

311 VICTORIA STREET NORTH KITCHENER / ONTARIO / N2H 5E1 519-742-8979

TECHNICAL MEMORANDUM

File: 1755, Rev. 2

Date: June 6, 2025

Attn: Mr. Wes Hordyk HIP Developments 74 Grand Avenue South, Suite 201 Cambridge, Ontario N1S 0B7

Re: Groundwater Level Monitoring Program – Summary Proposed Residential Development 105 Elmira Road North, Guelph, Ontario

Project Overview

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) was retained by HIP Developments ("Client") to complete a 'scoped' hydrogeological investigation involving a seasonal monitoring program of groundwater level fluctuations at 105 Elmira Road North in Guelph, Ontario (hereinafter referred to as the "Site"). The purpose of this investigation is to assess the seasonal high groundwater elevation at the Site to support the proposed construction of a 6-storey residential development, with a finished floor elevation (FFE) of 324.30 m, as shown in the Site Grading Plan (MTE Consultants, January 16, 2025) included in Appendix B.

This report presents a summary of the findings gathered from September 2024 to April 2025 as part of the CVD Geotechnical Investigation. This technical memorandum should be read in conjunction with the CVD Geotechnical Investigation report, dated October 21, 2024, and the CVD Insitu Permeameter Testing report, dated December 23, 2024.

As part of the CVD geotechnical investigation, fifteen (15) boreholes (Enclosures 1 to 15) were drilled to depths between 3.5 and 11.13 m below ground surface (bgs) across the Site as shown in the CVD Borehole Location Plan included in Appendix B. Of the boreholes, three (3) were converted into monitoring wells (labelled BHs 6, 9, and 13). Each monitoring well was developed using Waterra[™] polyethylene tubing, foot-valve and hand pumps.

Groundwater Level Monitoring Program

At the time of this summary, water level readings have been manually taken on six (6) occasions between September 2024 and April 2025 at all accessible monitoring wells.

Van Essen DI801 10 m TD-Diver automated data loggers were installed on September 20, 2024, in all three (3) monitoring wells to provide continuous water level measurements at 2-hr intervals during the monitoring period, which is ongoing. A barometric pressure data logger was also installed to compensate for atmospheric noise and pressure at the ground surface. Results to date are also included in Table 1 and visually shown on the hydrograph.

Furthermore, two (2) single well response test (SWRT) analyses were performed at monitoring wells BH 6 and 9. Hydraulic conductivities for the monitoring wells were calculated from 2.6×10^{-2} m/s to 5.5×10^{-2} m/s, which corresponds with the values expected from a fine to coarse sand which the monitoring wells screen. The hydraulic conductivity values were generated using the Constant-Head Method, and the results of these tests are included in both Appendix D and summarized in Table 1.

Table 1 in Appendix C summarize the depths and elevations of the on-Site water table as well as the fluctuations in the water table compared to a baseline reading taken September 6, 2024. Additionally, a hydrograph, which visually presents the water table elevations shown in Table 1, is also included in Appendix C.

Hydrogeological Assessment

Based on the results of manual groundwater level measurements recorded during the current monitoring period, water level elevations across the Site and across all visits varied from 319.42 to 320.28 mASL, corresponding to depths between 2.78 and 4.42 m bgs. The highest water levels were measured on April 25, 2025, and varied from 320.10 to 320.28 mASL. The maximum fluctuation between the high point (April 25, 2025) and the low water table mark (December 23, 2024) for manual water level measurements was measured at 0.76 m. The overall variation between the individual wells varied from 0.02 to 0.18 m across all measurements.

As shown in Figures 1a and 1b (included in Appendix C), the overall shallow groundwater flow direction travels southwards, and only an approximately 0.3± m gradient in water contours exists across the Site.

A clear peak in groundwater levels was observed via data logger data during April 2025, with maximum groundwater level elevations at monitoring wells BH 6 and 13 measured at 320.3± mASL. Based on the hydrogeological setting, CVD considers it reasonable to estimate that high groundwater levels at the subject Site will likely not exceed an elevation of 320.8± mASL, which accounts for a safety factor of 0.5± m above the highest recorded groundwater elevation. Considering the proposed FFE of 324.3± mASL, groundwater should not pose an issue during construction.

Recommendations

Based on the groundwater monitoring data collected between September 2024 and April 2025, a clear highwater mark was documented during April 2025 at an elevation of 320.3± mASL. Taking into account the proposed FFE of 324.3± mASL, it is considered reasonable to conclude that no direct issues should



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arise with respect to groundwater during foundation construction, and that this data could be relied upon for the purposes of foundation design and construction.

Nevertheless, to meet City of Guelph requirements, the groundwater monitoring is required for a 12month duration at a minimum. As such, groundwater monitoring is recommended to continue until September 2025, and this summary report will be updated upon completion of the monitoring program.

Closing

This assessment has been prepared for the exclusive use of the Client and their assigns for specific application to this project property.

The assessment was conducted in accordance with the verbal and written requests from the Client, and generally accepted assessment practices. Performance of this assessment is intended to reduce, but not eliminate, uncertainty regarding the hydrogeological conditions encountered at the project site, given reasonable limits of time and cost. No other warranty, expressed or implied, is made.

We trust this report is sufficient for your immediate requirements. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted, CHUNG & VANDER DOELEN ENGINEERING LTD.

Yaroslav Chudin, EIT Geotechnical Engineering Intern

Peter Dao, M.Sc., P.Geo. Project Hydrogeologist





APPENDIX A

Limitations of Report



STATEMENT OF LIMITATIONS

- 1. The work performed in this report was carried out in accordance with the Standard Terms of Conditions made part of our contract. The conclusions presented herein are based solely upon the scope of services and time and budgetary limitations described in our contract.
- 2. The report has been prepared in accordance with generally accepted hydrogeological study and/or engineering practices. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report.
- 3. The services performed and outlined in this report were based, in part, upon visual observations of the site and attendant structures. Our opinion cannot be extended to portions of the site which were unavailable for direct observation, reasonably beyond the control of CHUNG & VANDER DOELEN ENGINEERING LTD.
- 4. The objective of this report was to assess hydrogeological conditions at the site, within the context of our contract and hydrogeological assessment guidelines within the applicable jurisdiction. Evaluating compliance of past or future owners with applicable local, provincial and federal government laws and regulations was not included in our contract for services.
- 5. CHUNG & VANDER DOELEN ENGINEERING LTD. has relied in good faith on information and services provided by others while conducting the record search. We accept no responsibility for any deficiency, misstatements or inaccuracies contained in this report as a result of omission, misinterpretation or fraudulent acts of the services used.
- 6. It should be noted that the observations and recommendations presented in this report are limited to the actual locations explored. The information presented in terms of the thickness and types of the subsoils encountered, groundwater levels, and chemical testing results, etc., are only applicable to the actual locations explored. Variations may be present between these locations. Should significant variation become apparent during later investigations, it may be necessary to reevaluate the findings of this report.
- 7. The conclusions of this report are based in part, on the information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the site in locations not specifically investigated. Should such an event occur, CHUNG & VANDER DOELEN ENGINEERING LTD. must be notified in order that we may determine if modifications to our conclusions are necessary.



APPENDIX B

Site Plan (ABA Architects Inc., January 31, 2025), Site Grading Plan (MTE) & CVD Borehole Location Plan





HIS DRAWING IS AN INSTRUMENT OF SERVICE & IS THE PROPERTY OF ABA ARCHITECTS INC. & CANNOT BE MODIFIED AND/OR REPRODUCED WITHOUT THE PERMISSION OF ABA ARCHITECTS INC. THE CONTRACTOR MUST VERIFY ALL DIMENSIONS

ON SITE AND REPORT ANY DISCREPANCIES TO THE ARCHITECT, BEFORE PROCEEDING WITH THE WORK. DRAWINGS ARE NOT TO BE SCALED.

õõ

DATE

REVISIONS

Residential Townhouse RM.6 Zone (Legal Description	: BLOCK 180 on PLAN 61M-68)	Zoning E	3ylaw 2023-20790
Zoning Regulation RM.6 Zone	Required	Provided	Compliance
Maximum Density (units/ha)	100	130	No
Minimum Lot Frontage (m)	30	64.6	Yes
Minimum Front Yard (Elmira Rd.)	6	4.3m	No
Minimum Exterior Side Yard (Willow Rd.)	6	6.0m	Yes
Minimum Interior Side Yard	7.5	19.0m	Yes
Minimum Rear Yard	7.5	23.1m	Yes
Maximum Building Height (# storeys)	6	6	Yes
Minimum Common Amenity Area (20 sq.m./DU)	2,520.0	1,181.9	
Exterior Common Amenity Areas		719.2	No
Interior Common Amenity Areas		462.7	
Minimum Landscaped Open Space	40%	35%	No
Minimum Buffer Strips (m)	3	3	Yes
Garbage, Refuse Storage and Composters	Within main building or any accessory building	Within Main Building	Yes
Angular Plane from Front Lot Line (Elmira Road)	45 degrees	43 degrees	Yes
Angular Plane from Exterior Side Lot Line (Willow Rd.)	45 degrees	46 degrees	No
Angular Plane from Int. Side Yard (North)	45 degrees	49 degrees	No
Angular Plane from Rear Yard (East)	45 degrees	41 degrees	Yes
Parking Data	•		
Parking Dimensions	2.75m x 5.5m	2.75m x 5.5m	Yes
Off-Street Parking - Residential	163	144	No
Accessible Darking	Type A - Accessible Spaces = 3	3	Yes
	Туре В - Accessible Spaces = 3	3	Yes
Bike Parking	139	139	
Short Term (Exterior)		13	No.
Long Term - Horizontal (Interior)		32	res
Long Term - Stacked (Interior)		94	

KEY PLAN	
ZBA/OPA SUBMISSION	2025.01.31
SPA PRECONSULTATION	2024.11.18
CHRONOLOGY	DATE





2024-069

SITE PLAN

1:300 EET SIZE SP-24X36 ROJECT NUMBER

	Fror	it End Bins (Yd3)	240 L Carts
Units	Grey	Blue	Total	Green
			-	
126	20	30	50	
6 Yd3 Bins	3.4	5.0	8	
4 Yd3 Bins	5.1	7.5	13	





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JPL 2025-01-

JPL 2024-11-

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CAMBRIDGE

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54937-102

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APPENDIX C

Table 1, Hydrograph, & Figure 1



Table 1 - Summary of Water Levels, Elevations & Fluctuations

Well	Ground Elevation	Ground Top Pipe Hydraulic Elevation Elevation Stickup (m) Conductivity (mASL) (mASL) (m/s)			Water Level (m	Below Ground)				W	ater Elevation (r	n Above Sea Lev	Fluctuation Relative to September 6, 2024 (m)								
	(mASL)	(mASL)		(m/s)	06-Sep-24	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24	25-Apr-25	06-Sep-24	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24	25-Apr-25	16-Sep-24	20-Sep-24	05-Nov-24	23-Dec-24	25-Apr-25
BH 6	323.06	324.03	0.96	5.5 x 10 ⁻²	3.14	3.19	3.21	3.41	3.52	2.78	319.92	319.87	319.85	319.65	319.54	320.28	-0.05	-0.07	-0.28	-0.39	0.35
вн 9	323.84	325.03	1.19	2.6 x 10 ⁻²	4.06	4.12	4.13	4.32	4.42	3.74	319.78	319.72	319.71	319.52	319.42	320.10	-0.06	-0.07	-0.26	-0.36	0.32
BH 13	323.70	324.78	1.07	-	3.80	3.85	3.87	4.08	4.19	3.42	319.90	319.85	319.83	319.62	319.52	320.28	-0.05	-0.07	-0.28	-0.38	0.38

Notes: 1) All Elevations Referenced to Geodetic Survey by CVD.

2) **Bolded** elevations represent the maximum water table aquifer elvation at each monitoring well, measured throughout all seasons.

3) Negative water level indicates that water level is above ground.

4) : Monitoring well destroyed.

5) Negative fluctuation indicates drop in water level relative to baseline.

105 Elmira Road, Guelph CVD Engineering Ltd. Project: 1755





Groundwater Elevation (masl)

May 09/25





Drawn By: YC	Date: January 2025	File No.: 1755
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Drawn By: YC Date:	April 2025	File No.: 1755
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APPENDIX D

Constant Head Tests



Hydraulic Conductivity Calculations Using Hvorslev Constant-Head Method (1951)

	0	7	D	L	Н	k	
					Constant		
	Cons	stant	Effective	Well	Head		
	Pum	ping	Well	Screen	During	Hydra	aulic
	Ra	ite	Diameter	Length	Pumping	Condu	ctivity
Well	(Litres/min)	(cm ³ /s)	(cm)	(cm)	(cm)	(cm/s)	(m/s)
						,	
BH 6	3.7	62	5.1	240	0.03	5.5E+00	5.5E-02
BH 9	3.3	55	5.1	155	0.09	2.6E+00	2.6E-02
						-	

Notes:	 k calculated by Hvorslev 	Case G: Const	tant Head, Well-Point in Uniform Isotropic Soil
	as follows:	k=	q ln [L/D + sqrt(1 + (L/D)^2)] / (2 pi L H)
	2) Constant Lload tasts cons	lusted on De	aambar 22, 2024

2) Constant Head tests conducted on December 23, 2024

Project #: 1755

ENCLOSURES







CVD BOREHOLE (2017)









1755 - 715 WILLOW RD, GUELPH.GPJ CVD ENG.GDT 10-9-24

CVD BOREHOLE (2017)





1755 - 715 WILLOW RD, GUELPH.GPJ CVD ENG.GDT 10-9-24





1755 - 715 WILLOW RD, GUELPH.GPJ CVD ENG.GDT 10-9-24

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		trace clay	- 1.0		2	SS	16									- 1.0					
	321.67	moist	1.5		3	SS	15									1.5					
	1.85	buried topsoil	2.0				-									-2.0					
		brown	2.5		4	SS	17					0				2.5					
		Fine to Medium SAND	-3.0					 								-3.0					
	320.02	trace silt	3.5		5	SS	16	•				0				3.5 -	-Borehole open and dry				
	5.50	moist End of Borehole	4.0													4.0	upon withdrawal of drilling augers				
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	trace gravel trace clay	-	\bigotimes												-		
321.42	moist	-2.0	\bigotimes	3	SS	9	•					0			2.0		
2.15	buried topsoil	2.5		4	SS	21					0				2.5		
	Fine to Medium	-3.0												_	-3.0		
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\int				Cli	ent:		HIF	P Developme	nts						EQ	JIPI	MENT DATA
		Ø		Pro Loc	ject: catio	n:	Pro 715	posed Mixee Willow Roa	1-Use I 1d, Gue	Develo Pelph, (opmen Ontari	it io			Machine: Method: Size: Date: Sep	CM Hol 108 06 -	IE 55 Illow Stem Auger mm I.D. • 24 TO Sep 06 - 24
\int		SOIL LITHOLOGY			SA	MF	PLE	SHEAR S	STRENG	TH (kF	Pa)	C	WATI CONTI	ER ENT			
ELEV./	DEPTH (m)	DESCRIPTION	DEPTH (m)	SYMBOL	SAMPLE ID	TYPE	N-VALUE	FIELD VAI LAB TES 50 1 PENETRAT STANDARI	VE: Peak T: Unc. 00 15 TION RE 0 DY	\otimes Re \blacksquare P.P. 0 2 SISTA N. CO	m.× .□ .00 NCE NE ○		$(\%)$ $V_{P} W \rightarrow 0$ $0 20$		WELL DATA	DEPTH (m)	REMARKS
3	22.73	250 mm TOPSOIL		<u>x 1/</u>	1	SS	12	20 2) (0		30		-	
	0.25	compact brown	0.5				12									0.5	
		Fine to Coarse SAND	- 1.0		2	SS	8	•								-1.0	
		trace to some gravel trace silt	1.5		3	SS	14									1.5	
		moist to saturated	2.0													-2.0	
			2.5		4	SS	19					0				2.5	
			-3.0				10									-3.0	
3	19.48 3.50	End of Borehole	3.5		5	55	19	•					0			3.5 -	-Borehole open and dry upon withdrawal of
			-4.0													-4.0	druilling augers
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