Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 721-7863	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 721-7864	FAX: (905) 542-2769

April 16, 2024

13750701 Canada Inc.
c/o Candevcon Group Inc.
9358 Goreway Drive
Brampton, Ontario
L6P 0M7

Attention: Mr. Steven Giankoulas

Re: Nitrate Loading Impact Assessment
4646 County Road 2
Municipality of Port Hope

Dear Sir:

Soil Engineers Ltd. (SEL) was retained by 13750701 Canada Inc., c/o Candevcon Group Inc., to conduct a Nitrate Loading Impact Assessment for the proposed subdivision development at the property located at the southeast corner of the intersection of Dale Road and County Road 2, approximately 900 m north of Highway 401(the Subject Site). **Drawing No. 1** shows the location of the Subject Site.

1.0 INTRODUCTION

Based on the review of the Draft Plan of Subdivision, prepared by Candevcon Group Inc., dated April 25, 2024, and per the oral communication (phone call) with the Mr. Ramesh Konda on May 24, 2024, it is understood that the existing dwelling will be retained, and the remaining of the Subject Site will be developed into a residential subdivision with 11 lots with one (1) level of basement, an access roadway and municipal services. The Subject Site is 3.93 ha (39,300 m^2) in area. The revied plan is provided in **Appendix A**. It is also understood the proposed lots will be provided with individual onsite sewage system (Septic Beds).

SEL has previously completed a hydrogeological assessment for the Subject Site, and the findings are presented in a report titled:" *A Hydrogeological Assessment, Proposed Residential subdivision, 4646 County Road 2, Municipality of Port Hope, ON.*", dated July 23, 2024 (SEL Reference No. 2402-W021).

2.0 SCOPE OF WORK

The nitrate loading impact assessment was completed for the proposed in-ground septic sewage system and assessed the Subject Site's attenuation capacity for septic effluent disposal on the Subject Site, prior and following site development. The assessment was undertaken in accordance with the Ministry of Environment, Conservation and Parks (MECP) Procedure D-5-4 *'Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment'*.

3.0 GROUNDWATER QUALITY SAMPLING AND ANALYSIS

The groundwater samples were collected from the three (3) installed monitoring wells at BH/MW 2, 3 and 4 installed as a part of the above noted hydrogeological assessment. **Drawing No. 2** presents the monitoring wells' location. The results of the groundwater quality assessment for the selected parameters are presented in **Table 1**.

The groundwater samples were collected and packed in ice at about 9° C for shipment to the analytical laboratory where they were analysed for nutrient parameters including; nitrate nitrite, ammonia, TKN pH and total phosphorus. Sample analysis was completed by SGS, a third-party laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). The certificate of analysis is provided in **Appendix B**. The chain of custody Number for the groundwater samples is 039443.

Table 1 – Summary of the Groundwater Nitrate Concentration Results

Well ID	Sample Date	Background Nitrate concentration (mg/L)
BH/MW 2	August 27, 2024	2.56
BH/MW 3	August 27, 2024	0.083
BH/MW 4	August 27, 2024	0.156

The concentration of nitrate in shallow groundwater ranges from 0.083 mg/L to 2.56 mg/L. The Ontario Drinking Water Quality Standards (ODWS), Objectives and Guidelines 2006 (O. Reg 169/03) for nitrate is 10 mg/L. The background nitrate results for all the monitoring wells do not exceed the ODWS.

4.0 REASONABLE USE CRITERIA

Nitrate-nitrogen is considered the critical contaminant in this model and is considered a conservative anion because it is not adsorbed by soil in the subsurface, nor does it degrade quickly in a groundwater environment. The maximum permitted nitrate level at the hydraulically downgradient property boundary is 10 mg/L (based on the ODWS for nitrate). Based on the groundwater quality test results, maximum background nitrate (using reasonable use criteria) at the downgradient boundary of the Subject Site using average nitrate concentration reaches 3.39 mg/L.

5.0 NITRATE LOADING IMPACT MASS BALANCE

A mass balance assessment was conducted for nitrate to determine the anticipated concentration that can be predicted at the hydraulically downgradient property boundary based on the establishment of a certain number of proposed housing lots, each serviced by individual, on-site septic sewage systems. The assessment assumes natural attenuation for nitrate in shallow groundwater through its dilution, from the input of precipitation recharge to groundwater and from sewage system loading from the proposed established homes.

A monthly water balance model (the Thornthwaith water-balance program) provided by the U.S. Geological Survey (USGS, 2007) was used to determine the average infiltration rate at the Subject Site. Long-term precipitation data was collected from the Canadian Climate Normal between 1981 and 2010 from the Government of Canada website for the Cobourg weather station (Climate ID No. 6151689).

The assumed loading rate of the sewage system is 8,760,000.0 L/year for 12 lots with 4-bedroom houses, consisting of 2000.0 L/day for each lot with a 4-bedroom house as per Ontario Building Code. The approximate infiltration rate for the Subject Site was determined based on the 30-year climate normal for

precipitation, as presented in **Appendix C**. A mass balance calculation was conducted for nitrate at the Subject Site which is based on the use of both conventional and tertiary pre-treatment for sewage effluent input to septic leaching beds, with the concentration of nitrate loading to groundwater set at 40 mg/L for conventional effluent treatment and at 20 mg/L and 15 mg/L for tertiary effluent pre-treatment, respectively. The mass balance calculations are provided in Appendix C with the expression defined below.

$$Cpb= [(Ci \times Vi) + (Cs \times Vs)]/[Vi + Vs]$$

Where:

- Ci = Concentration of nitrate in precipitation, taken at 0.1 mg/L
- Vi= Annual volume of recharge (i.e., Site Area less impervious surfaces x annual infiltration rate (litres)
- Cs = Nitrate concentration in sewage set at 40 mg/L for conventional septic systems and at 20 mg/L and 15 mg/L for septic systems having tertiary pre-treatment
- Vs = Volume of sewage 8,760,000.0 L/year for twelve (12) lots within the Subject Site, where 2,000.0 L/day of sewage will be taken for each residential lot with 4 bedrooms as per Ontario Building Code
- Cpb = Concentration modelled for the property boundary based on the mass balance, attenuation approach

Considering the provided information and site statistics, data from the nearby weather station and background groundwater quality SEL has conducted mass balance calculation assuming conventional, tertiary and advanced tertiary sewage treatment loading. Assumptions and findings are presented in **Table 2**.

Table 2 - Summary of the Nitrate Load Impact Assessment

Parameters	11 Lots		
Total Lot Area (m^2)	39,300.00		
Net Recharge Area (m^2)*	39,300.00		
Annual Water Surplus (mm/year)	352.00		
Total Discharge Flow to the Septic Beds (L/year)	8,760,000.00		
Former MOE Factor**	0.55		
Average Background Nitrated in Groundwater (mg/L)***	1.18		
Assumed Nitrate Load based on Loading Methods (mg/L)	**40**	**20**	**15**
Calculated Concentration at Site Boundary (mg/L)	21.45	10.75	8.07
Calculation considering Average Background Nitrate (1.18 mg/L)	22.63	11.93	9.25

* Assuming generated runoff from the proposed development area will be managed within the Subject Site.
** Based on the soil type, site slope and vegetation
*** Based on results at BH/MW 2, 3 and 4 in SGS Certificate of Analysis No. CA40220-AUG24 R, dated September 6, 2024.

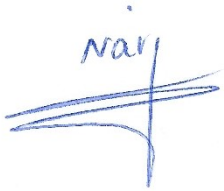
Based on the above analysis, the predicted results for the use of the sewage systems with any of the nitrate concentration in septic bed effluent 15 mg/L meets the ODWS of 10 mg/L limits. However, the predicted results for the use of a sewage system with nitrate concentration in septic bed effluent of 40 mg/L and 20 mg/L exceeds the ODWS of 10 mg/L.

For this assessment, additional dilution from assessed groundwater underflow beneath the site has not been considered, so the results are considered a conservative evaluation.

6.0 CLOSURE

We trust that the above-noted information is suitable for your review. If you have any questions regarding this information, please do not hesitate to contact the undersigned.

Yours truly,
SOIL ENGINEERS LTD.



Daixi Zhang, B.Sc., GIT
Project Manager-Hydrogeological Services

Narjes Alijani, M.Sc., P.Geo.
Department Manager-Hydrogeological Services

ENCLOSURES:

Subject Site Location Plan…….…….…… Drawing No. 1
Borehole, and Monitoring Well Location Plan …… Drawing No. 2
Revied Plans …… Appendix A
Groundwater Quality Test Results…… Appendix B
Nitrate Loading Impact Assessment Balance…… Appendix C

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DRAWINGS

REFERNCE NO. 2402-W021

713000

714000

4873000

4872000

PEARCE ROAD

CHOATE ROAD

DALE ROAD

COUNTY ROAD 10

COUNTY ROAD 2

FOX ROAD

GUIDEBOARD ROAD

Tributary of Lake Ontario

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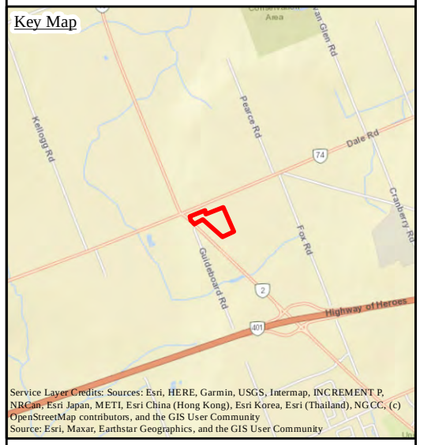
N

References: Ontario Ministry of Natural Resources and Forestry

Key Map



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Waterbody
- Watercourse

Soil Engineers Ltd.

Site Location Plan

Hydrogeological Assessment
Proposed Residential Development
4646 Country Road 2
Municipality of Port Hope

Reference No. 2402-W021

Date: May 22, 2024

Scale:

0 30 60 120 180 240 300
Metres

Drawing No. 1

713300 713400 713500 713600

4872500 4872400 4872300

DALE ROAD

EXISTING RESIDENTIAL

EXISTING AGRICU

LOT 1 (2607m²)

LOT 2 (2433m²)

38.5m

LOT 12 (3657m²)

LOT 11 (3038m²)

LOT 10 (2606m²)

LOT 9 (2911m²)

LOT 8 (2827m²)

LOT 7 (2672m²)

LOT 6 (2414m²)

LOT 5 (2618m²)

LOT 4 (2827m²)

LOT 3 (2860m²)

84.8m 40.0m 40.0m 73.3m 40.0m 60.8m 40.0m 55.8m 52.5m 52.5m 64.9m 70.3m 75.3m 40.0m 40.0m

18.0m

BH/MW 1

BH/MW 2

BH/MW 3

BH/MW 4

BH/MW 5

EXISTING RESIDENTIAL

COUNTY ROAD 2

GUIDEBOARD ROAD

EXISTING

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N

References: Ontario Ministry of Natural Resources and Forestry
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Key Map

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Watercourse
- Borehole With Monitoring Well (5)

Soil Engineers Ltd.

Borehole and Monitoring Well Location Plan

Hydrogeological Assessment
Proposed Residential Development
4646 Country Road 2
Municipality of Port Hope

Reference No. 2402-W021

Date: May 22, 2024

Scale:
0 5 10 20 30 40 50
Metres

Drawing No. 2

Soil Engineers Ltd.
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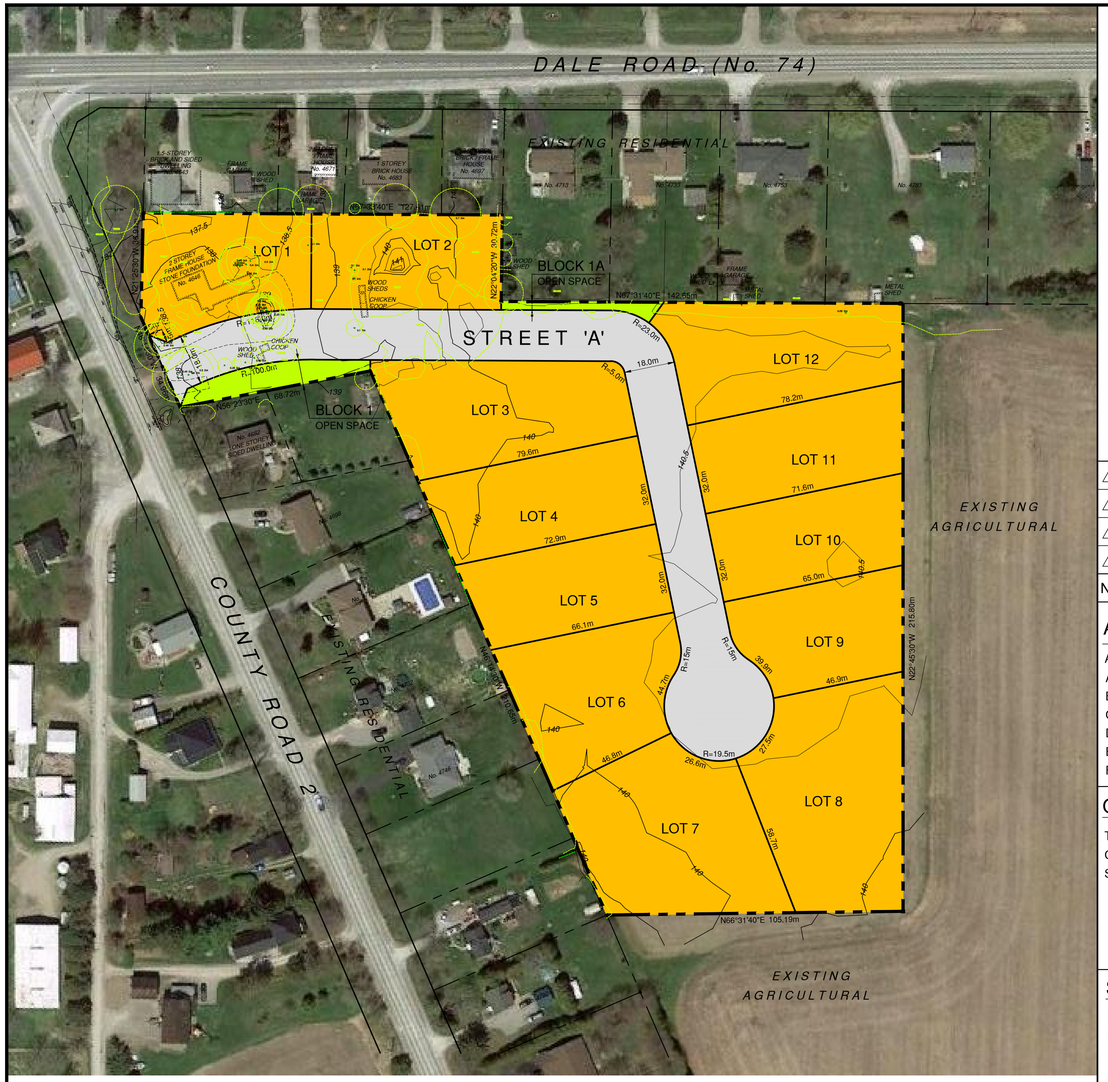
APPENDIX A

REVIEWED PLANS

REFERENCE NO. 2402-W021

SETUP 1:1000m 24x24



KEY PLAN
1:15,000

NO.	DESCRIPTION	DATE	BY
△			
△			
△			
△			

REVISIONS

ADDITIONAL INFORMATION

AS REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT (R.S.O. 1990 C.P. 13)

A) AS SHOWN ON DRAFT PLAN.
B) AS SHOWN ON DRAFT AND KEY PLAN.
C) AS SHOWN ON KEY PLANS.
D) AS SHOWN IN LAND USE SCHEDULE.
E) AS SHOWN ON DRAFT PLAN.
F) AS SHOWN ON DRAFT PLAN.
G) AS SHOWN ON DRAFT AND KEY PLANS.
H) MUNICIPAL SERVICES TO BE PROVIDED.
I) SOIL IS CLAYEY SILT.
J) AS SHOWN ON DRAFT PLAN.
K) MUNICIPAL SERVICES TO BE PROVIDED.
L) NONE.

OWNER'S AUTHORIZATION:

THE UNDERSIGNED, BEING THE OWNER OF THE SUBJECT LANDS HEREBY AUTHORIZE CANDEVCON GROUP INC. TO ACT ON OUR BEHALF AS AGENTS AND TO PREPARE AND SUBMIT A DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

13750701 CANADA INC.

SURVEYOR'S CERTIFICATE:

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJOINING PROPERTIES ARE CORRECTLY SHOWN ON THIS PLAN

DATE

BRETT COONES O.L.S.
J. D. BARNES LIMITED, LAND INFORMATION SPECIALISTS
T: (905) 723-1212 F: (905) 723-4234 www.jdbarnes.com

LOT / BLOCK AREA SCHEDULE

LAND USE	LOT / BLOCK	MINIMUM FRONTAGE	MINIMUM DEPTH	AREA
RESIDENTIAL	LOT 1	52.8m	33.7m	0.23 ha.
RESIDENTIAL	LOT 2	67.5m	33.7m	0.23 ha.
RESIDENTIAL	LOT 3	28.2m	79.6m	0.30 ha.
RESIDENTIAL	LOT 4	32.0m	72.9m	0.24 ha.
RESIDENTIAL	LOT 5	32.0m	66.1m	0.22 ha.
RESIDENTIAL	LOT 6	44.7m	46.8m	0.27 ha.
RESIDENTIAL	LOT 7	26.6m	46.8m	0.37 ha.
RESIDENTIAL	LOT 8	27.5m	46.9m	0.39 ha.
RESIDENTIAL	LOT 9	39.9m	46.9m	0.21 ha.
RESIDENTIAL	LOT 10	32.0m	65.0m	0.22 ha.
RESIDENTIAL	LOT 11	32.0m	71.6m	0.24 ha.
RESIDENTIAL	LOT 12	44.4m	78.2m	0.30 ha.
OPEN SPACE	BLOCKS 1-1A	-	-	0.07 ha.
ROADS	STREET 'A'	-	-	0.63 ha.
TOTAL				3.93 ha.

DRAFT PLAN OF SUBDIVISION

PART OF LOT 13, REGISTERED PLAN No. 52
GEOGRAPHIC TOWNSHIP OF HOPE
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

13750701 CANADA INC.
RESIDENTIAL SUBDIVISION

No. 4646 COUNTY ROAD 2
PORT HOPE

CANDEVCON GROUP INC.
CONSULTING ENGINEERS AND PLANNERS
TEL. (905) 794-0600 FAX (905) 794-0611

SCALE: 1:1000 0m 10 20 30 40 DWG. No. PL-1 △
DATE: APRIL 25th 2024 PROJECT No. W23089

Soil Engineers Ltd.
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APPENDIX B

GROUNDWATER QUALITY RESULTS

REFERENCE NO. 2402-W021

FINAL REPORT

CA40220-AUG24 R

2402-W021, 4646 County Rd 2, Port Hope

Prepared for

Soil Engineers Ltd.

FINAL REPORT

CA40220-AUG24 R

First Page

CLIENT DETAILS

Client	Soil Engineers Ltd.
Address	90 West Beaver Creek Rd Richmond, ON M1S 3A7. Canada
Contact	Gurkaranbir Singh
Telephone	519-731-6442
Facsimile	
Email	gurkaranbir.singh@soilengineersltd.com
Project	2402-W021, 4646 County Rd 2, Port Hope
Order Number	
Samples	Ground Water (3)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA40220-AUG24
Received	08/29/2024
Approved	09/06/2024
Report Number	CA40220-AUG24 R
Date Reported	09/06/2024

COMMENTS

MAC - Maximum Acceptable Concentration
Half MAC - Half of the Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
MDL - SGS Method Detection Limit

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 039443

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

TABLE OF CONTENTS

Client: Soil Engineers Ltd.
Project: 2402-W021, 4646 County Rd 2, Port Hope
Project Manager: Gurkaranbir Singh
Samplers: gs

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	9	10	11
				Sample Name	BH/MW3	BH/MW2	BH/MW4
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	27/08/2024	27/08/2024	27/08/2024
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
General Chemistry							
Total Dissolved Solids	mg/L	30	500		317	471	346
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			0.10	0.10	0.12
Ammonia+Ammonium (N)	as N mg/L	0.04			0.04	< 0.04	< 0.04
Metals and Inorganics							
Nitrite (as N)	as N mg/L	0.003		1	0.003#<MDL	0.003#<MDL	0.003#<MDL
Nitrate (as N)	as N mg/L	0.006		10	0.083	2.56	0.156
Nitrate + Nitrite (as N)	as N mg/L	0.006			0.083	2.56	0.156
Phosphorus (total)	mg/L	0.03			< 0.03	< 0.03	< 0.03
Other (ORP)							
pH	No unit	5	8.5		7.46	7.29	7.33
Chloride	mg/L	0.04	250		2.2	7.4	1.3

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0010-SEP24	mg/L	0.04	<0.04	ND	10	100	90	110	111	75	125
Ammonia+Ammonium (N)	SKA0022-SEP24	mg/L	0.04	<0.04	ND	10	100	90	110	102	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0017-SEP24	mg/L	0.04	<0.04	ND	20	103	90	110	102	75	125
Chloride	DIO0045-SEP24	mg/L	0.04	<0.04	2	20	102	90	110	77	75	125
Nitrate + Nitrite (as N)	DIO0699-AUG24	mg/L	0.006	<0.006	NA		NA			NA		
Nitrite (as N)	DIO0699-AUG24	mg/L	0.003	<0.003	3	20	99	90	110	106	75	125
Nitrate (as N)	DIO0699-AUG24	mg/L	0.006	<0.006	0	20	100	90	110	81	75	125
Chloride	DIO0704-AUG24	mg/L	0.04	<0.04	2	20	102	90	110	103	75	125

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0675-AUG24	No unit	5	NA	0		100			NA		

Phosphorus by SFA

Method: SM 4500-P J I Internal ref.: ME-CA-IENVISFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Phosphorus (total)	SKA0008-SEP24	mg/L	0.03	<0.02	1	10	98	90	110	98	75	125

Solids Analysis

Method: SM 2540C I Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
Total Dissolved Solids	EWL0673-AUG24	mg/L	30	<30	5	20	105	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0017-SEP24	mg/L	0.05	<0.05	3	10	97	90	110	106	75	125

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

No: 039443

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page ____ of ____

Laboratory Information Section - Lab use only

Received By: Scott Ken
Received Date: 08, 29, 2024 (mm/dd/yy)
Received Time: 08:00 (hr : min)
Received By (signature): S
Custody Seal Present: Yes ☐ No ☑
Custody Seal Intact: Yes ☐ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Temperature Upon Receipt (°C): 6.3
LAB LIMS #: CA40220-AUG24

REPORT INFORMATION	INVOICE INFORMATION
Company: SOIL ENGINEERS LTD	☑ (same as Report Information)
Contact: GURKARANBIR SINGH	Company:
Address: 90 West Beaver Creek, Richmond Hill.	Contact:
Phone: 519-731-6442	Address:
Fax:	Phone:
Email: gurkaranbir.singh@soilengineersltd.com	Email:

Quotation #:
P.O. #: 2402-W021
Project #:
Site Location/ID: 4646 County Rd 2, Port Hope

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)
TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days
PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:
*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium/Fine
☐ Table 3 ☐ Agri/Other
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations: ☐ Reg 347/558 (3 Day min TAT) ☐ PWQO ☐ MMER ☐ CCME ☐ Other: ____ ☐ MISA ☐ ODWS Not Reportable *See note

Sewer By-Law: ☐ Sanitary ☐ Storm Municipality: ____

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN,Hg pH,(B(HWS),EC,SAR--soil) (Cl, Na-water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other (please specify)	Other	Other	Other	Other: Sewer Use: Specify pkg:	Other: Water Characterization Pkg General ☐ Extended ☐	SPLP: Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	TCLP: Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	BH/MW 3	Aug 27, 2024	1:00pm	4	GW	N																				
2	BH/MW 2	Aug 27, 2024	12:45pm	4	GW	N																				
3	BH/MW 4	Aug 27, 2024	1:00pm	4	GW	N																				
4																										
5																										
6	* Test for Nutrient parameters including Nitrate, Nitrite, Ammonia,																									
7	Total phosphorus, TKN, Total dissolved solids, Chloride, pH.																									
8																										
9	* Compare to Ontario Safe Drinking water Standards.																									
10																										
11	Thanks																									
12																										

Observations/Comments/Special Instructions

Sampled By (NAME): GS Signature: [signature] Date: Aug 27 / 2024 (mm/dd/yy)
Relinquished by (NAME): GS Signature: [signature] Date: Aug 27 / 2024 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. (2) Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). (3) Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at ____ and conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Soil Engineers Ltd.
CONSULTING ENGINEERS
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BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 721-7863	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 721-7864	FAX: (905) 542-2769

APPENDIX C

NITRATE LOADING IMPACT ASSESSMENT MASS BALANCE

REFERENCE NO. 2402-W021

ADVIANCED TERTIARY EFFLUENT TREATMENT (40 mg/L)

Subject Site Information

Proposed Development: Industrial Building

Total Site Area	39,300.00	m^2	As per Draft Plan of Subdivision, parepared by Candevcon Group Inc., Dated April 25, 2024
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Excluding Natural Features and Protection Area Plan from MNDF

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	352.00	mm/yr	**Infiltr Factors:**	
Former MOE infiltration factor (total)	0.55		Slope	Rolling Land (0.2)
Weighted infiltration to soil	193.60	mm/yr	cover	Cultivated Land (0.1)
			soil	Silty Sand Till (0.25)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Considers Landscape Area Recharges Groundwater
Infiltration of soil	0.1936	m/yr	
Annual Infiltration to site (volume)	7,608.48	m^3/yr	
volume of recharge to soil/groundwater table	**7,608,480.00**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	40	mg/L	
Proposed Area for septic bed	Not Avaliable	m^2	
Assumed loading rate of sewage system	8,760.00	m^3/yr	Assumed Loading Rate of Sewage System (As per Ontario Building Code) (2000.0 L/day for each lot)
assuming industrial development	**8,760,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**21.45**	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
Alternate calculation considering average background nitrate in groundwater	1.18	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
(@1.18 mg/L)	**22.63**	mg/L	

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.

ADVIANCED TERTIARY EFFLUENT TREATMENT (20 mg/L)

Subject Site Information

Proposed Development: Industrial Building

Total Site Area	39,300.00	m^2	As per Draft Plan of Subdivision, parepared by Candevcon Group Inc., Dated April 25, 2024
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Excluding Natural Features and Protection Area Plan from MNDF

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	352.00	mm/yr	
Former MOE infiltration factor (total)	0.55		
Weighted infiltration to soil	193.60	mm/yr	

Infiltr Factors:

Slope	Rolling Land (0.2)
cover	Cultivated Land (0.1)
soil	Silty Sand Till (0.25)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Considers Landscape Area Recharges Groundwater
Infiltration of soil	0.1936	m/yr	
Annual Infiltration to site (volume)	7,608.48	m^3/yr	
volume of recharge to soil/groundwater table	**7,608,480.00**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	**20**	mg/L	
Proposed Area for septic bed	Not Avaliable	m^2	
Assumed loading rate of sewage system	8,760.00	m^3/yr	Assumed Loading Rate of Sewage System (As per Ontario Building Code) (2000.0 L/day for each lot)
assuming industrial development	**8,760,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**10.75**	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
Alternate calculation considering average background nitrate in groundwater	1.18	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
(@1.18 mg/L)	**11.93**	mg/L	

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.

ADVIANCED TERTIARY EFFLUENT TREATMENT (15 mg/L)

Subject Site Information

Proposed Development: Industrial Building

Total Site Area	39,300.00	m^2	As per Draft Plan of Subdivision, parepared by Candevcon Group Inc., Dated April 25, 2024
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Excluding Natural Features and Protection Area Plan from MNDF

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	352.00	mm/yr	
Former MOE infiltration factor (total)	0.55		
Weighted infiltration to soil	193.60	mm/yr	

Infiltr Factors:

Slope	Rolling Land (0.2)
cover	Cultivated Land (0.1)
soil	Silty Sand Till (0.25)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming Collected Water from Rooftop and paved area will be managed on site)	39,300.00	m^2	Considers Landscape Area Recharges Groundwater
Infiltration of soil	0.1936	m/yr	
Annual Infiltration to site (volume)	7,608.48	m^3/yr	
volume of recharge to soil/groundwater table	**7,608,480.00**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	**15**	mg/L	
Proposed Area for septic bed	Not Avaliable	m^2	
Assumed loading rate of sewage system	8,760.00	m^3/yr	Assumed Loading Rate of Sewage System (As per Ontario Building Code) (2000.0 L/day for each lot)
assuming industrial development	**8,760,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**8.07**	mg/L	**<10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
Alternate calculation considering average background nitrate in groundwater	1.18	mg/L	**<10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)
(@1.18 mg/L)	**9.25**	mg/L	

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.