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October 7, 2015

Via: Email

Mr. Marco Ramunno
Director of Planning and Development Services
Town of Aurora
100 John West Way, Box 1000
Aurora ON L4G 6J1

Dear Mr. Ramunno:

Re: Highland Gate Development
Hydrogeological Study Peer Review Comments
Project No.: 300037822.0000

R.J. Burnside & Associates Limited (Burnside) is pleased to provide peer review of the Hydrogeological Study completed by Golder Associates Limited (Golder) for the proposed Highland Gate Development in the Town of Aurora. The following documents have been reviewed as part of our peer review of the Hydrogeological Study:

- Preliminary Hydrogeological Investigation, Proposed Redevelopment of Highland Gate Golf Course Lands, Town of Aurora, Ontario. Prepared by Golder Associates Ltd. (February, 2015).
- Natural Heritage Evaluation Highland Gate Redevelopment, Town of Aurora. Prepared by Beacon Environmental (February, 2015).
- Highland Gate Golf Course Re-Development, Town of Aurora, Functional Servicing and Stormwater Management Report. Prepared by SCS Consulting (February, 2015).
- Geotechnical Investigation, Highland Gate Redevelopment, Aurora, Ontario. Prepared by Golder Associates Ltd. (February 27, 2015).
- Zoning By-law Amendment and Plan of Subdivision Applications, Highland Gate Developments Inc., 21 Golf Links Drive, Town of Aurora, Regional Municipality of York, IMS File No.: PSDC600C4, POFG156, PZOA548. Prepared by Malone Given Parsons (August 11, 2015). Referred to herein as the LSRCA response document.
- Zoning By-law Amendment and Plan of Subdivision Applications, Highland Gate Developments Inc., 21 Golf Links Drive, Town of Aurora, Regional Municipality of York, IMS File No.: PSDC600C4, POFG156, PZOA548. Prepared by Malone Given Parsons (August 17, 2015). Referred to herein as the addendum LSRCA response document.

- Highland Gate – Preliminary Results of Water Budget Analysis. Prepared by Golder Associates Ltd. (September 3, 2015).

The Preliminary Hydrogeological Investigation provided by Golder included a hydrogeological characterization of the subject lands, site water budget assessment, and a source water risk assessment and management plan. The hydrogeological characterization included the drilling of 25 boreholes and the installation of 18 monitoring wells across the site, two rounds of water level measurements in the on-site monitoring wells, and review of existing information including surficial geology mapping and MOECC well records. Following this report, additional information was provided by Golder in response to LSRCA comments, including additional water level measurements and hydrographs for site monitoring wells, a groundwater flow map, and feature based water balance calculations.

The western portion of the subject lands are located on the Oak Ridges Moraine and the subject lands are within the 5-year and 25-year wellhead protection areas (WHPA) for the Aurora municipal groundwater supply wells. As such, the site is subject to the policies of the Oak Ridges Moraine Conservation Plan and the South Georgian Bay Lake Simcoe Source Protection Plan documents.

It is our understanding that the LSRCA has reviewed the submissions with respect to the potential impacts of the development on the natural features and water balance and has prepared Draft Plan Conditions for the proposed development.

Based on our review of the above-noted documents, we provide the following comments for consideration in the Town's Draft Plan Conditions:

1. Several additional monitoring wells (i.e., the 15 series monitoring wells) are shown on the attachment to the LSRCA response document (GOLDER-4) and hydrographs for these wells were also provided as an attachment to that document (GOLDER-5). A copy of the borehole logs and well installation details for these monitoring wells is requested along with a discussion of how these affect the interpreted stratigraphy and context for the water level measurements (i.e., identify in which aquifer the monitoring wells are screened).
2. Hydrographs for the on-site wells were provided in response to the LSRCA comments as attachment GOLDER-5. It is noted that the hydrographs for several wells were not included (BH14-4, BH14-205, BH14-210, BH14-215 and BH14-217). It is requested that these hydrographs be provided. It was also noted in the LSRCA response document that dataloggers had been installed in 11 shallow monitoring wells. The datalogger data do not appear to be provided in the attachment GOLDER-5. These graphs should be plotted with precipitation records and a discussion provided of the hydrological response to precipitation events and seasonal conditions. The implications, if any, of the groundwater level variations on servicing and construction within the proposed developed must be identified.
3. Given the sensitivity of the subject lands being located within a WHPA, water quality should be monitored throughout the development process, i.e., pre-, during and post-development. A water quality monitoring program should be provided. At least one round of water quality sampling (both groundwater and surface water) should be completed prior to earthworks to establish the background (existing) conditions.

4. It is noted in the Preliminary Hydrogeological Investigation that there are existing private wells located to the west of the subject lands. Prior to construction activities, and in particular any dewatering or depressurization of the underlying aquifers, a private well survey should be conducted to determine the location, depth, water level and water quality of any wells within the potential zone of influence. A mitigation plan for addressing interference/interruption of private water supplies must be provided to the Town.

5. Several wetland and pond features have been identified on the subject lands. The Preliminary Hydrogeological Investigation notes that the water table is generally high across the site and "artesian conditions were observed in the low-lying areas adjacent to natural drainage features". For example, BH14-5 and BH14-209 were installed adjacent to the ORM wetland, and have flowing artesian conditions. Given the upward hydraulic gradients in this area, it seems that there is potential for groundwater discharge to this feature. Similar conditions may be present at other features on the subject lands where similar stratigraphy and upward hydraulic pressures are present. Please provide more information regarding how the upward gradients, artesian and high water table conditions will affect the development servicing, basements, and groundwater/surface water interactions. Please comment on where mitigative measures to prevent the potential capture and redirection groundwater flow in the servicing trenches may be required, and if there will be impacts to the artesian conditions.

6. As per the Oak Ridges Conservation Plan (clause 26), a hydrological evaluation of all hydrologically sensitive features (i.e., permanent and intermittent streams, wetlands, kettle lakes and seepage areas and springs) is required in order to demonstrate that the proposed development will have no adverse effects on the feature or related hydrological functions. The hydrologically sensitive features on the site should be clearly shown on a figure, and the hydrologic function defined. It is noted that feature based water budget assessments have been completed for three features (the ORM Woodland, the ORM Wetland and the Non-ORM Woodland); however in the absence of a definition of hydrologic function of all features, it is not possible to determine what additional feature assessments may be required.

7. There does not appear to be an assessment of the existing watercourses on the site (Tannery Creek, Eastern Tributary, and Western Tributary). We request that any flow monitoring or water quality sampling that may have been completed be provided. An evaluation of the groundwater/surface water interactions along the watercourse, and the potential for groundwater discharge should be completed. The groundwater flow map provided in response to the LSRCA comments (GOLDER-4) shows significant convergence of groundwater flow on the on-site watercourses, suggesting the potential for groundwater discharge. If present, details of how the groundwater inputs to these watercourses will be maintained post-development are required.

8. In the water budget calculations, it has been assumed that no infiltration occurs in the areas of ponds and wetlands, and that the water surplus on these features will become entirely runoff. Some of these features do not appear to have outlets, and as such infiltration from the water ponded in these features to the underlying soils would be expected. Please provide further justification for this assumption in the water balance calculations.

9. Prior to or during construction, all inactive wells within the development footprint must be properly decommissioned by a licensed water well contractor according to Ontario

Regulation 903. This regulation applies to the groundwater monitoring wells installed for this study unless they are maintained throughout the construction for monitoring purposes.

10. The Source Protection Plan for the South Georgian Bay Lake Simcoe Area came into effect on July 1, 2015. Under this plan activities that would generate drinking water threats are regulated and are under the jurisdiction of the Risk Management Official. For the current development, Golder's comment in Section 6.0 of the Preliminary Hydrogeological Investigation that de-icing and snow storage practices should be reviewed at detailed design and measures that are compliant with the requirements of the Source Protection Plan should be implemented is appropriate.

Yours truly,

R.J. Burnside & Associates Limited

Jackie Shaw, P.Eng.
Project Engineer
JS:cl

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