS identifies the following types of parameters:				
MAC=Maximum Allowable Concentration				
AO = Aesthetic Objective				
OG= Operational Guideline				
2. Shaded Concentration Indicates an Exceedance of the ODWS Objective				

Two water samples were recovered during the initial pumping test of the well and submitted for laboratory analyses. The laboratory groundwater geochemistry results can be found attached.

The water quality of the subject water supply well meets all the Ontario Drinking Water Standards maximum acceptable concentrations (MAC). Furthermore, the water meets all the aesthetic objectives (AO) and operational guidelines (OG) with the exception of the following:

- ❏ hardness;
- ❏ TDS;
- ❏ chloride;
- ❏ iron;
- ❏ manganese; and
- ❏ sodium.

Exceedances of the above parameters are typical of the water supply in the subject aquifer. Each of these groundwater parameters are discussed in detail below.

Hardness

Hardness, expressed as calcium carbonate, an operational guideline, does not appear in the ODWS. Rather, it appears in the Technical Support Documents for Drinking Water Standards, Objectives and Guidelines (Technical Support Documents) as a parameter with an operational guideline of 100 mg/L. At the measured concentration of 568 and 551 mg/L, the water is considered to be hard to very hard, however it is exceeding the reasonable treatable limit of 500 mg/L, specified in Table 3 of the MOECC guidance document Procedure D-5-5 (1996), by a small margin. The hardness concentration can be treated using modern conventional water softener technologies.

TDS

Total dissolved solids (TDS) refers to the concentration of inorganic substances dissolved in water. The main constituents are typically chloride, sulphates, calcium, magnesium and bicarbonates. Water with a TDS concentration above 500 mg/L of TDS may not be palatable. Procedure D-5-5 does not provide a 'treatability limit' for TDS, but it does require written rationale that corrosion, encrustation or taste problems will not occur.

The Langelier Saturation Index (Langelier, 1936) is used to predict the calcium carbonate stability of water. It indicates whether the water will precipitate, dissolve or be in equilibrium with calcium carbonate.

The results of the Langelier calculation (LSI = 0.8) indicate the water is super saturated

and tends to precipitate a scale layer of calcium carbonate (scale forming and non-corrosive). See attached Langelier calculations for further details.

The presence of TDS in drinking water contributes to the palatability of the water and is strictly an aesthetic parameter. Generally, water with TDS levels in excess of 1,200 mg/L is considered to be unacceptable, however, the palatability of the water is dependant upon the user. The TDS level in the subject water supply was measured to be 1,490 mg/L, which may impact the taste of the drinking water to some users. If desired, a point-of-use reverse osmosis treatment unit can be used to reduce the TDS levels at a designated drinking water tap. However, the proposed usage of the water supply is currently for hand washing and bathroom usage.

Chloride

Chloride (Cl), an aesthetic parameter, was detected in the laboratory test sample at a concentration of 567 and 554 mg/L, which exceeds the ODWS aesthetic objective of 250 mg/L. The World Health Organization prepared a document “Chloride in Drinking-water” dated 1996 that concludes chloride concentrations in excess of 250 mg/L may potentially provide a detectable taste in the water. Consumers may become accustomed to chloride concentrations that exceed 250 mg/L. WHO noted that they would not be proposing limits for chlorides in drinking water. If desired, a reverse osmosis system would be able to reduce chloride levels.

Iron

An iron concentration of 0.36 and 0.22 mg/L was measured at the 3 and 8.5 hour interval, which is slightly above and below the aesthetic objectives in the ODWO. Concentrations exceeding the aesthetic objective of 0.3 mg/L may contribute to staining of plumbing fixtures and laundry. As per D-5-5, the results are below the level considered to be reasonably treatable. A conventional water softener can be used to reduce the levels of iron.

Manganese

The manganese concentration results of 0.5 and 0.42 mg/L is above the aesthetic objectives in the ODWO. Concentrations exceeding the aesthetic objective of 0.05 mg/L may contribute to staining of plumbing fixtures and laundry. As per D-5-5, the results are well below the level considered to be reasonably treatable (1.0 mg/L). A conventional water softener can be used to reduce the levels of manganese.

Sodium

Sodium (Na), an aesthetic parameter, was detected in the laboratory test sample at a concentration of 236 and 275 mg/L, which exceeds the ODWS aesthetic objective of 200 mg/L. Although sodium is not toxic and no maximum acceptable concentration has been set, concentrations above 20 mg/L require that the Medical Officer of Health be notified of the water quality results, so that this information may be passed on to local physicians for use in treatment of those requiring a sodium-restricted diet.

Turbidity

Turbidity, which is generally an aesthetic parameter, was detected in the laboratory test samples at values of 18.2 and 9.0 NTU at the 3 and 8.5 hour tests. The field results showed that turbidity increased around the 2.0 to 6.5 hour period of the initial test. Continued pumping showed a steady decrease towards the end of the pumping test. Field tests initially showed values of 1.15 to 2.05 NTU during the second pumping test over a seven hour period.

The ODWS maximum acceptable concentration for turbidity in drinking water entering the distribution system is 1 NTU. The Aesthetic Objective for turbidity in drinking water reaching the consumer is 5 NTU. In accordance with Procedure D-5-5, Table 2 does not reflect a maximum concentration considered reasonably treatable for turbidity. Rather, Procedure D-5-5 indicates that “particular care must be taken during testing to ensure that the bacteria requirements of Table 1 are met.” Based on the test results, the bacteria requirements of Table 1 of D-5-5 have been met (E.Coli = 0 and Total Coliforms = 0).

It should be noted that the field turbidity testing indicated that the turbidly level reduced significantly during the pumping event. The field turbidity of 70.3 and 17.4 NTU was measured at the well head at approximately the 6 hour and 8.5 hour interval, respectively. Approximately 1 week after completion of the pumping test, the turbidity level was measured at 1.15 to 2.05 NTU. The high turbidity levels are related to sediment being mobilized and flushing into the well from the initial well construction. Further development of the well is expected to further reduce the turbidity levels.

EXISTING DRILLED WATER WELL SUPPLY

The existing drilled water well supply at the subject site is currently used for only hand washing and bathroom needs. When comparing the existing drilled well water supply to the proposed supply (TW 1), the existing drilled water well samples show exceedances for the same categories (Turbidity, Hardness, TDS, Chloride, Iron, Manganese and Sodium) as the proposed water well supply and also for Dissolved Organic Carbon (DOC) and Hydrogen Sulphide. The higher concentration of hydrogen sulphide was found in the existing drilled supply well. It was noted that the existing drilled supply has been in use for many years and is exhibiting worse water quality than the proposed water supply. There is no treatment system in place and the Service Station bathroom has a distinct odour of hydrogen sulphide (rotten eggs). This odour is common in other drilled wells in the area. Table 2 provides a comparison of the existing supply and TW 1 results.

The existing drilled water well supply will be retained for use. A portable hose for hand washing of cars only will be installed in this well.

CONCLUSIONS

Based on the information contained within the body of this report, the following conclusions can be drawn:

1. The water supply aquifer intercepted by TW 1 is considered to be adequate to support the proposed service station in the long term. However, seasonal variations of water quality and quantity in shallow aquifers may occur. The owner should monitor water levels weekly and maintain a log of readings. The water usage should be metered and recorded daily. The readings will form a seasonal baseline for the water supply. If the available supply should decrease below 50% of the baseline volume, daily readings should be performed to determine the potential rate of depletion. A temporary water supply should be provided prior to the water supply dropping below the pump intake.
2. It is recommended that the dug well water supply be used for hand washing and toilet use only. Disinfection (Ultraviolet treatment) is recommended and signs indicating the water is to be used for hand washing and toilet use only must be posted. Access to the bathroom will be restricted by key access through a request to an employee and is not considered a public supply.
3. All food and water used for consumption on site are to be shipped to site in single use containers/packaging. There is no preparation of food planned on site. Any public use of water will be through bottled water shipped to site. Slushies, coffee, ice cream, tea and any other beverage or liquid that could conceivably be produced in this setting will specifically be produced using bottled water that has been shipped to site in a sealed container from an approved potable supply.
4. The preferred water supply aquifer intercepted by TW 1 contains a water supply that contains only elevated concentrations of aesthetic parameters (Hardness, TDS, chloride, iron, manganese and sodium). Some of the concentrations are above the reasonable treatable limits of D-5-5, but they can be removed by readily available water conditioning equipment.
5. A water softener is recommended to facilitate the removal of the hardness, iron and manganese concentrations.
6. Turbidity had reduced to below 2 NTU during the further development of the well and it is expected to reduce upon further development of the well.
7. The sodium concentrations were measured to be above the 20 mg/L reporting limit and, as such, the Medical Officer of Health for the City of Ottawa should be informed to assist area physicians in the treatment of local residents on sodium reduced diets. However, the water supply is not to be used as a potable water supply.
8. The results of the water supply assessment have provided satisfactory evidence that the water supply aquifer underlying the subject lands can support the redeveloped property with respect to water quality and quantity for the proposed usage of hand washing and toilet flushing.

9. The existing drilled well is to be maintained as per O.Reg 903.

We trust that this satisfies your present requirements. Should you have any questions regarding this submission, please do not hesitate to contact the undersigned.

Yours truly,

PATERSON GROUP INC.

Michael S. Killam, P. Eng.

Attachments:

- MECP Water Well Record
- Eurofins Certificate of Analysis
- AquiferTest Pro - Pumping Test Analysis Reports
- Langelier Saturation Index Calculation
- Paterson Drawing PH3333-1
- Paterson Drawing PH3333-2
- Paterson Drawing PH3333-3