

G.

**Hydrogeology /
Geotechnical**

APPENDIX G1

Exploratory Borehole Logs

LOG OF BOREHOLE BH/MW1

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-04

Northing: 43.16812

Project Name: Elfrida Lands

Drilling Method: Solid Stem

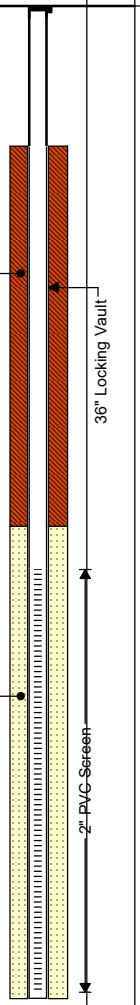
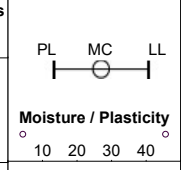
Easting: -79.824524

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 213.1

Depth Scale (m)	Subsurface Conditions			Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	PL MC LL	Moisture / Plasticity % ○ 10 20 30 40 ○				
0		213.0	Organic Material ~125 mm. Silty clay, some organics. Brown, moist.	1	SS	2 3 4 5	7								
			Silty Clay trace iron staining. Firm, brown and grey, moist.												
1		212.0	...stiff.	2	SS	3 4 6	10								
2		211.0		3	SS	3 5 6	11								
3		210.0	Silty Clay Till trace gravel, trace iron staining. Very stiff, brown, moist.	4	SS	4 8 11	19								
			...no iron staining. Stiff, grey, very moist to wet.												
4		209.0													
			...trace sand seams. Firm.												
5		208.0		6	SS	2 3 4	7								
			...very stiff.												
6		207.0		7	SS	3 4 13	17								
			End of Log												
7		206.0													
8		205.0													
9															



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage encountered on completion at approximately 5.0 m depth below the ground surface.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW2

SHEET 1 of 2

Project No.: 24255

Drill Date: 2024-11-04

Northing: 43.168899

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.819938

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 213.1

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Moisture / Plasticity PL MC LL	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×				
0		213.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist. Silty Clay trace iron staining. Firm to stiff, brown, moist.	1	SS	2 3 5 6	8							
1		212.0												
2		211.0	Silt trace red shale fragments, trace iron staining. Compact, brown, dry.	2	SS	6 9 12	21							
3		210.0	Clayey Silt Till trace gravel, trace iron staining. Very stiff, brown, dry.	3	SS	6 8 12	20							
4		209.0												
5		208.0	...with iron staining.	4	SS	5 6 10	16							
6		207.0	Silty Clay Stiff, grey, moist to very moist.	5	SS	4 5 5	10							
7		206.0												
8		205.0	Silty Clay Till trace gravel, trace silt till. Stiff, grey, wet.	6	SS	6 5 8	13							
		205.0	Limestone CONTACT	7	SS	50-1"	50							
9		204.0	Limestone TCR = 53 % RQD = 55 % Highly fractured, fair, weathered, grey.	8	CORE									

Additional Notes:

1. Borehole open to approximately 9.1 m depth on completion
2. Groundwater or water seepage encountered during drilling at approximately 7.6 m depth below the ground surface.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW2

SHEET 2 of 2

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-04 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.168899 Easting: -79.819938 Ground Surface Elevation: 213.1
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Moisture / Plasticity					
10	203.0	Limestone TCR = 78 % RQD = 82 %	8					▲ 40 80 120 160 ▲	PL MC LL					
11	202.0	Fractured, good, weathered, grey. End of Log	9	CORE				× 20 40 60 80 ×	○ 10 20 30 40 ○					
12	201.0													
13	200.0													
14	199.0													
15	198.0													
16	197.0													
17	196.0													
18	195.0													
19	194.0													



Additional Notes:

1. Borehole open to approximately 9.1 m depth on completion
2. Groundwater or water seepage encountered during drilling at approximately 7.6 m depth below the ground surface.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW2S

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-19

Northing: 43.169311

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.819624

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 213.1

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	PL MC LL	Moisture / Plasticity ○ 10 20 30 40 ○				
0	213.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist. Silty Clay trace iron staining. Firm to stiff, brown, moist.	1	SS	2 3 5 6	8	x	28.5			36" Locking Vault 3/8" Bentonite Pellets #10 Well Slat Sand 2" PVC Screen			
1	212.0						x	18.1						
2	211.0	Silt trace red shale fragments, trace iron staining. Compact, brown, dry.	2	SS	6 9 12	21	x	19.2						
3	210.0	Clayey Silt Till trace gravel, trace iron staining. Very stiff, brown, dry.	3	SS	6 8 12	20	x	21.1						
4	209.0	...with iron staining.	4	SS	5 6 10	16	x							
5	208.0													
6	207.0	End of Log												
7	206.0													
8	205.0													
9														



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion
2. Groundwater or water seepage not encountered during drilling.
3. Monitoring well straight-drilled to depth.
- 4.

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LOG OF BOREHOLE BH/MW3

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-26

Northing: 43.175038

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.814598

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 218.0

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0		218.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist.	1	SS	2 3 5 8	8	▲ 40 80 120 160 ▲	○ 10 20 30 40 ○	PL MC LL				
			Silty Clay Firm to stiff, brown, dry.											
1		217.0	...very stiff to hard, brown and grey.	2	SS	9 12 18	30							
2		216.0	Silty Clay Till trace gravel, trace red shale fragments, trace iron staining. Hard, brown, dry.	3	SS	7 12 20	32							
			...no red shale fragments.	4	SS	10 14 22	36							
3		215.0	...no iron staining. Dry to moist.	5	SS	9 13 18	31							
4		214.0	...stiff to very stiff, grey, moist.	6	SS	5 6 9	15							
5		213.0												
6		212.0	...stiff.	7	SS	5 5 8	13							
7		211.0	End of Log											
8		210.0												
9		209.0												



Additional Notes:
 1. Borehole open to approximately 6.0 m depth on completion.
 2. Groundwater or water seepage not encountered during drilling.
 3.
 4.

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LOG OF BOREHOLE BH/MW4

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-04

Northing: 43.165692

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.818179

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 210.3

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	PL MC LL	Moisture / Plasticity ○ 10 20 30 40				
0														
211.0														
210.0	█		Organic Material ~125 mm. Silty clay, trace organics. Brown, moist.	1	SS	3 3 4	7							
			Silty Clay trace iron staining. Firm, brown, moist. ...stiff, dry.	2	SS	4 4 5	9							
209.0														
208.0	█		Clayey Silt trace iron staining. Stiff, brown, moist.	3	SS	3 4 5	9							
207.0			...trace silt seam. Silt seam is wet.	5	SS	4 5 6	11							
206.0	█		Silty Clay Till trace gravel, trace silt till, trace iron staining. Firm, grey, moist.	6	SS	2 3 4	7							
205.0														
204.0	█		...hard.	7	SS	5 13 28	41							
203.0			End of Log											
202.0														



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage encountered during drilling at approximately 3.0 m depth below the ground surface.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW5

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-04

Northing: 43.164913

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.804924

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 215.0

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Moisture / Plasticity PL MC LL	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×				
0		215.0	Organic Material ~200 mm. Silty clay, with organics. Brown, dry.	1	SS	3 3 5 7	8							
			Silty Clay trace iron staining. Firm to stiff, brown, dry.											
1		214.0	Silt Till trace gravel, trace red shale fragments. Compact, brown, dry.	2	SS	5 9 13	22							
			Clayey Silt with iron staining. Very stiff, brown, moist.	3	SS	7 10 15	25							
2		213.0												
				4	SS	6 7 11	18							
3		212.0	...stiff.											
				5	SS	4 6 7	13							
4		211.0												
				6	SS	4 6 6	12							
5		210.0	Silt Compact, grey, moist to very moist.											
6		209.0	Limestone CONTACT. End of Log											
7		208.0												
8		207.0												
9		206.0												

Additional Notes:

1. Borehole open to approximately 5.9 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW6

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-05

Northing: 43.169999

Project Name: Elfrida Lands

Drilling Method: Solid Stem

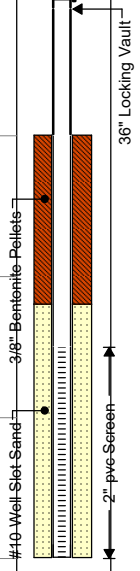
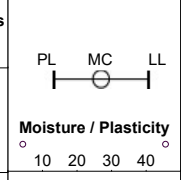
Easting: -79.803479

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 214.3

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0														
214.0	[Symbol]	214.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist.	1	SS	3 2 4 7	6	x						
213.0	[Symbol]	213.0	Silty Clay trace iron staining. Firm, brown, moist. ...trace red shale fragments, trace sand. Very stiff, brown and grey.	2	SS	5 8 9	17	x						
212.0	[Symbol]	212.0	Silty Clay Till trace gravel, trace iron staining. Stiff to very stiff, brown, moist. ...very stiff.	3	SS	4 6 9	15	x						
211.0	[Symbol]	211.0	Limestone Limestone End of Log	4	SS	7 11 14	25	x						
210.0		210.0		5	SS	6 50-3"	50	x						
209.0		209.0												
208.0		208.0												
207.0		207.0												
206.0		206.0												



Additional Notes:

- Borehole open to approximately 3.3 m depth on completion.
- Groundwater or water seepage not encountered during drilling.
- Terminated on auger and split-spoon refusal (assumed bedrock contact).
-

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LOG OF BOREHOLE BH/MW7D

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-05

Northing: 43.168716

Project Name: Elfrida Lands

Drilling Method: Solid Stem/Coring

Easting: -79.793993

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 211.0

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Moisture / Plasticity PL MC LL					
0		211.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist. Silty Clay Stiff, brown, moist.	1	SS	3 5 8 10	13							
1		210.0												
2		209.0	Clayey Silt Till trace gravel, trace iron staining, trace red shale fragments. Very stiff, brown, moist.	2	SS	5 8 8	16							
3		208.0	Silty Clay Till trace gravel. Firm, brown, moist. Silt Till trace gravel. Loose, brown, wet.	3	SS	3 3 3	6							
4		207.0	...compact, grey, dry.											
5		206.0		4	SS	6 7 13	20							
6		205.0	Limestone TCR = 56 % RQD = 69 % Fractured, fair, weathered, grey.	5	CORE									
7		204.0	Limestone TCR = 100 % RQD = 65 % Fractured, fair, weathered, grey.	6	CORE									
8		203.0												
9		202.0	Limestone TCR = 62 % RQD = 67 % Fractured, fair, weathered, grey.	7	CORE									
			End of Log											



Additional Notes:

1. Borehole open to approximately 9.1 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW7S

SHEET 1 of 1

Project No.: 24255

Drill Date: 2025-01-30

Northing: 43.169036

Project Name: Elfrida Lands

Drilling Method: Solid Stem/Coring

Easting: -79.793616

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 211.0

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0		211.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist. Silty Clay Stiff, brown, moist.	1	SS	3 5 8 10	13	▲ 40 80 120 160 ▲	○ 10 20 30 40 ○	PL MC LL				
1		210.0												
2		209.0	Clayey Silt Till trace gravel, trace iron staining, trace red shale fragments. Very stiff, brown, moist.	2	SS	5 8 8	16							
3		208.0	Silty Clay Till trace gravel. Firm, brown, moist. Silt Till trace gravel. Loose, brown, wet.	3	SS	3 3 3	6							
4		207.0	...compact, grey, dry.	4	SS	6 7 13	20							
5		206.0												
6		205.0	Limestone TCR = 56 % RQD = 69 % Fractured, fair, weathered, grey. End of Log	5	CORE									
7		204.0												
8		203.0												
9		202.0												



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

LANDTEK LIMITED


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Ph: (905) 383-3733

LOG OF BOREHOLE BH8

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-05 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.165692 Easting: -79.797323 Ground Surface Elevation: 212.4
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Depth Scale (m)	Stratigraphic Symbol	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
		Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity	Moisture / Plasticity				
1	[Symbol]	212.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist. Silty Clay trace gravel, trace red shale fragments. Firm, brown, moist. Clayey Silt trace iron staining. Stiff, brown, moist.	1	SS	3 3 4 7	7	x	22.5	19.6					
2	[Symbol]	211.0	Clayey Silt Till trace gravel, trace red shale fragments. Stiff, brown, moist. ...very stiff, moist to very moist.	2	SS	5 6 8	14	x	25.0	24.4					
3	[Symbol]	210.0	Clayey Silt Till trace gravel, trace red shale fragments. Stiff, brown, moist.	3	SS	3 6 6	12	x	21.9	21.5					
4	[Symbol]	209.0	Clayey Silt Till trace gravel, trace red shale fragments. Stiff, brown, moist.	4	SS	4 5 9	14	x							
5	[Symbol]	208.0	Limestone CONTACT. End of Log	5	SS	6 8 13	21	x							
6	[Symbol]	207.0		6	SS	50-1"	50	x							

	Additional Notes: 1. Borehole open to approximately 3.9 m depth on completion. 2. Groundwater or water seepage not encountered during drilling. 3. Terminated on auger and split-spoon refusal (assumed bedrock contact). 4.	LANDTEK LIMITED 205 Nebo Road, Unit 4B Hamilton, Ontario, L8W 2E1 Ph: (905) 383-3733
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LOG OF BOREHOLE BH/MW9

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-05 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.162255 Easting: -79.801406 Ground Surface Elevation: 214.6
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	215.0	Organic Material ~200 mm. Silty clay, some organics. Brown and grey, dry to moist.	1	SS	2 3 3 7	6	x	▲ 40 80 120 160 ▲	PL MC LL	○	36" Locking Vault 3/8" Bentonite Pellets #10 Well Slat Sand 2" PVC Screen			
1	214.0	Silty Clay trace iron staining. Firm, brown and grey, moist. ...very stiff.	2	SS	6 11 15	26	x			○				
2	213.0		3	SS	5 7 12	19	x			○				
3	212.0	Clayey Silt with iron staining. Stiff, brown, moist. ...very stiff.	4	SS	2 5 7	12	x			○				
4	211.0		5	SS	4 9 9	18	x			○				
5	210.0	Silt Loose to compact, grey, moist to very moist.	6	SS	4 4 6	10	x			○				
6	209.0									○				
7	208.0	Silty Clay Very stiff, grey, moist to very moist.	7	SS	5 9 12	21	x			○				
8	207.0	End of Log								○				
9	206.0									○				



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

LANDTEK LIMITED
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LOG OF BOREHOLE BH/MW10

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-06

Northing: 43.159506

Project Name: Elfrida Lands

Drilling Method: Solid Stem

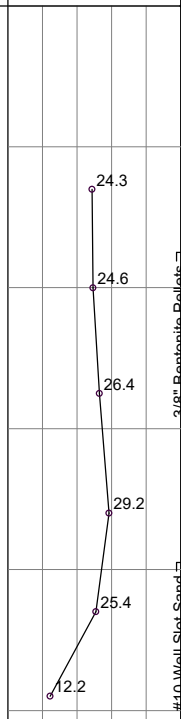
Easting: -79.791041

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 209.4

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	Moisture / Plasticity ○ PL MC LL				
0			Organic Material ~250 mm. Silty clay, with organics. Brown, moist.	1	SS	1 2 3 5	5							
0.9			Silty Clay Firm, brown, dry to moist.											
1.0			Clayey Silt Stiff, brown, moist.	2	SS	3 4 5	9							
1.8			...trace iron staining. Firm.	3	SS	3 3 2	5							
2.7				4	SS	2 3 4	7							
3.6			...stiff.	5	SS	4 5 5	10							
4.0			Limestone CONTACT.	6	SS	50-2"	50							
4.0			End of Log											
205.0														
204.0														
203.0														
202.0														
201.0														



- Additional Notes:**
- Borehole open to approximately 4.0 m depth on completion.
 - Groundwater or water seepage not encountered during drilling.
 - Terminated on auger and split-spoon refusal (assumed bedrock contact).
 -

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LOG OF BOREHOLE BH/MW11

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-06 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.164454 Easting: -79.789533 Ground Surface Elevation: 212.2
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0														
212.0	█	212.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist.	1	SS	2 3 3 5	6	x						
1	█	211.0	Silty Clay Firm, brown, dry to moist.											
1	█	211.0	Clayey Silt trace iron staining. Very stiff, brown, dry.	2	SS	6 9 13	22	x						
2	█	210.0	...trace grey clay seams.											
2	█	210.0	Clayey Silt Till trace gravel, trace iron staining. Hard, brown, dry to moist.	3	SS	5 10 13	23	x						
3	█	210.0	Clayey Silt Till trace gravel, trace iron staining. Hard, brown, dry to moist.	4	SS	7 15 19	34	x						
3	█	209.0	Limestone CONTACT. End of Log	5	SS	50-3"	50	x						
4		208.0												
5		207.0												
6		206.0												
7		205.0												
8		204.0												
9														



Additional Notes:

1. Borehole open to approximately 2.9 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.


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LOG OF BOREHOLE BH12

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-07 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.158635 Easting: -79.786769 Ground Surface Elevation: 209.2
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Depth Scale (m)	Stratigraphic Symbol	Depth / Elevation (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
			Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity						
1		209.0	Organic Material ~250 mm. Silty clay, with organics. Brown, dry to moist. Silty Clay trace grey clay seams. Firm to stiff, brown, dry to moist.	1	SS	2 3 5 7	8	x	26.8							
2		207.0		Clayey Silt Stiff, brown, moist.	2	SS	3 5 6	11	x	27.8						
3		206.0	Silt Compact, brown, very moist.	3	SS	6 8 10	18	x	24.3							
4		205.0	Limestone CONTACT. End of Log	4	SS	22 50-3"	50	x	12.9							
5		204.0														
6		203.0														
7		202.0														
8		201.0														
9		200.0														

	Additional Notes: 1. Borehole open to approximately 4.3 m depth on completion. 2. Groundwater or water seepage not encountered during drilling. 3. 4.	LANDTEK LIMITED 205 Nebo Road, Unit 4B Hamilton, Ontario, L8W 2E1 Ph: (905) 383-3733
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LOG OF BOREHOLE BH13

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-06

Northing: 43.156023

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.782937

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 205.9

Depth Scale (m)	Subsurface Conditions			Samples				Penetration / Strength Results				Moisture / Plasticity				Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)				Moisture / Plasticity							
								▲	40	80	120	160	▲	PL	MC				
							Penetration Test Values (Blows / 0.3m)				Moisture / Plasticity								
							×	20	40	60	80	×	○	10	20	30	40		
1	205.0	1	Organic Material ~250 mm. Silty clay, with organics. Brown, dry. Silty Clay Soft to firm, brown, moist. Clayey Silt trace iron staining, trace grey clay seams. Stiff, brown, wet.	1	SS	1 2 2 3	4	x	27.1										
		2		2	SS	3 5 5	10	x	21.3										
2	204.0	3	Silt Loose, brown, moist to very moist. ...moist.	3	SS	2 2 3	5	x	29.1										
		4		4	SS	2 3 5	8	x	27.4										
3	203.0	5	Silty Clay Till trace gravel, trace iron staining. Stiff, brownish grey, moist.	5	SS	6 7 7	14	x	26.2										
4	202.0	6	Limestone CONTACT. End of Log	6	SS	50-2"	50	x	7.3										
5	201.0																		
6	200.0																		
7	199.0																		
8	198.0																		
9	197.0																		
10	196.0																		



Additional Notes:

1. Borehole open to approximately 4.65 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW14

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-07 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.16033 Easting: -79.780989 Ground Surface Elevation: 209.8
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Depth Scale (m)	Stratigraphic Symbol	Depth / Elevation (m)	Subsurface Conditions Description	Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments	
				Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	PL	MC					LL
0	[Symbol]	210.0	Organic Material ~250 mm. Clayey silt, some organics. Brown, moist.	1	SS	2 3 6	9	x	26.2			36" Locking Vault 3/8" Bentonite Pellets #10 Well Slet Sand 2" PVC Screen				
1	[Symbol]	209.0	Clayey Silt trace iron staining, trace grey clay seams. Stiff, brown, moist.	2	SS	3 4 7	11	x	24.2							
2	[Symbol]	208.0	Silt Compact, brown, moist.	3	SS	3 4 5	9	x	24.6							
3	[Symbol]	207.0	Silt Till trace gravel. Loose, brown, moist.	4	SS	4 6 7	13	x	23.1							
4	[Symbol]	206.0	Clayey Silt Till trace gravel. Stiff, brown, moist.	5	SS	17 50-2"	50	x	9.6							
4	[Symbol]	206.0	Limestone CONTACT. End of Log													
5		205.0														
6		204.0														
7		203.0														
8		202.0														
9		201.0														



Additional Notes:

1. Borehole open to approximately 4.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW15

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-07 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.163996 Easting: -79.780361 Ground Surface Elevation: 208.7
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	209.0													
		Organic Material ~200 mm. Clayey silt, some organics. Brown, dry. Clayey Silt trace iron staining. Firm to stiff, brown, moist.	1	SS	3 3 5 10	8	x	20.0	25.9					
1	208.0	...stiff.					x							
		Silty Clay Till trace gravel, trace silt seams. Stiff, grey, very moist.	2	SS	3 5 6	11	x							
2	207.0													
		...firm.	3	SS	2 4 6	10	x	25.4						
3	206.0													
		...firm.	4	SS	2 3 4	7	x	25.7						
4	205.0													
		Limestone CONTACT. End of Log	5	SS	4 5 50-4"	50	x	12.5						
5	204.0													
6	203.0													
7	202.0													
8	201.0													
9	200.0													



Additional Notes:

1. Borehole open to approximately 6.5 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW16

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-07

Northing: 43.159689

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.773137

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 207.9

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0		208.0	Organic Material ~250 mm. Silty clay, trace organics. Brown, moist.	1	SS	2 3 6 12	9	40 80 120 160	26.0	PL MC LL	<p>36" Locking Vault</p> <p>3/8" Bentonite Pellets</p> <p>#10 Well Silt Sand</p> <p>2" PVC Screen</p>			
			Silty Clay Stiff, brown, moist.											
1		207.0	...very stiff.	2	SS	7 12 16	28		19.4					
			Clayey Silt Till trace gravel, trace iron staining. Stiff to very stiff, brown, moist.	3	SS	4 6 9	15		20.4					
2		206.0	...stiff.	4	SS	3 6 8	14		25.9					
			Silty Clay Till trace gravel, trace iron staining. Stiff, brownish grey, moist to very moist.	5	SS	3 5 6	11		24.7					
3		205.0	...no iron staining. Firm, grey.	6	SS	2 3 4	7		22.8					
4		204.0												
5		203.0												
6		202.0		7	SS	3 3 4	7		33.3					
7		201.0	End of Log											
8		200.0												
9		199.0												



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH17

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-08 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.157123 Easting: -79.769053 Ground Surface Elevation: 208.9
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Depth Scale (m)	Stratigraphic Symbol	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
		Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity					
1		208.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist. Silty Clay Firm to stiff, brown, moist.	1	SS	3 3 5 5	8	x	21.6						
			...trace iron staining. Stiff.	2	SS	4 6 6		x	23.1						
2		207.0	Silty Clay Till trace gravel. Brown, moist. Clayey Silt trace iron staining. Very stiff, brown, moist.	3	SS	3 7 9	16	x	25.2						
			...stiff, grey, very moist.	4	SS	4 5 8		x	19.8						
3		206.0	Clayey Silt Till trace gravel. Brown, moist. Limestone CONTACT.	5	SS	50-2"	50	x							
			End of Log												
4		205.0													
5		204.0													
6		203.0													
7		202.0													
8		201.0													
9		200.0													
10		199.0													

	Additional Notes: 1. Borehole open to approximately 3.2 m depth on completion. 2. Groundwater or water seepage not encountered during drilling. 3. Terminated on auger and split-spoon refusal (assumed bedrock contact). 4.	LANDTEK LIMITED 205 Nebo Road, Unit 4B Hamilton, Ontario, L8W 2E1 Ph: (905) 383-3733
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LOG OF BOREHOLE BH/MW18D

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-08 Drilling Method: Solid Stem/Coring Datum: Geodetic	Northing: 43.15529 Easting: -79.769367 Ground Surface Elevation: 210.5
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Depth Scale (m)	Stratigraphic Symbol	Subsurface Conditions		Samples				Penetration / Strength Results				Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments		
		Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)				Moisture / Plasticity							
								▲	40	80	120	160	▲	PL — MC — LL 					
								×	Penetration Test Values (Blows / 0.3m)				Moisture / Plasticity						
									20	40	60	80	×	○ 10 20 30 40 					
0	[Symbol]	211.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist.	1	SS	3 3 3 4 6	7	x											
1	[Symbol]	210.0	Silty Clay trace iron staining. Firm, brown, moist.					x											
2	[Symbol]	209.0	Silty Clay Till trace gravel, trace red shale fragments. Stiff, brown, moist.	2	SS	4 4 6	10	x											
3	[Symbol]	208.0	...trace limestone fragments. Very stiff, dry.					x											
4	[Symbol]	207.0	Limestone TCR = 53 % RQD = 87 %	3	SS	10 10 12	22												
5	[Symbol]	206.0	Highly fractured, weathered, good, grey. Limestone TCR = 99 % RQD = 69 %	4	CORE														
6	[Symbol]	205.0	Slightly fractured, weathered, good, grey.	5	CORE														
7	[Symbol]	204.0	Limestone TCR = 71 % RQD = 57 %	6	CORE														
8	[Symbol]	203.0	Slightly fractured, weathered, good, grey. Limestone TCR = 100 % RQD = 79 %	7	CORE														
9	[Symbol]	202.0	Highly fractured, weathered, good, grey.	7	CORE														
			End of Log																



Additional Notes:

1. Borehole open to approximately 9.1 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW18S

SHEET 1 of 1

Project No.: 24255	Drill Date: 2024-11-18	Northing: 43.15506
Project Name: Elfrida Lands	Drilling Method: Solid Stem	Easting: -79.769556
Location: Hamilton	Datum: Geodetic	Ground Surface Elevation: 210.5

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	211.0	<p>Organic Material ~250 mm. Silty clay, some organics. Brown, moist.</p> <p>Silty Clay trace iron staining. Firm, brown, moist.</p> <p>Silty Clay Till trace gravel, trace red shale fragments. Stiff, brown, moist.</p> <p>...trace limestone fragments. Very stiff, dry.</p>	1	SS	3 3 4 4 6	7	x	24.4	27.6					
1	210.0		2	SS	4 4 6	10	x							
2	209.0		3	SS	10 10 12	22	x	7.2						
3	208.0													
4	207.0	End of Log												
5	206.0													
6	205.0													
7	204.0													
8	203.0													
9	202.0													



Additional Notes:

1. Borehole open to approximately 4.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW19

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-08

Northing: 43.156573

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.764153

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 210.3

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	211.0													
0	210.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist.	1	SS	2 3 5 9	8			22.9		<div style="text-align: center;"> </div>			
1	209.0	Silty Clay trace red shale fragments. Firm to stiff, grey, moist. ...very stiff.	2	SS	10 11 17	28			19.6					
2	208.0	...trace iron staining.	3	SS	6 12 17	29			20.5					
3	207.0	Silty Clay Till with iron staining, trace gravel. Very stiff, grey, dry to moist.	4	SS	6 8 11	19			20.7					
4	206.0	...trace silt seams. Hard.	5	SS	6 9 11	20			21.2					
5	205.0	Limestone CONTACT. End of Log	6	SS	16 18 27	45			26.1					
6	204.0													
7	203.0													
8	202.0													
9														



Additional Notes:

1. Borehole open to approximately 5.2 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW20

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-13

Northing: 43.164454

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.763462

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 209.3

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0														
0.0		210.0												
0.0		209.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist. Silty Clay trace iron staining. Firm to stiff, brown, dry to moist.	1	SS	1 4 4 8	8							
0.5		208.0	...with iron staining, trace sand seam. Very stiff.	2	SS	7 10 11	21							
1.0		207.0		3	SS	5 7 13	20							
1.5		206.0	Silty Clay Till trace gravel. Very stiff, brown, dry to moist. ...grey.	4	SS	4 8 12	20							
2.0		205.0	...moist to very moist.	5	SS	3 6 10	16							
2.5		204.0		6	SS	2 4 4	8							
3.0		203.0	...firm, moist.	7	SS	2 3 3	6							
3.5		202.0	End of Log											
4.0		201.0												
4.5														
5.0														
5.5														
6.0														
6.5														
7.0														
7.5														
8.0														
8.5														
9.0														



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW21

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-14

Northing: 43.168716

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.772131

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 208.8

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Moisture / Plasticity PL MC LL	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×				
0		209.0	Organic Material ~200 mm. Silty clay, some organics. Brown, dry.	1	SS	3 2 5 6	7							
1		208.0	Silty Clay Firm, brown, moist. ...very stiff, grey, dry.	2	SS	5 8 9	17							
2		207.0	...dry to moist.	3	SS	5 9 11	20							
3		206.0	Silty Clay Till trace gravel. Stiff, grey, moist. ...firm.	4	SS	3 5 5	10							
4		205.0		5	SS	3 3 3	6							
5		204.0	...firm to stiff, moist to very moist.	6	SS	3 0 5	8							
6		203.0	...wet.	7	SS	2 3 50-3"	50							
7		202.0	Limestone CONTACT. End of Log											
8		201.0												
9		200.0												



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH/MW22

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-12

Northing: 43.173068

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.761515

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 211.6

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	Moisture / Plasticity ○ PL MC LL				
0			Organic Material ~250 mm. Silty clay, with organics. Brown, moist.	1	SS	0 1 2 4	3				36" Locking Vault 3/8" Bentonite Pellets #10 Well Slat Sand 2" PVC Screen			
211.0		Silty Clay Soft, brown, moist.								20.9				
1		...trace red shale fragments. Hard, grey and brown.	2	SS	7 12 20	32				18.9				
210.0		...very stiff, dry to moist.								21.3				
2			3	SS	5 10 17	27				18.2				
209.0		Silty Clay Till trace gravel. Very stiff to hard, grey, dry.	4	SS	6 12 18	30				18.4				
3		...very stiff.								20.9				
208.0														
4														
207.0		...stiff, moist.												
5			6	SS	4 6 7	13								
206.0		...firm to stiff.												
6														
205.0		End of Log												
7														
204.0														
8														
203.0														
9														



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH23

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-12 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.173755 Easting: -79.758436 Ground Surface Elevation: 212.0
--	---	--

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Moisture / Plasticity					
1 2 3 4 5 6		Organic Material ~250 mm. Silty clay, some organics. Brown, dry. Silty Clay trace iron staining. Firm, brown, dry. ...very stiff to hard.	1	SS	1 2 3 5	5	▲	○						
		2	SS	8 12 18	30	×	○							
		3	SS	7 12 19	31	×	○							
		4	SS	7 12 20	32	×	○							
		5	SS	7 12 16	28	×	○							
		6	SS	6 8 10	18	×	○							
		7	SS	3 4 5	9	×	○							
7		End of Log												



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW24

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-11

Northing: 43.176733

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.75919

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 215.1

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	PL MC LL	Moisture / Plasticity ○ 10 20 30 40				
0		215.0	Organic Material ~250 mm. Silty clay, with organics. Brown, dry to moist.	1	SS	3 6 11 15	17							
1		214.0	Silty Clay trace red shale fragments. Very stiff, brown, moist. ...trace iron staining. Grey.	2	SS	10 11 15	26							
2		213.0	Silty Clay Till trace gravel, trace red shale fragments. Very stiff, grey, moist. ...no red shale fragments. Hard, dry.	3	SS	5 11 14	25							
3		212.0	...very stiff. Moist.	4	SS	10 14 19	33							
4		211.0		5	SS	5 11 13	24							
5		210.0		6	SS	5 11 12	23							
6		209.0	...stiff, very moist.	7	SS	3 5 7 10	12							
7		208.0												
8		207.0	End of Log	8	SS	3 5 8	13							
9														



Additional Notes:

1. Borehole open to approximately 7.6 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW25

SHEET 1 of 1

Project No.: 24255

Drill Date: 2025-01-07

Northing: 43.178886

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.755107

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 210.1

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa) ▲ 40 80 120 160 ▲	Penetration Test Values (Blows / 0.3m) × 20 40 60 80 ×	Moisture / Plasticity ○ PL MC LL				
0	210.0	<p>Organic Material ~100 mm. Clayey silt, some organics. Brown, moist.</p> <p>Clayey Silt Till some grey clay seams, some red shale fragments, trace gravel. Firm, brown, moist.</p>	1	SS	8 2 3 5	5	x	27.7	21.1		36" Locking Vault			
1	209.0	...very stiff.	2	SS	5 8 13	21	x	22.0	20.8					
2	208.0		3	SS	5 8 13	21	x	14.1						
3	207.0	<p>Silty Clay Till trace gravel. Stiff to very stiff, brown, moist.</p> <p>...some gravel, trace iron staining. Stiff.</p>	4	SS	4 6 9	15	x							
4	206.0		5	SS	3 4 7	11	x							
5	205.0	<p>Limestone CONTACT.</p> <p>End of Log</p>	6	SS	50-5"	50	x							
6	204.0													
7	203.0													
8	202.0													
9														



Additional Notes:

1. Borehole open to approximately 4.5 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH26

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-26

Northing: 43.182734

Project Name: Elfrida Lands

Drilling Method: Solid Stem

Easting: -79.757808

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 205.1

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Moisture / Plasticity					
1	205.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist. Silty Clay Firm, brown and grey, moist.	1	SS	2 3 4 5	7	x	28.2						
2	204.0	...trace iron staining. Very stiff, grey.	2	SS	6 10 15	25	x	21.7						
3	203.0													
4	202.0	Silty Clay Till trace gravel. Very stiff, grey, moist.	3	SS	4 6 10	16	x	19.9						
5	201.0	Limestone CONTACT. End of Log	4	SS	50-2"	50	x							
6	200.0													
7	199.0													
8	198.0													
9	197.0													
10	196.0													



Additional Notes:

1. Borehole open to approximately 4.6 m depth on completion.
2. Groundwater or water seepage not encountered.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW27

SHEET 1 of 1

Project No.: 24255

Drill Date: 2024-11-14

Northing: 43.186994

Project Name: Elfrida Lands

Drilling Method: Solid Stem

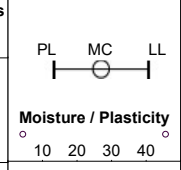
Easting: -79.761892

Location: Hamilton

Datum: Geodetic

Ground Surface Elevation: 205.5

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0														
0.25		206.0	Organic Material ~250 mm. Silty clay, with organics. Brown, moist.	1	SS	0 3 5 7	8							
0.5		205.0	Silty Clay Firm to stiff, brown, moist. ...trace iron staining. Very stiff, brown and grey, dry.	2	SS	5 8 9	17							
1.5		204.0	...no iron staining, trace grey clay seams. Stiff to very stiff, moist.	3	SS	4 6 9	15							
2.5		203.0	...trace iron staining. Firm to stiff.	4	SS	3 4 4	8							
3.5		202.0	Silty Clay Till trace gravel, trace silt seams. Firm to stiff, grey, moist.	5	SS	2 4 4	8							
4.5		201.0	... no silt seams. Firm, wet.	6	SS	6 3 4	7							
6.0		200.0	Limestone CONTACT.											
6.0		199.9	End of Log											



Additional Notes:

1. Borehole open to approximately 6.0 m depth on completion.
2. Groundwater or water seepage encountered during drilling at approximately 4.5 m depth below the ground surface.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.



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LOG OF BOREHOLE BH/MW28

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-14 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.184429 Easting: -79.765724 Ground Surface Elevation: 205.8
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	206.0	Organic Material ~250 mm. Silty clay, with organics. Brown, dry.	1	SS	3 4 4	8	x	18.7	18.7	36" Locking Vault 3/8" Bentonite Pellets #10 Well Slat Sand 2" PVC Screen				
1	205.0	Silty Clay trace iron staining. Firm to stiff, brown, moist. ...no iron staining. Very stiff, brown and grey, dry to moist.	2	SS	5 7 12	19	x	20.2	20.2					
2	204.0	...trace red shale fragments. Brown, dry.	3	SS	5 9 12	21	x	19.1	19.1					
3	203.0	...no red shale fragments, trace grey clay seams. Stiff, moist.	4	SS	4 5 8	13	x	22.6	22.6					
4	202.0	...no grey clay seams. Grey.	5	SS	3 5 6	11	x	24.7	24.7					
5	201.0	Silty Clay Till trace gravel. Firm, grey, moist to very moist.	6	SS	2 2 4	6	x	17.5	17.5					
6	200.0	Limestone CONTACT. End of Log												
7	199.0													
8	198.0													
9	197.0													



Additional Notes:

1. Borehole open to approximately 5.7 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
3. Terminated on auger and split-spoon refusal (assumed bedrock contact).
- 4.

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LOG OF BOREHOLE BH29

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2025-01-07 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.17797 Easting: -79.767043 Ground Surface Elevation: 212.0
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Depth Scale (m)	Stratigraphic Symbol	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
		Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity					
1		211.0	Organic Material ~125 mm. Silt, with organics. Brown, moist. Silt Till some grey silt seams, some red shale fragments, trace gravel. Loose, brown, moist.	1	SS	4 3 3 5	6	x		20.5					
			...compact, dry to moist.	2	SS	7 9 12	21	x		15.7					
2		210.0	...no grey silt seams, no red shale fragments, some gravel.	3	SS	19 13 16	29	x		15.6					
			...trace red shale fragments, trace grey silt seams. Dense.	4	SS	7 14 26	40	x		14.5					
3		209.0	...trace iron staining. Moist.	5	SS	8 15 23	38	x		14.4					
4		208.0													
5		207.0	Clayey Silt Till trace gravel. Stiff, brown and grey, moist.	6	SS	3 6 8	14	x		17.3					
6		206.0	Silty Clay Till trace gravel. Stiff, brownish grey, moist.	7	SS	5 5 8	13	x		18.4					
7		205.0	End of Log												
8		204.0													
9		203.0													
10		202.0													



Additional Notes:

1. Borehole open, with cave, to approximately 5.9 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW30D

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-12 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.177375 Easting: -79.769995 Ground Surface Elevation: 215.3
--	---	--

Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0		216.0												
0.5		215.5	Organic Material ~250 mm. Silty clay, with organics. Brown, dry.	1	SS	2 2 6 12	8			17.2				
0.5		215.5	Silty Clay Firm to stiff, brown, dry.											
1.5		214.0	Silty Clay Till trace gravel. Very stiff, brown, dry.	2	SS	9 13 15	28			16.7				
2.5		212.0	...trace iron staining. Hard.	3	SS	9 17 22	39			17.0				
4.5		211.0	...trace red shale fragments. Very stiff, grey.	4	SS	6 12 17	29			18.6				
6.5		209.0	...stiff, moist.	5	SS	4 5 7	12			18.2				
7.5		208.0												
8.5		207.0												
9.5		206.0												
10.0		206.0	End of Log	7	SS	5 5 8	13			20.9				



Additional Notes:




1. Borehole open to approximately 9.1 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.

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LOG OF BOREHOLE BH/MW30S

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-13 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.17797 Easting: -79.769807 Ground Surface Elevation: 215.3
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Depth Scale (m)	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
	Stratigraphic Symbol	Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity				
0	216.0													
0	215.5	 Organic Material ~250 mm. Silty clay, with organics. Brown, dry.  Silty Clay Firm to stiff, brown, dry.	1	SS	2 2 6 12	8	x	17.2	○	17.2	36" Locking Vault 36" Bentonite Pellets #40 Well Slet Sand 2" PVC Screen			
1	214.0	 Silty Clay Till trace gravel. Very stiff, brown, dry.	2	SS	9 13 15	28	x	16.7	○	16.7				
2	212.0	...trace iron staining. Hard.	3	SS	9 17 22	39	x	17.0	○	17.0				
4	211.0	...trace red shale fragments. Very stiff, grey.	4	SS	6 12 17	29	x	18.6	○	18.6				
6	210.0	End of Log												
7	209.0													
8	208.0													
9	207.0													
10	206.0													



Additional Notes:

1. Borehole open to approximately 9.1 m depth on completion.
2. Groundwater or water seepage not encountered during drilling.
- 3.
- 4.


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LOG OF BOREHOLE BH31

SHEET 1 of 1

Project No.: 24255 Project Name: Elfrida Lands Location: Hamilton	Drill Date: 2024-11-13 Drilling Method: Solid Stem Datum: Geodetic	Northing: 43.180673 Easting: -79.772508 Ground Surface Elevation: 209.5
--	---	--

Depth Scale (m)	Stratigraphic Symbol	Subsurface Conditions		Samples				Penetration / Strength Results		Moisture / Plasticity		Well Details	Groundwater Levels	Headspace Concentrations / PID (ppm) [LEL(%)] / ppm	Comments
		Depth / Elevation (m)	Description	Number	Type	Blow Counts/150 mm	N Value	Undrained Shear Strength Values (kPa)	Penetration Test Values (Blows / 0.3m)	Moisture / Plasticity					
1	[Symbol]	209.0	Organic Material ~250 mm. Silty clay, some organics. Brown, moist. Silty Clay trace grey clay seams. Firm, brown, moist.	1	SS	1 3 3 3	6	x	25.3						
2	[Symbol]	208.0	...very stiff.	2	SS	4 7 15	19	x	19.1						
3	[Symbol]	207.0													
4	[Symbol]	206.0	Silty Clay Till trace gravel. Stiff, brown, moist.	3	SS	5 6 8	14	x	20.7						
5	[Symbol]	205.0	...grey. Limestone CONTACT. End of Log	4	SS	50-1"	50	x	20.9						
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7		203.0													
8		202.0													
9		201.0													
10		200.0													

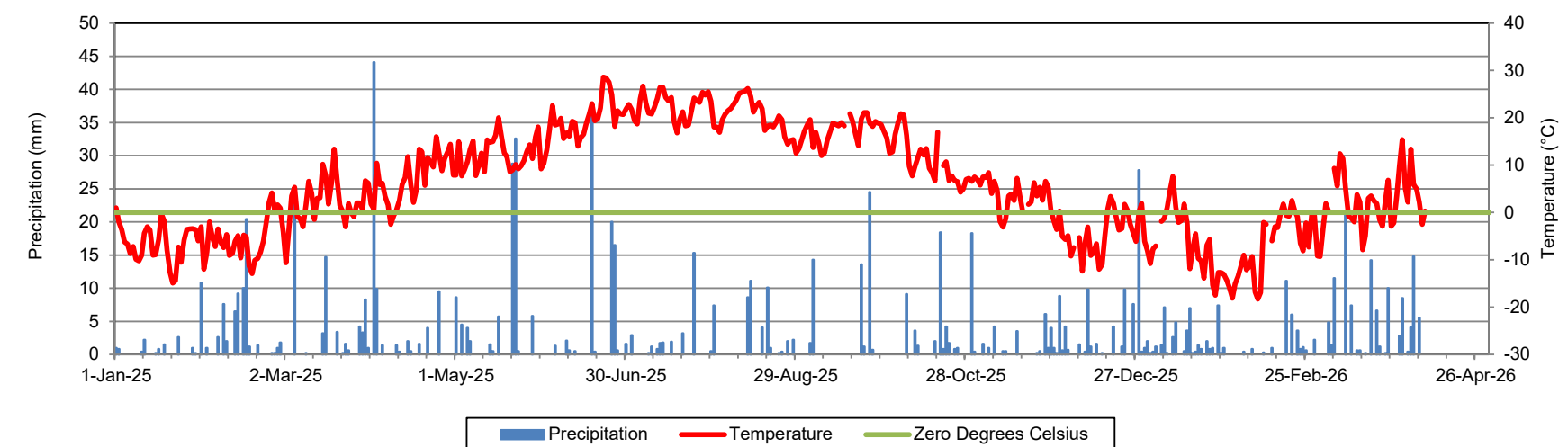
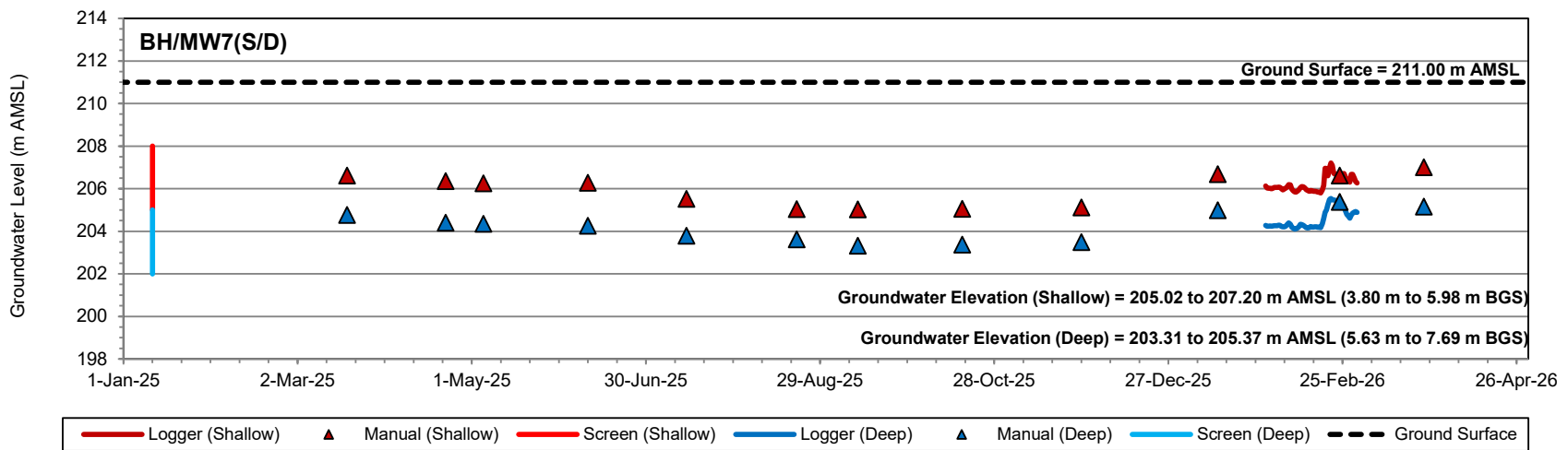
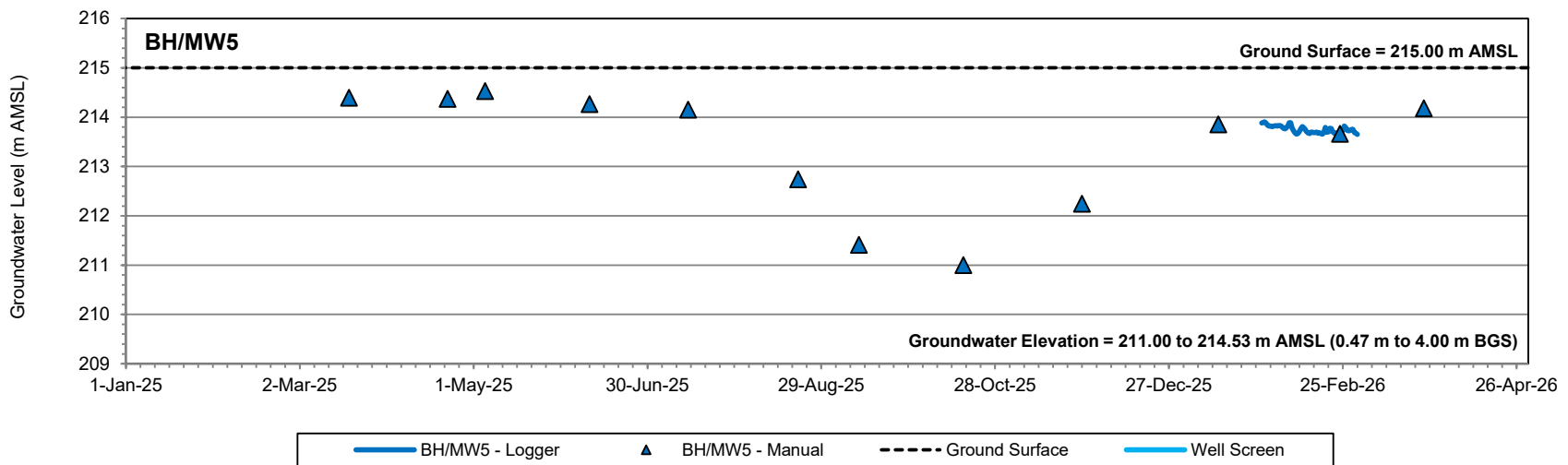
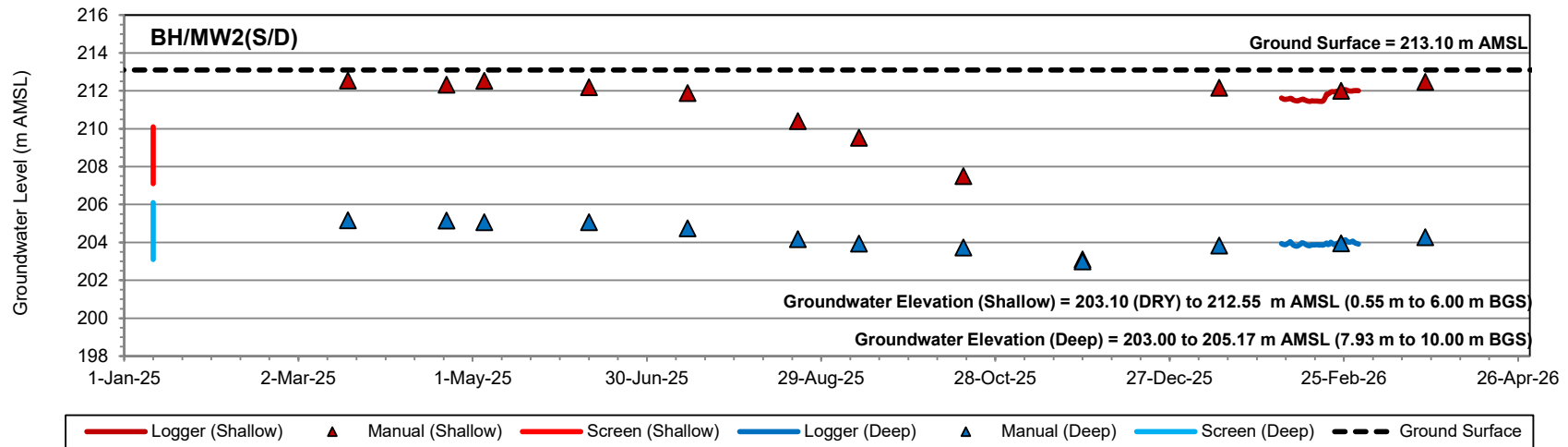
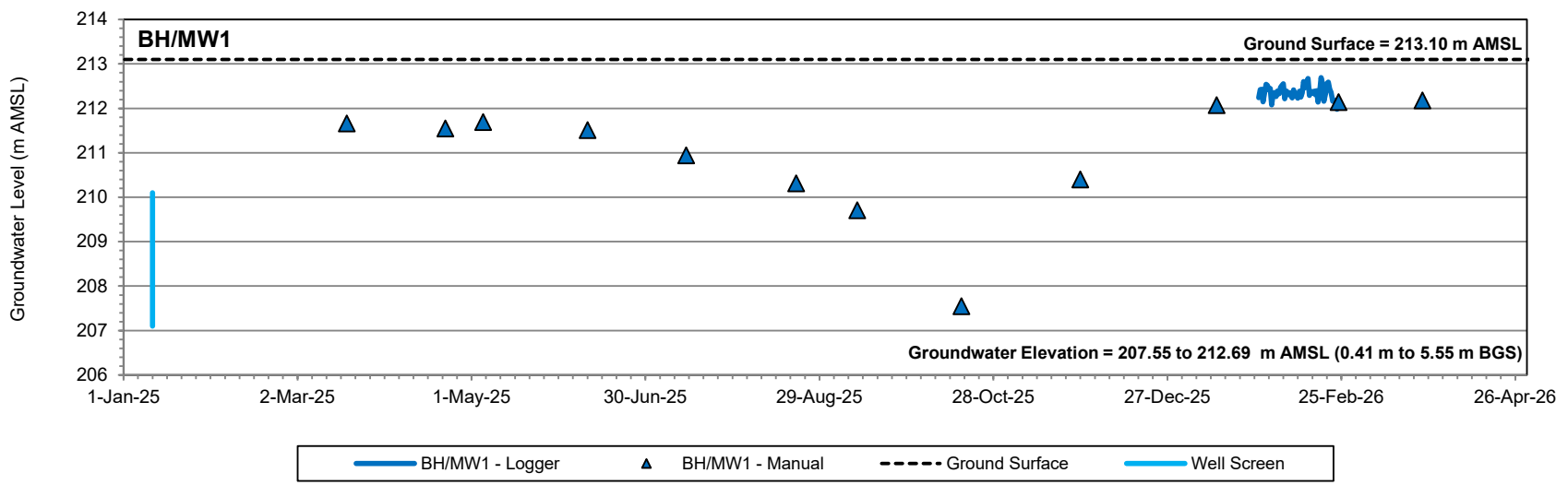
	Additional Notes: 1. Borehole open to approximately 4.5 m depth on completion. 2. Groundwater or water seepage not encountered during drilling. 3. 4.	LANDTEK LIMITED 205 Nebo Road, Unit 4B Hamilton, Ontario, L8W 2E1 Ph: (905) 383-3733
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Test Pit		TP1	TP3	TP4	TP8	TP9	TP11	TP13	TP16	TP17	TP18	TP19	TP21
Surface Geodetic Elevation (masl)		218.30	211.43	2196.66	213.39	211.17	207.40	206.93	208.87	208.70	214.49	214.52	205.50
Depth Below Grade & Stratigraphy Encountered (m bgs)	Topsoil	0.00 - 0.35	0.00 - 0.30	0.00 - 0.30	0.00 - 0.30	0.00 - 0.45	0.00 - 0.30	0.00 - 0.40	0.00 - 0.30	N.O.	0.00 - 0.25	0.00 - 0.30	0.00 - 0.30
	NATIVE: Silty and Clay / Clayey Silt / Silt	0.35 - 0.80	0.30 - 3.00	0.30 - 3.00	N.O.	0.45 - 3.00	0.30 - 3.00	0.40 - 3.00	0.30 - 3.00	0.00 - 3.00	0.25 - 3.00	0.30 - 1.20	0.30 - 3.00
	NATIVE: Clayey Silt to Silt Glacial Till	0.80 - 3.00	N.O.	N.O.	0.30 - 3.00	N.O.	N.O.	N.O.	N.O.	N.O.	N.O.	1.20 - 3.00	N.O.
Ground Water and Caving Conditions		No water, no cave	Water seepage below 1.20 m	Water seepage below 1.20 m	No water, no cave	No water, no cave	No water, no cave	Water seepage below 0.50 m	No water, no cave	No water, no cave	Water at surface, no cave	No water, no cave	Water seepage below 2.20 m

*N.O. is Not Observed

APPENDIX G2

Groundwater Hydrographs



Notes:

(1) Precipitation and temperature data obtained from Environment Canada for the Hamilton Airport Climate Station (Station ID 6153193), accessed April 2026.

Client/Project

Elfrida Community Builders Group Inc.
Elfrida Subwatershed Study

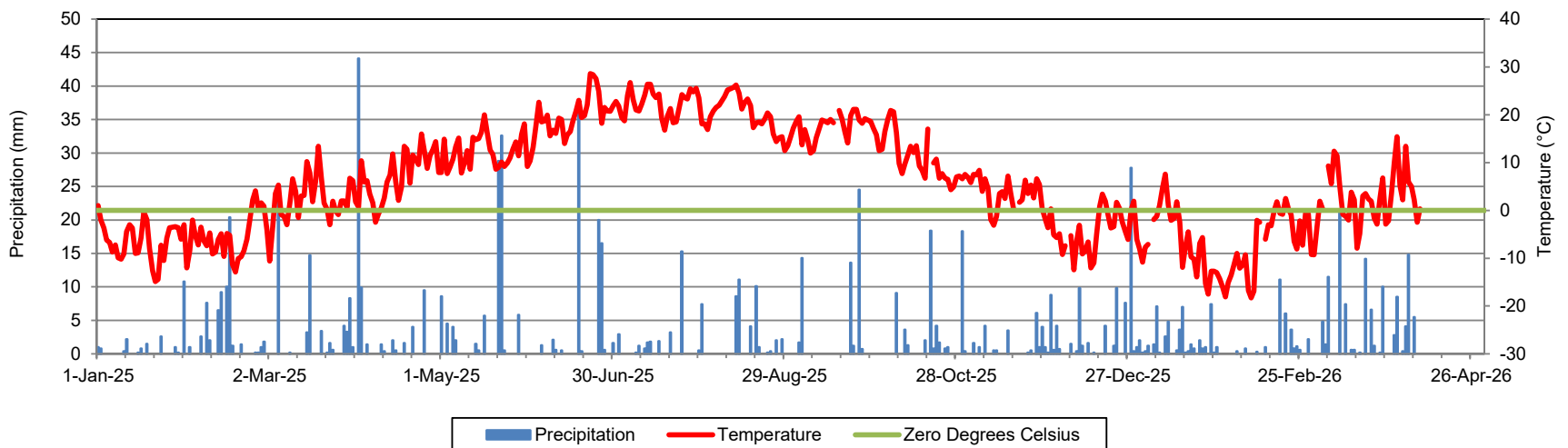
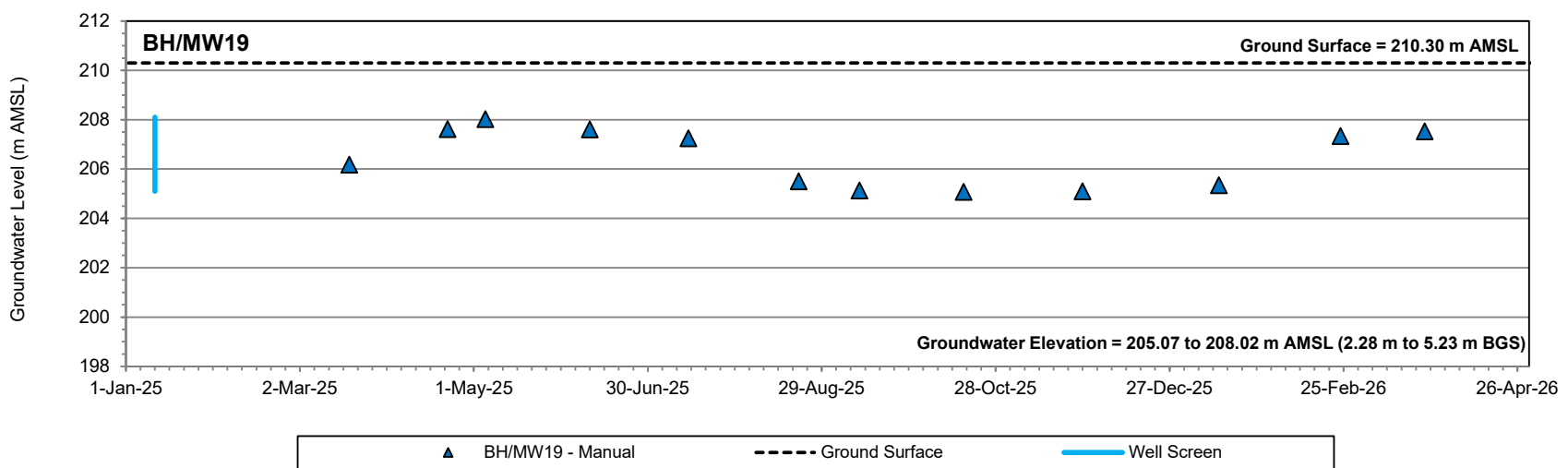
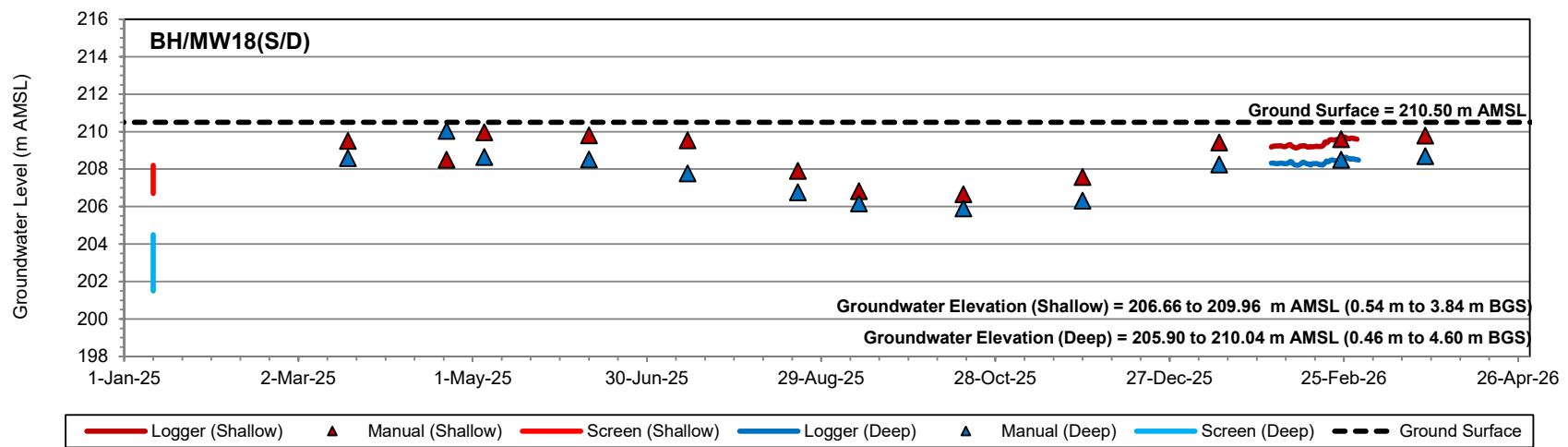
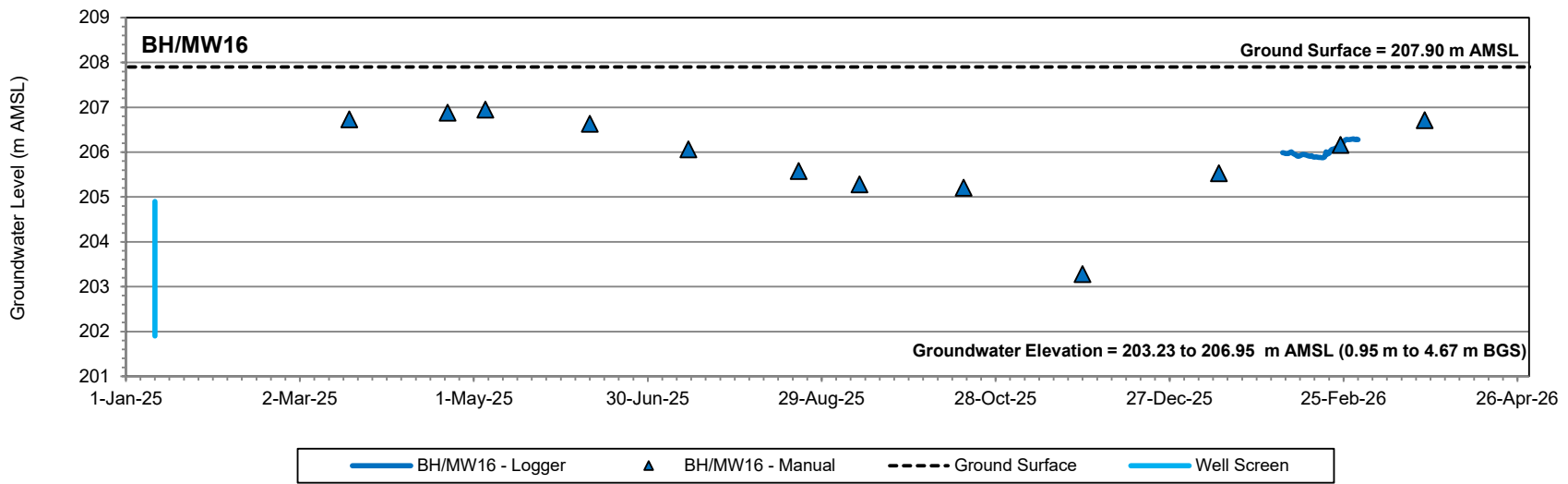
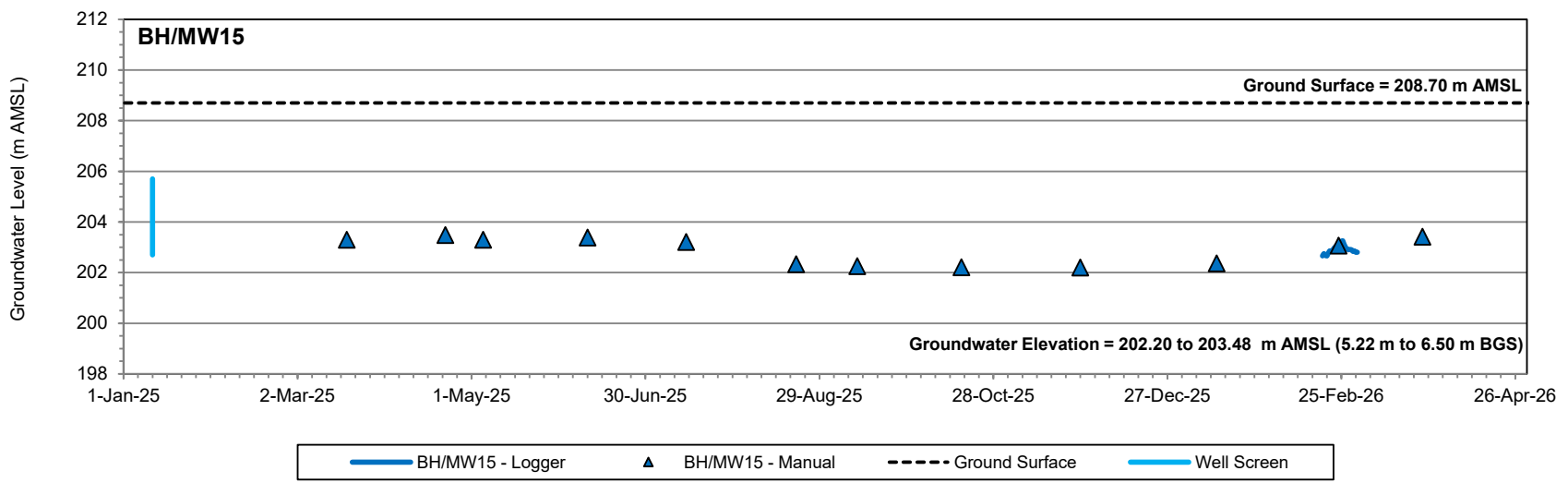
Figure No.

G2-1



Title

HYDROGRAPHS
BH/MW1, BH/MW2(S/D), BH/MW5, and BH/MW7



Notes:

(1) Precipitation and temperature data obtained from Environment Canada for the Hamilton Airport Climate Station (Station ID 6153193), accessed April 2026.

Client/Project

Elfrida Community Builders Group Inc.
Elfrida Subwatershed Study

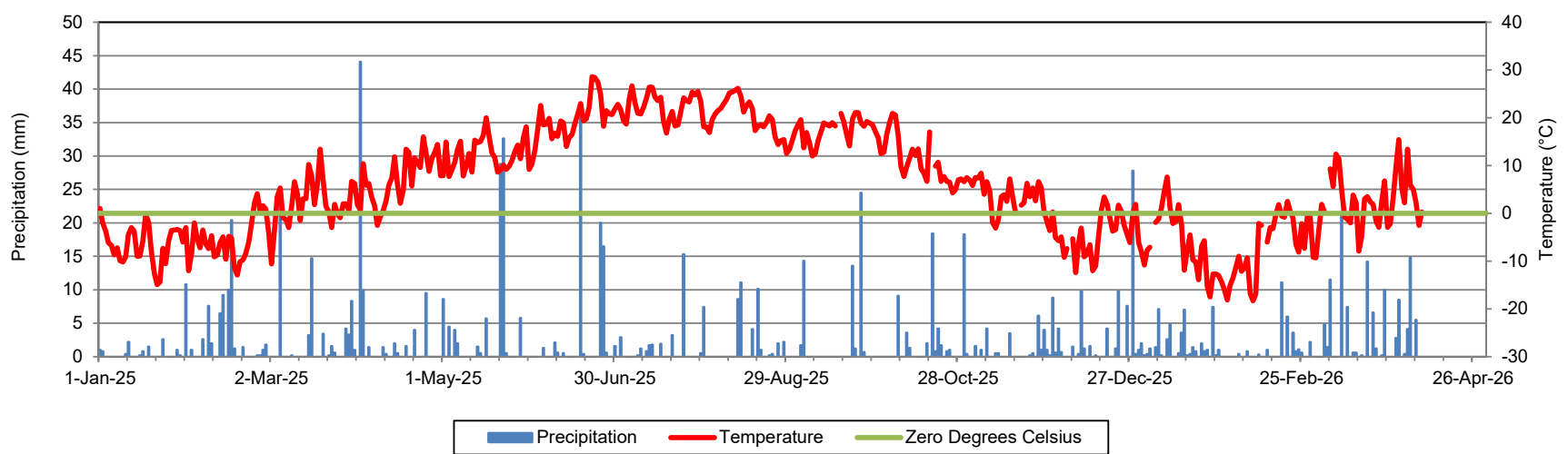
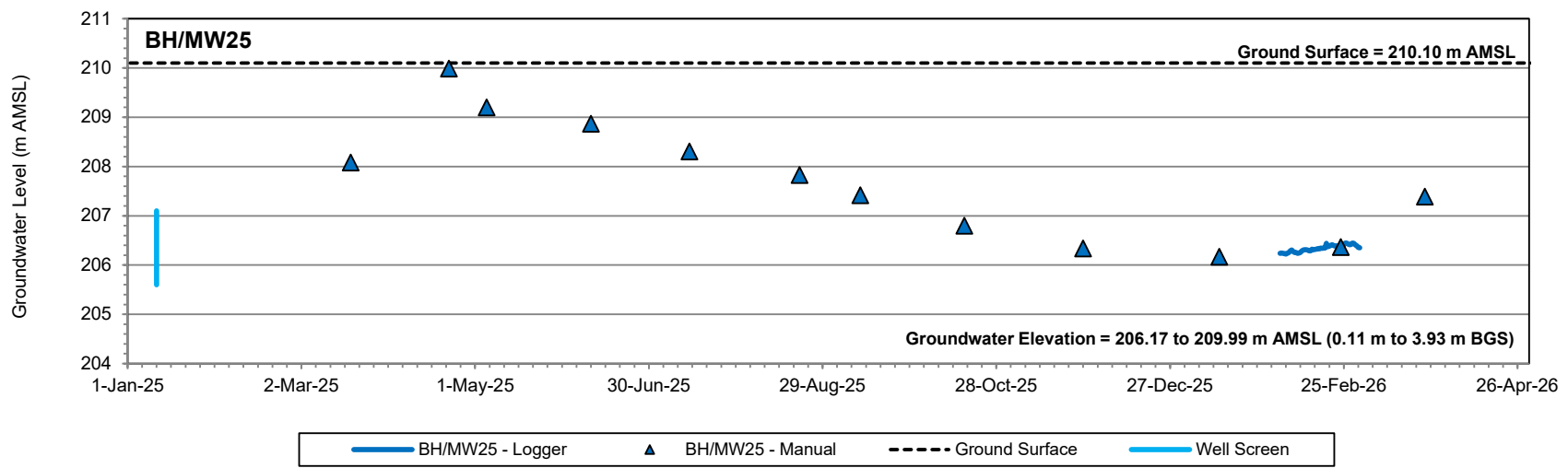
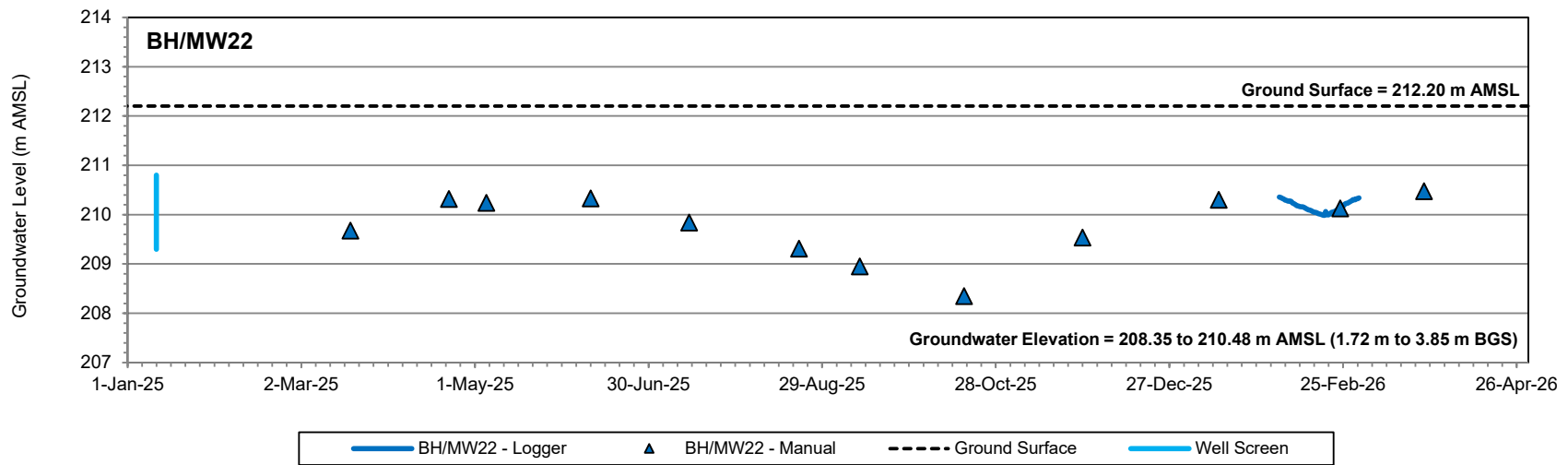
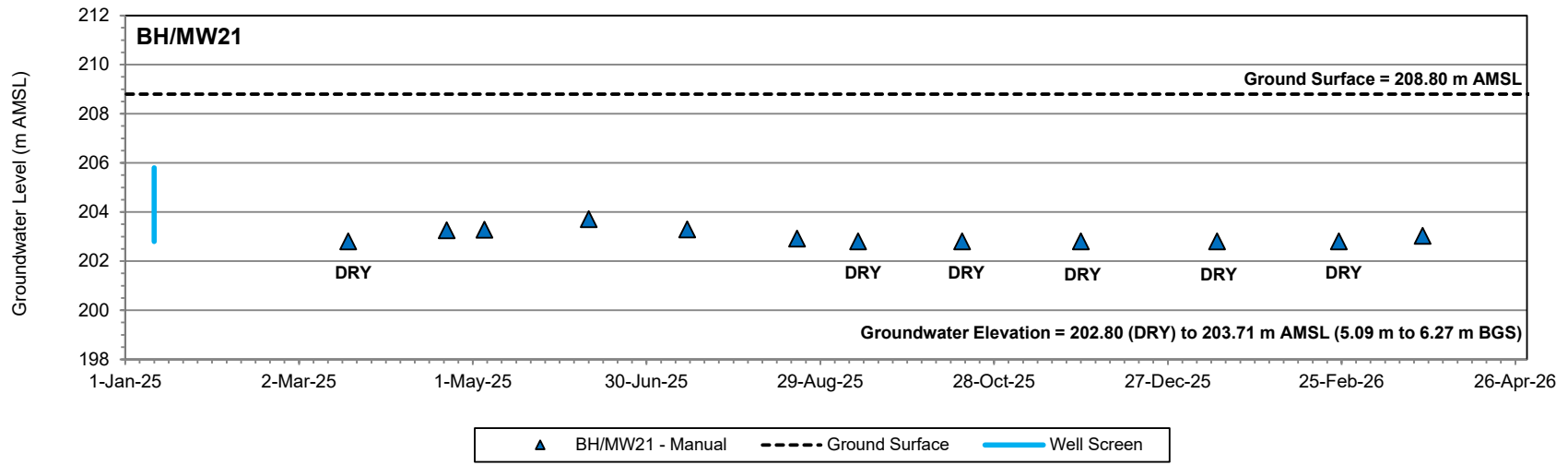
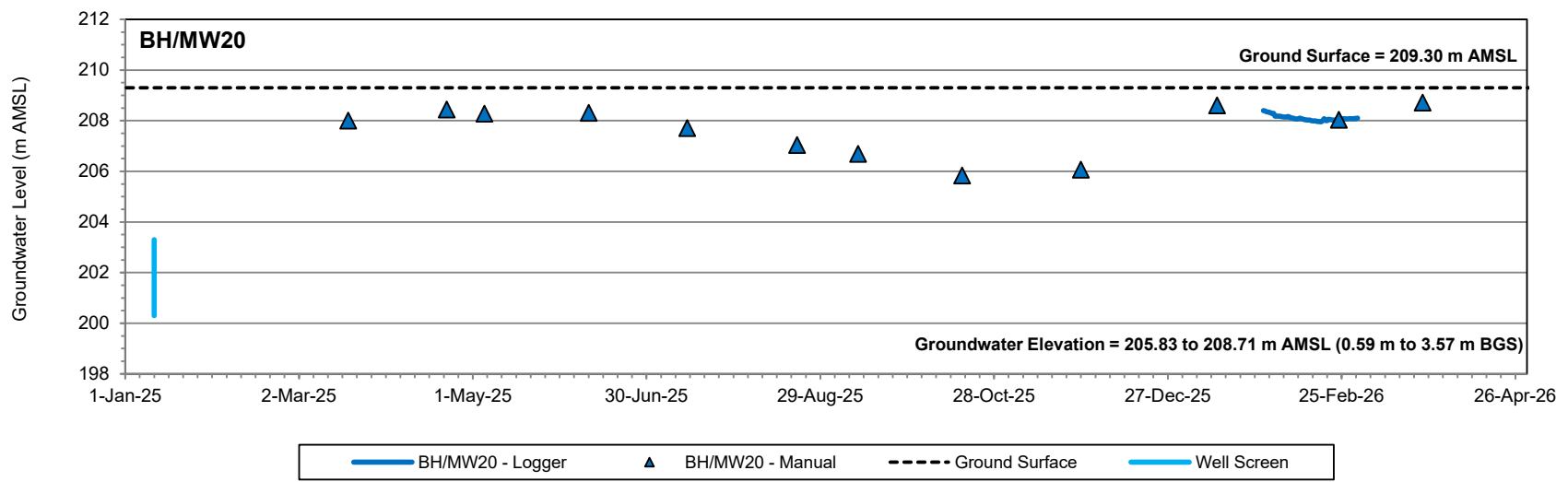
Figure No.

G2-2

Title

HYDROGRAPHS
BH/MW15, BH/MW16, BH/MW18(S/D), and BH/MW19





Notes:

(1) Precipitation and temperature data obtained from Environment Canada for the Hamilton Airport Climate Station (Station ID 6153193), accessed April 2026.

Client/Project

Elfrida Community Builders Group Inc.
Elfrida Subwatershed Study

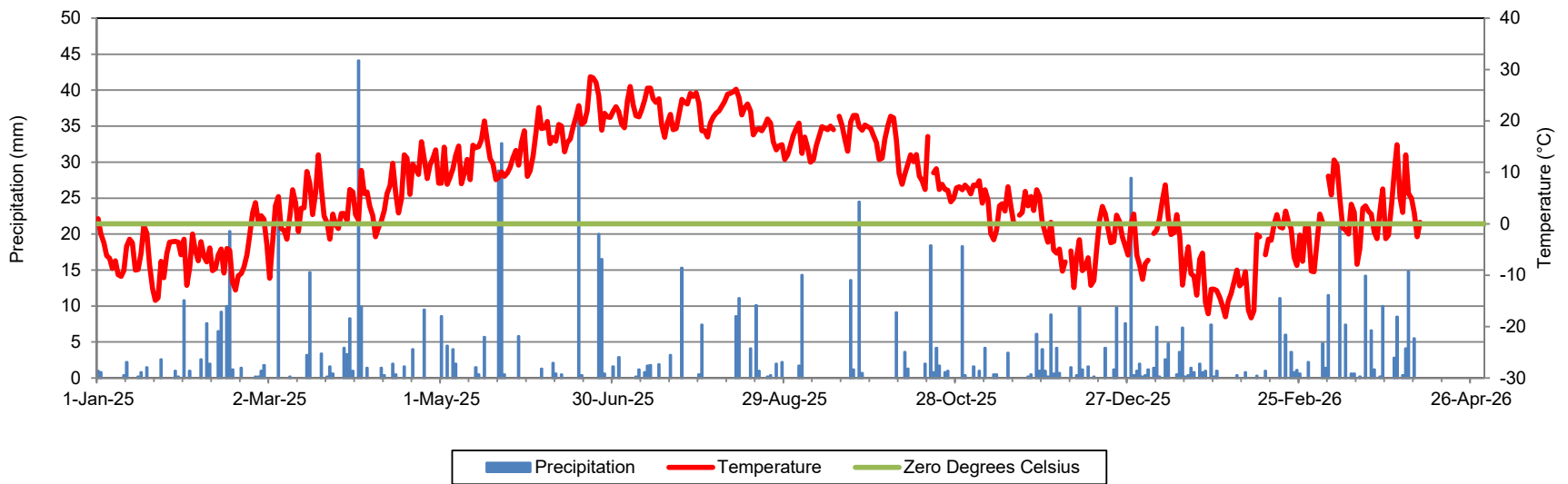
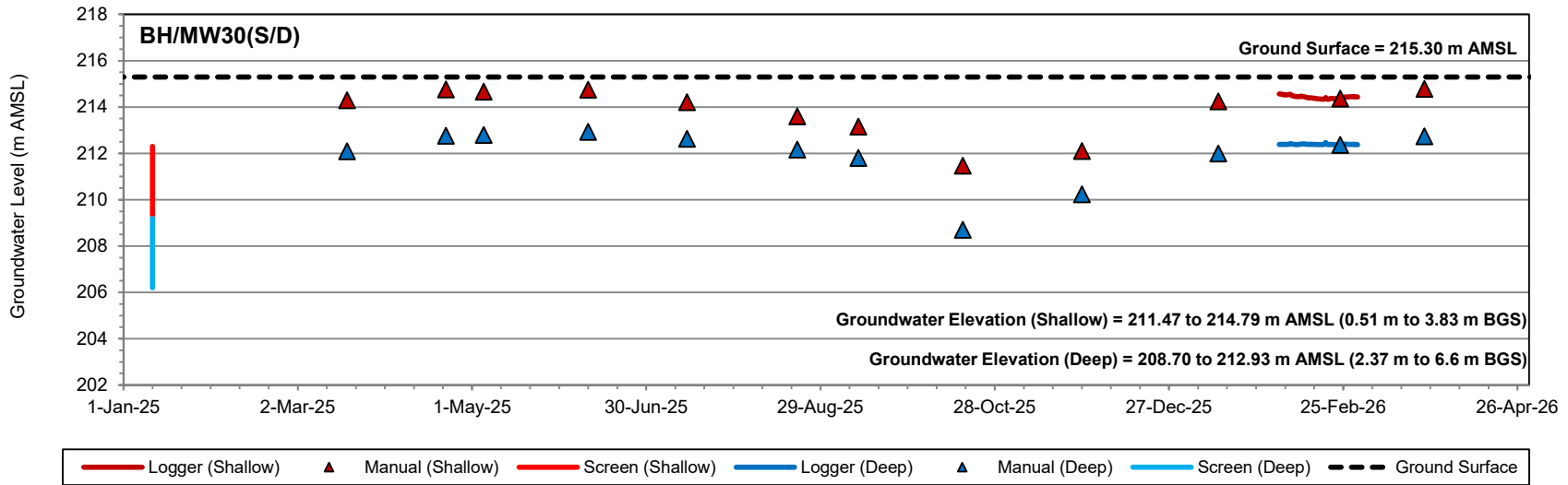
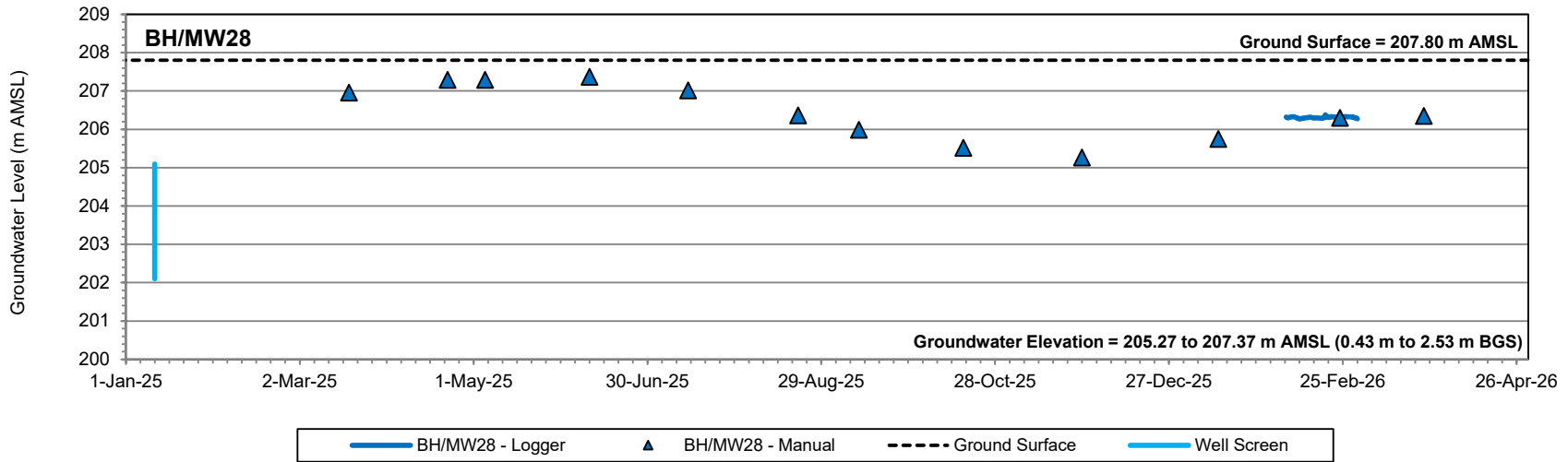
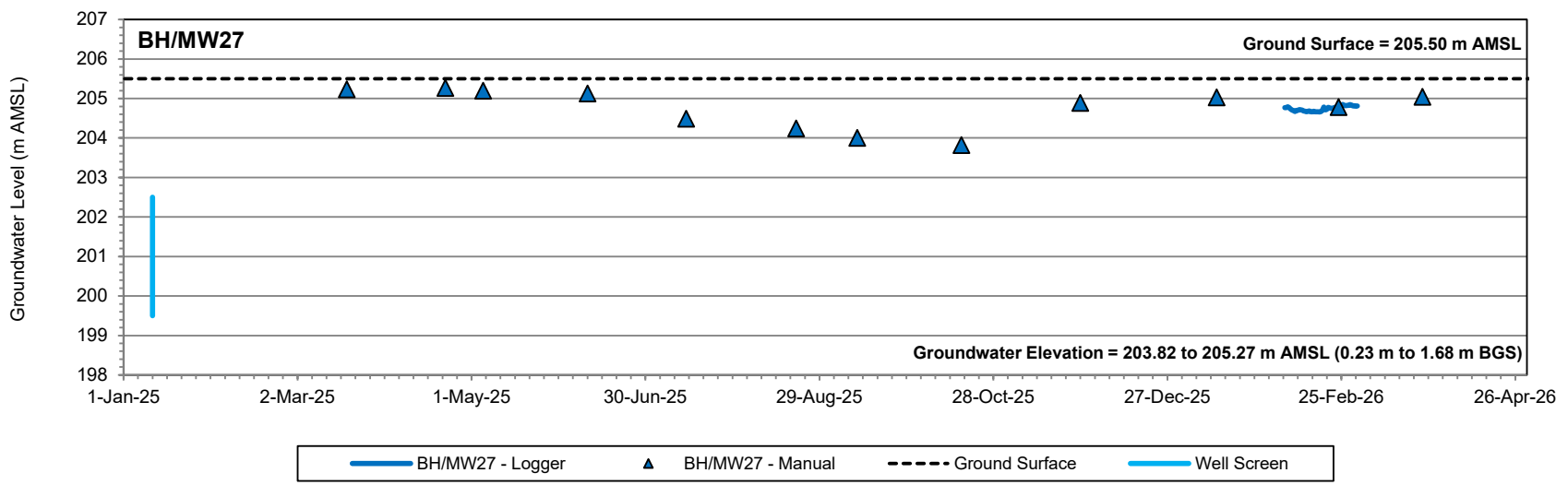
Figure No.

G2-3

Title

HYDROGRAPHS
BH/MW20, BH/MW21, BH/MW22, and BH/MW25





Notes:

(1) Precipitation and temperature data obtained from Environment Canada for the Hamilton Airport Climate Station (Station ID 6153193), accessed April 2026.

Client/Project

Elfrida Community Builders Group Inc.
Elfrida Subwatershed Study

Figure No.

G2-4

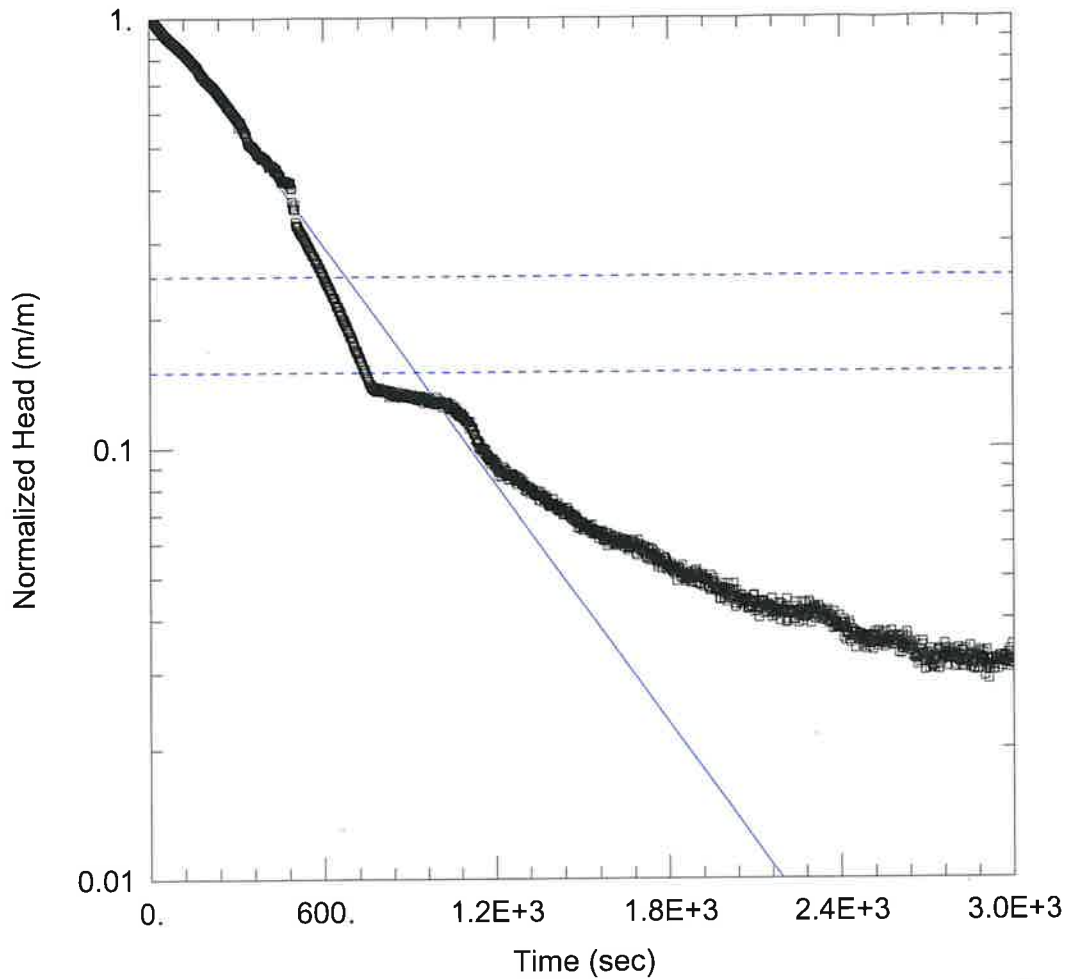
Title

HYDROGRAPHS
BH/MW27, BH/MW28, and BH/MW30(S/D)



APPENDIX G3

Hydraulic Response and Infiltration Testing Results



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...MW2D.aqt
Date: 01/28/26

Time: 10:04:18

PROJECT INFORMATION

Company: Landtek Limited
Client: DELTA URBAN INC.
Project: 24256
Location: Elfrida Community Subwatershed
Test Well: MW2D
Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 0.86 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW2D)

Initial Displacement: 0.2076 m
Total Well Penetration Depth: 0.86 m
Casing Radius: 0.0254 m

Static Water Column Height: 0.86 m
Screen Length: 0.86 m
Well Radius: 0.0254 m

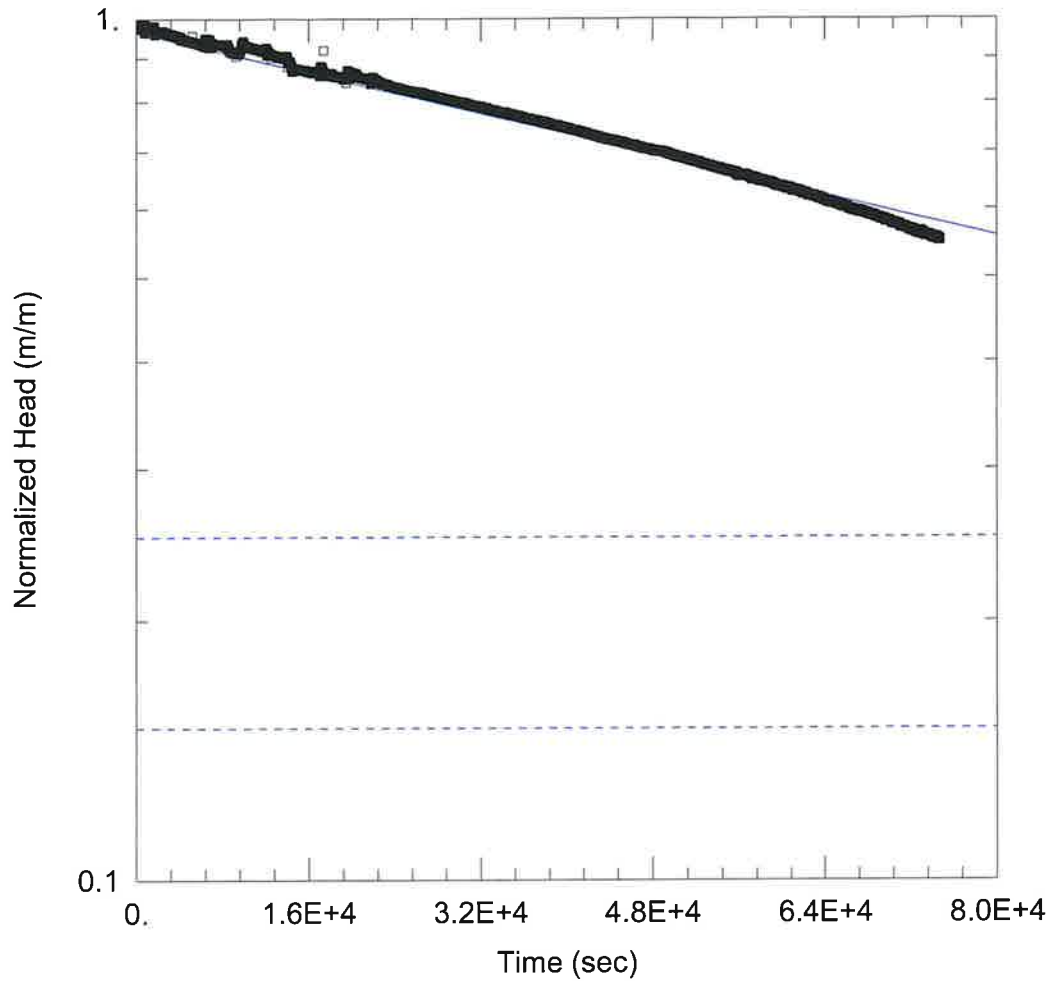
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 4.217E-6 m/sec

y0 = 0.2173 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW3.aqt
Date: 01/28/26

Time: 10:05:46

PROJECT INFORMATION

Company: Landtek Limited
Client: DELTA URBAN INC.
Project: 24256
Location: Elfrida Community Subwatershed
Test Well: MW3
Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 5.7 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW3)

Initial Displacement: 0.466 m
Total Well Penetration Depth: 5.7 m
Casing Radius: 0.0254 m

Static Water Column Height: 5.7 m
Screen Length: 3. m
Well Radius: 0.0254 m

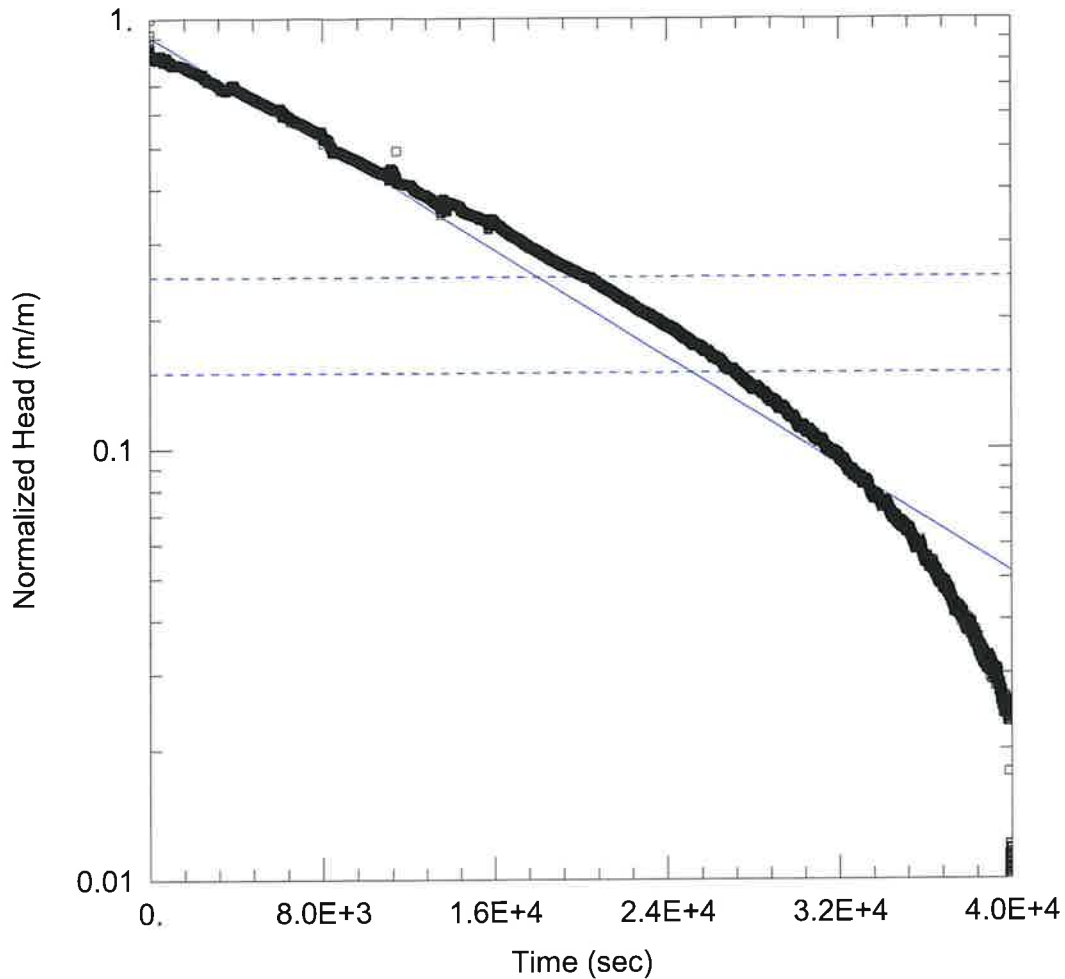
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 4.013E-9 m/sec

y0 = 0.4492 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW5.aqt
 Date: 01/28/26

Time: 10:06:56

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW5
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 3.42 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW5)

Initial Displacement: 0.3762 m
 Total Well Penetration Depth: 3.42 m
 Casing Radius: 0.0254 m

Static Water Column Height: 3.42 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

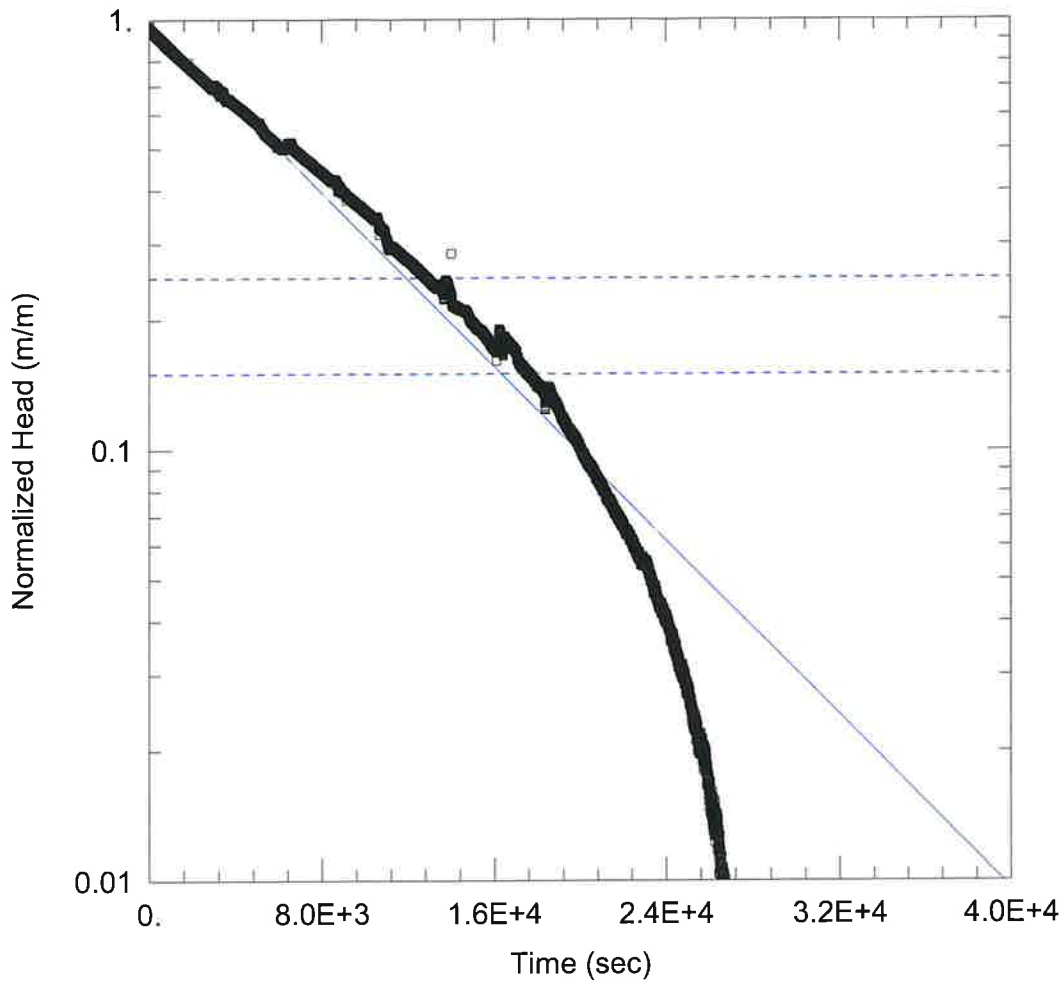
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 4.21E-8 m/sec

y0 = 0.3415 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW6.aqt
 Date: 01/28/26

Time: 10:08:02

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW6
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 2.97 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW6)

Initial Displacement: 0.4179 m
 Total Well Penetration Depth: 2.97 m
 Casing Radius: 0.0254 m

Static Water Column Height: 2.97 m
 Screen Length: 1.5 m
 Well Radius: 0.0254 m

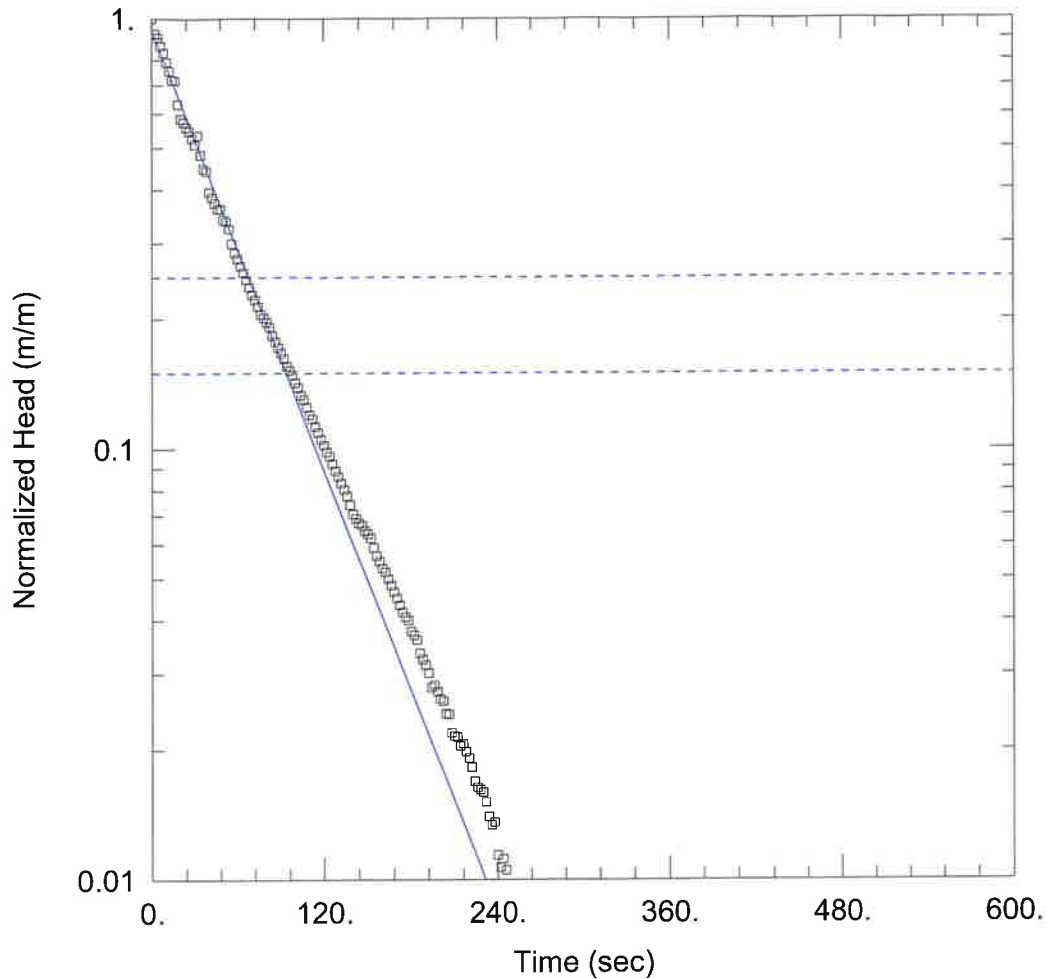
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 1.019E-7 m/sec

y0 = 0.4177 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW7D.aqt
 Date: 01/28/26

Time: 10:09:42

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW7D
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 2.09 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW7D)

Initial Displacement: 0.4036 m
 Total Well Penetration Depth: 2.09 m
 Casing Radius: 0.0254 m

Static Water Column Height: 2.09 m
 Screen Length: 2.09 m
 Well Radius: 0.0254 m

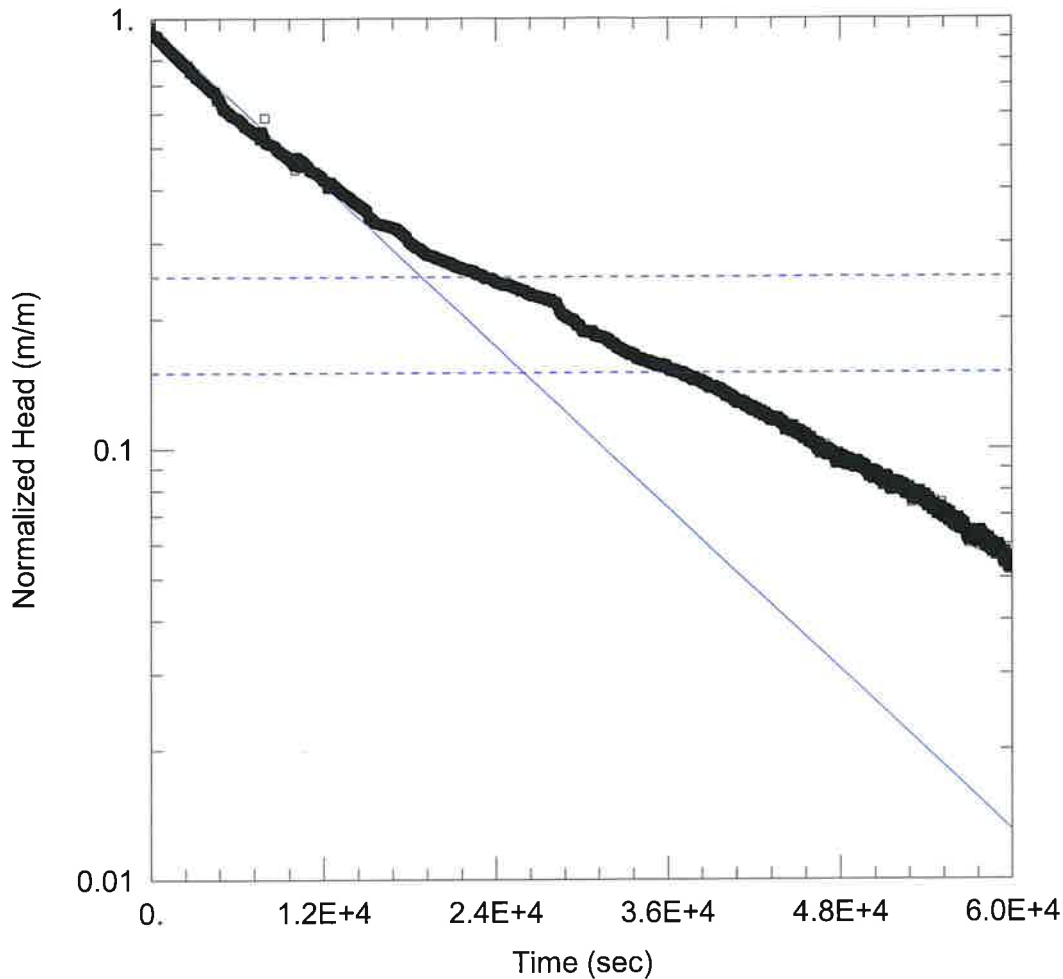
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 1.608E-5 m/sec

y0 = 0.3793 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW9.aqt
Date: 01/28/26

Time: 10:11:22

PROJECT INFORMATION

Company: Landtek Limited
Client: DELTA URBAN INC.
Project: 24256
Location: Elfrida Community Subwatershed
Test Well: MW9
Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 3.69 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW9)

Initial Displacement: 0.3917 m
Total Well Penetration Depth: 3.69 m
Casing Radius: 0.0254 m

Static Water Column Height: 3.69 m
Screen Length: 3. m
Well Radius: 0.0254 m

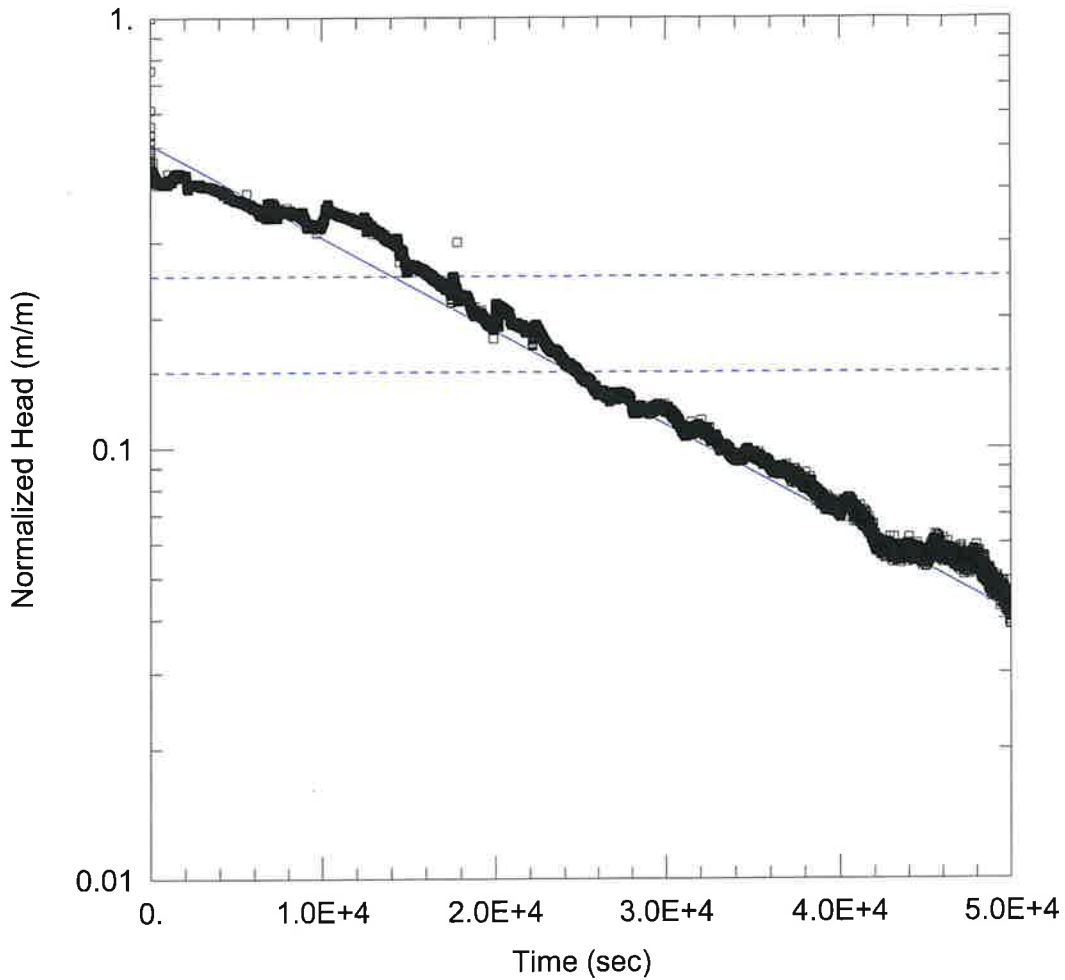
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 4.22E-8 m/sec

y0 = 0.3785 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW16.aqt
 Date: 01/28/26

Time: 10:14:06

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW16
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 1.62 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW16)

Initial Displacement: 0.3453 m
 Total Well Penetration Depth: 1.62 m
 Casing Radius: 0.0254 m

Static Water Column Height: 1.62 m
 Screen Length: 1.62 m
 Well Radius: 0.0254 m

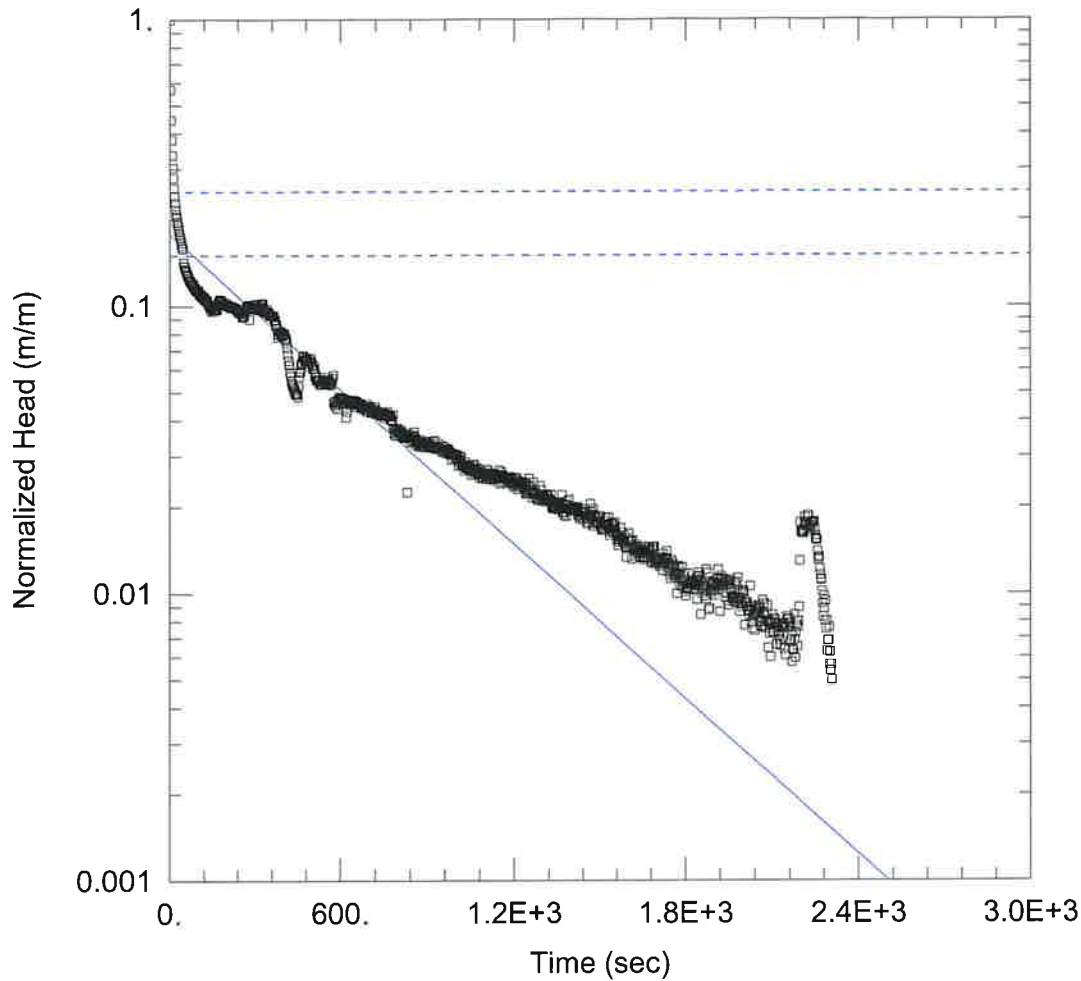
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 5.275E-8 m/sec

$y_0 =$ 0.1747 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW18D.aqt
Date: 01/28/26

Time: 10:16:17

PROJECT INFORMATION

Company: Landtek Limited
Client: DELTA URBAN INC.
Project: 24256
Location: Elfrida Community Subwatershed
Test Well: MW18D
Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 5.74 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW18D)

Initial Displacement: 0.2694 m
Total Well Penetration Depth: 5.74 m
Casing Radius: 0.0254 m

Static Water Column Height: 5.74 m
Screen Length: 3. m
Well Radius: 0.0254 m

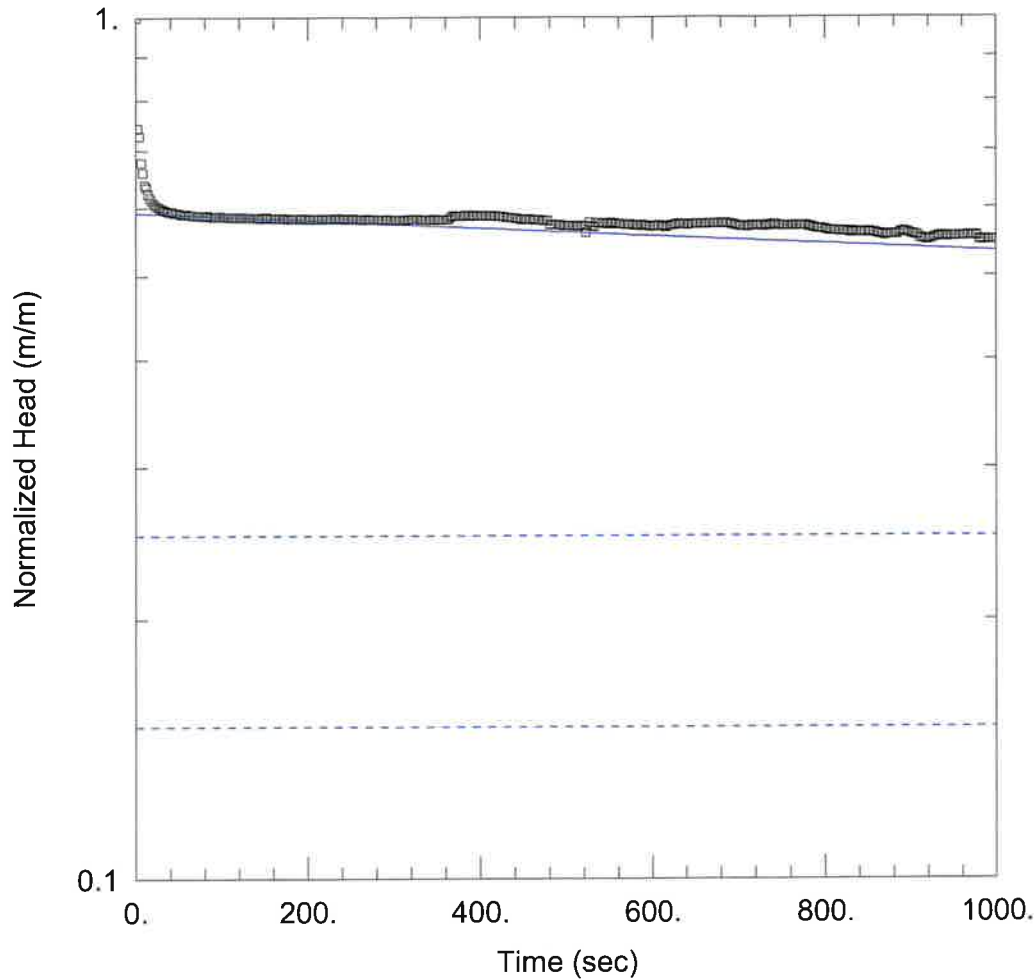
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 1.216E-6 m/sec

y0 = 0.04777 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...MW20.aqt
Date: 01/28/26

Time: 10:18:01

PROJECT INFORMATION

Company: Landtek Limited
Client: DELTA URBAN INC.
Project: 24256
Location: Elfrida Community Subwatershed
Test Well: MW20
Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 3.3 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW20)

Initial Displacement: 0.4397 m
Total Well Penetration Depth: 3.3 m
Casing Radius: 0.0254 m

Static Water Column Height: 3.3 m
Screen Length: 3. m
Well Radius: 0.0254 m

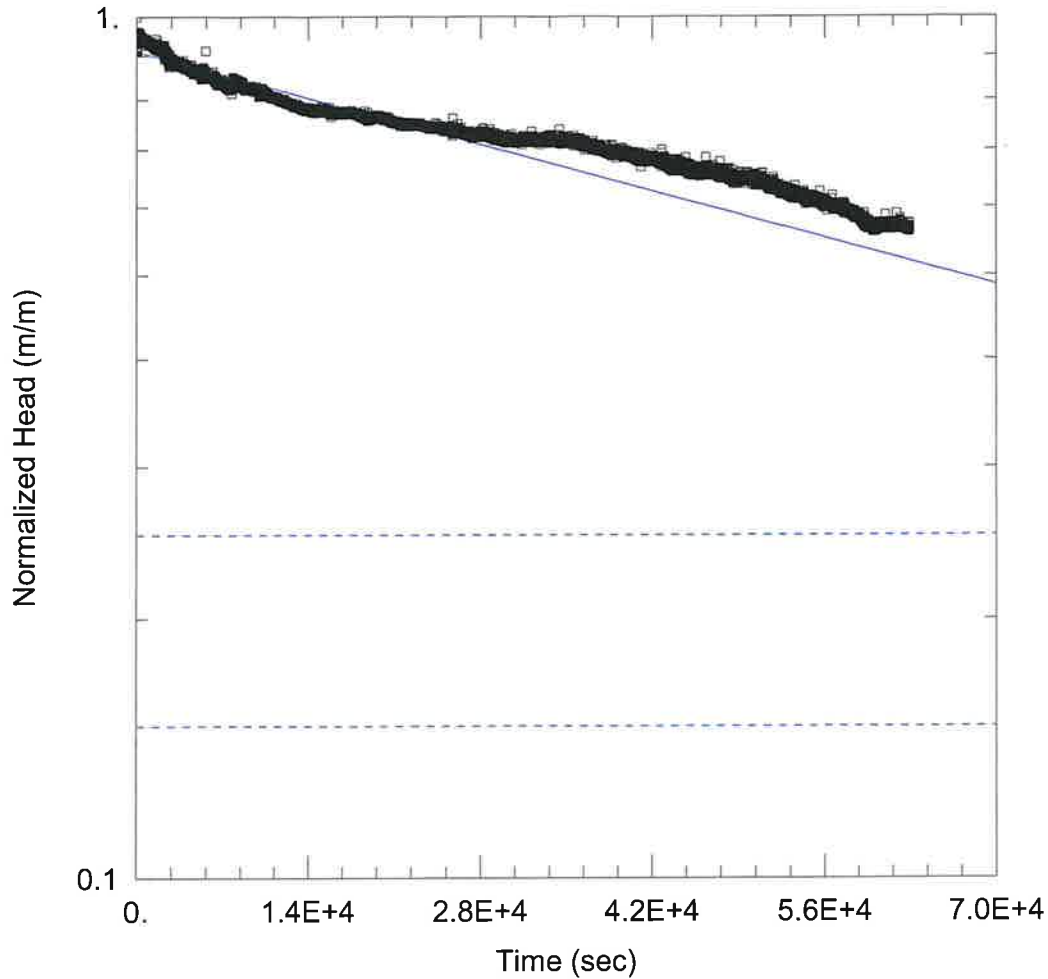
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 6.041E-8 m/sec

y0 = 0.26 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW22.aqt
 Date: 01/28/26

Time: 10:19:10

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW22
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 4.28 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW22)

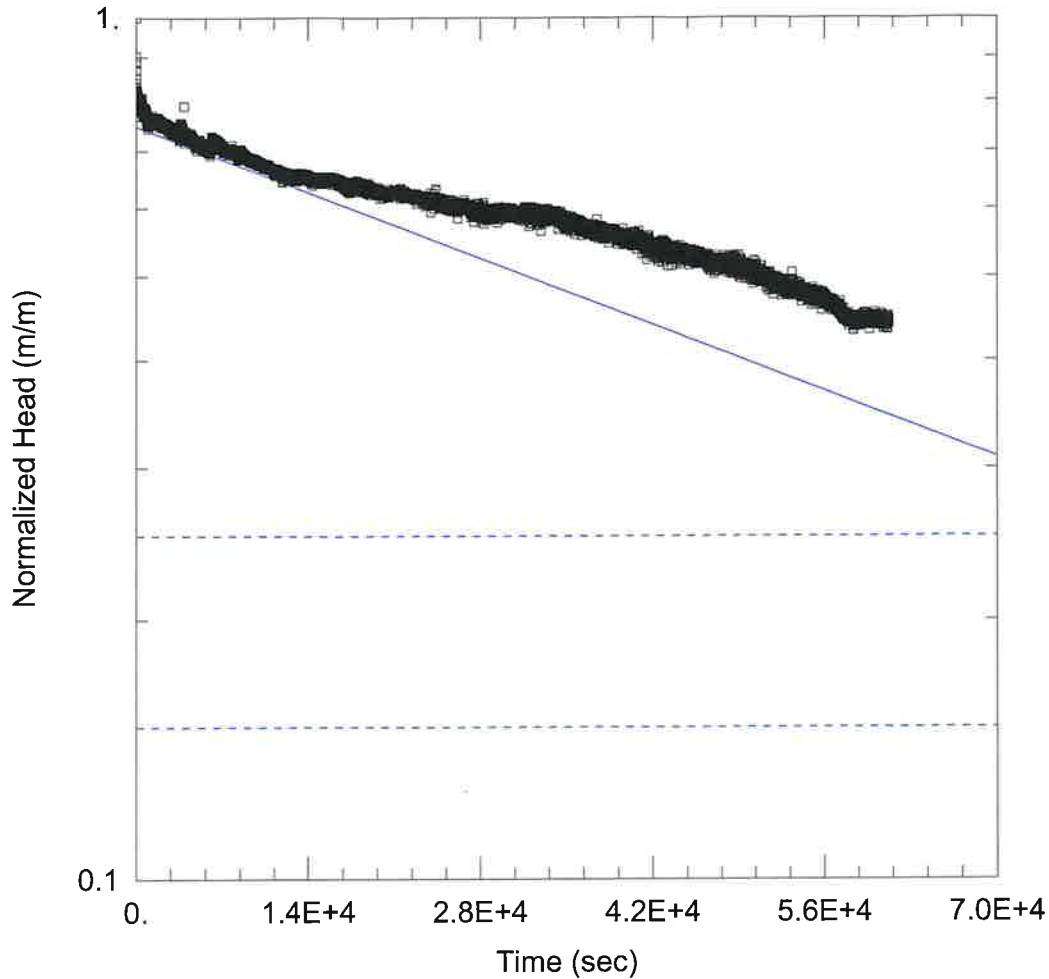
Initial Displacement: 0.4118 m
 Total Well Penetration Depth: 4.28 m
 Casing Radius: 0.0254 m

Static Water Column Height: 4.28 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
 K = 5.236E-9 m/sec

Solution Method: Hvorslev
 y0 = 0.3746 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW24.aqt
 Date: 01/28/26

Time: 10:20:25

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW24
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 5.04 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW24)

Initial Displacement: 0.4282 m
 Total Well Penetration Depth: 5.04 m
 Casing Radius: 0.0254 m

Static Water Column Height: 5.04 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

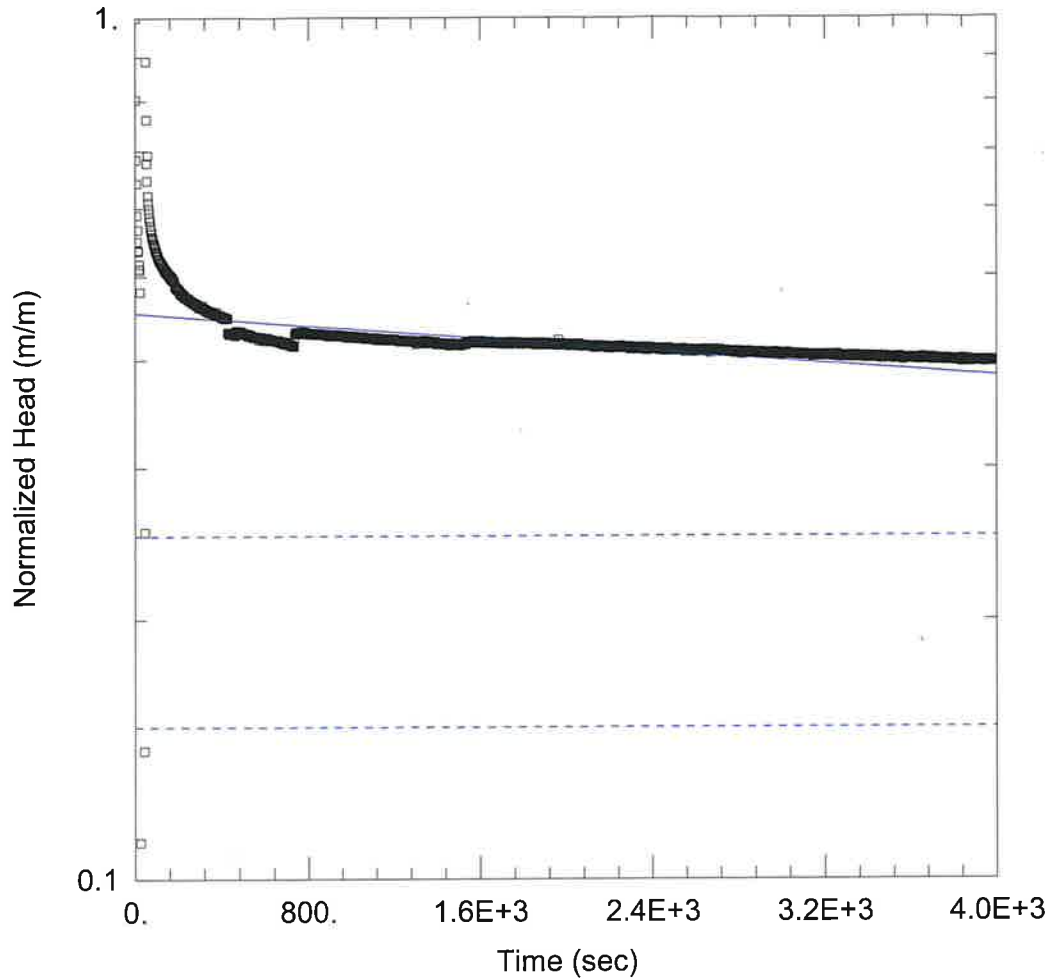
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 7.421E-9 m/sec

y0 = 0.3197 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW25.aqt
 Date: 01/28/26

Time: 10:22:38

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW25
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 1.06 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW25)

Initial Displacement: 0.2471 m
 Total Well Penetration Depth: 1.06 m
 Casing Radius: 0.0254 m

Static Water Column Height: 1.06 m
 Screen Length: 1.06 m
 Well Radius: 0.0254 m

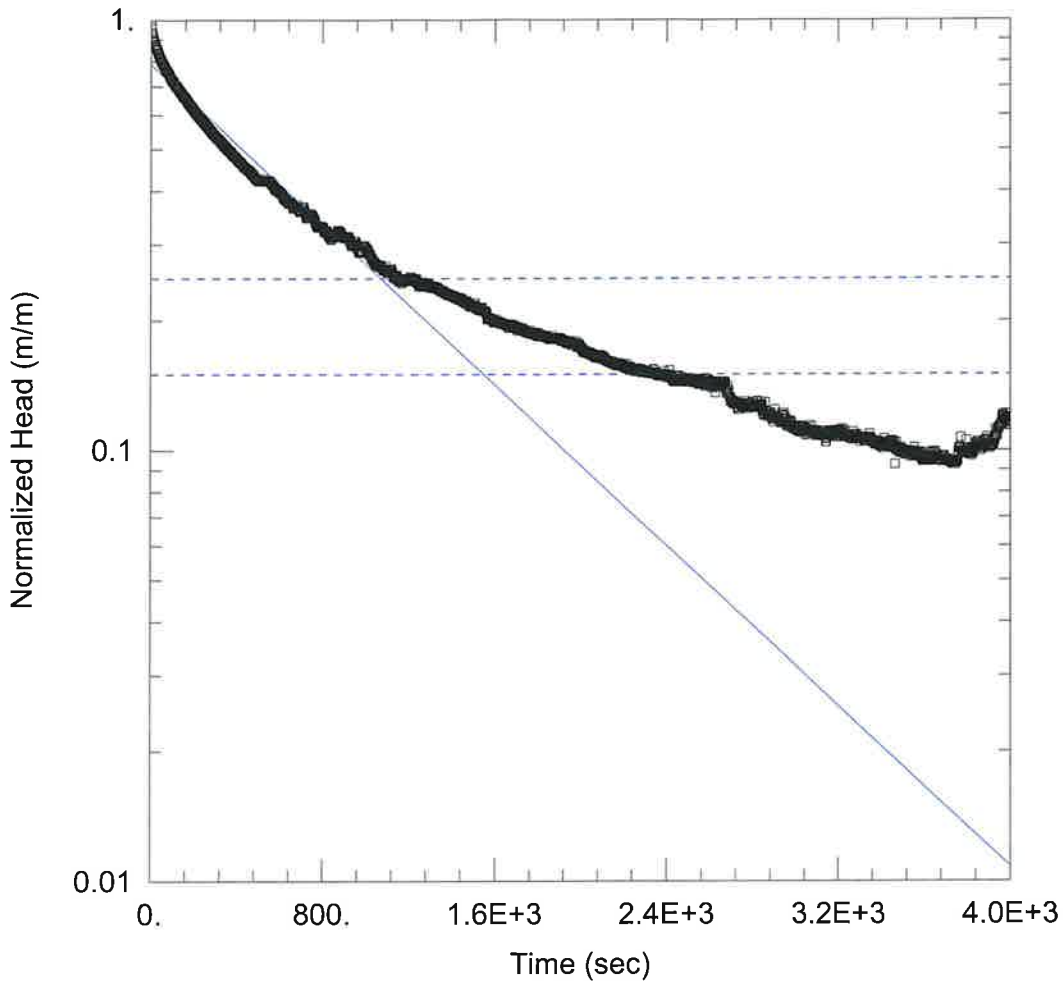
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 6.755E-8 m/sec

y0 = 0.1119 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW27.aqt
 Date: 01/28/26

Time: 10:55:39

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW27
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 5.61 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW27)

Initial Displacement: 0.4105 m
 Total Well Penetration Depth: 5.61 m
 Casing Radius: 0.0254 m

Static Water Column Height: 5.61 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

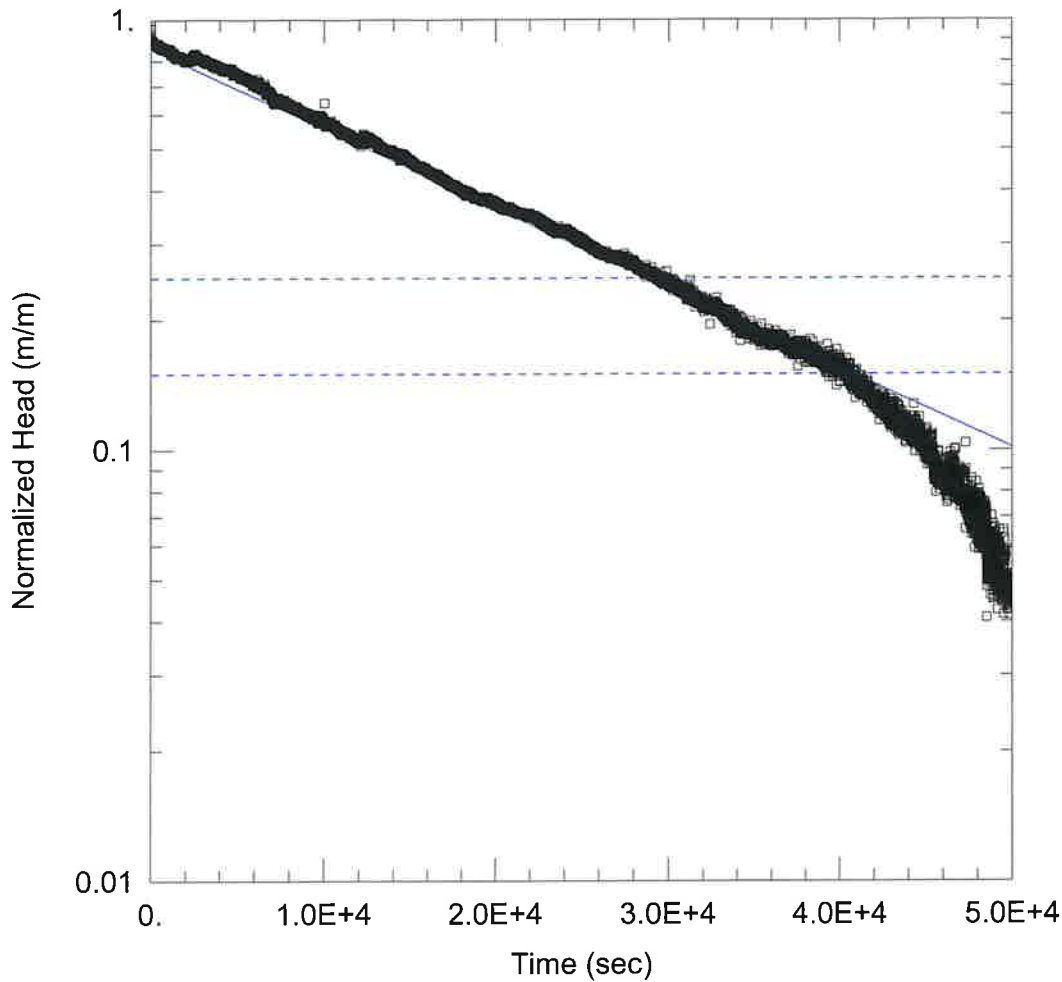
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 5.502E-7 m/sec

y0 = 0.3228 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...MW28.aqt
 Date: 01/28/26

Time: 10:25:26

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW28
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 3.42 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW28)

Initial Displacement: 0.3995 m
 Total Well Penetration Depth: 3.42 m
 Casing Radius: 0.0254 m

Static Water Column Height: 3.42 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

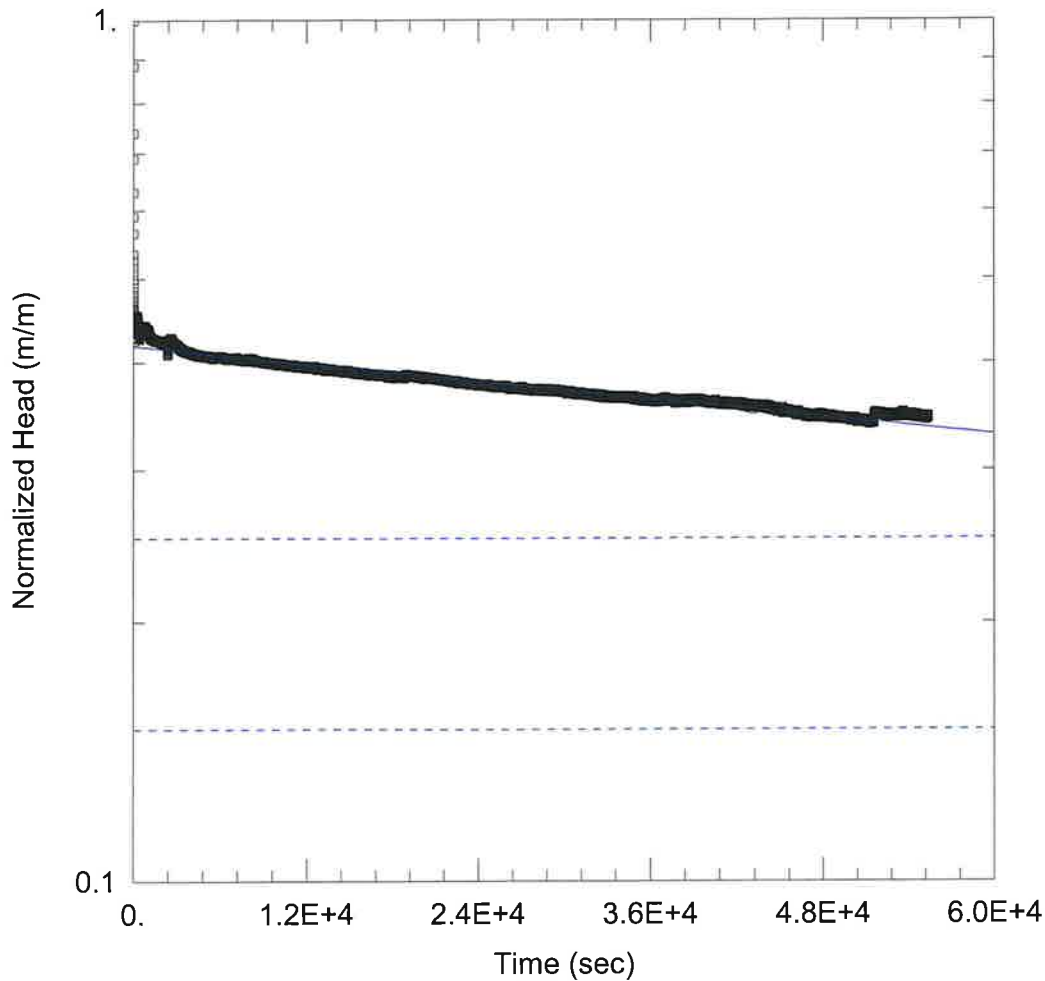
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 2.503E-8 m/sec

y0 = 0.34 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...MW30S.aqt
 Date: 01/28/26

Time: 11:08:29

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW830S
 Test Date: Nov. 27 , 2025

AQUIFER DATA

Saturated Thickness: 2.98 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW30S)

Initial Displacement: 0.4306 m
 Total Well Penetration Depth: 4.32 m
 Casing Radius: 0.0254 m

Static Water Column Height: 2.98 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

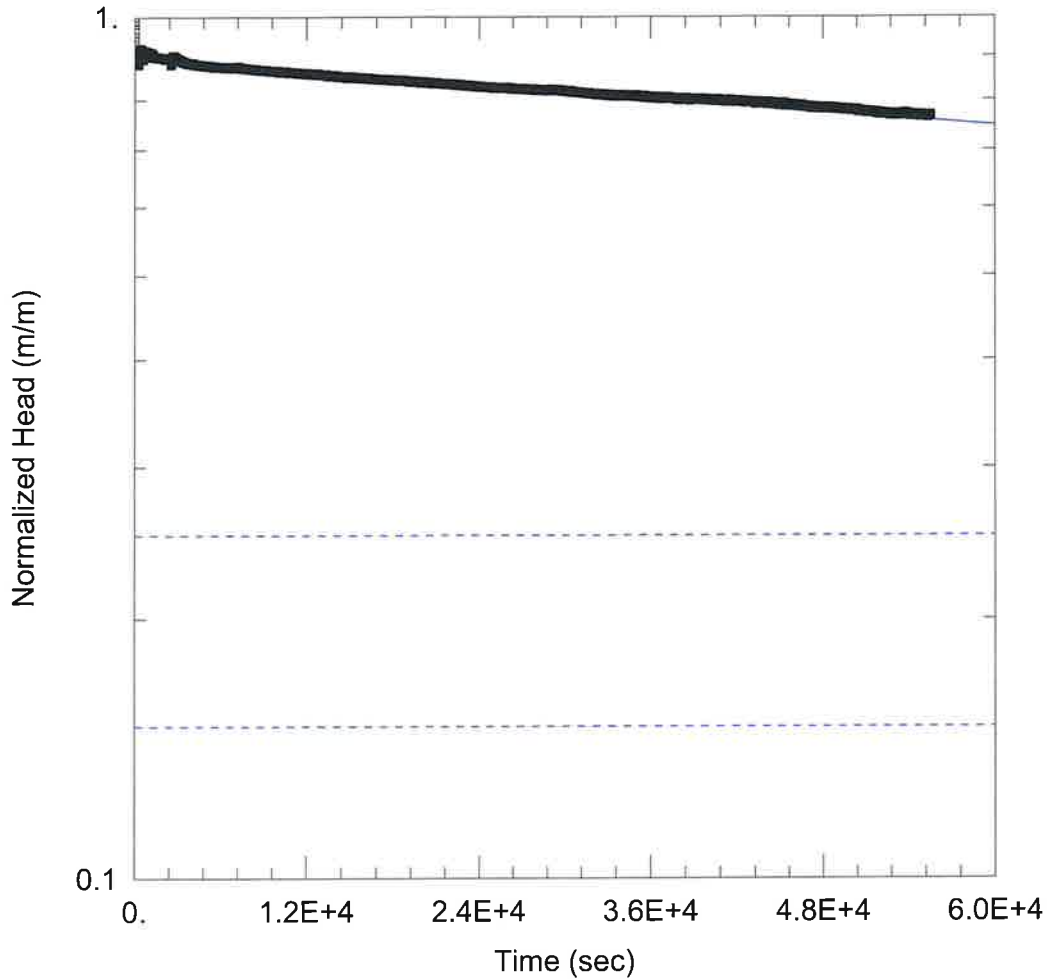
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 2.256E-9 m/sec

y0 = 0.1798 m



HDROGEOLOGICAL INVESTIGATION

Data Set: C:\...\MW30D.aqt
 Date: 01/28/26

Time: 11:02:24

PROJECT INFORMATION

Company: Landtek Limited
 Client: DELTA URBAN INC.
 Project: 24256
 Location: Elfrida Community Subwatershed
 Test Well: MW30D
 Test Date: Nov. 27, 2025

AQUIFER DATA

Saturated Thickness: 4.32 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW30D)

Initial Displacement: 0.3659 m
 Total Well Penetration Depth: 4.32 m
 Casing Radius: 0.0254 m

Static Water Column Height: 4.32 m
 Screen Length: 3. m
 Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

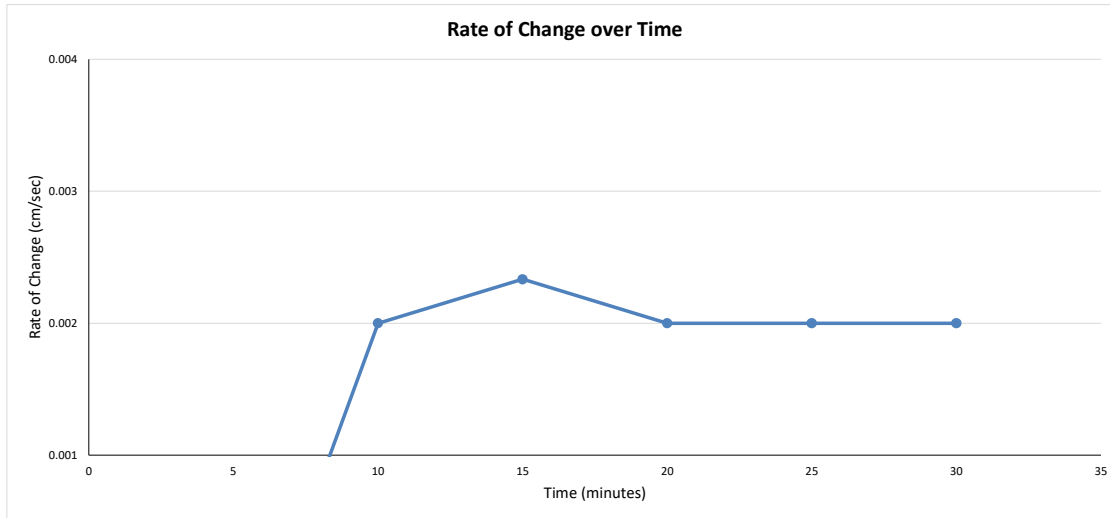
K = 1.713E-9 m/sec

y0 = 0.3256 m

Guelph Permeameter Infiltration Rate Determination



Test Location: TP1 - 1.5 m bgs



INPUT PARAMETERS

α^*	0.12	cm^{-1}
H	10	cm
a	3	cm
X	2.16	cm^2
R	0.002	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm^{-1}) =	1.288

CALCULATED PARAMETERS

H_a	3	unitless
Q_1	0.0043	cm^3/sec

CALCULATED DESIGN VALUES

k_{fs}	4.7E-06	cm/sec
Φ_m	3.9E-05	cm^2/s
Infiltration:	20	mm/hr
FOS:	2.50	unitless
Design Infiltration:	8	mm/hr

Variable Glossary

α^*	<ol style="list-style-type: none"> 1) is the ratio of gravity to capillarity forces during infiltration or drainage 2) determined from table 1 on page 47 of the manual (or the adjacent table)
H	<ol style="list-style-type: none"> 1) is the water head in the BH 2) determined by the height that the inner tube is pulled up during field operation
a	<ol style="list-style-type: none"> 1) is the radius of the borehole 2) determine by the size of the auger
X	<ol style="list-style-type: none"> 1) is the reservoir constant 2) determined by the reservoir knob at the top of the unit <ul style="list-style-type: none"> • if the knob is up $X = 35.22$ (outer and inner reservoir) • if the knob is down $X = 2.16$ (inner reservoir)
R	<ol style="list-style-type: none"> 1) is the steady state rate of flow per minute 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

H_a	is the ratio of head to borehole radius
Q_1	is the flow rate
$C_{(1, 2 \text{ or } 3)}$	is the shape factor which accounts for the saturated area of the soil <ul style="list-style-type: none"> • Select C_1 if α^* is $\geq 0.12 \text{ cm}^{-1}$ • Select C_2 if $\alpha^* = 0.04 \text{ cm}^{-1}$ • Select C_3 if $\alpha^* = 0.01 \text{ cm}^{-1}$
k_{fs}	is the field saturated hydraulic conductivity of the soil
Φ_m	is an indicator of the capillary pull exerted by the unsaturated soil on the water

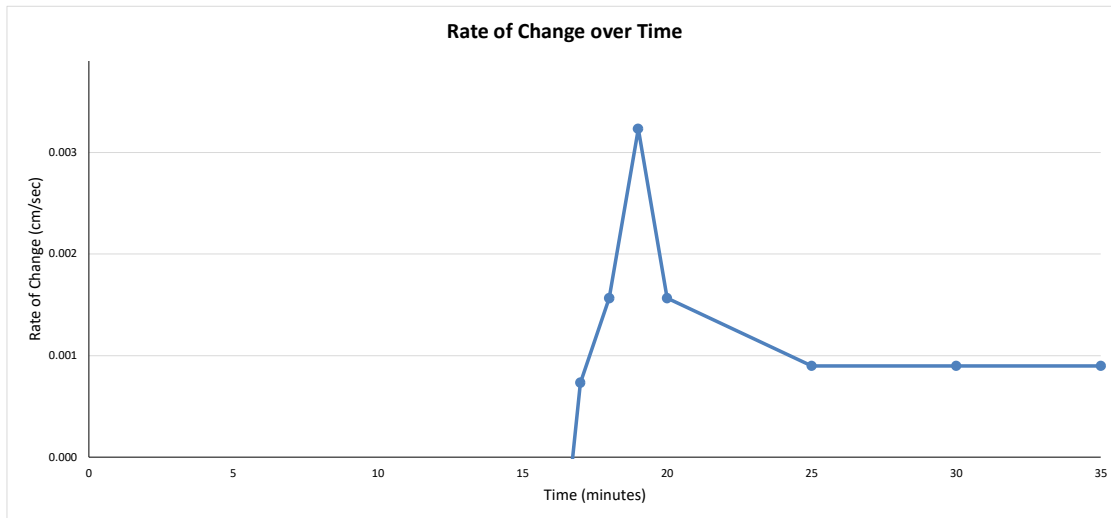
Table 1. Soil texture-structure categories for site-estimation of α^* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α^* (cm^{-1})
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP8 - 1.5 m bgs



INPUT PARAMETERS

α^* =	0.12	cm ⁻¹
H =	10	cm
a =	3	cm
X =	2.16	cm ²
R =	0.001	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm ⁻¹) =	1.288

CALCULATED PARAMETERS

H _a =	3	unitless
Q _i =	0.0022	cm ³ /sec

CALCULATED DESIGN VALUES

k _{fs} =	2.3E-06	cm/sec
Φ _m =	2.0E-05	cm ² /s
Infiltration:	17	mm/hr
FOS:	2.50	unitless
Design Infiltration:	7	mm/hr

Variable Glossary

- α***
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H**
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a**
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X**
- 1) is the reservoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up X = 35.22 (outer and inner reservoir)
 - if the knob is down X = 2.16 (inner reservoir)
- R**
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- H_a** is the ratio of head to borehole radius
- Q_i** is the flow rate
- C_(1, 2 or 3)** is the shape factor which accounts for the saturated area of the soil
- Select C₁ if α* is ≥ 0.12 cm⁻¹
 - Select C₂ if α* = 0.04 cm⁻¹
 - Select C₃ if α* = 0.01 cm⁻¹
- k_{fs}** is the field saturated hydraulic conductivity of the soil
- Φ_m** is an indicator of the capillary pull exerted by the unsaturated soil on the water

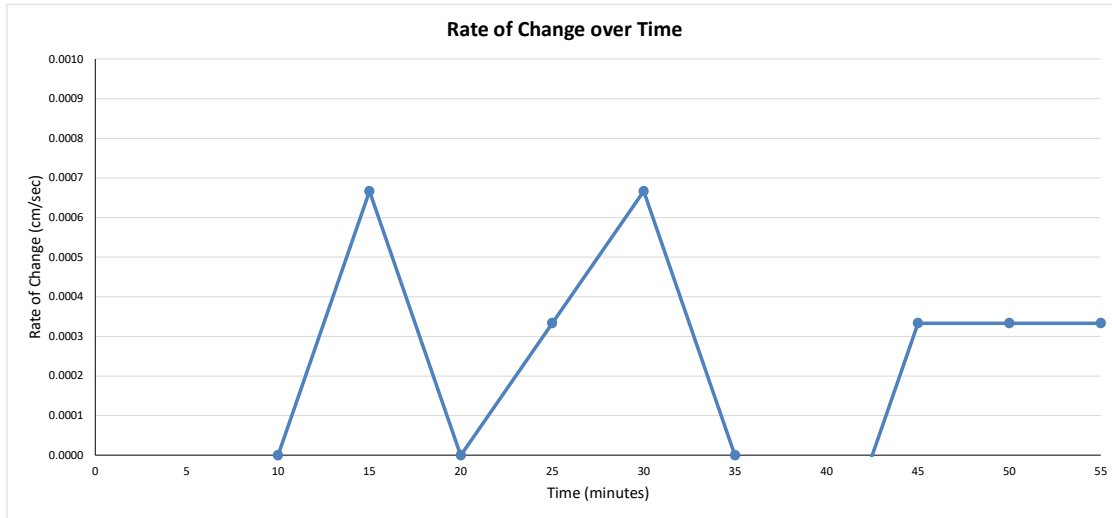
Table 1. Soil texture-structure categories for site-estimation of α* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α* (cm ⁻¹)
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP9 - 1.5 m bgs



INPUT PARAMETERS

α^* =	0.12	cm ⁻¹
H =	10	cm
a =	3	cm
X =	2.16	cm ²
R =	0.00033	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm ⁻¹) =	1.288

CALCULATED PARAMETERS

H _a =	3	unitless
Q _i =	0.00	cm ³ /sec

CALCULATED DESIGN VALUES

k _{fs} =	7.8E-07	cm/sec
Φ _m =	6.5E-06	cm ² /s
Infiltration:	13	mm/hr
FOS:	2.50	unitless
Design Infiltration:	5	mm/hr

Variable Glossary

- α***
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H**
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a**
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X**
- 1) is the reservoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up X = 35.22 (outer and inner reservoir)
 - if the knob is down X = 2.16 (inner reservoir)
- R**
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- H_a** is the ratio of head to borehole radius
- Q_i** is the flow rate
- C_(1, 2 or 3)** is the shape factor which accounts for the saturated area of the soil
- Select C₁ if α* is ≥ 0.12 cm⁻¹
 - Select C₂ if α* = 0.04 cm⁻¹
 - Select C₃ if α* = 0.01 cm⁻¹
- k_{fs}** is the field saturated hydraulic conductivity of the soil
- Φ_m** is an indicator of the capillary pull exerted by the unsaturated soil on the water

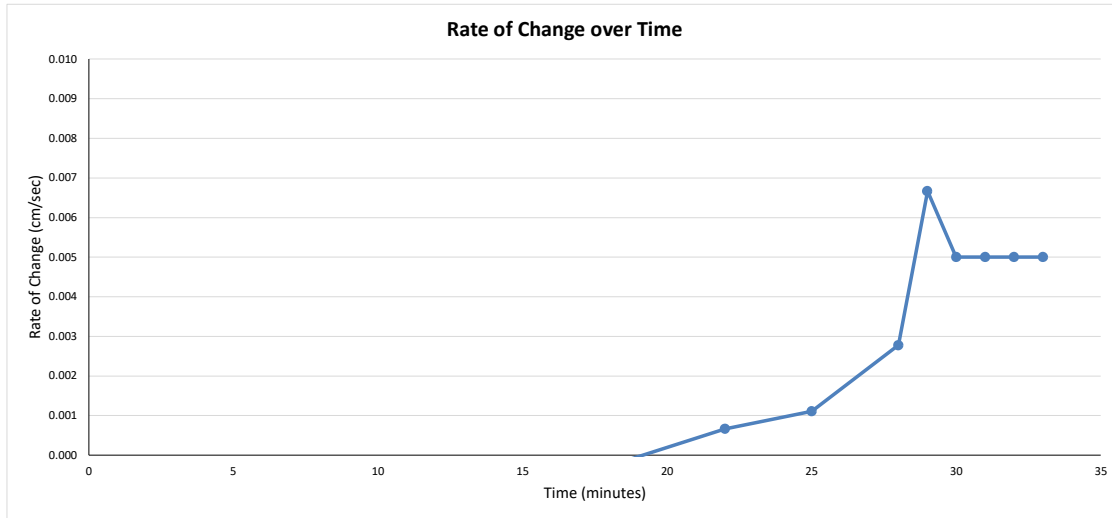
Table 1. Soil texture-structure categories for site-estimation of α* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α* (cm ⁻¹)
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP11 - 1.5 m bgs



INPUT PARAMETERS

α^* =	0.12	cm ⁻¹
H =	10	cm
a =	3	cm
X =	2.16	cm ²
R =	0.005	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm ⁻¹) =	1.288

CALCULATED PARAMETERS

H _a =	3	unitless
Q _i =	0.01	cm ³ /sec

CALCULATED DESIGN VALUES

k _{fs} =	1.2E-05	cm/sec
Φ _m =	9.8E-05	cm ² /s
Infiltration:	26	mm/hr
FOS:	2.50	unitless
Design Infiltration:	10	mm/hr

Variable Glossary

- α***
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H**
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a**
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X**
- 1) is the resevoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up X = 35.22 (outer and inner reservoir)
 - if the knob is down X = 2.16 (inner reservoir)
- R**
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- Ha** is the ratio of head to borehole radius
- Q_i** is the flow rate
- C_(1, 2 or 3)** is the shape factor which accounts for the saturated area of the soil
- Select C₁ if α* is ≥ 0.12 cm⁻¹
 - Select C₂ if α* = 0.04 cm⁻¹
 - Select C₃ if α* = 0.01 cm⁻¹
- k_{fs}** is the field saturated hydraulic conductivity of the soil
- Φ_m** is an indicator of the capillary pull exerted by the unsaturated soil on the water

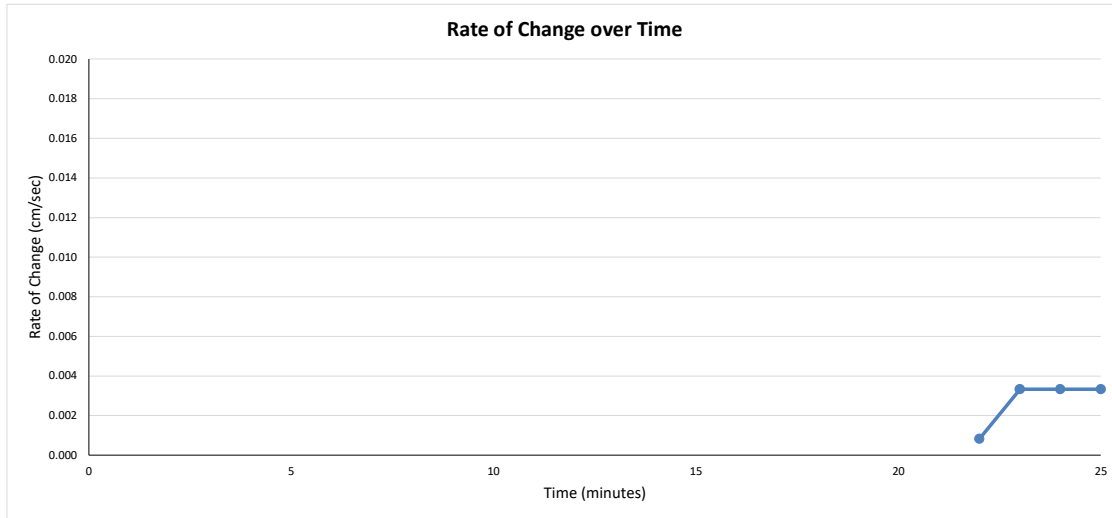
Table 1. Soil texture-structure categories for site-estimation of α* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α* (cm ⁻¹)
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP16 - 1.5 m bgs



INPUT PARAMETERS

α^*	0.12	cm^{-1}
H	10	cm
a	3	cm
X	2.16	cm^2
R	0.003	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm^{-1}) =	1.288

CALCULATED PARAMETERS

H_a	3	unitless
Q_1	0.01	cm^3/sec

CALCULATED DESIGN VALUES

k_{fs}	7.8E-06	cm/sec
Φ_m	6.5E-05	cm^2/s
Infiltration:	23	mm/hr
FOS:	2.50	unitless
Design Infiltration:	9	mm/hr

Variable Glossary

- α^***
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H**
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a**
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X**
- 1) is the reservoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up $X = 35.22$ (outer and inner reservoir)
 - if the knob is down $X = 2.16$ (inner reservoir)
- R**
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- H_a** is the ratio of head to borehole radius
- Q_1** is the flow rate
- $C_{(1, 2 \text{ or } 3)}$** is the shape factor which accounts for the saturated area of the soil
- Select C_1 if α^* is $\geq 0.12 \text{ cm}^{-1}$
 - Select C_2 if $\alpha^* = 0.04 \text{ cm}^{-1}$
 - Select C_3 if $\alpha^* = 0.01 \text{ cm}^{-1}$
- k_{fs}** is the field saturated hydraulic conductivity of the soil
- Φ_m** is an indicator of the capillary pull exerted by the unsaturated soil on the water

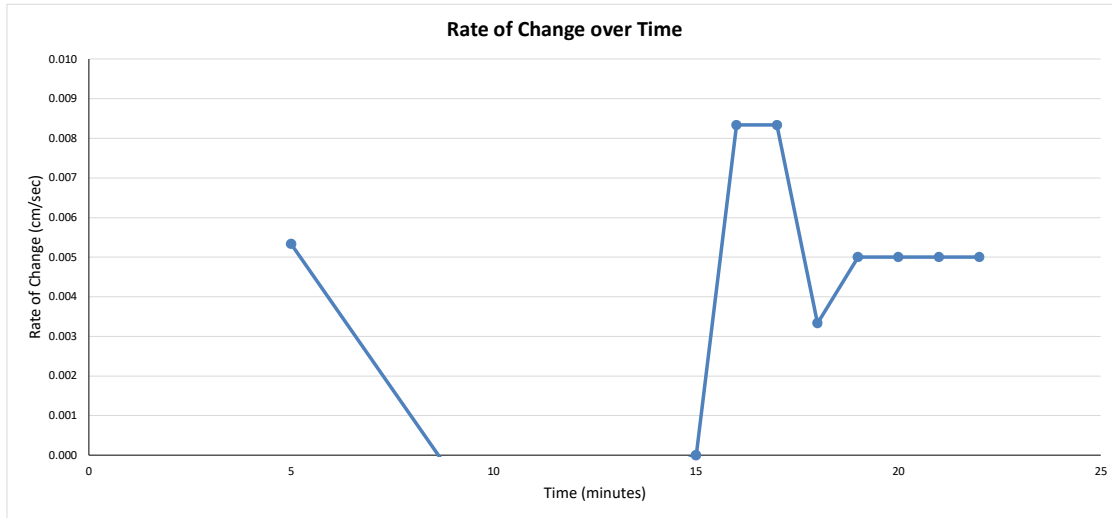
Table 1. Soil texture-structure categories for site-estimation of α^* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α^* (cm^{-1})
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP17 -1.5 m bgs



INPUT PARAMETERS

α^*	0.12	cm^{-1}
H	10	cm
a	3	cm
X	2.16	cm^2
R	0.005	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm^{-1}) =	1.288

CALCULATED PARAMETERS

H_a	3	unitless
Q_1	0.01	cm^3/sec

CALCULATED DESIGN VALUES

k_{fs}	1.2E-05	cm/sec
Φ_m	9.8E-05	cm^2/s
Infiltration:	26	mm/hr
FOS:	2.50	unitless
Design Infiltration:	10	mm/hr

Variable Glossary

- α^*
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X
- 1) is the reservoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up $X = 35.22$ (outer and inner reservoir)
 - if the knob is down $X = 2.16$ (inner reservoir)
- R
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- H_a
- is the ratio of head to borehole radius
- Q_1
- is the flow rate
- $C_{(1, 2 \text{ or } 3)}$
- is the shape factor which accounts for the saturated area of the soil
- Select C_1 if α^* is $\geq 0.12 \text{ cm}^{-1}$
 - Select C_2 if $\alpha^* = 0.04 \text{ cm}^{-1}$
 - Select C_3 if $\alpha^* = 0.01 \text{ cm}^{-1}$
- k_{fs}
- is the field saturated hydraulic conductivity of the soil
- Φ_m
- is an indicator of the capillary pull exerted by the unsaturated soil on the water

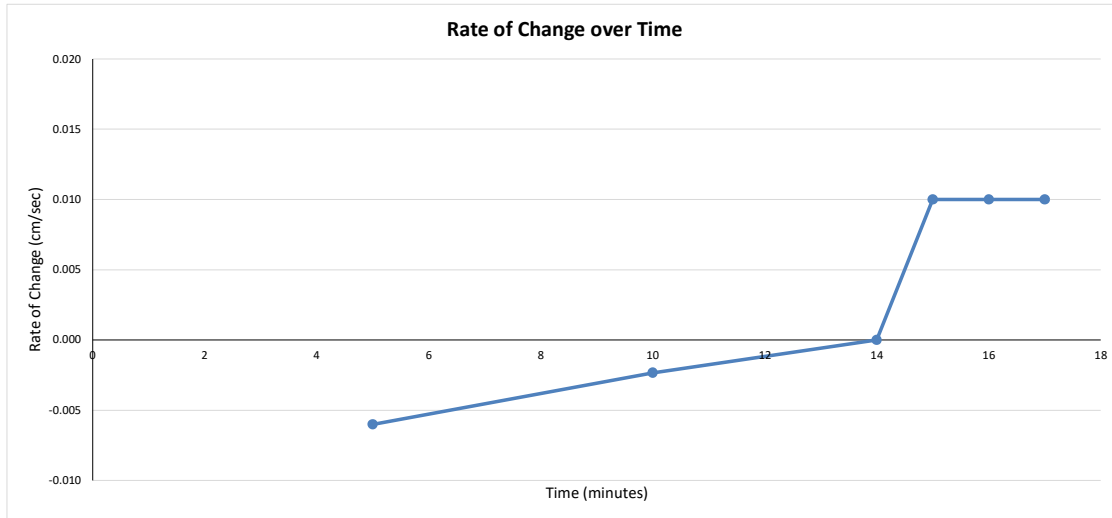
Table 1. Soil texture-structure categories for site-estimation of α^* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α^* (cm^{-1})
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP19 - 1.5 m bgs



INPUT PARAMETERS

α^*	0.12	cm^{-1}
H	10	cm
a	3	cm
X	2.16	cm^2
R	0.010	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm^{-1}) =	1.288

CALCULATED PARAMETERS

H_a	3	unitless
Q_1	0.022	cm^3/sec

CALCULATED DESIGN VALUES

k_{fs}	2.3E-05	cm/sec
Φ_m	2.0E-04	cm^2/s
Infiltration:	31	mm/hr
FOS:	2.50	unitless
Design Infiltration:	13	mm/hr

Variable Glossary

α^*	1) is the ratio of gravity to capillarity forces during infiltration or drainage 2) determined from table 1 on page 47 of the manual (or the adjacent table)
H	1) is the water head in the BH 2) determined by the height that the inner tube is pulled up during field operation
a	1) is the radius of the borehole 2) determine by the size of the auger
X	1) is the reservoir constant 2) determined by the reservoir knob at the top of the unit • if the knob is up $X = 35.22$ (outer and inner reservoir) • if the knob is down $X = 2.16$ (inner reservoir)
R	1) is the steady state rate of flow per minute 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

H_a	is the ratio of head to borehole radius
Q_1	is the flow rate
$C_{(1, 2 \text{ or } 3)}$	is the shape factor which accounts for the saturated area of the soil • Select C_1 if α^* is $\geq 0.12 \text{ cm}^{-1}$ • Select C_2 if $\alpha^* = 0.04 \text{ cm}^{-1}$ • Select C_3 if $\alpha^* = 0.01 \text{ cm}^{-1}$
k_{fs}	is the field saturated hydraulic conductivity of the soil
Φ_m	is an indicator of the capillary pull exerted by the unsaturated soil on the water

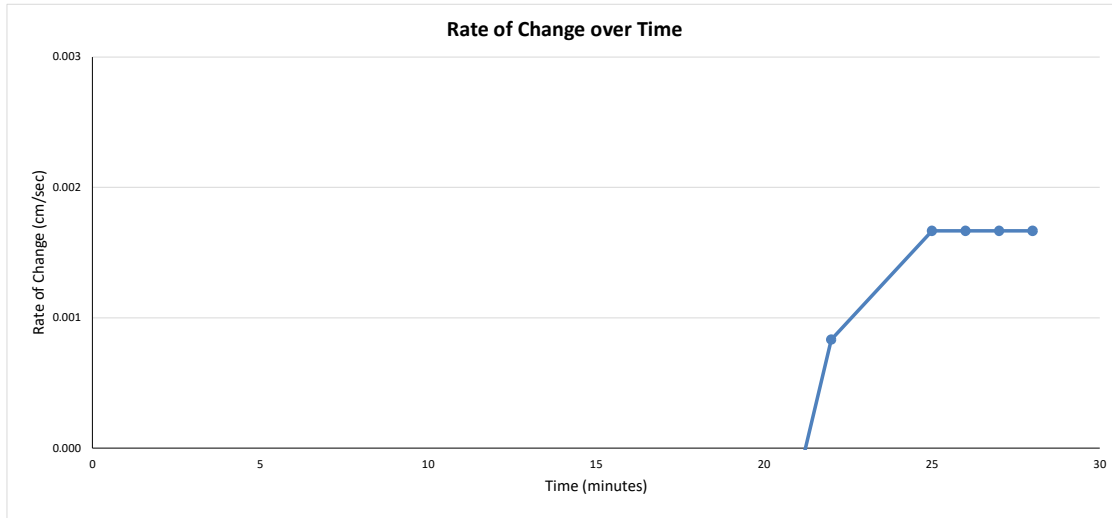
Table 1. Soil texture-structure categories for site-estimation of α^* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α^* (cm^{-1})
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

Guelph Permeameter Infiltration Rate Determination



Test Location: TP21 - 1.5 m bgs



INPUT PARAMETERS

α^*	0.12	cm^{-1}
H	10	cm
a	3	cm
X	2.16	cm^2
R	0.002	cm/sec

SHAPE FACTOR

Shape Factor (1, 2 or 3) =	1
Shape Factor Value (cm^{-1}) =	1.288

CALCULATED PARAMETERS

H_a	3	unitless
Q_1	0.00	cm^3/sec

CALCULATED DESIGN VALUES

k_{fs}	3.9E-06	cm/sec
Φ_m	3.3E-05	cm^2/s
Infiltration:	19	mm/hr
FOS:	2.50	unitless
Design Infiltration:	8	mm/hr

Variable Glossary

- α^***
- 1) is the ratio of gravity to capillarity forces during infiltration or drainage
 - 2) determined from table 1 on page 47 of the manual (or the adjacent table)
- H**
- 1) is the water head in the BH
 - 2) determined by the height that the inner tube is pulled up during field operation
- a**
- 1) is the radius of the borehole
 - 2) determine by the size of the auger
- X**
- 1) is the resevoir constant
 - 2) determined by the reservoir knob at the top of the unit
 - if the knob is up $X = 35.22$ (outer and inner reservoir)
 - if the knob is down $X = 2.16$ (inner reservoir)
- R**
- 1) is the steady state rate of flow per minute
 - 2) is determined by timing the drop of water in the Guelph Permeameter

Equation Glossary

- H_a** is the ratio of head to borehole radius
- Q_1** is the flow rate
- $C_{(1, 2 \text{ or } 3)}$** is the shape factor which accounts for the saturated area of the soil
- Select C_1 if α^* is $\geq 0.12 \text{ cm}^{-1}$
 - Select C_2 if $\alpha^* = 0.04 \text{ cm}^{-1}$
 - Select C_3 if $\alpha^* = 0.01 \text{ cm}^{-1}$
- k_{fs}** is the field saturated hydraulic conductivity of the soil
- Φ_m** is an indicator of the capillary pull exerted by the unsaturated soil on the water

Table 1. Soil texture-structure categories for site-estimation of α^* (adapted from Elrick et al., 1989)

Soil Texture - Structure Category	α^* (cm^{-1})
Compacted, structureless, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12
Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36

APPENDIX G4

Pre-Development Water Balance Calculations

**TABLE G4-1: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
EAST TWENTY MILE CREEK SUBWATERSHED**

Pre-Development
 Model Type: Thornthwaite and Mather (1955)
 Client: Elfrida Community Builders Group Inc.
 Location **East Twenty Mile Creek Subwatershed**
 Total Site Area (ha) **149.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D									Total
Topography	0.20	0.20	0.20	0.20									
Soils	0.05	0.05	0.05	0.05									
Cover	0.05	0.15	0.20	0.05									
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30									
Soil Moisture Capacity (mm)	100	250	400	100									
Site area (ha)	121.30	6.18	4.93	16.59									149.00
Imperviousness Coefficient	0.05	0.05	0.05	0.05									
Impervious Area (ha)	6.55	0.33	0.27	0.90									8.05
Percentage of Total Site Area	4.4%	0.2%	0.2%	0.6%									5%
Remaining Pervious Area (ha)	114.75	5.85	4.66	15.69									140.95
Total Pervious Site Area (ha)	114.75	5.85	4.66	15.69									140.95
Percentage of Total Site Area	77.0%	3.9%	3.1%	10.5%									95%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	36,045	86,430	127,273	129,704	99,238	92,256	46,223	14,287	0	631,456
Pervious Runoff (m³)	55,023	50,444	55,585	45,696	4,080	0	0	0	0	0	19,155	56,067	286,051
Pervious Infiltration (m³)	0	0	0	112,635	1,749	0	0	0	0	0	8,209	0	122,593
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	4,487	4,114	4,533	5,784	5,266	5,430	5,817	4,507	5,063	5,620	4,179	4,572	59,371

**TABLE G4-1: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
EAST TWENTY MILE CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	1,838	4,406	6,651	7,136	5,862	4,703	2,356	728	0	33,682
Pervious Runoff (m³)	2,404	2,204	2,429	1,997	178	0	0	0	0	0	-57	2,450	11,606
Pervious Infiltration (m³)	0	0	0	7,656	119	0	0	0	0	0	-38	0	7,737
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	229	210	231	295	268	277	297	230	258	287	213	233	3,027

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	293	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	1,464	3,511	5,335	5,813	4,899	3,747	1,877	580	0	27,226
Pervious Runoff (m³)	1,756	1,610	1,774	1,458	130	0	0	0	0	0	-257	1,789	8,261
Pervious Infiltration (m³)	0	0	0	6,862	107	0	0	0	0	0	-210	0	6,759
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	182	167	184	235	214	221	236	183	206	228	170	186	2,412

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	4,929	11,820	17,405	17,737	13,571	12,616	6,321	1,954	0	86,353
Pervious Runoff (m³)	7,525	6,898	7,601	6,249	558	0	0	0	0	0	2,619	7,667	39,118
Pervious Infiltration (m³)	0	0	0	15,403	239	0	0	0	0	0	1,123	0	16,765
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	614	563	620	791	720	743	795	616	692	769	571	625	8,119

**TABLE G4-1: PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
EAST TWENTY MILE CREEK SUBWATERSHED**

Pre-Development Summary - East Twenty Mile Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	142,557	2,213	0	0	0	0	0	9,084	0	153,854
Pre-Development Runoff (R)	72,219	66,210	72,957	62,505	11,416	6,670	7,145	5,536	6,220	6,903	26,594	73,590	417,964
Pre-Development Evapotranspiration (ET)	0	0	0	44,276	106,167	156,664	160,391	123,570	113,322	56,778	17,549	0	778,717
Total = INF + R + ET	72,219	66,210	72,957	249,338	119,796	163,334	167,536	129,106	119,542	63,682	53,227	73,590	1,350,536

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	153,854	m ³ /yr	103	mm/yr	4.9	L/s
Pre-Development Runoff (R)	417,964	m ³ /yr	281	mm/yr	13.2	L/s
Pre-Development Evapotranspiration (ET)	778,717	m ³ /yr	523	mm/yr	24.7	L/s
Total = INF + R + ET	1,350,536	m³/yr	906	mm/yr	42.8	L/s
Precipitation	1,350,536	m ³ /yr	906	mm/yr	42.8	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.

**TABLE G4-2: PRE-DEVELOPMENT MONTHLY WATER BALANCE
HANNON CREEK SUBWATERSHED**

Pre-Development
 Model Type: Thornthwaite and Mather (1955)
 Client: Elfrida Community Builders Group Inc.
 Location **Hannon Creek Subwatershed**
 Total Site Area (ha) **36.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D										Total
Topography	0.20	0.20	0.20	0.20										
Soils	0.05	0.05	0.05	0.05										
Cover	0.05	0.15	0.20	0.05										
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30										
Soil Moisture Capacity (mm)	100	250	400	100										
Site area (ha)	34.32	1.68	0.00	0.00										36.00
Imperviousness Coefficient	0.04	0.04	0.04	0.04										
Impervious Area (ha)	1.37	0.07	0.00	0.00										1.44
Percentage of Total Site Area	3.8%	0.2%	0.0%	0.0%										4%
Remaining Pervious Area (ha)	32.94	1.61	0.00	0.00										34.56
Total Pervious Site Area (ha)	32.94	1.61	0.00	0.00										34.56
Percentage of Total Site Area	91.5%	4.5%	0.0%	0.0%										96%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	10,349	24,814	36,540	37,238	28,491	26,486	13,271	4,102	0	181,290
Pervious Runoff (m³)	15,797	14,483	15,958	13,119	1,171	0	0	0	0	0	5,499	16,097	82,125
Pervious Infiltration (m³)	0	0	0	32,337	502	0	0	0	0	0	2,357	0	35,196
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	940	862	950	1,212	1,104	1,138	1,219	944	1,061	1,178	876	958	12,442

**TABLE G4-2: PRE-DEVELOPMENT MONTHLY WATER BALANCE
HANNON CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	507	1,216	1,836	1,970	1,618	1,298	650	201	0	9,298
Pervious Runoff (m³)	664	608	671	551	49	0	0	0	0	0	-16	676	3,204
Pervious Infiltration (m³)	0	0	0	2,113	33	0	0	0	0	0	-10	0	2,136
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	46	42	47	59	54	56	60	46	52	58	43	47	610

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	296	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	2
Pervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	1
Pervious Infiltration (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0

**TABLE G4-2: PRE-DEVELOPMENT MONTHLY WATER BALANCE
HANNON CREEK SUBWATERSHED**

Pre-Development Summary - Hannon Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	34,451	535	0	0	0	0	0	2,346	0	37,333
Pre-Development Runoff (R)	17,447	15,995	17,626	14,942	2,378	1,194	1,279	991	1,113	1,236	6,402	17,778	98,382
Pre-Development Evapotranspiration (ET)	0	0	0	10,856	26,031	38,376	39,208	30,110	27,785	13,921	4,303	0	190,590
Total = INF + R + ET	17,447	15,995	17,626	60,249	28,944	39,570	40,487	31,100	28,898	15,157	13,052	17,778	326,304

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	37,333	m ³ /yr	104	mm/yr	1.2	L/s
Pre-Development Runoff (R)	98,382	m ³ /yr	273	mm/yr	3.1	L/s
Pre-Development Evapotranspiration (ET)	190,590	m ³ /yr	529	mm/yr	6.0	L/s
Total = INF + R + ET	326,304	m³/yr	906	mm/yr	10.3	L/s
Precipitation	326,304	m ³ /yr	906	mm/yr	10.3	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March in the Study Area.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.

**TABLE G4-3 - PRE-DEVELOPMENT MONTHLY WATER BALANCE
SINKHOLE CREEK SUBWATERSHED**

Pre-Development

Model Type: Thornthwaite and Mather (1955)
Client: Elfrida Community Builders Group Inc.

Location **Sinkhole Creek Subwatershed**

Total Site Area (ha) **642.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D									Total
Topography	0.20	0.20	0.20	0.20									
Soils	0.05	0.05	0.05	0.05									
Cover	0.05	0.15	0.20	0.05									
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30									
Soil Moisture Capacity (mm)	100	250	400	100									
Site area (ha)	534.41	46.02	14.52	47.05									642.00
Imperviousness Coefficient	0.05	0.05	0.05	0.05									
Impervious Area (ha)	28.32	2.44	0.77	2.49									34.03
Percentage of Total Site Area	4.4%	0.4%	0.1%	0.4%									5%
Remaining Pervious Area (ha)	506.08	43.58	13.75	44.56									607.97
Total Pervious Site Area (ha)	506.08	43.58	13.75	44.56									607.97
Percentage of Total Site Area	78.8%	6.8%	2.1%	6.9%									95%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	158,969	381,182	561,309	572,031	437,668	406,873	203,857	63,010	0	2,784,899
Pervious Runoff (m³)	242,667	222,474	245,146	201,531	17,996	0	0	0	0	0	84,478	247,272	1,261,564
Pervious Infiltration (m³)	0	0	0	496,753	7,712	0	0	0	0	0	36,205	0	540,670
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	19,402	17,787	19,600	25,010	22,772	23,480	25,151	19,487	21,894	24,302	18,070	19,770	256,724

**TABLE G4-3 - PRE-DEVELOPMENT MONTHLY WATER BALANCE
SINKHOLE CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	13,690	32,827	49,553	53,164	43,676	35,039	17,556	5,426	0	250,930
Pervious Runoff (m³)	17,913	16,422	18,096	14,876	1,328	0	0	0	0	0	-425	18,252	86,462
Pervious Infiltration (m³)	0	0	0	57,039	886	0	0	0	0	0	-283	0	57,641
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	1,671	1,532	1,688	2,154	1,961	2,022	2,166	1,678	1,885	2,093	1,556	1,703	22,109

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	296	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	4,320	10,358	15,739	17,152	14,454	11,056	5,539	1,712	0	80,330
Pervious Runoff (m³)	5,181	4,750	5,234	4,303	384	0	0	0	0	0	-757	5,279	24,374
Pervious Infiltration (m³)	0	0	0	20,247	314	0	0	0	0	0	-620	0	19,942
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	527	483	533	680	619	638	683	530	595	660	491	537	6,976

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	13,996	33,560	49,419	50,363	38,533	35,822	17,948	5,548	0	245,190
Pervious Runoff (m³)	21,365	19,587	21,583	17,743	1,584	0	0	0	0	0	7,438	21,770	111,071
Pervious Infiltration (m³)	0	0	0	43,735	679	0	0	0	0	0	3,188	0	47,602
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	1,708	1,566	1,726	2,202	2,005	2,067	2,214	1,716	1,928	2,140	1,591	1,741	22,603

**TABLE G4-3 - PRE-DEVELOPMENT MONTHLY WATER BALANCE
SINKHOLE CREEK SUBWATERSHED**

Pre-Development Summary - Sinkhole Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	617,775	9,591	0	0	0	0	0	38,490	0	665,856
Pre-Development Runoff (R)	310,433	284,601	313,605	268,499	48,650	28,208	30,215	23,410	26,302	29,194	112,442	316,324	1,791,883
Pre-Development Evapotranspiration (ET)	0	0	0	190,975	457,927	676,021	692,710	534,331	488,790	244,900	75,695	0	3,361,349
Total = INF + R + ET	310,433	284,601	313,605	1,077,248	516,168	704,228	722,925	557,741	515,092	274,094	226,627	316,324	5,819,088

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	665,856	m ³ /yr	104	mm/yr	21.1	L/s
Pre-Development Runoff (R)	1,791,883	m ³ /yr	279	mm/yr	56.8	L/s
Pre-Development Evapotranspiration (ET)	3,361,349	m ³ /yr	524	mm/yr	106.5	L/s
Total = INF + R + ET	5,819,088	m³/yr	906	mm/yr	184.4	L/s
Precipitation	5,819,088	m ³ /yr	906	mm/yr	184.4	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March in the Study Area.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.

**TABLE G4-4 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
STONEY CREEK SUBWATERSHED**

Pre-Development
 Model Type: Thornthwaite and Mather (1955)
 Client: Elfrida Community Builders Group Inc.
 Location **Stoney Creek Subwatershed**
 Total Site Area (ha) **215.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D									Total
Topography	0.20	0.20	0.20	0.20									
Soils	0.05	0.05	0.05	0.05									
Cover	0.05	0.15	0.20	0.05									
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30									
Soil Moisture Capacity (mm)	100	250	400	100									215.00
Site area (ha)	180.04	2.61	0.50	31.84									
Imperviousness Coefficient	0.07	0.07	0.07	0.07									
Impervious Area (ha)	12.78	0.19	0.04	2.26									15.27
Percentage of Total Site Area	5.9%	0.1%	0.0%	1.1%									7%
Remaining Pervious Area (ha)	167.26	2.43	0.47	29.58									199.74
Total Pervious Site Area (ha)	167.26	2.43	0.47	29.58									199.74
Percentage of Total Site Area	77.8%	1.1%	0.2%	13.8%									93%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	52,539	125,979	185,511	189,054	144,648	134,470	67,374	20,824	0	920,399
Pervious Runoff (m³)	80,200	73,527	81,020	66,605	5,948	0	0	0	0	0	27,920	81,722	416,942
Pervious Infiltration (m³)	0	0	0	164,175	2,549	0	0	0	0	0	11,966	0	178,689
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	8,756	8,028	8,846	11,287	10,277	10,597	11,351	8,795	9,881	10,968	8,156	8,922	115,865

**TABLE G4-4 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
STONE CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	762	1,828	2,759	2,960	2,432	1,951	977	302	0	13,971
Pervious Runoff (m³)	997	914	1,008	828	74	0	0	0	0	0	-24	1,016	4,814
Pervious Infiltration (m³)	0	0	0	3,176	49	0	0	0	0	0	-16	0	3,209
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	127	116	128	164	149	154	165	128	143	159	118	129	1,681

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	296	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	147	352	534	582	491	375	188	58	0	2,727
Pervious Runoff (m³)	176	161	178	146	13	0	0	0	0	0	-26	179	828
Pervious Infiltration (m³)	0	0	0	687	11	0	0	0	0	0	-21	0	677
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	24	22	25	32	29	30	32	25	28	31	23	25	323

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	9,293	22,282	32,811	33,438	25,584	23,784	11,916	3,683	0	162,791
Pervious Runoff (m³)	14,185	13,005	14,330	11,781	1,052	0	0	0	0	0	4,938	14,454	73,745
Pervious Infiltration (m³)	0	0	0	29,038	451	0	0	0	0	0	2,116	0	31,605
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	1,549	1,420	1,565	1,996	1,818	1,874	2,008	1,556	1,748	1,940	1,442	1,578	20,493

**TABLE G4-4 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
STONE CREEK SUBWATERSHED**

Pre-Development Summary - Stoney Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	197,076	3,060	0	0	0	0	0	14,045	0	214,181
Pre-Development Runoff (R)	106,015	97,194	107,099	92,839	19,360	12,655	13,555	10,502	11,800	13,097	42,547	108,027	634,691
Pre-Development Evapotranspiration (ET)	0	0	0	62,740	150,441	221,615	226,035	173,154	160,580	80,456	24,868	0	1,099,889
Total = INF + R + ET	106,015	97,194	107,099	352,655	172,860	234,270	239,590	183,656	172,380	93,553	81,460	108,027	1,948,760

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	214,181	m ³ /yr	100	mm/yr	6.8	L/s
Pre-Development Runoff (R)	634,691	m ³ /yr	295	mm/yr	20.1	L/s
Pre-Development Evapotranspiration (ET)	1,099,889	m ³ /yr	512	mm/yr	34.9	L/s
Total = INF + R + ET	1,948,760	m³/yr	906	mm/yr	61.8	L/s
Precipitation	1,948,760	m ³ /yr	906	mm/yr	61.8	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.

**TABLE G4-5 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
UPPER DAVIS CREEK SUBWATERSHED**

Pre-Development
 Model Type: Thornthwaite and Mather (1955)
 Client: Elfrida Community Builders Group Inc.
 Location **Upper Davis Creek Subwatershed**
 Total Site Area (ha) **2.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D									Total
Topography	0.20	0.20	0.20	0.20									
Soils	0.05	0.05	0.05	0.05									
Cover	0.05	0.15	0.20	0.05									
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30									
Soil Moisture Capacity (mm)	100	250	400	100									
Site area (ha)	1.83	0.04	0.00	0.13									2.00
Imperviousness Coefficient	0.03	0.03	0.03	0.03									
Impervious Area (ha)	0.05	0.00	0.00	0.00									0.06
Percentage of Total Site Area	2.7%	0.1%	0.0%	0.2%									3%
Remaining Pervious Area (ha)	1.78	0.03	0.00	0.13									1.94
Total Pervious Site Area (ha)	1.78	0.03	0.00	0.13									1.94
Percentage of Total Site Area	88.8%	1.7%	0.0%	6.5%									97%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	558	1,337	1,969	2,007	1,535	1,427	715	221	0	9,770
Pervious Runoff (m³)	851	781	860	707	63	0	0	0	0	0	296	868	4,426
Pervious Infiltration (m³)	0	0	0	1,743	27	0	0	0	0	0	127	0	1,897
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	38	34	38	48	44	46	49	38	42	47	35	38	498

**TABLE G4-5 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
UPPER DAVIS CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	11	26	39	42	34	27	14	4	0	197
Pervious Runoff (m³)	14	13	14	12	1	0	0	0	0	0	0	14	68
Pervious Infiltration (m³)	0	0	0	45	1	0	0	0	0	0	0	0	45
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	1	1	1	1	1	1	1	1	1	1	1	1	10

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	296	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Pervious Infiltration (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	0	0	0	0	0	0	0	0	0	0	0	0	0

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	41	98	145	147	113	105	52	16	0	717
Pervious Runoff (m³)	62	57	63	52	5	0	0	0	0	0	22	64	325
Pervious Infiltration (m³)	0	0	0	128	2	0	0	0	0	0	9	0	139
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	3	3	3	4	3	3	4	3	3	3	3	3	37

**TABLE G4-5 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
UPPER DAVIS CREEK SUBWATERSHED**

Pre-Development Summary - Upper Davis Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	1,915	30	0	0	0	0	0	136	0	2,081
Pre-Development Runoff (R)	969	888	979	824	117	50	53	41	46	51	356	987	5,362
Pre-Development Evapotranspiration (ET)	0	0	0	609	1,461	2,153	2,196	1,682	1,560	781	242	0	10,684
Total = INF + R + ET	969	888	979	3,348	1,608	2,202	2,249	1,724	1,606	833	734	987	18,128

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	2,081	m ³ /yr	104	mm/yr	0.1	L/s
Pre-Development Runoff (R)	5,362	m ³ /yr	268	mm/yr	0.2	L/s
Pre-Development Evapotranspiration (ET)	10,684	m ³ /yr	534	mm/yr	0.3	L/s
Total = INF + R + ET	18,128	m³/yr	906	mm/yr	0.6	L/s
Precipitation	18,128	m ³ /yr	906	mm/yr	0.6	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

- † Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.
- * PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.
- ‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.

**TABLE G4-6 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
WEST TWENTY MILE CREEK SUBWATERSHED**

Pre-Development
 Model Type: Thornthwaite and Mather (1955)
 Client: Elfrida Community Builders Group Inc.
 Location **West Twenty Mile Creek Subwatershed**
 Total Site Area (ha) **188.00**

Land Description Factors (Sub-area descriptions provided below)	Sub-Area A	Sub-Area B	Sub-Area C	Sub-Area D									Total
Topography	0.20	0.20	0.20	0.20									
Soils	0.05	0.05	0.05	0.05									
Cover	0.05	0.15	0.20	0.05									
Sum (Infiltration Factor) [†]	0.30	0.40	0.45	0.30									
Soil Moisture Capacity (mm)	100	250	400	100									
Site area (ha)	151.14	11.18	3.87	21.81									188.00
Imperviousness Coefficient	0.05	0.05	0.05	0.05									
Impervious Area (ha)	7.10	0.53	0.18	1.03									8.84
Percentage of Total Site Area	3.8%	0.3%	0.1%	0.5%									5%
Remaining Pervious Area (ha)	144.04	10.65	3.69	20.78									179.16
Total Pervious Site Area (ha)	144.04	10.65	3.69	20.78									179.16
Percentage of Total Site Area	76.6%	5.7%	2.0%	11.1%									95%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Climate Data (Hamilton Airport Climate Normals, 1996 - 2025)[‡]													
Average Daily Temperature (°C)	-5.3	-5	0	6.5	13.1	18.5	20.9	20.1	16.1	9.7	3.8	-1.9	8.0
Precipitation (mm)	68.5	62.8	69.2	88.3	80.4	82.9	88.8	68.8	77.3	85.8	63.8	69.8	906

Potential Evapotranspiration Analysis for Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Heat Index	0.0	0.0	0.0	1.5	4.3	7.2	8.7	8.2	5.9	2.7	0.7	0.0	39
Unadjusted Potential Evapotranspiration (mm)	0.0	0.0	0.0	28.1	61.3	90.0	103.2	98.8	77.1	43.9	15.4	0.0	518
Potential Evapotranspiration Adjusting Factor for Latitude*	0.77	0.87	0.99	1.12	1.23	1.29	1.26	1.16	1.04	0.92	0.81	0.75	
Adjusted Potential Evapotranspiration (mm)	0	0	0	31	75	116	130	115	80	40	12	0	601
Precipitation - PET (mm)	69	63	69	57	5	-33	-41	-46	-3	46	51	70	306

Evapotranspiration Analysis	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Sub-Area A													
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	45,244	108,489	159,755	162,806	124,565	115,801	58,020	17,933	0	792,613
Pervious Runoff (m³)	69,066	63,319	69,771	57,358	5,122	0	0	0	0	0	24,043	70,376	359,055
Pervious Infiltration (m³)	0	0	0	141,381	2,195	0	0	0	0	0	10,304	0	153,881
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	4,866	4,461	4,916	6,272	5,711	5,889	6,308	4,887	5,491	6,095	4,532	4,958	64,387

**TABLE G4-6 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
WEST TWENTY MILE CREEK SUBWATERSHED**

Evapotranspiration Analysis													
Sub-Area B	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-125	-60	0	0	
Storage (S)	250	250	250	250	250	219	186	155	152	197	250	250	
Change in Storage	0	0	0	0	0	-31	-33	-31	-3	46	53	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	122	100	80	40	12	0	576
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-2	70	331
Potential Infiltration (I)	27	25	28	23	2	0	0	0	0	0	-1	28	132
Potential Direct Surface Water Runoff (R)	41	38	42	34	3	0	0	0	0	0	-1	42	198
Potential Infiltration (mm)	0	0	0	131	2	0	0	0	0	0	-1	0	132
Pervious Evapotranspiration (m ³)	0	0	0	3,345	8,022	12,109	12,992	10,673	8,563	4,290	1,326	0	61,320
Pervious Runoff (m³)	4,377	4,013	4,422	3,635	325	0	0	0	0	0	-104	4,460	21,129
Pervious Infiltration (m³)	0	0	0	13,939	216	0	0	0	0	0	-69	0	14,086
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	360	330	363	464	422	435	466	361	406	451	335	367	4,761

Evapotranspiration Analysis													
Sub-Area C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-124	-67	0	0	
Storage (S)	400	400	400	400	400	368	333	296	293	339	400	400	
Change in Storage	0	0	0	0	0	-32	-36	-36	-3	46	61	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	114	125	105	80	40	12	0	584
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	-10	70	322
Potential Infiltration (I)	31	28	31	26	2	0	0	0	0	0	-5	31	145
Potential Direct Surface Water Runoff (R)	38	35	38	31	3	0	0	0	0	0	-6	38	177
Potential Infiltration (mm)	0	0	0	147	2	0	0	0	0	0	-5	0	145
Pervious Evapotranspiration (m ³)	0	0	0	1,160	2,781	4,227	4,606	3,881	2,969	1,488	460	0	21,571
Pervious Runoff (m³)	1,391	1,276	1,405	1,155	103	0	0	0	0	0	-203	1,418	6,545
Pervious Infiltration (m³)	0	0	0	5,437	84	0	0	0	0	0	-166	0	5,355
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	125	114	126	161	146	151	162	125	141	156	116	127	1,651

Evapotranspiration Analysis													
Sub-Area D	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Accumulated Potential Water Loss (APWL)	0	0	0	0	0	-33	-74	-120	-131	-32	0	0	
Storage (S)	100	100	100	100	100	72	48	30	27	72	100	100	
Change in Storage	0	0	0	0	0	-28	-24	-18	-3	46	28	0	
Actual Evapotranspiration (mm)	0	0	0	31	75	111	113	86	80	40	12	0	550
Recharge/Runoff Analysis													
Water Surplus (mm)	69	63	69	57	5	0	0	0	0	0	24	70	356
Potential Infiltration (I)	21	19	21	17	2	0	0	0	0	0	7	21	107
Potential Direct Surface Water Runoff (R)	48	44	48	40	4	0	0	0	0	0	17	49	249
Potential Infiltration (mm)	0	0	0	98	2	0	0	0	0	0	7	0	107
Pervious Evapotranspiration (m ³)	0	0	0	6,529	15,655	23,052	23,492	17,974	16,710	8,372	2,588	0	114,372
Pervious Runoff (m³)	9,966	9,137	10,068	8,277	739	0	0	0	0	0	3,469	10,155	51,811
Pervious Infiltration (m³)	0	0	0	20,401	317	0	0	0	0	0	1,487	0	22,205
Potential Impervious Evaporation (mm)	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Impervious Runoff (mm)	69	63	69	88	80	83	89	69	77	86	64	70	906
Impervious Runoff (m³)	702	644	709	905	824	850	910	705	792	879	654	715	9,291

**TABLE G4-6 - PRE-DEVELOPMENT MONTHLY WATER BALANCE CALCULATIONS
WEST TWENTY MILE CREEK SUBWATERSHED**

Pre-Development Summary - West Twenty Mile Creek Subwatershed

Monthly Summary (m ³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Pre-Development Infiltration (INF)	0	0	0	181,158	2,813	0	0	0	0	0	11,556	0	195,526
Pre-Development Runoff (R)	90,853	83,293	91,781	78,228	13,393	7,325	7,846	6,079	6,830	7,581	32,843	92,577	518,629
Pre-Development Evapotranspiration (ET)	0	0	0	56,278	134,947	199,143	203,896	157,094	144,042	72,170	22,307	0	989,876
Total = INF + R + ET	90,853	83,293	91,781	315,664	151,152	206,468	211,743	163,173	150,872	79,751	66,705	92,577	1,704,032

SUMMARY - NO INFILTRATION AUGMENTATION / MITIGATION MEASURES						
Pre-Development Infiltration (INF)	195,526	m ³ /yr	104	mm/yr	6.2	L/s
Pre-Development Runoff (R)	518,629	m ³ /yr	276	mm/yr	16.4	L/s
Pre-Development Evapotranspiration (ET)	989,876	m ³ /yr	527	mm/yr	31.4	L/s
Total = INF + R + ET	1,704,032	m³/yr	906	mm/yr	54.0	L/s
Precipitation	1,704,032	m ³ /yr	906	mm/yr	54.0	L/s
Error	0.000	(m ³ /yr)	0.000	mm/yr	0.000	L/s

Sub-Area Descriptions (topography, soils, cover)	
Sub-Area A	Rolling, Silty Clay to Clayey Silt, Shallow Rooted Row Crops
Sub-Area B	Rolling, Silty Clay to Clayey Silt, Pasture and Shrubs
Sub-Area C	Rolling, Silty Clay to Clayey Silt, Forest
Sub-Area D	Rolling, Silty Clay to Clayey Silt, Urban Lawn

Notes:

† Infiltration factors after Ontario Ministry of the Environment, 2003. Stormwater Management Planning and Design Manual. March 2003.; and Ontario Ministry of Environment and Energy (MOEE). 1995. MOEE Hydrogeological Technical Information Requirements for Land Development Applications. April 1995.

* PET adjustment factors after Thornthwaite, C.W., and J.R. Mather, 1957. Instructions and Tables for Computing Potential Evapotranspiration and the water balance. Drexel Institute of Technology, Laboratory of Climatology, Publications in Climatology, Volume X, No. 3. Centerton, New Jersey.

‡ Climate Data after Environment Canada, 2026. Canadian Climate Normals 1996-2025, Hamilton Airport Climate Station, Climate ID 6153194. [Online] http://climate.weather.gc.ca/climate_normals/index_e.html Accessed April 2026.

Assumptions:

- [1] The monthly average precipitation collected at the Hamilton Airport Climate Station is reflective of the precipitation trends that have historically occurred at the Study Area.
- [2] Surplus water is not available for runoff and recharge during months where water losses from actual evapotranspiration exceed precipitation inputs.
- [3] Runoff, infiltration and evapotranspiration do not occur in months where the average daily temperature is below 0°C, which is the case for the months of December through March at the Site.
- [4] Precipitation during freezing months (i.e., December to March) is assumed to accumulate as snow and result in additional precipitation in the first month thereafter where the average temperature is greater than 0°C (i.e., April).
- [5] Soil moisture capacity is at a maximum in April.