



October 30, 2017

Alexandra Mullins, President
Silver Maple Developments
315 Fairmont Ave.
Ottawa, ON K1Y 1Y5

Re: **OTT-00228145-A0 Samara Square Residential Development
Silver Maple Developments
Professional Opinion on GUDI Status**

Dear Ms. Mullins:

EXP Services Inc. (EXP) is pleased to provide this letter outlining our professional opinion on whether the Samara Square Residential Development, located at 6143 Perth Street, in the Village of Richmond (Ottawa), Ontario is located in an area where groundwater is under direct influence (GUDI) of surface water.

1. Introduction

This letter outlines some of the relevant conclusions from previous hydrogeological work undertaken at the site, and offers a professional opinion as to the GUDI status.

Previous hydrogeological reports by others have discussed whether or not the hydrogeological conditions at the site are under direct influence from surface water. While the reports have implied that the bedrock hydrogeological regime is considered non-GUDI, some ambiguous language, regarding the recommendation for the lining of the storm water ponds, has raised some confusion, and prompted the City of Ottawa to request further clarification.

2. Previous Hydrogeological Reports

EXP review the following reports in order to prepare this letter:

- *Hydrogeological Evaluation for Communal Water Supply in Support of the Groundwater Component Requirement for a Permit to Take Water (S.34 OWRA) and Waterworks C of A (S.52 OWRA) - Hyde Park Townhome Project, Richmond, Ontario.* Golder Associates Ltd. Report No. 011-2809. May 2001.
- *Hydrogeology near Hyde Park Development - Ottawa (Richmond), Ontario.* Golder Associates Ltd. Report No. 06-1122-181/3000. September 2007.
- *Hydrogeological Study - Hyde Park Phases 3A and 3B.* Golder Associates Ltd. Report No. 08-1122-0275. October 2008.
- *Wellhead Protection Area Plan - Hyde Park Development - City of Ottawa (Richmond), Ontario.* Golder Associates Ltd. Report No. 08-1122-0275 (6000). January 2010.
- *Engineering Evaluation Report – Drinking Water System Number: 260 029 549 – Silver Maple Development – Samara Square Residential Development.* EXP Services Inc. Report No. OTT-00228145-A0. January 31, 2017.

3. Discussion

The hydrogeological conditions in the Village of Richmond, now part of the City of Ottawa, have been extensively studied over the years. The general area of Richmond, where the proposed Samara Square Residential Development is located, has been investigated by a number of consulting engineering firms – including EXP, on behalf of various property developers. EXP has reviewed the reports listed in Section 2 of this letter in the preparation of our opinion on the GUDI status of the proposed development.

Since the area is not serviced with municipally-supplied potable water, individual and communal bedrock groundwater wells have been installed to provide domestic water supply. The majority of water supply wells are drilled through the native overburden deposits and into the underlying bedrock formations. The domestic water wells in the area range in depth from approximately 45 m to over 90 m from ground surface, and are cased through the overburden materials. In general, the local overburden deposits found in the area consist of low permeability silty clay and glacial till deposits, and generally extend to depths greater than 10 m below ground surface. The two bedrock aquifers that are frequently exploited by domestic water wells consist of the Nepean Formation sandstone aquifer or the March and Oxford Formations limestone aquifer. Both the local limestone and sandstone aquifers are productive aquifers, which provide good water quality.

The ambiguity regarding the potential for the bedrock aquifers to be under direct influence of surface water stems from a recommendation included in the document entitled “*Wellhead Protection Area Plan - Hyde Park Development - City of Ottawa (Richmond), Ontario*”, prepared by Golder Associates Ltd., and dated January 2010. In the report, the authors recommend: “*Lining of the pond with a low permeability liner to be constructed immediately south of the proposed Immanuel House to prevent surface water influence on the supply wells.*” This recommendation seems to contradict other statements made in the same report, such as: “*The Nepean sandstone aquifer, the main supply aquifer of the Hyde Park communal wells, is indicated to be naturally protected by a significant thickness of overlying bedrock of moderate hydraulic conductivity, and also by low and moderate hydraulic conductivity overburden.*” In that report, the authors build a strong argument that the bedrock aquifers in the area are not under direct influence of surface water, through discussion of the capture zone modelling work undertaken, and including the determination of the aquifer vulnerability (using the Intrinsic Susceptibility Index). Specifically, the report authors state: “*The very low aquifer vulnerability in the lower Nepean Formation aquifer is a result of the relatively large depth to the top of the Nepean aquifer from ground surface, which results in vertical groundwater travel times, from ground surface to the Nepean aquifer, to be a minimum of several years, based on the modelled conditions.*” These statements support the argument that the bedrock water source is considered non-GUDI.

In describing the groundwater quality from a test well during and subsequent to a 24-hour pumping test, in the report entitled: “*Hydrogeological Evaluation for Communal Water Supply in Support of the Groundwater Component Requirement for a Permit to Take Water (S.34 OWRA) and Waterworks C of A (S.52 OWRA) - Hyde Park Townhome Project, Richmond, Ontario*”, the report authors state: “*A minimum of weekly sampling for bacteria is required as per ODWS during operation of the waterworks, however natural water quality suggest no bacterial impacts are associated with the groundwater at the site.*” This observation was supported in multiple hydrogeological investigations undertaken in the area, including investigations undertaken by EXP for adjacent developments, and would suggest that the bedrock water source is considered non-GUDI.

In order for the bedrock aquifer system to have the potential to have GUDI status, the bedrock supply well would have to be within 500 m of surface water. With respect to the subject site, the nearest surface water

features are the storm water management ponds located on the subject property and adjacent properties. Based on a review of aerial imagery, these storm water management ponds were constructed in or about 2013. Previously, the nearest surface water feature was the Hamilton Drain, a shallow municipal drain. The development in the area has essentially removed the Hamilton Drain, which eliminates any potential for GUDI associated with that feature. With respect to the storm water management ponds, these features are shallow (approximately 1.5 m deep), and contain variable water volumes (depending on precipitation events).

4. Conclusions

It is EXP's professional opinion that the Samara Square Residential Development domestic water wells are considered non-GUDI. This opinion is based on:

- The results of the many hydrogeological investigations that have been undertaken in the area, including investigations undertaken by EXP, which suggest isolation of the bedrock aquifers from surficial influences;
- The depth of the domestic water wells (most exploiting the Nepean or March/Oxford formations);
- The anticipated low hydraulic conductivity of the native overburden materials;
- The shallow depths and variable volumes of the local storm water management ponds (which didn't exist prior to 2013); and,
- The removal of the Hamilton Drain from the area due to development that has occurred.

It is EXP's opinion that the recommendation provided by Golder Associates Ltd, in their report entitled "Wellhead Protection Area Plan - Hyde Park Development - City of Ottawa (Richmond), Ontario", where they said: "Lining of the pond with a low permeability liner to be constructed immediately south of the proposed Immanuel House to prevent surface water influence on the supply wells." was overly conservative based on the overall report conclusions. As such, it is EXP's opinion that that statement should be considered only an additional factor of safety, and not a recommendation based on legitimate concern that the bedrock water supply is under direct influence of surface water.

We trust that this letter meets your needs. If you have any question or concerns, please do not hesitate to contact the undersigned.

Sincerely,



Robert Renaud, M.Sc., P.Geo.
Senior Hydrogeologist
Earth & Environment



Shawn Doherty, P.Eng.
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exp Services Inc.

RR/SD:kmr