



CLARK
CONSULTING SERVICES

Planning Justification

Consent Application

Township of Douro-Dummer

Lot 11, Concession 1 Dummer Ward

CCS Project No. 2092

May 2020

Prepared for: Fred Clifford

Prepared by: **Clark Consulting Services**

1. INTRODUCTION

Clark Consulting Services has been retained by the landowner of subject lands located in the Hamlet of Warsaw to undertake a planning assessment to sever 1 lot from the retained parcel.

The subject lands had 3 residential severances approved in 2017. This application is to sever the last feasible residential lot in the southern area of the subject lands.

This report is submitted in support of that consent application.

A Severance Proposal Form was submitted to the County of Peterborough on September 27, 2019. On November 15, 2019 a Preliminary Severance Review was prepared by the Peterborough County Planning Department, please see Attachment A. In response to this review the lot configuration was revised and resubmitted for comments. The proposed lot configuration was presented to the Township of Douro-Dummer Planning Advisory Committee meeting on March 2, 2020. At that meeting further information was requested concerning water provision and residents in attendance objected to the proposed severance. The following report will provide a policy review in support of the application, and provide the additional information requested related to water capacity, access and safety and review potential impacts on adjacent property owners and natural features.

2. SITE DESCRIPTION

These lands are located in the southern portion of the Hamlet of Warsaw as illustrated on *Figure 1- Location Map*. Residential uses are located to the north and west with farmland to the east and an unevaluated wetland to the south. The parcel is irregularly shaped and extends from South Street on the west to Clifford Street on the north. The 5.57ha(13.76 ac) property is vacant in the north and south with a woodland in the center. The woodlands are located on a steep sloped area

effectively dividing the site. The retained parcel has frontage on Clifford Road and can obtain access from Banks Road and the proposed severed parcel has frontage on South St (County Road 38).

3. PROPOSAL

The proposal is to sever a 1.49ha (3.68ac) residential lot with frontage on South Street (County Road 38) from the retained parcel of 4.08ha (10.08 ac) that has frontage on Clifford Road. The proposal is illustrated on the Consent Sketch attached as *Figure 2*.

The consent sketch attached proposes 1 irregular shaped lot in the southern area leaving the retained area for future development. A private driveway is proposed from County Road 38.. The proposed lot does not inhibit future development and, though irregular, works with the existing site condition working to reduce impact on the adjacent unevaluated wetland to the south and the woodland in the center of the parcel.

4. REVIEW OF PLANNING DOCUMENTS

The subject lands are located in the Hamlet of Warsaw, in the Township of Douro-Dummer in the County of Peterborough. CCS has reviewed relevant planning policy as it relates to the subject lands including the Provincial Policy Statement (2014 and Proposed May 1, 2020), The Greater Golden Horseshoe Growth Plan, the County of Peterborough Official Plan and the Township of Douro-Dummer Zoning By-law.

4.1 Provincial Policy Statement

The Provincial Policy Statement(PPS) issued under Section 3 of the Planning Act and effective as of May 1, 2020 in section 1.1.4.2 directs that in rural areas rural settlement areas shall be the focus of growth and development.

The proposed consent works to provide a housing option in a designated rural settlement area.

An unevaluated wetland identified as a key natural heritage feature is located south of the proposed severed lot. Section 2.1 of the PPS requires planning authorities to protect natural heritage features. The existing wetland feature was rezoned to Environmental Conservation (EC) Zone through the past severances. ORCA were supportive of past approved applications and did a preliminary review of the subject consent and noted that the revised plan appears to meet applicable policy as the proposed new lot lines will not traverse hydrologic features and the 30 metre buffer is zoned to limit development. ORCA will review the proposed application through the formal agency review process.

A small portion of the north area of the subject lands is identified as a primary sand and gravel



aggregate resource. In the past application reviews the Minister of Natural Resources and Forestry had no concerns with development due to the constraints as it is located in a designated settlement area.

MDS is also addressed through provincial policy and is reviewed in section 5.3 of this report.

It is the opinion of CCS that the proposed consent is consistent with the Provincial Policy Statement as required by Section 3 of the Planning Act.

4.2 Greater Golden Horseshoe Growth Plan

The Growth Plan of the Greater Golden Horseshoe came into effect on June 16, 2006. Section 2.2.9 contains policy related to Rural Areas. 2.2.9.6 directs units for residential development to settlement areas. The Hamlet of Warsaw is identified as a settlement area.

It is the opinion of CCS that the proposed consent conforms to relevant policy contained within the Growth Plan of the Greater Golden Horseshoe.

4.3 County of Peterborough Official Plan

The subject lands are described as Settlement Area in the County of Peterborough Official Plan. Section 2.6.3.2 permits severances in Settlement Areas provided criteria is met related to servicing and road access (Ss. 2.6.3.2.(A) and (C)). The County plan also functions as the lower tier OP for the Township of Douro-Dummer with local policy contained in Section 6 and 7.

The subject lands are designated Hamlet in the Local Component of the County Official Plan, please see *Figure 3 - County of Peterborough Official Plan Excerpt*. Policy related to Hamlet is contained in section 6.2.3.3. which permits residential development and encourages growth in depth, rather than in strips along the main road.

Section 7 contains local plan policies for general development. Section 7.12 outlines criteria for assessing consent applications. This criteria has been applied to the proposed consent.

7.12.1 direct access from major roads should be restricted and residential lots should, where possible, have access only from internal or minor roads

The proposed lot has access from South Street in line with adjacent land uses that are within a settlement area. The proposed access is the same as adjacent residential land uses.

7.12.3 the proposed consent shall not jeopardize any future plans for a comprehensive residential development of the surrounding area

The proposed residential lot configuration works with the existing environmental features on the



site which limit development links between the southern area and the northern portion of the subject lands. The existing woodland effectively divides the subject lands into two distinct areas. The woodland is on a sloped area in the center of the subject lands that provides a constraint to road access through the site. The only location for a north south internal road is directly behind existing residential lots which is not efficient development form and would not be supported by existing residents. The woodland is also identified in Ministry of Natural Resources and Forestry Natural Heritage Areas mapping and would therefore not be supported for future residential development. However if the County wished to preserve possible future connections an easement over the proposed driveway in favour of the retained parcel would conserve a possible future south north connection albeit inefficient. This is not the preferred option but demonstrates that the proposed consent lot configuration does not jeopardize any future plans for comprehensive development of the surrounding area.

7.12.7 impact on Township's financial status

There are no unusual servicing requirements that would suggest an impact on the Township's financial status.

7.12.8 compatibility

The proposed development is compatible with adjacent residential development to the west. There is an agricultural operation and livestock facility to the east however as outlined in MDS Guideline #36, MDS1 setbacks are not required for proposed land uses changes (e.g. consents, rezonings, redesignations, etc.) within approved settlement areas, as it is generally understood that the long-term use of the land is intended to be for non-agricultural purposes.

7.12.9 traffic hazard

As noted above, the County Road Authority will review the proposal. It is noted that approved consents met criteria for access and safety at the same location demonstrating that access can be safely provided with adequate site lines.

7.12.10 adequate services

A Hydrogeological Assessment Report was completed by GHD in 2017 concluding that servicing the proposed lots in the southern portion of the subject lands was feasible with adequate area for septic fields and wells that will not impact adjacent properties. GHD provided a Hydrogeological letter dated March 31, 2020 supporting the proposed consent. These findings will be discussed in greater detail in Section 5.2 of this report.

7.12.11 creation of lots fronting on and having direct access to a Provincial Highway or County Road should generally be discouraged where an alternative access is available from a Township Road.



County Road 38 (South Street) travels through the designated Settlement Area of Warsaw, and therefore provides frontage and access to all development fronting on it. Due to the designation of these lands, existing driveway access and frontage on this street the proposed lot access is consistent with the adjacent residential development.

7.12.12 Review by Health Unit

As part of the consent review process the health unit will review the proposed servicing of the development and appropriate permits will be required from them. The Hydrogeological Assessment that was completed is Attachment C to this report and is discussed in greater detail in Section 5.2 of this report. The assessment stated that provided that the waste disposal system is properly constructed, no significant impact is anticipated on down gradient baseline water quality functions or to the existing water bearing aquifers. It also stated that the use of properly constructed drilled wells that are certified and adequately sealed, should be sufficient to provide ample quantities of potable groundwater while preserving the long-term water quality of the aquifer complex. A letter dated March 31, 2020 was prepared in support of the proposed consent. Please see Attachment B and C. Further discussion is contained in section 5.2 of this report.

7.12.13 sketch plan

A Concept Sketch has been prepared, please see Figure 2.

7.12.14 in the Township of Douro-Dummer a maximum of 5 lots may be created by consent from a land holding in the Hamlets identified on Schedule A4-1, A4-2 and A4-4

Schedule A4-4 identifies the Hamlet of Warsaw where the subject lands are located. The proposed consent is the 4th proposed lot off of the parent parcel.

7.12.15 lots shall be suitable in size and shape for the use. Generally, the depth of the lot should not be greater than twice the width of the lot

The proposed lot configuration is irregular and as noted above, the shape of the lands and the adjoining environmental features limit the form of development that is feasible for this property. It is our opinion that the site specific circumstances warrant consideration of the variation in shape as proposed.

7.12.16 the lot to be severed shall be an existing lot of record that existed for a minimum of 25 years prior to the date of severance application

Our client advises that these lands meet this criteria and have been unchanged since the last development in 1987, a duration of 29 years.



Based on the above analysis, we conclude that the proposed consent complies with the policies of the County of Peterborough Official Plan.

4.4 Township of Douro-Dummer Zoning By-law

The subject lands are zoned Special District 230 (SD230) with a portion zoned Environmental Conservation (EC), please see excerpt *Figure 4 Zoning Bylaw Excerpt*. All permitted uses, provisions and regulation of the rural (RU) zone apply with the exception of 20 m lot frontage.

The proposed severed parcel meets the requirements of the SD 230 zone proposing 1 residential land use and a lot frontage of 20m. The retained parcel also meets the SD 230 zone requirements.

There is no land use change proposed in the area zoned EC.

If required a zoning amendment of the severed parcel from SD 230 to Rural (RU) could be a condition of consent if the Township decides to proceed as it did with the previously severed residential parcels.

5. ANALYSIS

The following section reviews site specific conditions.

5.1 Natural Features

There is a woodland identified traversing the center of the subject lands and, as discussed above in section 4.1, an unevaluated wetland is located south of the proposed severed lot that has been identified as a key natural heritage feature and/or key hydrologic feature. Section 2.2 of the PPS requires planning authorities to protect natural heritage features. Please see *Figure 5 Natural Heritage Features Map*. The existing wetland feature was re-zoned to Environmental Conservation (EC) Zone through the past severances. ORCA reviewed past approved applications and had no objections as the building envelopes were setback at least 30m from the wetland and at a higher elevation. A request has been sent to ORCA to review the proposed severance. ORCA will review the proposed application.

The adjacent lands to the east are identified as part of the Dummer Swamp, a Natural Heritage System. The proposed severance has no impact on this feature.

In the Peterborough County Preliminary Severance Review dated November. 15, 2019, please see Attachment A, there was a comment that endangered and/or threatened species may exist in the area and on site. When reviewing the Natural Heritage mapping for the area the Eastern Wood-pewee was identified as a species of Special concern since 2012. This bird is found in forest stands of intermediate age and in mature stands with little understory vegetation. It can therefore be



assumed that if this species is found on the subject lands it is within the existing woodland which is not impacted by the proposed consent.

A small portion of the north area of the subject lands is identified as a primary sand and gravel aggregate resource. In the past application reviews the Minister of Natural Resources and Forestry had no concerns with development due to the constraints as it is located in a designated settlement area.

5.2 Servicing

During the pre-consultation process neighbours expressed a concern over the potential impacts of a new well on existing well's capacity and quality. As this was a concern during past consent approvals water conditions have been reviewed in detail finding support of water supply in the southern portion of the subject lands. A Hydrogeological Assessment Report, GHD, Sept. 2017 (Attachment C) and a Hydrogeological Letter dated March 31, 2020 (Attachment B) are attached to this report. Below is an excerpt from the 2020 letter supporting the proposed severance:

GHD completed a Hydrogeological Assessment Report dated September 5, 2017 detailing the pumping tests on each of the three (3) previously severed lots. For developments up to 15 ha, 3 wells are recommended (MECP Guideline D-5-5 for Private Wells – Water Supply Assessment). The report concluded that each of the 3 wells produced about 23 L/min (5 Imperial gallons per minute or lgpm) with minor interference between them and no interference with the nearest dug well. GHD recommended that the future wells be outfitted with flow restrictors to about 14 L/min (3 lgpm) to minimize over pumping of the wells and further reduce potential interference with existing dug and drilled wells. It was our opinion that the drilled wells on the previously severed lots would provide an adequate, long-term supply and suitable water quality to support these dwellings.

The letter concludes:

For purposes of the severance process, it is our opinion that an additional well can be supported by the aquifer formation that the 3 wells on the previously severed lots are tapping into. For developments up to 15ha, 3 wells are recommended which has been previously satisfied for this development. Provided that the waste disposal system is properly constructed, no significant impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers.

CCS concludes that the extensive hydro-geotechnical work conducted on adjacent lots demonstrates adequate water supply for the development of a private well on the proposed severed lot.

In terms of construction of a private septic system to service the proposed residential use, the large lot size and past studies conducted on the subject lands concluded that provided that the waste disposal system is properly constructed, no significant impact is anticipated on down gradient baseline water quality functions or to the existing water bearing aquifers. Please see *Figure 2*



Consent Sketch illustrates a possible location of the septic system demonstrating ample area to meet all required setbacks.

Based on the above CCS, concludes that the development of a single family dwelling on the proposed severed lot is serviceable through a drilled well and properly constructed waste disposal system.

5.3 Minimum Distance Separation (MDS) Calculation

The Ontario Ministry of Agriculture, Food and Rural Affairs provides a calculation to determine appropriate separation distances from livestock and manure storage facilities to ensure compatibility with non-farm land uses.

Guideline#37 states that MDS I does not apply to proposed non-agricultural uses in approved settlement area designations. Since the proposed development is in an approved Settlement Area and the livestock facility is not in the Settlement Area, Guideline#37 directs that MDS I does not apply.

It is also important to note that the existing livestock facilities are recognized and can expand in accordance with the MDS II calculations.

5.4 Comments from Pre-Consultation Meeting March 2, 2020

There were 2 neighbours in attendance at the Township of Douro-Dummer PAC meeting held on March 2, 2020 that submitted comments concerning the proposed consent. Comments focused on access/safety from County road 38, loss of privacy, site review for endangered or threatened species and a policy review. There were specific comments related to Official Plan policy which have been addressed in Section 4 of this report.

In terms of traffic safety and access, as stated above, County Road 38 (South Street) travels through the designated Settlement Area of Warsaw, and therefore provides frontage and access to all development fronting on it. Due to the designation of these lands and existing driveway access and frontage on this street, the proposed lot access is consistent with the adjacent residential development. The County reviewed and supported the 3 approved lot in 2017. They will also review the proposed severance in the application circulation process and provide comments.

In terms of loss of privacy it should be noted that the subject lands have always been designated for residential development. This area is a designated Settlement Area and Hamlet.

There is a species of special concern in the area called an Eastern Wood-pewee. This bird lives in woodland areas. The proposed consent does not impact the existing woodland.



6. SUMMARY

The proposed severed lot size is larger than typically desired in a hamlet area but site specific conditions make this the most effective and efficient form for development at this location. The woodland in the middle of the subject lands has effectively divided the northern section of the subject lands from the southern section. The proposed lot size is supported by the following site specific conditions:

- There is limited water supply in the northern portion of the subject lands (north of the woodland) and proven water supply in the area to the south of the woodland.
- The woodland is identified in the Ministry of Natural Resources and Forestry mapping.
- The woodland is located on a significant slope which is not amenable to residential development and limits potential linkages between the north and south lot area.
- The proposed severance effectively completes the development in the southern area of the subject lands.
- Limiting development to 1 new residential lot results in less potential impact on the existing unevaluated wetland located to the south.

A consent application is being submitted to the County for consideration. Approval will be conditional upon the preparation of a survey and the creation of deeds for certification prior to registration. In addition, a Zoning By-law Amendment may be required as a condition of consent to re-zone the proposed severed lot to Rural (Ru) Zone which was the preferred zone for the other consents approved in 2017.

7. RECOMMENDATION

The subject lands are located in the designated settlement area of Warsaw which is where new development is encouraged in rural areas through both Provincial and Local planning policy. It is the opinion of CCS that the proposed development represents sound planning practice. The proposed lot configuration reflects site conditions and works to protect natural features in the area. The residential land use proposed is appropriate for this location and it has been demonstrated that private servicing is feasible. We thank you for consideration of this Consent application and look forward to working with you through the application review process.

Sincerely,



Bob Clark, P.Eng., P.Ag., MCIP, RPP, OLE
Principal Planner

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Figures

Figure 1 - Location Map

Figure 2 - Consent Sketch

Figure 3 - Peterborough County Official Plan Excerpt

Figure 4 - Township of Douro-Dummer Zoning Bylaw Excerpt

Figure 5 - Natural Heritage Features Map

Attachment

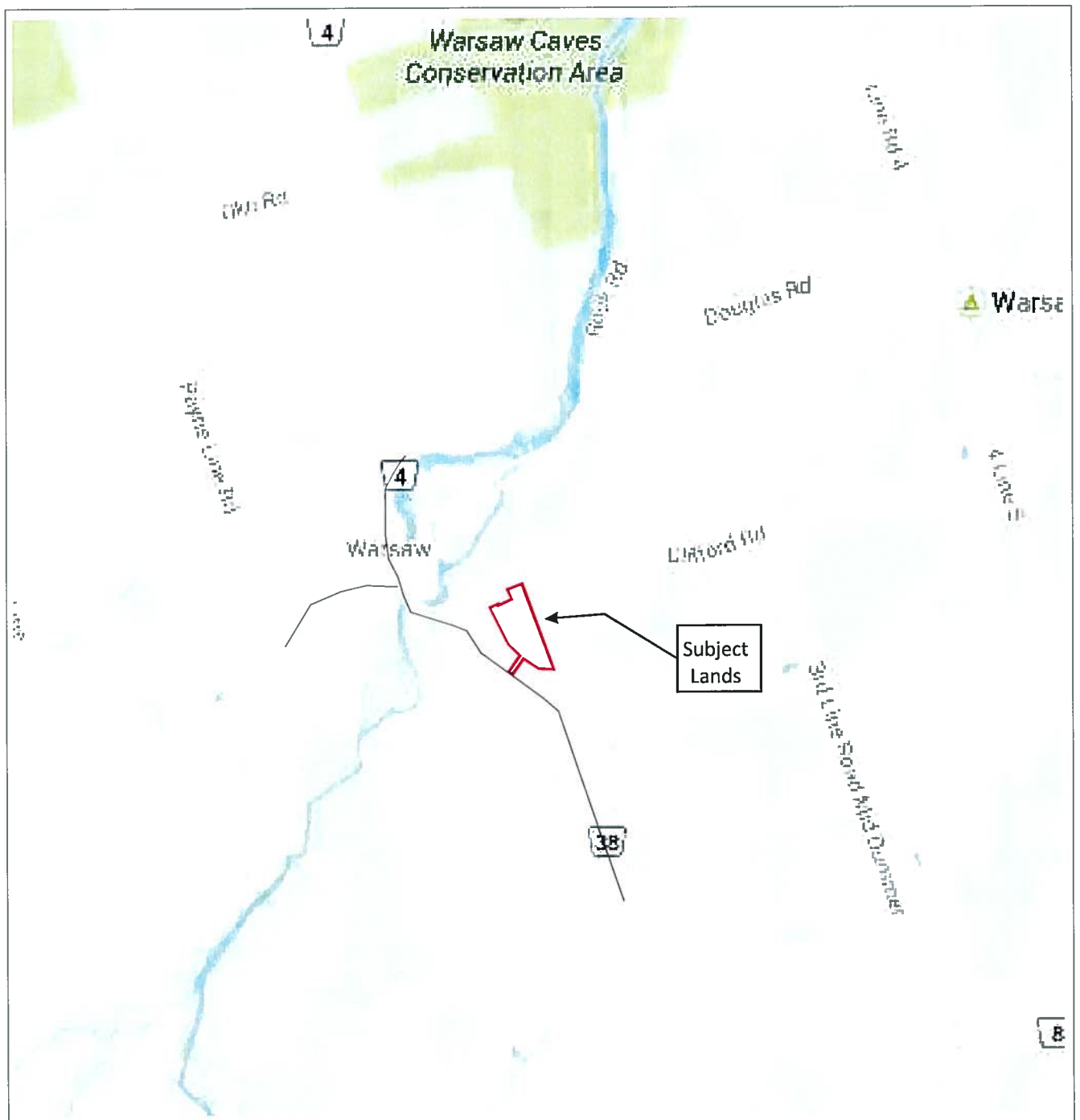
Attachment A- Preliminary Severance Review, Peterborough County, Nov. 15, 2019

Attachment B- Hydrogeological Letter, GHD March 31, 2020

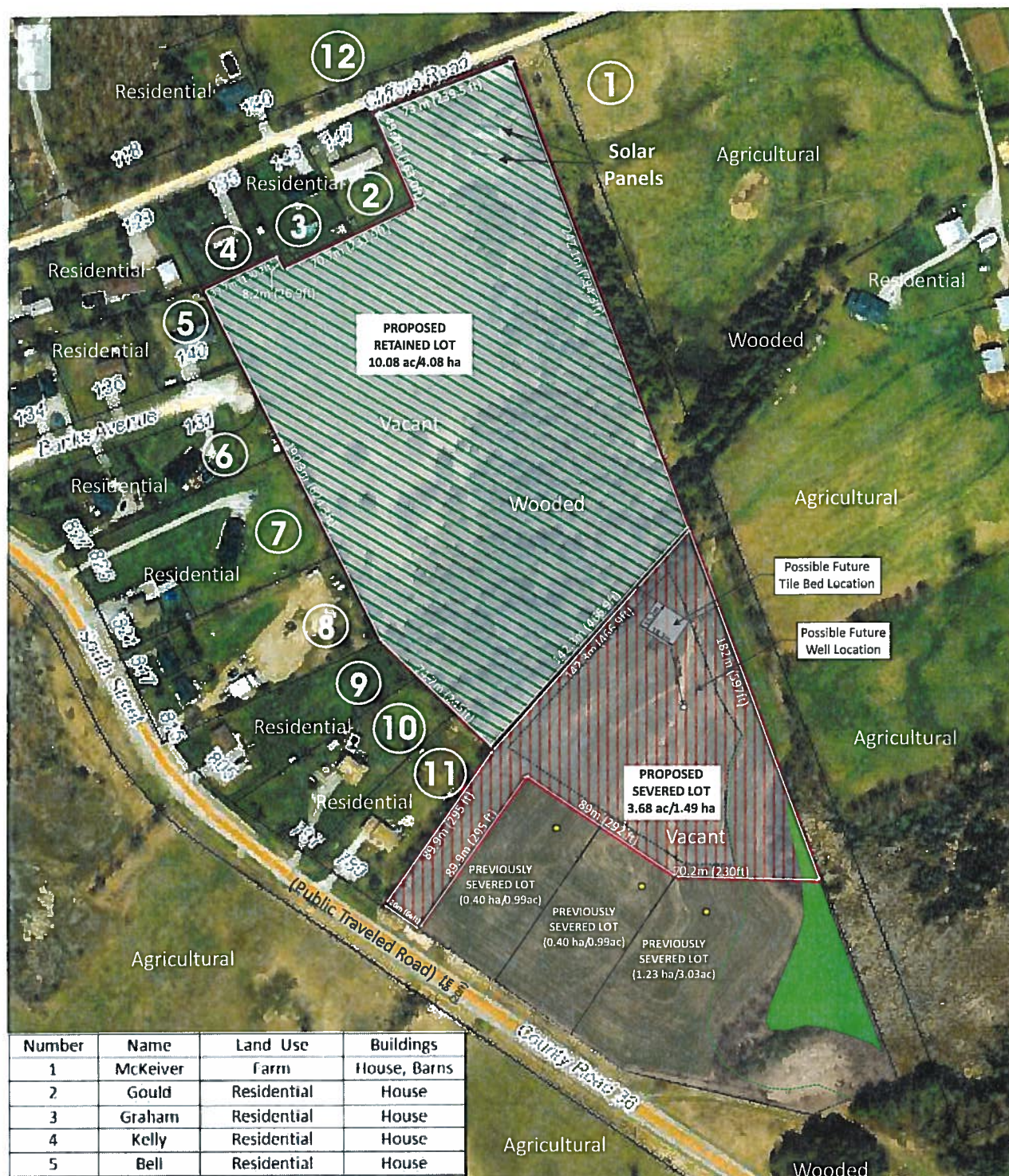
Attachment C- Hydrogeological Assessment Report, GHD, 2017 (under separate cover)



Figure 1 - Location Map
 County Road 38, Warsaw
 Township of Douro-Dummer



**Figure 2 - Consent Sketch
Part Lot 11, Concession 1
County Road 38, Warsaw
Township of Douro-Dummer**



Number	Name	Land Use	Buildings
1	McKeiver	Farm	House, Barns
2	Gould	Residential	House
3	Graham	Residential	House
4	Kelly	Residential	House
5	Bell	Residential	House
6	Payne	Residential	House
7	Munroe	Residential	House
8	Shepherd	Residential	House
9	Heffernan	Residential	House
10	Beecroft	Residential	House
11	Watts	Residential	House
12	Florence	Residential/Rural	House

SCALE



LEGEND









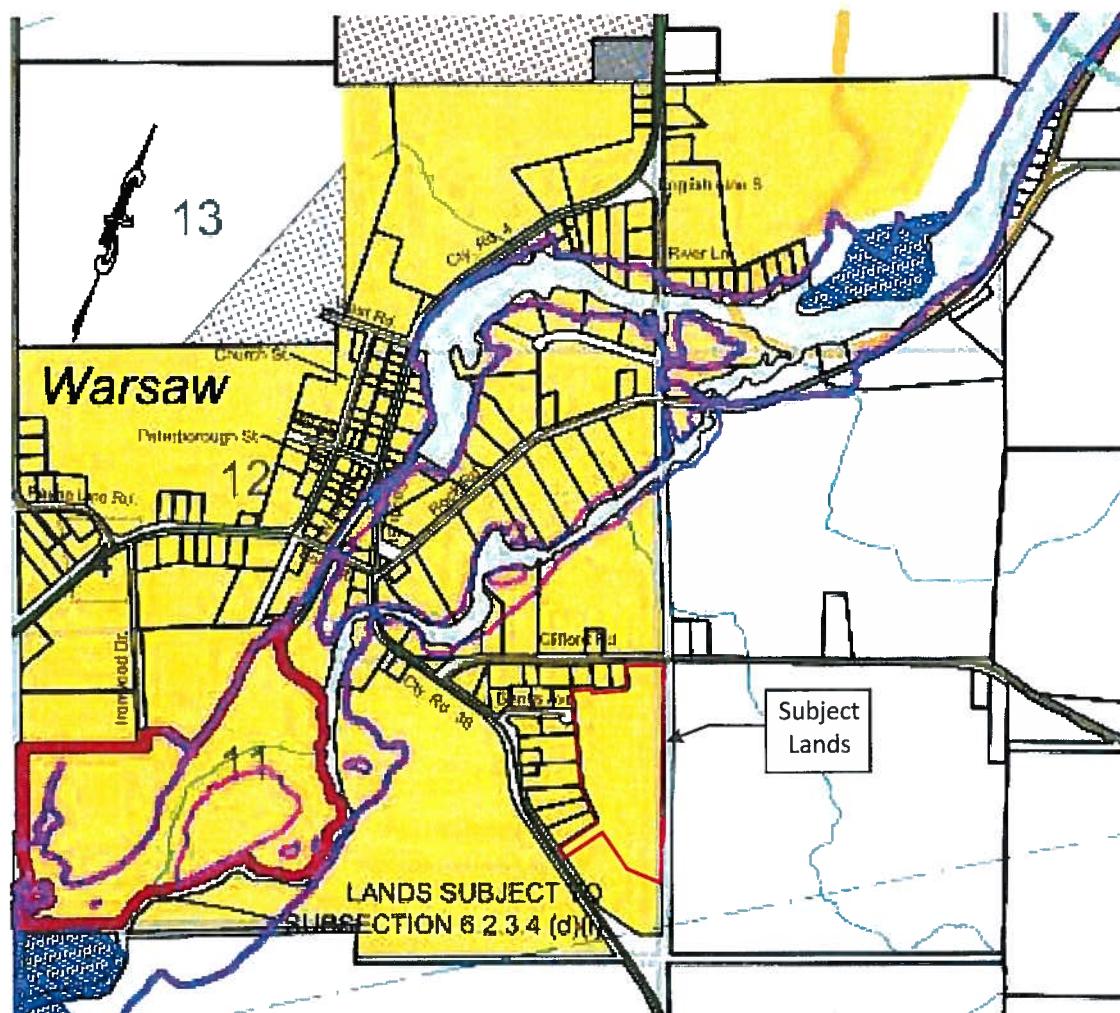
-  Subject Lands
-  Proposed Severed Lot (3.68 ac/1.49 ha)
-  Proposed Retained Lot (10.08 ac/4.08 ha)
-  Wetland
-  30 metre Setback from Wetland
-  Building Envelope
-  Test Well Locations
-  Possible Future Well Location



Figure 3 - County of Peterborough Official Plan Excerpt, Schedule A4-4 (Warsaw Hamlet)
 County Road 38, Warsaw
 Township of Douro-Dummer



WARSAW

Legend

Subject Lands

- Provincially Significant Wetland
- Locally Significant Wetland
- Extractive Industrial
- Highway Commercial
- Recreation Commercial
- Lakeshore Residential
- ANSILife Science
- Environmental Constraint

BASE FEATURES

- Municipal Boundary
- Ward Boundary
- Provincial Highway
- County Road
- Township Road
- Private Road
- H.E.P.C. Tower Lines

DESIGNATIONS

- Residential
- Seasonal Residential
- Hamlet
- Rural
- Recreational - Open Space
- Commercial
- Extractive Industrial Licensed
- Industrial



Figure 4 - Excerpt from Township of Douro-Dummer Zoning By-law #10-1996,
County Road 38, Warsaw
Township of Douro-Dummer

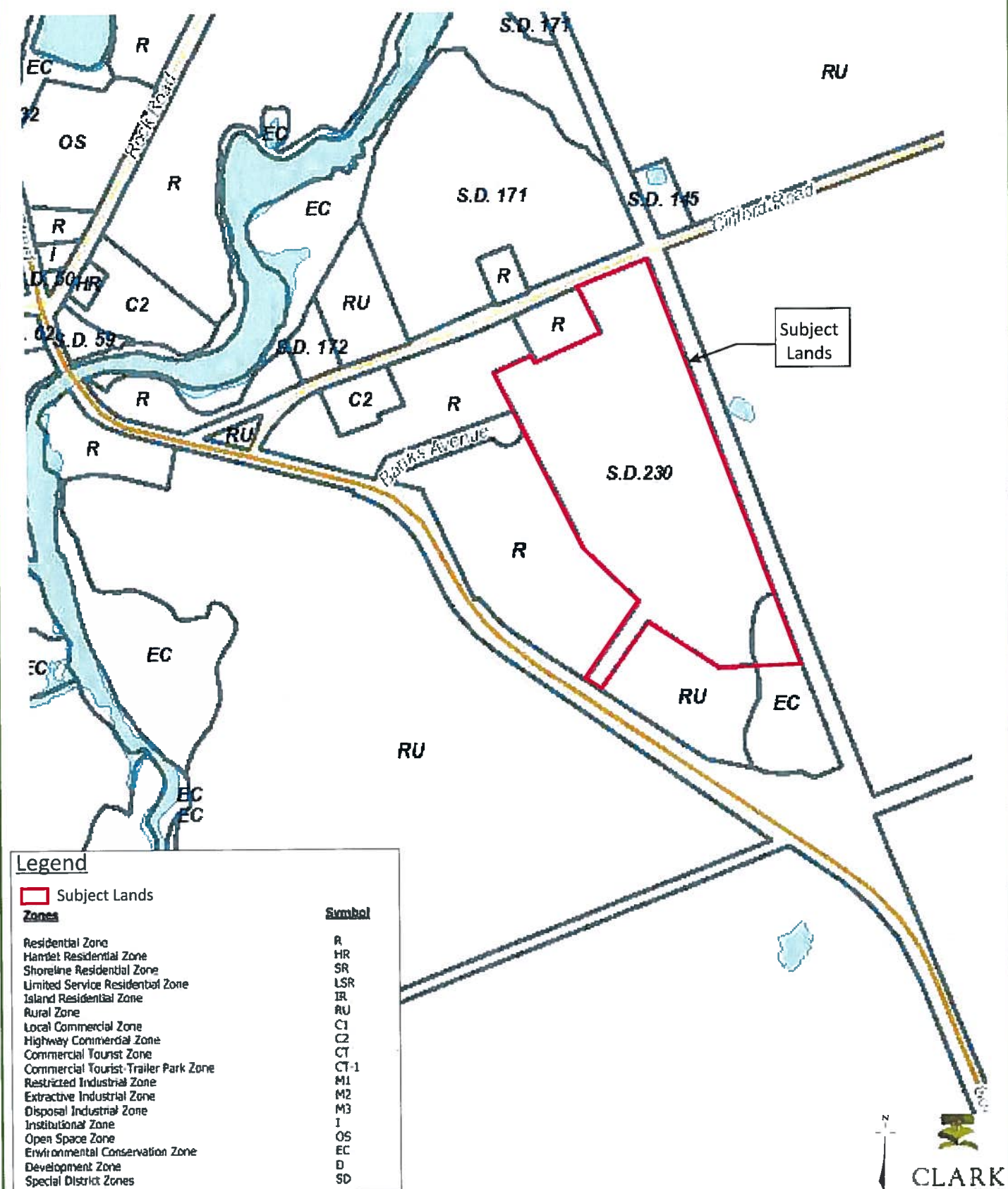
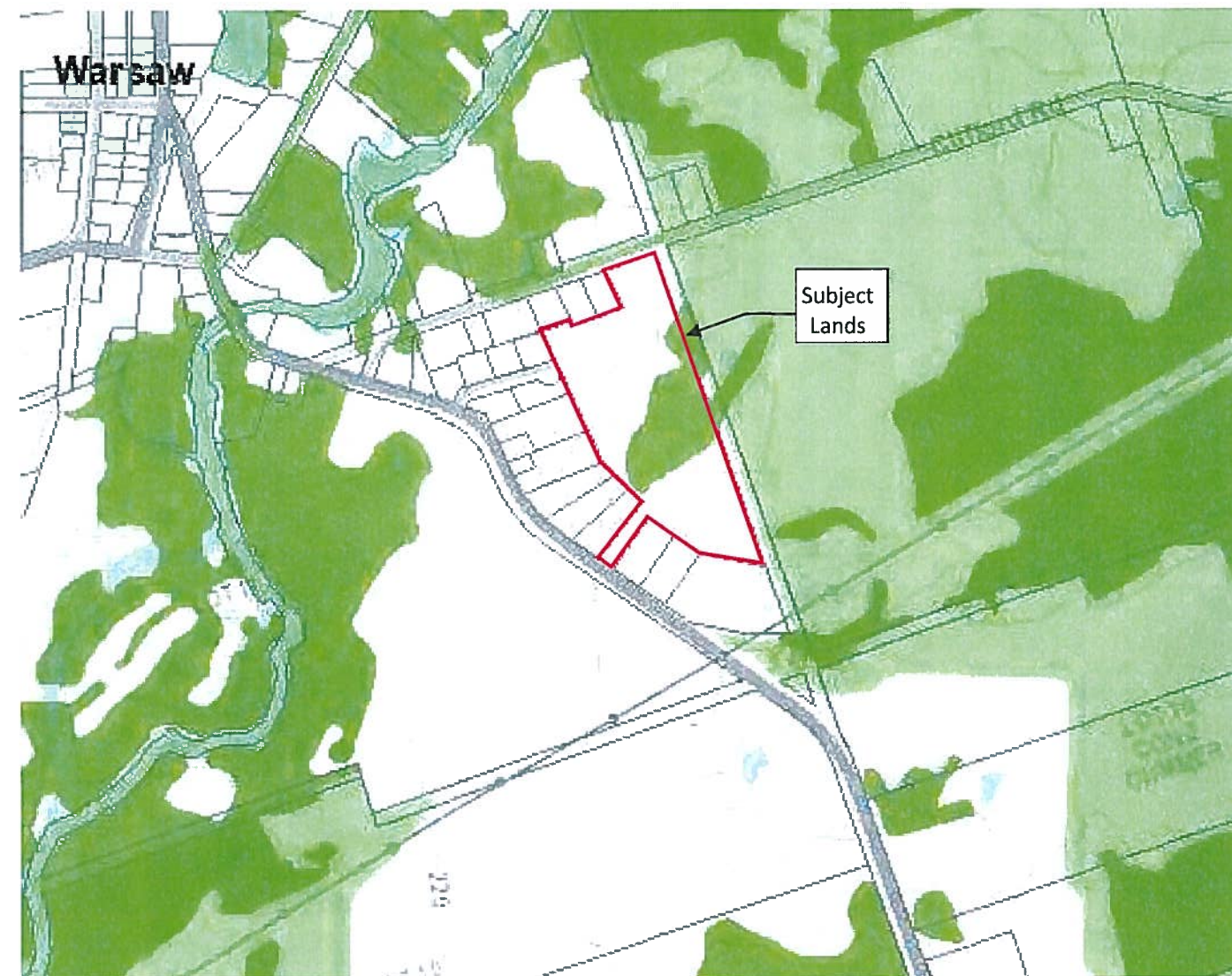


Figure 5 Natural Heritage Features Map
 County Road 38, Warsaw
 Township of Douro-Dummer



Legend

Subject Lands

Assessment Parcel

Woodland

Conservation Reserve

Provincial Park

Natural Heritage System

Ecoregion

Wetland

Provincially Significant Wetland Evaluated

Non-Provincially Significant Wetland Evaluated

Unevaluated Wetland



ATTACHMENT A

Preliminary Severance Review, Peterborough County, Nov. 15, 2019



Preliminary Severance Review

Prepared by the Peterborough County
Planning Department



Name: Fred Clifford

Agent: Clark Consulting
Services

Date: November 15, 2019

Lot: 11

Concession: 1

Municipality: Dummer Ward
Township of Douro-Dummer

Description:

Phone:

Email: bob@clarkcs.com

Office Phone: (905) 885-
8023

Communication Sent To: Owner: ☐

Agent: ☒

	Severed	Retained
County O.P. Description	Settlement Area	Settlement Area
Municipal O.P. Designation (effective April 2014)	Hamlet	Hamlet
Municipal Zoning (By-Law No. 10-1996)	S.D. 230	S.D. 230
Area/Lot Dimensions	±1.49 hectares with ±20 m of frontage on County Road 38	±4.08 hectares with ±73 m of frontage on Clifford Road
Existing Use/Buildings	Residential/Vacant	Residential/Vacant

Intent: To sever a residential lot. Roll No.(s) 1522-020-003-03000.

County Official Plan Policy Review: The subject property is described as Settlement Area in the County of Peterborough Official Plan. Section 2.6.3.2 of the Plan suggests that severances may be permitted in Settlement Areas provided Health Unit and road frontage and access requirements can be met (Ss.2.6.3.2 (A) & (C)). Section 4.2.3 of the Plan states that "...growth should be directed to those settlement areas that currently have servicing systems or can reasonably expect to obtain them in the future...where the use of public communal services is not feasible, and where site conditions permit, development may be serviced by individual on-site systems."

Municipal Official Plan Policy Review:

The subject lands are designated Hamlet in the Local Component of the County Official Plan. Permanent residential dwellings are permitted within the Hamlet designation.

In the Hamlet designation for Douro-Dummer, a maximum of five lots may be created by consent from a land holding as it existed 25 years prior to the date of application (S.7.12.14 & 7.12.16). The applicant previously applied for five consent applications from the subject property (Files B-102-16 to B-106-16). The files were conditionally approved subject to the demonstration of water supply. Three of the five lots (File B-104-16, B-105-16 and B-106-16) demonstrated adequate water supply and received final approval. These lots were deposited with Land Registry on September 1, 2017. Files B-102-16 and B-103-16 were appealed by the applicant to the Local Planning

Appeal Tribunal and have since been formally withdrawn by the applicant. The lands remain eligible for two more consents.

Section 7.12.11 states, in part, that consents shall not be granted which do not comply with the policies of the applicable road authority. The proposal was circulated to the County Infrastructure Services Department for comments. Their comments will be provided when received.

Section 7.2.7 states the Township and/or approval authority may request additional information that it considers it may need when considering development proposals or Planning Act applications. A hydrogeologic study was required in order to support the creation of five residential lots. A recommendation of the study indicated that *"prior to issuance of a building permit, each well should be constructed and tested under the supervision of a qualified hydrogeologist to confirm suitability as a private water supply and to ensure no impacts to neighbouring wells. The results of the work should be documented in a report"*. Due to neighbour concerns regarding wells going dry in the neighbourhood, the Township requested that the recommendation be revised to demonstrate that the lots can be adequately serviced before the lots are created. As a result, a well was constructed and tested on each proposed lot before final approval was granted. As previously discussed, the three lots located at the south end of the subject property demonstrated adequate water supply. The two lots located off a proposed extension to Banks Avenue could not demonstrate adequate water supply. The latest proposal locates a new lot behind the previously severed lots where water was shown to be available.

Section 7.12.3 indicates that the proposed consent shall not jeopardize any future plans for a comprehensive development of the surrounding area. It is staff's opinion that the proposed lot configuration will jeopardize a comprehensive form of development on the balance of the lands. It is staff's opinion that the lands should remain in a larger continuous block to allow for more development options in the future if/when servicing makes sense.

Furthermore, Section 7.12.15 states, in part, that lots shall be a suitable size and shape for the proposed use. The proposed lot will create a large irregular shaped lot. Typically, the lot size for a residential use in the hamlet area and the rural area on private services is 0.4 hectares (1 ac.). This land use pattern will also eliminate access from County Road 38 and would appear to result in jeopardizing a comprehensive form of development on the retained parcel. The proposed lot does not present a desirable land use pattern.

As applicable, consents must meet road frontage & access, Zoning By-law, Health Unit and Minimum Distance Separation (MDS) requirements (S. 7.12.1, 7.12.4, and 7.12.12).

Municipal Zoning By-Law Review: The severed parcel is zoned Special District 230 (S.D. 230) in the Municipal Zoning By-law. All uses permitted in the Rural (RU) Zone shall apply. A residential use is permitted in the (RU) zone (S. 9.1.5). All provisions and

regulations of the (RU) zone shall apply with the exception of lot frontage. The lot frontage in the S.D. 230 zone is 20 metres. The proposed severed parcel appears to meet the requirements of the S.D. 230 zone.

The retained parcel is zoned Special District 230 (S.D. 230) in the Municipal Zoning By-law. All uses permitted in the Rural (RU) Zone shall apply. A residential use is permitted in the (RU) zone (S. 9.1.5). All provisions and regulations of the (RU) zone shall apply with the exception of lot frontage. The minimum lot frontage in the S.D. 230 zone is 20 metres. The proposed retained parcel appears to meet the requirements of the S.D. 230 zone.

Given that the S.D. 230 zone applies to roll no. 1522-020-003-03000, it is suggested that the Township be consulted to determine the implications of this zoning if the lands are severed and if a rezoning should be required.

Provincial Policy Review: The Provincial Policy Statement, 2014 (PPS) and Growth Plan for the Greater Golden Horseshoe, 2019 (GPGGH) apply to this proposal.

The following key natural heritage features and/or key hydrologic features have been identified on or adjacent to the subject property: an unevaluated wetland.

Section 2.2 (c) of the PPS states that “planning authorities shall protect, improve or restore the quality and quantity of water by identifying water resource systems consisting of ground water features, hydrologic functions, natural heritage features and areas, and surface water features...” As part of the previously severed lots, the wetland and its 30 metre buffer were rezoned to the Environmental Conservation (EC) Zone to preclude development. ORCA, in their review comments on the previous applications, had no objections and stated that field observations suggest that the proposed building envelope will be setback at least 30 metres from the wetland and at higher elevations. It is recommended that the applicant consult with ORCA to confirm their comments remain the same and can be applied to the subject proposal.

The subject property contains a small portion of an area identified as a primary sand and gravel aggregate resource. In the previous preliminary review completed for this property, the Ministry of Natural Resources and Forestry was circulated the proposal for comment and concluded that they have no substantial concerns with the proposal as the viability of developing the resource is questionable due to existing constraints (i.e. settlement area of Warsaw).

Minimum Distance Separation Formula I (MDS I) as per policy 1.1.5.9 of the 2014 Provincial Policy Statement has not been calculated. MDS I does not apply to proposed non-agricultural uses in approved settlement area designations (2017 MDS I, guideline #36).

Additional Notes:

The lands appear to be regulated by Regulation 167/06, the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation of the Otonabee Conservation Authority. Therefore, the proposal should be discussed with Matt Wilkinson/Alex Bradburn at (705) 745-5791 ext.213/ext.227 to determine what, if any permits may be necessary.

The applicant and any prospective owners are advised that endangered and/or threatened species exist in the area and may exist on the site. It is the responsibility of the landowner to identify endangered and threatened species and their habitat within the property prior to undertaking work, and to ensure that the work/activity will not result in negative impacts. Landowners are encouraged to consult with the Ministry of Environment, Conservation and Parks (MECP) if they have questions about the *Endangered Species Act, 2007 (ESA)*. Any sightings of a threatened or endangered species during development and construction on the property must be reported in accordance with the ESA.

This Preliminary Severance Review has been circulated by the Planning Department to the following agencies (marked with an X):

- ☒ Local Municipality of Douro-Dummer
- ☒ County Infrastructure Services (i.e. Roads) comments forthcoming ;
- ☐ Conservation Authority ;
- ☐ First Nations ;
- ☐ Other Choose an item.

Agencies to be Contacted by Owner/Agent (marked with an X):

- | | |
|--|--|
| <input checked="" type="checkbox"/> Township | <input type="checkbox"/> Health Unit |
| <input checked="" type="checkbox"/> Conservation Authority | <input type="checkbox"/> Trent-Severn Waterway |
| <input type="checkbox"/> Source Water Risk Management Officer | <input type="checkbox"/> First Nations |
| <input type="checkbox"/> Ministry of Environment, Conservation and Parks | <input type="checkbox"/> Other |

Proposal does not appear to conform to County Official Plan policies.

The severance proposal does not appear to conform to the County Official Plan. Section 2.6.3.1 of the Plan states that under no circumstances shall severances be recommended for approval where the proposed severance is contrary to this plan and/or the respective local official plan.

Proposal does not appear to conform to Township Official Plan policies.

The severance proposal does not appear to conform to the Township Official Plan. Section 7.12.3 indicates that the proposed consent shall not jeopardize any future plans for a comprehensive development of the surrounding area. It is staff's opinion that the proposed lot configuration will jeopardize a comprehensive form of development on the

balance of the lands. Furthermore, Section 7.12.15 states, in part, that lots shall be a suitable size and shape for the proposed use. The proposed lot will create a large irregular shaped lot.

- ☒ Application requires confirmation from the Township or identified agency regarding policy conformity. ****Please note that the landowner should be aware that members of the local council may not support a rezoning or minor variance to create a lot that is not in compliance with the provisions of the zoning by-law.****

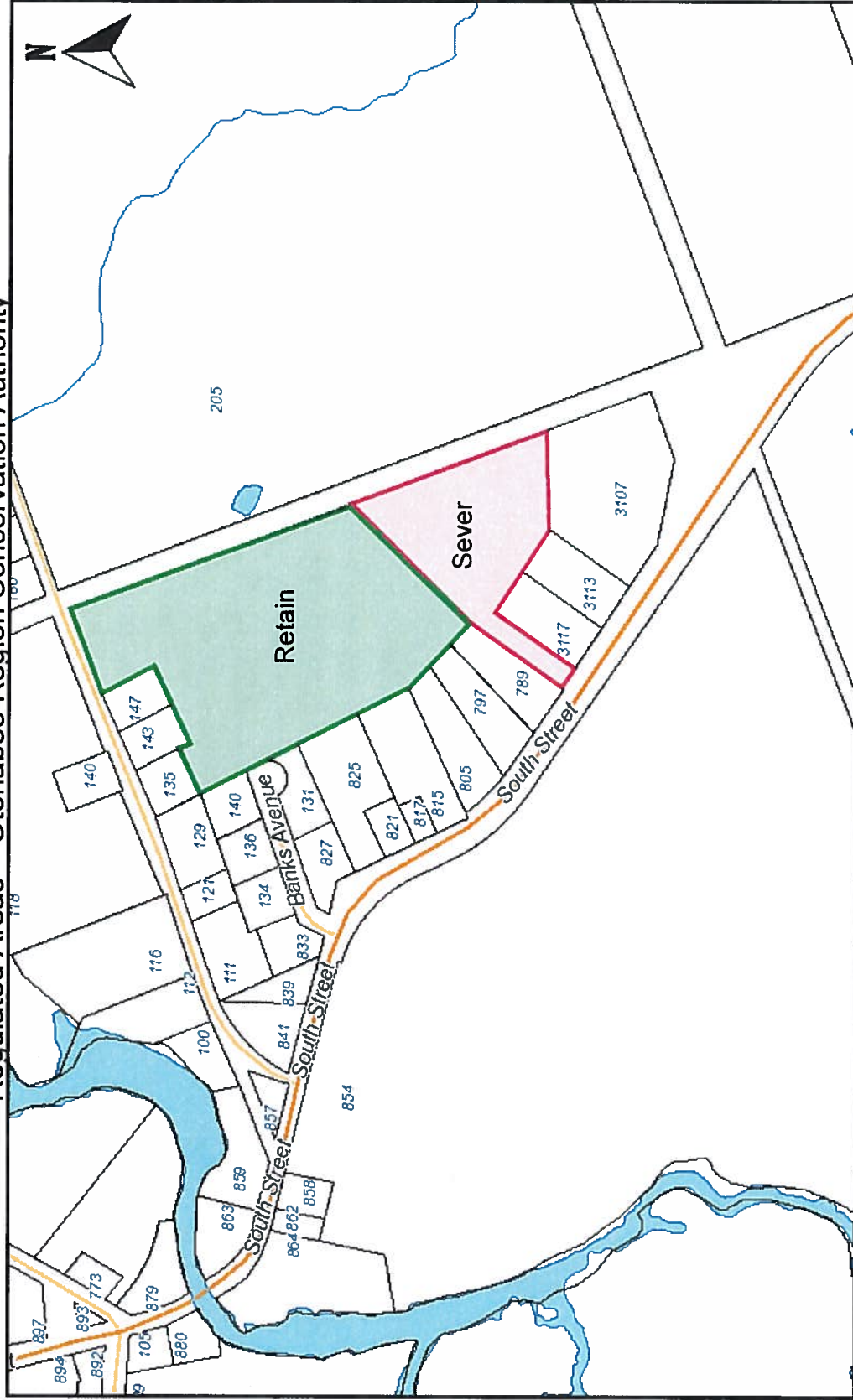
Reviewed By: Caitlin Robinson

Important

Our position on the overall conformity of the proposal is based on information available at the time of review. Subsequent information from commenting agencies can change our comments relating to any formal application for severance which is subsequently filed. Therefore, the above-noted comments should not be construed as preliminary approval or denial of a proposal but recognized as a position of the County Planning Department based on the availability of current information.

Roll #1522-020-003-03000
 Lot 11, Concession 1, Dummer Ward
 (Clifford)

Regulated Areas – Otonabee Region Conservation Authority



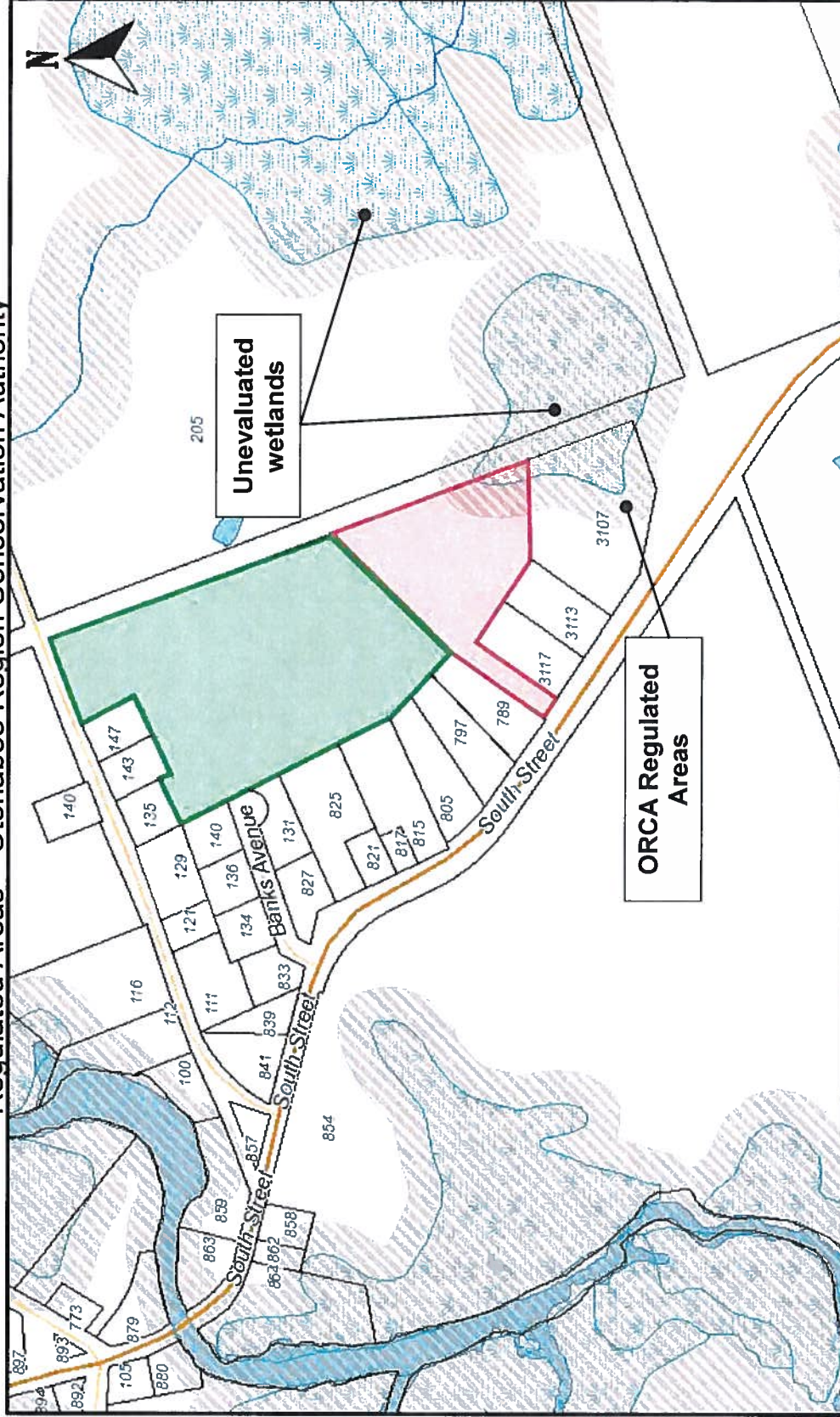
Scale (metric)
 1:5000

Roll #1522-020-003-03000

Lot 11, Concession 1, Dummer Ward

(Clifford)

Regulated Areas – Otonabee Region Conservation Authority



NOTE: The subject lands are traversed by wetlands and streams; these features and areas are regulated by Regulation 167/06, the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation of the Otonabee Region Conservation Authority.

Scale (metric)
1:5000



March 31, 2020

Reference No. 11210956-01

Fred Clifford

c/o Jacqueline Mann
Clark Consulting Services
52 John Street
Port Hope, ON L1A 2Z2

**Re: Hydrogeological Letter – Proposed Severed Lot
Part Lot 11, Concession 1
County Road 38, Warsaw ON
Township of Douro-Dummer**

Dear Mr. Clifford and Ms. Mann:

1. Introduction

GHD Limited (GHD) is pleased to provide you the following letter in support of a proposed severed lot to be privately serviced for water and septic. The proposed severed lot is located at the above noted location and will be herein referred to as "the Lot". The proposed severed lot is 1.49 hectares (ha) of a 7.6 ha parcel ("the Property") that also includes a 4.08 ha proposed retained lot and three (3) previously severed lots (2 lots are 0.4 ha and 1 lot is 1.23 ha).

The general location of the Property is shown on the Vicinity Plan, Figure 1.

It is our understanding that the Township Planning Advisory Committee has requested an assessment that sufficient water is available for the Lot and will not impact nearby wells.

2. Background

GHD completed a Hydrogeological Assessment Report dated September 5, 2017 detailing the pumping tests on each of the three (3) previously severed lots. For developments up to 15 ha, 3 wells are recommended (MECP Guideline D-5-5 for Private Wells – Water Supply Assessment).

The report concluded that each of the 3 wells produced about 23 L/min (5 Imperial gallons per minute or lgpm) with minor interference between them and no interference with the nearest dug well. GHD recommended that the future wells be outfitted with flow restrictors to about 14 L/min (3 lgpm) to minimize over pumping of the wells and further reduce potential interference with existing dug and drilled wells. It was our opinion that the drilled wells on the previously severed lots would provide an adequate, long-term supply and suitable water quality to support these dwellings.

GHD

347 Pido Road Unit 29 Peterborough Ontario K9J 6X7 Canada
T 705 749 3317 F 705 749 9248 W www.ghd.com
SMQ ISO 9001:2008



Site Inspection

GHD conducted a site inspection of the Property and surrounding residences on March 16, 2020. GHD observed three (3) new homes constructed on the previously severed lots. GHD conducted an inspection of the Lot where the new home is proposed. The Lot is a large lot with the topography gently sloping toward a low lying feature to the east and also toward the Indian River toward the west. The Lot was observed to be pasture adjacent to a wooded area and agricultural lands. Based upon our observations, the nearest homes (excluding the new dwellings) are about 160 m away to 789 South Street (County Road 38) and about 235 m away to 205 Clifford Road from the centre of the lot.

There were no observable changes noted during the site inspection by GHD between 2017 and the current existing residential areas in close proximity of the Property along County Road 38 and Clifford Road. GHD also compared aerial photographs using Google Earth imagery between 2018 and 2017 and did not observe any notable changes.

Photographs are provided in Appendix A.

3. Well Records Review

GHD reviewed nineteen (19) MECP well records within about 500 m of the Lot and updates well record information provided in our May 2015 report which documented 14 well records. The well record locations are depicted on mapping provided in Appendix B. A summary of well record details are also provided in Appendix B. All of the wells are drilled into the underlying limestone.

The available well records does not include the three (3) wells on the Property. A summary table is provided below of the MECP well records reviewed and also includes the 3 additional wells.

The table shows that the wells produced variable groundwater yields that ranged from dry to 15 lpm. Compared with the data in the May 2015 report, the well record yields are slightly higher in this assessment at an average rate of 19.8 L/min compared to 17.3 L/min in 2015.



Table 1: Summary of Water Well Information

Total Number of Wells Inventoried:				22		
Dug/Bored Wells:				0 (0%)		
Drilled Wells (Overburden):				0 (0%)		
Drilled Wells (Bedrock):				22 (100%)		
Parameters	Statistical Summary					
	Dug / Bored Wells		Drilled – Overburden		Drilled – Bedrock	
WELL YIELDS						
Range	--	--	--	--	0.5 – 15 lgpm	2.3 – 68 L/min
Average					4.4 lgpm	19.8 L/min
REPORTED YIELDS	Frequency		Frequency		Frequency	
Not Reported	0	0%	0	0%	2	9%
Dry	0	0%	0	0%	1	5%
0 to 1 lgpm	0	0%	0	0%	5	23%
2 to 4 lgpm	0	0%	0	0%	4	18%
5 to 9 lgpm	0	0%	0	0%	8	36%
≥10 lgpm	0	0%	0	0%	2	9%
STATIC WATER						
LEVELS						
Range	--	--	--	--	2.4 – 11.4 m	8 – 37 ft
Average					6.0 m	19.8 ft
WATER						
ENCOUNTERED						
Range	--	--	--	--	3 – 27.7 m	10 – 91 ft
Average					14.0 m	45.9 ft
WELL DEPTH						
Range	--	--	--	--	10.1 – 30.5 m	33 – 100 ft
Average					18.4 m	60.4 ft

Notes: Data based on MECP well record information (see Appendix B). L/m represents litres per minute, lgpm indicates Imperial gallons per minute and m is metres.

4. Proposed Lot Layout

The site inspection was also conducted to review potential lot layout and planning. The potential lot layout is provided in Figure 2 and illustrates the septic at the rear of the home and the well in the front. The well location maintains a greater than 15 m setback from the septic. The location of the septic maximizes the setback from the future well on this lot, the wells located on the 3 previously severed lots and the existing residential lots. The future well for this lot is anticipated to be drilled into the same aquifer formation as the 3 wells on the previously severed lots. As noted above in the background section of this report, the previous pumping tests were conducted at 23 L/min with minimal interference. The location of a new well shown on Figure 2 is anticipated to be on the order of 90 m from the nearest drilled wells as this lot is large at 1.49 ha and there is sufficient space for the house, well and septic.



5. Conclusion

For purposes of the severance process, it is our opinion that an additional well can be supported by the aquifer formation that the 3 wells on the previously severed lots are tapping into. For developments up to 15 ha, 3 wells are recommended which has been previously satisfied for this development. Provided that the waste disposal system is properly constructed, no significant impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers.

We trust this letter report meets with your immediate requirements. Should you have any questions please contact our office.

Sincerely,

GHD

A handwritten signature in black ink, appearing to read "R. Neck". The signature is fluid and cursive.

Robert Neck, P.Geo. (Limited)

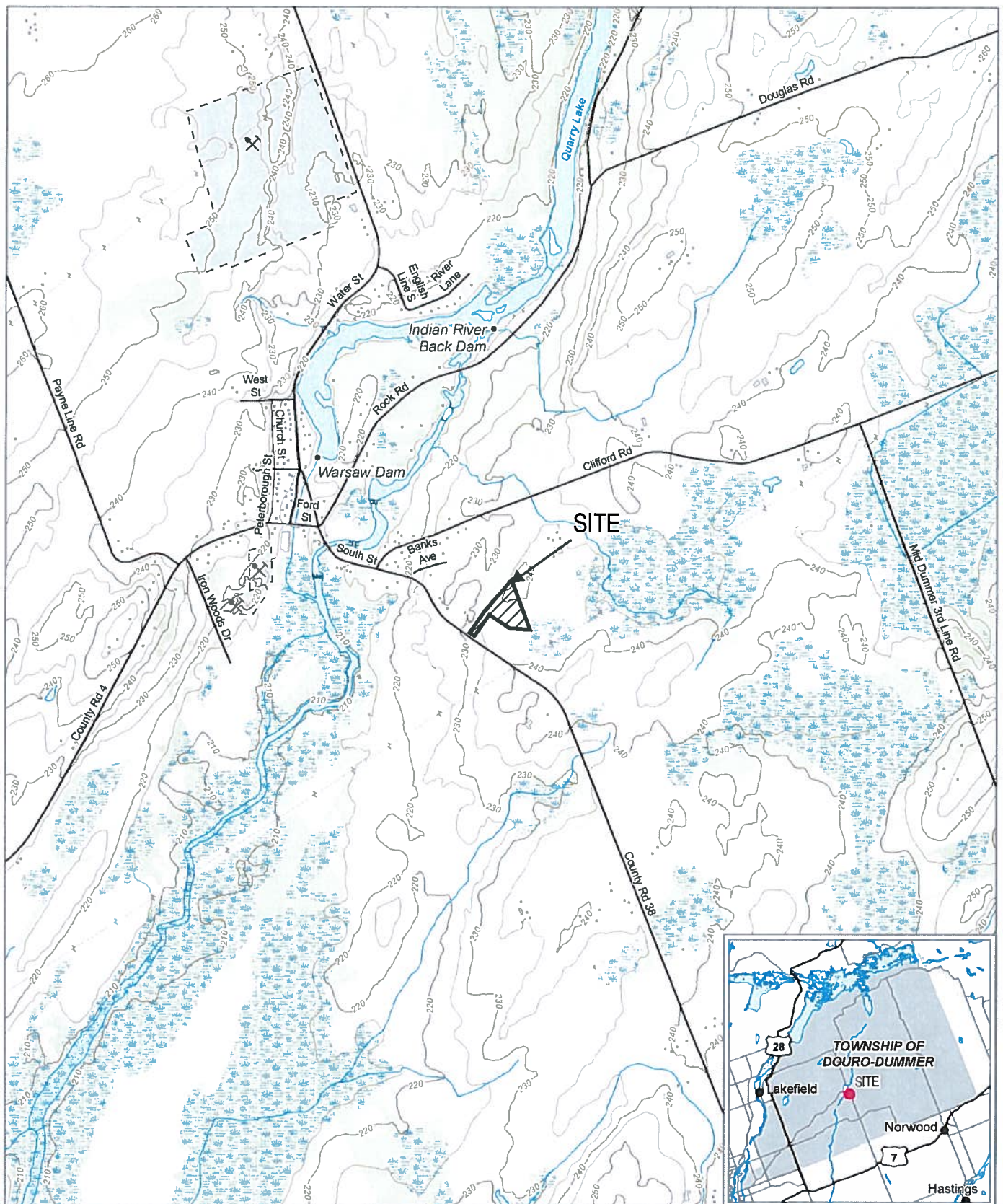
A handwritten signature in black ink, appearing to read "Nyle McIlveen". The signature is fluid and cursive.

Nyle McIlveen, P.Eng.

/BN/nmc/01

Appendix A – Photographs

Appendix B – MECP Well Records



Paper Size ANSI A
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 Meters



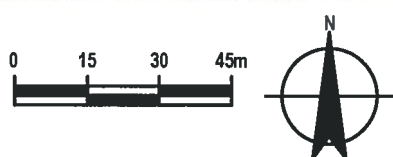
Map Projection: Transverse Mercator
 Horizontal Datum: North American 1983
 Grid: NAD 1983 UTM Zone 17N

CLIENT NAME
FRED CLIFFORD
 COUNTY ROAD 38, WARSAW, ON
 HYDROGEOLOGICAL ASSESSMENT

Project No. 11210956
 Revision No. -
 Date Mar 19, 2020

SITE LOCATION MAP

FIGURE 1



FRED CLIFFORD
COUNTY ROAD 38, WARSAW, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

Project No. 11210956
Date March 2020

CONCEPTUAL SITE LAYOUT

FIGURE 2

Appendix A Photographs



Photo 1 – View of new homes on the Property.



Photo 2 – View across the proposed new lot looking towards the new homes and County Road 38.

Site Photographs





Photo 3 – View from proposed new lot toward existing residential home to the north.



Photo 4 – View across the new lot toward low lying area.

Site Photographs



Appendix B

MECP Well Records and Mapping

MECP Water Well Record - Formation Report



Well ID: 5101016	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(010)	Completion Date: 12/11/1962 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728631.1,4922691) [5]	Primary Use: Livestock
Depth to bedrock (m): 12.19199	Secondary Use: Domestic
Elevation (masl): 239.368133	Final Status: Water Supply

Layer	Colour	Description	Top - Bottom	Depth (m)
	BROWN	CLAY STONES	0	3.66
	GREY	CLAY STONES	3.66	12.19
		GRAVEL SHALE	12.19	15.24

Well ID: 5101018	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 9/30/1952 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728151.1,4923274) [9]	Primary Use: Domestic
Depth to bedrock (m): 3.96239	Secondary Use: <null>
Elevation (masl): 216.115081	Final Status: Water Supply

Layer	Colour	Description	Top - Bottom	Depth (m)
		CLAY MEDIUM SAND STONES	0	3.96
		LIMESTONE	3.96	15.85

Well ID: 5101019	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 5/17/1958 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728185.1,4923246) [9]	Primary Use: Domestic
Depth to bedrock (m): 8.53439	Secondary Use: <null>
Elevation (masl): 217.629928	Final Status: Water Supply

Layer	Colour	Description	Top - Bottom	Depth (m)
		GRAVEL TOPSOIL	0	8.53
		SANDSTONE	8.53	10.97

Well ID: 5101020	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 8/5/1958 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728208.1,4923259) [9]	Primary Use: Not Used
Depth to bedrock (m): 8.53439	Secondary Use: <null>
Elevation (masl): 218.063873	Final Status: Abandoned-Quality

Layer	Colour	Description	Top - Bottom	Depth (m)
		GRAVEL BOULDERS	0	8.53
	BROWN	LIMESTONE	8.53	9.45
	GREY	LIMESTONE	9.45	26.21
	BLACK	LIMESTONE	26.21	27.13

Well ID: 5101021	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 8/14/1958 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728300.1,4923219) [9]	Primary Use: <null>
Depth to bedrock (m): 7.92479	Secondary Use: <null>
Elevation (masl): 222.190979	Final Status: Abandoned-Supply

Layer Colour	Description	Top - Bottom Depth (m)
	GRAVEL BOULDERS	0 7.92
GREY	LIMESTONE	7.92 13.11

Well ID: 5101063	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 02(011)	Completion Date: 1/3/1956 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728572.1,4923420) [9]	Primary Use: Domestic
Depth to bedrock (m): 4.26719	Secondary Use: <null>
Elevation (masl): 229.528244	Final Status: Water Supply

Layer Colour	Description	Top - Bottom Depth (m)
	GRAVEL BOULDERS	0 4.27
GREY	LIMESTONE	4.27 10.06

Well ID: 5105576	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 7/7/1970 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728345.1,4923323) [4]	Primary Use: Not Used
Depth to bedrock (m): 0	Secondary Use: <null>
Elevation (masl): 224.394393	Final Status: Abandoned-Quality

Layer Colour	Description	Top - Bottom Depth (m)
BROWN	SHALE MEDIUM SAND	0 4.57
GREY	LIMESTONE	4.57 11.58

Well ID: 5105577	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 7/7/1970 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728265.1,4923313) [4]	Primary Use: Domestic
Depth to bedrock (m): 5.18159	Secondary Use: <null>
Elevation (masl): 219.028366	Final Status: Water Supply

Layer Colour	Description	Top - Bottom Depth (m)
BROWN	MEDIUM SAND	0 5.18
GREY	LIMESTONE	5.18 16.46

Well ID: 5106437	County / Township: PETERBOROUGH / DUMMER TOWNSHIP
Concession (Lot): CON 01(011)	Completion Date: 6/27/1973 12:00 AM
UTM Zone (Easting, Northing) [RC]: 17 (728285.1,4923282) [4]	Primary Use: Domestic
Depth to bedrock (m): 2.43839	Secondary Use: <null>
Elevation (masl): 220.92955	Final Status: Water Supply

Layer Colour	Description	Top - Bottom Depth (m)
	TOPSOIL	0 0.3

BROWN	CLAY STONES	0.3	2.44
GREY	LIMESTONE	2.44	25.91

Well ID: 5107174	County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(011)	Completion Date: 10/2/1974 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728396.1,4923254) [4]	Primary Use: Domestic	
Depth to bedrock (m): 7.61999	Secondary Use: <null>	
Elevation (masl): 227.61885	Final Status: Water Supply	
Layer Colour	Description	Top - Bottom Depth (m)
	PREVIOUSLY DUG	0 7.62
GREY	LIMESTONE	7.62 10.97

Well ID: 5109773	County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(011)	Completion Date: 7/3/1975 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728365.1,4923373) [5]	Primary Use: Domestic	
Depth to bedrock (m): 2.43839	Secondary Use: <null>	
Elevation (masl): 223.82875	Final Status: Water Supply	
Layer Colour	Description	Top - Bottom Depth (m)
	PREVIOUSLY DUG	0 2.44
GREY	SHALE	2.44 3.05
GREY	LIMESTONE	3.05 17.37

Well ID: 5110172	County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(012)	Completion Date: 2/19/1981 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728415.1,4923423) [5]	Primary Use: Domestic	
Depth to bedrock (m): 1.52399	Secondary Use: <null>	
Elevation (masl): 227.421051	Final Status: Water Supply	
Layer Colour	Description	Top - Bottom Depth (m)
BROWN	TOPSOIL SOFT	0 0.61
BROWN	CLAY GRAVEL PACKED	0.61 1.52
GREY	SHALE STONES HARD	1.52 4.27
GREY	LIMESTONE LAYERED	4.27 16.76

Well ID: 5113949	County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(011)	Completion Date: 7/8/1989 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728029.1,4922925) [9]	Primary Use: Domestic	
Depth to bedrock (m): 1.82879	Secondary Use: <null>	
Elevation (masl): 209.572189	Final Status: Water Supply	
Layer Colour	Description	Top - Bottom Depth (m)
GREY	CLAY STONES	0 1.83
GREY	LIMESTONE SHALE	1.83 5.18

GREY LIMESTONE LAYERED

5.18 24.99

Well ID: 5119768		County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(011)		Completion Date: 8/22/2003 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728026.2,4922927) [9]		Primary Use:	Domestic
Depth to bedrock (m): 3.04799		Secondary Use:	<null>
Elevation (masl): 209.591156		Final Status:	Water Supply
Layer Colour	Description	Top - Bottom Depth (m)	
	TOPSOIL	0	0.3
BROWN	CLAY STONES	0.3	3.05
GREY	LIMESTONE ROCK	3.05	22.86

Well ID: 5119771		County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(011)		Completion Date: 8/29/2003 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728026.2,4922927) [9]		Primary Use:	Domestic
Depth to bedrock (m): 3.96239		Secondary Use:	<null>
Elevation (masl): 209.591156		Final Status:	Water Supply
Layer Colour	Description	Top - Bottom Depth (m)	
	TOPSOIL	0	0.3
BROWN	CLAY STONES	0.3	3.96
GREY	LIMESTONE ROCK	3.96	22.86

Well ID: 7042610		County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 02(014)		Completion Date: 2/4/2006 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728384,4923167) [3]		Primary Use:	Domestic
Depth to bedrock (m): 1.52399		Secondary Use:	<null>
Elevation (masl): 228.136199		Final Status:	Water Supply
Layer Colour	Description	Top - Bottom Depth (m)	
BROWN	CLAY STONES	0	1.52
BROWN	CLAY SHALE	1.52	3.35
GREY	SHALE GRAVEL	3.35	5.48
GREY	LIMESTONE STONES	5.48	28.950001

Well ID: 7153393		County / Township: PETERBOROUGH / DUMMER TOWNSHIP	
Concession (Lot): CON 01(012)		Completion Date: 9/20/2010 12:00 AM	
UTM Zone (Easting, Northing) [RC]: 17 (728313,4923537) [3]		Primary Use:	Domestic
Depth to bedrock (m):		Secondary Use:	<null>
Elevation (masl): 217.62239		Final Status:	Water Supply
Layer Colour	Description	Top - Bottom Depth (m)	
GREY	CLAY BOULDERS HARD	0	1.22

GREY	LIMESTONE HARD	1.22	27.74
GREY	LIMESTONE POROUS	27.74	30.48

Well ID: **7184452** County / Township: PETERBOROUGH / DUMMER TOWNSHIP
 Concession (Lot): CON 01(011) Completion Date: 5/16/2012 12:00 AM
 UTM Zone (Easting, Northing) [RC]: 17 (728312,4923269) [4] Primary Use: Domestic
 Depth to bedrock (m): Secondary Use: <null>
 Elevation (masl): <null> Final Status: Water Supply

Layer	Colour	Description	Top - Bottom Depth (m)	
	BROWN	TOPSOIL STONES PACKED	0	0.61
	GREY	CLAY FILL STONES	0.61	2.44
	GREY	CLAY STONES PACKED	2.44	4.27
	GREY	LIMESTONE HARD	4.27	11.28
	GREY	LIMESTONE HARD	11.28	19.2
	GREY	LIMESTONE LAYERED	19.2	19.81

Well ID: **7263358** County / Township: PETERBOROUGH / DUMMER TOWNSHIP
 Concession (Lot): CON 01(011) Completion Date: 1/28/2016 12:00 AM
 UTM Zone (Easting, Northing) [RC]: 17 (728322,4923307) [4] Primary Use: Domestic
 Depth to bedrock (m): Secondary Use: <null>
 Elevation (masl): <null> Final Status: Water Supply

Layer	Colour	Description	Top - Bottom Depth (m)	
	GREY	CLAY STONES PACKED	0	1.83
	GREY	LIMESTONE SAND SHALE	1.83	5.49
	GREY	LIMESTONE HARD	5.49	18.9
	GREY	LIMESTONE SAND SHALE	18.9	24.69
	BLACK	LIMESTONE HARD	24.69	26.82



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental and construction services to private and public sector clients.

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Robert Neck, P.Geo. (Limited)
robert.neck@ghd.com
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ATTACHMENT C

Hydrogeological Assessment Report
GHD 2017 (under separate cover)





Hydrogeological Assessment Report

Proposed Residential Severances

Part Lot 11, Concession 1

County Road 38 and Clifford Road

Warsaw, Ontario

Report for: Fred Clifford c/o Clark Consulting Services

September 5, 2017

347 Pido Road Unit 29 Peterborough Ontario K9J 6X7, Canada

11148465 | 01 | Report No. 2 |



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Enclosures

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Appendix B:	Aquifer Performance Testing Curves
Appendix C:	Certificates of Chemical Analyses



1. Introduction

This report presents the results of a hydrogeological assessment for the severance of three (3) lots from an 8.1 hectare (20 acre) parcel within Part Lot 11, Concession 1 in the township of Douro-Dummer. The severances are along County Road 38 and Clifford Road in Warsaw, Ontario (the Site) within an area that is privately serviced for well and septic. Mapping of the Site including test well locations is provided within the Enclosures of this report.

This hydrogeological report documents the well testing component of the assessment to provide information regarding the test wells for their use in supporting typical, single-family household usage. This report builds upon the preliminary report prepared for the Site by Geo-Logic (now GHD) entitled "Hydrogeological Assessment Report – Proposed Residential Development, Part Lot 11, Conc. 1, Warsaw, Ontario, Township of Douro-Dummer. Project No. G030465E1" dated May 2015. The preliminary report, peer reviewed by Stantec Consulting Ltd., provided subsurface conditions based upon test pits completed at the Site, general groundwater and hydrogeological information, water balance details and water and waste disposal recommendations. The preliminary report should be referred to for details and will not be discussed further in this report.

2. Scope of Investigation

The purpose of this component of the hydrogeological assessment was to:

- *Define prevailing hydrogeologic conditions at the site, including, groundwater movement and local hydrochemistry, subsurface soil stratigraphy, and shallow groundwater movement;*
- *Assess the availability of adequate groundwater supplies based on pumping tests;*
- *Evaluate the suitability of the planned land use and assess existing and adjacent groundwater resources within the study area; and*
- *Carry out engineering analyses to assess the potential impacts and provide appropriate recommendations for the site.*

To achieve the aforementioned purpose, the scope of work for this assessment included the following:

- *Conducted pumping tests at three (3) lots at a controlled and constant rate for a minimum of six (6) hours to indicate if an adequate source of potable water is available to service the development. Collected measurements of the discharge rate from the wells (to maintain a constant rate) and water levels from the wells. Data loggers were used to measure the water level in the pumped well, adjacent test wells and neighbouring wells.*
- *Water samples were collected during the testing for general chemistry and bacteriological parameters to evaluate the water quality. Two (2) samples were collected at each well including after one (1) hour of pumping and six (6) hours of pumping (i.e. at the end of the testing). The analysis was conducted by SGS Canada Inc., an environmental laboratory accredited for testing of these parameters.*



- *Reviewed and analyzed the data logger information and prepared this report documenting the pumping test results and work completed.*

3. Well Construction

Three (3) drilled water wells were constructed on the Site for the purpose of aquifer performance testing. The new drilled test wells were constructed by Burgess Well Drilling (Ministry of the Environment and Climate Change License No. 1455) and completed in July 2017. The Ministry of Environment and Climate Change (MOECC) well records are presented in Appendix A. The test wells are located as shown on the Plot Plan within the Enclosures. The drilled test wells are labelled as TW-1, TW-2, and TW-3.

The following sections discuss the test wells utilized for the aquifer performance testing.

3.1 Test Well TW-1

Test well TW-1 (MOECC Well Tag No. A213277) has the following characteristics:

- Drilled to 12.2 m encountering overburden materials consisting of clay, sand and gravel then bedrock at 11.9 m;
- Water was encountered from 10.4 – 11.0 m and 11.9 – 12.2 m;
- Recommended for pumping at 22.7 litres per minute or L/min (5 Imperial gallons per minute or Igpm); and
- Construction was completed on July 14, 2017.

3.2 Test Well TW-2

Test well TW-2 (MOECC Well Tag No. A213278) has the following characteristics:

- Drilled to 12.2 m encountering overburden materials consisting of clay, sand and gravel then bedrock at 11.6 m;
- Water was encountered at 11.3 m;
- Recommended for pumping at 22.7 L/min (5 Igpm); and
- Construction was completed on July 14, 2017.

3.3 Test Well TW-3

Test well TW-3 (MOECC Well Tag No. A213275) has the following characteristics:

- Drilled to 12.2 m encountering overburden materials consisting of clay, sand and gravel then bedrock was encountered at 10.7 m;
- Water was encountered at 10.7 m;
- Recommended for pumping at 22.7 L/min (5 Igpm); and
- Construction was completed on July 17, 2017.



4. Aquifer Performance Testing

A pumping test program was carried out on July 25, 26 and 27, 2017 to assess aquifer response and confirm the availability of a suitable groundwater resource for the proposed severance of three (3) residential lots. Controlled constant rate pumping tests were conducted for six hours at each of the three (3) test wells with recovery measurements completed after the pumping. Submersible pumps were installed in each well to conduct the testing. Water levels in the test wells were monitored throughout the aquifer performance testing manually and through the use of data loggers to evaluate the potential for interference. The discharge water was directed away from each pumped well a distance of about 30 m downgradient and was allowed to flow overland away from the test well and other test / observation wells. This practice safeguards against artificial recharge of the well from occurring during the pumping test. Chlorine levels were confirmed in the field prior to bacteria sampling conducted at each of the test wells. The residual chlorine was non-detect prior to obtaining the bacteriological samples.

Field measurements of methane, pH, temperature, free chlorine, turbidity, and conductivity were completed with a Hach Pocket Pro+ Multi 2. Calibration of the instruments was completed during each pumping test.

The results of the constant rate pumping tests are graphically presented in Appendix B (TW-1 on Figures B-1 to B-4; TW-2 on Figures B-5 to B-8; and TW-3 on Figures B-9 to B-12). The Constant Rate Drawdown, Recovery and Testing Details curves include flow rate, conductivity, pH, turbidity, temperature, free chlorine and methane gas are presented on the Figures in Appendix B. Pumping test information is summarized for each test well below.

4.1 Test Well TW-1

The water level during the pumping test at TW-1 is illustrated on Figures B-1 and B-2 showing water level versus time. The plot shows the water level dropping quickly for the first 40 minutes at a pumping rate of 22.7 L/min (5 lpm). After 40 minutes, the water level began levelling off around 5 meters below top of pipe (mbtp). After six hours of pumping at 22.7 L/min, the water level was about 5 mbtp with nearly 6 m of available drawdown above the pump remaining. The plotted data indicates this well can safely provide long-term quantities of groundwater at a pumping rate of 22.7 L/min.

Drawdown data from the constant rate test was plotted on a drawdown versus time semi-log plot in order to evaluate transmissivity and specific capacity coefficients. The coefficients are summarized in Table 4.1. The estimated transmissivity for TW-1 was 13.3 m²/day (894.1 lpm/ft) based on the drawdown and 9.2 m²/day (619.0 lpm/ft) based on the recovery period and represents a moderate transmissivity.



4.2 Test Well TW-2

The water level during the pumping test at TW-2 is illustrated on Figures B-5 and B-6 showing water level versus time. The plot shows the water level dropping quickly during the first 40 minutes at a pumping rate of 22.7 L/min (5 lgpm). After 40 minutes the water level began levelling off around 5 mbtp. After six hours of pumping at 22.7 L/min, the water level was about 5 mbtp with nearly 6 m of available drawdown above the pump remaining. The data indicates this well can safely provide long-term quantities of groundwater at a pumping rate of 22.7 L/min.

Drawdown data from the constant rate test was plotted on a drawdown versus time semi-log plot in order to evaluate transmissivity and specific capacity coefficients. The coefficients are summarized in Table 4.1. The estimated transmissivity for TW-2 was 12.0 m²/day (804.7 lgpd/ft) based on the drawdown and 10.0 m²/day (670.6 lgpd/ft) based on the recovery period and represents a moderate transmissivity.

4.3 Test Well TW-3

The water level during the pumping test at TW-3 is illustrated on Figures B-9 and B-10 showing the water level versus time. The plot shows the water level dropping quickly within the first 40 minutes at a pumping rate of 22.7 L/min (5 lgpm). After 40 minutes the water level began levelling off around 4 mbtp. After six hours of pumping at 22.7 L/min, the water level was about 4 mbtp with nearly 7 m of available drawdown above the pump remaining. The data indicates this well can safely provide long-term quantities of groundwater at a pumping rate of 22.7 L/min.

Drawdown data from the constant rate test was plotted on a drawdown versus time semi-log plot in order to evaluate relevant coefficients. The computed coefficients are summarized in Table 4.1. The estimated transmissivity for TW-3 was 12.0 m²/day (804.7 lgpd/ft) based on the drawdown and 9.2 m²/day (619.0 lgpd/ft) based on the recovery period and represents a moderate transmissivity.

4.4 Summary of Aquifer Performance

Table 4.1 presents a summary of the values obtained from the aquifer performance pump testing and the corresponding calculated coefficients. The drawdown within the pumped test wells was observed to be minimal and ranged from 1.1 to 1.5 m while pumping 22.7 L/min for 6 hours.



Table 4.1: Aquifer Performance Testing Summary

WELL No.	STEP No.	YIELD		TEST TYPE	TIME	MAXIMUM DRAWDOWN		AVAILABLE DRAWDOWN*		SPECIFIC CAPACITY		ESTIMATED TRANSMISSIVITY	
		lgpm	L/min			feet	metres	feet	metres	lgpm/ft	L/min/m	lgpd/ft	m ² /day
TW-1	1	0	0	Static	0	0	0	23.9	7.3	---	---	---	---
	2	5	22.7	Const	360	4.3	1.3	19.7	6.0	1.2	17.7	894.1	13.3
	3	0	0	Recvy	100% recovery after ~ 4 hours							619.0	9.2
TW-2	1	0	0	Static	0	0	0	22.7	6.9	---	---	---	---
	2	5	22.7	Const	360	3.5	1.1	19.7	6.0	1.3	18.9	804.7	12.0
	3	0	0	Recvy	95% recovery after ~ 4 hours							670.6	10.0
TW-3	1	0	0	Static	0	0	0	28.1	8.6	---	---	---	---
	2	5	22.7	Const	360	4.8	1.5	23.3	7.1	1.2	17.7	804.7	12.0
	3	0	0	Recvy	95% recovery after ~ 6 hours							619.0	9.2

Notes:

lgpm = Imperial gallons per minute; lgpd/ft = Imperial gallons per day per foot

"Recvy" refers to Recovery measurements; "Const" refers to the 6 hr Constant Rate test

*Available Drawdown refers to the height of water in the well above the pump.

Static water levels at TW-1, TW-2, and TW-3 were 3.7, 4.1, and 2.4 metres below top of pipe, respectively.

The pumping data reflects relatively moderate transmissivities of the aquifer complexes below the Site. The recovery measurements also indicate relatively moderate recharge. It is concluded that the tested drilled wells (TW-1, TW-2, and TW-3) can provide groundwater yields on the order of 22.7 L/min (5 lgpm) based on an adequate period of recharge. Over the duration of the 6 hour pumping tests, the wells each yielded about 8170 litres or 1800 Imperial gallons of water.

4.5 Well Interference

The test wells were monitored during each pumping test to assess the potential for well interference. The nearest existing domestic well (789 County Road 38) was also monitored during pumping of the closest test well to the domestic well. The linear distances between the test well and existing domestic well locations are provided in Table 4.2 and range from about 35 m to 90 m between the test wells and 350 to 610 m between the test wells and the existing domestic well.

Table 4.2: Distances Between Test Wells

Location	Observation Wells (Distances from Test Wells in metres)			
	TW-1	TW-2	TW-3	789 CR. 38 (dug well)
TW-1	---	35	90	610
TW-2	35	---	55	495
TW-3	90	55	---	350



The data collected during the pumping tests illustrate that groundwater levels lowered between 1.1 and 1.5 m within the pump test themselves and also lowered within the observation wells between 0.25 and 1.25 m (Table 4.3). Upon completion of the pumping test, the observation wells recovered rapidly to static levels. The results represent a confined aquifer system between the three (3) test wells.

During pumping at TW-3, no drawdown was observed at the nearest domestic well at 789 County Road 38. This well is a dug well and sits upon the top of bedrock at a depth of about 3.7 m (12 feet). Water was observed at 2.4 m within the dug well at the time of testing.

The drawdown curves of the observation wells for each pumping test are provided in Appendix B.

Table 4.3: Maximum Drawdowns in Pumping and Observation Wells

PUMPING WELLS		OBSERVATION WELLS					
LOCATION	DRAWDOWN AT PUMPING WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)
TW-1	-1.3	TW-2	-1.25	TW-3	-1.15	--	--
TW-2	-1.1	TW-1	-0.3	TW-3	-0.3	--	--
TW-3	-1.5	TW-1	-0.25	TW-2	-0.25	789 CR. 38	0.0

The pumping data information indicates that there is a sufficient quantity of water below the Site for the planned development without significant impact to future and existing neighbouring wells.

5. Test Well Water Quality

Groundwater samples were collected during the course of the pumping tests for the purpose of water quality analyses. The wells were sampled after a minimum period of one (1) hour into the constant rate test and at the end of the test (i.e. 6 hours). Certificates of chemical analyses are presented in Appendix C. The water quality data are summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 5.1.



Table 5.1: Test Well Water Quality Summary

PARAMETER	Test Well TW-1		Test Well TW-2		Test Well TW-3		ODWS		
	(1 hour)	(6 hours)	(1 hour)	(6 hours)	(1 hour)	(6 hours)	MAC	IMAC	AO/OG
Alkalinity (as CaCO ₃)	181	173	180	177	188	179	—	—	30 to 500
Ammonia+Ammonium	0.05	0.06	0.10	0.05	< 0.04	0.08	—	—	—
Arsenic	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0006	0.0002	—	0.025	—
Barium	0.248	0.278	0.306	0.321	0.283	0.289	1	—	—
Boron	0.025	0.025	0.022	0.022	0.025	0.026	5	—	—
Calcium	96.7	116	129	133	123	117	—	—	—
Chloride	140	180	220	220	250	250	—	—	250
Chromium	< 0.00003	< 0.00003	< 0.00003	< 0.00003	0.00008	< 0.00003	0.05	—	—
Colour (T.C.U.)	< 3	< 3	< 3	< 3	3	4	—	—	5
Conductivity (mS/cm)	813	907	1020	1050	1120	1130	—	—	—
Copper	0.00022	0.00007	0.00026	0.00018	0.00029	0.00026	—	—	1.0
Fluoride	0.18	0.18	0.16	0.16	0.16	0.16	1.5	—	—
Hardness (as CaCO ₃)	348	398	438	449	440	420	—	—	80 to 100
Iron	0.222	0.253	0.332	0.310	0.812	0.342	—	—	0.3
Lead	< 0.00001	< 0.00001	0.00001	< 0.00001	0.00002	< 0.00001	0.01	—	—
Magnesium	25.4	26.3	28.0	28.1	32.2	30.9	—	—	—
Manganese	0.0116	0.0131	0.0159	0.0160	0.0220	0.0189	—	—	0.05
Nitrogen-Kjeldahl (N)	0.05	0.09	< 0.05	< 0.05	0.09	< 0.05	—	—	—
Nitrite (N)	0.004	0.004	0.007	0.008	0.003 <MDL	0.003 <MDL	1.0	—	—
Nitrate (N)	0.006 <MDL	0.006 <MDL	0.006 <MDL	0.006 <MDL	0.006 <MDL	0.006	10	—	—
Organic Nitrogen	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	—	—	0.15
pH (units)	8.14	8.11	7.98	8.04	8.02	7.99	—	—	6.5 to 8.5
Phosphorus	< 0.003	< 0.003	0.004	< 0.003	0.003	< 0.003	—	—	—
Potassium	3.27	3.61	3.68	3.86	3.87	3.94	—	—	—
Selenium	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	< 0.00004	0.01	—	—
Sodium	21.9	33.8	41.0	43.9	49.6	48.7	—	—	200
Sulphate	23	23	23	23	22	22	—	—	500
Total Dissolved Solids	419	487	553	558	593	580	—	—	500
Total Organic Carbon	< 1	< 1	1	< 1	< 1	1	—	—	5
Total Suspended Solids	< 2	< 2	3	< 2	2	< 2	—	—	—
Turbidity (N.T.U.)	2.48	1.96	4.23	3.74	4.27	1.13	—	—	5
Uranium	0.000094	0.000090	0.000307	0.000065	0.000058	0.000058	0.02	—	—
Zinc	< 0.002	< 0.002	0.007	0.006	0.020	0.013	—	—	5.0
E. coli	—	0	—	0	—	0	0	—	—
Total Coliform	—	0	—	3	—	1	<6	—	—
Fecal Coliform	—	0	—	0	—	0	0	—	—

Notes: All units in mg/L (i.e. parts per million) unless otherwise noted. Time indicates when the sample was obtained during the pumping test.
MAC = maximum acceptable concentration (health related); IMAC = Interim MAC (insufficient data to establish MAC or not feasible to establish MAC to desired level); AO/OG = aesthetic objective or operational guideline (not health related)
Bacteriological data is presented in Colony Forming Units per 100 mL (CFU/100 mL). Bolded value exceeds ODWS

Each of the test wells had exceedances of the aesthetic objective for hardness. TW-2 and TW-3 had exceedances of iron and total dissolved solids. After six hours, there were no other water quality exceedances.



The groundwater in the area is hard to moderately hard ranging from 346 to 449 mg/L as CaCO_3 and related to the overburden materials containing calcium and to a lesser extent, magnesium. Elevated hardness and iron is a common trait of groundwater supplies in Southern Ontario and can be treated using commercially available treatment equipment such as a water softener. The total dissolved solids will be related to the iron in the water also.

Total coliform were reported in test well TW-2 and TW-3. Coliform results were less than 6 coliform forming units (CFU) per 100 mL in each well. As described in Procedure D-5-5: Technical Guideline for Private Wells, total coliform counts of less than 6 per 100 mL of sample and zero (0) for *Escherichia coli* (*E. coli*) and fecal coliforms shall be considered as indicative of acceptable water quality. GHD recommends that bacteriological treatment (i.e. ultraviolet treatment) be used at each of the proposed severances to ensure potable water is available to each of the dwellings.

6. Conclusions and Recommendations

Based on the results of our investigation, it is our professional opinion that the Site is suitable for development of three (3) lots where the test wells were constructed. Based on the pumping tests at TW-1, TW-2 and TW-3 the wells can produce operational yields of 22.7 L/min (5 lpgm) provided there is adequate recharge.

As the three (3) test wells are part of a confined aquifer and there is minor interference between the test wells but not the nearest dug well, it is our opinion that the future water systems be outfitted with flow restrictors to 13.6 L/min (3 lpgm) to minimize potential interference impacts. Based upon theoretical calculations using specific capacity and a pump rate of 13.6 L/min, the expected drawdown of the test wells will be a maximum of 0.75 m (2.5 feet). Restricting each well will provide adequate groundwater resources for the planned development while minimizing impacts to neighbouring drilled wells that are existing and future wells.

It is our professional opinion that there is minimal potential for groundwater impact as a result of the planned residential development from a quality and quantity perspective provided that the septic systems and wells are constructed properly including recommended flow restrictors on the water systems. Well and septic construction should follow recommendations provided in Geo-Logic's Hydrogeological Assessment Report – Proposed Residential Development, Part Lot 11, Conc. 1, Warsaw, Ontario, Township of Douro-Dummer. Project No. G030465E1" dated May 2015.

The groundwater may require commercial water treatment for hardness and iron but treatment should be at the discretion of the individual residences. Ultraviolet treatment is recommended for each of the residences.

Based on the results of the aquifer performance testing and water quality analyses, it is our opinion that the drilled wells will provide an adequate, long-term supply at 13.6 L/min (3 lpgm) and suitable quality of water to support the proposed three (3) severances.



We trust that this report meets your immediate requirements. Should you have any questions, please contact our office.

Sincerely,

GHD

A handwritten signature in blue ink, appearing to read "R. Neck".

Robert Neck, M.Eng., P.Geo. (Limited)



A handwritten signature in blue ink, appearing to read "Nyle McIlveen".

Nyle McIlveen, P.Eng.

/PV/JG/bn/nmc/01





7. References

Hydrogeological Assessment Report – Proposed Residential Development, Part Lot 11, Conc. 1, Warsaw, Ontario, Township of Douro-Dummer. Project No. G030465E1" dated May 2015 by Geo-Logic.

Ontario Ministry of the Environment and Climate Change, June 2003, revised June 2006. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines.

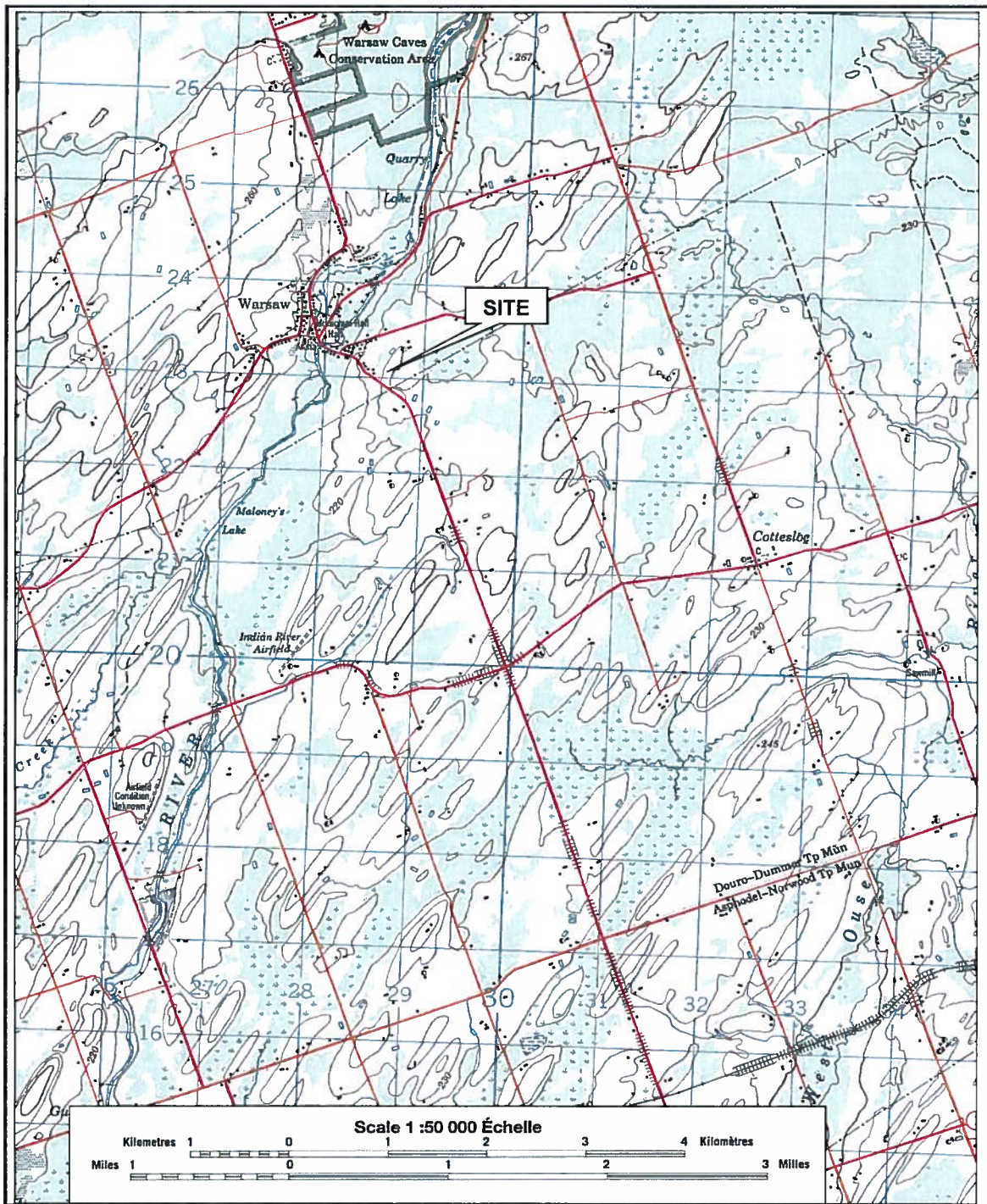


8. Statement of Limitations

This report is intended solely for Fred Clifford c/o Clark Consulting Services in assessing the hydrogeological aspects of the property (Part Lot 11, Concession 1, County Road 38 & Clifford Road, Warsaw, Ontario) and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of hydrogeological engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Enclosures



Base map compiled from Energy, Mines and Resources Canada Map 31 D/08 dated 1999. Air photography 1996.

Scale:
1:50000
Coordinate System
NAD 1983 UTM
Zone 17

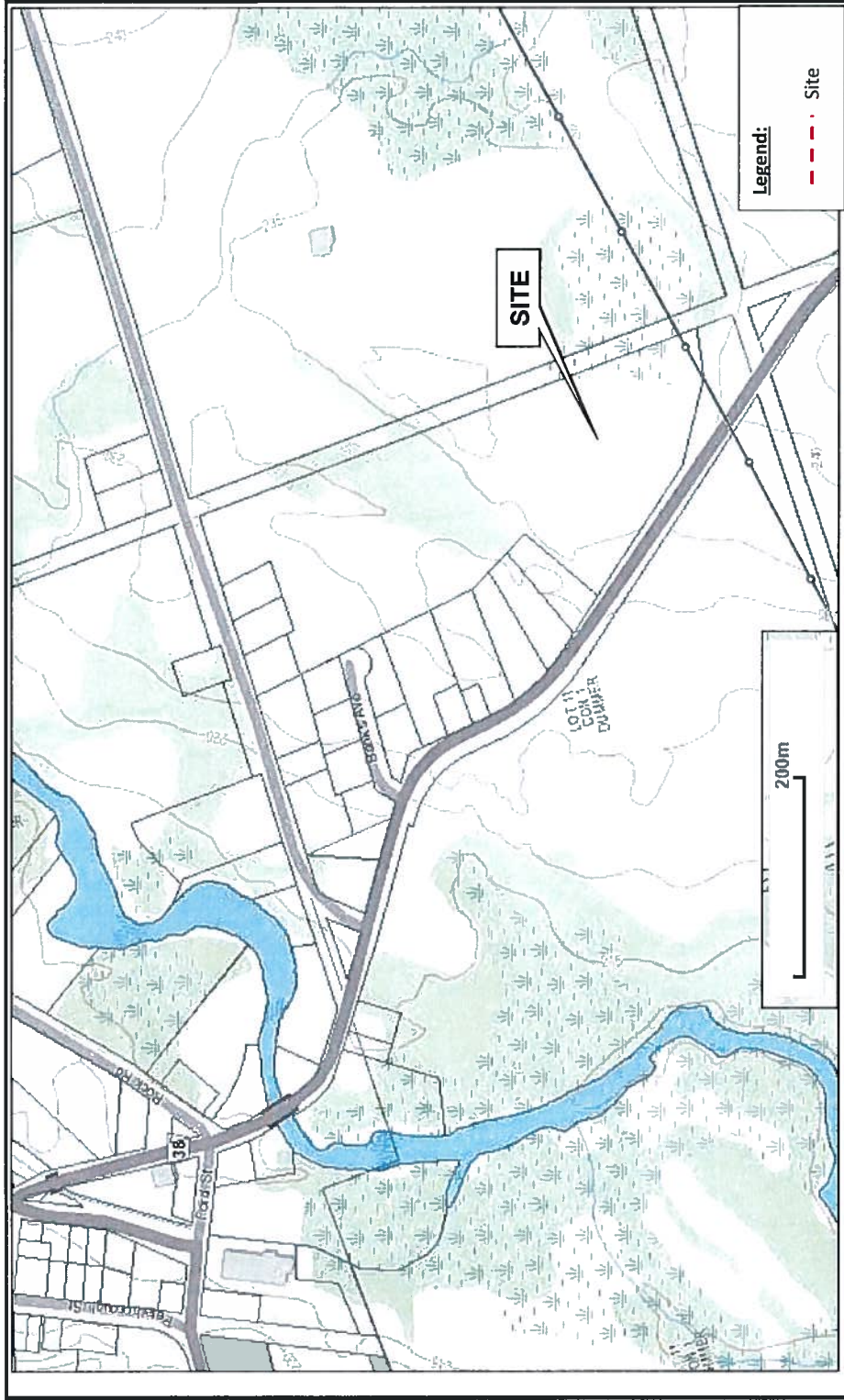


Fred Clifford
Part 11, Conc. 1, Warsaw, ON
Hydrogeological Assessment

11148465-01
September 2017

Vicinity Plan

FIGURE 1



Source: Ministry of Natural Resources and Forestry, online (www.giscoeapp.lrc.gov.on.ca) © Queen's Printer for Ontario, 2015.

Scale:
Refer to Scale Bar
Coordinate System:
NAD 1983 UTM Zone 17

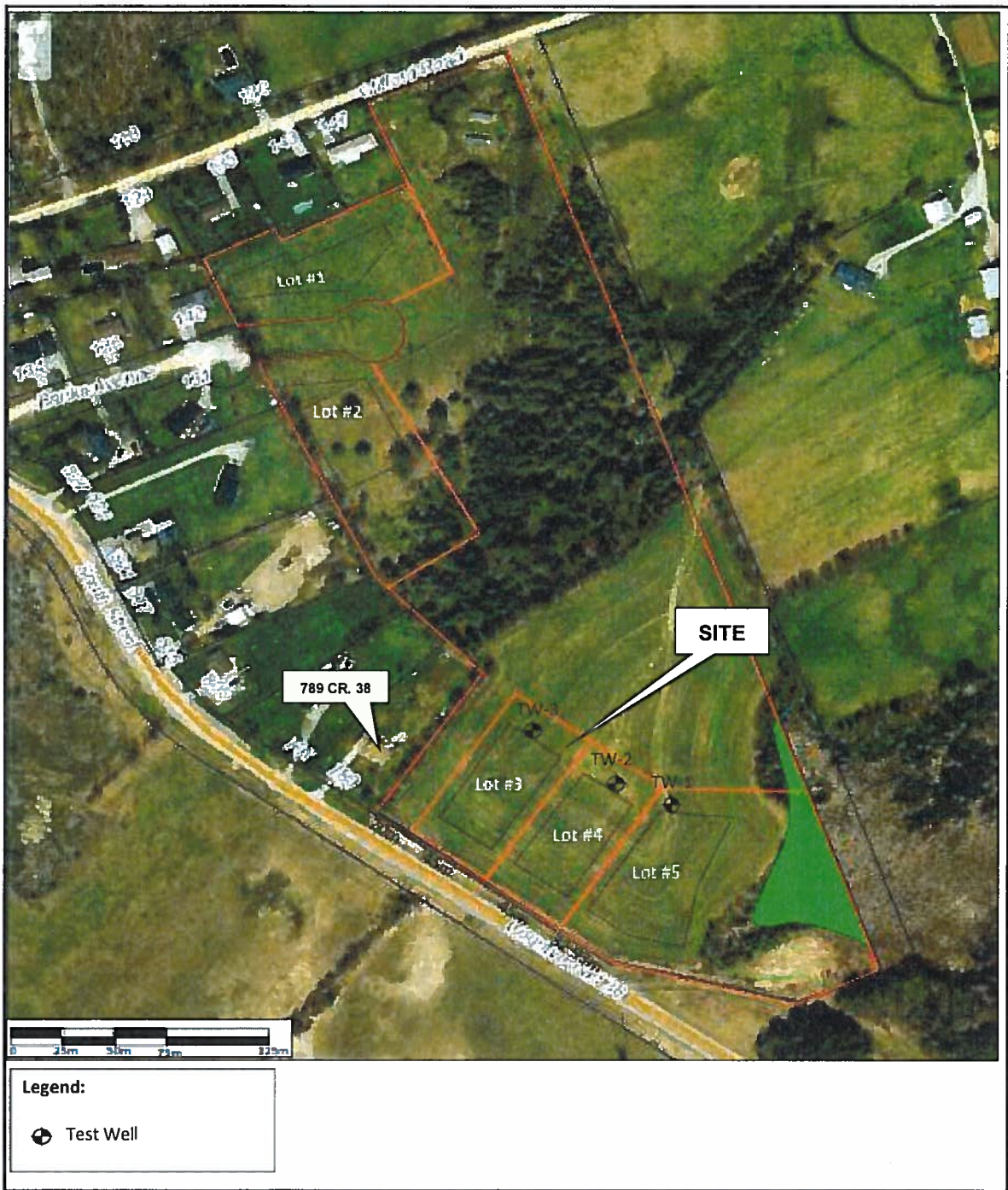


Fred Clifford
Part 11, Conc. 1, Warsaw, ON
Hydrogeological Assessment

11148465-01
September 2017

Property Plan

FIGURE 2



Source: MNR NRVIS 2015. Produced by GHD under licence from Ontario Ministry of Natural Resources and Forestry. © Queen's Printer, 2016.

Scale:
Refer to Scale Bar



Fred Clifford
Part Lot 11, Conc. 1, Warsaw, ON
Hydrogeological Assessment

11148465-01
September 2017

Plot Plan

FIGURE 3

Appendix A

MOECC Well Records



Ministry of the Environment
and Climate Change

Well Tag No. (Place Sticker and/or Print Below)

Tag #: A 213277 TW-1

LOT: #5

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Measurements recorded in: ☐ Metric ☐ Imperial

Well Owner's Information

First Name: FRED Last Name / Organization: CLIFFORD E-mail Address: _____ ☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name): 100 Adelaide St. W. Municipality: TORONTO Province: ONT Postal Code: M5H 0B3 Telephone No. (inc. area code): _____

Address of Well Location (Street Number/Name): _____ Township: DOWNS - DUMMEL Lot: 11 Concession: 1

County/District/Municipality: PETERBOROUGH City/Town/Village: WALSLEY Province: Ontario Postal Code: _____

UTM Coordinates: Zone: 17 Easting: 728675 Northing: 4922998 Municipal Plan and Sublot Number: _____

NAD: 83

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)
				From To
BROWN	TOPSOIL			0 2
BROWN	CLAY, STONE			2 19
GREY	CLAY, STONE			19 34
SHALE	GRAVEL, SAND			34 36
GREEN	LIMESTONE ROCK			36 40
	GRAVEL + SAND - IN ROCK @ 40'			

Depth Set at (m/ft)	Annular Space	Volume Placed	Results of Well Yield Testing
From To	Type of Sealant Used (Material and Type)	(m³/ft³)	After test of well yield, water was: <input checked="" type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify _____ If pumping discontinued, give reason: _____ Static Level: 9-4 Draw Down: 11-8 Recovery: 17- 1 11-8 1 17- 2 12-8 2 16- 3 13-6 3 15- 4 14-2 4 14- 5 14-7 5 14- 10 15-3 10 13- 15 17-2 15 12- 20 17-7 20 11- 25 18-1 25 11-5 30 18-4 30 11-0 40 18-8 40 10-8 50 19-2 50 10-5 60 19-4 60 10-2
0 20	3/8 hole plug. quick grout - mix.		

Method of Construction	Well Use
<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary (Conventional) <input type="checkbox"/> Rotary (Reverse) <input type="checkbox"/> Boring <input type="checkbox"/> Air percussion <input type="checkbox"/> Other, specify _____	<input type="checkbox"/> Public <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Livestock <input type="checkbox"/> Irrigation <input type="checkbox"/> Industrial <input type="checkbox"/> Other, specify _____ <input type="checkbox"/> Commercial <input type="checkbox"/> Municipal <input type="checkbox"/> Test Hole <input type="checkbox"/> Cooling & Air Conditioning <input type="checkbox"/> Not used <input type="checkbox"/> Dewatering <input type="checkbox"/> Monitoring

Construction Record - Casing	Status of Well
Inside Diameter (cm/in) 6 1/4 Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) STEEL Wall Thickness (cm/in) 188W Depth (m/ft) From To 0 36	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____

Construction Record - Screen	Status of Well
Outside Diameter (cm/in) 6 1/4 Material (Plastic, Galvanized, Steel) STEEL Slot No. 188W Depth (m/ft) From To 0 36	<input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify _____ <input type="checkbox"/> Other, specify _____

Water Details	Well Diameter
Water found at Depth: 34-36 m/ft Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ Water found at Depth: 39-40 m/ft Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ Water found at Depth: (m/ft) Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Depth (m/ft) From To 0 40 Diameter (cm/in) 6 1/4

Well Contractor and Well Technician Information	Comments:
Business Name of Well Contractor: BURGESS WELL DEPT. LTD. Business Address (Street Number/Name): 467 Emily Park Rd Province: ONT Postal Code: K0L 2N0 Business E-mail Address: _____ Bus. Telephone No. (inc. area code): 705 799 5871 Name of Well Technician (Last Name, First Name): Wm. S. BURGESS Well Technician's Licence No.: 856 Signature of Technician and/or Contractor: _____ Date Submitted: 2017 07 14	Well Contractor's Licence No.: 11455 Municipality: Oshawa Well owner's information package delivered: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date Package Delivered: 2017 07 07 Date Work Completed: 2017 07 04

Ministry Use Only
Audit No.: 224344 Received: _____



Ministry of the Environment
and Climate Change

Well Tag No. (Place Sticker and/or Print Below)

Tag #: A 213278 TW-2

LOT #4.

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

Measurements recorded in: ☐ Metric ☐ Imperial

Well Owner's Information

First Name: **FRAN** Last Name / Organization: **CLIFFORD** E-mail Address: _____
Mailing Address (Street Number/Name): **100 Adelaide St. W.** Municipality: **Toronto** Province: **ONT.** Postal Code: **M5H0B3** Telephone No. (Inc. area code): _____
Well Location: _____

Address of Well Location (Street Number/Name): **County Rd 38** Township: **Douco-Dummer** Lot: **Dr. 21** Concession: **1**
County/District/Municipality: **Peterborough** City/Town/Village: **Wassau** Province: **Ontario** Postal Code: _____
UTM Coordinates: **NAD 83 17 72 86 41 423010** Municipal Plan and Sublot Number: _____

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	From	To
Brown	TOBOLT		0	2
Brown	CLAY, SANDS		2	17
Brown	SANDY CLAY		17	21
Grey	CLAY, SANDS		21	36
Gravel	SANDS		36	38
Grey	LIMESTONE ROCK		38	40

Annular Space		
Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
0 20'		

Method of Construction		Well Use	
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning
<input type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial	
<input type="checkbox"/> Other, specify		<input type="checkbox"/> Other, specify	

Construction Record - Casing			Depth (m/ft)	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	From	To
6 1/4	STEEL	18BW	0	37'

Construction Record - Screen			Depth (m/ft)	
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	From	To

Water Details		Hole Diameter	
Water found at Depth: 37-40'	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	Depth (m/ft)	Diameter (cm/in)
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	From To	
Water found at Depth: _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	0 40	6 1/4
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		
Water found at Depth: _____	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested		
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		

Well Contractor and Well Technician Information
Business Name of Well Contractor: **BURGESS WELL DRILLING** Well Contractor's Licence No.: **114515**
Business Address (Street Number/Name): **467 Emily Park Rd** Municipality: **Orillia**
Province: **ONT.** Postal Code: **K0L2A0** Business E-mail Address: _____
Bus. Telephone No. (Inc. area code): **705 799 5871** Name of Well Technician (Last Name, First Name): **Wm. S. Burgess**
Well Technician's Licence No.: **836** Signature of Technician and/or Contractor: _____ Date Submitted: **2017 07 14**

Results of Well Yield Testing			
After test of well yield, water was:		Draw Down	
<input checked="" type="checkbox"/> Clear and sand free		Time (min)	Water Level (m/ft)
<input type="checkbox"/> Other, specify		Static Level	
if pumping discontinued, give reason:		1 11-4	
Pump intake set at (m/ft)		2 13-1	1 18-1
Pumping rate (l/min / GPM)		3 14-6	2 17-3
Duration of pumping		4 15-2	3 16-5
Final water level end of pumping (m/ft)		5 15-6	4 16-3
if flowing give rate (l/min / GPM)		10 17	5 15-9
Recommended pump depth (m/ft)		15 17-7	10 14-7
Recommended pump rate (l/min / GPM)		20 18-3	15 14
Well production (l/min / GPM)		25 18-7	20 13-5
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		30 19-0	25 13
		40 19-4	30 12-9
		50 19-7	40 12-2
		60 19-9	50 12-2

Map of Well Location
Please provide a map below following instructions on the back.

Well owner's information package delivered: ☒ Yes ☐ No
Date Package Delivered: **2017 07 14**
Date Work Completed: **2017 07 06**
Ministry Use Only
ADDENDUM: **2243443**

Measurements recorded in: ☐ Metric ☐ Imperial

Well Owner's Information

First Name: FRED Last Name / Organization: CIPRO E-mail Address: _____
Mailing Address (Street Number/Name): 100 Adelaide St. W. Municipality: TORONTO Province: ONT. Postal Code: M5H Telephone No. (inc. area code): _____
☐ Well Constructed by Well Owner

Well Location

Address of Well Location (Street Number/Name): COUNTY RD 38 Township: Downsview Lot: 11 Concession: 1
County/District/Municipality: PETERBOROUGH City/Town/Village: WATERLOO Province: Ontario Postal Code: _____
UTM Coordinates: Zone: 17 Easting: 728598 Northing: 4923037 Municipal Plan and Sublot Number: _____ Other: _____

Overburden and Bedrock Materials/Abandonment Sealing Record (See instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)
				From To
BROWN	TOPSOIL			0 2
BROWN	CLAY STONE			2 17
GRAY	CLAY, SANDY			17 30
GRAY	SAND			30 35
GRAY	LIMESTONE			35 40

Depth Set at (m/ft)	Type of Sealant Used (Material and Type)	Volume Placed (m ³ /ft ³)
From To		
0 20	quick grant 3/8 hole plug.	

Method of Construction: ☒ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, specify _____
☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use: ☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify _____

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft)
			From To
6 1/4	STEEL	188W	0 35"

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)
			From To

Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Depth (m/ft)	Diameter (cm/in)
		From To	
35-40 m/ft		0 40	6 1/4

Well Contractor and Well Technician Information

Business Name of Well Contractor: BURGESS WELL DRILLING Well Contractor's Licence No.: 1455
Business Address (Street Number/Name): 467 Emery Park Rd. Municipality: Omenece
Province: ONT. Postal Code: K0K 2A0 Business E-mail Address: _____
Bus. Telephone No. (inc. area code): 705 799 5871 Name of Well Technician (Last Name, First Name): Wm. S. Burgess
Well Technician's Licence No.: 836 Signature of Technician and/or Contractor: _____ Date Submitted: 2017 07 17

Results of Well Yield Testing					
After test of well yield, water was:		Draw Down		Recovery	
<input checked="" type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, <i>specify</i>		Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason:		Static Level	8'-5"		
Pump intake set at (m/ft) 35 ft.		1	11-9.	1	14-2
Pumping rate (l/min / GPM) 56 l.m.		2	12-9	2	13-4
Duration of pumping 1 hrs + 0 min		3	13-6	3	12-7
Final water level end of pumping (m/ft) 17-6.		4	14	4	12-3
If flowing give rate (l/min / GPM)		5	14-3	5	11-9
Recommended pump depth (m/ft) 35 ft.		10	15-4	10	10-9
Recommended pump rate (l/min / GPM) 56 l.m.		15	16	15	10-2.
Well production (l/min / GPM) 86 l.m.		20	16-5	20	9-9
Disinfected?		25	16-7	25	9-5
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		30	16-9	30	9-4
		40	17-2	40	9-1
		50	17-4	50	8-9
		60	17-6	60	8-8

Map of Well Location

Please provide a map below following instructions on the back.

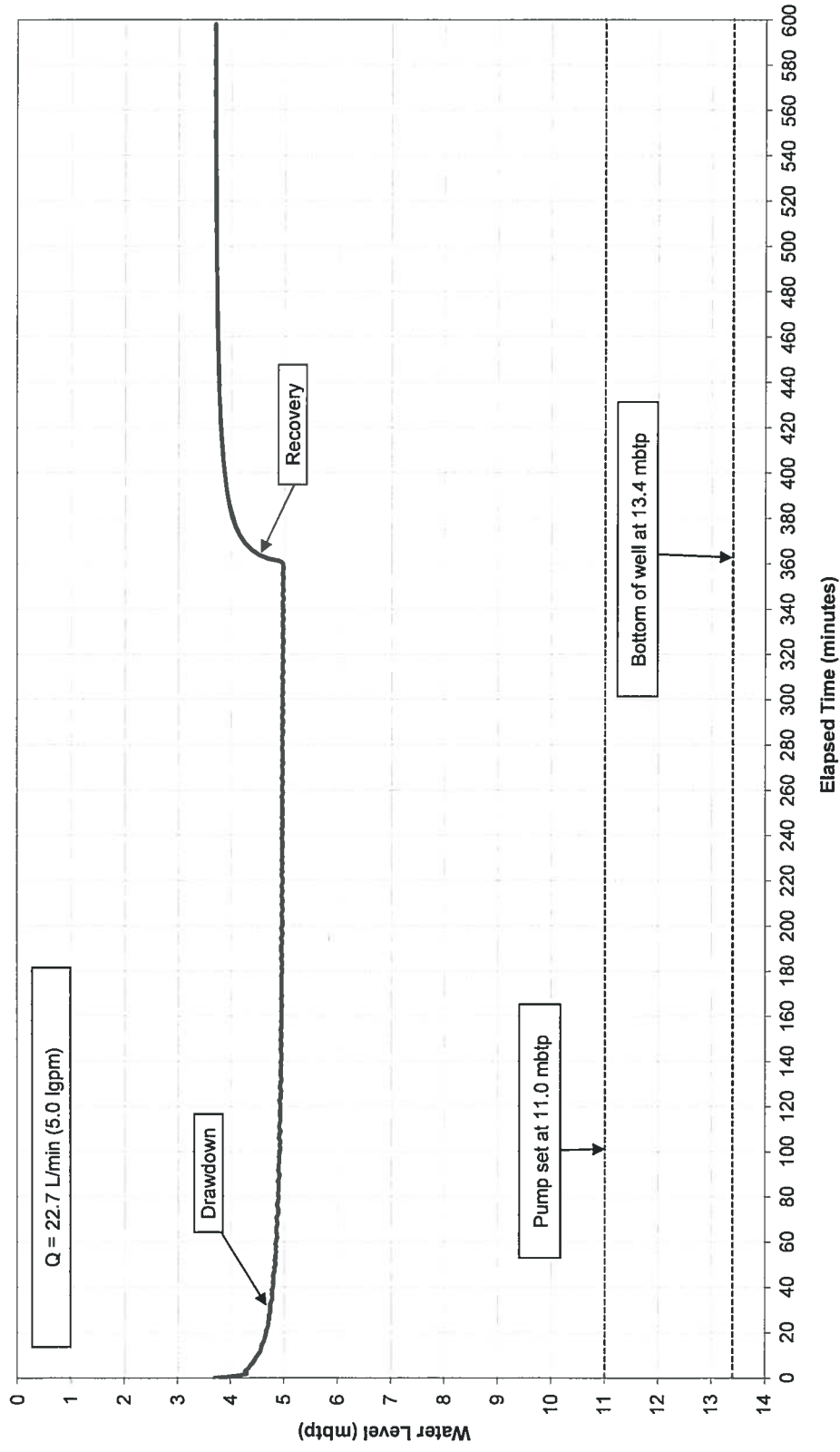
Comments: _____

Well owner's information package delivered: ☐ Yes ☐ No
Date Package Delivered: _____
Date Work Completed: _____
Ministry Use Only: Addit No: 2243445
Recorded: _____

Appendix B

Aquifer Performance Testing

PUMP HISTORY CURVE TW-1: July 25, 2017



PUMP HISTORY CURVE

Drilled Well TW-1
MOECC Well ID: A213277
Static Level = 3.70 mbtp (2.52 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: August 2017

LOCATION: County Road 38, Warsaw

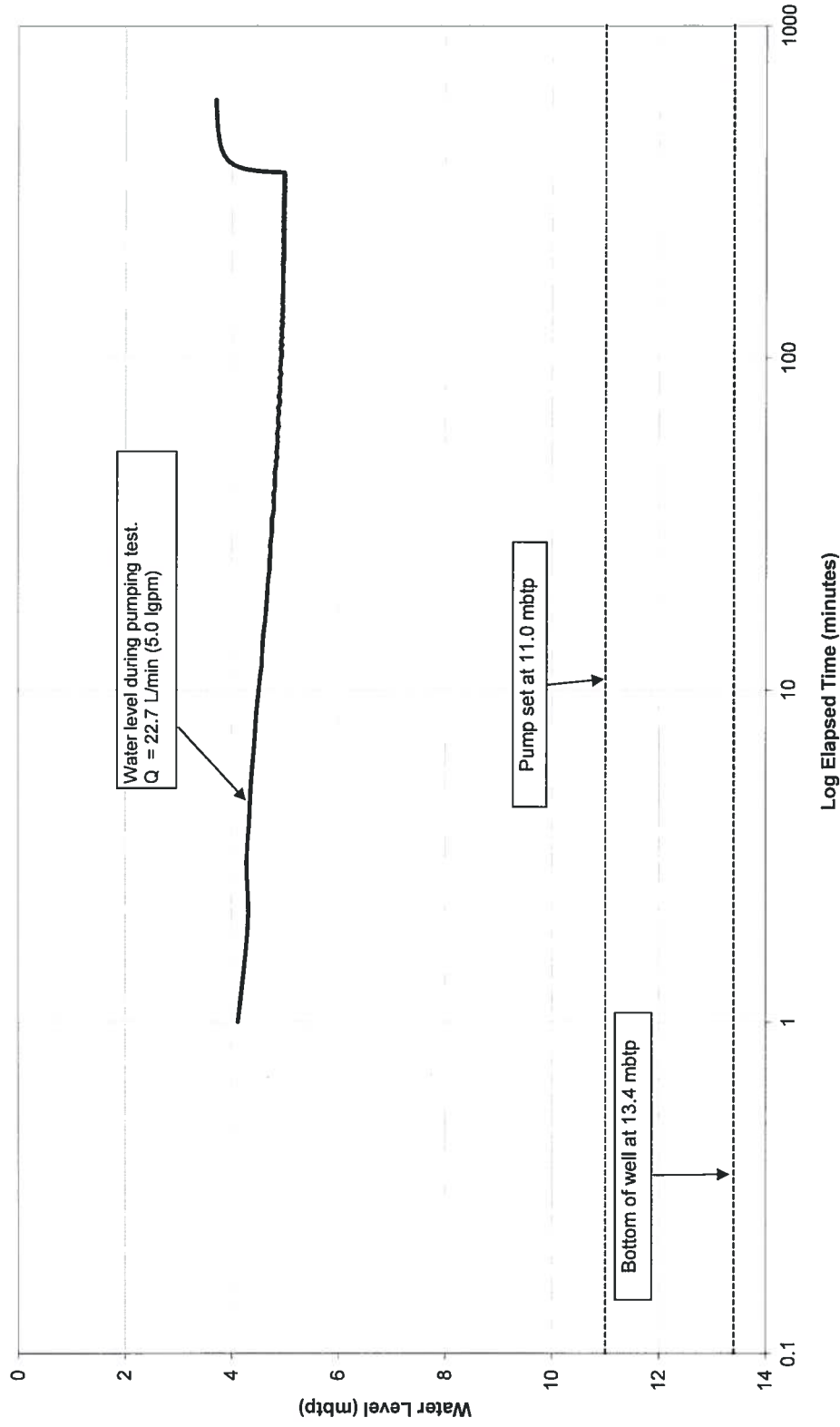
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-1



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME TW-1: July 25, 2017



CONSTANT RATE

Drilled Well TW-1
MOECC Well ID: A213277
Static Level = 3.70 mbtp (2.52 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: August 2017

LOCATION: County Road 38, Warsaw

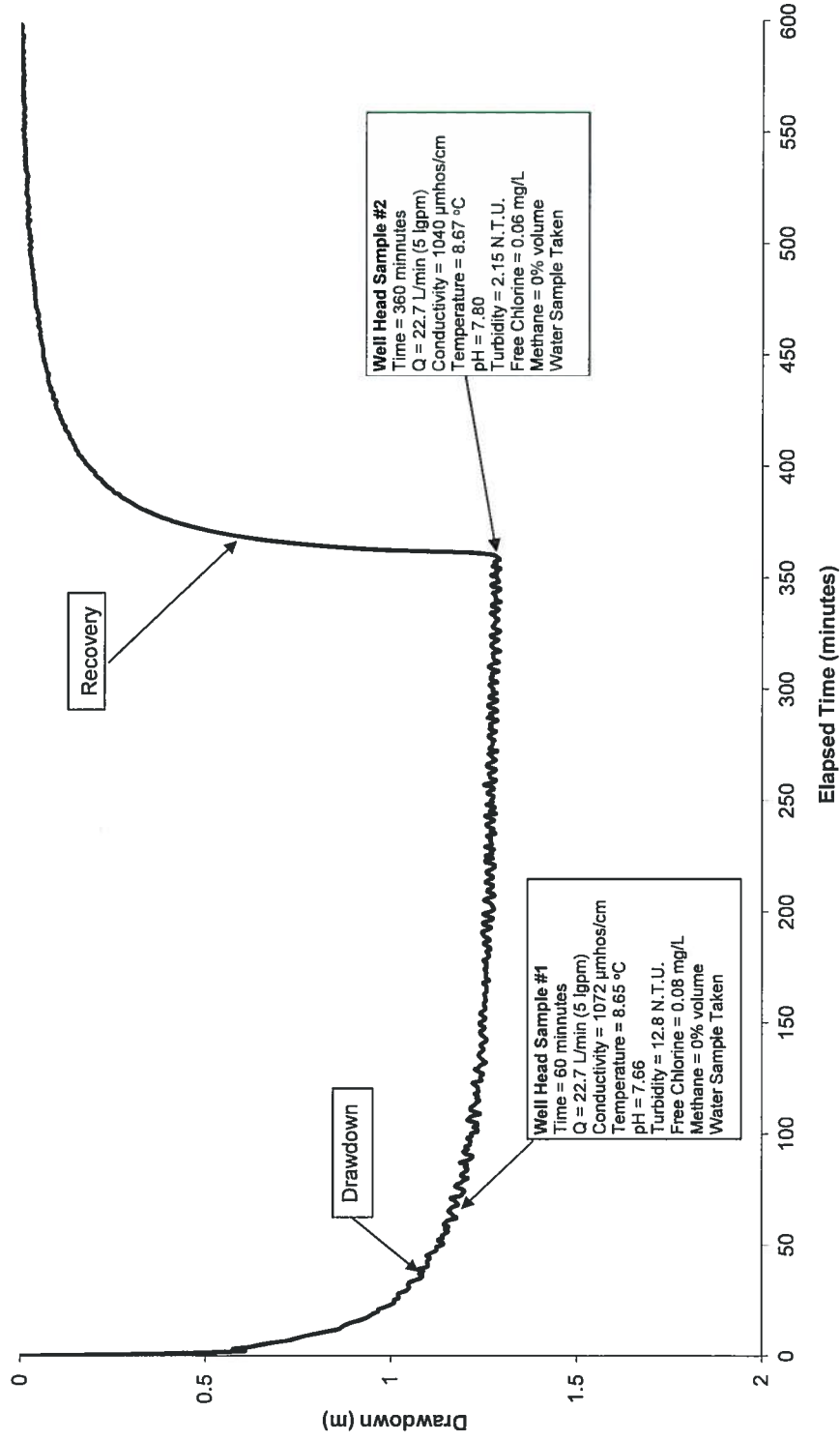
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-2



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS TW-1: July 25, 2017



CONSTANT RATE

Drilled Well TW-1
MOECC Well ID: A213277
Static Level = 3.70 mbtp (2.52 m)

DATE: August 2017

LOCATION: County Road 38, Warsaw

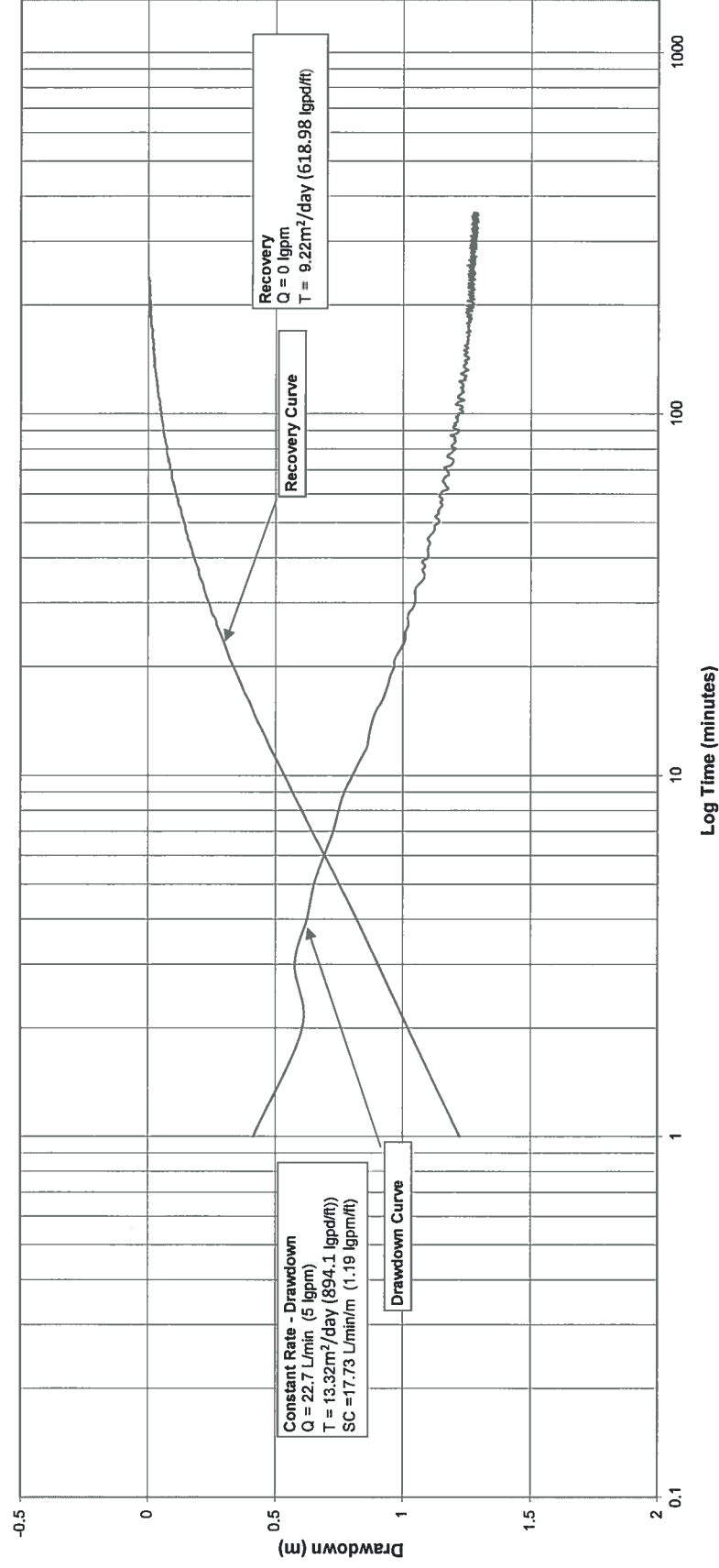
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-3



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-1: July 25, 2017



TRANSMISSIVITY CURVE

Drilled Well TW-1
 MOECC Well ID: A213277
 Static Level = 3.70 mbtp (2.52 m)

LOG TIME VERSUS DRAWDOWN

Q = Pumping Rate
 T = Transmissivity
 SC = Specific Capacity

DATE: August 2017

LOCATION: County Road 38, Warsaw

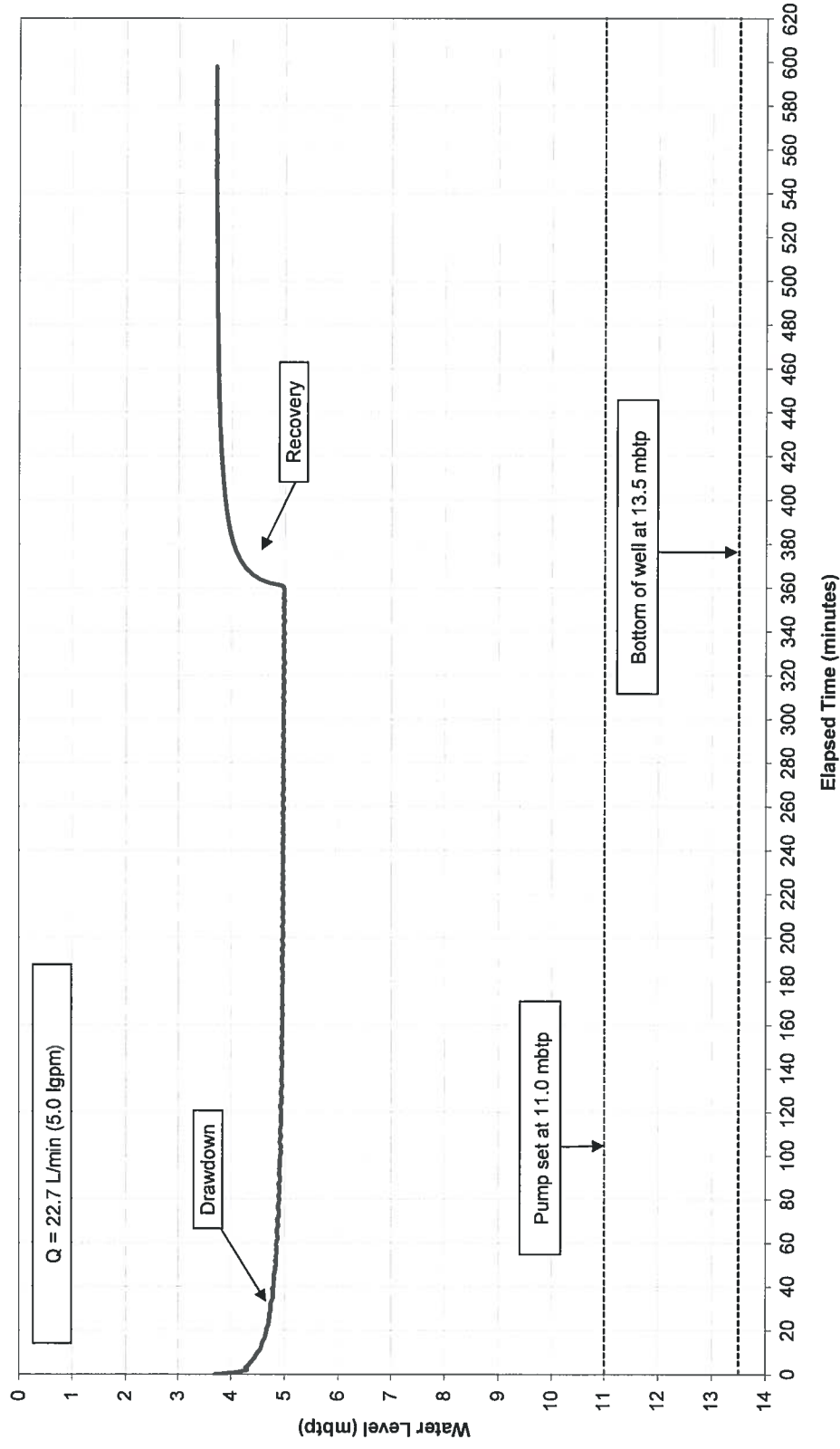
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-4



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 (705) 749-3317 FAX: (705) 749-9248 www.ghd.com

PUMP HISTORY CURVE TW-2: July 26, 2017



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.ghd.com

DATE: August 2017

LOCATION: County Road 38, Warsaw

JOB NUMBER: 11148465-01

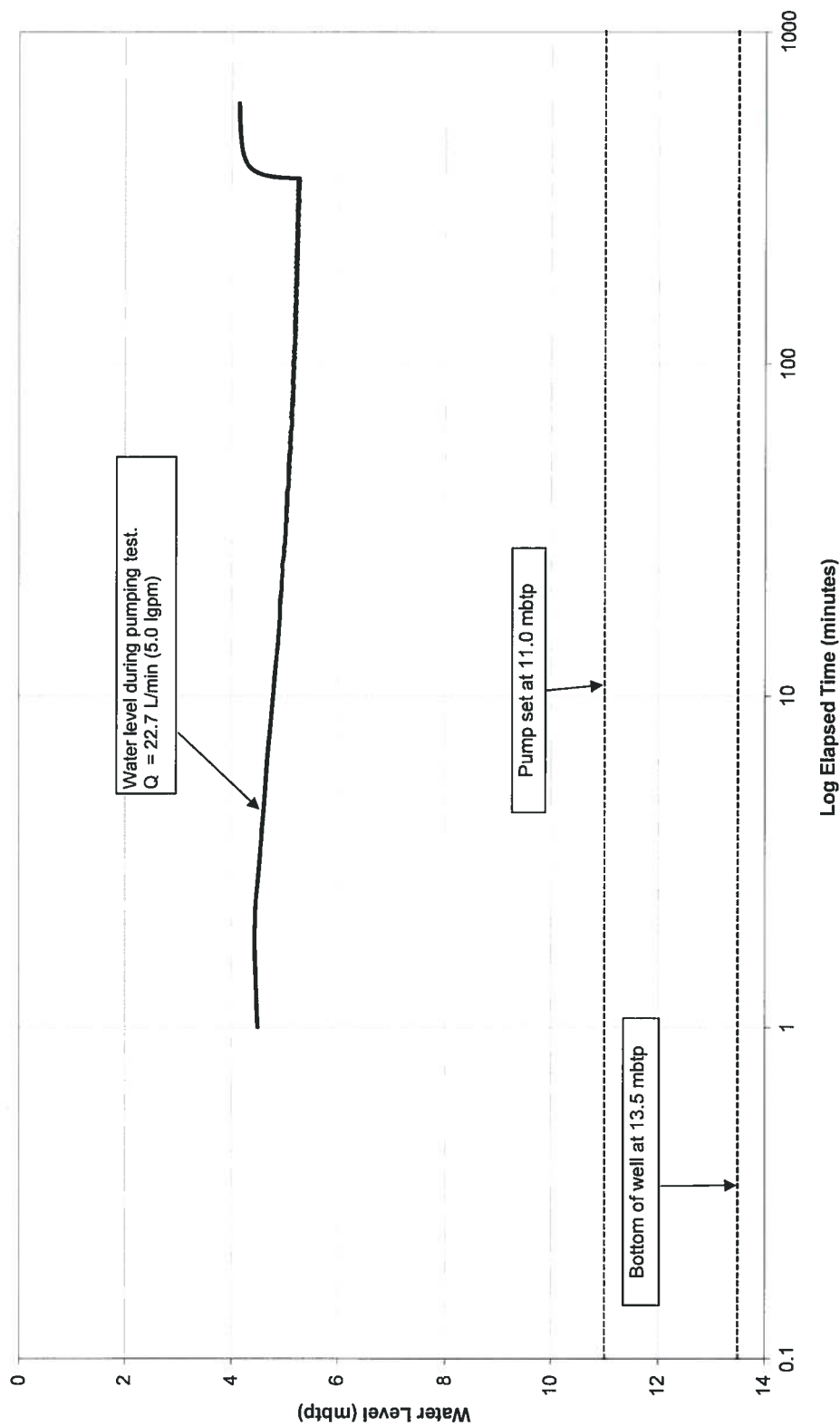
DRAWING NUMBER: B-5

PUMP HISTORY CURVE

Drilled Well TW-2
MOECC Well ID: A213278
Static Level = 4.07 mbtp (2.84 m)

Note: m = metres, mbtp = metres below top of pipe

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME TW-2: July 26, 2017



CONSTANT RATE

Drilled Well TW-2
MOEC Well ID: A213278
Static Level = 4.07 mbtp (2.84 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: August 2017

LOCATION: County Road 38, Warsaw

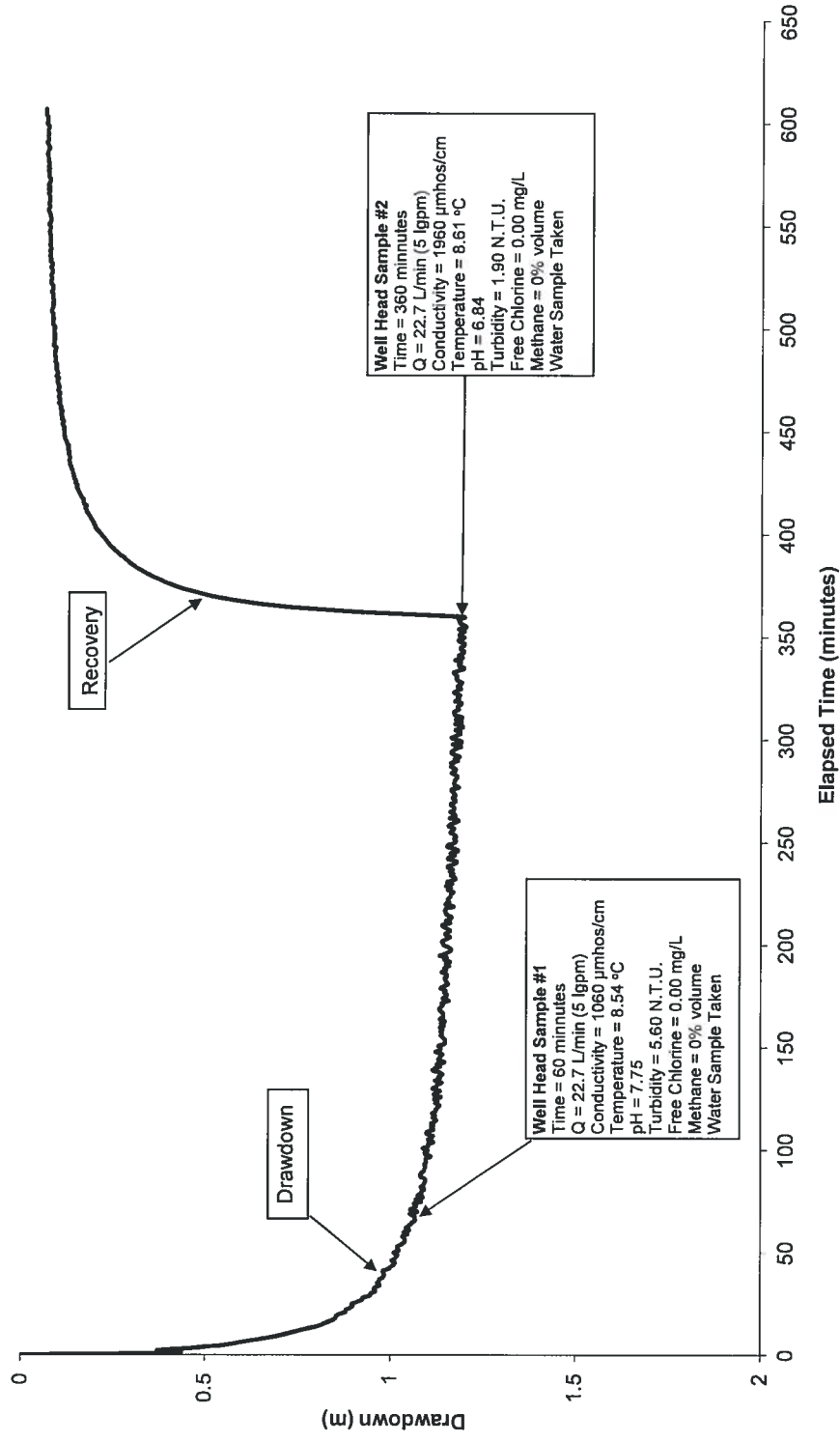
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-6



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 740-3317 FAX: (705) 749-9218 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS TW-2: July 26, 2017



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.chd.com

DATE: August 2017

LOCATION: County Road 38, Warsaw

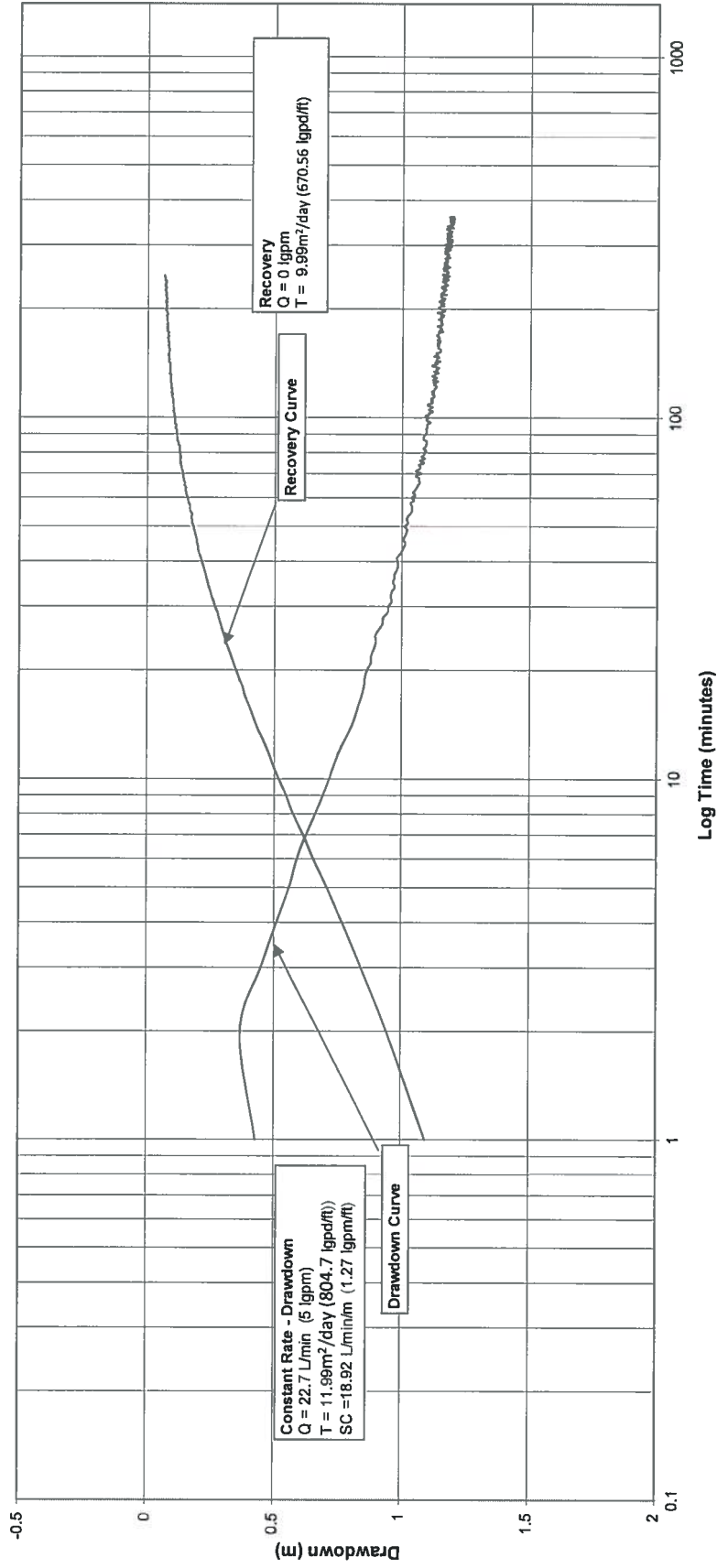
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-7

CONSTANT RATE

Drilled Well TW-2
MOECC Well ID: A213278
Static Level = 4.07 mbtp (2.84 m)

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-2: July 26, 2017



TRANSMISSIVITY CURVE

Drilled Well TW-2
 MOECC Well ID: A213278
 Static Level = 4.07 mbtp (2.84 m)

LOG TIME VERSUS DRAWDOWN

Q = Pumping Rate
 T = Transmissivity
 SC = Specific Capacity

DATE: August 2017

LOCATION: County Road 38, Warsaw

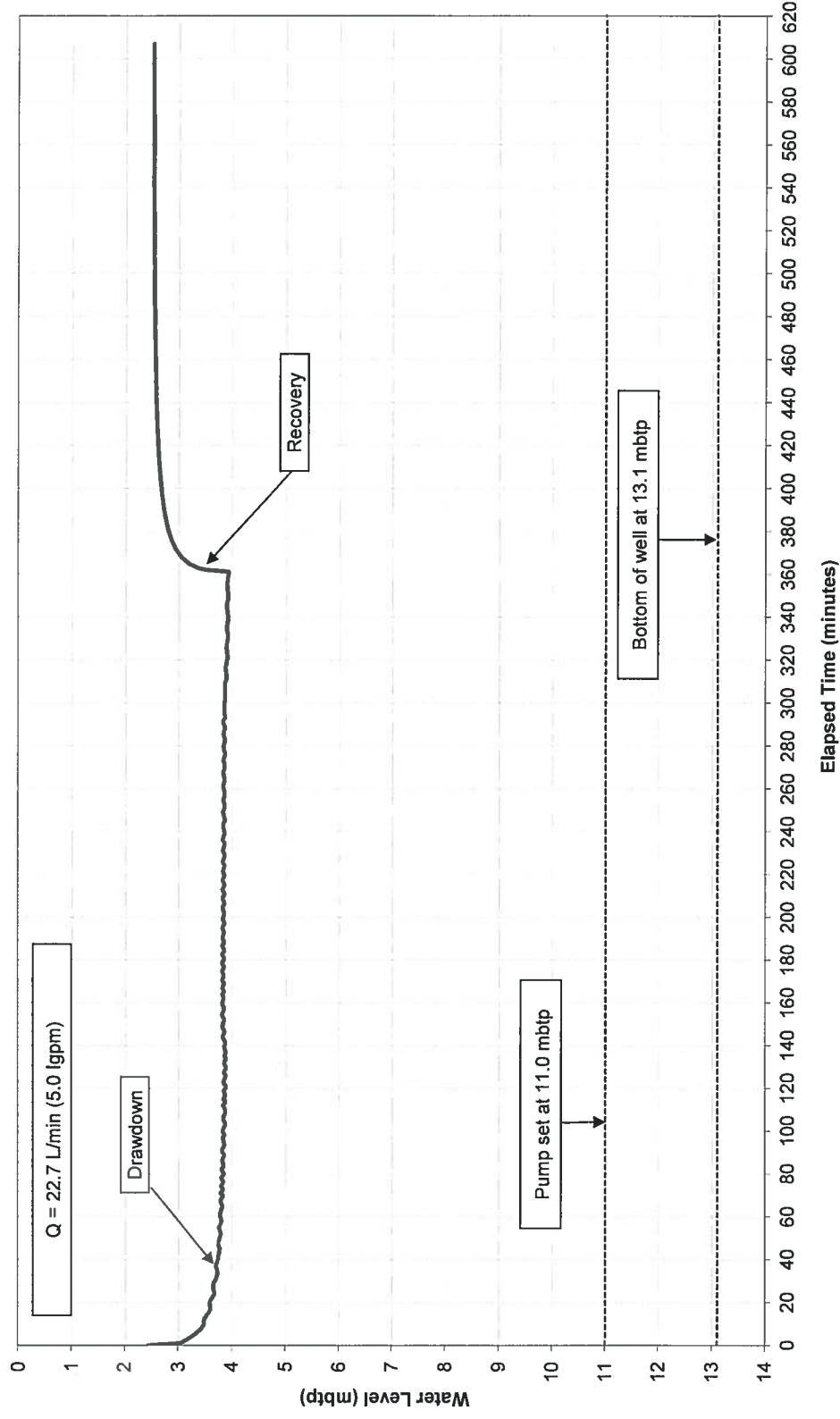
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-8



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 (705) 749-3317 FAX (705) 749-0248 www.ghd.com

PUMP HISTORY CURVE **TW-3: July 27, 2017**



PUMP HISTORY CURVE

Drilled Well TW-3
 MOECC Well ID: A213275
 Static Level = 2.44 mbtp (1.56 m)

Note: m = metres; mbtp = metres below top of pipe

DATE: August 2017

LOCATION: County Road 38, Warsaw

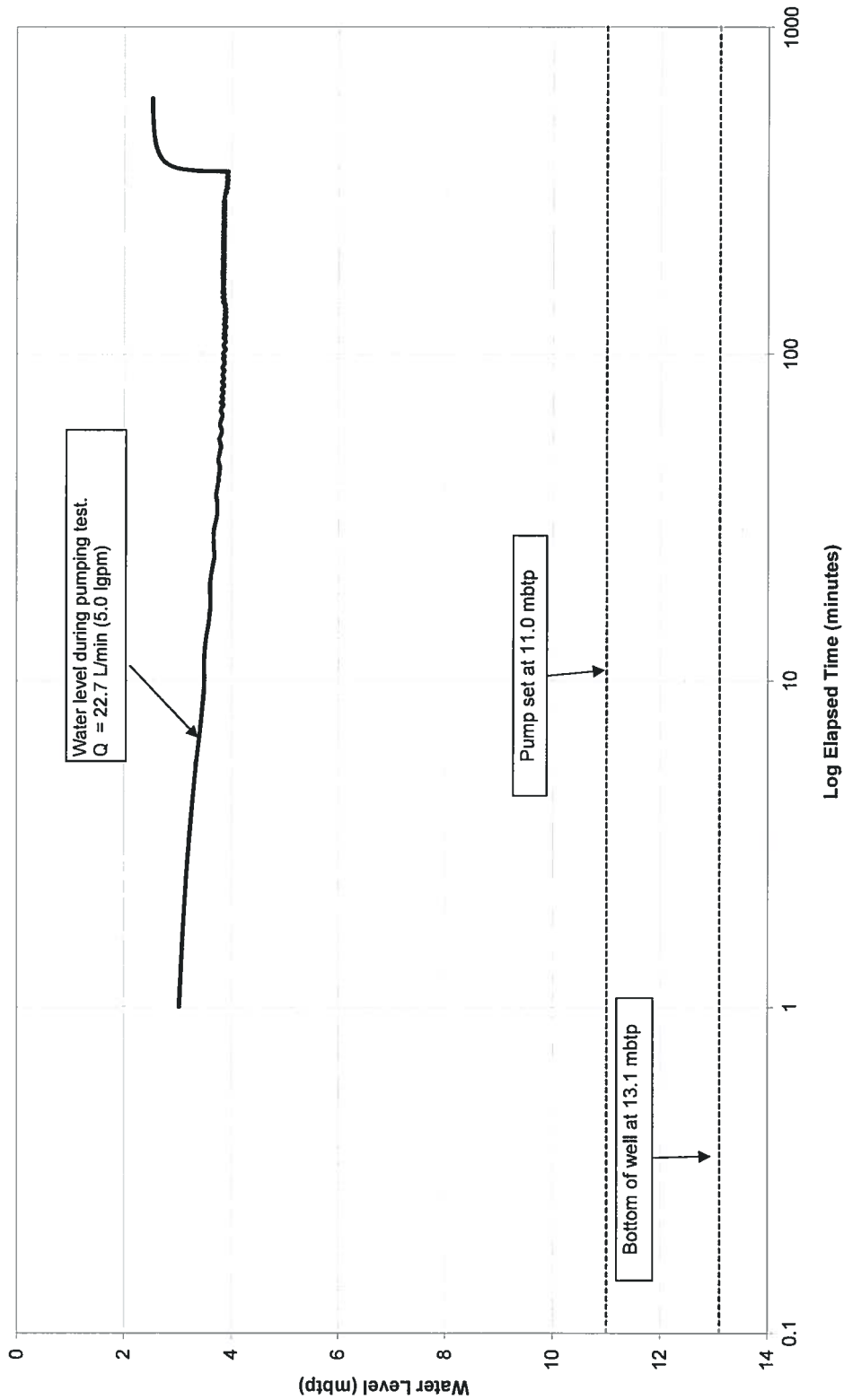
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-9



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 (705) 749-3317 FAX: (705) 749-9248 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs. LOG ELAPSED TIME
TW-3: July 27, 2017



CONSTANT RATE

Drilled Well TW-3
MOECC Well ID: A213275
Static Level = 2.44 mbtp (2.56 m)

Note: m = metres; mbtp = metres below top of pipe



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248 www.chd.com

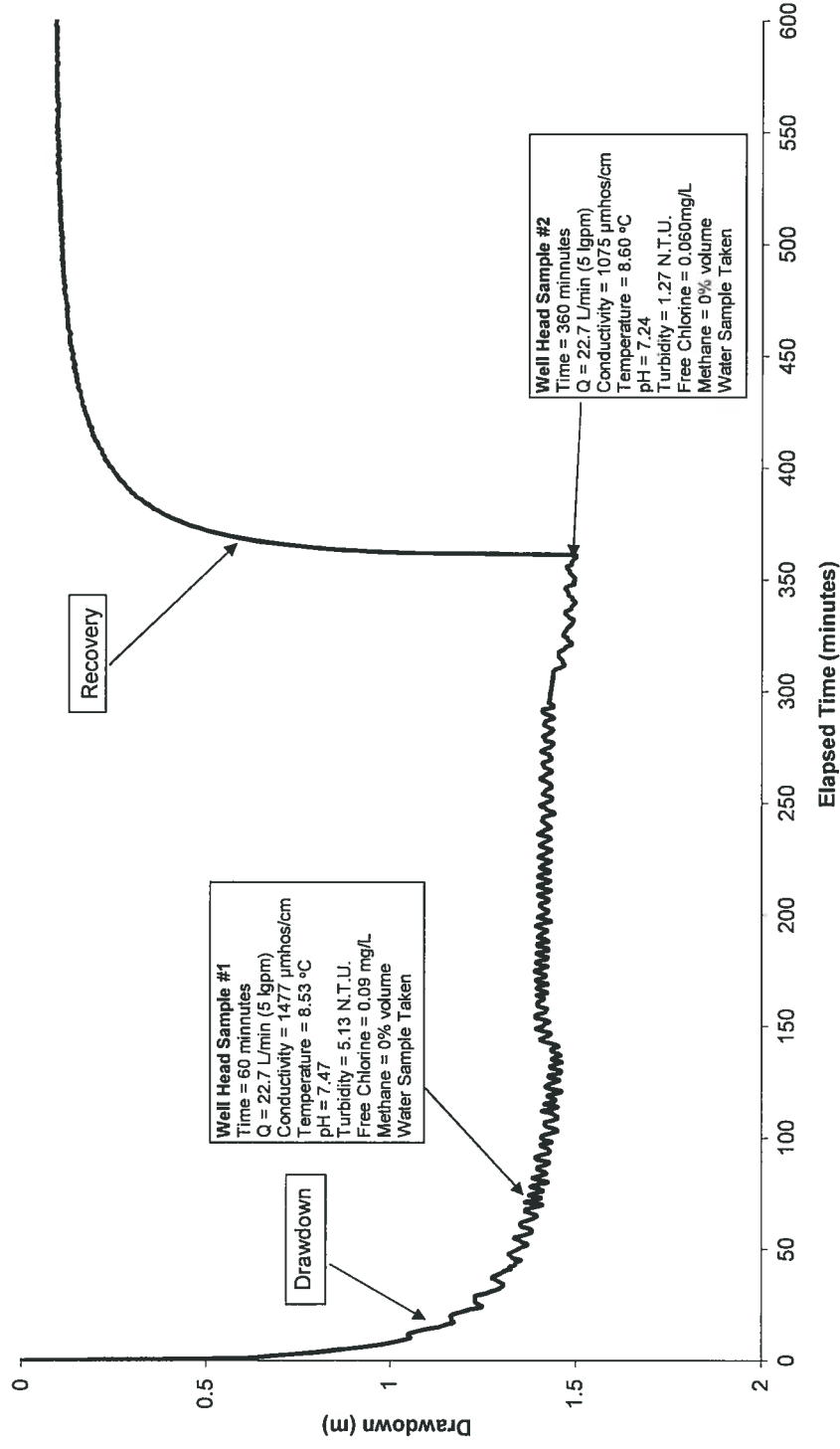
DATE: August 2017

LOCATION: County Road 38, Warsaw

JOB NUMBER: 11148465-01

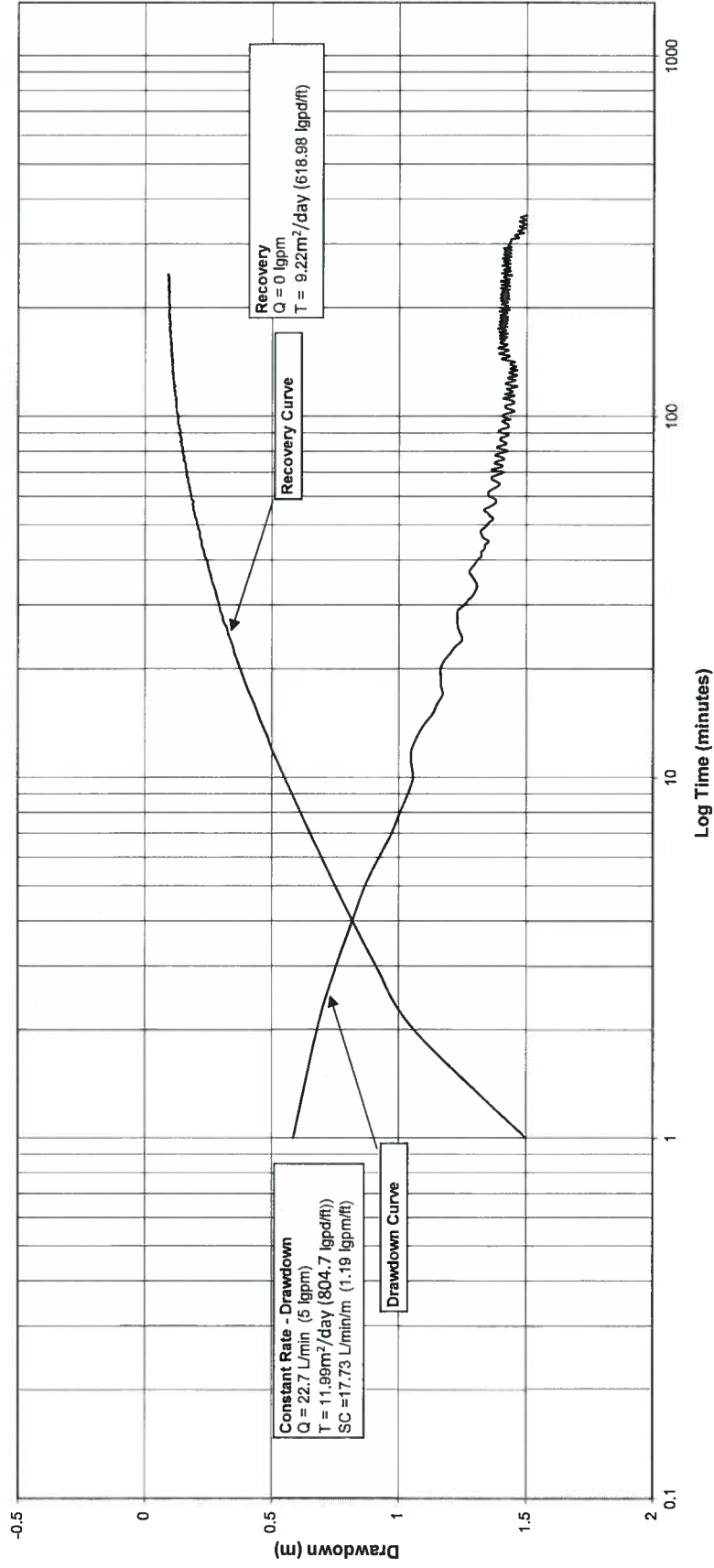
DRAWING NUMBER: B-10

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS TW-3: July 27, 2017



<p>CONSTANT RATE</p> <p>Drilled Well TW-3 MOECC Well ID: A213275 Static Level = 2.44 mbtp (1.56 m)</p>		<p>DATE: August 2017</p>	<p>GHD</p> <p>347 PIDO ROAD, UNIT 29 PETERBOROUGH, ON K9J 6X7 (705) 749-3317 FAX: (705) 749-9238 www.ghd.com</p>
		<p>LOCATION: County Road 38, Warsaw</p>	
		<p>JOB NUMBER: 11148465-01</p>	
		<p>DRAWING NUMBER: B-11</p>	

Constant Rate Test: Drawdown and Recovery Curves vs Log Time
TW-3: July 27, 2017



TRANSMISSIVITY CURVE

Drilled Well TW-3
 MOECC Well ID: A213275
 Static Level = 2.44 mbtp (1.56 m)

LOG TIME VERSUS DRAWDOWN

Q = Pumping Rate
 T = Transmissivity
 SC = Specific Capacity

DATE: August 2017

LOCATION: County Road 38, Warsaw

JOB NUMBER: 11148465-01

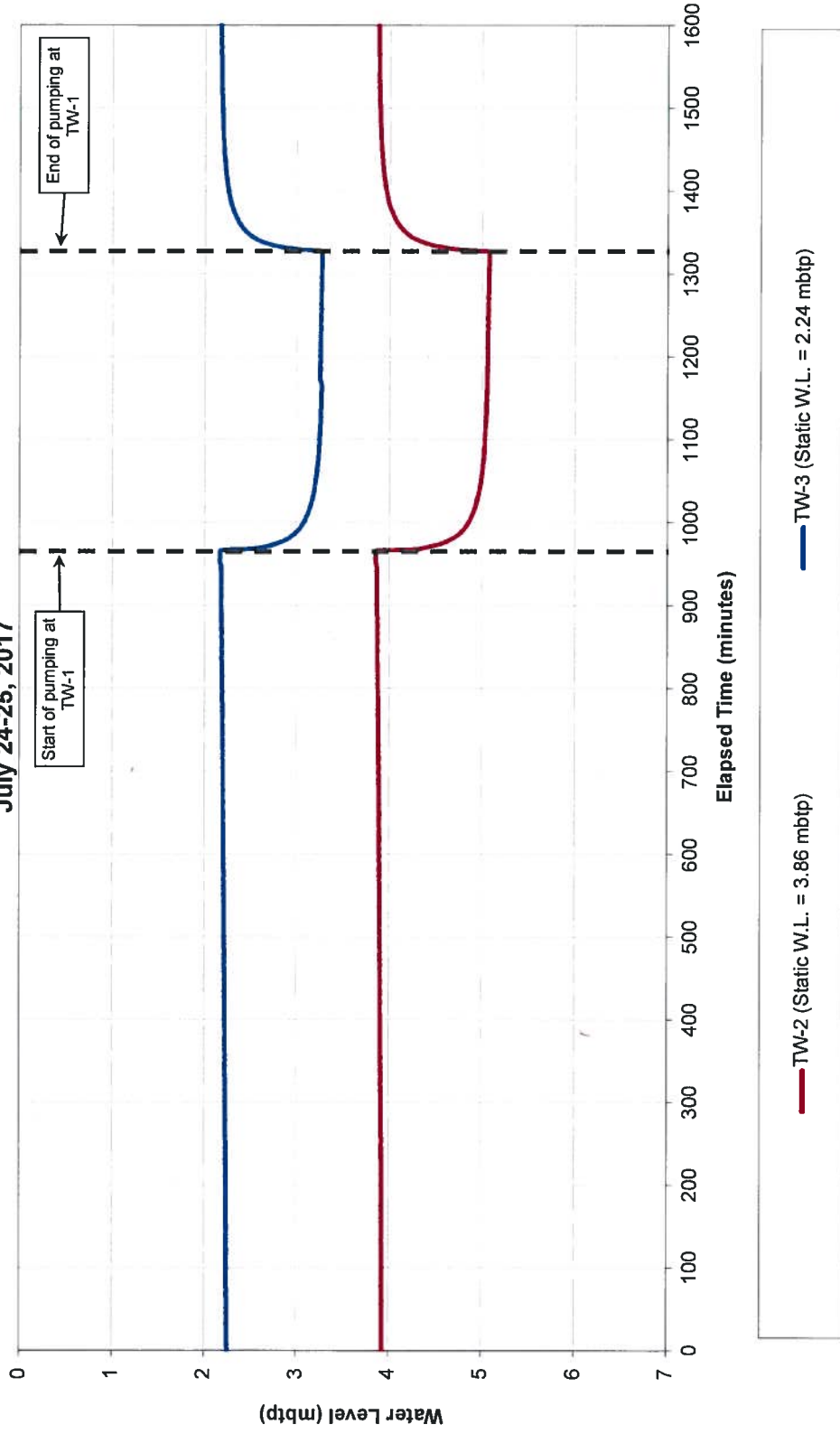
DRAWING NUMBER: B-12



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 (705) 749-3317 FAX: (705) 749-9248 www.ghd.com

OBSERVATION WELL CURVES

Pumping at TW-1
Water Level vs. Time
July 24-25, 2017



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of 5:00 PM July 24, 2017.
mbtp = metres below top of pipe. W.L. = water level

DATE: August 2017

LOCATION: County Road 38, Warsaw

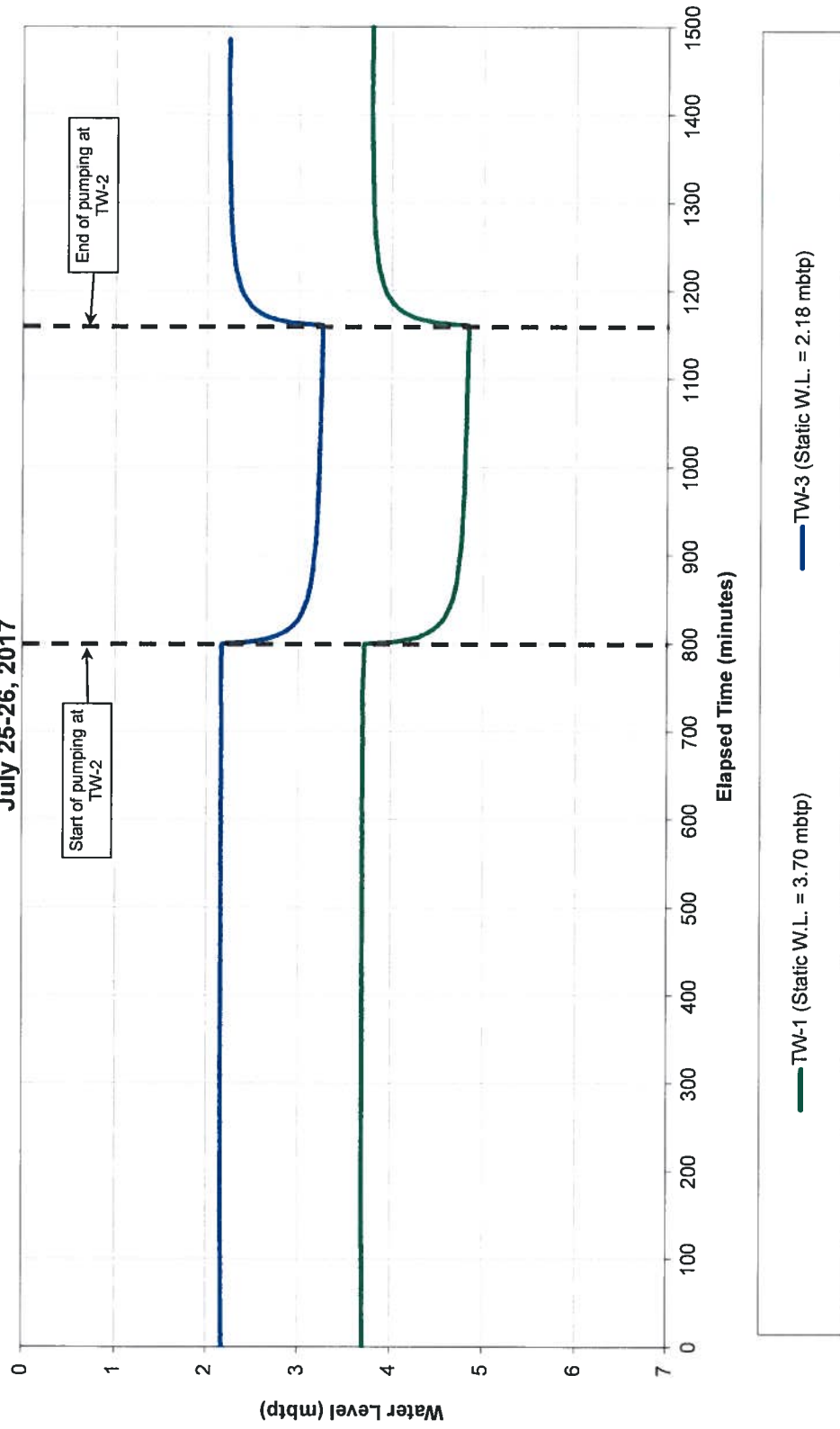
JOB NUMBER: 11148465-01

DRAWING NUMBER: B-13



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248

OBSERVATION WELL CURVES Pumping at TW-2 Water Level vs. Time July 25-26, 2017



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of 7:00 PM July 25, 2017.
mbtp = metres below top of pipe. W.L. = water level

DATE: August 2017

LOCATION: County Road 38, Warsaw

JOB NUMBER: 11148465-01

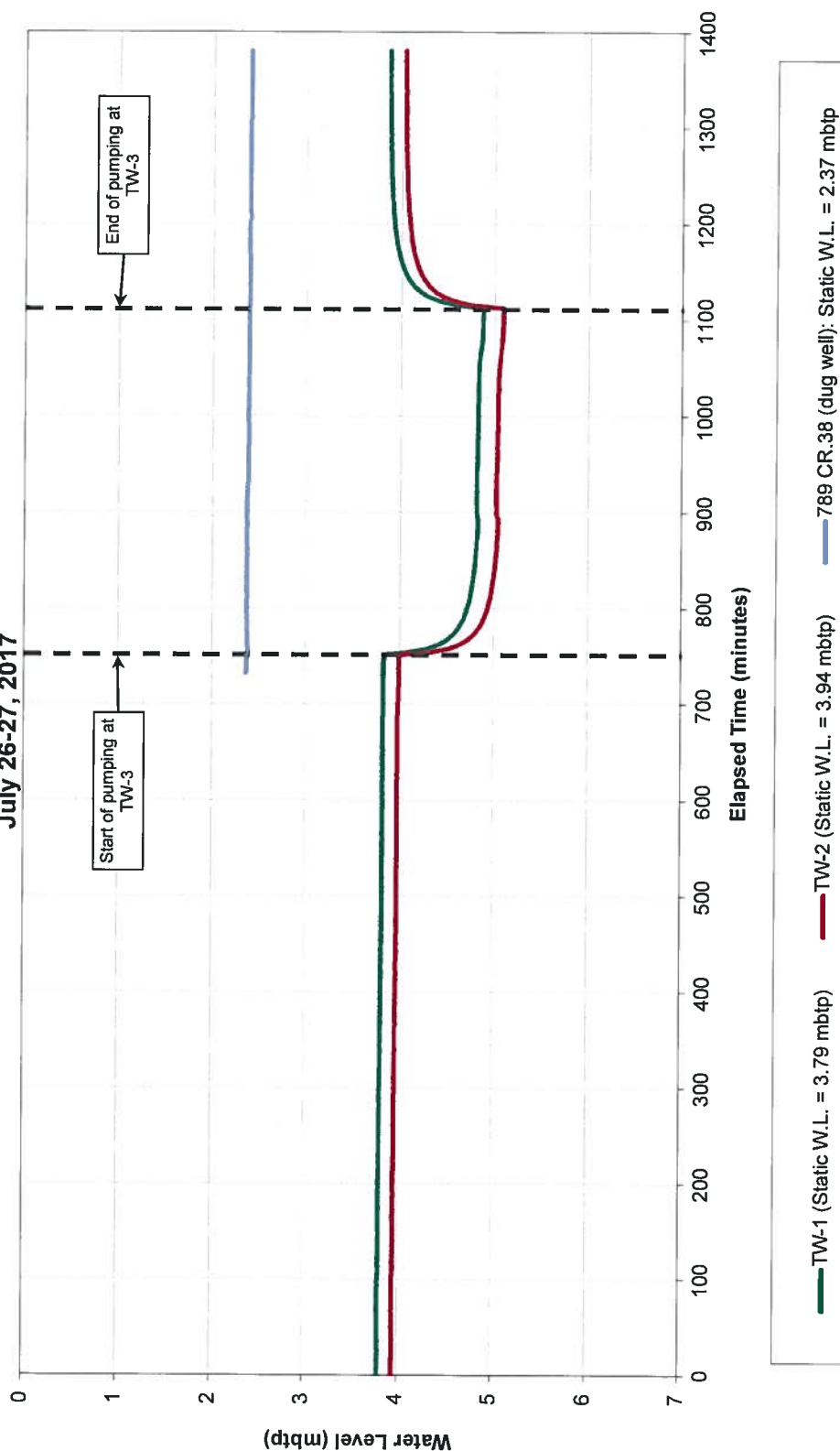
DRAWING NUMBER: B-14



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248

OBSERVATION WELL CURVES

Pumping at TW-3
Water Level vs. Time
July 26-27, 2017



OBSERVATION WELL CURVES

Note: 0 minutes relates to a daytime of 8:00 PM July 26, 2017.
mbtp = metres below top of pipe. W.L. = water level

DATE: August 2017

LOCATION: County Road 38, Warsaw

JOB NUMBER: 11148465-01

DRAWING NUMBER: B-15



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 FAX: (705) 749-9248

Appendix C

Certificate of Analysis



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

GHD

Attn : Kyle Geraldi

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8,

Phone: 705-749-3317
Fax: 705-749-9248

Project : 11148465-01 Fred Clifford/Warsaw

09-August-2017

Date Rec. : 25 July 2017

LR Report: CA14787-JUL17

Reference: 11148465-01 Fred Clifford/Warsaw

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MAC	6: AO/OG	7: NR TW-1 1 Hour	8: NR TW-1 6 Hour
Sample Date & Time								
Temperature Upon Receipt [°C]	---	---	---	---	---	---	25-Jul-17	25-Jul-17
UV Transmittance [%]	26-Jul-17	13:37	27-Jul-17	10:56	---	---	18.0	18.0
Alkalinity [mg/L as CaCO3]	26-Jul-17	08:46	28-Jul-17	13:46	---	30-500	95.8	95.8
Colour [TCU]	26-Jul-17	13:07	27-Jul-17	11:23	---	5	< 3	173
Conductivity [µS/cm]	26-Jul-17	08:46	28-Jul-17	13:45	---	---	813	< 3
pH [no unit]	26-Jul-17	08:46	28-Jul-17	13:45	---	6.5-8.5	8.14	907
Total Suspended Solids [mg/L]	26-Jul-17	10:01	27-Jul-17	15:38	---	---	< 2	8.11
Turbidity [NTU]	25-Jul-17	19:29	26-Jul-17	10:26	1	5	2.48	< 2
Organic Nitrogen [mg/L]	25-Jul-17	20:00	27-Jul-17	09:34	---	0.15	< 0.05	1.96
Total Kjeldahl Nitrogen [mg/L]	26-Jul-17	08:26	27-Jul-17	09:32	---	---	0.05	< 0.05
Ammonia+Ammonium (N) [mg/L]	25-Jul-17	20:00	26-Jul-17	11:19	---	---	0.05	0.09
Total Organic Carbon [mg/L]	25-Jul-17	20:00	26-Jul-17	13:05	---	---	< 1	0.06
Chloride [mg/L]	27-Jul-17	17:13	28-Jul-17	15:39	---	250	140	< 1
Fluoride [mg/L]	26-Jul-17	10:36	27-Jul-17	09:17	1.5	---	0.18	180
Nitrite (as N) [mg/L]	25-Jul-17	23:56	27-Jul-17	14:42	1	---	0.004	0.18
Nitrate (as N) [mg/L]	25-Jul-17	23:56	27-Jul-17	14:42	10	---	0.006 <MDL	0.004
Sulphate [mg/L]	27-Jul-17	17:13	28-Jul-17	15:39	---	500	23	0.006 <MDL
								23



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 11148465-01 Fred Clifford/Warsaw
LR Report : CA14787-JUL17

Analysis		1:	2:	3:	4:	5:	6:	7:	8:
		Analysis Start Date	Analysis Start Time	Analysis Completed Date	Analysis Completed Time	MAC	AO/OG	NR TW-1 1 Hour	NR TW-1 6 Hour
Hardness [mg/L as CaCO ₃]		27-Jul-17	12:00	31-Jul-17	12:01	—	80-100	346	398
Aluminum (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	0.1	0.001	< 0.001
Arsenic (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.025	—	< 0.0002	< 0.0002
Boron (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	5	—	0.025	0.025
Barium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	1	—	0.248	0.278
Calcium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	—	96.7	116
Cadmium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.005	—	< 0.000003	< 0.000003
Copper (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	1	0.00022	0.00007
Chromium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.05	—	< 0.00003	< 0.00003
Iron (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	0.3	0.222	0.253
Potassium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	—	3.27	3.61
Magnesium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	—	25.4	26.3
Manganese (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	0.05	0.0116	0.0131
Sodium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	20*	200	21.9	33.8
Phosphorus (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	—	< 0.003	< 0.003
Lead (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.01	—	< 0.00001	< 0.00001
Antimony (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.006	—	0.0004	0.0003
Selenium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.01	—	< 0.00004	< 0.00004
Uranium (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	0.02	—	0.000094	0.000090
Zinc (dissolved) [mg/L]		27-Jul-17	12:00	31-Jul-17	12:01	—	5	< 0.002	< 0.002
Cation sum [meq/L]		—	—	—	—	—	—	7.95	9.51
Anion Sum [meq/L]		—	—	—	—	—	—	8.04	9.01
Anion-Cation Balance [% difference]		—	—	—	—	—	—	-0.57	2.72
Ion Ratio		—	—	—	—	—	—	0.99	1.06
Total Dissolved Solids (calculated) [mg/L]		—	—	—	—	—	—	419	487
Conductivity (calculated) [µS/cm]		—	—	—	—	—	—	800	926
Langgeller's Index [°C]		—	—	—	—	—	—	0.41	0.44
Saturation pH [pHs @ 4°C]		—	—	—	—	—	—	7.73	7.67

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable provincial drinking water regulations as per client.

Online LIMS



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Project : 11148465-01 Fred Clifford/Warsaw
LR Report : CA14787-JUL17

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Project : 11148465-01 Fred
Clifford/Warsaw

27-July-2017

GHD

Attn : Kyle Gerald

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Date Rec. : 25 July 2017
LR Report: CA14788-JUL17
Reference: 11148465-01 Kyle Gerald

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CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Sample Date & Time	Temperature Upon Receipt °C	Total Coliform cfu/100mL	E. Coli cfu/100mL	Fecal Coliform cfu/100mL
1: Analysis Start Date		---	25-Jul-17	25-Jul-17	25-Jul-17
2: Analysis Start Time		---	18:00	18:00	18:00
3: Analysis Completed Date		---	27-Jul-17	27-Jul-17	27-Jul-17
4: Analysis Completed Time		---	08:39	08:39	08:39
5: MAC		---	0	0	---
6: NR TW-1 6 Hour	25-Jul-17	18.0	0	0	0

MAC - Maximum Acceptable Concentration

NR - Not reportable under applicable drinking water regulations as per client.

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09-August-2017

Date Rec.: 26 July 2017
LR Report: CA14823-JUL17
Reference: 11148465-01 Fred Clifford/Warsaw

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1:		2:		3:		4:		5:		6:		7:		8:	
	Analysis Start Date	Analysis Time	Analysis Start Time	Analysis Completed Date	Analysis Completed Date	Analysis Completed Time	MAC	AO/OG	TW-2 1 Hour	TW-2 6 Hour	MAC	AO/OG	TW-2 1 Hour	TW-2 6 Hour	MAC	AO/OG
Sample Date & Time																
Temperature Upon Receipt [°C]	28-Jul-17	11:42	—	—	28-Jul-17	16:09	—	—	9.0	9.0	—	—	9.0	9.0	—	—
UV Transmittance [%]	27-Jul-17	08:10	—	—	31-Jul-17	09:05	—	—	94.5	94.3	—	—	94.5	94.3	—	—
Alkalinity [mg/L as CaCO ₃]	27-Jul-17	13:31	—	—	28-Jul-17	14:39	—	30-500	180	177	—	—	180	177	—	—
Colour [TCU]	27-Jul-17	08:10	—	—	31-Jul-17	09:05	—	5	< 3	< 3	—	—	< 3	< 3	—	—
Conductivity [µS/cm]	27-Jul-17	08:10	—	—	31-Jul-17	09:05	—	—	1020	1050	—	—	1020	1050	—	—
pH [no unit]	27-Jul-17	14:45	—	—	28-Jul-17	13:12	—	6.5-8.5	7.98	8.04	—	—	7.98	8.04	—	—
Total Suspended Solids [mg/L]	26-Jul-17	18:06	—	—	28-Jul-17	10:31	—	—	3	< 2	—	—	3	< 2	—	—
Turbidity [NTU]	26-Jul-17	22:10	—	—	28-Jul-17	12:19	1	5	4.23	3.74	—	—	4.23	3.74	—	—
Organic Nitrogen [mg/L]	26-Jul-17	22:10	—	—	28-Jul-17	12:19	—	0.15	< 0.05	< 0.05	—	—	< 0.05	< 0.05	—	—
Total Kjeldahl Nitrogen [mg/L]	26-Jul-17	08:53	—	—	28-Jul-17	09:57	—	—	< 0.05	< 0.05	—	—	< 0.05	< 0.05	—	—
Ammonia+Ammonium (N) [mg/L]	27-Jul-17	12:00	—	—	28-Jul-17	10:12	—	—	0.10	0.05	—	—	0.10	0.05	—	—
Total Organic Carbon [mg/L]	28-Jul-17	04:30	—	—	31-Jul-17	11:55	—	5	1	< 1	—	—	1	< 1	—	—
Chloride [mg/L]	26-Jul-17	21:54	—	—	28-Jul-17	14:43	—	250	220	220	—	—	220	220	—	—
Fluoride [mg/L]	27-Jul-17	00:57	—	—	27-Jul-17	12:13	1.5	—	0.16	0.16	—	—	0.16	0.16	—	—
Nitrite (as N) [mg/L]	27-Jul-17	00:57	—	—	27-Jul-17	12:13	1	—	0.007	0.008	—	—	0.007	0.008	—	—
Nitrate (as N) [mg/L]	27-Jul-17	04:30	—	—	31-Jul-17	11:55	10	—	0.006 <MDL	0.006 <MDL	—	—	0.006 <MDL	0.006 <MDL	—	—
Sulphate [mg/L]	28-Jul-17	04:30	—	—	31-Jul-17	11:55	—	500	23	23	—	—	23	23	—	—



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LR Report : CA14823-JUL17

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MAC	6: AO/OG	7: TW-2 1 Hour	8: TW-2 6 Hour
Hardness [mg/L as CaCO ₃]	27-Jul-17	12:00	31-Jul-17	12:07	—	80-100	438	449
Aluminum (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	0.1	0.009	0.006
Arsenic (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.025	—	< 0.0002	< 0.0002
Boron (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	5	—	0.022	0.022
Barium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	1	—	0.306	0.321
Calcium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	—	129	133
Cadmium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.005	—	< 0.000003	< 0.000003
Copper (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	1	0.00026	0.00018
Chromium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.05	—	< 0.00003	< 0.00003
Iron (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	0.3	0.332	0.310
Potassium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	—	3.68	3.86
Magnesium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	—	28.0	28.1
Manganese (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	0.05	0.0159	0.0160
Sodium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	20*	200	41.0	43.9
Phosphorus (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	—	0.004	< 0.003
Lead (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.01	—	0.00001	< 0.00001
Antimony (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.006	—	0.0003	0.0004
Selenium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.01	—	< 0.00004	< 0.00004
Uranium (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	0.02	—	0.000307	0.000065
Zinc (dissolved) [mg/L]	27-Jul-17	12:00	31-Jul-17	12:07	—	5	0.007	0.006
Cation sum [meq/L]	—	—	—	—	—	—	10.6	11.0
Anion Sum [meq/L]	—	—	—	—	—	—	10.3	10.2
Anion-Cation Balance [% difference]	—	—	—	—	—	—	1.62	3.48
Ion Ratio	—	—	—	—	—	—	1.03	1.07
Total Dissolved Solids (calculated) [mg/L]	—	—	—	—	—	—	553	558
Conductivity (calculated) [µS/cm]	—	—	—	—	—	—	1045	1059
Langelier's Index [at 4°C]	—	—	—	—	—	—	0.36	0.43
Saturation pH [pHs @ 4°C]	—	—	—	—	—	—	7.62	7.61

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

Online LIMS



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LR Report : CA14823-JUL17

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03-August-2017

Date Rec. : 26 July 2017
LR Report: CA14822-JUL17
Reference: 11148465-01 Fred
Clifford/Warsaw

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: NR TW-2 6 Hour
Sample Date & Time					25-Jul-17
Temperature Upon Receipt [°C]	---	---	---	---	9.0
Total Coliform [cfu/100mL]	26-Jul-17	17:00	28-Jul-17	12:55	3
E. Coli [cfu/100mL]	26-Jul-17	17:00	28-Jul-17	12:55	0
Fecal Coliform [cfu/100mL]	26-Jul-17	17:00	28-Jul-17	12:55	0

NR - Not reportable under applicable drinking water regulations as per client.

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Project : 11148465-01 Fred Clifford/Warsaw

09-August-2017

Date Rec. : 27 July 2017
LR Report: CA14867-JUL17
Reference: 11148465-01 Fred Clifford/Warsaw

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1:	2:	3:	4:	5:	6:	7:	8:
	Analysis Start Date	Analysis Start Time	Analysis Completed Date	Analysis Completed Time	MAC	AO/OG	NR TW-3 1 Hour	NR TW-3 6 Hour
Sample Date & Time							27-Jul-17	27-Jul-17
Temperature Upon Receipt [°C]	28-Jul-17	11:42	28-Jul-17	16:09	—	—	9.0	9.0
UV Transmittance [%]	28-Jul-17	07:50	31-Jul-17	11:24	—	—	93.6	95.1
Alkalinity [mg/L as CaCO ₃]	1844187136	10:37	28-Jul-17	13:42	—	30-500	188	179
Colour [TCU]	28-Jul-17	07:50	31-Jul-17	11:24	—	5	3	4
Conductivity [µS/cm]	28-Jul-17	07:50	31-Jul-17	11:24	—	—	1120	1130
pH [no unit]	28-Jul-17	07:50	31-Jul-17	11:24	—	6.5-8.5	8.02	7.99
Total Suspended Solids [mg/L]	31-Jul-17	10:56	01-Aug-17	14:34	—	—	2	< 2
Turbidity [NTU]	27-Jul-17	14:20	28-Jul-17	14:32	1	5	4.27	1.13
Organic Nitrogen [mg/L]	27-Jul-17	17:36	31-Jul-17	13:07	—	0.15	0.06	< 0.05
Total Kjeldahl Nitrogen [mg/L]	27-Jul-17	17:36	31-Jul-17	10:36	—	—	0.09	< 0.05
Ammonia+Ammonium (N) [mg/L]	27-Jul-17	18:00	31-Jul-17	13:06	—	—	< 0.04	0.08
Total Organic Carbon [mg/L]	31-Jul-17	18:00	01-Aug-17	09:29	—	5	< 1	1
Chloride [mg/L]	27-Jul-17	21:59	31-Jul-17	11:59	—	250	250	250
Fluoride [mg/L]	27-Jul-17	21:06	28-Jul-17	13:59	1.5	—	0.16	0.16
Nitrite (as N) [mg/L]	28-Jul-17	23:18	31-Jul-17	12:07	1	—	0.003 <MDL	0.003 <MDL
Nitrate (as N) [mg/L]	28-Jul-17	23:18	31-Jul-17	12:07	10	—	0.006 <MDL	0.006
Sulphate [mg/L]	27-Jul-17	21:59	31-Jul-17	12:00	—	500	22	22



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Project : 11148465-01 Fred Clifford/Warsaw
LR Report : CA14867-JUL17

Analysis		1:	2:	3:	4:	5:	6:	7:	8:
		Analysis Start Date	Analysis Start Time	Analysis Completed Date	Analysis Completed Time	MAC	AO/OG	NR TW-3 1 Hour	NR TW-3 6 Hour
Hardness [mg/L as CaCO ₃]		01-Aug-17	14:54	02-Aug-17	11:11	—	80-100	440	420
Aluminum (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	0.1	0.012	0.003
Arsenic (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.025	—	0.0006	0.0002
Boron (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	5	—	0.025	0.026
Barium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	1	—	0.283	0.289
Calcium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	—	123	117
Cadmium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.005	—	< 0.000003	< 0.000003
Copper (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	1	0.00029	0.00026
Chromium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.05	—	0.00008	< 0.00003
Iron (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	0.3	0.812	0.342
Potassium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	—	3.87	3.94
Magnesium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	—	32.2	30.9
Manganese (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	0.05	0.0220	0.0189
Sodium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	20*	200	49.6	48.7
Phosphorus (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	—	0.003	< 0.003
Lead (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.01	—	0.00002	< 0.00001
Antimony (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.006	—	0.0003	0.0003
Selenium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.01	—	< 0.00004	< 0.00004
Uranium (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	0.02	—	0.000056	0.000058
Zinc (dissolved) [mg/L]		01-Aug-17	14:54	02-Aug-17	11:11	—	5	0.020	0.013
Cation sum [meq/L]		—	—	—	—	—	—	11.0	10.6
Anion Sum [meq/L]		—	—	—	—	—	—	11.3	11.1
Anion-Cation Balance [% difference]		—	—	—	—	—	—	-1.00	-2.24
Ion Ratio		—	—	—	—	—	—	0.98	0.96
Total Dissolved Solids (calculated) [mg/L]		—	—	—	—	—	—	593	580
Conductivity (calculated) [µS/cm]		—	—	—	—	—	—	1115	1084
Langlier's Index [°C]		—	—	—	—	—	—	0.40	0.33
Saturation pH [pHs @ 4°C]		—	—	—	—	—	—	7.62	7.66

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.



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Project : 11148465-01 Fred Clifford/Warsaw
LR Report : CA14867-JUL17

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28-August-2017

GHD

Attn : Bob Neck

Date Rec. : 25 August 2017
LR Report: CA13557-AUG17

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CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: NR TW-3
Sample Date & Time					25-Aug-17
Temperature Upon Receipt [°C]	---	---	---	---	10.0
Total Coliform [cfu/100mL]	25-Aug-17	15:00	28-Aug-17	09:25	1
E. Coli [cfu/100mL]	25-Aug-17	15:00	28-Aug-17	09:25	0
Fecal Coliform [cfu/100mL]	25-Aug-17	15:00	28-Aug-17	09:25	0

MAC - Maximum Acceptable Concentration

AO/OG - Aesthetic Objective / Operational Guideline

NR - Not reportable under applicable drinking water regulations as per client.

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