



308 Wellington Street
2nd Floor
Kingston, ON K7K 7A8
Canada

613-548-3446
www.malroz.com

via: e-mail

June 28, 2019
File: 1227-101.00

James Bar, Mpl, MCIP, RPP.
Senior Planner
Planning Building and Licensing Department
City of Kingston
1211 John Counter Boulevard, Kingston, ON

Subject: Peer Review of the Documents Related to the Proposed Unity
Inn & Spa, 2285 Battersea Road, Glenburnie, Ontario K0H 1S0

Dear Mr. Bar:

Malroz Engineering Inc. (*Malroz*) is pleased to present our peer review of the hydrogeological study for the proposed Unity Inn and Spa. *Malroz* was retained by the City of Kingston (the City) to peer review the hydrogeological assessment and terrain analysis. We were furnished with the following documents by you:

1. *Hydrogeological Study, Servicing Options and Terrain Analyses, Proposed Unity Inn and Spa, 2285 Battersea Road, Kingston, Ontario*, prepared by ASC Environmental Inc., dated April 5, 2019, File: ASC-458 101r.
2. *Conceptual Site Plan for 2285 Battersea Rd.*, by Shoalts and Zaback Architects Ltd., dated March 1, 2019, File: A020 Site phase 3c, Drawing No. A022.

The purpose of this peer review was to assess if the proponent has used commonly accepted scientific practices to support their conclusions relating to the proposed development at 2285 Battersea Road as outlined in our Proposal and Letter of Agreement, dated April 17, 2019. The following is a list of regulatory documents for assessing privately serviced developments that guided the peer review for the hydrogeology and terrain analysis:

- *Hydrogeological Technical Information Requirements for Land Development Applications*, MOE, April 1995;
- *Procedure D-5-5 Technical Guidelines for Private Wells: Water Supply Assessment*, MOE, March 1995;

And additional document, *Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment*, (MOE, April 1996), was not considered as the site is proposing a wastewater treatment system approved by the MECP through an Environmental Compliance Approval (ECA).

1. Background

The proposed development is located at 2285 Battersea Road in Glenburnie, Ontario (the subject site), which is within the City boundary. The subject site is 14 hectares (ha) and reportedly currently designated as rural in the City of Kingston Official Plan.

A site visit was conducted on May 14th and included representatives from *Malroz*, the developer, ASC, and the City. At the time of the site visit, a number of structures were observed at the site, including a limestone house, a site construction trailer, and wooden barns. Site grading and a recent excavation was evident across the southern portion of the site. Based on site observations and aerial images, the site is bordered by rural, residential, institutional (eg: school), community (church) and agricultural use properties.

The Site topography reportedly slopes shallowly (138 to 124 masl) from the northwest corner to the southeast corner of the property and open ditches at Battersea and Unity Roads. A small wetland is present to the east of the proposed development area across Battersea Road.

According to the grain size analysis, overburden at the Site consists of fine-medium sand. Fourteen test pits were excavated in May 2018 and soil depths of up to 1.7 mbg were observed. Most test pits were excavated to less than 1 meter below grade (mbg) due to bedrock refusal. The upper bedrock was reported to be limestone, with outcropping observed around the site, and underlying granite. ASC reports that the limestone bedrock is the predominant water supply aquifer in the area.

The hydrogeological report identifies that the proposed development, will consist of a Farm, an Inn (27 suites: 26 one-bedroom and one two-bedroom), a 96-seat restaurant and seasonal 60 seat roof-top patio, a corporate venue, 18 one-bedroom cottages, and a spa. The site area is reported as 14 hectares, with the proposed development planned in a 7-ha area.

ASC calculated the total daily water taking requirement to be 75,375 L/day, based on maximum occupancy. The report identifies that approximately 29,960 L/day will be recycled, so as to reduce the total daily water demand for aquifer water takings to 45,415 L/day. It is our understanding that a well water storage system will be put in place to help facilitate water recycling. Water will be sourced from an on-site well water supply and an on-site sewage works treatment system (which requires MECP approval) which will include stormwater ponds. The hydrogeological investigation reports that the water taking

activities at the Site will not serve the tubs servicing the spa, which will receive potable water via truck delivery.

2. Comments

We offer the following comments on the Hydrogeological Assessment prepared by ASC (the consultant) for your review and consideration.

Servicing Options

The consultant provided a summary of the rationale for the provision of servicing the site and suitability of the site for private services. Our comments on the proposed servicing are provided below:

1. On Page 7, second-to-last paragraph of the hydrogeologic study, the consultant identifies that for the long-term provision of private on-site services from groundwater, it must be shown to be safe and sustainable. The consultant further identifies that trucking of water, to site, will be undertaken to supply water for certain aspects of the proposed development. The proponent should outline all water supply needs for the site and evaluate the provision of onsite services to support the full proposed development.
2. The consultant does not identify how, should offsite water sources be permitted, the offsite water will be separated from onsite sources.

We recommend that the above comments be addressed prior to resolving whether the site is suitable for private services.

Groundwater Quantity

The groundwater quantity at the Site was assessed through three pumping tests: two 48-hour tests (note that partial data was provided for the pumping test at well TW02; see comment 6) were completed in two recently drilled wells (TW01 and TW02), and a third 6-hour test in an on-site well (TW03). Wells were pumped at a rate of approximately 30 L/min and onsite and nearby water levels were recorded using an in-well water levellogger.

Results from well TW01 show that the maximum drawdown reached during the test was 4.1 m. The well recovered to 95% of pre-pumping conditions in approximately 1440 minutes after 48 hours of pumping.

Results from well TW02 show that the maximum drawdown reached during the test was 0.09 m. The well recovered to 95% of pre-pumping conditions in approximately 1930 minutes after 24 hours of pumping.

Results from well TW03 show that the maximum drawdown reached during the test was 3.45 m. The well recovered to 95% of pre-pumping condition in approximately 505 minutes after 8.4 hours of pumping.

During each of the pumping tests, nearby onsite and offsite wells were monitored (where possible) to assess for potential interference from the proposed water takings. ASC reported decreases and increases in water levels for offsite wells and attributed this to domestic water usage, which can be common for daily domestic well use.

ASC concluded that no significant drawdown of the onsite well supply was observed during the pumping tests, which included pumping 100% of the proposed daily design requirement (47,500 litres). They further concluded that the pumping will not result in an unacceptable interference to offsite water supplies.

Our comments on water quantity are summarized below:

3. Section 1.4 of the hydrogeological study identifies a peak daily water demand of 75,375 litres, in accordance with the Ontario Building Code. The report further identifies that 29,960 litres per day will be recycled, resulting in a peak daily water taking from groundwater of 45,415 litres.

During the site visit, the proposed development was identified to include a brewery, a winery and potentially an open loop groundwater geothermal system. The hydrogeologic study considered for this review does not evaluate for a water demand beyond those outlined on Page 4, in the Table titled 'Anticipated Flow Calculations Based on Site Use for Phase 1 and Phase 2 of Development' which does not include a winery, open loop geothermal system or brewery.

The anticipated flow calculations indicate that the spa, with bathhouse, showers and toilets, will have a demand of 150 litres per day. This appears to be low and the peak number of patrons to the spa should be re-evaluated.

Page 37, item 8, identifies that the re-use water will supply toilets and laundry. Supporting calculations on the demand for toilet water is not provided (laundry is shown as 7,500 litres per day) and should be included.

A Permit to Take Water (PTTW) from the MECP is required for water takings of 50,000 litres or more in any 24 hour period. As well, both closed and open-loop

groundwater geothermal system can require approvals and/or licensed installers though the MECP.

Considering the site is projecting a peak of 45,415 litres per day of groundwater takings and that there are potential additional water supply needs for tubs, a brewery and winery, or other uses, the proponent should consider the requirement to obtain a PTTW and other approvals. Should additional groundwater uses

beyond those identified on Page 4, in the Table titled 'Anticipated Flow Calculations Based on Site Use for Phase 1 and Phase 2 of Development', further adequate study should be undertaken.

4. Page 44 recommends a groundwater monitoring program for during and post-site development. However, a detailed monitoring program was not provided in the report. The proponent should provide a proposed monitoring program for review. The monitoring program should include a protocol for responding to water taking concerns from the construction phase and operations phase of the development.
5. Groundwater monitoring in on-site and off-site wells was undertaken as a part of the hydrogeologic assessment. The following details should be provided in the pumping test and water level monitoring data tables (eg: Appendix F) to facilitate evaluation:
 - i. water level measurements from a datum (eg. metres below ground, metres below top of casing, etc.),
 - ii. depth of well,
 - iii. clarification regarding the units of numbers stated in cell following "pumping started at".
6. The consultant describes the pumping test at TW02 as lasting 48 hours, however, although field water quality monitoring data for 48 hours was provided (table D1), the groundwater monitoring data only reflected 24 hours (table D2 and Figure 1 TW2 Pumping Test Drawdown). The consultant should clarify and provide the additional data, if available.
7. The report does not identify whether additional water supply wells are considered or not. Should additional wells be installed at the site, we recommend that they be assessed for water, quantity, and interference by a qualified hydrogeologist.

The volume and use of groundwater at the site should be further described and substantiated considering the comments above. We recommend that clarification on the comments above be obtained prior to developing a conclusion as to whether the proposed development will produce an adequate quantity of water, without undue interference to existing groundwater users.

Groundwater Quality

Groundwater quality was assessed by the consultant through sampling of groundwater collected during the pumping tests at each of the on-site wells. Groundwater samples were collected from the 48-hour pumping tests (wells TW01 and TW02) after the first hour and subsequently at twelve-hour intervals. Two groundwater samples were collected from the 6-hour pumping test (TW03), the first within the first hour and the second within the last hour of pumping.

Groundwater samples were also collected from 19 off-site, nearby wells before and after the pumping test programs. Samples collected prior to pumping tests were used to characterize the pre-development groundwater quality, which served as a benchmark to evaluate for changes following the pumping test program. Results of the groundwater sample lab analyses were compared to the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG)

Analytical results from the three sampled on-site wells exceeded the ODWSOG for hardness, iron, TDS, conductivity, and chloride. Slightly elevated fluoride concentrations were also detected.

The consultant recommended that all water supply systems be equipped with water treatment systems to address the parameters exceeding the ODWSOG. A reverse osmosis system was recommended, in particular, to treat the elevated sodium and chloride concentrations.

8. During the site visit, it was noted that a water treatment system will be installed at the site to treat and condition the groundwater. Considering that the site will be open to the public, as a commercial operation, the proponent must seek the appropriate approval from the MECP and/or health unit for the drinking water system. We recommend that this information be provided to the City.
9. Should additional wells be installed at the site, we recommend that they be assessed for water quality by a qualified hydrogeologist, considering the reported water quality.

We concur with the consultant that water treatment will be necessary for the site. Based on the data presented in the report, the proposed 47,500 litres per day water taking is not anticipated to result in an unacceptable impact to off-site water quality. We defer to the MECP technical review of the ECA for wastewater, regarding impacts from the discharge of water or site activities.

Terrain Analysis

During the site walkthrough, the proponent and the consultant discussed the proposed wastewater management system at a high-level and identified that a consultant had been retained to complete the design. The system is proposed to have a design capacity of greater than 10,000 litres per day and, as a result, will be subject to technical review by the MECP as part of obtaining an ECA.

Considering the design of the wastewater system is outside of the scope of the hydrogeologic study and subject to MECP approval, we offer no comment on it. We recommend that the hydrogeologic study and any further assessment be considered in the design of the system.

3. Summary

Our proposal included three questions that were to be considered:

- i. if the hydrogeological work completed by the proponent's consultant team satisfactorily evaluates groundwater quantity, quality and interference to existing or future neighbours.
- ii. provide a conclusion as to whether we agree or disagree with the proponent that the hydrogeological conditions are appropriate for the proposed development water takings and servicing options.
- iii. provide a conclusion as to whether we agree or disagree with the proponent's analysis, assessment, results, conclusions and recommendations.

Considering the comments above, we would recommend that further information be provided by the proponent and their hydrogeologist in advance of responding to the questions.

4. Closure

This peer review is based on the site visit and documents provided to *Malroz* by the City. We recommend that the comments above be resolved to the satisfaction of the City and their consultant, prior to granting approval.

We remind the reader that the purpose of the peer review was to assess if the proponent has used generally accepted practices to support the conclusions of the hydrogeological

study. The peer review is not an audit and as such is not intended to detect facts that were concealed, or omissions in the report. Unless otherwise stated, the peer review does not consider local By-laws, nor does it represent a legal opinion regarding compliance with laws, regulations, and/or guidelines.

We hope this process has been helpful. Please do not hesitate to contact the undersigned if you have any questions or concerns.

Yours truly,

Malroz Engineering Inc.



per: John Pyke, P.Geo.

Environmental Geoscientist

