

TAGGART INVESTMENTS AND ALGONQUINS OF ONTARIO Tewin Lands

Existing Conditions Hydrogeological Study

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1.0 Introduction

This Tewin Lands: Existing Conditions Hydrogeological Study is part of a set of technical reports which have been prepared as part of Phase 1 of the Tewin study process. The Tewin Study Area ("Study Area") lands were identified as a future urban development area in the new City of Ottawa Official Plan (2022). The Study Area is located in southeast Ottawa, generally bordered by Leitrim Road to the north, Farmers Way to the east, Thunder Road to the south, and Anderson Road and Ramsayville Road to the west. The Study Area is outlined in Figure 1. These technical reports are intended to establish an understanding of the existing physical, social and ecological conditions that characterize the Study Area. Where appropriate, these reports also identify preliminary opportunities to help guide the next phase of the master planning process.

This information will be used to identify opportunities and strategic considerations that will inform the Tewin community design process going forward, as well as frame the preparation of additional site-specific technical studies and recommendation reports. Development at Tewin will explore new approaches to planning, design and development, including alternative strategies and solutions that can successfully implement the key community objectives.

1.1 Integrated Master Plan & Municipal Class EA Process

The ambition and scale of Tewin requires ongoing internal and external consultation. The purpose of the integrated Master Plan and Municipal Class EA process is to consolidate the various technical and community planning elements of the project to promote coordinated community engagement through streamlined and aligned decision making. This format will ensure critical partners, consultants and stakeholders are brought together at major milestones to identify and track challenges and opportunities through the development process.

The integrated Master Plan and Municipal Class EA process will include a public consultation strategy and technical study review timeline that achieves the requirements of the Master Plan and Municipal Class EA concurrently. The statutory Municipal Class EA meetings will be timed to align with the development of the community objectives, urban framework, preferred plans, and the draft secondary plan. Additional public and targeted consultations will be planned to complement the statutory consultation requirements. The development of the One Planet Action Plan (OPAP) will occur in parallel, with the final OPAP available at the time of final secondary plan. Council approval. One Planet Living endorsement will follow Council approval of the secondary plan.

1.2 Tewin Overview and Community Vision

Tewin is planned to be a community of approximately 45,000 people and thousands of jobs. It will be more compact and dense than existing suburbs in Ottawa, with new urban areas integrated alongside valuable natural areas. Tewin will be an inclusive community, anchored in Algonquin wisdom and



placekeeping principles, and welcoming to all. The community will have a meaningful mix of land uses and support active mobility, to achieve a complete, future ready community. The Tewin Project Team and City of Ottawa have committed to exploring appropriate options, alternatives and standards to enable Tewin to become a model of best practices in sustainable and inclusive community design in the North American context.

The integrated Master Plan and Municipal Class EA process will bring together various technical and community planning considerations.

The key objectives for Tewin are to create a community that is:

- Anchored in Algonquin wisdom, principles and placekeeping;
- A benchmark for community design, demonstrating achievement of the 5 Big Moves identified in the Ottawa Official Plan;
- Mobility-oriented and supportive, promoting a broad range of active forms of movement, where personal vehicles are optional;
- Characterized by a meaningful mix of housing, community amenities, jobs and services in order to achieve a complete, future-ready community;
- Designed to protect and integrate alongside valuable natural areas and agricultural lands; and
- Affordable, inclusive, healthy, welcoming and accessible to all.

1.3 Tewin Intent: A Forward-Thinking Framework

Development at Tewin will explore new approaches to planning, design and development, finding successful options and alternatives to implement the key community objectives, in some cases likely going beyond what current development standards would allow for. The Tewin Project Team and the City of Ottawa have articulated these in the "Tewin Intent" which sets out the following:

1. Bold and Innovative Thinking:

Tewin is about creating a new kind of community, a future-focused model for smart, healthy and sustainable development. It will be a people-centred place that seeks to create the conditions for well-being. The Tewin Project Team will be open to bold ideas, innovative approaches, creative solutions, efficient use of land and resources, emerging technologies, smart city infrastructure that advances the City's goals and objectives, and other future-forward ideas and opportunities that will enable Tewin to reach its full potential.

2. Integrating Algonquin Values and Principles:

Algonquin principles, values and teachings will guide the planning, consultation, design and development process for Tewin. The integration of Algonquin principles and design intentions will ensure the community is nature-based and sensitive to Mother Earth while creating capacity-building and economic development opportunities for the Algonquin people.



3. Sustainability and Resilience:

Tewin will be a model community that will position Ottawa as a leader in integrated sustainable design with the goal of being a resilient and holistic community. Tewin will be guided by the One Planet Living framework and Algonquin values of respect for the earth. The Community Design Plan will respond to the City's High Performance Development Standard and Climate Change Master Plan, and will result in a Community Energy Plan. A Community Energy Plan and performance-based sustainability metrics that address climate mitigation and adaptation, and the other categories of the High Performance Development Standards will be established from the start and monitored over time.

4. Systems-Based Environmental Planning

Tewin's organization and functions will be designed to respect nature and integrate natural features and landscapes into its form, character, and spirit. To that end, the Tewin Project Team is committed to pursuing a systems-based approach to natural heritage protection, environmental management, and water management in a way that is inclusive and integrated and encourages stewardship and a positive relationship with the natural world. Natural features are regarded as opportunities rather than constraints, will be woven into the fabric of the community, and will be central to its design and character.

5. Alternative Design Solutions:

Designing a community of the future requires progressive and forward-thinking infrastructure solutions. The Tewin Project Team is committed to being solutions-oriented and will consider alternative design and engineering standards that prioritize natural systems, pedestrians, cyclists and transit users, and which efficiently use available land and resources.

Surface water management strategies that achieve quality, conveyance and storage objectives will be based on the fundamentals of natural cycles, green/soft infrastructure, and multi-use opportunities that complement the human realm. Infrastructure design will consider the needs of those involved in the construction, operation and maintenance of municipal services to find opportunities to efficiently service the community and showcase sustainable practices while meeting the community's needs.

A framework for assessing alternative design standards will be established to consider and review alternatives against existing standards within the context of goals and objectives for the City and Tewin.

6. Cost-Effectiveness and Efficiency:

Tewin will demonstrate best practices in efficient and compact development. As a dense, mixed-use community of scale, Tewin will achieve a critical mass of people and jobs to support new infrastructure investments. The Tewin Project Team is committed to exploring opportunities to optimize the community's efficiency through a range of strategies, including prioritizing space-efficient modes of transportation, use of technology, green infrastructure, innovative construction practices, shared-use agreements, and mixed-use forms of development that will promote the efficient use and optimization



of land; housing affordability; and supporting the long-term financial viability of the community and city resources.

7. Integrated Planning Process:

We are committed to advancing Tewin through a comprehensive and integrated planning and environmental assessment process where possible or applicable. The process will bring together various planning, environmental, transportation, urban design, infrastructure, economic, financial, social and technical considerations. The process will be underpinned by engagement with the Algonquin people, other stakeholders, and the public.

8. Collaboration and Problem Solving:

The Tewin Project Team and City of Ottawa Project Team are committed to working collaboratively together to move Tewin forward in an expedited way. We will plan with a spirit of collaboration and joint problem-solving to ensure that the development of Tewin meets the best interests of the City of Ottawa and the Algonquins of Ontario.

9. Communication and Transparency

The Tewin Project Team and the City of Ottawa Project Team commit to open and transparent communication throughout the project. This will require proactively sharing information between the groups as decisions are made and to ensure relevant communication materials are distributed in a timely manner.

The Tewin Project Team and the City of Ottawa Project Team will ensure that all parties, including City Council, residents, and other stakeholders, are provided with pertinent details. Effective information sharing will ensure the project achieves outcomes that are, to the greatest extent possible, known by all involved.

1.4 **Existing Conditions Technical Reports**

A range of specialized consultants have been studying the physical environment of the Study Area to support community design, servicing strategies and the future development of Tewin. This data has been collected and reported on in a set of Existing Conditions and Opportunities Reports, of which this document is one. The full suite of reports includes the following:

- Tewin Existing Conditions and Preliminary Opportunities Report dated September 2024 and prepared by Urban Strategies
- Fluvial Geomorphology Study Tewin Lands: Existing Conditions Summary Report Bear Brook and Ramsay Creek Watersheds dated September 2024 and prepared by GEO Morphix Ltd.
- Tewin Lands: Existing Conditions Hydrogeological Study dated September 2024 and prepared by Dillon Consulting
- Existing Conditions Geotechnical: Tewin Lands dated September 2024 and prepared by Paterson Group



- Tewin Lands: Natural Heritage Preliminary Existing Conditions Report dated April 2024 and prepared by Kilgour and Associates
- Tewin Lands: Cumulative Hydrologic Impact Assessment dated April 2024 and prepared by J.F. Sabourin and Associates
- Tewin Lands: 2021-22 Field Monitoring Report dated April 2024 and prepared by J.F. Sabourin and Associates
- Tewin Lands Existing Conditions Water Budget dated September 2024 and prepared by J.F. Sabourin and Associates
- Tewin Mobility Existing Conditions dated May 2024 and prepared by CGH Transportation
- Stage 1 Archaeological Assessment Tewin Lands dated July 14, 2023 and prepared by WSP Canada Inc.

1.5 Framework for Identifying Preliminary Opportunities

Given the unique scale, vision and project goals for Tewin, as well as the shared commitment to exploring new ways of advancing the community design process as expressed in the Tewin Intent, the Phase 1 reports for Tewin include a discussion of potential opportunities to be explored in subsequent stages of the integrated Master Plan and Municipal Class EA process. The identification of preliminary constraints and opportunities, as well as a preliminary community structure, is required in Phase 1 of the integrated Master Plan and Municipal Class EA process as per specific Terms of Reference that were established for each of the Tewin planning, environmental and transportation studies.

The opportunities introduced within these reports are based on a series of key policy directions and strategic considerations, including:

- Ottawa's new Official Plan, which promotes the creation of complete, transit-supportive communities;
- Algonquin values and principles, underscored by respect for nature, integration of water, and planning the natural environment to achieve long-term vitality over many generations;
- The Tewin Intent, which promotes innovative thinking and alternative, performance-based solutions;
- One Planet Living, a holistic framework for achieving environmental resiliency, sustainable development, and reduced carbon emissions;
- Provincial policy direction focused on supporting housing development and facilitating growth, in order to address the province's housing supply challenges; and,
- An integrated, systems-based approach to planning at Tewin that brings together diverse planning, environmental, technical and economic considerations.



1.6 **Tewin Lands: Existing Conditions Hydrogeological Study Introduction**

Dillon Consulting Limited (Dillon) is part of the Tewin Lands consulting team responsible for completing existing conditions assessments for the future Tewin Lands area in Ottawa, Ontario. Dillon's scope of work was to complete an assessment of existing hydrogeological conditions within the Study Area. Additional land parcels to the west, east and southeast of the Study Area were also included as part of the assessment. The boundaries of the Study Area are shown on Figure 1.

The scope of work for the existing conditions hydrogeological assessment of the Study Area includes:

- A review of background records relevant to hydrogeology
- Borehole drilling, piezometer installation, groundwater level monitoring
- Development of a geological and a groundwater flow model
- Data interpretation (including select data provided by the broader consulting team) and reporting

The objective of this report is to provide an assessment of the existing hydrogeological conditions at the Study Area and identify preliminary potential issues to development, if any, along with potential mitigating measures.



2.0 Methodology

2.1 Literature Review

A literature review of available geological reports, scientific studies and local geological mapping was conducted to develop an understanding of geological and hydrogeological framework for the Tewin Study Area. Key sources that were reviewed are listed below:

- Ministry of the Environment, Conservation and Parks (MECP). 2018. Water Well Information System (Well Location and Summary). Time Period: 1899 – September 30, 2017 (Data Last Updated: February 2, 2018)
- South Nation Conservation Authority (SNCA). 2016. Source Protection Plan, Raisin-South Nation Source Protection Region Version 1.4.0
- Rideau Valley Conservation Authority (RVCA). 2022. Mississippi-Rideau Source Protection Plan (approved) Revision 1.3
- Ontario Geological Survey (OGS). 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14
- Ontario Geological Survey (OGS). 2003. Surficial Geology of Southern Ontario
- Ontario Geological Survey (OGS). 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release – Data 126-Revision 1. ISBN 978-1-4435-5704-7 (CD) ISBN 978-1-4435-5705-4 [zip file]
- Ontario Ministry of Natural Resources and Forestry (OMNR). 2022. Land Information Ontario (LIO) Warehouse, Data Class Name: Wetland Documentation

2.2 Field Activities

2.2.1 Drilling and Mini Piezometer Installation

Dillon and Paterson coordinated to implement a comprehensive drilling program across the Study Area and select adjacent properties. This included dozens of geotechnical boreholes, some installed with monitoring wells, that were completed by Paterson and 17 mini piezometers completed by Dillon targeting the perimeter of the Study Area and locations adjacent to surface water features within the neighbouring properties. Mini piezometers are shallow, small diameter monitoring wells that are completed by hand held equipment in areas where drill rig access is not practical. The mini piezometer locations were also coordinated with other members of the Tewin Lands consulting team such that collocated data could be collected (e.g., surface water gauges and groundwater monitoring locations).

Utility locating activities were conducted prior to the initiation of Dillon's intrusive activities. Premier Locates was retained by Dillon to complete public and private locates for each proposed drilling location. Utility locates for drilling locations were reviewed by Dillon personnel and subcontractors prior to undertaking ground breaking activities at the Study Area.



Boreholes for the mini piezometers were drilled by Ohlmann Geotechnical Services, a licensed well contractor, using a combination of a pionjar hand held drill and a hand-auger. During the drilling program, soil was logged for colour, grain size, moisture content, density, structures and textures. Piezometers were installed in each borehole within the shallow stratigraphy and intercepting the water table. The mini piezometers consisted of 32mm outside diameter; Schedule 40 PVC, with No.10 well screens connected to riser pipe.

A total of 17 mini piezometers were installed as part of Dillon's drilling program. These were installed on two separate occasions; late May and late June 2022. The mini piezometers were drilled to nominal depths ranging from approximately 1.7 to 2.4 meters below ground surface (m bgs). The location of Dillon's piezometers are shown on Figure 1 and borehole logs are included in Appendix A.

A summary of the findings from the geotechnical assessment can be found in the Paterson Group (2024) report.

2.2.2 Water Level Monitoring

To continuously monitor the water levels at each mini piezometer, as well as select geotechnical monitoring wells installed by Paterson, a Solinst Levelogger was installed at each location. The Leveloggers were programmed to record water column pressure at 5 minute intervals; a total of 34 Leveloggers were installed as part of the water level monitoring program, the locations are shown on Figure 1. A Solinst Barologger was installed at a location (Piezometer: P10) to record atmospheric pressure changes to allow for atmospheric compensation of the pressure head data collected by the Leveloggers. Manual water level measurements were taken at each data download event.

It is noted that on June 2nd, 2022, mini piezometer P7 was found to be broken and Levelogger missing.

2.2.3 Geological Model

A 3D geological model for the Study Area was generated using Leapfrog Works 2022.1 software, based on the lithological data collected at the time of drilling each mini piezometer (Dillon) and geotechnical piezometer (Paterson). A total of 112 borehole locations were incorporated into the model, in addition to DEM (Digital Elevation Model) data, topographic and surface water features. Using the borehole and elevation data, Leapfrog interpolates the geological layers and lateral extents into a three-dimensional geological model.

A finite-element mesh was then constructed in Leapfrog, incorporating a sufficient level of refinement (i.e., elemental sizing and node spacing) as a means to appropriately characterize varying geological/hydrogeological/hydrological conditions in pertinent areas of interest (e.g., surficial water features, inferred geological contacts). The geological model and finite-element mesh were then exported into FEFLOW for the development of a numerical groundwater flow model.



.2.4	Groundwater Model						
	FEFLOW (Version 7.2) was used to develop the numerical groundwater flow model. This included assigning input parameters such as aquifer recharge rates, boundary conditions and hydraulic properties to corresponding elements and nodes within the flow model. FEFLOW simulations were run and parameters were adjusted to calibrate to model existing conditions (i.e., steady-state conditions based on the available ongoing monitoring data). The methodology and findings of the groundwater model is included as part of a technical memo in Appendix E.						
.2.5	Groundwater Quality						
	Dillon collected groundwater samples from four monitoring wells and one mini piezometer in January 2024, the sampling locations were selected based on spatial distribution across the Study Area. Groundwater samples were collected from monitoring wells BH14-22, BH22-22, BH47-22 and BH63-22 and, mini piezometer P2. Groundwater samples were collected with newly installed 13-mm LDPE tubing and a peristaltic pump. Samples analyzed for metal parameters were field filtered using 0.45-micron disposable filters.						
	Disposable nitrile gloves were used during sample collection and changed between each sample to minimize the potential for cross-contamination. Groundwater samples were collected directly into laboratory-supplied bottles and stored in a cooler containing ice. The groundwater samples were submitted to the analytical laboratory under the standard chain of custody procedures.						
	Six groundwater samples, including one field duplicate, were submitted for laboratory analysis, as summarized in the following table.						
		of Groundwater Samples Submitted for Labo					
	Sample ID	Laboratory Analyses	Additional Information				
		Anions Conoral Inorganics Motals					
	BH14-22	Anions, General Inorganics, Metals	-				
	BH22-22	Anions, General Inorganics, Metals					
		-	- - - Field duplicate (Dup1) collected at this location				



3.0 Findings

Results of the desktop literature review, drilling program, groundwater level monitoring, geological
model and groundwater model are provided in the following sections.

3.1 Study Area Topography and Drainage

The ground surface within the Study Area generally slopes to the northwest from an elevation of approximately 80 metres above sea level (m asl) to 70 m asl. Within the Study Area, surface drainage is relatively poor, resulting in the development of saturated areas and ephemeral pooling of surface water.

More detailed mapping and characterization of the Study Area was completed by others on the Tewin Lands consulting team.

Surface water within the Study Area is interpreted to drain into two major surface water features; Ramsay Creek and Bear Brook. Ramsay Creek flows north from the northwestern portion of the Study Area, and Bear Brook cross cuts (north/south) an area east of the Study Area.

For further information on the surface water regime, please refer to the JFSA (2024) surface water and cumulative hydrologic impact assessment, and Geomorphix (2024) reports.

A topographic map of the Study Area is provided in Figure 2.

3.2 Background Geology and Hydrogeology

3.2.1 Regional Surficial Geology

Surficial geology of Southern Ontario mapping by OGS (2003), indicates the predominant surficial geology within the Study Area consist of fine textured glaciomarine deposits, composed of well laminated silt and clay with minor sand and gravel. These are indicative of the Champlain Sea sediments found throughout the Ottawa area. To the east/northeast of the Study Area, are coarse textured glaciomarine deltaic deposits composed of sand, gravel and minor silt and clay. To the west/southwest of the Study Area, coarse textured glaciomarine, foreshore and basinal deposits composed of sand, gravel and minor silt and clay occur.

Provincial surficial geological mapping is provided in Figure 3. Observations made during project drilling programs (Dillon and Paterson) are summarized in Section 3.3.1.



3.2.2	Regional Bedrock Geology								
	Ordovician (WWR) wit	grey shale (w	vith some d Area and s	olomitic laye urrounding p	rs) of the C	arlsbad Forn	tudy Area is unde nation. Water We drock is encounte	Il Records	
3.2.3	Source Pr	otection Are	a and Aqu	ifer Vulner	ability				
	(MECP), th Source Pro boundary (According to the Source Protection Atlas by the Ministry of the Environment, Conservation and Parks (MECP), the Study Area is located within two Source Protection Areas. The Mississippi-Rideau Valley Source Protection Area (SPA) extends about 850 m south into the Study Area from the northwest boundary (Leitrim Road) and covers a relatively small area of approximately 1.7 km ² . The remainder of the Study Area lies in the Raisin-South Nation SPA.							
	The Study Area does not lie within a vulnerable aquifer, intake protection zone, or wellhead protection area as defined by the Mississippi-Rideau Valley and Raisin-South Nation Source Protection Plans; however, the majority of the area east and southwest of the Study Area, is classified as a Highly Vulnerable Aquifer zone with a vulnerability score of 6 in the Raisin-South Nation Source Protection Plan. The score of 6 is defined as an area where there may be some degree of natural protection overlying the aquifer (i.e., layers of clay), which can restrict vertical movement of contaminants.								
3.2.4	Water Re	cords Well S	earch						
	 Water wells from the MECP Water Well Record database within the Study Area are summarized in Table 2, shown in Figure 4 and found in Appendix B. There were 22 well records identified with depths ranging from 1.5 m to 85.3 m. A total of seven water supply wells three active domestic wells and one abandoned domestic well were observed. A shallow sand unit encountered near surface was noted in seven records, with thicknesses ranging from 0.1 to 10.6m. Note that the locations of the wells are based on the MECP water well record database, which often contains inaccurate location coordinates. Actual well locations and potential unregistered wells should be verified in the field, as needed. 							n depths ranging d one was noted in which often	
		Vater Well Re						· · · · · · · · ·	
	Well ID	Ground Elevation (masl)	Latitude	Longitude	Static Water Level (m)	Well Depth (m)	Sand Unit Depth (m)	Well Use	
	7053152	-	45.357	-75.529	1.75	5.49	0 - 1.22	-	
	7268066	-	45.358	-75.536		5.05	0.15 - 0.25	Monitoring	
	1516399	79.25	45.358	-75.536	1.24	42.36	-	Water Supply	

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45.357

45.354

-75.538

-75.519

1.22

2.13

64.62

85.34

0 - 10.67

-

77.72

79.25

1501573

1511284



Water Supply

Water Supply

1534582	82.3	45.349	-75.550	-	6.70	-	Domestic
							(abandoned)
1501575	82.3	45.346	-75.553	10.67	66.75	12.2 - 51.2	Water Supply
1501574	82.3	45.346	-75.551	3.05	47.55	0 - 1.22	Domestic
7271498	-	45.345	-75.545	-	-	-	-
1520517	-	45.345	-75.552	1.44	5.18	-	Water Supply
1527377	-	45.343	-75.549	2.44	7.01	0.30 - 1.82	Water Supply
7147912	-	45.351	-75.505	2.10	6.27	-	Domestic
7223479	-	45.349	-75.512	2.85	34.84	0 - 0.9	Water Supply
7138987	-	45.347	-75.512	-	6.10	-	-
1501578	80.16	45.347	-75.510	-	35.01	-	-
7168182	-	45.346	-75.519	-	5.79	-	-
1501579	80.77	45.339	-75.522	2.13	42.70	-	-
7240518	-	45.338	-75.521	-	5.49	-	-
1513762	81.08	45.330	-75.514	3.66	68.58	-	Domestic
7200420	-	45.337	-75.501	-	1.50	0 - 1.22	Monitoring
7347066	-	45.334	-75.495	-	-	-	-
7334281	-	45.334	-75.495	-	-	-	-

masl – Meters Above Sea Level

Note: all water wells installed in limestone bedrock except for 1520517, 1527377 and 7147912 (installed in grey clay)

3.3 Field Investigation

3.3.1 Geology

A total of 17 mini piezometers were installed as part of Dillon's drilling program. These were installed on two separate occasions in May and June 2022. As part of the mini piezometer installation, soil was logged for colour, grain size, moisture content, density, structures and textures. In addition to Dillon's subsurface investigation, Paterson drilled and installed numerous boreholes and geotechnical piezometers / monitoring wells within the Study Area boundary. Dillon's mini piezometers targeted areas close to surface water features and near areas of standing surface water within the Study Area and adjacent properties; Paterson's geotechnical piezometers / monitoring wells targeted areas within the Study Area boundaries. A total of 18 geotechnical monitoring wells installed by Paterson were included in Dillon's hydrogeological investigation. The geotechnical monitoring wells were selected due to depth, location and general Study Area coverage.

The field investigations completed by Dillon and Paterson indicated that the soil stratigraphy within the Study Area consists of two distinct units comprised of silty sand and silty clay. The overlaying silty sand unit was found at depths between surface and 3.0 m bgs. The underlying silty clay unit can be split into two distinct zones based primarily by colour; shallow brown and deeper grey. The brown colour suggests intermittent oxidative conditions within the clay. The brown clay is typically weathered and fractured. The brown silty clay was found at depths between surface and 3.8 m bgs. The grey colour in



the underlying clay suggests an anoxic environment with the degree of fractures quickly diminishing. The grey silty clay was found at depths between 0.7 and 47.6 m bgs.

Borehole logs detailing the construction and soil description in mini piezometers (Dillon) and geotechnical monitoring wells (Paterson) included in Dillon's hydrogeological investigation are found in Appendix A, with locations shown on Figure 1.

3.3.2 Groundwater: Elevations

Water level data was collected on numerous occasions from the mini piezometers and monitoring wells (Dillon's and Paterson's) within the Study Area since April 2022. Shallow piezometers and monitoring wells, as well as select collocated deep monitoring wells (i.e., nested monitoring wells), were selected as part of the monitoring program to monitor fluctuations in the water table. Water levels were monitored with the use of leveloggers to collect water column pressure data, and a barologger was installed within the Study Area (at P10) to allow for atmospheric pressure compensation of the data collected by the leveloggers. Manual water level measurements taken during the data download were used to calibrate the data collected from the leveloggers and to convert level measurements into groundwater elevations. The hydrographs produced are presented in Appendix C and water level elevations are shown on Table 3 below:





Piezometer ID	Date	Water Level (masl)
P1 (silty clay)	June 28, 2022	77.01
FI (Silty Clay)	October 7, 2022	77.72
	May 9, 2022	79.31
P2 (silty sand)	June 2, 2022	79.60
Γ	October 6, 2022	78.50
	May 9, 2022	78.63
	June 2, 2022	79.72
P3 (silty sand)	June 28, 2022	78.61
	October 6, 2022	77.95
	May 3, 2022	72.84
P4 (silty clay)	June 2, 2022	72.82
	October 6, 2022	72.45
	May 3, 2022	73.08
P5 (silty clay)	June 2, 2022	73.06
F	October 6, 2022	72.86
	May 3, 2022	75.23
P6 (silty clay)	June 2, 2022	75.31
	October 7, 2022	75.00
	May 3, 2022	77.76
P7 (silty clay)	June 2, 2022	Destroyed
	May 4, 2022	69.04
P8 (silty clay)	June 2, 2022	70.30
FO (Sirty Clay)	October 6, 2022	69.86
	May 3, 2022	79.35
P9 (silty clay)	June 2, 2022	79.33
F9 (Silty Clay)		79.14
	October 7, 2022	78.92
P10 (ciltur clay)	May 3, 2022	
P10 (silty clay)	June 2, 2022	79.60
	October 7, 2022	79.54
	May 3, 2022	67.93
P11 (silty clay)	June 2, 2022	67.90
	October 7, 2022	67.98
P12 (silty sand)	June 28, 2022	75.62
	October 7, 2022	76.29
P13 (silty sand)	July 5, 2022	76.35
. , ,	October 6, 2022	76.23
P14 (silty clay)	June 28, 2022	76.96
. , ,,	October 5, 2022	77.26
P15 (silty sand)	June 28, 2022	76.64
- (/ /	October 5, 2022	77.2
P16 (silty clay)	June 28, 2022	74.59
	October 5, 2022	75.36
P17 (silty sand)	July 5, 2022	76.42
	October 7, 2022	77.13

Piezometer ID	Date	Water Level (masl)
	May 10, 2022	80.89
BH13A-22 (silty	May 27, 2022	80.79
clay)	July 28, 2022	80.32
	October 5, 2022	80.28
BH13-22 (silty	May 27, 2022	80.72
clay)	July 28, 2022	80.29
ciay)	October 5, 2022	80.25
	May 4, 2022	78.57
BH22A-22 (silty	May 27, 2022	78.04
clay)	August 3, 2022	77.27
	October 6, 2022	77.11
BH26A-22 (silty	August 8, 2022	79.1
sand)	May 26, 2022	79.27
BH29A-22 (silty		
clay)	May 26, 2022	77.81
	May 11, 2022	78.09
BH29-22 (silty	May 26, 2022	77.87
clay)	August 8, 2022	77.73
	October 6, 2022	77.65
	May 11, 2022	78.135
BH35A-22 (silty	May 24, 2022	78.24
sand)	August 9, 2022	78.22
	October 6, 2022	77.46
	May 11, 2022	76.89
BH38A-22 (silty	May 24, 2022	77.05
clay)	August 9, 2022	76.96
	October 6, 2022	76.92
	May 10, 2022	76.85
BH42A-22 (silty	May 26, 2022	76.78
clay)	August 15, 2022	76.89
	October 5, 2022	76.86
	April 14, 2022	79.87
BH45A-22 (silty	May 27, 2022	80.06
clay) —	October 5, 2022	79.17
	April 14, 2022	78.79
BH47A-22 (silty	May 26, 2022	78.07
sand)	August 15, 2022	77.75
,	October 5, 2022	78.31
	May 4, 2022	78.94
BH49A-22 (silty	May 27, 2022	78.94
sand)	August 15, 2022	78.49
	October 5, 2022	78.48
	May 4, 2022	78.96
BH49-22 (silty	May 27, 2022	78.91
clay)	August 15, 2022	78.47
	October 5, 2022	78.29
	May 10, 2022	80.09
BH56A-22 (silty	May 27, 2022	80.01
sand)	August 12, 2022	79.35
	October 5, 2022	79.25
	May 11, 2022	79.20
BH56-22 (silty	May 27, 2022	79.85
clay)	August 12, 2022	79.83
	October 5, 2022	79.25
BH60A-22 (silty	000000 5, 2022	/3.25
sand)	May 25, 2022	79.1
sanuj	April 14, 2022	79.1
BH63A-22 (silty		
	May 25, 2022	78

cand)	May 25, 2022	/8
sand)	October 6, 2022	78.17

Notes:

MASL Meters Above Sea level

Daily precipitation measurements from the Ottawa International Airport Climate Station (Climate ID 6106001) were plotted on hydrographs to assess the influence of precipitation in water level elevations. The hydrographs indicate a strong correlation between water level elevations and daily precipitation volumes. The relationship between the two can be clearly observed in late July and early August, where two rainfall events in excess of 40 mm occurred. The late July and early August rainfall events increased water level elevations at nearly every monitoring location, with increases typically ranging from 5 cm to 50 cm; however, locations P5, P6, P8, BH13A-22, BH35A-22 and BH45A-22 recorded water level increases of nearly 100 cm.

Groundwater levels were observed to fluctuate according to rainfall events throughout the monitoring period; however, the increase in water level was not observed to be sustained. Rather, high water levels returned to pre-rainfall levels within a few days at most monitoring locations.

Data from mini piezometers located adjacent to surface water monitoring locations were compared to the surface water level data to illustrate the existing hydrogeological relationship of precipitation, groundwater, and surface water. Mini piezometer labels and corresponding adjacent surface water monitoring site labels are summarized in Table 4 below. The surface water monitoring locations are shown on Figure 1.

Location	Mini Piezometer	Surface Water Monitoring Site
Location 1	P1	S7
Location 2	P4	S4
Location 3	P5	S4
Location 4	P6	S5
Location 5	P8	\$3
Location 6	P9	\$8
Location 7	BH22A-22	S6

Table 4 – Piezometer and Adjacent Surface Water Monitoring Site Locations

In general, the hydrographs of the monitoring wells / piezometers and the surface water monitoring sites display very similar responses to precipitation events with a sharp in increase in water level following the major precipitation events throughout the monitoring period. At locations 2 through 7, the groundwater levels were consistently above the water levels reported at the surface water monitoring sites; typically between 0.5 m and 3 m, indicating the potential for groundwater discharge to surface water.

At location 1, the water level reported at surface monitoring site S7 is at a higher elevation than the groundwater level in the mini piezometer at P1 for most of the monitoring period, indicating a slight potential surface water recharge condition from surface water to groundwater. Therefore, there is a limited area to assess the groundwater and surface water interactions within Location 1; given that other surface water features (aside from Ramsay Creek, where only its headwaters fall within the Study Area) are ephemeral and/or poorly defined; additional monitors were not assessed to be useful.



Groundwater level data from nearby monitoring wells (BH13-22 and BH22-22) were also used to evaluate the existing groundwater conditions within Location 1.

During dryer months, water levels in both mini piezometers and surface water level monitoring locations were below the leveloggers for several periods, corresponding with no flow measurements at the stream gauges. Recorded periods with no stream flow, corresponding to low groundwater levels suggest that potential groundwater discharge conditions are not persistent (i.e., ephemeral/ intermittent) in Bear Brook. Hydrographs produced with a comparison between mini piezometer groundwater levels, adjacent surface water monitoring site water levels, and daily precipitation are presented in Appendix C.

Vertical gradients at three nested monitoring well locations were calculated and are summarized in Table 5 below. The shallow piezometers (indicated by the "A" in the name) were installed within the upper brown clay. The deep piezometers were installed in the deeper grey clay.

Nested Piezometers	Vertical Gradient		
	May 2022	October 2022	
BH13A-22 / BH13-22	0.02	0.01	
BH29A-22 / BH29-22	-0.02	-0.03	
BH49A-22 / BH49-22	0.01	0.06	

Table 5 – Nested Piezometer Vertical Gradients

Notes:

-Positive vertical gradient indicates a downward gradient -Negative vertical gradient indicates an upward gradient

a.a.a Groundwater: Laboratory Analysis

Groundwater samples were submitted to Paracel Laboratories in Ottawa, Ontario, for the chemical analysis as summarized in Section 2.2.5. Paracel Laboratories is accredited by the Canadian Association for Laboratory Accreditation (CALA) for the analytical testing completed as part of this investigation.

The groundwater analytical results are presented in Appendix D. Further monitoring and analysis of the groundwater quality within the Study Area will be completed during the future design phases of the development.

3.4 Geological Model

Using data collected during the drilling programs, the 3D geological model calculated the extent of the four lithologic layers (top soil, silty sand, brown silty clay and grey silty clay). The results from the model indicate that the grey and brown silty clay layers are laterally extensive throughout the Study Area, with the exception of the area near three monitoring wells in the northern portion of the Study Area (BH34-



22, BH35-22 and BH36-22) where only grey silty clay was noted to be present beneath the overlying sand.

The silty sand layer is also laterally extensive, with the exception of where the river channels appear to have eroded through the sand, and in select boreholes in the south (BH59-22, BH44-22, BH43-22, BH40-22, BH46-22, BH45-22, BH45-22 and BH48-22). The thickness of the silty sand layer was modeled to have a non-uniform thickness across the Study Area that ranged from 0 to 2.82 m. The silty sand unit as modeled, is shown on Figure 5. Cross-sections generated from the model are included in Appendix E.

This geological model was then used as a base framework for the hydrogeologic model in FEFLOW.

3.5 Groundwater Model

The findings of the groundwater model discussed in a technical memo are attached in Appendix F.



4.0 Discussion

4.1 Existing Hydrogeological Conditions

The intrusive field investigations and geological model indicate that a thin sand unit is present through most of the Study Area and the surrounding region, underlain by a thick clay unit that can be subdivided into a shallow upper brown silty clay and an underlying grey silty clay, as discussed in Section 3.3.1. The sand appears to act as the most active hydrogeological unit due to its permeability, while the underlying grey silty clay acts as a 'floor' with low permeability characteristics. The brown silty clay has a higher hydraulic conductivity than the underlying grey silty clay but the silty sand unit is significantly more permeable than the brown silty clay. The silty sand unit is somewhat discontinuous and in particular is very thin over large areas. Therefore, the significance of the silty sand unit to be a major groundwater flow pathway is limited.

The groundwater levels within the shallow overburden are subject to seasonal and precipitation changes; following a significant rain event, increases in the elevation of the water table by several tens of centimeters and in some areas up to 1 metre were measured, as noted in Section 3.3.2. However, the increased water levels were not sustained, indicating high hydrogeological activity within the shallow overburden. The silty clay underlying the sand unit suggests the shallow groundwater system is laterally active as the low permeability grey silty clay unit does not allow for significant vertical flow.

The groundwater flow system is therefore a shallow system and groundwater will discharge to local surface water features. The amount of baseflow groundwater discharge to surface is limited due to the relatively low permeability of the brown silty clay and the thin and discontinuous sand hydrostratigraphic unit.

4.2 Tewin Lands: Summary of Preliminary Opportunities

Based on the information provided in this report, the strategic planning and community design objectives for Tewin, and the commitment to exploring bold and innovative strategies for Tewin, the following section identifies a series of preliminary opportunities for consideration. These preliminary opportunities may help inform the next phase of the integrated master planning and EA process and can be used to frame community design options and technical solutions.

Overall, the hydrogeology of the development area is dominated by low permeability silty clay soils. There is no significant deep movement of groundwater due to a thick layer of very low permeability grey clay. The shallow groundwater flow system is dominated by horizontal movement towards surface water features. Development will alter the shallow groundwater flow system including the potential alterations to existing surface drainage features. The groundwater flow model will be used to simulate the effect of deeper sewers and changes to surface water features. While localized decreases in the water table is commonly observed in development projects in Ottawa, post-development water table



impacts will nonetheless be thoroughly assessed during future stages of the study to identify required impact mitigation measures. For example, strategies to manage surface water runoff and promote natural infiltration will be assessed and incorporated into the development during future phases of the project, as needed.

It is noted that the existing conditions of the development area may limit the effectiveness of some LIDs, however, LIDs are still sometimes feasible in low permeability materials. These opportunities will be assessed for functional value in future stages of the development process; likely with a focus on how LIDs may contribute to filtration and evapotranspiration objectives.

Shallow groundwater levels have fluctuated by up to 1 m, indicating seasonality effects. Additional water level monitoring data will be used to confirm the degree of seasonal water table fluctuations.



5.0 Reference

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- South Nation Conservation Authority (SNCA). 2016. Source Protection Plan, Raisin-South Nation Source Protection Region Version 1.4.0
- Rideau Valley Conservation Authority (RVCA). 2022. Mississippi-Rideau Source Protection Plan (approved) Revision 1.3
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- Ontario Ministry of Natural Resources and Forestry (OMNR). 2022. Land Information Ontario (LIO) Warehouse, Data Class Name: Wetland Documentation
- Paterson Group. 2024. Existing Conditions Geotechnical: Tewin Lands
- J.F. Sabourin and Associates. 2024. Tewin Lands: 2021-22 Field Monitoring Report



Closure

This report was prepared exclusively for the purposes, project, and project location outlined in the report. The report is based on available information provided to, or obtained by Dillon as indicated in the report and represents a reasonable review of this information within an established work scope, work schedule, and budget. In preparing this report, we have relied on data collected by others and we accept no responsibility for the accuracy and completeness of that data.

This report was prepared by Dillon for the sole benefit and use of Taggart Investments and Algonquins of Ontario. The material in it reflects Dillon's best judgment in light of the information available to it at the time of preparation. Any use that a third party makes of this report, or any reliance on or decision made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Respectfully Submitted,

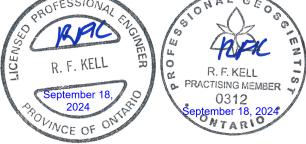
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Daniel Orjuela, P. Geo. Hydrogeologist



Matthew McCurdy, P.Geo. Associate MATTHEW B. McCURDY PRACTISING MEMBER 2012 September 18, 2024

Rob Kell, P.Geo., P.Eng Senior Hvdroaeoloaist



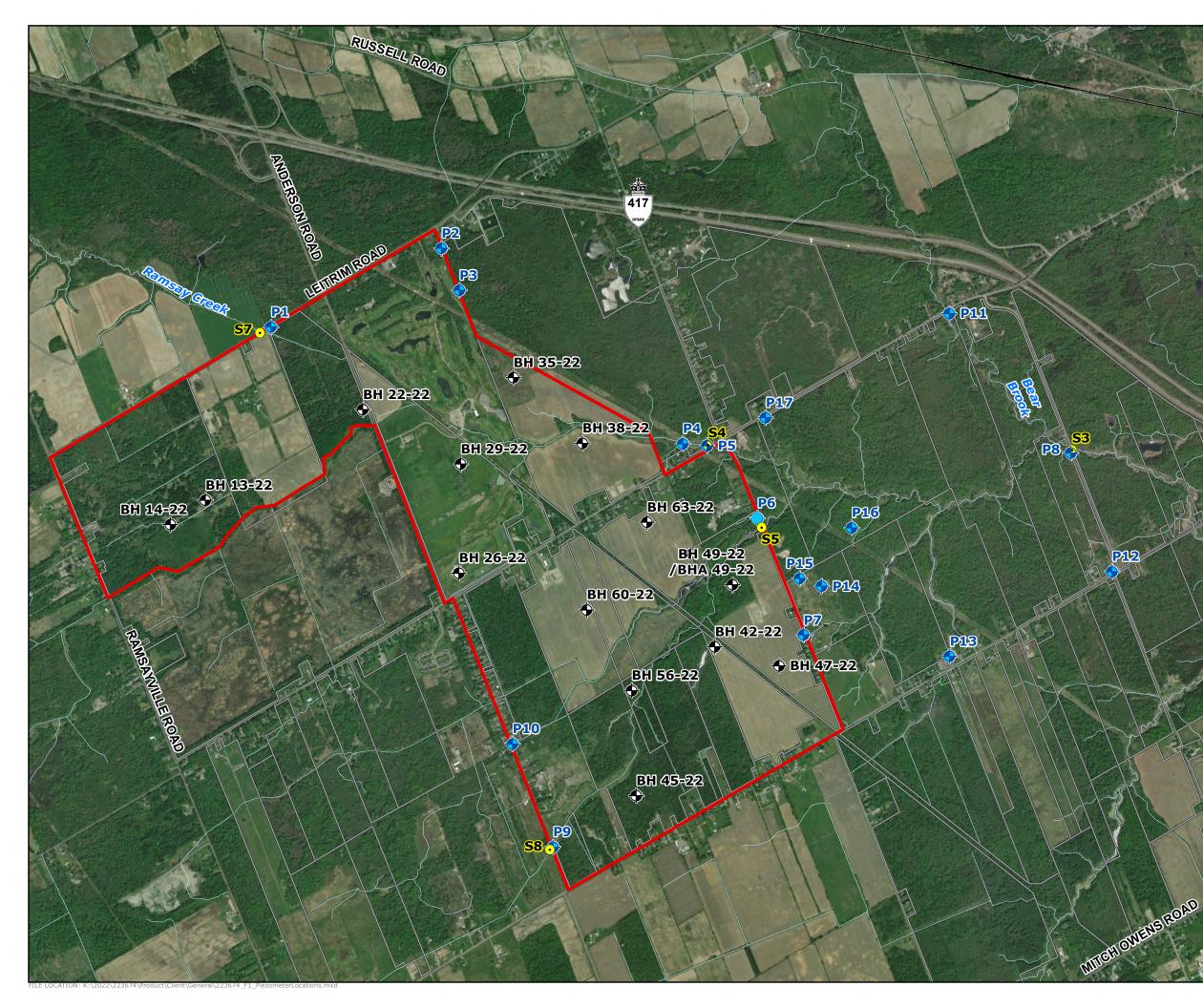


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Figures

Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674





PIEZOMETER AND SURFACE WATER MONITORING

FIGURE 1

- Borehole Locations (Paterson)
- Piezometer Location (Dillon)
- Surface Water Monitoring Sites (JFSA)
- Study Area
- ----- Railway
 - Watercourse
 - Property Boundary







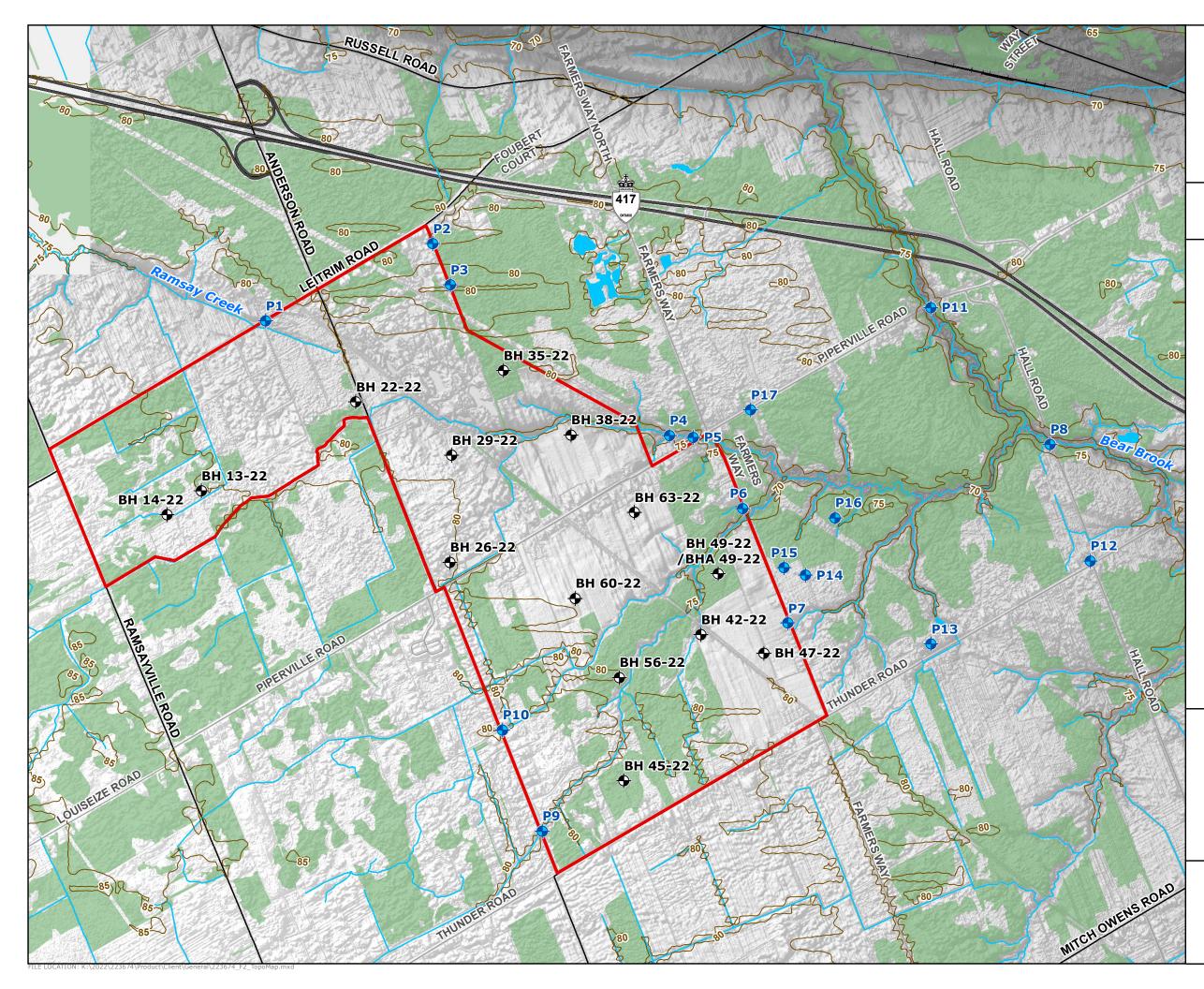
MAP DRAWING INFORMATION: DATA PROVIDED BY MNRF, Dillon Consulting Limited, Imagery by ESRI basemaps

MAP CREATED BY: LMM MAP CHECKED BY: -MAP PROJECTION: NAD 1983 MTM 9



PROJECT: 22-3674

DATE: 2024-04-24



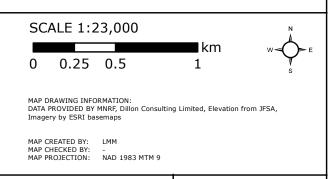
TOPOGRAPHIC MAP

FIGURE 2

- Borehole Locations (Paterson)
- Piezometer Location (Dillon)
- Contour (LIO) [m]
- Study Area
- Highway
- Major Road
- Minor Road
- ----- Railway
- ----- Watercourse
- Water Body
- Wooded Area

Elevation - High : 119.27m

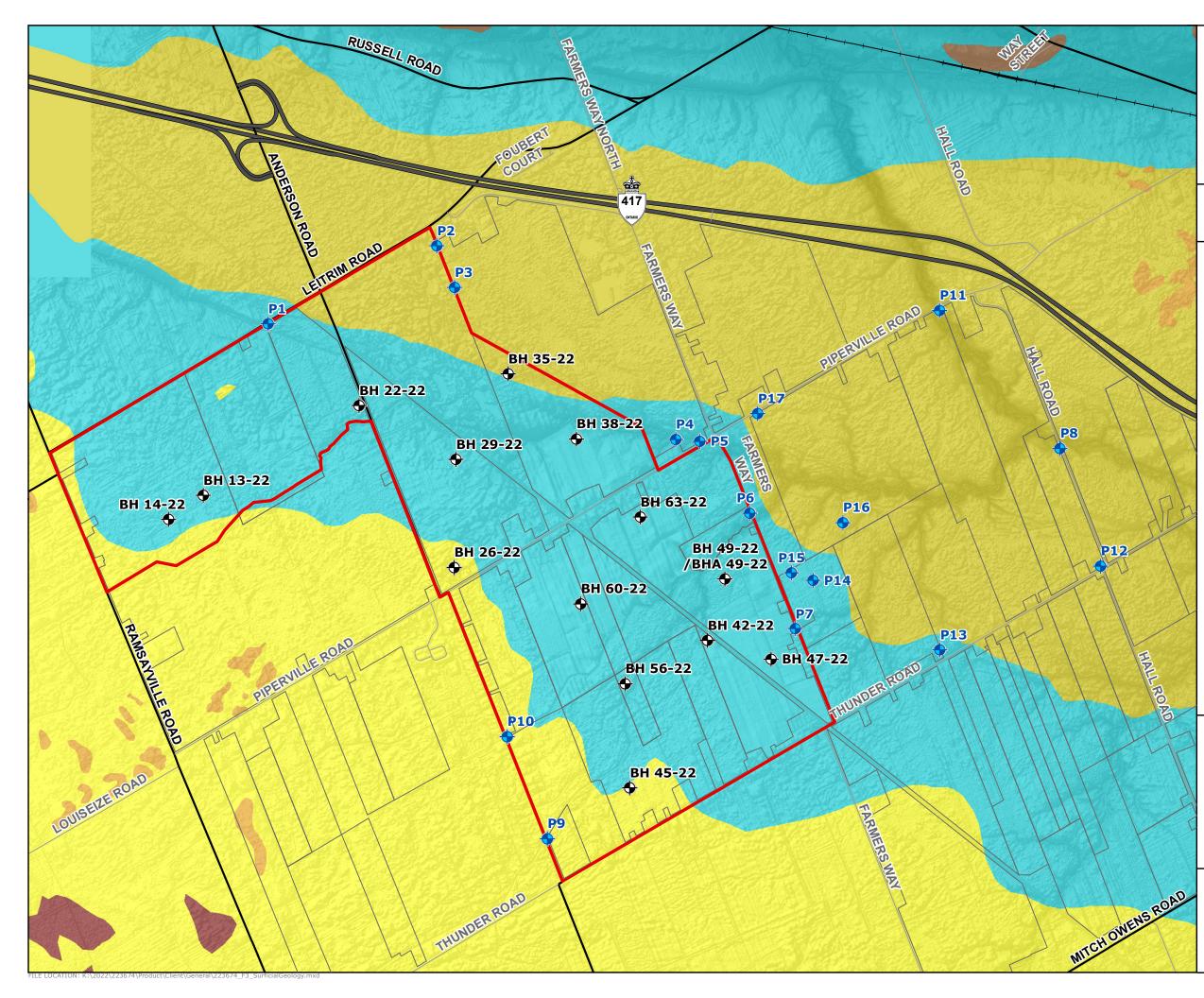
Low : 51.17m





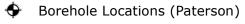
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STATUS: FINAL
DATE: 2024-04-24



SURFICIAL GEOLOGY

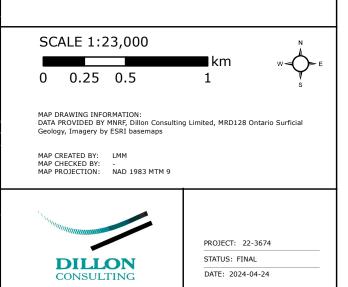
FIGURE 3



- Piezometer Location (Dillon)
- Study Area
- 🗕 Highway
- Major Road
- Minor Road
- ----- Railway
- Property Boundary

Surficial Geology

- 10a: Massive-well laminated
- 11a: Deltaic deposits
- 11c: Foreshore-basinal deposits
- 12: Older alluvial deposits
- 17: Eolian deposits
- 20: Organic deposits

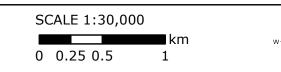




WELL WATER RECORDS

FIGURE 4

- Well Water Record
- Study Area
- ----- Railway
 - Property Boundary



MAP DRAWING INFORMATION: DATA PROVIDED BY MNRF, Dillon Consulting Limited, Ontario Well Water Inrformation System 2022, Imagery by ESRI basemaps

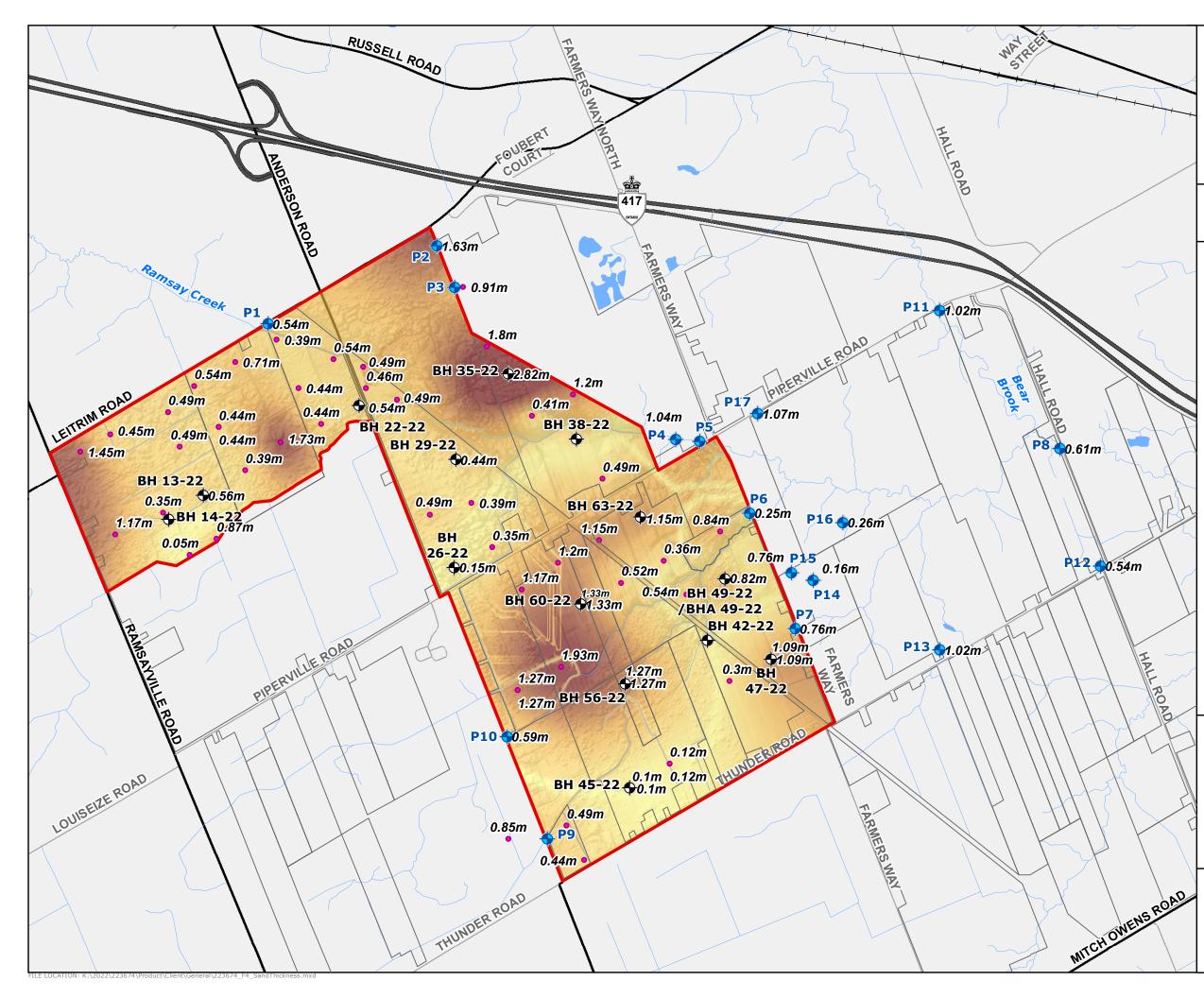
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PROJECT: 22-3674

STATUS: FINAL

DATE: 2024-04-24

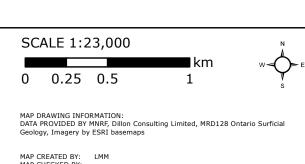


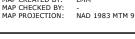
SAND THICKNESS

FIGURE 5

- Borehole Locations (Paterson)
- Piezometer Location (Dillon)
- Sand Sample Point (Thickness Value)
- Study Area
- Major Road
- Minor Road
- Watercourse
- Property Boundary
- Sand Layer Thickness (m) High : 2.77

Low : 0.00







PROJECT: 22-3674

STATUS: FINAL
DATE: 2024-04-24

Appendix A

Borehole Logs

Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674



	•
DILLON CONSULTING	

roject N	lo.: <u>22-3674</u>	Location:					
-	Co.: OGS Inc.	-		Hand Aug			
upervise	Date Start	ed: _	22-6-28	Date Completed: 22-6-28			
Depth (m)	Stratigraphic Description Elevation (m): 78.22	Abology (m)			Well Construction	Method	Elevatio (m)
	Topsoil Dark brown, some fine grained sand, rootlets	$\frac{\sqrt{L_{x}}}{\sqrt{L_{x}}} = \frac{\sqrt{L_{x}}}{\sqrt{L_{x}}}$			C through bentonite seal		
-	Sand Medium brown, fine grained, some minor grey clay	0.2					-78.0
0.5-	Clau	0.74		Solid PV	C through fine sand pack		77.5
1.0-	Clay Grey clay, high content of fine grained brown sand, damp to dry Damp to wet on 0.91 m bgs	0.14					-
- 1.5-	No sand present, increased silt content, damp to wet at 1.22 m bgs			Slotted F	PVC through fine sand pack		-77.0
-	Transition to wet at 1.57 m bgs						-76.5
2.0-	Transition to saturated at 1.98 m bgs						_
	Notes: Borehole terminated at 2.21 m bgs	2.21	L				J



aggart Investments and Algonquins of Ontario					
			 Split Spoon		
	Date Started:		22-5-9		
Stratigraphic Description Elevation (m): 79.59	Lithology (m) (m)	Well Construction	(m)		
Dark brown, wet, roots present	$\frac{U_{1}}{\sqrt{U_{1}}} \cdot \frac{\sqrt{U_{1}}}{\sqrt{U_{2}}} \cdot \frac{\sqrt{U_{2}}}{\sqrt{U_{2}}}$	Solid PVC through bentonite seal	-79.5		
Sand Medium brown, fine grained, transitions from wet to saturated at 0.46 m bgs, loose			- 79.0		
		Slotted PVC through fine sand pack			
			-78.0		
Notes: Borehole terminated at 2.44 m bgs	1.83				
	Io.: <u>22-3674</u> So.: <u>OGS Inc.</u> ed by: <u>EB</u> Stratigraphic Description Elevation (m): 79.59 Top Soil Dark brown, wet, roots present Sand Medium brown, fine grained, transitions from wet to saturated at 0.46 m bgs, loose Notes:	Io.: 22-3674 Location: Ottaw Io.: OGS Inc. Drilling Method: ad by: EB Date Started: Stratigraphic Description Io. Elevation (m): 79.59 Io. Top Soil Io. Dark brown, wet, roots present Io. Sand Io.2 Medium brown, fine grained, transitions from wet to saturated at 0.46 m bgs, loose Io.2 Io. Io.2 Notes: 1.83	In: 22-3674 Location: Ottawa, Ontario In: OGS Inc. Dinjar - Split Spoon Dinjar - Split Spoon In: Date Stratigraphic Description Dinjar - Split Spoon Dinjar - Split Spoon Image: Stratigraphic Description Image: Strated: 22-5-9 Date Completed: Image: Split Spoon Image: Stratigraphic Description Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Stratigraphic Description Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spoon Image: Split Spl		

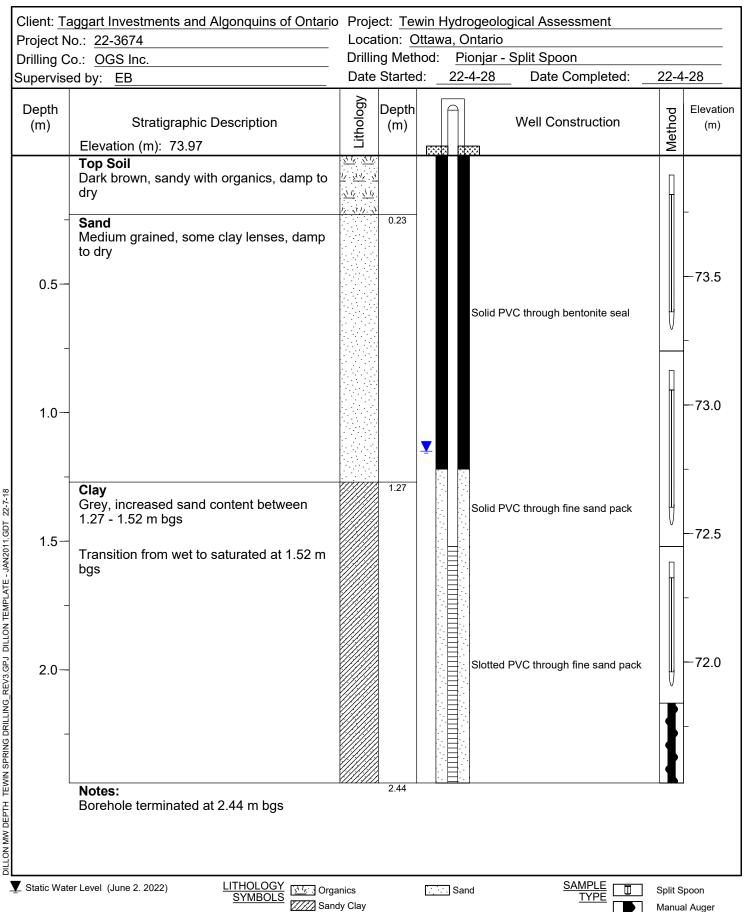




Project N	aggart Investments and Algonquins of Ontaric lo.: <u>22-3674</u>	Loca	ect: <u>Tev</u> tion: <u>C</u> ng Meth	Ottaw	/a, Or	ntario			
Drilling Co.: <u>OGS Inc.</u> upervised by: EB			Starte		z i			2-5-9	
Depth (m)	Stratigraphic Description	Lithology	Depth (m)			Well Construction	Method	Elevatior (m)	
	Sand Medium brown, fine grained, damp to wet					Solid PVC through bentonite seal			
_						Solid PVC through fine sand pack	Ŭ 	-	
1.0	Clay Brown, some sand throughout Increased clay content below 1.12 m bgs		0.91			Slotted PVC through fine sand pack			
1.5—	Transitions from brown to grey, increased silt content below 1.5 m bgs		1.73				U U		







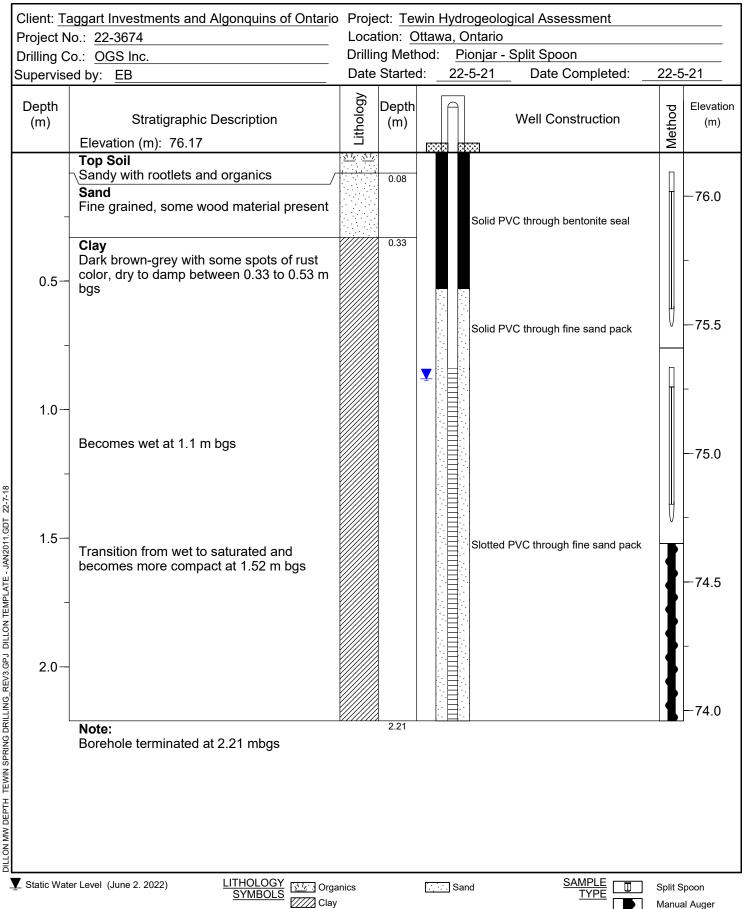


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	aggart Investments and Algonquins of Ontaric lo.: 22-3674					Ontario	al Assessment		
-	co.: OGS Inc.					Pionjar - Sp	lit Spoon		
-	ed by: EB		Starte			2-4-28	Date Completed: 22-4-28		
Depth		-	Depth	_	A]	· · · ·		Elevatio
(m)	Stratigraphic Description Elevation (m): 73.57	Lithology	(m)	1000	121 2		Vell Construction	Method	(m)
0.5-	Clay Brown-grey, damp transitioning to wet at 0.9 m bgs, soft			Ť		Solid PVC	through bentonite seal		-73.5
-						Solid PVC	through fine sand pack		-73.0
1.0	Grey sand lens from 1.07 - 1.19 m bgs Transition from wet to saturated at 1.19 m bgs					Slotted PV	C through fine sand pack		72.5
-									-72.0
	Notes: Borehole terminated at 2.44 m bgs		1.83						

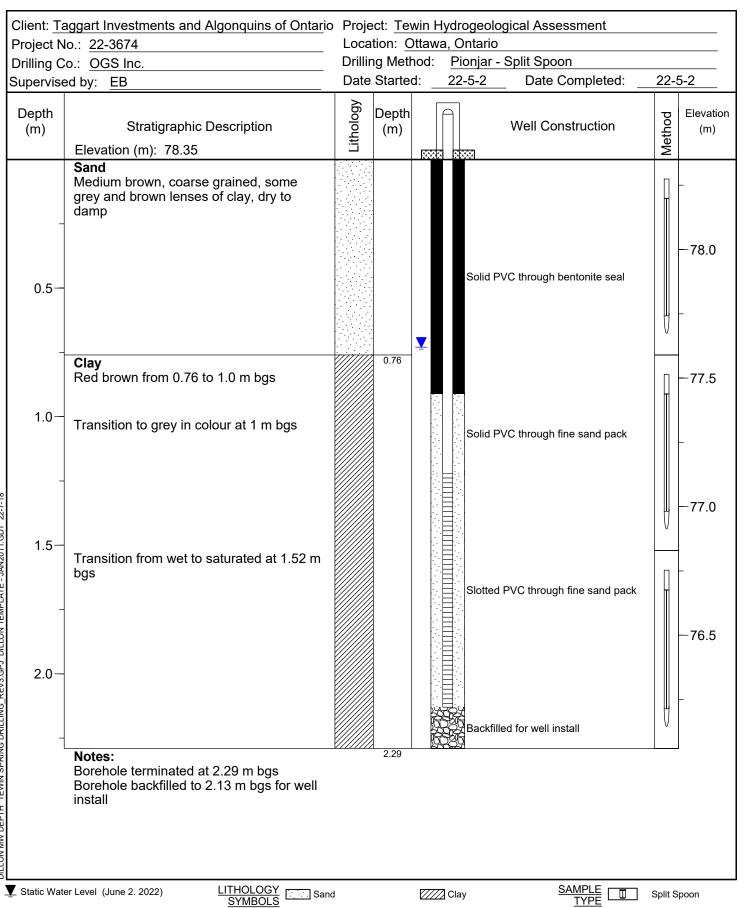








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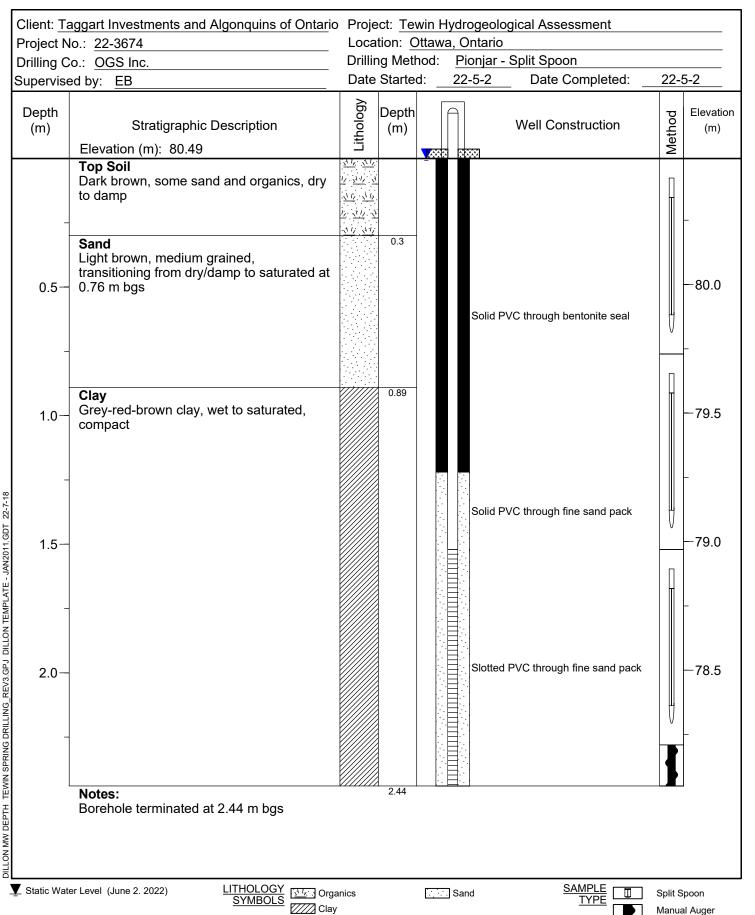


) · OGS Inc	D.::!!:							
Drilling Co.: OGS Inc.		Drilling Method: Pionjar - Split Spoon						
d by: <u>EB</u>	Date	Starte	2-5-4 Date Completed:	d: <u>22-5-4</u>				
Stratigraphic Description Elevation (m): 70.79	Lithol	Depth (m)			Well Construction	Method	Elevatior (m)	
Top Soil Dark brown, sandy with organics and rootlets	$\frac{\underline{x}^{1}}{\underline{y}} \cdot \underline{x}^{1} \underline{y}$ $\frac{1}{\underline{y}} \cdot \underline{x}^{1} \underline{y} \cdot \underline{x}^{1}$	0.15					_	
Sand Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp			Ţ		Solid PVC through bentonite seal		70.5	
							_	
Clay Red-brown transition to grey at 1.27 m bgs		0.76			Solid PVC through fine sand pack		-70.0	
						Ŭ	- 69.5	
Increased silt content and saturated below 1.75 m bgs					Slotted PVC through fine sand pack		- 69.0	
Notoo		244					-68.5	
Notes: Borehole terminated at 2.44 m bgs		2.74						
	Stratigraphic Description Elevation (m): 70.79 Top Soil Dark brown, sandy with organics and rootlets Sand Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp Clay Red-brown transition to grey at 1.27 m bgs Increased silt content and saturated below 1.75 m bgs Notes:	Stratigraphic Description Bigg Elevation (m): 70.79 Top Soil Dark brown, sandy with organics and rootlets Sand Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp Increased silt Clay Red-brown transition to grey at 1.27 m bgs Increased silt content and saturated below 1.75 m bgs Increased silt content and saturated below Notes: Notes:	Stratigraphic Description Open film Elevation (m): 70.79 Depth (m) Top Soil Dark brown, sandy with organics and rootlets 0.15 Sand 0.15 0.15 Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp 0.16 Clay 0.76 Red-brown transition to grey at 1.27 m bgs 0.76 Increased silt content and saturated below 1.75 m bgs Notes: 2.44	Stratigraphic Description Depth (m) Elevation (m): 70.79 Depth (m) Top Soil Dark brown, sandy with organics and rootlets 0.15 Sand Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp 0.16 Clay Red-brown transition to grey at 1.27 m bgs 0.76 Increased silt content and saturated below 1.75 m bgs 0.76 Notes: 2.44	Stratigraphic Description Bog Depth (m) Elevation (m): 70.79 Top Soil Dark brown, sandy with organics and rootlets 0.15 Sand 0.15 Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp 0.16 Clay 0.76 Red-brown transition to grey at 1.27 m bgs 0.76 Increased silt content and saturated below 1.75 m bgs Notes: 2.44	Stratigraphic Description Image: Construction Elevation (m): 70.79 Image: Construction Top Soil Image: Construction Dark brown, sandy with organics and rootlets Image: Construction Sand Image: Construction Reddish brown, sand, high clay content between 0.15 - 0.32 m bgs, damp Image: Construction Clay Image: Construction to grey at 1.27 m bgs Image: Construction to grey at 1.27 m bgs Increased silt content and saturated below Image: Construction to grey at 1.27 m bgs Image: Construction to grey at 1.27 m bgs Notes: 244	Stratigraphic Description Depth (m) Well Construction Depth (m) Increased silt content and saturated below 1.75 m bgs 0.76 0.76 0.76	



Project No.: 22-3674			D Project: <u>Tewin Hydrogeological Assessment</u> Location: Ottawa, Ontario							
-	o.: OGS Inc.	_	Drilling Method: Pionjar - Split Spoon							
Supervised by: EB			Starte		22-4-28	Date Completed: 22-4-28				
Depth (m)	Stratigraphic Description Elevation (m): 80.70	Lithol	Depth (m)			Well Construction	Method	Elevation (m)		
	Top Soil Dark brown, sand, clay and gravel present, rootlets present, dry to damp							80.5		
0.5	Sand Medium brown, fine grained		0.24		Solid P	VC through bentonite seal				
1.0-	Clay Red brown, damp to wet		1.09			VC through fine sand pack		- 79.5		
1.5—	Transitions to red/brown/grey			Ţ	Slotted	PVC through fine sand pack				
2.0-	Notes:		2.13				Ļ	_		
	Borehole terminated at 2.13 m bgs									





DILLON CONSULTING	

Project No.: 22-3674			Location: Ottawa, Ontario							
Drilling C	OGS Inc.Drilling Method:Pionjar - Split Spoonby:EBDate Started:22-5-2Date Complete									
	ed by: EB	Date	Starte	: 22-5-2						
Depth (m)	Stratigraphic Description Elevation (m): 69.02	Lithology	Depth (m)			Well Construction	Method	Elevation (m)		
	Sand							-69.0		
0.5-	Light brown to grey, fine grained, some clay and silt throughout Transition from dry to damp at 0.61 m bgs					Solid PVC through bentonite se	al			
1.0-	Clay Dark grey, becoming lighter grey at 1.22 m bgs		1.02	_			ck	-68.0		
1.5-	Increased silt and sand content below 1.63 m bgs					Solid PVC through fine sand pa	ck	- 67.5		
2.0-	Transition from damp to wet at 1.83 m bgs, becomes soft with increased moisture content					Slotted PVC through fine sand p	oack	-67.0		
	Notes: Borehole terminated at 2.44 m bgs		2.44							



Project No.: 22-3674			Location: Ottawa, Ontario							
-	co.: OGS Inc.	Drilling Method: Hand Auger								
Supervised by: EB			Starte	d: _	22-	6-28 Date Completed:	22-6	5-28		
Depth (m)	Stratigraphic Description Elevation (m): 77.47	Lithology	Depth (m)			Well Construction	Method	Elevatio (m)		
_	Topsoil Sand Brown, fine grained, some grey clay, damp to wet at 0.86 m bgs	<u><u>x</u> 1_x. <u>x</u> 1_y</u>	0.05			Solid PVC through bentonite seal		_		
0.5						Solid PVC through fine sand pack		77.0		
1.0	Clay Grey, some coarse grained sand and silt		0.91			Slotted PVC through fine sand pack		76.5		
1.5-	Transition from wet to saturated at 1.52 m bgs							76.0		
	Notes: Borehole terminated at 1.98 m bgs	<u> </u>	1.98					-75.5		

DILLON CONSULTING	

Project No.: 22-3674 Drilling Co.: OGS Inc.			Location: <u>Ottawa, Ontario</u> Drilling Method: Hand Auger							
-	ed by: EB		Starte		22-7-5	Date Completed:	ed: 22-7-5			
Depth (m)	Stratigraphic Description Elevation (m): 77.99	Lithol	Depth (m)	-		Well Construction	Method	Elevation (m)		
	Topsoil Dark brown, sandy, organics present	$\frac{ \underline{A} \underline{b}_{\underline{A}} - \underline{b} - \underline{b} \underline{b}_{\underline{A}} - \underline{b} - \underline{b} \underline{b}$	0.2		Solid P	VC through bentonite seal				
- 0.5	Sand Medium brown, fine grained, very compact, dry		0.2		Solid P ¹	VC through fine sand pack		-77.5		
1.0-	Clay		1.22					77.0		
1.5	Brown-grey, high content of sand, damp to dry Damp at 1.37 m bgs			_		PVC through fine sand pack		76.5		
2.0-	Wet at 1.83 m bgs		2.03					-76.0		
	Notes: Borehole terminated at 2.03 m bgs									



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DILLON CONSULTING	

Client: Taggart Investments and Algonquins of Ontario Project No.: 22-3674		Loca	Location: Ottawa, Ontario								
Drilling C	co.: OGS Inc.	Drilli	ng Met								
Supervise	ed by: <u>EB</u>	Date	Date Started: <u>22-6-28</u> Date Completed: _								
Depth (m)	Stratigraphic Description Elevation (m): 78.02	Lithology	Depth (m)				Vell Constructior	Method	Elevatior (m)		
_	Topsoil Dark brown, organics present	$\frac{\langle \mathbf{x} \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{x} \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{x} \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{x} \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{x} \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle}} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle \langle \mathbf{y}_{\mathbf{x}} \rangle} = \frac{\langle \mathbf{y}_{\mathbf{x}} \rangle}{ \mathbf{y}_{\mathbf{x}} \rangle$	· · · · ·				through bentonite s	eal	-78.0		
	Sand Light brown, medium grained		0.3								
0.5-	Clay Grey-red-brown, high content of sand, damp		0.46			Solid PVC	through fine sand p	ack	-77.5		
1.0-	Increasing silt content and less sandy, more compact, damp to wet at 0.91 m bgs			Ţ		Slotted PV	′C through fine sand	pack			
- 1.5—	Less compact, saturated at 1.37 m bgs								- 		
l	Notes: Borehole terminated at 1.65 m bgs	<u> </u>	1.65								
-	er Level (June 28. 2022) LITHOLOGY				Sa		SAMPLE TYPE				



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DILLON CONSULTING	

Project No.: 22-3674			ario Project: <u>Tewin Hydrogeological Assessment</u> Location: Ottawa. Ontario								
		-				22-6	3-28				
Stratigraphic Description	Lithology				Well Construction	Method	Elevation (m)				
Topsoil Dark brown, organics present Sand Medium brown, medium grained, some	$\frac{\underline{x} \cdot \underline{y}}{\underline{y}} \cdot \underline{x} \cdot \underline{y}$	0.15	-		PVC through bentonite seal		-78.0				
clay present, dry							77.5				
Darker brown, increased amount of sand content, becoming more compact, damp at 0.76 m bgs Clay Dark brown, high content of clay, damp, compact Becoming more sandy and silty at 1.1 m bgs		0.91		Slotte	d PVC through fine sand pack		77.0				
			Y				-76.5				
Lenses of grey sand present Notes:		2.01									
,	co.: OGS Inc. ed by: EB Stratigraphic Description Elevation (m): 78.03 Topsoil Dark brown, organics present Sand Medium brown, medium grained, some clay present, dry Darker brown, increased amount of sand content, becoming more compact, damp at 0.76 m bgs Clay Dark brown, high content of clay, damp, compact Becoming more sandy and silty at 1.1 m bgs Lenses of grey sand present	o.: OGS Inc. Drillir ad by: EB Date Stratigraphic Description Image: Comparison of the second se	o.: OGS Inc. Drilling Met ad by: EB Date Starte Stratigraphic Description 0 Elevation (m): 78.03 Depth (m) Topsoil 0.15 Dark brown, organics present 0.15 Sand 0.15 Medium brown, medium grained, some clay present, dry 0.15 Darker brown, increased amount of sand content, becoming more compact, damp at 0.76 m bgs 0.91 Clay 0.91 Dark brown, high content of clay, damp, compact 0.91 Becoming more sandy and silty at 1.1 m bgs 0.91 Lenses of grey sand present 0.91	bo:: OGS Inc. Drilling Method: ad by: EB Depth Stratigraphic Description 0 Depth Elevation (m): 78.03 2 2 Topsoil 2 2 4 Dark brown, organics present 2 4 0.15 Sand 0.15 0.15 0.15 Medium brown, medium grained, some clay present, dry 0.15 0.15 Darker brown, increased amount of sand content, becoming more compact, damp at 0.76 m bgs 0.91 0.91 Dark brown, high content of clay, damp, compact 0.91 0.91 0.91 Lenses of grey sand present Lenses of grey sand present Image: clay is an interval of the same cla	io:: OGS Inc. Drilling Method: Hand A ad by: EB Date Started: 22-6-28 Stratigraphic Description Image: Strate Started: 22-6-28 Topsoil Depth (m) Image: Started: 22-6-28 Dark brown, organics present Image: Started: 22-6-28 Sand Image: Started: Image: Started: 22-6-28 Sand Image: Started: Image: Starte	Description Diffing Method: Hand Auger Date Started: 22-6-28 Date Completed: Stratigraphic Description Depth (m) Well Construction Elevation (m): 78.03 Depth (m) Well Construction Sand Medium brown, organics present Depth (m) Solid PVC through bentonite seal Dark brown, organics present 0.15 Solid PVC through bentonite seal Darker brown, increased amount of sand content, becoming more compact, damp at 0.76 m bgs 0.91 Solid PVC through bentonite seal Clay Descoming more sandy and silty at 1.1 m bgs 0.91 Slotted PVC through fine sand pack Lenses of grey sand present 2.01	bo: OGS Inc. Drilling Method: Hand Auger ad by: EB Date Started: 22-6-28 Date Completed: 22-6 Stratigraphic Description Image: Completed: 22-6 Date Completed: 22-6 Topsoil Image: Completed: 22-6 Date Completed: 22-6 Dark brown, organics present Image: Completed: 22-6 Date Completed: 22-6 Sand Image: Completed: Image: Completed: 22-6 Date Completed: 22-6 Sand Image: Completed: Image: Completed: Image: Completed: 22-6 Image: Completed: 22-6 Sand Image: Completed: Image: Completed: Image: Completed: Image: Completed: 22-6 Sand Image: Completed: Image: Completed: <t< td=""></t<>				



DILLON CONSULTING	

OGS Inc.					Intario			
		-			and Auger			
ру: <u>EB</u>	Date	Starte	d: _	22	-6-28 Date Co	ompleted:	22-6	5-28
Stratigraphic Description levation (m): 76.17	Lithology	Depth (m)				struction	Method	Elevatio (m)
opsoil ark brown, roots and organics	$\frac{\underline{x}^{\dagger} \underline{1}_{\underline{x}}}{\underline{x}^{\dagger} \underline{1}_{\underline{y}}} \cdot \frac{\underline{x}^{\dagger} \underline{1}_{\underline{y}}}{\underline{x}^{\dagger}}$							-76.0
and ledium brown, fine grained, high content f silt		0.2			Solid PVC through be	ntonite seal		
lay rown-grey, high content of sand, damp, ompact		0.46						-75.5
amp to wet, very compact at 0.76 m bgs			· · · · · · · · · · · · · · · · · · ·					_
lore red brown than grey, becoming lore compact at 1.22 m bgs					Slotted PVC through f	ine sand pack		75.0
ight to medium brown, Increasing mounts of sand, saturated, loose at 1.71 bgs								74.5
otes: orehole terminated at 1.98 m bgs	<u> </u>	1.98		· <u> </u>				1
	levation (m): 76.17 opsoil ark brown, roots and organics and edium brown, fine grained, high content silt approvem-grey, high content of sand, damp, ompact amp to wet, very compact at 0.76 m bgs ore red brown than grey, becoming ore compact at 1.22 m bgs ght to medium brown, Increasing mounts of sand, saturated, loose at 1.71 bgs	opsoil ark brown, roots and organics Image: Ark brown, roots and organics and edium brown, fine grained, high content 'silt Image: Ark brown, fine grained, high content 'silt lay rown-grey, high content of sand, damp, ompact Image: Ark brown, damp, organical ark brown, damp, organi	opsoil ark brown, roots and organics 1 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 +	opsoil is at is at is at and is at is at is at is at and is at is at is at is at is at and is at is at<	and 0.2 and 0.2 edium brown, fine grained, high content silt and edium brown, fine grained, high content silt and edium brown, fine grained, high content silt and edium brown, fine grained, high content silt and edium brown, fine grained, high content silt and orward amp to wet, very compact at 0.76 m bgs ore red brown than grey, becoming ore compact at 1.22 m bgs ght to medium brown, Increasing nounts of sand, saturated, loose at 1.71 bgs otes: 1.98	opsoil Add Add Loos Cool and Add Add Add Add Solid PVC through be edium brown, fine grained, high content 0.2 Solid PVC through be isilt 0.46 0.46 Image: Cool of the second of the	and edium brown, fine grained, high content sit 0.2 0.2 Solid PVC through bentonite seal lay rown-grey, high content of sand, damp, ompact 0.46 0.46 Image: Content of sand, damp, ompact amp to wet, very compact at 0.76 m bgs 0.46 Image: Content of sand pack Solid PVC through bentonite seal ore red brown than grey, becoming ore compact at 1.22 m bgs 0.46 Image: Content of sand pack Solid PVC through fine sand pack ght to medium brown, Increasing mounts of sand, saturated, loose at 1.71 Image: Content of sand, loose at 1.71 Image: Content of sand, loose at 1.71 bgs 1.98	oppoil Image: All of the second operation of the second operation of the second operation



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DILLON CONSULTING	

Project N	o.: 22-3674	Loca	ation: C	Ottaw	va, Ontario			
-	o.: OGS Inc.		ng Metl			ger		
-	ed by: EB	Date	e Starte	d:	22-7-5	Date Completed:	22-	7-5
Depth (m)	Stratigraphic Description Elevation (m): 78.40	Lithology	Depth (m)			Well Construction	Method	Elevation (m)
_	Topsoil Dark brown, some sand, rootlets and organics, dry	$\frac{\sqrt{L_2}}{\sqrt{L_2}} \frac{\sqrt{L_2}}{\sqrt{L_2}}$			Solid P\	/C through bentonite seal		_
0.5-	Sand Medium brown, fine grained, dry	<u>NU NI</u>	0.3		Solid P\	/C through fine sand pack		-78.0
-	increasing clay content at 0.61 m bgs							-
1.0-	no clay content, medium grained between 0.91 to 1.22 m bgs							77.5
1.5—	Clay Brown and grey, high content of sand, damp to wet, soft		1.37		Slotted	PVC through fine sand pack		-77.0
2.0-	Transitioning to saturated at 1.73 m bgs Increasing silt content							-76.5
	Notes: Borehole terminated at 2.06 m bgs		2.06					



SOIL PROFILE AND TEST DATA

FILE NO.

PG5827

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geodetic DATUM

REMARKS

BORINGS BY Track-Mount Power Auge	ger DATE March 28, 2022 HOLE NO. BH13A-22												
SOIL DESCRIPTION	PLOT	SAMPLE DEPTH EI							n. Re	sist. I	Blows/0 Dia. Con		g Well ion
	STRATA	ТҮРЕ	NUMBER	∾ RECOVERY	N VALUE or RQD	(,	(m)	0) Wa	ater C	ontent 9	%	Monitoring Well Construction
GROUND SURFACE	_		N	R	z ⁰	0-	-80.97	2	20	40	60	80	
TOPSOIL 0.20 Brown SILTY SAND with clay 0.76	+	-				0	00.37						<u> </u> ¥
		ss	1	42	Р	1-	-79.97			0			
		Ê											
Very stiff to stiff, brown SILTY CLAY, trace sand		X ss	2	83	Р	2-	-78.97			C)		
 very soft to soft and grey by 2.0m depth 		TW	3	92		3-	-77.97						
4.42						4-	-76.97						
End of Borehole		-											
(GWL @ 0.18m - May 27, 2022)													
										46			
								5	20 Shear ndistur		60 Igth (kP △ Remo		U

SOIL PROFILE AND TEST DATA

FILE NO.

PG5827

HOLE NO.

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

DATUM Geodetic

REMARKS

SOIL DESCRIPTION SAMPLE DEPTH (m) ELEV. (m) Pen. Resist. Blows/0.3m • 50 mm Dia. Cone GROUND SURFACE 0.20 Brown SILTY SAND with clay 0.20 0.76 1 0.00 SS 1 0.00 SS 1 0.00 SS 1 0.00 SS 0 80.97 0 80.97 Very stiff to stiff, brown SILTY CLAY, trace sand 0.20 SS 1 2 67 P 1 79.97 - very soft to soft and grey by 2.0m depth SS 3 75 P 3 77.97 SS 4 100 P 5 75.97 End of Borehole (GWL @ 0.25m - May 27, 2022) SS 4 100 P				SAN	IPLE		DEDTII		Pen. Resist. Blows/0.3m					
TOPSOIL 0.20	SOIL DESCRIPTION			~	ХХ	Що			• 50 mm Dia. Cone					
TOPSOIL 0.20 X G 1 Brown SILTY SAND with clay 0.76 X G 1 Very stiff to stiff, brown SILTY SS 2 67 P 1 - 79.97 Very stiff to stiff, brown SILTY SS 3 75 P 3 - 77.97 Very soft to soft and grey by 2.0m SS 3 75 P 4 - 76.97 Septh SS 4 100 P 5 - 75.97 0 End of Borehole G 5 6 74.97 0			LYPE	JMBEI	COVEI	VALU r RQI			• Water Content %	Monitoring Wall				
Brown SiLTY SAND with clay 0.76 I SS 2 67 P 1-79.97 Very stiff to stiff, brown SiLTY SS 2 67 P 1-79.97 Very soft to soft and grey by 2.0m SS 3 75 P 3-77.97 Very soft to soft and grey by 2.0m SS 3 75 P 4-76.97 SS 4 100 P 5-75.97 0 0 End of Borehole G 5 6 6-74.97 0		". ".		N	REC	z Ö	0-	-80 07	20 40 60 80					
/ery stiff to stiff, brown SILTY SS 2 67 P 1 - 79.97 /LAY, trace sand 2 - 78.97 2 - 78.97 3 - 77.97 wery soft to soft and grey by 2.0m SS 3 75 P 3 - 77.97 Mepth SS 4 100 P 5 - 75.97 0 G 5 6 - 74.97 0 0 0			G	1				00.37	q					
very soft to soft and grey by 2.0m SS 3 75 P 3-77.97 Mepth SS 3 75 P 4-76.97 SS 4 100 P 5-75.97 G 5 6-74.97 0			ss	2	67	Р	1-	-79.97		_				
epth SS 3 75 P 4-76.97 SS 4 100 P 5-75.97 G 5 6-74.97	ery stiff to stiff, brown SILTY CLAY, trace sand						2-	-78.97		-				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	very soft to soft and grey by 2.0m		x ss	3	75	P	3-	-77.97						
G 5 6-74.97							4-	-76.97						
nd of Borehole			ss	4	100	Р	5-	-75.97	0					
	6.55		χG	5			6-	-74.97	e e					
GWL @ 0.25m - May 27, 2022)														

SOIL PROFILE AND TEST DATA

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

DATUM	Geodetic

REMARKS

PG5827	7
HOLE NO.	

BORINGS BY Track-Mount Power Auge	er			D	ATE	April 11, 2	2022				e no. 22A			
SOIL DESCRIPTION	PLOT	SAMPLE DEPTH ELEV Image: Constraint of the second				Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone					g Well ion			
	STRATA	ТҮРЕ	NUMBER	° ≈ © ©	N VALUE or RQD		(11) (11)	0	Wa	ater (, 0	Monitoring Well Construction		
GROUND SURFACE	N N		Z	RE	z °	0	70 70	20)	40	60) 8	30	∣≚ö
TOPSOIL 0.15	$+$ $+$ $+$ \times	SS	1	50	3	- 0-	-78.70							
Loose, brown SILTY SAND0.69			0	07		1-	77.70							
Very stiff to stiff, brown SILTY		SS	2	67	3	1	11.10			· · · · · · · · ·				
CLÁY, some sand seams		SS	3	100	Р	2-	76.70		· · · · · · · · · · · · · · · · · · ·		·····			
- soft to firm and grey by 2.2m depth		т.,,	4	100		2	/0./0							
End of Borehole	P/L	тw	4	100						<u> </u>		<u></u>		-
(GWL @ 0.66m - May 27, 2022)														
										1	<u> </u>	<u> </u>		4
								20) hoor	40 Stro	60 Itonati) a h (kPa	30 1(a)	00
								Jana Jana Jana Jana Jana Jana Jana Jana	distur	bed		Remou	▲/ ulded	

patersongroup Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
 Proposed Mixed-Use Community Development
 Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geodetic

REMARKS

DATUM

PG5827
HOLE NO.

BORINGS BY Track-Mount Power Auger				DATE	April 6, 20	022	BH26A-22			
SOIL DESCRIPTION	РГОТ	S	AMPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone	Monitoring weil Construction		
	STRATA		_{>1} (m) (m)							
GROUND SURFACE	ß		RE	z °		70 77	20 40 60 80	žΰ		
		SS 1	62	4] 0-	-79.77	• • • • • • • • • • • • • • • • • • •	Ţ		
Loose, brown SILTY SAND, trace 0.30		s 2	2 54	28	1-	-78.77				
Very stiff, brown SILTY CLAY Compact, grey SILTY SAND1.83										
Compact, grey SILTY SAND 1.63	S	ss 3	3 100	P	2-	77.77		<u> </u>		
Firm, grey SILTY CLAY, trace sand	X s	s 4	l 100	Р			O			
	Пт	w 5	5 100		3-	-76.77				
3.66 End of Borehole	1//	vv								
(GWL @ 0.50m - May 26, 2022)										
							20 40 60 80 100			
							Shear Strength (kPa)			
							▲ Undisturbed △ Remoulded			

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

DATUM Geodetic

PG5827
HOLE NO.
BH29-22

BORINGS BY Track-Mount Power Auge	er			D	ATE /	April 7, 20)22	BH29-22
SOIL DESCRIPTION	РІОТ		SAN	IPLE		DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m=● 50 mm Dia. Cone≥ 5
	STRATA	ЭЛУРЕ	NUMBER	°% ©™ECOVERY	N VALUE or RQD	(11)	(11)	Pen. Resist. Blows/0.3m• 50 mm Dia. ConeO Water Content %20406080
GROUND SURFACE		V				0-	-78.73	
TOPSOIL0.25 Brown SILTY CLAY with sand0.69		ss	1	25	7			O 130 ₹
		X ss	2	33	Р	1-	-77.73	
		ss	3	100	Р	2-	-76.73	
Very stiff to stiff, brown SILTY CLAY		∛ss	4	100	Р			
- soft and grey by 2.2m depth		G	5			3-	-75.73	
		ss	6	75	Р	4-	-74.73	
				75				
		X G	7			5-	-73.73	
		X G X G	8 9			6-	-72.73	
<u>6.55</u> Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 13.82m depth, borehole terminated. (GWL @ 0.88m - May 26, 2022)		_						

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geodetic

REMARKS

DATUM

FILE NO. PG5827
HOLE NO. BH29A-22

BORINGS BY Track-Mount Power Aug	er			D	ATE	April 7, 20	022	_	B	H29/	-22		
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH (m)	ELEV. (m)	Pen			ows/0.3 . Cone		l Well on
	STRATA	ТҮРЕ	NUMBER	° ≈ © © ©	N VALUE or RQD			0			tent %		Monitoring Well Construction
GROUND SURFACE				Ř	4	- 0-	-78.73	20) 6	0 8	0	
TOPSOIL0.25		ss	1	33					0				
		ss	2	42	6	1-	77.73		0	· · · · · · · · · · · · · · · · · · ·			
Very stiff to stiff, brown SILTY CLAY		Ê							· · · · · · · · · · ·	• • • • • • • • • •	•••••••		
- soft and grey by 2.2m depth		ss	3	0	0	2-	-76.73		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·			
2.90		ss	4	100	0								
End of Borehole													
(GWL @ 0.92m - May 26, 2022)													
								20) 40) 6	0 8	0 10	00
								S	hear S	trengt	h (kPa	i)	
								🔺 Un	disturbe	ed ∆	Remou	lded	

patersongroup Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

DATUM Geodetic

REMARKS

FILE NO.
PG5827
HOLE NO.

BORINGS BY Track-Mount Power Auger					D	ATE /	April 5, 20)22	1	BH35A-22									
SOIL DESCRIPTION		PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)				lows/0 a. Con		g Well ion					
	L0.15 SS 1 17 3 vrown SILTY SAND SS 2 42 6 1-77.65 y SILTY CLAY 2.13 TW 3 100 2-76.65	Monitoring Well Construction																	
GROUND SURFACE TOPSOIL	0.15		Vee	4			0-	-78.65	2	+	40 	60	80						
Loose, brown SILTY SAND						3				0				III VIII					
	<u>1.45</u>		ss	2	42	6	1-	-77.65		<u> </u>									
Soft, grey SILTY CLAY	<u>2.13</u>		ΤW	3	100		2-	-76.65											
End of Borehole																			
(GWL @ 0.41m - May 24, 2022)									5	20 Shear ndisturi	Streng	60 jth (kP	a)	00					

SOIL PROFILE AND TEST DATA

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

DATUM	Geodetic
DATUM	Geodelic

REMARKS

HOLE NO.
BH38A-22

FILE NO. PG5827

ORINGS BY Track-Mount Power	Auger	1		D	ATE	April 1, 20	022			BH38A-22					
SOIL DESCRIPTION			SAMPLE			DEPTH	ELEV.	Pen. Resist. Blows/0.3m Image: Constant of the second se							
GROUND SURFACE	STRATA PLOT	ТҮРЕ	NUMBER	°° © © ©	N VALUE or RQD	(m)	(m)	2		er Cor		% ·			
OPSOIL	0.25	ss	1	42	24	0-	-77.77						E		
compact, brown SILTY SAND	0.69	÷.	•	72	24					· · · · · · · · · · · · · · · · · · ·					
ery stiff to stiff, reddish brown		X ss	2	100	4	1-	-76.77			O					
firm to soft by 1.5m depth		ss	3	100	P	2-	-75.77	·····	· · · · · · · · · · · · · · · · · · ·	C)·····	······································			
grey by 2.2m depth		TW	4	100											
grey by 2.2m depth		Тт	5	100		3-	-74.77								
nd of Borehole	3.66	1	-						<u> </u>						
GWL @ 0.72m - May 24, 2022)															
<u> </u>															
										0 6			 00		
	1	1	i i	i .	i.	1	1	· · ·	Shear S	1					

SOIL PROFILE AND TEST DATA

FILE NO. PG5827

HOLE NO.

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

0.0

DATUM Geodetic

REMARKS

STRATA PLOT	ТҮРЕ	SAN	NPLE %	Йо	DEPTH (m)	ELEV. (m)			Blows/0.3 Dia. Cone	3m =
STRATA	ТҮРЕ	NUMBER	VER!	E O						
				N VALUE or RQD					Content %	
	1				0-	-77.61	20	40	60 8	0
2					1-	-76.61				
	ss	1	100	Р	2-	-75.61		·····		0
	ss	2	100	Р		-74.61			0	
	.	_	100		4-	-73.61				
2	TW	3	100		т 	70.01			·····	
							20			0 100

SOIL PROFILE AND TEST DATA

FILE NO.

PG5827

HOLE NO.

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geodetic

REMARKS

DATUM

BORINGS BY Track-Mount Power	Auge	er			D	ATE	March 18	, 2022	BH45A-22							
SOIL DESCRIPTION		РІОТ		SAN	IPLE	1	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone							
		STRATA	ТҮРЕ	NUMBER	% RECOVERY	N VALUE or RQD	(,	(11)	Pen. Resist. Blows/0.3m ■ ● 50 mm Dia. Cone > ○ Water Content % > 20 40 60 80							
GROUND SURFACE		01		4	R	z ^o	0	-80.19								
TOPSOIL Brown SILTY SAND, some clay	<u>0.15</u> 0.25		ss	1	33	2			0							
Reddish brown SILTY CLAY with sand seams			ss	2	33	7	1-	-79.19								
End of Borehole	<u>2.13</u>	X	∦ss	3	100	0	2-	-78.19								
(GWL @ 0.13m - May 27, 2022)																
									20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded							

SOIL PROFILE AND TEST DATA

FILE NO.

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

REMARKS BORINGS BY Track-Mount Power Au SOIL DESCRIPTION	ger		SA	MPLE		March 21	, 2022	1				
	ШОТС	+	SA									
SOIL DESCRIPTION						DEPTH					ows/0.3m . Cone	Well
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0			itent %	Monitoring Well
GROUND SURFACE	Ŭ		ION	REC	N OF		-78.99	20		0 6		Mon
						- 0-	-70.99					
OVERBURDEN						1-	-77.99					
End of Borehole	3					2-	76.99					11
(GWL @ 0.92m - May 26, 2022)												
(and @ 0.02.11 may 20, 2022)												
								20	<u></u> д	06	0 80 -	100
								Sh Sh	near S	Strengt	t h (kPa) Remoulded	

SOIL PROFILE AND TEST DATA

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

PG5827 HOLE NO.

BORINGS BY Track-Mount Power Auger DATE M							, 2022	BH49-22					
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone > 5					
	STRATA	ТҮРЕ	NUMBER	% RECOVERY	N VALUE of RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ ● 50 mm Dia. Cone □ ○ Water Content % □ 20 40 60 80					
GROUND SURFACE		Vaa				0-	-79.26	<u></u>					
Compact brown SILTY SAND	ΠTΓ	ss	1	0	3								
1.07		ss	2	83	11	1-	-78.26						
Very stiff to stiff, brown SILTY CLAY with sand seams		G	3			2_	-77.26						
- soft to firm and grey by 2.3m depth		G	4										
		ss	5	100	Р	3-	-76.26						
		X G	6			4-	-75.26						
			7										
		X G				5-	-74.26						
		X SS ≍ G	8 9	87	Р	6-	-73.26						
<u>6.55</u> Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 10.97m depth, borehole terminated. (GWL @ 0.39m - May 27, 2022)								20 40 60 80 100 Shear Strength (kPa) △ Remoulded 100					

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SOIL PROFILE AND TEST DATA

gineers Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geodetic

REMARKS

DATUM

BORINGS BY Track-Mount Power Auge	er			D	ATE	March 22	, 2022		BH49	NO. 9 A-22	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		Blows/0.3m ia. Cone	Well	
	STRATA	ТҮРЕ	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 V	/ater Co	ontent %	Monitoring Well Construction
GROUND SURFACE	0		Z	RE	z °			20	40	60 80	ĬΣŬ
Compact, brown SILTY SAND						- 0-	-79.26				
Very stiff to stiff, brown SILTY CLAY		ss	1		10	1-	-78.26	0			
- firm and grey by 2.3m depth		∦ ss	2			2-	-77.26				
		TW	3	92		3-	-76.26				
						4-	-75.26				· · · · ·
5.18		тw	4	100		5-	-74.26				····
End of Borehole											
(GWL @ 0.36m - May 27, 2022)								20 Shea	40 ar Stren	gth (kPa)	
								Shea	ar Stren urbed	gth (kPa) △ Remoulded	

SOIL PROFILE AND TEST DATA

9 Auriga Drive, Ottawa, Ontario K2E 7T9

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

DATUM Geodetic

REMARKS

PG5827 HOLE NO.

BORINGS BY Track-Mount Power Auge		D	ATE	March 25	, 2022	BH56-22		
SOIL DESCRIPTION	PLOT	SAMPLE			1	DEPTH		Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone
	STRATA I	ТҮРЕ	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Water Content %
GROUND SURFACE				8	2	0-	-80.21	·····
TOPSOIL <u>0.18</u>		X ss	1	8	2		00.21	
Very loose to compact, brown SILTY SAND		ss	2	42	10	1-	-79.21	
		ss	3	100	Р	2-	-78.21	
		G	4				77.04	
Stiff to soft, grey SILTY CLAY		ss	5	67	Р	3-	-77.21	0
		G	6			4-	-76.21	
		ss	7	67	Р	5-	-75.21	
		G	8 9			6-	-74.21	↓ ○
6.55 Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed up to 14.02m depth, borehole terminated. (GWL @ 0.37m - May 27, 2022)								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

FILE NO.

PG5827

9 Auriga Drive, Ottawa, Ontario K2E 7T9 Proposed

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

REMARKS

BORINGS BY Track-Mount Powe	r Auger			D	ATE	March 25	, 2022			HOLE N			- i
SOIL DESCRIPTION	РГОТ		SAN	IPLE	1	DEPTH (m)	ELEV. (m)				lows/0 ia. Con		y Well
	STRATA		NUMBER	* RECOVERY	N VALUE or RQD	(11)	(11)	0) Wa	ater Cc	ontent	%	Monitoring Well Construction
GROUND SURFACE	0		2	RE	z o		00.01	2	0	40	60	80	žŭ
	0.18	·/-				- 0-	-80.21						
Very loose to compact, brown SILTY SAND	_ 1.45	ss	1	50	10	1-	-79.21		0				
Stiff to soft, grey SILTY CLAY		ss		100	Р	2-	-78.21				0	· · · · · · · · · · · · · · · · · · ·	
	_ 2.90	TW	3	100							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	-
End of Borehole													
(GWL @ 0.20m - May 27, 2022)													
								2	20	40	60	80 1	⊣ 00
								€ U	Shear ndistu	Streng rbed	gth (kP △ Remo	a) ulded	

SOIL PROFILE AND TEST DATA

FILE NO.

PG5827 HOLE NO.

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Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

DATUM Geodetic

REMARKS

BORINGS BY Track-Mount Power Auger		DATE Ma			March 29	, 2022	BH60A-22	
SOIL DESCRIPTION	PLOT		SAN			DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content % 20 40 60 80
		되	ER	% RECOVERY	VALUE r ROD	(11)	(11)	
	STRATA	ТҮРЕ	NUMBER	°∾ n	N VA. of F			• Water Content %
GROUND SURFACE	03		N	RE	z ^o	0-	-79.74	20 40 60 80 Š Ö
	FFF	-				0	73.74	
Very stiff, brown SILTY CLAY, trace0.69		ss	1	50	22	1-	-78.74	
Compact, brown SILTY SAND 1.58	ΠŢΓ			50				
Soft, grey SILTY CLAY <u>2.13</u>		∦ ss	2	8	Р	2-	-77.74	
End of Borehole								
(GWL @ 0.64m - May 25, 2022)								
								20 40 60 80 100
								Shear Strength (kPa)
								▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Mixed-Use Community Development Tewin Community - Ottawa, Ontario

9 Auriga Drive, Ottawa, Ontario K2E 7T9

DATUM	Geodetic

BORINGS BY	Track-Mount	Power	Auge

PG5827
HOLE NO.

DRINGS BY Track-Mount Power Au	ger			0	DATE	March 30	, 2022	1	BH63	A-22	-1	
SOIL DESCRIPTION	РГОТ	SAMPLE			DEPTH ELEV.		Pen. Resist. Blows/0.3m • 50 mm Dia. Cone			Well		
	STRATA P	ТҮРЕ	NUMBER	°8 ©	N VALUE or RQD	(m)	(m)					
ROUND SURFACE	ST	Ĥ	ЮN	REC	N N N N			20		60 80	Mon	
OPSOIL 0.3	30	_				- 0-	-78.66				目	
iff, brown SILTY CLAY 0.0	69											
ompact, brown SILTY SAND	45	SS	1	33	14	1-	-77.66	0				
Ľ:		ss	2	33	P					0		
					'	2-	-76.66				-	
oft, grey SILTY CLAY with sand		TW	3	96								
eams						3-	-75.66				-	
		1										
4.4	42	SS	4	100	0	4-	-74.66		· · · · · · · · ·	······	-	
nd of Borehole												
GWL @ 0.66m - May 25, 2022)												
									<u> </u>			
								20 Shea	40 ar Strend	60 80 1 gth (kPa)	00	
	1	1			1	1		▲ Undist	. Such	A Remoulded		

Appendix B

Water Well Records

Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674



Ontario

VII

Metric

Well Location	·				
Address of Well Location (Street Number/Name)	Township	Lot	Concess	. 11	4-
4950 Sth line Rd County/District/Municipality	Ottowa Res	tion 13	Lond	° /41	ers
	City/Town/Village		Province		I Code
UTM Coordinates Zone, Easting , Northing	CARISTAN SP Municipal Plan and Subl		Ontario	KO	ALKO
NAD 8 3 1 8 4 5 9 8 5 5 50 21 5 8 4	01		Other		
Overburden and Bedrock Materials/Abandonment Sealing Re		2245			
	Other Materials	General Description		Dep	oth (m/ft)
		2		From	To
Clean Native C	6 13.49	14		17	20
Clean Notive (124			D	17
	1			1.0	
A/ 1 21, 1 A.	1	A. 1 . 1	-		
Aprindone Deinch DIAM	n Oug u	ell coment	CASing		1000
Abstratione 36 inch Distr 20 FT Dept	4		-		
			19. X 1 1	1.1	1030-57
			1		
Annular Space		Results of We	ell Yield Testin	g	all the second
Depth Set at (m/ft) Type of Sealant Used From To (Material and Type)	Volume Placed	After test of well yield, water was:	Draw Down		ecovery
(wateriar and Type)	(m³/tt³)	Clear and sand free Other, specify	Time Water Le (min) (m/ft)	vel Time (min)	Water Level (m/ft)
		If pumping discontinued, give reason:	Static	(many	(intry
		in particing ascontinued, give reason.	Level		
			1	1	
		Pump intake set at (m/ft)	2	2	
Method of Construction Well U	Jse	Pumping rate (Vmin / GPM)	3	3	
Cable Tool Diamond Public Comm	nercial 💢 Not used	Duration of numerica	4	4	
Rotary (Conventional) Jetting Domestic Munic Rotary (Reverse) Driving Livestock Test H		Duration of pumping hrs + min	5	5	
	Hole Monitoring	Final water level end of pumping (m/ft)			
Air percussion	ig a Air conditioning	i individuo lovor one or pomping party	10	10	
Other, specify		If flowing give rate (Vmin / GPM)	15	15	
Construction Record - Casing	Status of Well		20	20	
Inside Open Hole OR Material Wall Depth (m/ft) Diameter (Galvanized, Fibreglass, Thickness	Water Supply	Recommended pump depth (m/ft)	20	20	100 A 2 1 1
(cm/in) Concrete, Plastic, Steel) (cm/in) From To	Replacement Well Test Hole	and the second	25	25	
	Recharge Well	Recommended pump rate (Vmin / GPM)	30	30	
	Dewatering Well	(commit of my	40	10	
	Observation and/or Monitoring Hole	Well production (Vmin / GPM)	40	40	1000
	Alteration	Disisfacto d2	50	50	
	(Construction)	Disinfected?	60	60	
Construction Descend Conser	Insufficient Supply	~			
Outside Material Depth (m/ft)	Abandoned, Poor Water Quality	Please provide a map below following	ell Location	back	States
Diameter (<i>anvin</i>) (Plastic, Galvanized, Steel) Slot No. From To	Abandoned, other,	Frence a map below following	NT	Duon.	
	specify		11		
	Other, specify	_ 8th line	Rd	10.00	r ·
	D Ouler, specily				
Water Details	Hole Diameter	ar			
	epth (m/ft) Diameter	29			
(m/ft) Gas Other, specify From	To (cm/in)	4 12		7	
Water found at Depth Kind of Water: Fresh Untested			House		
(m/ft) Gas Other, specify		E I		1	
Water found at Depth Kind of Water: Fresh Untested				3,0	EL
(m/ft) Gas Other, specify	Martin Parasan	, <u>L</u>		- 18	17
Well Contractor and Well Technician Inform	THE POLICE REPAIRS NOT A DEVICE A			0	
	Vell Contractor's Licence No.				
KAY MONIPump + New	Aunicipality	Comments:		1.8.9	2019-20
147 main st. StAlhoat	Natin .	Comments.			
Province, Postal Code Business E-mail Address	THION				
ONTARIO TO A3 CO		Well owner's Date Package Delivered	Mini	stry Use	Only
Bus Telephone No. (inc. area code) Name of Well Technician (Last Name	, First Name)	information	Audit No.		
6139872399 XHYmond 1A	eques	delivered Date Work Completed	ZZ	099	957
Well Technician's Licence No. Signature of Technician and/or Contractor D	ate Submitted	L Yes			C. Lake
aby for the a	10091204	XNO 2009121	P 4 Received	332	2010
3506E (12/2007)	Ministry's Copy		A DESCRIPTION OF A DESC		Ontario, 2007

	Ministry of the Environment	Wel A 0369	35	number below)	Pequilation 003	Well Re Ontario Water Reso	
Instructions for Completin		A036	935			page	
 For use in the Province All Sections must be cor Questions regarding con All metre measurement 	of Ontario only. This npleted in full to avoid npleting this application	document is a perm d delays in processir on can be directed to	anent lega ng. Further i the Water	nstructions and	d explanations are avai	lable on the back of t	his form.
 Please print clearly in blu Noll Owner's Information 	e or black ink only.		MUN		Ministry Use	Only	
5/00 8ª Jine R#/Street Number (Name 5/00 8 Jine Cer	Cody love Spring	ng-	OTTau City/TownWi	wood Spr	incol	tment/Block/Tract etc Part	6
PS Reading NAD Zor 8 3	8 460365	5021222	Unit Make/M	V		ferentiated Avera rentiated, specify	ged
og of Overburden and B eneral Colour Most common		other Materials	-	Genera	I Description	Depth	Metres
Brown Top Sôi Grey Clay							46
Hole Diameter Depth Metres Diameter From To Centimetres	Inside diam Materi	Construction Reco Wall thickness	ord Depth	Metres	Pumping test method	of Well Yield Draw Down Re Time Water Level Time	
	centimetres	Casing	From	То	D	min Metres min Static 395	Metres
	01	Fibreglass	~	627	Pumping rate - (litres/min) //	1 396 1	439
Water Record	Galvanized	1	0	671	Duration of pumping	2 397 2	439
Gas Salty Minerals	Steel	Concrete			Final water level end of pumping metres	3 398 3	434
Other:		Fibreglass			Recommended pump type. Shallow Deep	4 398 4	433
Gas Salty Minerals	Galvanized	I IIII			Recommended pump depth. 602 metres Recommended pump	5 399 5	435
m Fresh Sulphur Gas Salty Minerals Other:	Outside Steel	Screen Fibreglass Slot No.			rate. (litres/min) If flowing give rate -	15 407 15	129
ter test of well yield, water was	Galvanized				(litres/min)	20 4/0 20 25 4/4 25 30 4/7 30	429
Other, specify		No Casing or Scr	een		If pumping discontin- ued, give reason.	40 423 40 50 429 50	429
hlorinated Pres No	Open hole	A				60 434 60	420
Plugging and Se Depth set at - Metres From To 6 306	ealing Record [pe (bentonite slurry, neat cen	ment slurry) etc Volun	andonment ne Placed c metres)	In diagram below Indicate north by	Location of v show distances of well fro v arrow.		lding.
	0			Andre	and a second	5100 8 × Yin	el.
	Method of Construction			9.	5		V
Cable Tool Rotary Rotary (conventional) Air pan Rotary (reverse) Boring		etting	Digging Other	FR	ussellRd	-	
Bornestic Industri Stock Comme Irrigation Municip	arcial N	ublic Supply ot used coling & air conditioning	Other		Lange Contraction	Well Completed	MM DD
	insufficient supply	ewatering	oned, (Other)		vner's information Date	Delivered YYYY	MM DD
Test Hole Abandoned, Well Con ame of Well Contractor	tractor/Technician In	formation Well Contractor's L	icence No	Data Source	Ministry Use	Only	
usiness Address (street name, num Box 208 are	ser, city etc.)	7199		Date Received	8 2010 Date	of Inspection YYYY	MM DD
ame of Well Technician (last name, <u>Hurt</u> <u>Hel</u> <u>Over</u> ignature of Technician(Contractor <u>Hurt</u> <u>Her</u>	inst name)	Well Technician's I -2986 Date Submitted YYYY 2010	MM . pD	Remarks	Well	Record Number	
1506E (09/03)	Contractor's Cop	y Ministry's Copy-	P (1	er's Copy	Cette for	rmule est disponible e	en français

Ministry of Ontario the Environment Well Tag No. (Place Sticker and/or Print Below)

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General Colour

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Bentonito

Postal Code

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Lot

Ottowa Region City/Town/Village CARISBAD Spring Municipal Plan and Sublot Number 4794 Sth line Rd 15 8 Province Ontario Other Northing NAD 8 3 1 8 4 5 9 3 1 1 5 0 2 1 2 8 4 Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form) Depth (m/ft) From To General Description Other Materials Most Common Material YARA Ay Hole Plug 3 cubic 6 529 Dug well 30 inch Sign Coment the 19 Ft Removed to Casing De comitined Se Casing, oth

	1.11111		Annular	Space	I. C.		Results of We	II Yiel	d Testing		
Depth Se	et at (m/ft)		Type of Sea			Volume Placed	After test of well yield, water was:		aw Down		ecovery
From	То		(Material an			(m³/ft³)	Clear and sand free Other, specify	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
							If pumping discontinued, give reason:	Static Level			
								1		1	
							Pump intake set at (m/ft)	2		2	
Meth	nod of Con	struction			Well Us	e	Pumping rate (Vmin / GPM)	3		3	
Cable To	ool	Diamond	Put	olic	Commer	rcial 🛛 🕅 Not used		4		4	
_	Conventional)	Jetting	Dor	mestic estock	Municipa	al Dewatering	Duration of pumping hrs + min	5		5	
Boring			🗆 Irrig	ation		& Air Conditioning	Final water level end of pumping (m/R)	10		10	
Other, st				ustrial ier, <i>specify</i> _			If flowing give rate (Vmin / GPM)	15		15	
		struction R			(up (0))	Status of Well		20		20	
Inside Diameter (cm/in)	(Galvanized	OR Material , Fibreglass, fastic, Steel)	Wall Thickness (cm/in)	From	(<i>m/ft</i>) To	Water Supply	Recommended pump depth (m/ft)	25		25	
			1			Test Hole Recharge Well	Recommended pump rate (I/min / GPM) Well production (I/min / GPM)	30		30	
						Dewatering Well Observation and/or		40		40	
						Monitoring Hole	Disinfected?	50		50	
						(Construction)	X Yes No	60		60	
Cartesian .	Co	nstruction R	ecord - Scre	en	10111111	Insufficient Supply	Map of W	ell Loo	cation		C. Standard
Outside Diameter <i>(cm/in)</i>		terial anized, Steel)	Slot No.	Depth From	(<i>m/ft)</i> To	Water Quality Abandoned, other, specify NOT used	Please provide a map below following		T	ack.	
Water four	nd at Depth I	Water Det	and the second se	Untested		Other, specify		T	1		
(11	n/ft) 🗌 Gas	Other, spe	ecify		From	To (cm/in)		1			
	nd at Depth H		Sec. 10 10	Untested				T			_
Water four	nd at Depth	Kind of Wate	r: 🗌 Fresh	Untested				1	100/4		
(11	n/ft) Gas	Contracto		Technicia	n Informat	tion		-7	281	use	1
RAY A Business A	lame of Well	Contractor	+ ale	el et	and the second second second second	Il Contractor's Licence No. 7 2 6 0 Inicipality 4 ATION	Comments:		L		1
ONTA	A. A. I.	stal Code		E-mail Add	lress		Well owner's Date Package Delivered	d	Minist	ry Us	e Only
613	one No. (inc. a 9872 cian's Licence N	rea code) Na 399	ame of Well 1	rond	JAC	ques	information package delivered Yes X No 201105 Date Work Completed 201105	67	Audit No. z 1 SEI	28	694 2011
0506E (2007/	(12) © Queen	's Printer for On	tario, 2007	7	X	Ministry's Com			Received		

	Well Tag No. (Place Sticker	and/or Print Below) 5-1	3803 v	Vall Record
Ontario Ministry of the Environment	in the second	Regulatio		ater Resources A
Measurements recorded in: R Metric Imperia	Tag#: A141838	A191838	Pag	e of
Well Owner's Information First Name Last Name / Organiz		E-mail Address		Well Constructed
Capital regiden Reserves 1 Mailing Address (Street Number/Name)	Gecovery Centrality	Province Postal Code	e Telephone	by Well Owner e No. (inc. area code)
_708-225 Metcalfe St.	offawa		P9613	
Well Location Address of Well Location (Street Number/Name)	Township	Lot	Concessi	on
County/District/Municipality			Province	Postal Code
County/District/Municipality	City/Town/Village		Ontario	
NAD 8 3 1 5 4 6 7 7 6 5 0 7	Municipal Plan and Sub	lot Number	Other	
NAD 8 3 54960 706507 Overburden and Bedrock Materials/Abandonmen		ne back of this form)		
General Colour Most Common Material	Other Materials	General Description	n	Depth (<i>m/ft</i>) From To
Gabrann Sand				012
Red Clay				1.12 1.5
Annular Space			ell Yield Testing	
Depth Set at (m/ft) Type of Sealant Us		After test of well yield, water was:	Draw Down	Recovery
From To (Material and Type,) (m³/ft³)	Clear and sand free	Time Water Lev (min) (m/ft)	vel Time Water Leve (min) (m/ft)
3 O Benseel		If pumping discontinued, give reason:	Static Level	
		Pump intake set at (m/ft)	1	1
			2	2
Method of Construction	Well Use	Pumping rate (I/min / GPM)	3	3
Cable Tool Diamond Public Rotary (Conventional) Jetting Domestic	Commercial Not used	Duration of pumping	4	4
Rotary (Reverse) Driving Livestock Boring Digging Irrigation	Cooling & Air Conditioning	hrs + min Final water level end of pumping <i>(m/ft)</i>	5	5
Air percussion	iffy		15	10
Construction Record - Casing	Status of Well	If flowing give rate (I/min / GPM)	20	20
Diameter (Galvanized, Fibreglass, Thickness	epth (<i>m/ft</i>) Ukter Supply	Recommended pump depth (m/ft)	25	25
(<i>cm/in</i>) Concrete, Plastic, Steel) (<i>cm/in</i>) Prom	Test Hole	Recommended pump rate (<i>I/min / GPM</i>)	30	30
3.45	-5 Dewatering Well	Well production (I/min / GPM)	40	40
	Monitoring Hole		50	50
	(Construction)	Disinfected?	60	60
Construction Record - Screen	Insufficient Supply		Il Location	
Diameter (cm/in) (Plastic, Galvanized, Steel) Slot No. From	the system Water Quality To Abandoned, other, anality	Please provide a map below following i		Dack.
1.21 RUC 10 767	specify	Lahlue	d Map	
-5	Other, specify	Por	Map	
Water Details	Hole Diameter		1	
Nater found at Depth Kind of Water: Fresh Untest (m/ft) Gas Other, specify	ed Depth (<i>m/ft</i>) Diameter From To (<i>cm/in</i>)			
Nater found at Depth Kind of Water: Fresh Untest	ed 0 151,43			
(<i>m/ft</i>) Gas Other, specify Water found at Depth Kind of Water: Fresh Untest	ed			
(m/ft) Gas Other, specify				
Well Contractor and Well Technic Business Name of Well Contractor	Vell Contractor's Licence No.			
Strata Dr. U. M. Group Business Address (Street Number/Name)	7 2 4 1 Municipality	Comments:		
147 West Beaver (les)				
Province Postal Code Business E-mail A	ddress - 15 Costra booticom	Well owner's Date Package Delivered	Minia	try Use Only
Bus.Telephone No. (inc. area code) Name of Well Techniciar	(Last Name, First Name)	package	Audit No.	
Vell Technician's Licence No. Signature of Technician and/or	Contractor Date Submitted	Yes Date Work Completed		152748
3 7 6 7 Function 2007	2011303103	No 20113932	5 Received	<u>(16201)</u>
COCE (2007) 21 W QUEENS PHILIEF IOF UNIARIO, 2007	Ministry's Copy			in the second

Meeting location 'A' south of Hwy 417 off of Frontier Road. HIGHWAY 417 LECEND

12-1125-0045-1000 Boundary Road Site

C-7241 ZISZ748

5-13203

APR 16 200

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Ontario	Ministry of the Environ
Measurements recorded ir	n: Metric

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Regulation 903 Ontario Water Resources Act Page of

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2014 060

Concession Address of Well Location (Street Number/Name) Lot Cloucester City/Town/Village 13 4951 - PTh County/District/Municipality Kd Linc Postal Code Province City OTTAW14 . OTTAWA Municipal Plan and Sublot Number Ontario KORIKO Other NAD 8 3 / 8 45 98 43 50216 96 Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form) Depth (m/ft) General Colour Most Common Material Other Materials General Description From Soft Brown Samo 0 0.80 Soft Clay Gres 0,80 34,84 3484 67.27 Annular Space **Results of Well Yield Testing** Depth Set at (m/ft) Type of Sealant Used After test of well yield, water was Volume Placed Draw Down Recovery From To (Material and Type) Clear and sand free (m^3/ft^3) Time Water Level Time Water Level Other, specify (min) (m/ft)Per (min) (m/ft) 0.06 0 Cant 120Ks Static If pumping discontinued, give reason: 2,25 34.42 Level 1 3,81 1 33.32 Pump intake set at (m/ft) 2 2 82 33.16 51:51 Pumping rate (Ilmin I GPM) 5,62 3 32,81 Method of Construction Well Use 13.50 Duration of pumping Cable Tool Diamond Public Commercial Not used 86 32.33 Rotary (Conventional) Domestic Municipal Dewatering / hrs + 00 min Rotary (Reverse) AIR Driving 5 2,36 5 31,79 Livestock Test Hole Monitoring Boring Irrigation Digging Final water level end of pumping (m/ft) Cooling & Air Conditioning 10 10 31.06 Air percussion 0.37 Other, specify 34, 1/2 If flowing give rate (*Ilmin | GPM*) Other, specify 15 15 30.78 13.24 **Construction Record - Casing** Status of Well Inside Diamete *(cm/in)* 20 20 29, 93 Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) Water Supply 5,96 Depth (m/ft) Wall Recommended pump depth (m/ft) Thickness Replacement Well Recommended pump rate (*IImin I GPM*) From То (cm/in) 25 8.42 25 29.24 Test Hole en Hole Recharge Well 30 25:40 82 30 28.47 6.06 Well production (*limin I GPM*) 3. Lifte Dewatering Well 40 25,44 Observation and/or 40 27.02 Monitoring Hole 0.48 6.60 Alteration (Construction) 50 30.16 50 25,66 5:55 Stee 34.84 Disinfected? Yes No 60 34,42 Abandoned, 60 24.34 Insufficient Supply **Construction Record - Screen** 八个 Map of Well Location Abandoned, Poor Outside Diameter (cm/in) Material (Plastic, Galvanized, Steel) Please provide a map below following instructions on the back. Depth (m/ft) Water Quality Slot No. Abandoned, other From To specify Ngor He Rd. Other, specify Water Details **Hole Diameter** Water found at Depth Kind of Water: Hresh Untested Depth (m/ft) Diameter From Ťc (cm/in) (m/ft) Gas Other, specify SAI+ Water found at Depth Kind of Water: Fresh Untested 67.27 15:55 (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Well Contractor and Well Technician Information Business Name of Well Contracto Well Contractor's Licence No DAR-well-Drilling Business Address (Street Number/Name) 6006 Comments 763 - Raute vince Postal Code Soo west Business E-mail Address Nation us.Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name) Well owner's information Date Package Delivered Ministry Use Only 2 55 28 Des novers Louis package delivered Audit No. 20140604 z 175592 Date Work Completed Yes

20140604

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No No

We Tag #: A166286

A166286

Ontario Ministry of the Environment	Well Tag No. (Place Sticker an			Vell Record	
Measurements recorded in: Metric Merrial			Page	e of	
Address of Well Location (Street Number/Name) H 4635 AnderSon Recol County/District/Municipality OHCO- UTM Coordinates Zone Easting Northing NAD 8 3 8 459 18 5000 Overburden and Bedrock Materials/Abandonment Sea General Colour Most Common Material	Ining Record (see instructions on the Other Materials	back of this form) General Description	Province Ontario Other	Postal Code	a contractioned and the second
Dig Wall Alos	ndonment (18	3' X 24" Diam)	0, 18,	
	Volume Placed (m ^(R)) 10 Boops 10 Boops 1	Results of W After test of well yield, water was: Clear and sand free Other, specify If pumping discontinued, give reason: Pump intake set at (m/ft) Pumping rate (l/min / GPM) Duration of pumping hrs + min	(min) (m/ft)	Provide the second seco	
	Cooling & Air Conditioning	Final water level end of pumping (m/t)	1	10	
Other, specify Other, specify Other, specify Other, specify Inside Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) Wall Depth Inside Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) Wall Depth Inside Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) Wall Depth Inside Open Hole OR Material (Concrete, Plastic, Steel) Wall Depth Inside Material Wall Depth Outside Material (Plastic, Galvanized, Steel) Stot No. Depth	Status of Well (m/ft) Water Supply Replacement Well Test Hole Recharge Well Dewatering Well Observation and/or Monitoring Hole Alteration (Construction) Abandoned, Insufficient Supply Mandoned, Poor Nonitoring Hole	Please provide a map below following	instructions on the		
Water Details Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Well Contractor and Well Techniciar Business Name of Well Contractor Address (Street Number/Name) Business Address (Street Number/Name)	Hole Diameter Depth (m/ft) Diameter From To Information Well Contractor's Licence No. Municipality Way D	Piperville # 4635 ANDERSON Peoto Comments:	Pood 1.44 451	N D	
Province Postal Code Business E-mail Addr DWT KoADZ Bus.Telephone No. (inc. area code) Name of Well Technician (La Well Technician's Licence No. Signature of Technician and/or Cor T 4 Advance of Technician and/or Cor 0506E (2007/12) Queen's Printer for Ontario, 2007	ast Name, First Name)	Well owner's infomation package delivered Pres. No No Date Package Delivered Date Work Completed	Dis Audit No Z	stry Use Only 191359 APR 24 2015	

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Ministry of the Environment Measurements recorded in: Metric Imperial	Well Tag No. (Place Sticker a		V Iation 903 Ontario V Pag	Vater Reso	ecord
Well Owner's Information					
First Name Last Name Organiza	tion	E-mail Address		6	onstructed
City of Mailing Address (Street Number/Name)	Ottawa Municipality	Province Postal	Code Telephon	by we e No. <i>(inc. a</i>	Il Owner area code)
	oor Ottawa	ON Kal	565861B		
Well Location	<u>.</u>				
Address of Well Location (Street Number/Name) N/A (Leitrim Rd)	Township Geograp of Gloncest		7 Concess	on	m River
County/District/Municipality	City/Town/Village	<u> </u>	Province	Postal	
	City of Ot	tawa	Ontario	"Tarakan	
UTM Coordinates Zone Easting Northing NAD 8 3 1 8 4 5 7 7 7 7 5 0 2	Municipal Plan and Subl	ot Number	Other		
Overburden and Bedrock Materials/Abandonment		e back of this form)			
General Colour Most Common Material	Other Materials	General Descri	iption	Depti From	
Abandonment (no well tag)		Carse Sand		0.15	0.25m
or well ID			ante)	0.25	\$*************************************
June 27, 2016	ANN/99/ANN99/	Benseal & (Bent Hydrated	Sersin = 7,		
Unite 23, dolle		NYALOVER			
		\ 			
					MNA 77777924717 10224441
Depth Set at (m/h) Type of Sealant Use	d Volume Placed	After test of well yield, water was	of Well Yield Testin		covery
From To (Material and Type)	(m ⁹ / <i>l</i> t ³)	Clear and sand free	Time Water Le	vel Time V (min)	Vater Level (m/ft)
		Other, specify	Son		
			Level		
		Pump intake set at (m/ft)	turneture internetien wind der werden	1	
		runp make set at (mm)	2	2	
Method of Construction	Well Use	Pumping rate (Ilmin I GPM)	3	3	
Cable Tool Diamond Public	Commercial Not used		4	4	
Rotary (Conventional) Jetting Domestic Device Driving Livestock	Municipal Dewatering Test Hole Monitoring	Duration of pumping hrs + min	5	5	
Rotary (Reverse) Driving Livestock Boring Digging Irrigation	Cooling & Air Conditioning	Final water level end of pumping	(m///)	10	
Air percussion Industrial Other, specify Other, specify				15	
Construction Record - Casing	Status of Well	If flowing give rate (I/min / GPM)	historia and the second s		
Inside Open Hole OR Material Wall De	pth@//fl)	Recommended pump depth (m	20	20	
Diameter (Galvanized Ethreglass, Thickness Contract, Plastic Steel) (cm/in) From	To Replacement Well		25	25	
1.9 PVC Riser O	4.05 Recharge Well	Recommended pump rate (Ilmin I GPM)	30	30	
	Dewatering Well		40	40	
Cacina Remove	Observation and/or Monitoring Hole	Well production (IImin / GPM)	50	50	
	Construction	Disinfected?			
	Abandoned, Insufficient Supply	Yes No	60	60	
Construction Record - Screen	Abandoned, Poor	Map of Ma	of Well Location	e back	
Outside Diameter Convin) Material Galvanized, Steel) Slot No. From	pth (m/ft) Water Quality To Abandoned, other,	N		12	
iniza da la construcción de la cons A construcción de la construcción d	specify	*		112	
1.9 PVC unknown		1 the		115	
Screen Remove		E.	med creet		0
Water Details	Hole Diameter		C.		P-
(<i>m/ft</i>) Gas Other, <i>specify</i>	From To (cm/in)		Cex -	0.47km	
Water found at Depth Kind of Water: Fresh Untest	ed			0.7.	15
(m/ft) Gas Other, specify					//
Water found at Depth Kind of Water: Fresh Untest (mift) Gas Other, specify	eu		1	and the second s	
Well Contractor and Well Technic	ian Information	Leitrim Rd.		4	-11
Business Name of Well Contractor 853921 Ontar	Well Contractor's Licence No.	Leiter	Well Loc	ain	\sim
Mctutosh Perry Consulting Engine Business Address (Street Number/Name)	ers 41, 7477	and the second s	······		·····
Business Address (Streef Number/Name) 3 3 3 115 Walgreen Rd. RR3	Municipality	Comments: Well in ea last of culver	stbound le	ine, c	ivectly
Province Postal Code Business E-mail A	ddress	east of culver	+ crossing)	
ON KOAILO information	Toshperry.com	Well owner's Date Package De information		istry Use	Only
Bus. Telephone No. (inc. area code) Name of Well Technician	ι (Last Name, First Name)	delivered	Audit No.	700	00
Well Technician's Licence No. Signature of Technician and or	Contractor Date Submitted	Date Work Compl		.709	00 2016
	- 20160726	20160	625 Records	602	CU 10
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Ministry of the Environment and Climate Change	Well Tag No. (Place Stick	er and/or Print Below)	Resultation 002 Octor	Well Record
Measurements recorded in: 🗌 Metric 🗔 Imperial			-	o Water Resources Act
Well Owner's Information				
First Name Last Name / Organization	Sutions	E-mail Address		Well Constructed by Well Owner
Mailing Address (Street Number/Name)	Municipality	Province		hone No. (inc. area code)
310 Hwy 7 Green River Well Location	2 LOCUSTE	rii Out	LOHITOYO	54727300
Address of Well Location (Street Number/Name)	Township		Lot Conc	ession
<u>4091 Kansay Ville Koad</u> County/District/Municipality	City/Town/Village	20	Province	Postal Code
Ottava	Ottai	sa	Ontario	
NAD 8 3 0 7 53 2790 4520=		Sublot Number	Other	
Overburden and Bedrock Materials/Abandonment Seal	ing Record (see instructions o	n the back of this form)		
General Colour Most Common Material	Other Materials	Genera	al Description	Depth (<i>m/ft)</i> From To
Decommissioned o	Fieldsto	ne usate	r holder	$\langle \mathbf{q} \rangle$
chamber 8'X8'X12'a	deep inca	sedinc	Concrete	
	N			
	·····			
Annular Space			esults of Well Yield Tes	sting
Depth Set at (<i>m/ft</i>) Type of Sealant Used From To (<i>Material and Type</i>)	Volume Placed (m³/ft³)	After test of well yield, w		wn Recovery r Level Time Water Level
SPE Amile	······································	Other, specify	(min) (n	v/ft) (min) (m/ft)
		If pumping discontinued	, give reason: Static Level	
			1	1
		Pump intake set at (m/	^(ft) 2	2
Method of Construction	1	Pumping rate (I/min / G	PM) 3	3
	Well Use		4	4
Rotary (Conventional)	Municipal Dewater		n 5	5
Boring Digging Irrigation] Test Hole [] Monitori] Cooling & Air Conditioning	Final water level end of		10
Air percussion Other, specify Other, specify				
Construction Record - Casing	Status of Well	If flowing give rate (I/mi		15
Inside Open Hole OR Material Wall Depth () Diameter (Galvanized, Fibreglass, Thickness	, <u> </u>	Recommended pump	11 1	20
(cm/in) Concrete, Plastic, Steel) (cm/in) From	To Replacement We	Recommended pump i	25	25
See Above.	Recharge Well Dewatering Well	(I/min / GPM)	30	30
	Observation and/	Well production (I/min /	GPM) 40	40
	Monitoring Hole	Disinfected?	50	50
	(Construction)	No	60	60
Construction Record - Screen	Insufficient Supp		Map of Well Location	
Outside Material Diameter (Plastic, Galvanized, Steel) Slot No. From	n/ft) Water Quality To Abandoned, othe		elow following instructions on	the back.
(cm/in) (Plasuc, Gaivanizeu, Steel) From	specify	- NY		N
	Other, specify	- 200 PROPE	RTY LIDE	2
		85	"D'Wen	Z
Water Details	Hole Diameter Depth (<i>m/ft</i>) Diamet	er		乐
(<i>m/ft</i>) Gas Other, <i>specify</i>	From To Contrin			(13
Water found at Depth Kind of Water Fresh Untested				1×
(<i>m/ft</i>) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested				1 E
(m/fi) Gas Other, specify				9
Well Contractor and Well Technician I Business Name of Well Contractor	and a second			Evenantes
Smith Water Systems In				
Business Address (Street Number/Name)	Municipality	Comments: NOT	to Con.	GAZ ANA
Province Postal Code Business E-mail Addres	ERIN	- NO LONG		903 AND
Province Postal Code Business E-mail Addres	55			ゴイ. linistry Use Only
Bus. Telephone No. (inc. area code) Name of Well Technician (Las	t Name, First Name)	package		[№] Z216904
Well Technician's Licence No. Signature of Jeckrycian and/appContr	actor Date Submitted	delivered _	rk Completed	
+ Z UL Challa	2016071		60712 SE	P 1 5 2016

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0506E (2014/11)

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Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records).

Go Back to Map

Well ID

Well ID Number: 7334281Well Audit Number: *C30145*Well Tag Number: *A203656This table contains information from the original well record and any subsequent updates.*

Well Location

Address of Well Location	

Township	GLOUCESTER TOWNSHIP
Lot	011
Concession	OF 08
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 461202.00 Northing: 5020160.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General	Most Common	Other	General	Depth	Depth
Colour	Material	Materials	Description	From	To

Annular Space/Abandonment Sealing Record

Method of Construction & Well Use

Method of Construction	Well Use

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To

Construction Record - Screen

Outside Diamete	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1844

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	
Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	

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Map: Well records | ontario.ca

25	25	
30	30	
40	40	
45	45	
50	50	
60	60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: C30145

Date Well Completed: May 15, 2018

Date Well Record Received by MOE: June 04, 2019

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environmentmap#wells) Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Undated: October 18 2021



Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records).

Go Back to Map

Well ID

Well ID Number: 7334281Well Audit Number: *C30145*Well Tag Number: *A203656This table contains information from the original well record and any subsequent updates.*

Well Location

Address of Well Location	

Township	GLOUCESTER TOWNSHIP
Lot	011
Concession	OF 08
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 461202.00 Northing: 5020160.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General	Most Common	Other	General	Depth	Depth
Colour	Material	Materials	Description	From	To

Annular Space/Abandonment Sealing Record

Method of Construction & Well Use

Method of Construction	Well Use

Status of Well

Construction Record - Casing

lnside Diameter	Open Hole or material	Depth From	Depth To

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1844

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	
Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	

12/11/22,	9:25 PM
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Map: Well records | ontario.ca

25	25	
30	30	
40	40	
45	45	
50	50	
60	60	

Water Details

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Depth From	Depth To	Diameter

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Related

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Undated: October 18 2021

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5 R 5101212151010 N The Ontario Water Res			118 dis 1970	
Elev. 4 R 0125151 WATER WE	LL REC		NTARIO MATER	
Basin 25			Gloucester	<u> </u>
County or District CEPTECON	Date completed 1	8th J	month	1966 year)
		· · ·	Ont.	•
	ess	Pumpin		
Casing and Screen Record		4 		
Inside diameter of casing 6 3/16"	Test numping r	ate 1000	G.P.H.	XXXXII.
Total length of casing.	Pumping level	100		
Type of screen	Duration of test	pumping	hours	
Length of screen	Water clear or c	oudy at end o	f test clear	
Depth to top of screen 6 3/16	Recommended	pumping rate	25	G.P.M.
Diameter of finished hole	with pump setti	ng of 120	feet belo	w ground surface
Well Log				Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
sand	0	35	212	salty
clay	<u>35</u> 200	200		
gravel-sand	200			
Very slight touch of salt				
For what purpose(s) is the water to be used? barn			n of Well	II from
	road an	am below sho d lot line. I	ow distances of we indicate north by	arrew.
Is well on upland, in valley, or on hillside? valley				
Drilling or Boring Firm		2 × 5 5 €		
J.B. DUFRESNE & CO. LIMITED			44	
Address 1014 Maitland Ave.,	·····		i es	
Ottawa 5, Ont.			, i l	
Licence Number 307-2030	······	Con6		
Name of Driller or Borer. W. Rey				
Address 79 St-Jean Baptiste - Deschesmes,	P.Q. 2 7	LINE	ROAD	
Date January 18th 1966	7 120			
(Signature of Licensed Drilling or Boring Contractor) for J.B. Durresse & Co. Limited	1-2/	W E L L		
for J.E. Durresne & Co. Limited Form 7 15M-60-4138	11.9	Con	7	
LOLUI (1981-00-4100		,	·	× 12
OWRC COPY			م ولي الي الي الي الي الي الي الي الي الي ا	3.3 52

1955 31659 UTM 18 41516171110 E 9 R 50211110 N GEOLUCICAL BRAMM DEPARTMENT of This Elev. 9 R 0270 The Water-well Drillers Act, 1954 **Department** of Mines Basin |25|Water-Well Record Front or Territorial District. Carleton Township, Village, Town or City. Houseste (year) (month) (day) **Pumping Test** Pipe and Casing Record Casing diameter(s) Type of screen Length of screen Water Record Well Log Kind of water (fresh, salty, or sulphur) Depth(s) No. of feet at which water (s) то From water rises Overburden and Bedrock Record ft. ft. found 4 Jel en/42 45% 4 156 142 253 156 blate Bedrock) V For what purpose(s) is the water to be used? Location of Well house hold use In diagram below show distances of well from road and lot line. Indicate north by arrow. th Is well on upland, in valley, or on hillside?..... uplando ames Nelle Drilling firm Ham sayvelb ort Address East Side en Keld e Name of Driller ... Licence Number. 5. 3.7 Conda I certify that the foregoing statements of fact are true. Date 1-2/ Signature of Licensee Form 5 CSS.58

Elev. 44 0.21201 The Outstice Water Resources Commission Act, 1877 APR 6.1950 Basin, 2.5	UTM $\frac{18}{18}$ 41516161510 E 1518-15021134010 N			31G5a	CROUND WATER BR	
WATER WELL RECORDENCEDENTS UNITS County or District $CARL & ETER$ Township, Village, Toon or City. $C.Solve 821 eR$ Deptit to pol erceon. V_R Diameter of finished hole $H.R.dt eR$ Weil Log Water fines Overburden and Betrack Record $Var Variation of the stress mainburg. N.e.dt est Solve 80 Var Overburden and Betrack Record Var Variation of Well In diagram below show distances of well from read and be have. Indeate north by arrow. $		io Water Re	sources C	ommission Act, 1		
County or District. Control of Counce State of the	Basin 25_01	FD W	TT T	BECUI	ONTARIO WAT	NIZZION I Len I
2 Des completed 2 March 40 ress Casing and Screee Record Inside diameter of cusing. 4 .Atc.H. Total length of casing. 4 .Atc.H. Total length of casing. 4 .Atc.H. Total length of casing. 4 .Atc.H. Der complex ress Overburden and Bedrock Record To Weil Leg Wolspan="2">Der complex ress Set of the cord Core charles reserved To Core charles reserved Total colspan="2"					and the second sec	
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Weil LogWater RecordOverburden and Bedrock Record $From Record$ $C(AY)$ 0 $from Record$ $Record$ $C(AY)$ 0 $from Record$ $Record$ $SAND$ 40 $SAND$ 40 $found$ $Record$ <	Diameter of finished hole	4 INCH	Ree	commended pumpi	ing rate	5 G.P.M.
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$\frac{SANQ}{BROWN SHALE} \frac{4\pi}{168} \frac{168}{219} \frac{200}{219} \frac{150}{189} \frac{FREM}{1}$ $\frac{BROWN SHALE}{BROWN SHALE} \frac{168}{168} \frac{219}{219} \frac{189}{1899} \frac{1}{1899} \frac{1}{1999} \frac{1}{1999} \frac{1}{1899} \frac{1}{1$	Overburden and Bedrock Record			at which water(s)		(fresh, salty,
$\frac{GRU}{BR_{W}N} \frac{GR}{GR} \frac{GR}{GR$						
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Drilling Firm $M \circ h \circ u \circ h h h h h h h h h h h h h h h$		PUPLAND		road and lot	line. Indicate nort	h by arrow.
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V Owner	A A		I Reco	or City. City) Uciwa	ester
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Well Log Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Water Record No. of feet water rises	Kind of water (fresh, salty, or sulphur)
June day The day chelles tolue	-0- /02	9 102 115	105.50115	5 flowing	<u>s.e. Ty</u>
GAS EXPLOSION	HEBE.	WEF	ABANDO	~··ED.	
Address	hillside? hillside? bud lay b Sank Thaiya work n foregoing are true.			Location of Well elow show distances of line. Indicate north	

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Form 5

	1	9 K 64		61
UTM 1 8 12 4 5 19 0 9 10 E	31659	,	15 Nº	1579
65 50 2 0151615 The Ontario Water Resou	rces Commission	Act	\hat{g} . \hat{a}	
Elev! 41x 01216151 WATER WEL			. (/
			41GLOU	ESTER
Basin 25 CRKLETON County or District CRKLETON TO Con. 8 D.F. Lot N2 4615. Da	ownship, Village, To	own or City	Sept	67
$\operatorname{Con} \ \$ \ \bigcirc \ \overleftarrow{F} \ Lot \ \aleph \ 2 \ \overleftarrow{F} \ D $			month	year)
Owner Ac	ldress KR	ander	ARA ROL	Marcher J.
Casing and Screen Record		Pumping		1-
Inside diameter of casing 3 anch	Static level		7 - Ju	×
Total length of casing 135-	Test-pumping ra			G.P.M.
Type of screen	Pumping level			hanne
Length of screen	Duration of test p Water clear or clo		-	Pior
Depth to top of screen	Recommended p			
Diameter of finished hole	with pump settin	g of Z	1 feet belo	w ground surface
Well Log				Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
the please	σ	135	140	Luch Saul
line store	1.35	140		
For what $purpose(s)$ is the water to be used? House		Location	of Well	
For what purpose(s) is the water to be used.	In diagra	m below show	distances of we	ll from
Is well on upland, in valley, or on hillside? VALLEY	road and	lot line. Inc	licate north by	
Drilling or Boring Firm			el _	
C DUFRESHE		W		0.7
Address 135 Sweetland ave		/	/100'	4
Ottama	12	16	K	TA
Licence Number 2676	t t	XX,		
Name of Driller or Borer. C. Dufresse	-	7 3		D. J.
Address May 21/68	GA	decis	out	Frank
Date	- The	1.	e	
(Signature of Licensed Drilling or Boring Contractor)		1	to (-	X /
Form 7 15M-60-4138	LOT NOSC	·		5\ 1070
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AD		The Ontario	Water Reso	urces Commi	ission Act)	315 50	r.
ter management in On	itario 1 PRINT ONLY IN SPA	CES PROVIDED	11	15112	84 - 45100			
NTY OR DISTRICT	2. CHECK 🛛 CORRECT	BOX WHERE APPLICABLE TOWNSHIP, BOROUGH, Glouces	CITY, TOWN, VILLAGE	3	VII O, F	AVEY, ETC.	014	25-27
Carleton.			bad Sprin	gs. Ont.		DATE COMPLETE		(R. 71
		32	2090 4		RC. BASIN CODE			
2	<u> </u>	G OF OVERBURD	EN AND BEDR	OCK MATERIAL	S (SEE INSTRUCTIONS)		DEPTH - FE	ET
ENERAL COLOUR	MOST COMMON MATERIAL	OTHER	MATERIALS		GENERAL DESCRIPTION		FROM	то
grey	clay							140 163
	hard pan							280
grey	shale							
	de .							
1) 0140	205111016	2 14	28/2/17	<u>_</u>				
							34-38 LENG	75 75
² 1 WATE	R RECORD	51 CASING	& OPEN HO		SIZE(S) OF OPENING (SLOT NO.)	31-33 DIAMETER	INCHES	
10-13 1	KIND OF WATER	DIAM. MATERIA INCHES 10-11 1 STEEL		FROM TO 13-16			F SCREEN	41-4 FEET
0188 2 1	SALTY 4 I MINERAL			0 0165		G & SEALI	NG REC	OR
20-23	SALTY 4 MINERAL FRESH 3 SULPHUR 24	4 OPEN H 17-18 1 STEEL 2 GALVAN	19	20-23	DEPTH SET AT - FEET FROM TO 10-13 14-17	MATERIAL AND TYP	PE (CEMENT LEAD PAC)	
25-28	SALTY 4 MINERAL FRESH 3 SULPHUR	3 CONCRE 4 OPEN H 24-25 1 STEEL		165 0.280	18-21 22-25		<u> </u>	
30-33 1	SALTY 4 MINERAL	2 🗌 GALVAN 3 🗌 CONCRE	TE		26-29 30-33	80		
2	HOD 10 PUMPING RAT	4 OPEN H	N OF PUMPING	 _ [LOCATION	OF WELL		1
			15-16 00 17- HOURS 00 MIN 1 0 PUMPING		DIAGRAM BELOW SHOW DISTA	NCES OF WELL FROM	ROAD AND	
LEVEL 19-21	END OF WATE PUMPING		ZERECOVERY AINUTES 32-34 60 MINUTES 35-35	-	SAY TILLE -			
	280 FEET 265 FE 38-41 PUMP INTAKE		T END OF TEST	ET 42		X.		
GIVE RATE	GPM. WP TYPE RECOMMENDE	D 43-45 RECOMM			201	5		
	DEEP SETTING	200 FEET RATE	°0001 •	·M. (TIP	.355M.	S. T.	
	54 SWATER SUPPLY		, INSUFFICIENT SUPPL			1.76	Ľ(
FINAL STATUS OF WELL	2 OBSERVATION WI 3 TEST HOLE 4 RECHARGE WELL	ELL 6 🗌 ABANDONEI 7 🗌 UNFINISHEI), POOR QUALITY			-lfm		Se la
_	5-56 1 DOMESTIC	5 COMMERCIAL 6 MUNICIPAL			M	•		
WATER USE	3 IRRIGATION	7 PUBLIC SUPPLY 8 COOLING OR A	R CONDITIONING		k.J	76 m		
	OTHER	9 6 [] BO	NOT USED		1			
METHOD OF	1 CABLE TOOL 2 ROTARY (CONVEL 3 ROTARY (REVER	NTIONAL) 7 01/ SE) B 0 JE	AMOND TTING					
DRILLING	4 ROTARY (AIR) 5 AIR PERCUSSION	9 🗌 DR		DRILLERS REMA		59-62 DATE RECEIVED		63
J.B.	CONTRACTOR DUFRESNE & (O. LIMITEL	LICENCE NUMBER	DATA SOURCE O DATE OF INS	58 CONTRACTOR 1802	300	771	
ADDRESS	Maitland Ave			L L L L L L L L L L L L L L L L L L L	PECTION INSPE	m.		- ,/ -
NAME OF DRILL			LICENCE NUMBER	C REMARKS:			Р	K
Z R. LA)) A DAY 24		OFFICE		C ¹ .	<u>ः २</u> w	I
- <u> </u>	OPY		<u> </u>				*	

	MINISTRY OF THE ENV The Ontario Water Re	sources Act	22112- 13-25 6	icat.	n (and an
Ontario			ORD =	315.	
1. PRINT ONLY IN SPAC	TES PROVIDED 11 11 11 11 11 11 11 11 11 11 11 11 11	513762 -	MUNICIP	F	08
OWNER WE EIRCT	AD PRESS Dil	1	8'OF	MPLETED	48-53
	61 5019238 4	ELEVATION	DAY	1 <u>2 m006</u>	YR 78
LOG	OF OVERBURDEN AND BEDROCK	26 39 31			47
GENERAL COLOUR COMMON MATERIAL	OTHER MATERIALS	GENERAL D	ESCRIPTION	DEPTH FROM	то
Brown Elley		Soft		03	3 20
Tray Situator		Stoft (lastic)	20 130	130
1			and	750	225
				+	
31 0.00.36.05	15 1 0130205 1 02	25215111111			
41 WATER RECORD	CASING & OPEN HOLE RECO	RD Z SIZE(S) OF 0 (SLOT NO.)	PENING 31-33 DIAME	TER 34-38 LE	75 80 NGTH 39-40
WATER FOUND AT - FEET KIND OF WATER INST 10-13 ' DEPH SULPHUR 14	DE WALL DEPTH - MATERIAL THICKNESS INCHES FROM	TO MATERIAL AT	ND TYPE	INCHES DEPTH TO TOP OF SCREEN	FEET
07 345 2 HETY 3 MINERAL 15-18 1 HETY 3 MINERAL 02 05 2 HETY 3 MINERAL	GALVANIZED	/33	PLUGGING & SEAL		
20-23 1 HE SULPHUR 24 22-5 2 HE S 1 SULPHUR 24 2 HE S 4 MINERAL	17-18 1 - STEEL 19 2 - GALVANIZED 3 - CONCRETE	20-23 DEPTH SET AT FROM 0225 10-13			GROUT
29-28 1 [] FRESH 3 [] SULPHUR 29 2 [] SALTY 4 [] MINERAL 2 30-33 1 [] FRESH 3 [] SULPHUR ³⁴ 80	24-25 1 🗋 STEEL 26 2 🗋 GALVANIZED	27-30 18-21	22-25		
2 SALTY 4 MINERAL	3 CONCRETE 4 OFEN HOLE 11-14 DURATION OF PUMPING	26-29	30-33 80		
STATIC WATER LEVEL 25 LEVEL END OF WATER LEVELS D	GPM 02 15-16 00 17-18 HOURS 00 17-18	IN DIAGRAM BELOW SHO	W DISTANCES OF WELL	011	19
FU12 120 120"	2 RECOVERY INUTES 45 MINUTES 60 MINUTES /2°0' /2°30' /2.307	LOT LINE. INDICATE	NORTH BY ARROW.		
IF FLOWING. 38-41 PUMP INTAKE SET AT GIVE RATE GPM /LU	FEET FEET FEET FEET A2 WATER AT END OF TEST 42 FEET 1 CLEAR 2 CLOUDY	A	200,0		
RECOMMENDED PUMP TYPE SHALLOW DEEP SETTING 120 50-53 000.1	43-45 RECOMMENDED 46-49 PUNPING FEET RA 0005 GPM		11		
FINAL 1 WATER SUPPLY 5	ABANDONED, INSUFFICIENT SUPPLY	ъ Т	# 1V		
OF WELL	ABANDONED, POOR QUALITY UNFINISHED	*	ì		
WATER USE	COMMERCIAL MINICIPAL JUBLIC SUPFLY	2-0	Con	IX	
	Not Used				
OF DRILLING	Difference of the second secon	0-0	# 8 -	->	-
NAME OF WELL CONTRACTOR		RS REMARKS:	59.62		
ADDRESS 409-465 Richm	rilling 3658 NO		INSPECTOR	274	63-68 40
NAME OF DILLET R BORER		IARKS:		K	\checkmark
SIGNATIVE OF CONTRACTOR			CS8.58		
	DAY MO YR O		C.7.94.177		

MINISTRY OF THE ENVIRONMENT The Ontario Water Resources Act WATER WELL RECOR	3 <i>le 5</i> a
	22 ØF 107
COUNTY OR DISTRICT Carleton OWNER (SUBNUME CONT CON. BLOCK, TRACT. SU Gloucester VIII	14 13 33 33 34
55	DATE COMPLETED 48-53
	DAY 20 MO6 YR77
LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)	
GENERAL COLOUR MOST COMMON MATERIAL OTHER MATERIALS GENERAL DESCRIPTION	DEPTH - FEET FROM TO
yellow hardpan yellow clay	0 2
blue clay	2 15 15 130
grey sand + gravel	130 136
grey slate	136 149
31 00024514 1 015565 1 0130805 1 013622811 0149219	
41 WATER RECORD CASING & OPEN HOLE RECORD	
WATER FOUND AT - FEET KIND OF WATER INSIDE DIAM MATERIAL (HICKNESS) AND ALL DEPTH - FEET	31-33 D-AMSTER 34-38 LENGTH 39-40 INCHES FEET
0149 2 SALTY 4 MINERAL 30-11 1 STEEL 12 33-16 0	DEPTH TO TOP 41-44 30 OF SCREEN FEEL
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	G & SEALING RECORD
2 SALTY 4 MINERAL 3 CONCRETE 10-13 00-13	MATERIAL AND TYPE ICEMENT GROUT LEAD PACKER, ETC.)
1 FRESH 3 SULPHUR 4 OPEN HOLE 2 SALTY 4 MINERAL 24-25 1 STEEL 26 27-30 18-21 22-25	
1 TRESH 3 SQLPHUR 3 CONCRETE 26-29 30-33 80 2 SALTY 4 MINERAL 4 OPEN HOLE 26-29 30-33 80	
71 UMPING TEST METHOD 10 PUMPING RATE 11-14 DURATION OF PUMPING 1 Y PUMP COOS GPN 01 15-16 00 17-18	OF WELL
STATIC WATER LEVEL 25 LEVEL END OF WATER LEVELS DURING ID PUMPING IN DIAGRAM BELOW SHOW DISTANCE	ES OF WELL FROM ROAD AND RROW.
-010 0.000 0.000 0.000 0.000 0.000	W.
GIVE RATE GIVE RATE GPM 80 FEET 1 CLOUDY	
SHALLOW TO DEEP SETTING 080 FEET RATE 000 5 GPM	CON VI V
GPM./FL. SPECIFIC CAPACITY	0.F.
FINAL 54 120 WATER SUPPLY 5 ABANDONED, INSUFFICIENT SUPPLY OBSERVATION WELL OBSERVATION WELL TEST HOLE TE	
SS-55 1 DOMESTIC S COMMERCIAL R.F. +	5 mi > 50 Z
WATER 0 2 STOCK 6 MUNICIPAL 3 D IRRIGATION 7 D PUBLIC SUPPLY USE 4 D INDUSTRIAL 6 D COOLING OR AIR CONDITIONING 2 2 20116	
METHOD ¹ CABLE TOOL ² CA	O.F. Still
5 AIR PERCUSSION DRILLERS REMARKS:	С. т.
G.Charbonneau+Son Drilling Ltd Licence NUMBER Address Jource	DATE REC. TED 00278 53-68 80
S R R 2 Box 19/4 Opleong Ont KIC 101 W	1421
LICENCE NUMBER	P
Signature Of Contractor Charbonneau submission date Jerand Charbonneau Day 20 mo 6 y77 0	7
MINISTRY OF THE ENVIRONMENT COPY	FORM 7 MOE 07-091

Minist of the Enviro]		WA		ER	W	/E	ter Res			CC	R	D
Ontario	1. PRINT ONLY IN S 2. CHECK 🛛 CORRE		PLICABLE	11	1 !	5209	517		MUNICIP		CON.	II	22	23 24
COUNTY OR DISTRICT				ER, On		.0		CON., BLO	CK. TRACT. S	URVEY, ETC			LOT 2	5-27
			s aslin	e Rd.	RAMS	AYVII	LE,	Ont.			е сомр r_ 24	LETED MO	48-53 4	86
1 2	M	17 28	FHING F I I		RC				IN CODE		• 	114	vi 1 1	-1-47
		G OF OVER	BURDEN	AND BED	ROCK	MATER	ALS (s	SEE INSTR	UCTIONS					
GENERAL COLOUR	MOST COMMON MATERIAL		OTHER MATI	ERIALS			G (ENERAL D	ESCRIPTIO	N		FROM	TO	
		DUG WA	TER W	ELL 4'	in	DIAMI	TER	17	DEE	P				
							-							
31														
												1111		
	R RECORD	INSIDE				ORD	E N	SIZE(S) OF (SLOT NO)	OPENING	31-33	DIAME	TER 34-38	LENGTH	39-40 FEET
AT - FEET	FRESH ³ SULPHUR ¹⁴ SALTY ⁴ MINERAL	INCHES	ATERIAL	THICKNESS	FROM	10	SCRI	MATERIAL	AND TYPE			DEPTH TO TOP OF SCREEN	41-44 Fee	
15-18 1 _ 1 2 s	FRESH ³ ULPHUR ¹⁹ SALTY ⁴ MINERAL	4 • ™ • ™ •	ALVANIZED CONCRETE OPEN HOLE STEEL 19	3 ³ 2" + 2	L •	17.	· · · · · · · · · · · · · · · · · · ·	EPTH SET A	T - FEET	1	SEAL		ORD	
2 🗆 S	FRESH 3 🗌 SULPHUR ²⁴ SALTY 4 🗌 MINERAL FRESH 3 🗍 SULPHUR ²⁹	3 🗆 a 4 🗆 a	GALVANIZED CONCRETE OPEN HOLE					RОМ 10-13	TO 14-17				ACRER, ETC	
2 🗋 5	SALTY 4 [] MINERAL FRESH 3 [] SULPHUR 34 30		STEEL 26 GALVANIZED CONCRETE			27-3	°	18-21 26-29	30-33	80				
2 S	SALTY 4 MINERAL	• 🗆 o	UPEN HOLE	IMPING							A/ F 1	•	· .	
71 1 X PUMP 2	BAILER 4		215-16 Hou	6 17			DIAGRAM	BELOW S	HOW DIST	ANCES OF		L FROM ROAD	AND	
4.72 ·	22-24 5.95 ¹ FEET FEE	T FEET	45 MINUTES 5.43 ³²⁻¹ FE	5.57 ET 5.57	37 :ET		1							
U FEET IF FLOWING GIVE RATE	38-41 PUMP INTAKE S		NATER AT END C	2 🗌 CLOUC	ν2 γ			-						
X SHALLOW	PUMP	P	ECOMMENDED UMPING ATE 4	46- 51 G	49 PM	Leit	rim	Ka I						
50-53				-					45'	40'				
FINAL STATUS OF WELL	1 WATER SUPPLY 2 OBSERVATION WEL 3 I TEST HOLE 4 RECHARGE WELL		DONED POOR	FICIENT SUPPL QUALITY					The second	ſ				
SS-SG WATER	2 STOCK	5 COMMERCI 6 MUNICIPA	L					¥ [•		
USE	3 IRRIGATION 4 INDUSTRIAL 0 OTHER	7 DPUBLICSU						asel.						
METHOD OF DRILLING	1 CABLE TOOL 2 ROTARY (CONVENT 3 ROTARY (REVERSE 4 ROTARY (AIR) 5 AIR PERCUSSION	10NAL) 7 [) * [BORING DIAMOND JETTING DRIVING	هر.		RILLERS REM	ARKS:	# 						
NAME OF WELL CO	NTRACTOR DRILLING CO	. LIMIT		ENCE NUMBER		DATA		58 CONTRA		9-62 DAT)**	06	86	
ADDRESS	0 Terminal	•			L L		SPECTION		INSPECT	OR				
TEST PU	MPING BY RO	y W. Re:	nwick	ENCE NUMBER										
	murice Soc		24MO	04 ,8	5									
MINISTRY	OF THE ENVIRON		Y									FORM NO. 050	6—4—77 F(ORM 7

Ministry of the	\ \ / \ 7		Water Resources	
Ontario Environment	spaces provided	152737 7	NUNICIP	
2. CHECK X CORR COUNTY OR DISTRICT	TOWNSHIP, BOROUGH CITY TOWN, VILLAGE	CON	BLOCK TRACT SURVEY ETC	15 4 22 23 24
		RD, GLOULESTE		TE COMPLETED 44-53 y 26 NO 08 YR 93
	TI T	CCK MATERIALS (SEE)	31 INSTRUCTIONS)	4
GENERAL COLOUR COMMON NATERIAL	OTHER MATERIALS	GENER	AL DESCRIPTION	DEPTH - FEET FROM TO
Brown top Soil				0" 1'
Red Land				3' 6'
Blue Clar.			•	6' 23'
			· · · · · · · · · · · · · · · · · · ·	
	· · · · · · · · · · · · · · · · · · ·		. •	
32 10 14 15 21 21 41 WATER RECORD 14 15 14 15	51 CASING & OPEN HOLE	RECORD Z SIZE.	54 (S) OF OPENING 31-33 (T NO)	65 75 0 DIAMETER 34-38 LENGTH 39-40
WATER FOUND AT - FEET 10-13	INSIDE MATERIAL WALL DIAM MATERIAL THICKNESS INCHES F		ERIAL AND TYPE	INCHES FEE DEPTH TO TOP 41-44 3 OF SCREEN
1 □ FRESH 3 ISULPHUR 2 ISALTY 4 IMINERALS 6 GAS 15-18 1 □ FRESH 3 ISULPHUR 19	10-11 1 STEEL 12 48 11 2 GALVANIZED 3 DECONCRETE 4 0 OPEN HOLE	0' 23' 0		
2 SALTY 6 GAS 20-23 1 FRESH 3 SULPHUR 24	4 ⊡ OPEN HOLE 7 5 □ PLASTIC 19 10.5TEL 19 2 □ GALVANIZED		SET AT - FEET	SEALING RECORD
2 SALTY 4MINERALS 6 GGAS 25-26 1 TRESH 3SULPHUR 23 4	3 CONCRETE 4 COPEN HOLE 5 PLASTIC 24-25 26		9-13 9 4.17 cem	ent CS. 665 Joint sealant
2 SALTY 6 GAS 30-33 FRESH 3 SULPHUR 34 BC 4 MINERALS	1 □ STEEL 2 □ GALVANIZED 3 □ CONCRETE 4 □ OPEN HOLE		$\begin{array}{c} 121 \\ 1529 \\ 1529 \\ 172$	t clay coment
2 [] SALTY 6 [] GAS	1		OCATION OF	<u>Kersond CS. 66</u> WELL
STATIC WATER LEVEL 23 STATIC END OF WATER L	6PM	IN DIAGRAM BEL	OW SHOW DISTANCES OF	WELL FROM ROAD AND
LEVEL END OF WATER 1 19-21 22-24 IS MINUTES 26-22 1/ 1/ 22-24 IS MINUTES 26-22 1/ 1/ 22-24	30 MINUTES 45 MINUTES 60 MINUTES	1 SW	HWY 417	
	ET / FEET / O D FEET / FEET		LEITRIM	RD
C FEET FEET FEET FEET FEET FEET FEET FEE	FEET 1 CLEAR 2 CLOUDY D 43-45 RECOMMENDED 46-49			à
50-53	21 FEET RATE 5 GPM	1.2 km	WELL IS 65Ft.	FROM ROAD
FINAL 2 OBSERVATION WE STATUS 3 DESK HOLE			and 22Ft .	
OF WELL 3 DEST HOLE	7 UNFINISHED DEWATERING COMMERCIAL COMMERCIAL	× ×		21 NC STA
WATER 2 STOCK	 MUNICIPAL PUBLIC SUPPLY 	D SET IN		AN
USE 1 INDUSTRIAL	COOLING OR AIR CONDITIONING NOT USED	i na	STH LINE	
METHOD 1 CABLE TOOL 2 D ROTARY (CONVEN OF 3 D ROTARY (REVERSI	—		a lit ci ive	
	° □ DRIVING PDIGGING □ OTHER	DRILLERS REMARKS	يې بې	127826
C Denis Land	WELL CONTRACTOR'S LIGENCE NUMBER	SOURCE		AUG 3 1 1993 ***
ADDRESS DEL ZECHNICIAN	nbrun Ont.		INSPECTOR	
5 Denis Sarra	SUBMISSION DATE			
Litemin Sarna	Les DAY 26 MO 8 YR 93	N III		
MINISTRY OF THE ENVIRON	MENT COPY		······································	FORM NO. 0506 (11/86) FORM

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Ministry of the			o Water Resources A		·
Ontario Environment				ECC	RD
2. CHECK COR	SPACES PROVIDED 11 RECT BOX WHERE APPLICABLE 12 TOWNSHIP, BOROUGH CITY, TOWN, VILLAG	1527513 • coi	N BLOCK, TRACT, SURVEY ETC	F	LOT 23-27
Vattor Contra	pucester			COMPLETED	20
	4ING	RC ELEVATION RC	Bloucester DAY -6	24 mo 4	<u>чв 43</u>
	OG OF OVERBURDEN AND BEDI	ROCK MATERIALS (SEE	INSTRUCTIONS)		47
GENERAL COLOUR MOST COMMON MATERIAL	OTHER MATERIALS	GENE	RAL DESCRIPTION	DEPT FROM	H - FEET TO
Brown top Soil			·	0'	1'
grey. sand.				4'	4'
Blue Clay.				7'	23'
		:			
			311111		
32 10 14 15 21 21 21					
41 WATER RECORD	51 CASING & OPEN HOLE	RECORD	SI OF OPENING 31-33 DIAI	METER \$4-38	75 80 LENGTH 39-40
10-13 1 B FRESH 3 SULPHUR 2 SALTY 4 MINERALS 6 Gas	10-11 1 STEEL 12		RIAL AND TYPE	INCHES DEPTH TO TOP OF SCREEN	FEET 41-44 30 FEET
15-18 1 FRESH 3 SULPHUR 2 SALTY 6 GAS	78 3 BEONCRETE 4 OPEN HOLE 5 OPLASTIC 4 OPEN HOLE 5 OPLASTIC	>' 2/'	PLUGGING & SEA	LING RECO	
20-23 1 FRESH 3 SULPHUR 2 3 SALTY 6 GAS 25-28 - 2 7 23	12-16 1 □ STEEL 19 2 □ GALVANIZED 3 □ CONCRETE 4 □ OPEN HOLE	20-23 DEPTH S FROM	TO MATERIAL AN	LEAD PA	NT GROUT ICKER, ETC)
1 ☐ FRESH 3 ∐SULPHUR 2 ☐ SALTY 6 ☐ GAS 30-13	5 □ PLASTIC 24-25 1 □ STEEL 2 □ GALVANIZED	27.30	21 2245 Sand.	5 seala	sit . semeret
$2 \square SALTY 6 \square GAS$	3 CONCRETE 4 COPEN HOLE 5 OPLASTIC	15"	23° filte	2.5.665 2 Samo	Les665
71 1 PUMP 2 D BAILER 5	11-14 DURATION OF PUMPING 15-16 17-18 GPM HOURS MINS	L	OCATION OF WEL	- L	
	ELS DURING 2 RECOVERY 30 MINUTES 45 MINUTES 60 MINUTES	LA HNDI	ICATE NORTH BY ARROW	FROM ROAD AI	ND
SUP RECOMMENDED PUMP TYPE PUMP	AT WATER AT END OF TEST 42		EITFINA	RPA	
GIVE NATE GPM 2	FEET 1 CLEAR 2 □ CLOUDY 43-45 RECOMMENDED 46-49	De w	ell is 1171	Q	
C SHALLOW DEEP SETTING 2	FEET RATE 5 GPM	y Fg	ell is 1171	1. 2	
FINAL 2 OBSERVATION WELL	5] ABANDONED. INSUFFICIENT SUPPLY 5] ABANDONED POOR QUALITY	N N N	(By u		
OF WELL 4 CRECHARGE WELL	7 UNFINISHED DEWATERING		× O op	AND 'Y	
Image: Definition Image: Definition <thimage: definit<="" th=""> Image: Definit <thi< td=""><td>COMMERCIAL UNICIPAL UPUBLIC SUPPLY</td><td></td><td></td><td>6</td><td></td></thi<></thimage:>	COMMERCIAL UNICIPAL UPUBLIC SUPPLY			6	
USE • □ INDUSTRIAL • □ OTHER	COOLING OR AIR CONDITIONING	Ø		9	
57 1 CABLE TOOL 2 ROTARY (CONVENTION OF 3 ROTARY (REVERSE)			STH LINE	RD	
	 D JETTING D DRIVING DIGGING DOTHER 	DRILLERS REMARKS		127	830
Chenia Anna	WELL CONTRACTOR'S LICENCE NUMBER	DATA 58 CON SOURCE 6	TRACTOR 59-62 DATE RECEIVED		63-68 80
ADDRESS BOX 222 Emb	un Brit	A SOURCE SE CON	INSPECTOR	0 4 1993	
DEMIS STRATURE OF TECHNICIAN	well technician's Ligence number T2265	D RENARKS	I		
Denis Jarrain	SUBMISSION DATE DAY 27 MO. 9 93	OFFICE			
MINISTRY OF THE ENVIRONME	NT COPY		FOR	RM NO. 0506 (11/	/86) FORM 9

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	محمد یا به محمد ومحمد میں اور	Mall Tax Number (7)	· · · · · ·		3			
	Ministry of he Environment	Well Tag Number (Pla	ace sticker and p	rint number below)				ecord
	tie Environment				Regulation 90	3 Ontario Wa	ter Res	ources Act
Instructions for Completin	a Form						page _	of
• For use in the Province of	-	is document is a perr	nanent lea	al document. P	lease retain for futur	e reference		
 All Sections must be con 	npleted in full to avo	oid delays in processi	ng. Further	instructions and	d explanations are av	ailable on the	back of	this form.
 Questions regarding-com All metre measurement 	pleting this applicat	tion can be directed t	o the Wate	r-Well Manager	ment Coordinator at	416-235-62	03.	
 Please print clearly in blue 		ato mo orametre	·		Ministry Us	e Only		
Address of Well Location (County)	/District/Municipality)	To	ownship		Lot	• •	cession	
RR#/Street Number/Name			City/Town/	ices 6		K <i>O</i> artment/Block	Z	
4085 MAM	syville K	d	GIVIONING	ucesta		AM SY		
GPS Reading NAD Zon		Northing	Unit Make/M	Nodel Mode	of Operation: Und	ifferentiated	X Aver	
Log of Overburden and Be		5021639	INTER	1 An UT	T Diffe	erentiated, specif	у	<u>+</u>
General Colour Most common	·····	Other Materials		Genera	I Description		Depth	Metres
							From	То
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Hole Diameter		Construction Rec	ord		Tes	t of Well Yie	ld	
Depth Metres Diameter	Inside	· Wall	Depth	Metres	Pumping test method	Draw Dowr		ecovery
From To Ceptimetres	diam Mate	centimetres	From	То		Time Water Le min Metres		Water Level Metres
0 6.7 91.44						Static		
1 Mar 1 M		Casing			(metres)	Level		
	Steel	Fibreolass	1	·····			1	
	01	Fibreglass	0	6.7	Pumping rate - (litres/min)	1	1	
Water Record	01	Concrete 10,16	0	6.7	Pumping rate - (litres/min) Duration of pumping		1 : 2	
Water Record Water found at Metres Kind of Water	91,44 Plastic X	Concrete 10,16	0	6.7	Pumping rate - (litres/min) Duration of pumping hrs + min	2	2	
Water Record Water found atMetres Kind of Water m Fresh Sulphur	91,44 Plastic Galvanize	Concrete Horeglass Concrete	0	6.7	Pumping rate - (litres/min) Duration of pumping hrs + min Final water level end of pumping	1	;	
Water Record Water found at Metres Kind of Water	91,44 Plastic Galvanize	Concrete ed Fibreglass Concrete ed	0	6.7	Pumping rate - (litres/min) Duration of pumping hrs + min Final water level end of pumpingmetres Recommended pump	2	2	
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	& Driveway
Method of Construction	110 miter
Cable Tool Rotary (air) Diamond Digging Rotary (conventional) Air percussion Jetting Other Rotary (reverse) Boring Driving	Audit No. 7 01700 Date Well Completed
Final Status of Well Water Supply Recharge well Unfinished Abandoned, (Other) Observation well Abandoned, insufficient supply Dewatering Manual Action Action	Addit No. Z U1796 Date Weil Completed MM DD Was the well owner's information package delivered? Date Delivered YYYY MM DD
Abandoned, poor quality Replacement well Well Contractor/Technician Information	Ministry Use Only
Name of Well Contractor Well Contractor's Licence No. Paymond Pump + Well's Business Address (street name, number, city etc.) Page 260 Paymond Street name, number, city etc.) Name of Well Technician (last name, first name) Well Technician's Licence No. Signature of Technician/Contractor Date Submitted Paymond Paymond Paymond Paymond Paymond Paymond Paymond Paymond P	Data Source Contractor 7260 Date Received YYXY MM DD Date of Inspection YYYY MM DD Remarks Well Record Number 1534582 ner's Copy □ Cette formule est disponible en francais

Contractor's Copy
Ministry's Copy
Well Owner's Copy

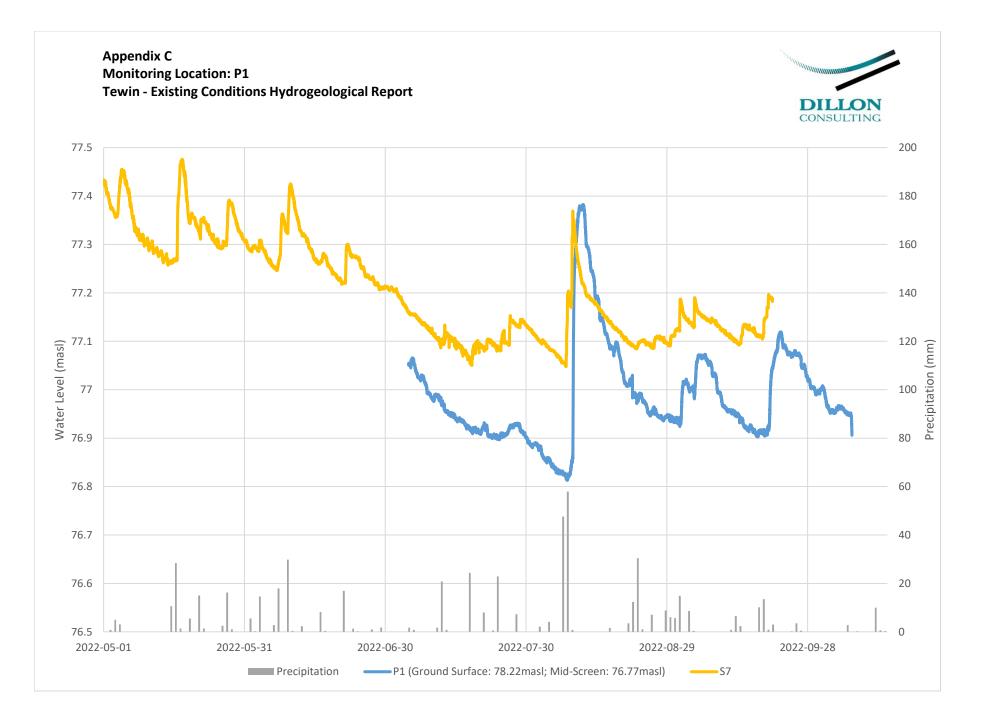
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Olher:		Screen		4	Recommended nump		73 8	10 8	23
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Other, specify	· · · · · · · · · · · · · · · · · · ·	No Casing or Scre	еп		uéd, give reason.	40	82"	40 8	6
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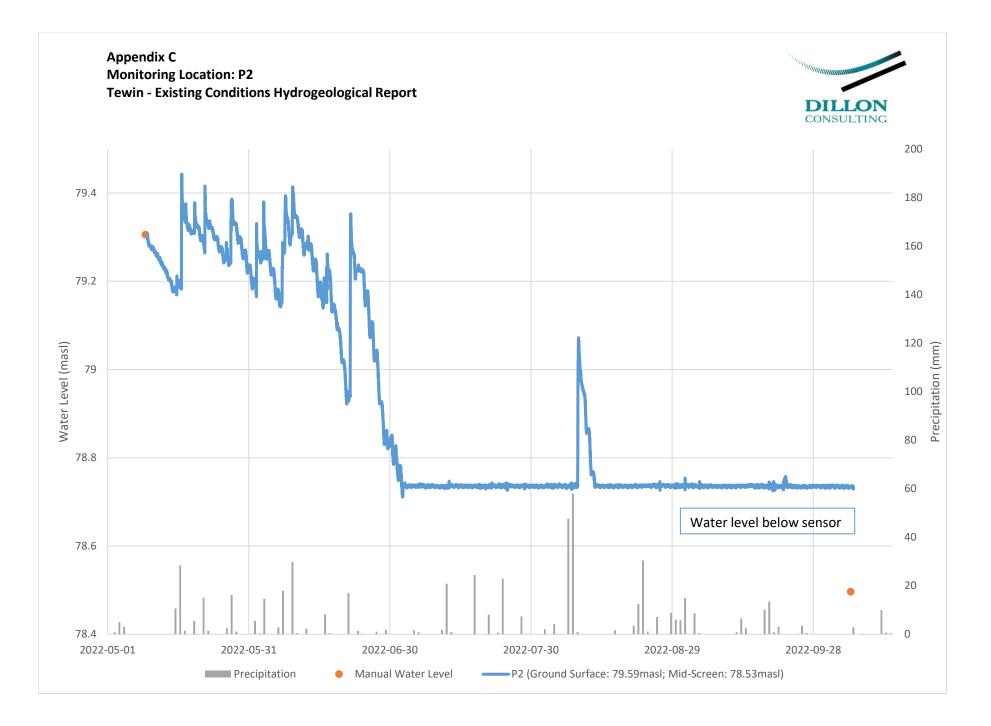
Appendix C

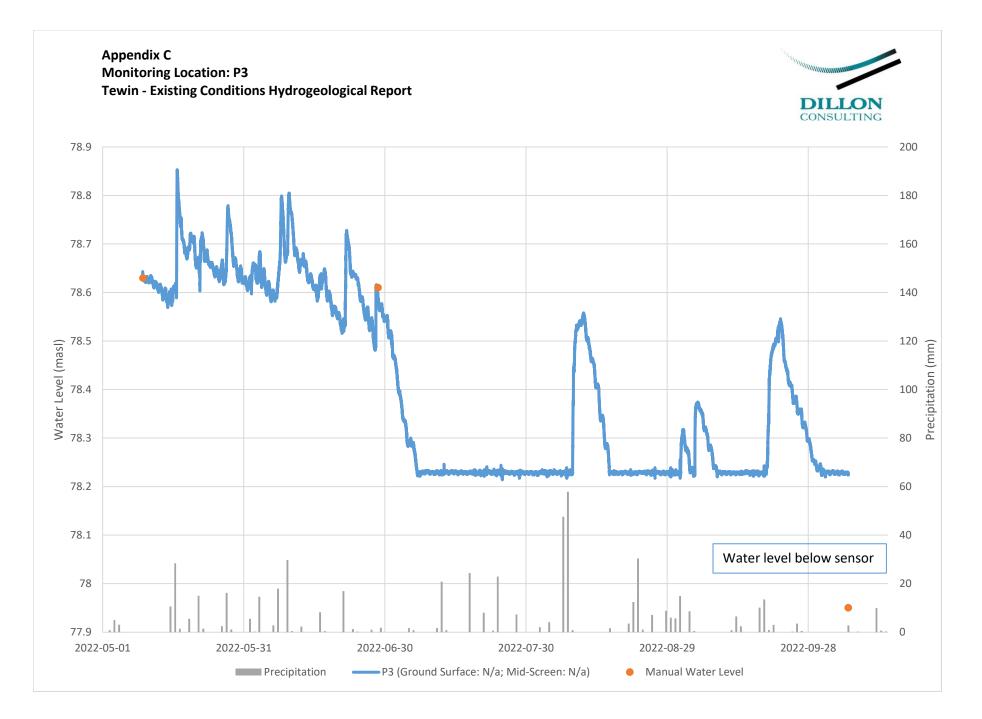
Hydrographs

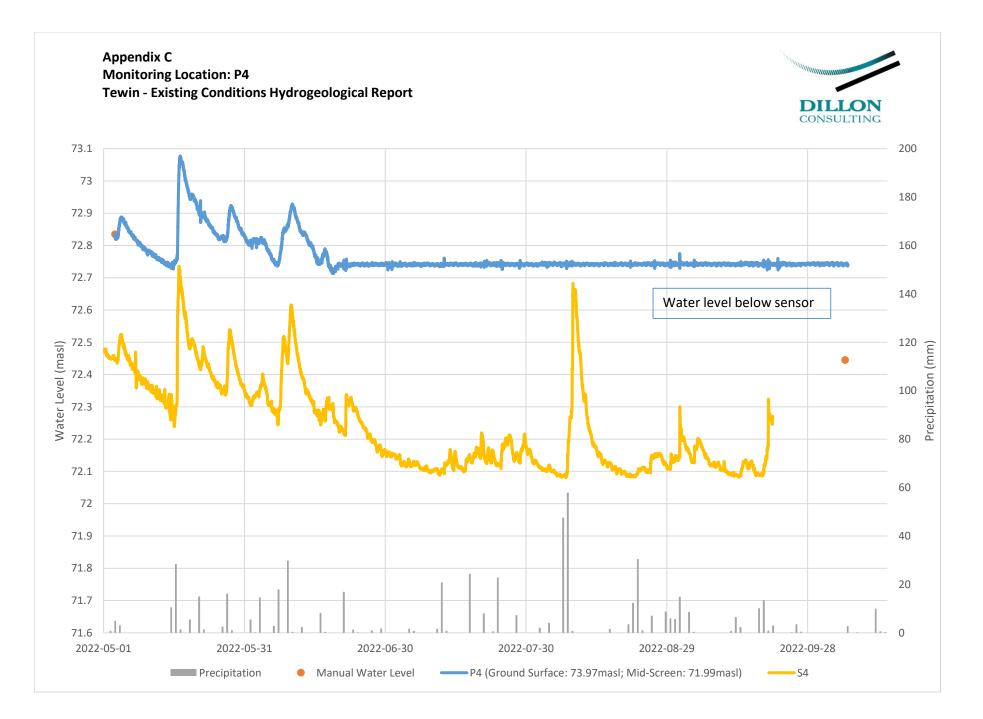
Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674

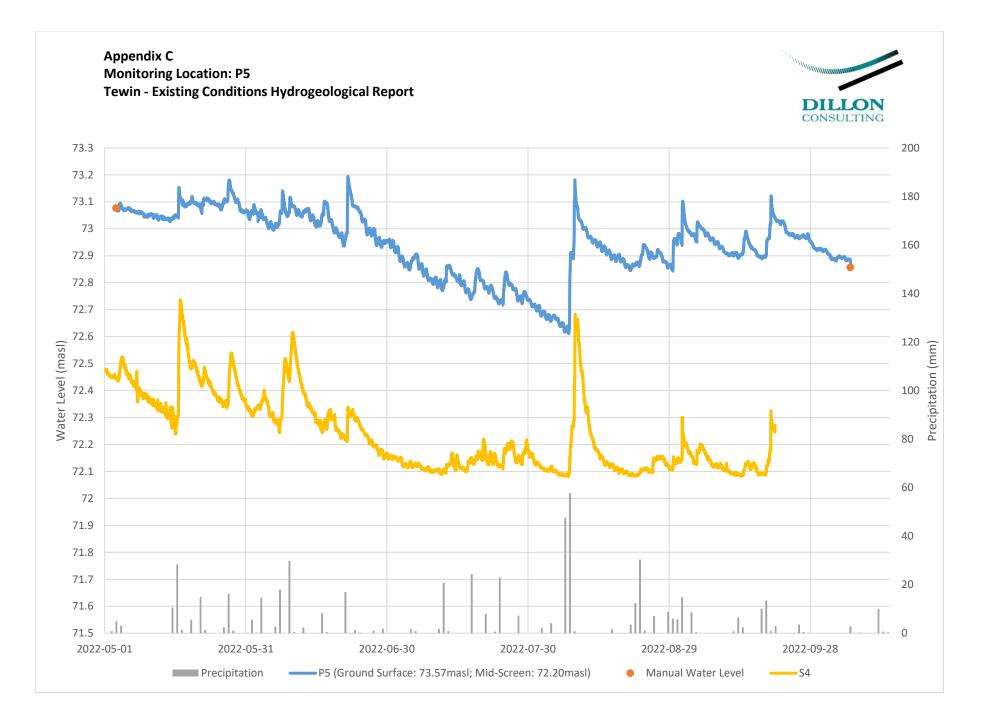


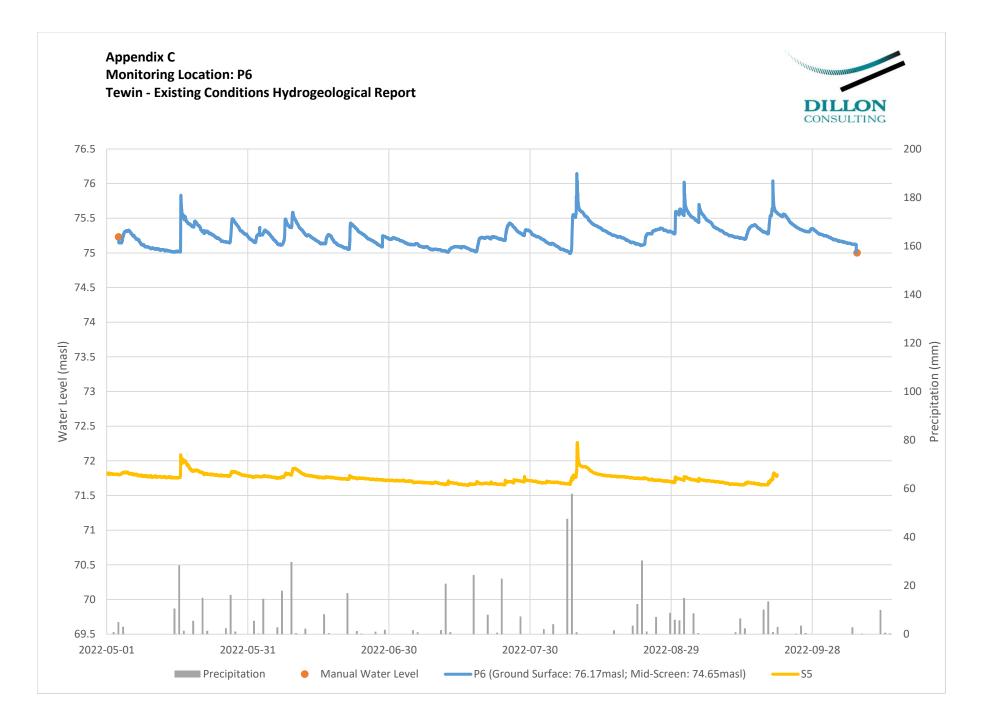


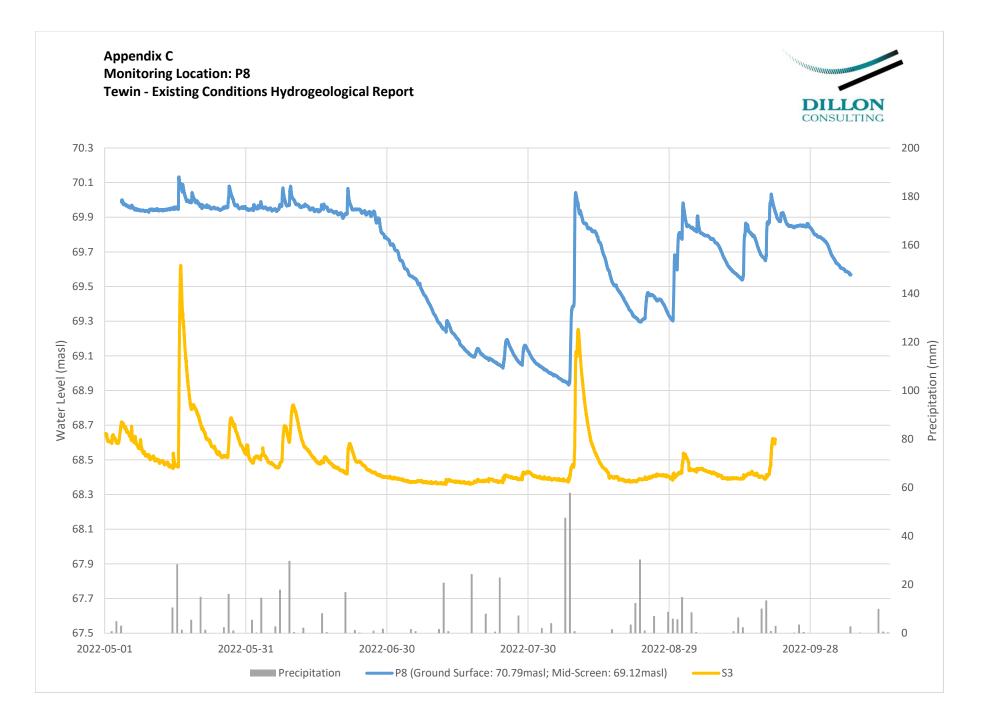


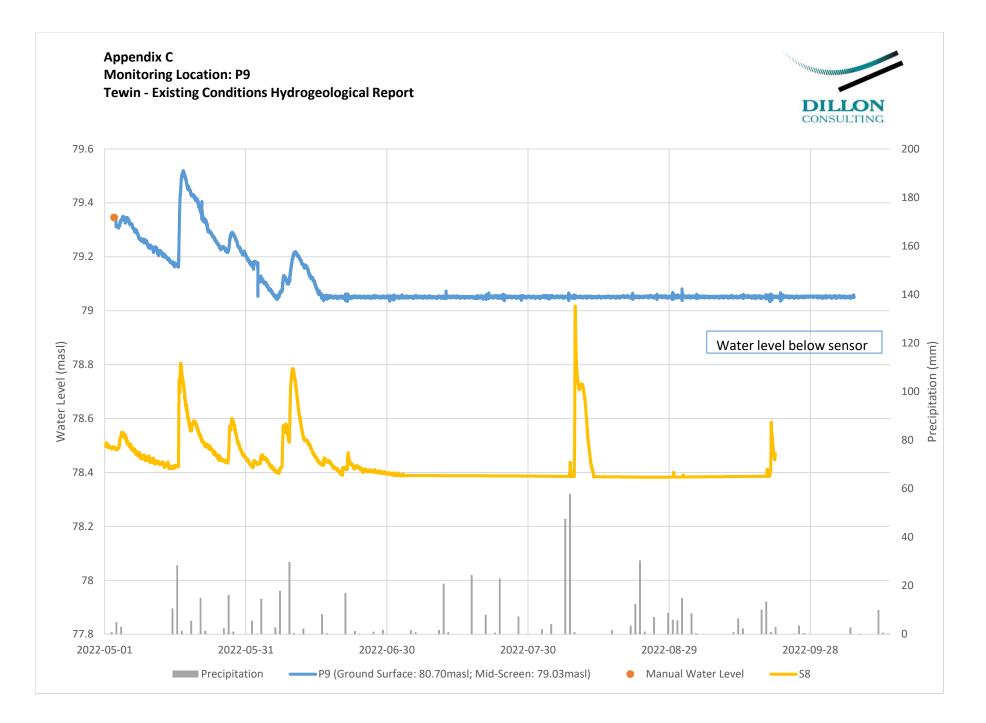


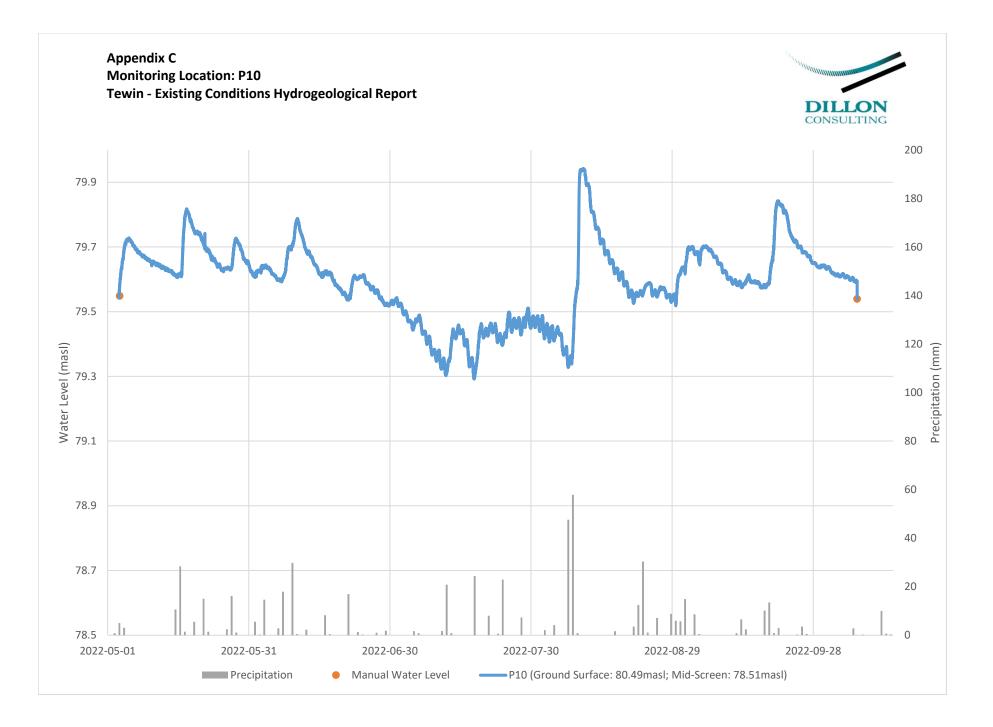


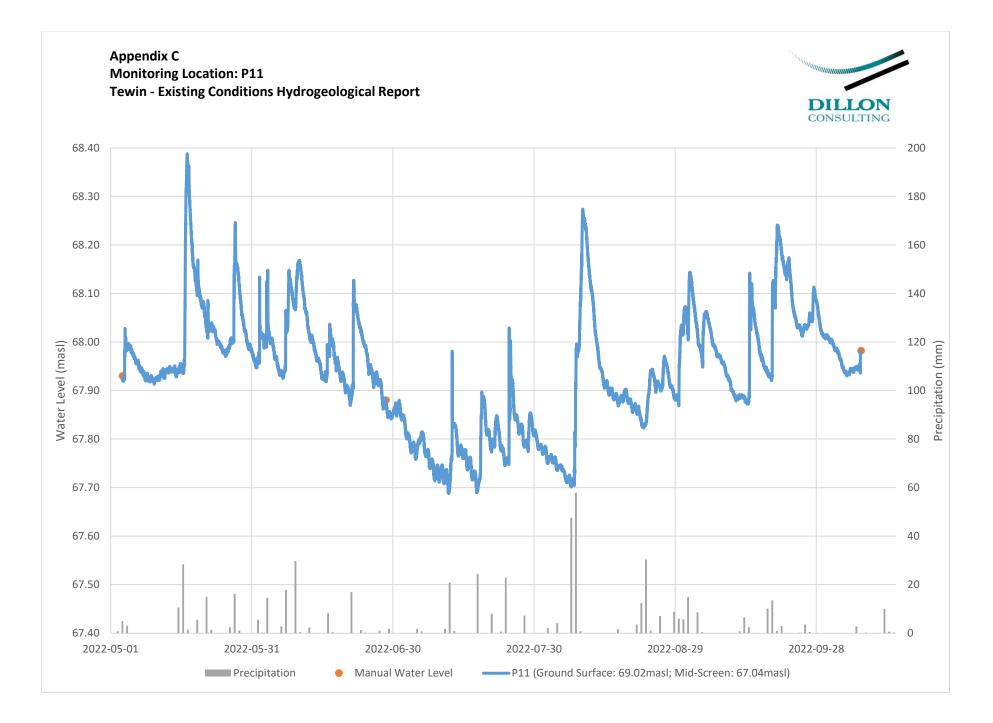


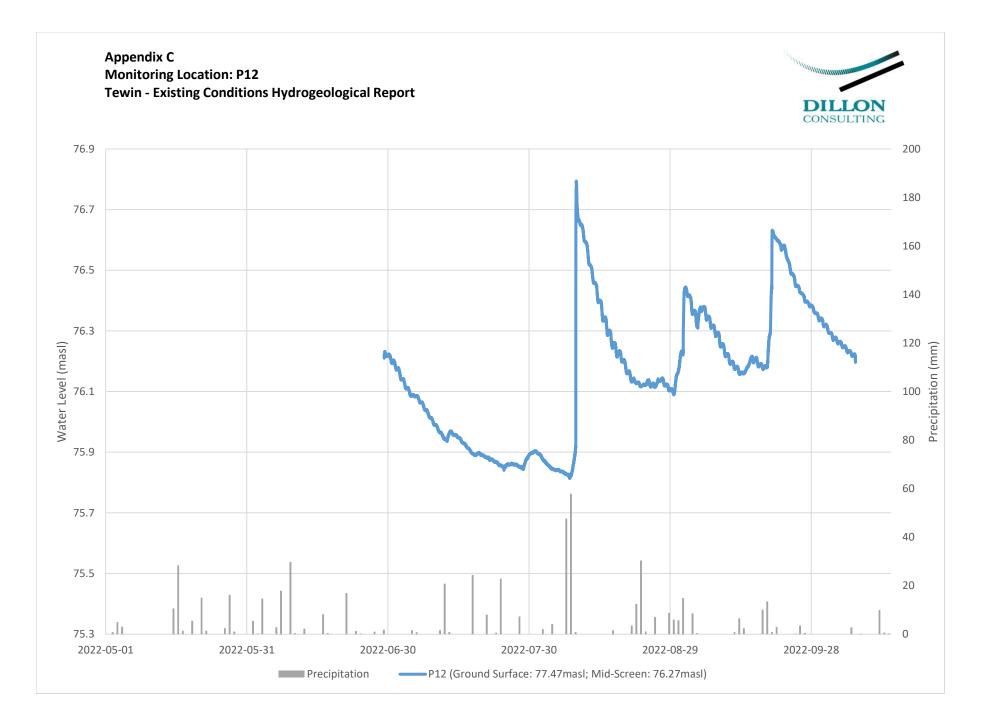


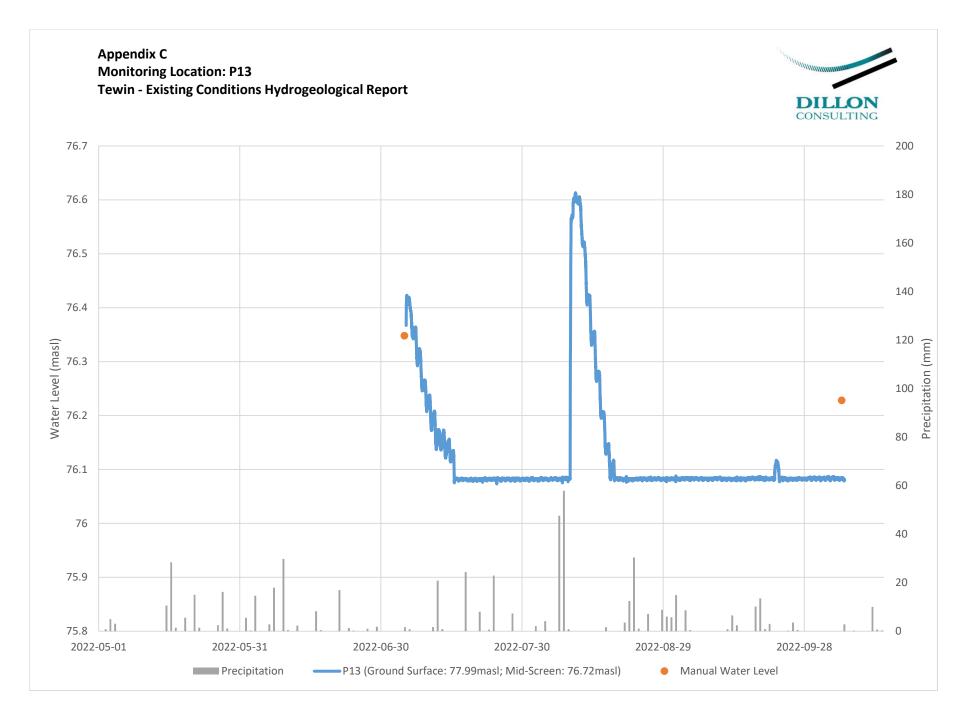


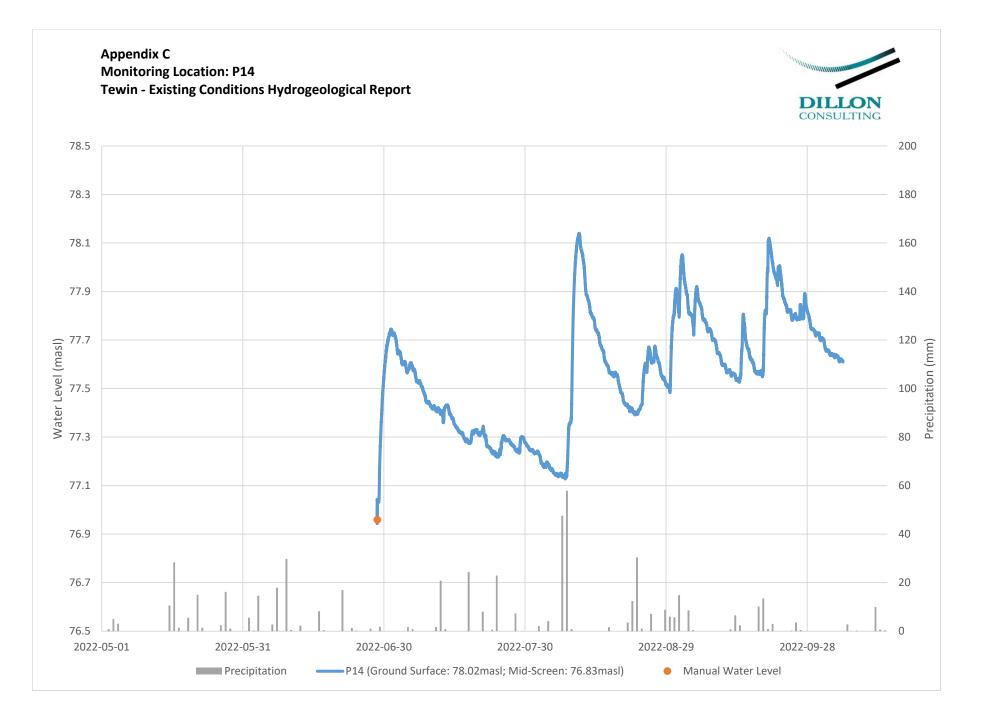


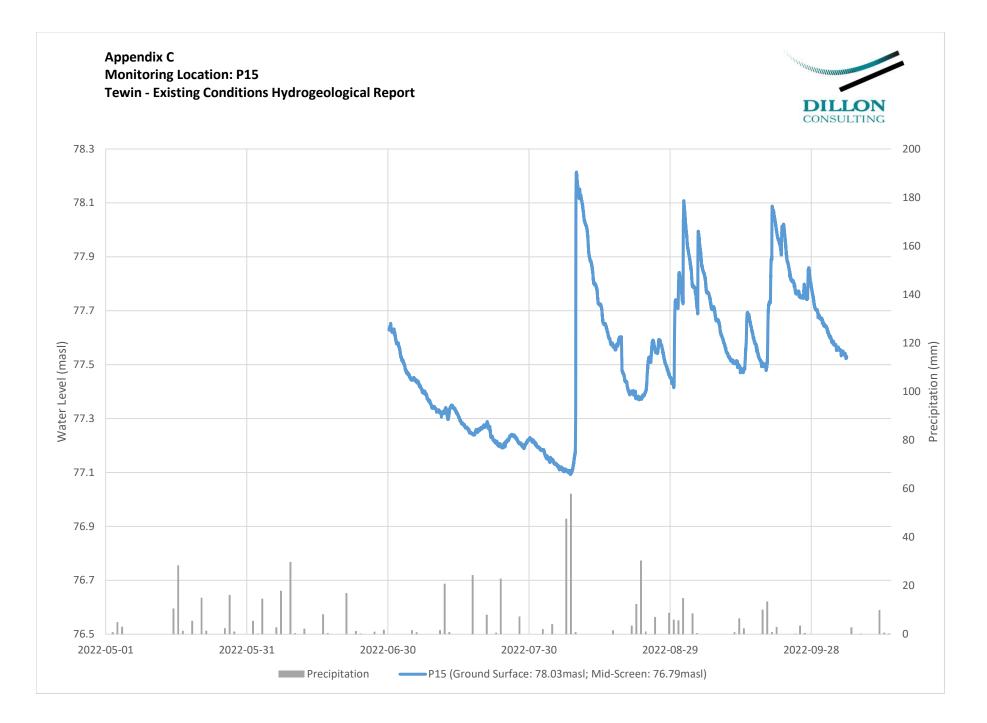


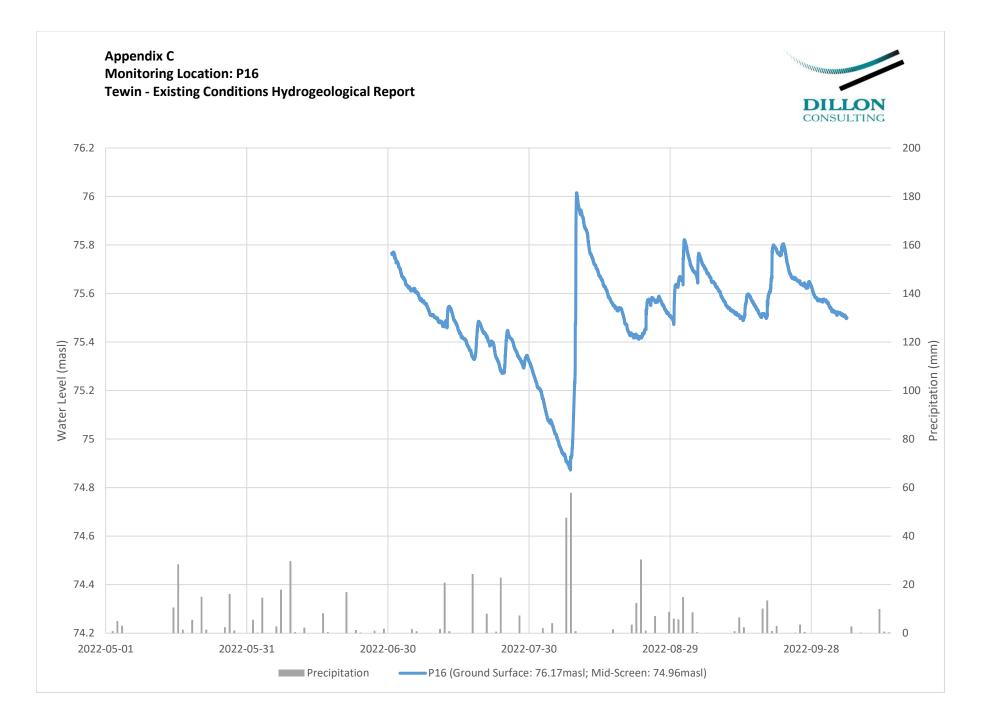


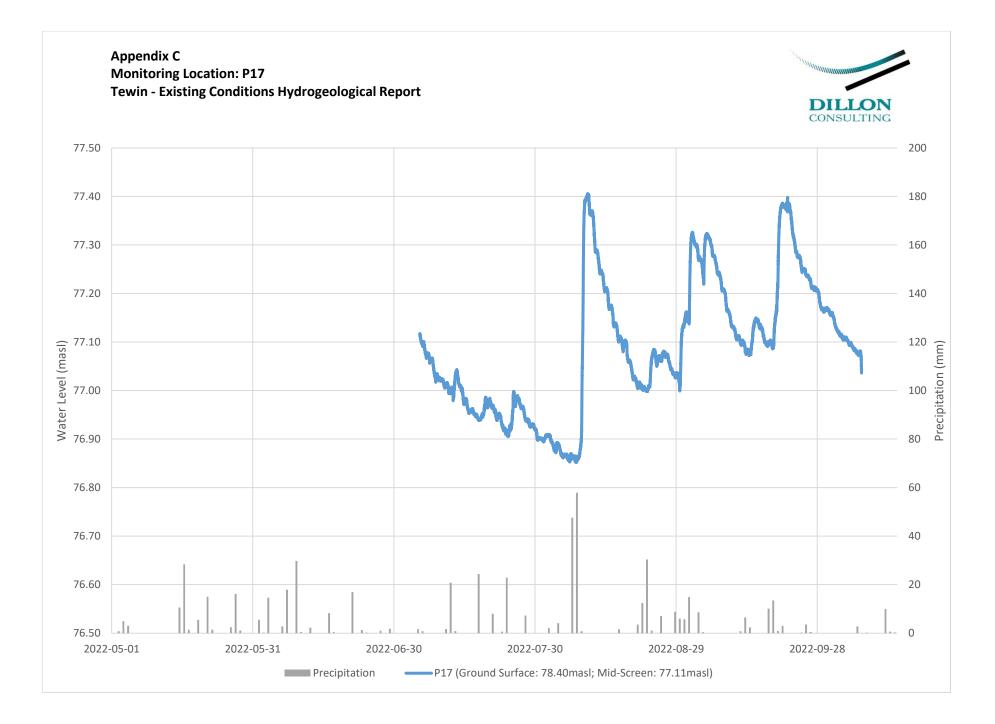


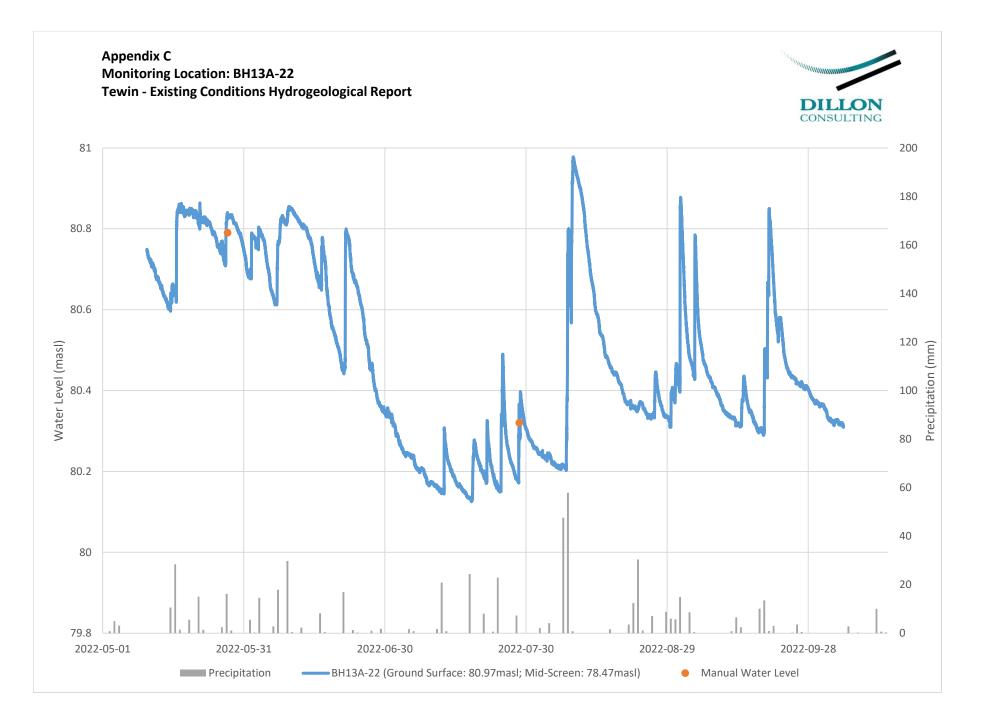


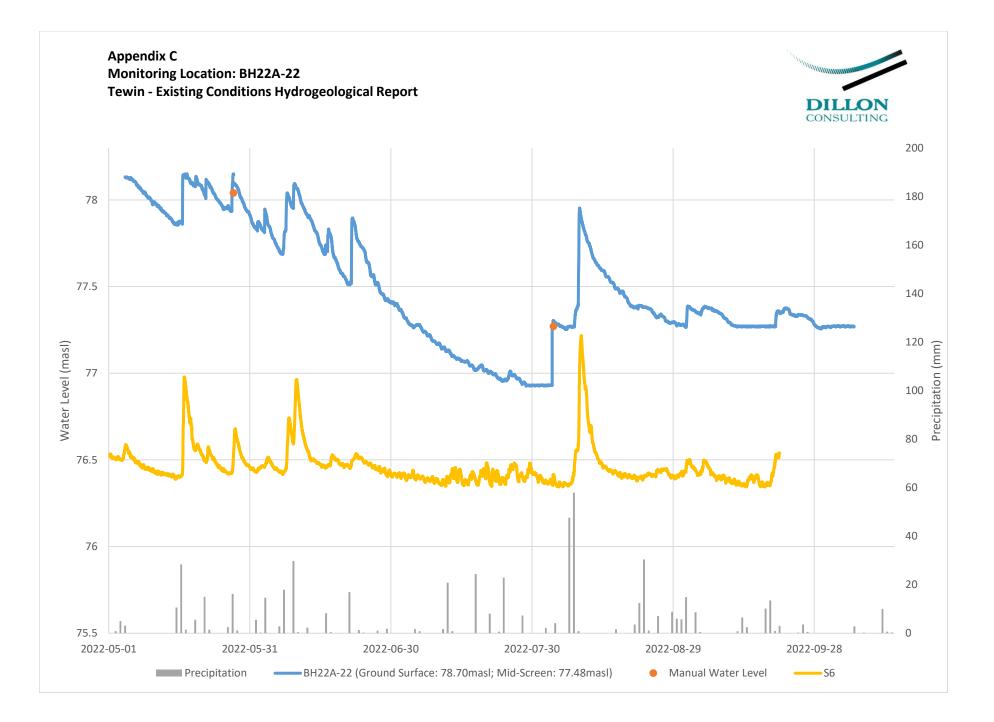


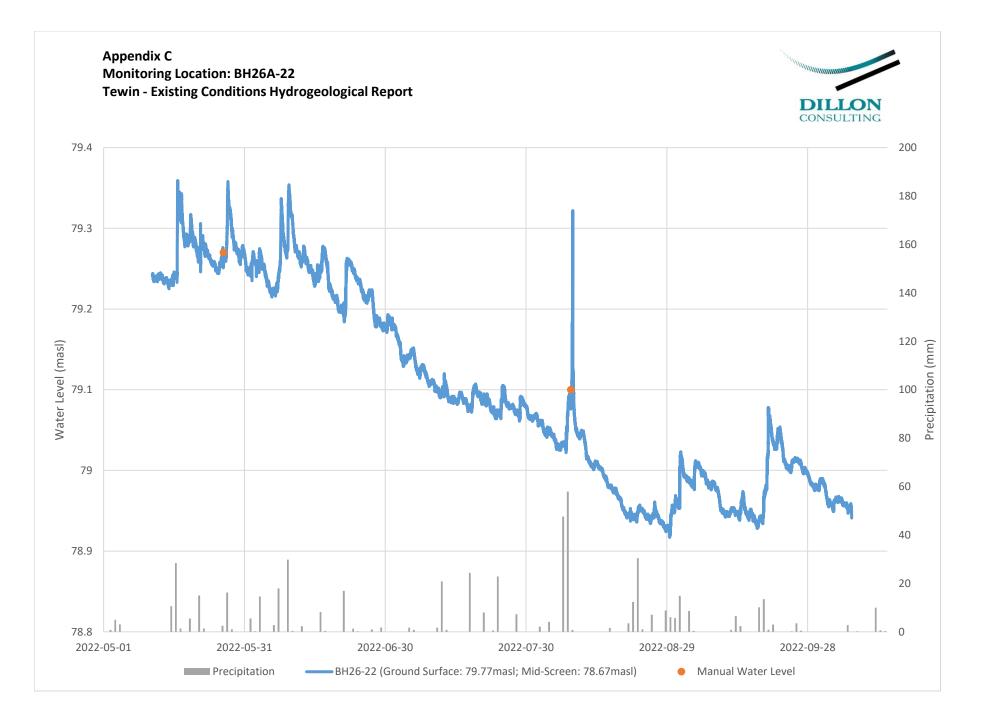






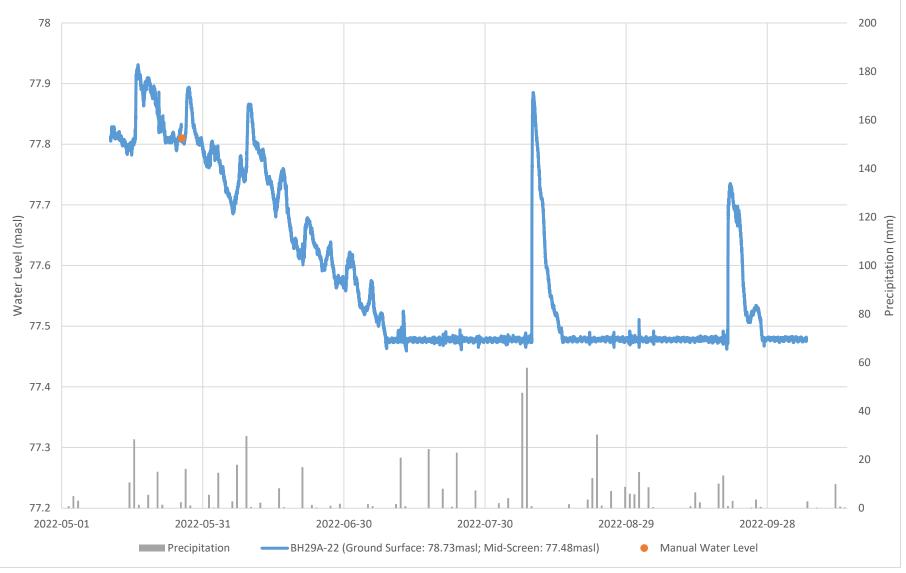


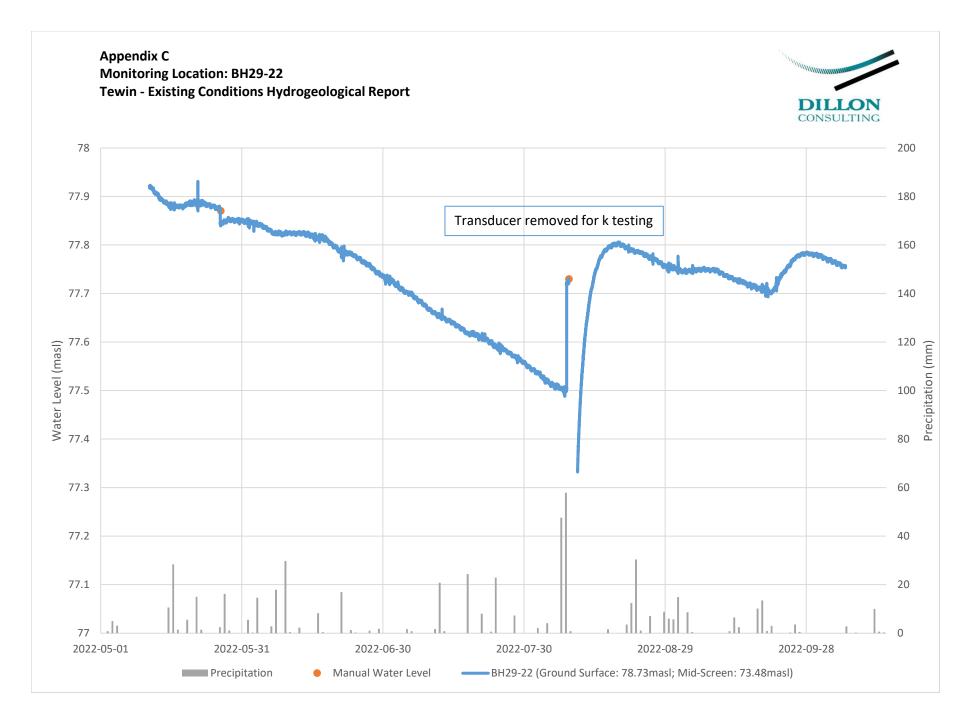


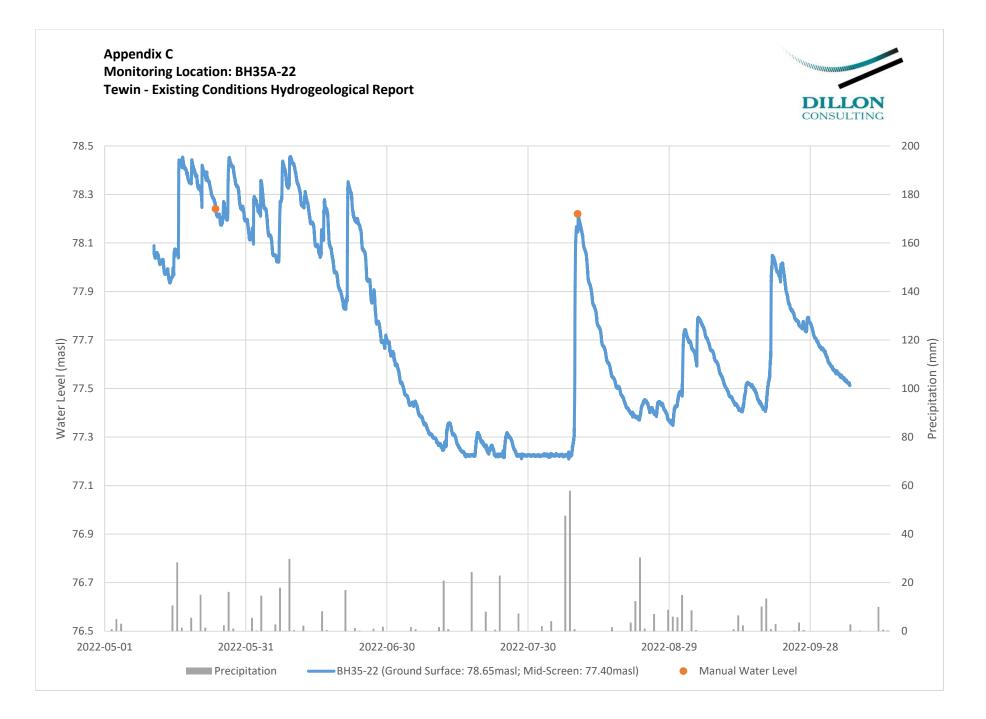


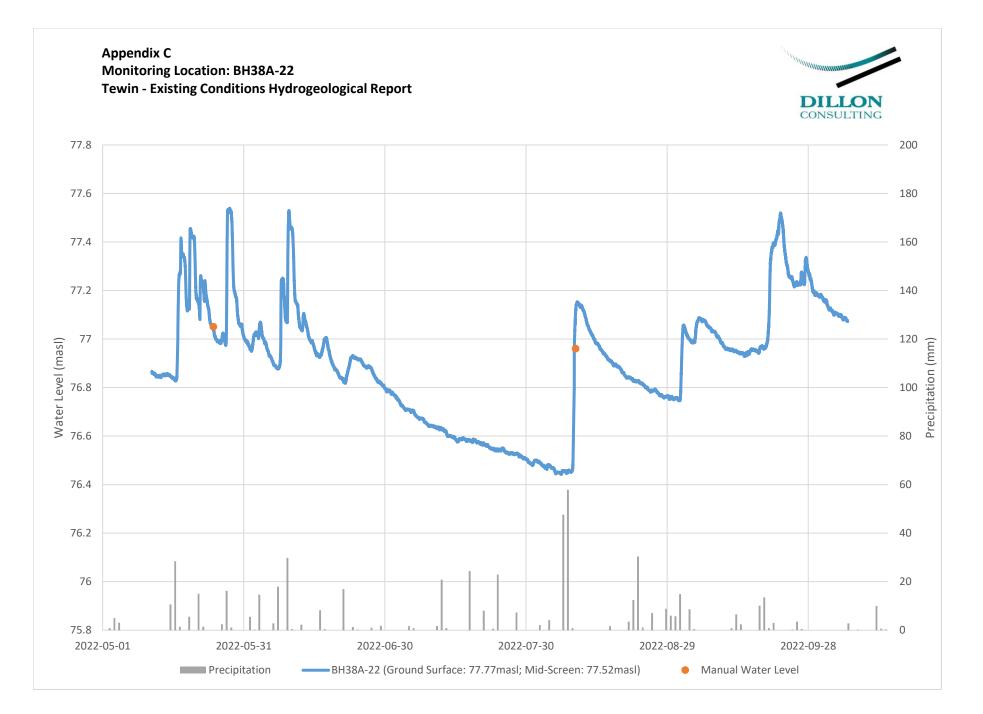
Appendix C Monitoring Location: BH29A-22 Tewin - Existing Conditions Hydrogeological Report

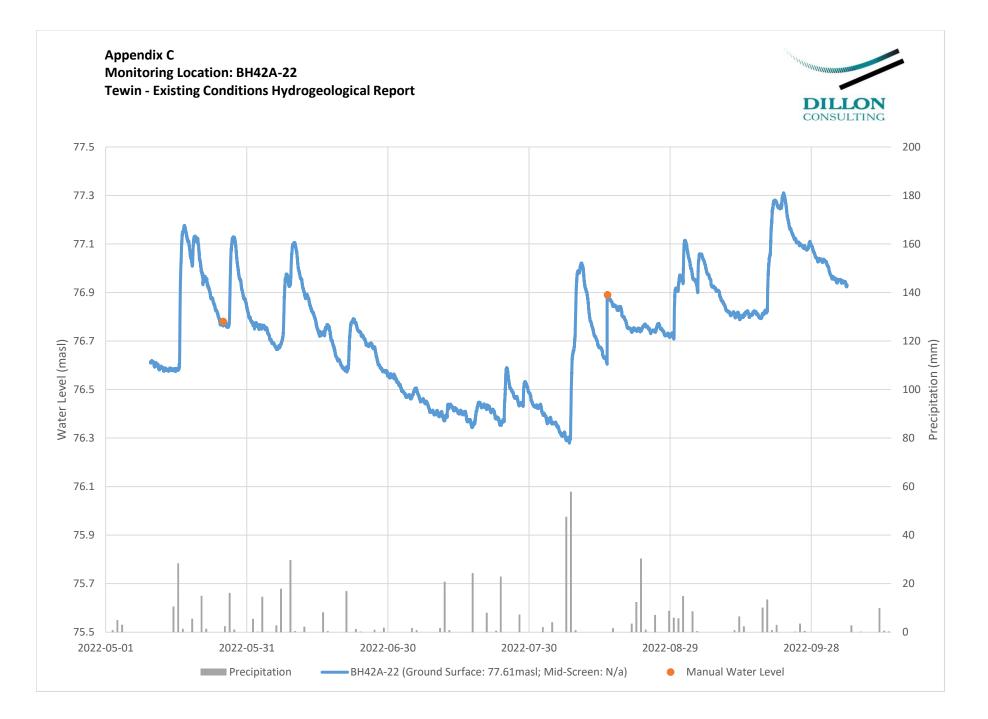


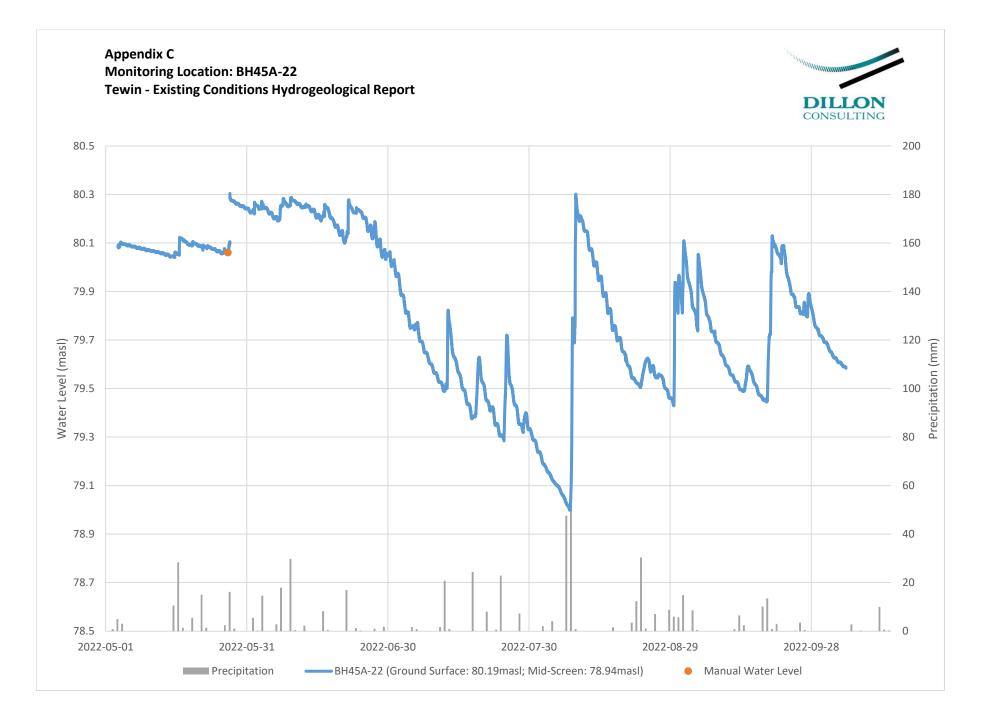


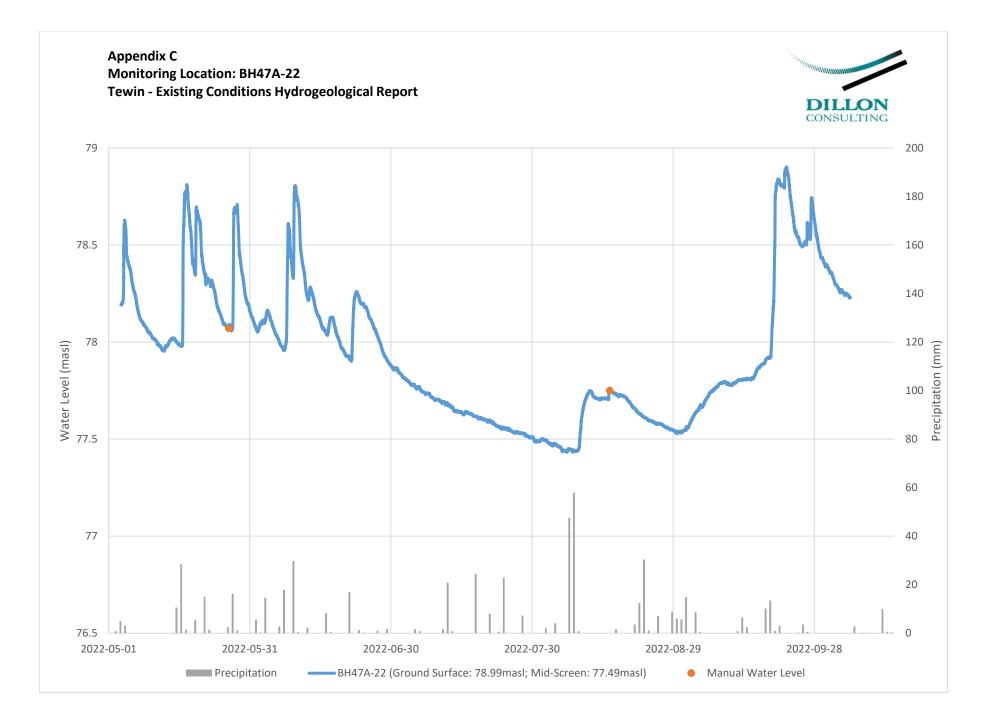


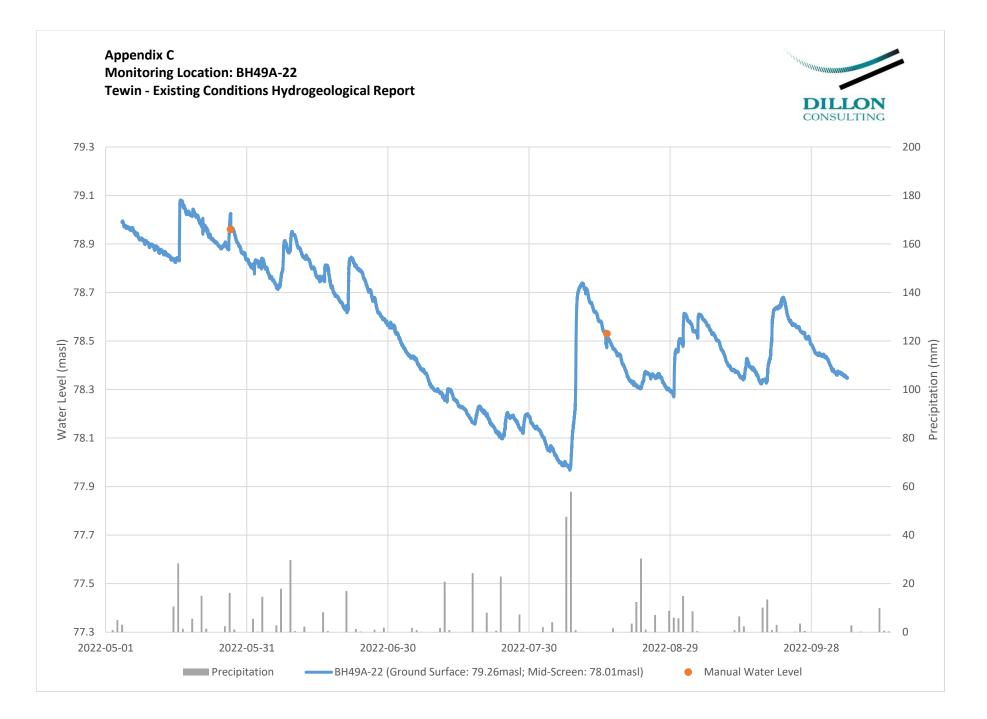


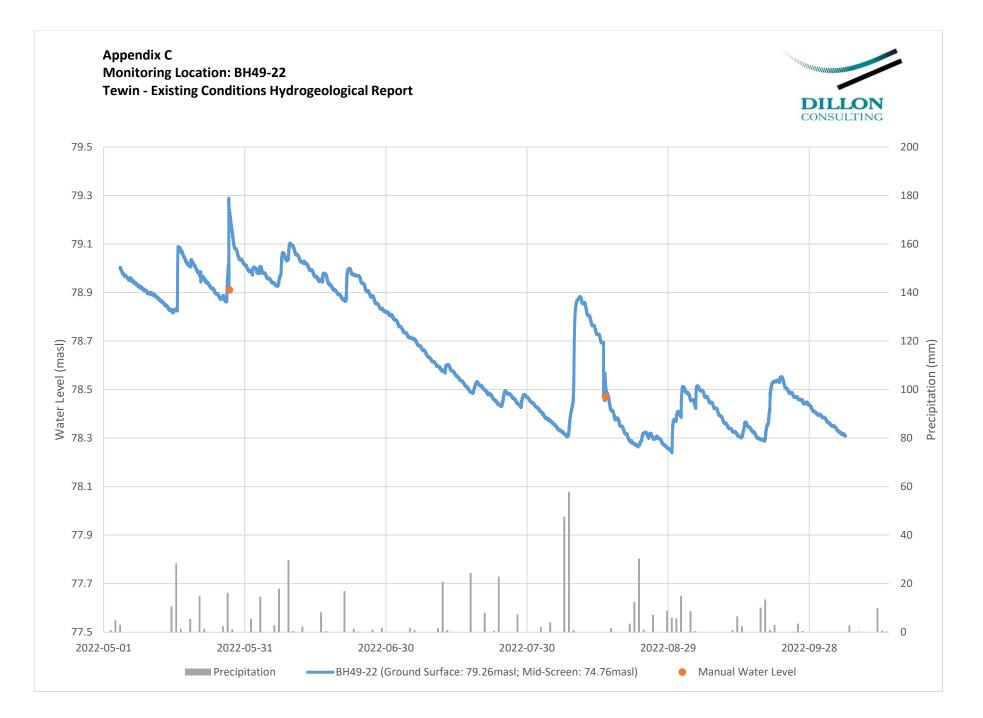


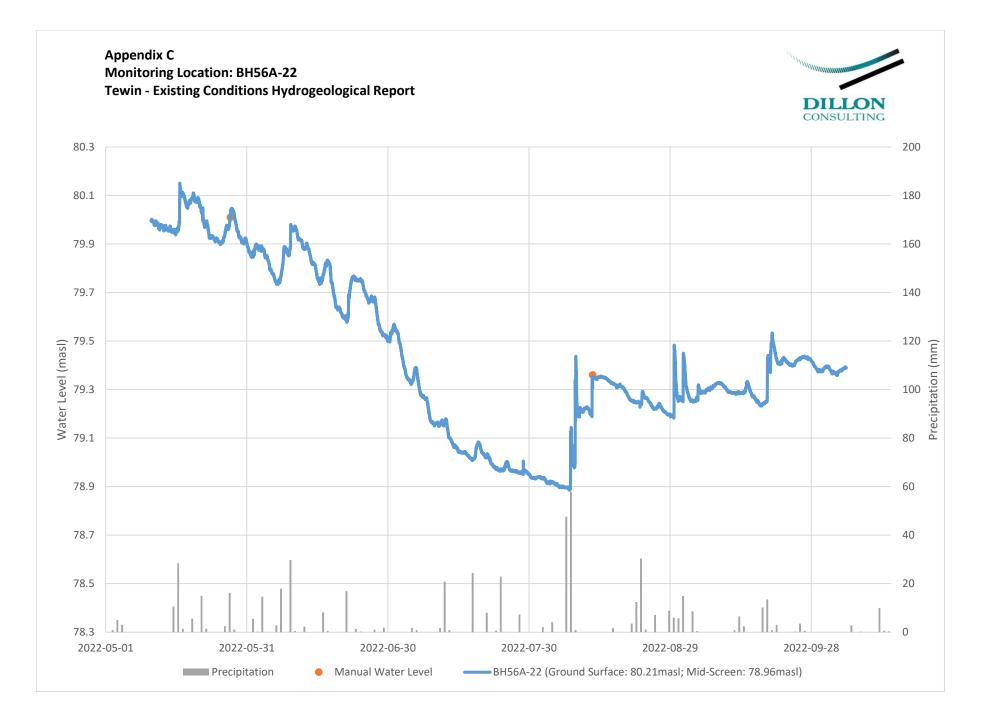


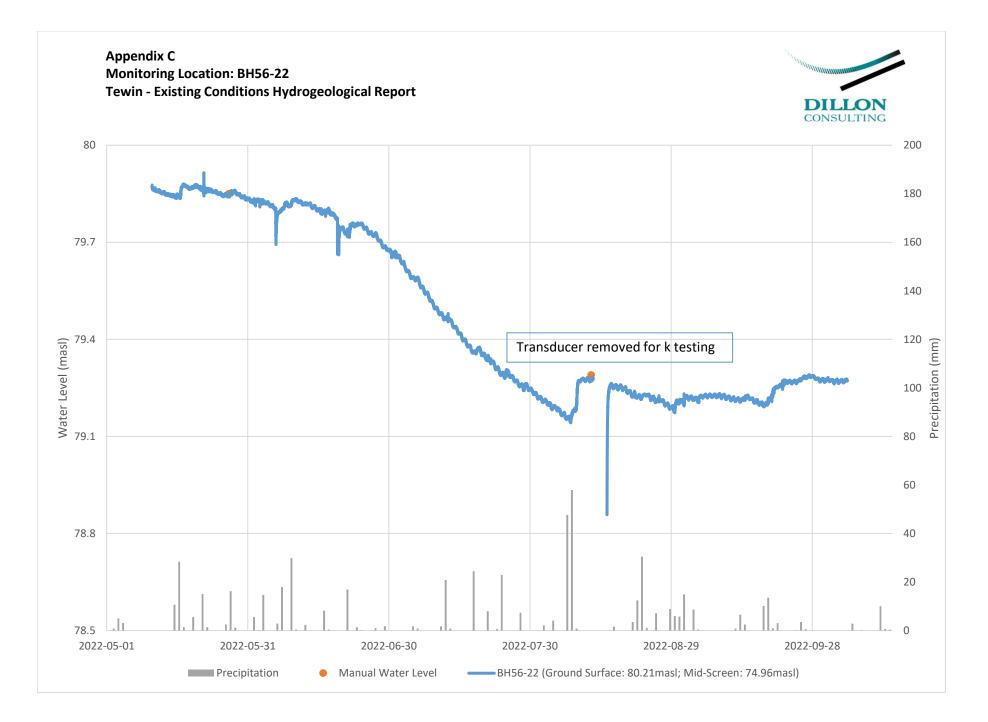


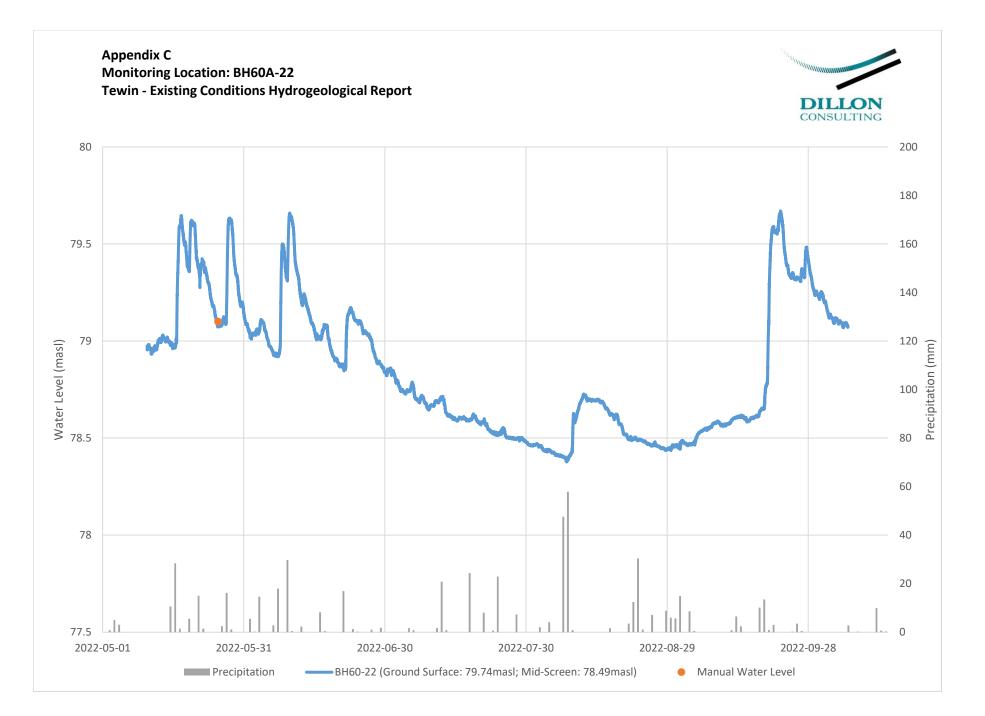


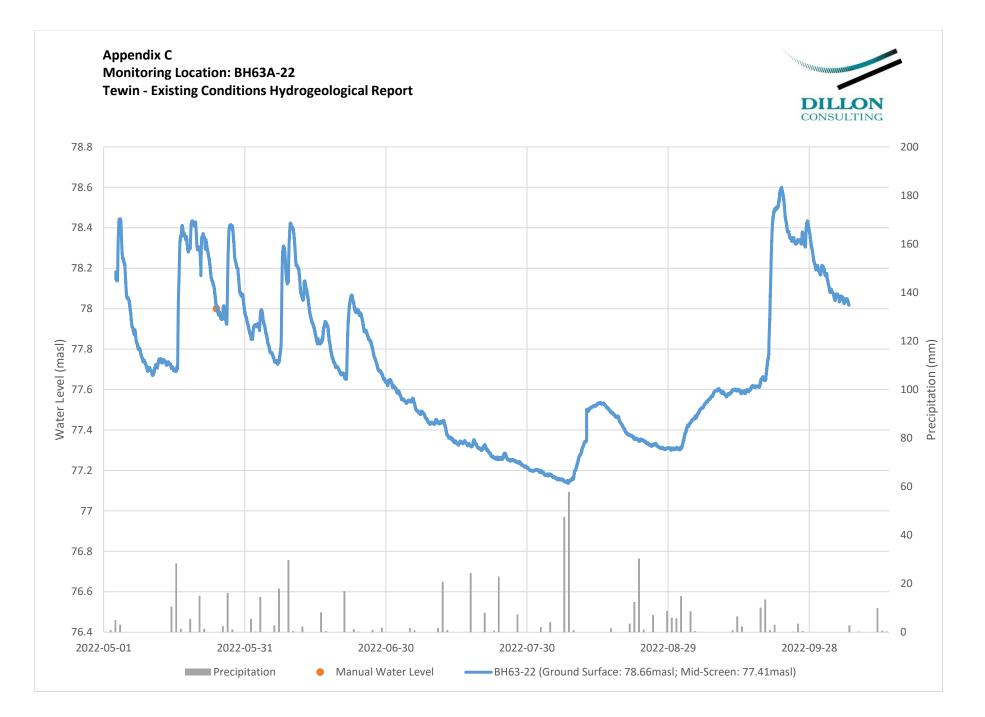












Appendix D

Groundwater Analytical Results

Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674





	Units	RDL	Sample						
Parameter			BH14-22	BH22-22	BH47-22	BH63-22	Dup1	P2 2404197-04	
Sample Date (m/d/y)			01/17/2024	01/23/2024	01/23/2024	01/23/2024	01/23/2024	01/23/2024	
General Inorganics									
Alkalinity, total	mg/L	5	317	N/A	306	487	483	102	
Ammonia as N	mg/L	0.01	0.08	N/A	0.06	ND (0.01)	ND (0.01)	0.04	
Phosphorus, total	mg/L	0.01	0.11	N/A	0.66	0.02	0.02	1.39	
Total Kjeldahl Nitrogen	mg/L	0.1	0.3	N/A	0.8	0.2	0.2	1.0	
Anions				1					
Chloride	mg/L	1	414	N/A	138	701	720	10	
Nitrate as N	mg/L	0.1	0.7	N/A	2.7	0.8	0.7	ND (0.1)	
Nitrite as N	mg/L	0.05	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	
Sulphate	mg/L	1	20	N/A	42	87	85	70	
Metals	3								
Mercury	ug/L	0.1	ND (0.1)	N/A	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	
Antimony	ug/L	0.5	ND (0.5)						
Arsenic	ug/L	1	1	ND (1)	2	ND (1)	ND (1)	ND (1)	
Barium	ug/L	1	58	38	124	122	126	22	
Beryllium	ug/L	0.5	ND (0.5)						
Boron	ug/L	10	69	63	22	65	65	ND (10)	
Cadmium	ug/L	0.1	ND (0.1)						
Calcium	ug/L	100	49200	95400	72700	84300	83700	37300	
Chromium	ug/L	1	ND (1)	ND (1)	8	ND (1)	ND (1)	2	
Chromium (VI)	ug/L	1	ND (1)	1					
Cobalt	ug/L	0.5	ND (0.5)	ND (0.5)	3.6	ND (0.5)	ND (0.5)	ND (0.5)	
Copper	ug/L	0.5	0.9	0.6	12.6	1.2	1.7	0.8	
Lead	ug/L	0.1	ND (0.1)	ND (0.1)	2.9	0.1	ND (0.1)	ND (0.1)	
Magnesium	ug/L	200	37000	83600	33000	66300	66500	10500	
Molybdenum	ug/L	0.5	4.6	1.0	ND (0.5)	1.5	1.4	ND (0.5)	
Nickel	ug/L	1	ND (1)	ND (1)	7	ND (1)	ND (1)	ND (1)	
Potassium	ug/L	100	11200	9110	1500	8000	7720	745	
Selenium	ug/L	1	ND (1)	ND (1)	3	ND (1)	ND (1)	ND (1)	
Silver	ug/L	0.1	ND (0.1)						
Sodium	ug/L	200	257000	485000	89700	465000	463000	15000	
Thallium	ug/L	0.1	ND (0.1)						
Uranium	ug/L	0.1	1.3	7.2	1.9	3.2	3.2	ND (0.1)	
Vanadium	ug/L	0.5	1.4	ND (0.5)	14.7	1.1	1.2	0.9	
Zinc	ug/L	5	21	ND (5)	18	ND (5)	ND (5)	ND (5)	

Notes:

Dup1	Field duplicate of BH63-22
NV	No Value
ug/L	Microgram per litre
mg/L	Milligram per litre
ND	No data
RDL	Reportable Detection Limit
N/A	Not applicable
*	Dependent on Hardness as CaCO3



Certificate of Analysis

Paracel ID Client ID	
This Certificate of Analysis contains analytical data applicable to the following samples as submitted:	
Custody: 72074	01001 #. 2404137
Project: 223674	Order #: 2404197
Client PO:	Order Date: 23-Jan-2024
Attn: Matthew McCurdy	Report Date: 29-Jan-2024
Ottawa, ON K2E 7J4	
177 Colonnade Road, Suite 101	
Dillon Consulting Ltd. (Ottawa)	

Paracel ID	Client ID
2404197-01	BH14-22
2404197-02	BH47-22
2404197-03	BH63-22
2404197-04	P2
2404197-05	Dup1
2404197-06	BH22-22

Approved By:

Mark Foto

Mark Foto, M.Sc.



Certificate of Analysis

Alkalinity, total to pH 4.5

Phosphorus, total, water

Total Kjeldahl Nitrogen

Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Analysis

Anions

Ammonia, as N

Mercury by CVAA

Metals, ICP-MS

Analysis Summary Table

Chromium, hexavalent, water, low level

Extraction Date

24-Jan-24

29-Jan-24

24-Jan-24

25-Jan-24

24-Jan-24

25-Jan-24

24-Jan-24

24-Jan-24

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Analysis Date

24-Jan-24

29-Jan-24

24-Jan-24

25-Jan-24

24-Jan-24

25-Jan-24

25-Jan-24

25-Jan-24

Project Description: 223674

OTTAWA = MISSISSAUGA	 HAMILTON 	 KINGSTON 	 LONDON 	 NIAGARA 	 WINDSOR 	RICHMOND HIL	.L
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Method Reference/Description

EPA 310.1 - Titration to pH 4.5

EPA 351.2 - Auto Colour

EPA 200.8 - ICP-MS

MOE E3056 - colourimetric

EPA 245.2 - Cold Vapour AA

EPA 365.4 - Auto Colour, digestion

EPA 351.2 - Auto Colour, digestion

EPA 300.1 - IC



Certificate of Analysis

Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

	Client ID:	BH14-22	BH47-22	BH63-22	P2		
	Sample Date:	17-Jan-24 11:07	23-Jan-24 09:55	23-Jan-24 11:15	23-Jan-24 13:00	-	-
	Sample ID:	2404197-01	2404197-02	2404197-03	2404197-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
General Inorganics							
Alkalinity, total	5 mg/L	317	306	487	102	-	-
Ammonia as N	0.01 mg/L	0.08	0.06	<0.01	0.04	-	-
Phosphorus, total	0.01 mg/L	0.11	0.66	0.02	1.39	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	0.8	0.2	1.0	-	-
Anions							
Chloride	1 mg/L	414	138	701	10	-	-
Nitrate as N	0.1 mg/L	0.7	2.7	0.8	<0.1	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05	-	-
Sulphate	1 mg/L	20	42	87	70	-	-
Metals							
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1	-	-
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Arsenic	1 ug/L	1	2	<1	<1	-	-
Barium	1 ug/L	58	124	122	22	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5	-	-
Boron	10 ug/L	69	22	65	<10	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1	-	-
Calcium	100 ug/L	49200	72700	84300	37300	-	-
Chromium (VI)	1 ug/L	<1	<1	<1	1	-	-
Chromium	1 ug/L	<1	8	<1	2	-	-
Cobalt	0.5 ug/L	<0.5	3.6	<0.5	<0.5	-	-
Copper	0.5 ug/L	0.9	12.6	1.2	0.8	-	-
Lead	0.1 ug/L	<0.1	2.9	0.1	<0.1	-	-
Magnesium	200 ug/L	37000	33000	66300	10500	-	-
Molybdenum	0.5 ug/L	4.6	<0.5	1.5	<0.5	-	-

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Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

	Client ID: Sample Date: Sample ID: Matrix: MDL/Units	BH14-22 17-Jan-24 11:07 2404197-01 Ground Water	BH47-22 23-Jan-24 09:55 2404197-02 Ground Water	BH63-22 23-Jan-24 11:15 2404197-03 Ground Water	P2 23-Jan-24 13:00 2404197-04 Ground Water	-	-
Metals					•		•
Nickel	1 ug/L	<1	7	<1	<1	-	-
Potassium	100 ug/L	11200	1500	8000	745	-	-
Selenium	1 ug/L	<1	3	<1	<1	-	-
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1	-	-
Sodium	200 ug/L	257000	89700	465000	15000	-	-
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1	-	-
Uranium	0.1 ug/L	1.3	1.9	3.2	<0.1	-	-
Vanadium	0.5 ug/L	1.4	14.7	1.1	0.9	-	-
Zinc	5 ug/L	21	18	<5	<5	-	-



Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

	г		I		,		
	Client ID:	Dup1	BH22-22				
	Sample Date:	23-Jan-24 12:00	23-Jan-24 16:20			-	-
	Sample ID:	2404197-05	2404197-06				
	Matrix:	Ground Water	Ground Water				
	MDL/Units						
General Inorganics							
Alkalinity, total	5 mg/L	483	-	-	-	-	-
Ammonia as N	0.01 mg/L	<0.01	-	-	-	-	-
Phosphorus, total	0.01 mg/L	0.02	-	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.2	-	-	-	-	-
Anions							
Chloride	1 mg/L	720	-	-	-	-	-
Nitrate as N	0.1 mg/L	0.7	-	-	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-	-	-
Sulphate	1 mg/L	85	-	-	-	-	-
Metals							
Mercury	0.1 ug/L	<0.1	-	-	-	-	-
Antimony	0.5 ug/L	<0.5	<0.5	-	-	-	-
Arsenic	1 ug/L	<1	<1	-	-	-	-
Barium	1 ug/L	126	38	-	-	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	-	-	-	-
Boron	10 ug/L	65	63	-	-	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	-	-	-	-
Calcium	100 ug/L	83700	95400	-	-	-	-
Chromium	1 ug/L	<1	<1	-	-	-	-
Chromium (VI)	1 ug/L	<1	<1	-	-	-	-
Cobalt	0.5 ug/L	<0.5	<0.5	-	-	-	-
Copper	0.5 ug/L	1.7	0.6	-	-	-	-
Lead	0.1 ug/L	<0.1	<0.1	-	-	-	-
Magnesium	200 ug/L	66500	83600	-	-	-	-
Molybdenum	0.5 ug/L	1.4	1.0	-	-	-	-

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Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

	Client ID: Sample Date: Sample ID: Matrix: MDL/Units	Dup1 23-Jan-24 12:00 2404197-05 Ground Water	BH22-22 23-Jan-24 16:20 2404197-06 Ground Water			-	-
Metals	II						
Nickel	1 ug/L	<1	<1	-	-	-	-
Potassium	100 ug/L	7720	9110	-	-	-	-
Selenium	1 ug/L	<1	<1	-	-	-	-
Silver	0.1 ug/L	<0.1	<0.1	-	-	-	-
Sodium	200 ug/L	463000	485000	-	-	-	-
Thallium	0.1 ug/L	<0.1	<0.1	-	-	-	-
Uranium	0.1 ug/L	3.2	7.2	-	-	-	-
Vanadium	0.5 ug/L	1.2	<0.5	-	-	-	-
Zinc	5 ug/L	<5	<5	-	-	-	-

PARACEL

Certificate of Analysis

Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Method Quality Control: Blank

Order #:	2404197

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Nitrate as N	ND	0.1	mg/L					
Nitrite as N	ND	0.05	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Alkalinity, total	ND	5	mg/L					
Ammonia as N	ND	0.01	mg/L					
Phosphorus, total	ND	0.01	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Metals								
Mercury	ND	0.1	ug/L					
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.1	ug/L					
Calcium	ND	100	ug/L					
Chromium (VI)	ND	1	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Lead	ND	0.1	ug/L					
Magnesium	ND	200	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Potassium	ND	100	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Sodium	ND	200	ug/L					
Thallium	ND	0.1	ug/L					
Uranium	ND	0.1	ug/L					
Uranium	UN	0.1	uy/L					

OTTAWA - MISSISSAUGA - HAMILTON - KINGSTON - LONDON - NIAGARA - WINDSOR - RICHMOND HILL



Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

PARACEL

Certificate of Analysis

Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Method Quality Control: Duplicate

Order	±٠	240	41	97
UIUEI	π .	24U	-	31

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	716	5	mg/L	720			0.6	20	
Nitrate as N	0.69	0.1	mg/L	0.69			0.3	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
Sulphate	86.5	1	mg/L	84.6			2.3	10	
General Inorganics									
Alkalinity, total	314	5	mg/L	317			1.0	14	
Ammonia as N	0.081	0.01	mg/L	0.081			0.6	18	
Phosphorus, total	ND	0.01	mg/L	ND			NC	15	
Total Kjeldahl Nitrogen	0.27	0.1	mg/L	0.26			6.1	16	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	0.66	0.5	ug/L	ND			NC	20	
Arsenic	1.2	1	ug/L	1.4			11.1	20	
Barium	96.1	1	ug/L	98.0			2.0	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	160	10	ug/L	164			2.3	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Calcium	60400	100	ug/L	61000			1.1	20	
Chromium (VI)	ND	1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	6.68	0.5	ug/L	6.73			0.6	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Magnesium	24900	200	ug/L	25200			1.1	20	
Molybdenum	23.0	0.5	ug/L	22.8			1.0	20	
Nickel	ND	1	ug/L	ND			NC	20	
Potassium	2160	100	ug/L	2210			2.1	20	
Selenium	1.4	1	ug/L	1.4			0.9	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	64500	200	ug/L	66300			2.8	20	

OTTAWA - MISSISSAUGA - HAMILTON - KINGSTON - LONDON - NIAGARA - WINDSOR - RICHMOND HILL



Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Analyte

Thallium

Uranium

Zinc

Vanadium

Method Quality Control: Duplicate

Notes

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

Source

Result

ND

3.6

1.36

ND

Units

ug/L

ug/L

ug/L

ug/L

Reporting

Limit

0.1

0.1

0.5

5

Result

ND

3.6

1.29

ND

%REC

Limit

%REC

RPD

Limit

20

20

20

20

RPD

NC

1.0

5.3

NC

PARACEL

Certificate of Analysis

Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes	
Anions										
Chloride	10.6	1	mg/L	ND	106	78-114				
Nitrate as N	1.70	0.1	mg/L	0.69	101	77-126				
Nitrite as N	0.892	0.05	mg/L	ND	89.2	82-115				
Sulphate	94.1	1	mg/L	84.6	95.5	74-126				
General Inorganics Ammonia as N	1.11	0.01	mg/L	0.081	102	81-124				
Phosphorus, total	1.05	0.01	mg/L	ND	105	80-120				
Total Kjeldahl Nitrogen	1.31	0.1	mg/L	0.26	105	81-126				
Metals										
Mercury	2.91	0.1	ug/L	ND	97.1	70-130				
Arsenic	53.4	1	ug/L	1.4	104	80-120				
Barium	143	1	ug/L	98.0	89.9	80-120				
Beryllium	46.1	0.5	ug/L	ND	92.3	80-120				
Boron	46	10	ug/L	ND	91.3	80-120				
Cadmium	48.4	0.1	ug/L	ND	96.7	80-120				
Calcium	67100	100	ug/L	61000	61.4	80-120			QM-07	
Chromium (VI)	155	1	ug/L	ND	77.5	70-130				
Chromium	49.0	1	ug/L	ND	97.9	80-120				
Cobalt	46.9	0.5	ug/L	ND	93.7	80-120				
Copper	50.8	0.5	ug/L	6.73	88.2	80-120				
Lead	43.4	0.1	ug/L	ND	86.7	80-120				
Magnesium	31700	200	ug/L	25200	65.7	80-120			QM-07	
Molybdenum	67.2	0.5	ug/L	22.8	88.8	80-120				
Nickel	46.5	1	ug/L	ND	92.3	80-120				
Potassium	11500	100	ug/L	2210	93.2	80-120				
Selenium	48.0	1	ug/L	1.4	93.2	80-120				
Silver	42.6	0.1	ug/L	ND	85.2	80-120				
Sodium	9170	200	ug/L	ND	91.7	80-120				
Thallium	44.4	0.1	ug/L	ND	88.7	80-120				
Uranium	51.4	0.1	ug/L	3.6	95.6	80-120				

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Order #: 2404197

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024



Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Analyte

Zinc

Vanadium

Method Quality Control: Spike

Reporting

Limit

0.5

5

Result

51.4

49

Order	±٠	2404197
	π.	ETUTIU

Notes

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

Project Description: 223674

%REC

Limit

80-120

80-120

Source

Result

1.36

ND

%REC

100

89.1

Units

ug/L

ug/L

RPD

Limit

RPD



Client: Dillon Consulting Ltd. (Ottawa)

Client PO:

Qualifier Notes:

QC Qualifiers:

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Report Date: 29-Jan-2024

Order Date: 23-Jan-2024

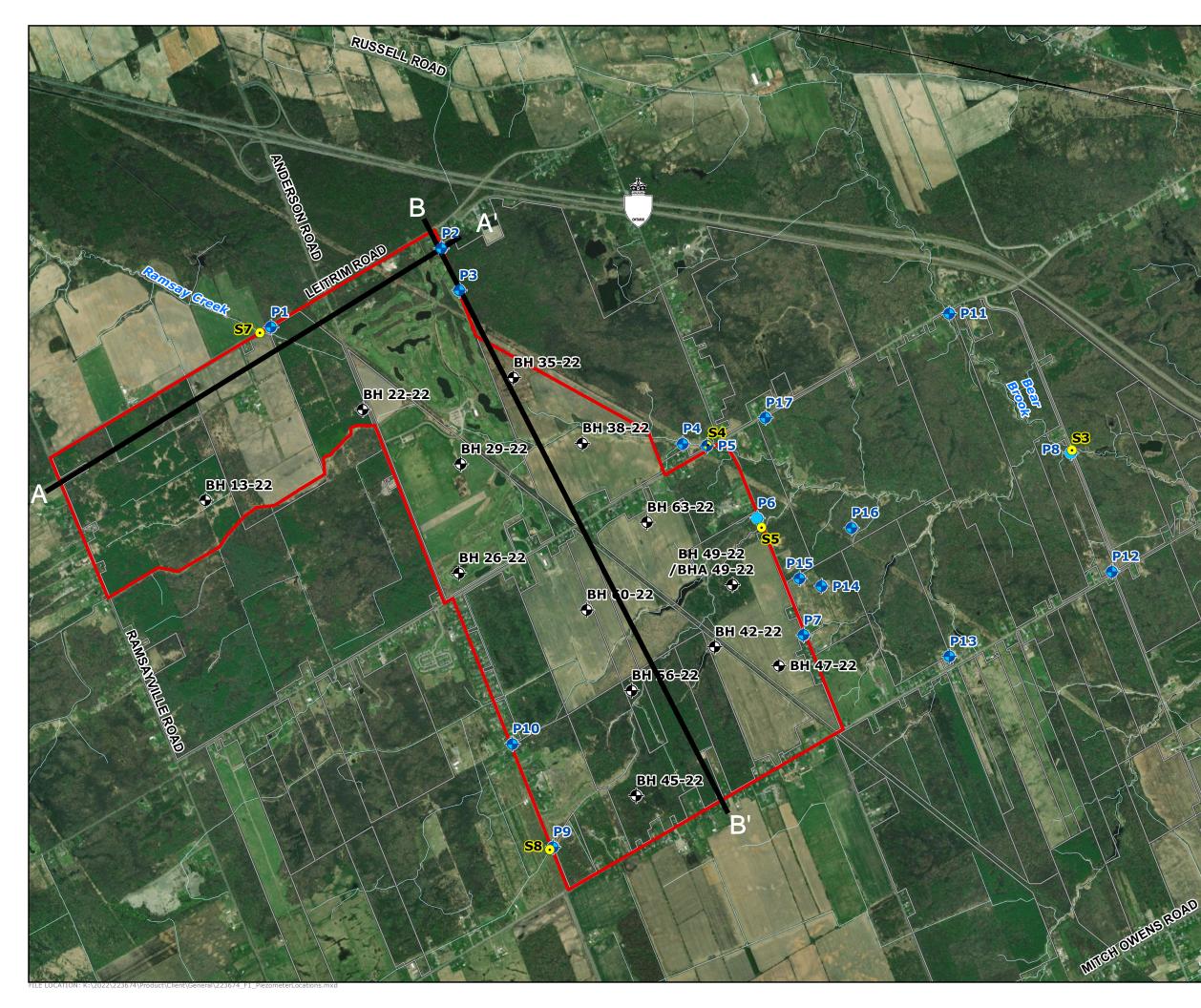
VOPARACE LABORATORIES LT				04197	vd. J8 com		el Order ab Use (Number Dnly)	CH Nº	(Lab Use	Custody only) 074
Client Name: Dillon Consulting Ltd		Proj	ect Ref:	223	674	910	117	+			
Matthew McCurdy		Quot	e#:	24-060)- (14	_					of
177 Colonnade Rd, Nepean, ON K2E 75 Suite 101 Telephone: 613.745-6338 ext. 630 6038	4	PO #	il:	curdy@di					☐ 1 day ☐ 2 day Date Requi		nd Time ☐ 3 day Ø Regular
Table 1 Res/Park Med/Fine REG 558 PWQ0 Table 2 Ind/Comm Coarse CCME MISA	S	Aatrix SW (Su	Irface \	S (Soil/Sed.) GW (G Nater) SS (Storm/Sa Paint) A (Air) O (Oth	nitary Sewer)			1 1	Required Anal	/sis	
□ Table 3 □ Agri/Other □ SU - Sani □ SU - Storm □ Table Mun:	S Matrix	Air Volume	Ch # of Containers	Sample Date 17-01-24	Time	Cler Chemas Der Grote	Nukrients as				
BH 47-22 BH 63-22 4 P2	GW GW GW		5 5 5	23-01-24	09:55						
6 BH22-22	GW GW		5	23-01-24 23-01-24 23-01-24	12:00						
8 9 10											
Comments: Metals are field filtered Relinquished By (Sign): N GALY D GALE Relinquished By (Print): N L L L L L L L L L L L L L L L L L L L	xot:		en se si se		eceived at Lab:	B	160	Met	hod of Delivery:	al	an
Date/Time: 23-01-24 16:50 Temperature: Chain of Custody (Blank) xlsx					emperature:	N (2)	40 Pc	pH V	erified.	14 D	1485

Appendix E

Geological Model Cross-Sections

Taggart Investments and Algonquins of Ontario *Tewin Lands* April 2024 (Revised September 2024) – 22-3674





TEWIN HYDROGEOLOGY ASSESSMENT

Cross-Sections

- Borehole Locations (Paterson)
- Piezometer Location (Dillon)
- Surface Water Monitoring Sites (JFSA)
- Study Area
- ----- Railway
 - Watercourse
 - Property Boundary





MAP DRAWING INFORMATION: DATA PROVIDED BY MNRF, Dillon Consulting Limited, Imagery by ESRI basemaps

MAP CREATED BY: LMM MAP CHECKED BY: -MAP PROJECTION: NAD 1983 MTM 9

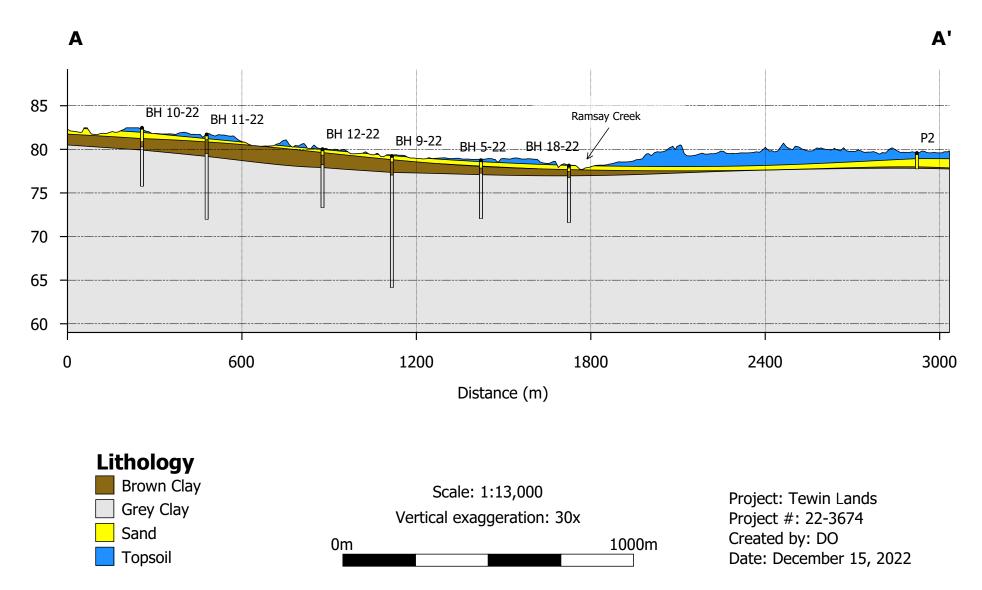
DILLON CONSULTING

PROJECT: 22-3674 STATUS: FINAL

DATE: 2024-04-25

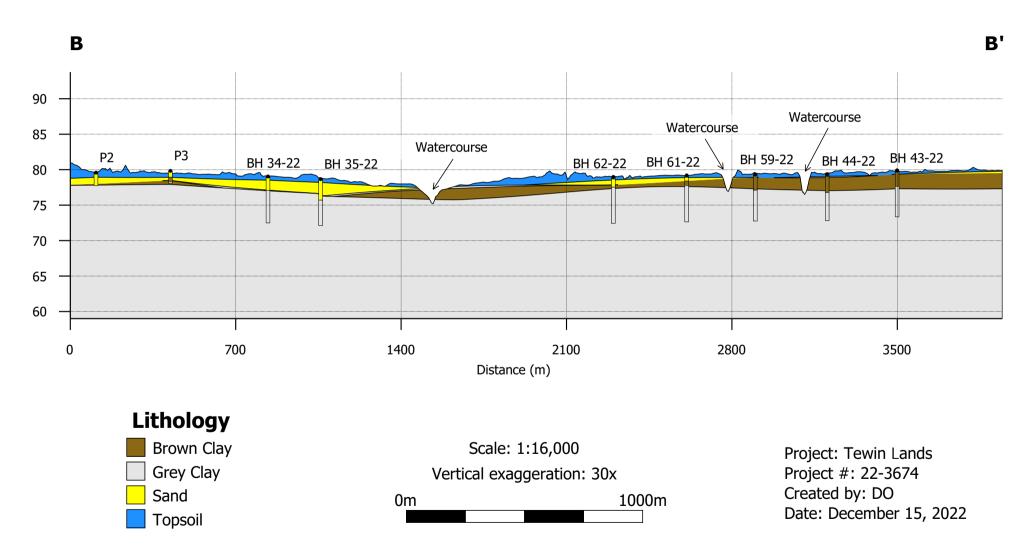


Cross Section: A-A'





Cross Section: B-B'



Appendix F

Groundwater Flow Modelling Memo





Memo



To: Taggart Investments and Algonquins of Ontario

From: Dillon Consulting Limited

Date: April 25, 2024

Subject: Tewin Existing Hydrogeological Conditions Assessment - Groundwater Flow Modelling Component

Our File: 22-3674

Dillon Consulting Limited (Dillon), part of the Tewin Lands consulting team, is responsible for completing an existing conditions hydrogeological assessment for the future Tewin Lands (herein the "Study Area") in Ottawa, Ontario. This submission describes the development of the hydrogeological Conceptual Site Model (CSM) supporting the development of the groundwater flow model for the Study Area.

The hydrogeological CSM describes the geological and hydrogeological environment within the Study Area, including expected groundwater recharge areas and points of groundwater discharge. This in turn informs the development of the groundwater flow model, including the selection of hydrostratigraphic units to be simulated, and boundary conditions.

Conceptual Site Model

The CSM was developed using existing data from ongoing monitoring at the site, and available pertinent databases (e.g., climate data, provincial geological/hydrogeological mapping). The CSM was used to aid in the development of a numerical, three-dimensional, groundwater flow model for the assessment.

Leapfrog software (Version 3.0.4) was used to prepare the geological information and existing boreholes/monitoring wells, topography, surficial geology, bedrock geology information for incorporation into a three-dimensional geological model. A finite-element mesh was then constructed in Leapfrog, incorporating a sufficient level of refinement (i.e., elemental sizing and node spacing) as a means to appropriately characterize varying geological/hydrogeological/hydrological conditions in pertinent areas of interest (e.g., surficial water features, inferred geological contacts). The geological model and finite-element mesh were then exported into FEFLOW.

FEFLOW (Version 7.2) was then used to develop the numerical groundwater flow model. This included assigning input parameters such as the shallow permeable unit recharge rates, boundary conditions and hydraulic properties to corresponding elements and nodes within the flow model. FEFLOW simulations were run and parameters were adjusted to calibrate to model existing conditions (i.e., steady-state conditions based on the available ongoing monitoring data).

The CSM domain is based upon the proximal extents of the surface water catchment defined by the topography and drainage around the site, as well as the surface water features and hydrogeological properties of the deposits at the site. The approximate limits of the CSM domain are illustrated on Figure 1, below.





Data Sources

The data sources used for the development of the model are listed in Table 1 below. Table 1 - Summary of Input Data and Sources

Data Type	Source							
Digital Elevation Model (DEM)	The province of Ontario Digital Elevation Model							
	Dillon, 2022							
Well Logs and Stratigraphy	Paterson Group, 2022							
	MECP Water Well Information System, 2022							

Data Type	Source	
Hydraulic Conductivity Data	Paterson / Dillon 2022 Permeability and Slug Tests	
Base Overlay	ESRI, Maxar, Earthstar Geographics	
Watercourse/Water Body Mapping	Ontario Ministry of Natural Resources and Forestry Mapping (MNRF)	

Site Setting and Surficial Geology

The site is located on a relatively uniform northeast-southwest trend of Champlain Sea sediments which consist of clay and silty clay marine deposits with upper sections consisting of brown silty clay, overlain by pockets of sand, and move towards medium to fine sand and gravelly-sand deltaic and nearshore deposits in the northeastern section of the site. The overburden sands are typically 1-2 metres thick, whereas the clays reach up to 30 metres in thickness. The surficial geology was provided by the Geological Survey of Canada, and the details describing the sequence by Gadd (1963, and 1986).

The sand deposits overlying the silty clay represent a shallow permeable unit, and the silty clays represent aquitard conditions, therefore it is reasonable to assume that the site receives relatively lower amounts of recharge in a given year. Borehole data is provided in Appendix A, and additional details regarding the shallow permeable unit recharge are provided in the section below.

Hydrostratigraphic Units

From a hydrogeological perspective, it is more instructive to classify units in terms of hydrostratigraphy (i.e., units with similar hydrogeological properties), herein referred to as "HGUs". This is typically broadly similar to the stratigraphic units based strictly on geological properties, but may vary where adjoining units behave similarly in terms of groundwater flow, or where there are differences in hydrogeological properties within units. The hydrostratigraphic profile for the area can be described as follows (starting from surface, or youngest to oldest):

• Shallow silty sands (HGU1) – this unit consists of silty sands that range in fine to medium grain size, contains trace gravels and clay, and transitions into the underlying brown silty clay unit. This unit also represents the shallow permeable unit overlying the clay aquitard and is fairly continuous throughout the site, although the layer is relatively thin. The sands generally outcrop along the river banks.

• Silty clays (HGU2 and HGU3) – The silty clays encompass the majority of the subsurface in the Study Area (the CSM domain) and represent the aquitard. These finer grained materials represent Champlain Sea sediments deposited while deeper water conditions prevailed following glacial retreat. The clays are separated into two units: brown silty clay (HGU2) and grey clay (HGU3), based on stiffness and the degree of weathering and fracturing with depth – the grey clay being much less weathered and fractured than the overlying brown clay.

Hydrogeologic Properties

Hydraulic conductivity values were calculated using slug test data collected by Paterson within the Study Area, which were then used to represent the varying hydrogeological conditions throughout the model domain. A brief summary of hydraulic conductivity values from the recent assessment work (i.e., 2022 slug and permeameter tests) and other sources, is provided below in Table 2.

Hydrostratigraphic Unit	Measured Hydraulic Conductivity (m/s)			
	Average	Maximum	Minimum	
Silty Sands (HGU1)	3.7 × 10 ⁻⁶	6.3 × 10 ⁻⁵	8.1 × 10 ⁻⁹	
Silty Brown Clay (HGU2)	1.7 × 10 ⁻⁷	6.3 × 10 ⁻⁷	8.1 × 10 ⁻⁹	
Silty Grey Clay (HGU3)	8.7 × 10 ⁻⁷	2.0 × 10 ⁻⁵	6.4 × 10 ⁻⁹	

Table 2 - Measured Hydraulic Conductivity

Surface Water Features

Nodes and elements representing surficial water features (e.g. creeks, streams, and larger water bodies) were selected in the groundwater model (GWM) using high-resolution mapping data sourced from the MNRF and by reviewing available aerial photography. The surficial water features were distributed throughout the GWM, and are illustrated on Figure 2.

The surficial water and drainage features were then represented in the GWM by applying boundary conditions. These conditions included constant-head (1st kind/Dirichlet, including seepage faces). In some areas, boundary condition types (i.e., 1st kind or 3rd kind) were varied for selected features during the sensitivity analysis/model calibration stages of the assessment. Additional details regarding model calibration are presented in the section below.

In general, where a feature was known or suspected to have a direct hydraulic connection to the shallow permeable unit (e.g., main watercourses and water bodies, as well as the perimeter nodes), constant-head boundary conditions were applied. Where applicable, known water stage elevations were used for the boundary condition head reference value. Where water stages were unknown, the elevations were interpolated between observation locations and applied as constant head boundary conditions.



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Groundwater Model Calibration and Sensitivity Analyses

The steady state GWM is calibrated to static conditions. This process consists of adjusting hydraulic properties (e.g., hydraulic conductivity, recharge) such that modelled water levels agree with measured data from the Site. During this process, a sensitivity analysis is also completed, where the degree to which changes in the solution, relative to changes in the input parameters, are monitored. The GWM for this site showed sensitivity to the brown silty clay and silty sand hydraulic conductivities, due to the increased flow towards the river nodes, as well as recharge values.

In FEFLOW, the recharge rate is applied as an elemental property and is applied to the top and bottom layers of the model. This value was adjusted to representative values for the HGUs, i.e. a model that is predominantly clay would tend to have relatively lower infiltration rates and higher run off, evapotranspiration, etc. Infiltration rates within the model were only applied to areas without watercourses. The recharge rate was applied to the entire top layer of the GWM, except where there were suspected river "banks" (areas where seepage face boundary conditions were applied).

Model calibration is completed using known water level data. During this assessment, in consideration of the assortment of hydrological, hydrogeological and conceptual site knowledge, a robust calibration is in the process of being completed. This process includes:

- · Calibration of hydraulic head solutions to known water level readings across the site;
- Comparison of calibrated hydraulic properties (e.g., hydraulic conductivity) in the GWM to field measured data (i.e., slug tests, permeameter tests); and,
- Calibration of discharge at river nodes.

Parameter Recharge (mm/a)		Value 20
HGU1 (silty sand)	1.0 × 10 ⁻⁵	
HGU2 (silty brown clay)	5.5 × 10 ⁻⁷	
HGU3 (silty grey clay – upper layers)	5.0 × 10 ⁻⁸	
HGU3 (silty grey clay – mid layers)	1.0 × 10 ⁻⁹	
HGU3 (silty grey clay – lower layers)	1.0 × 10 ⁻¹⁰	

The calibrated parameter (hydraulic conductivity, and recharge) values are presented in Table 3, below: Table 3 - Calibrated Parameter Values Scatter plots are used to assess the statistical agreement between modelled solutions and known data. A scatter plot of the modelled static solution (prior to sewer integration) compared to the known water level data is presented below on Figure 3. The modelled results (i.e., computed head values from each observation well) is presented along the vertical axis, while the corresponding observed result (i.e., actual head value at each observation well) is presented along the horizontal axis. Calculated statistical values based on the scatter plot include normalized error (\bar{E}) with a value of 1.04, root mean square (RMS) with a value of 1.47, and standard deviation (σ) with a value of 1.48. These results are within standard acceptable norms for groundwater flow model calibration. The resulting scatter plot is shown in Figure 3, below.

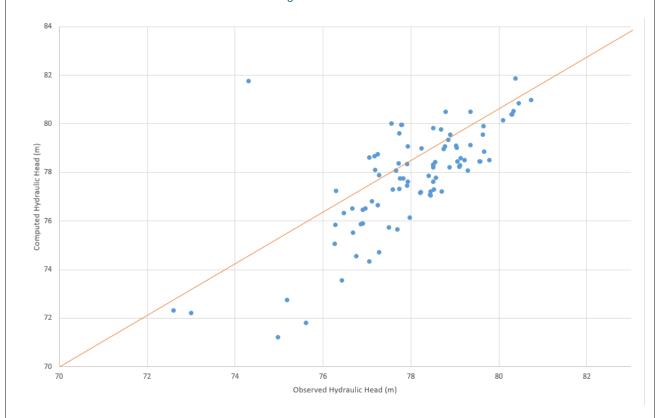
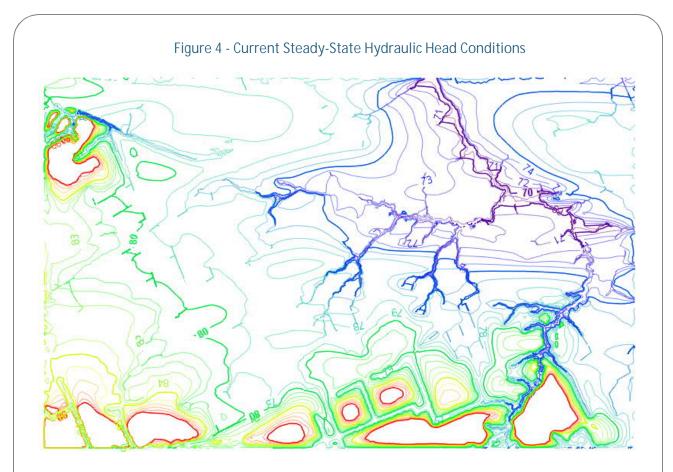


Figure 3 - Scatter Plot

A water table map for the current steady-state model conditions is presented in Figure 4, below:



References

Dillon, April 2024. Tewin Lands: Existing Conditions Hydrogeological Study

Ontario Geological Survey, 2003. Surficial Geology of Southern Ontario.

Gadd, N.R., 1963. Surficial Geology of Ottawa map-area, Ontario and Quebec. Geological Survey of Canada, Map 16-1962.

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