June 25, 2023
Project Number: 230352-00

Ms. Theodhora Merepeza, MCP, MCIP, RPP
Manager, Planning
Municipality of Port Hope
5 Mill Street South
Port Hope, ON N2G 4J3
Email: tmerepeza@porthope.ca

Re: Peer Review of Hydrogeology Study
Proposed Residential Development, 5868 County Road 65, Osaca

Dear Ms. Merepeza:

BluMetric Environmental Inc. (BluMetric®) was retained by the Municipality of Port Hope to peer review hydrogeological studies prepared by others in support of the proposed residential development at 5868 County Road 65 in Osaca. The documents provided to us for review included:

- Phase I Environmental Site Assessment – 5868 County Road 65, Port Hope, Ontario prepared by Cambium Inc., dated September 28, 2002
- Phase II Environmental Site Assessment – 5868 County Road 65, Port Hope, Ontario prepared by Cambium Inc., dated October 1, 2002
- Geotechnical Investigation – Proposed Residential Development, 5868 County Road 65, Port Hope, ON prepared by Cambium Inc., dated November 18, 2022
- Hydrogeological Study Report, Osaca Hillstreet Subdivision, County Road 65, Osaca, Ontario prepared by D.M. Wills Associates Limited, dated December 2022
- Environmental Impact Study, Osaca Whitepine Subdivision, County Road 65, Osaca, Ontario prepared by D.M. Wills Associates Limited, dated December 2022
- Hydrogeology Investigation and Servicing Concepts Study, Osaca Subdivision, Lot 28 Concession 5, Municipality of Port Hope, County of Northumberland prepared by Azimuth Environmental Consulting Inc., dated February 2011
- Site Servicing Report, 5280 County Road 65, Part of Lot 27, Concession 5, Municipality of Port Hope prepared by D.M. Wills Associates Limited, dated September 2017

- Groundwater Supply Assessment, Part of Lot 27, Concession 5, Port Hope, Ontario prepared by Ted Rannie, dated September 11, 2018

The documents reviewed include work conducted at 5868 County Road 65 as well as hydrogeological aspects for proposed Wienfield Subdivision (south of the site under review) and the property located at Lot 28 Concession 5 (west of the site under review). The work on these additional sites provides more information on hydrogeological conditions in areas adjacent to the site, and, where additional work has been conducted, what might be expected at the 5868 property.

The overall work conducted by D.M. Wills (Wills or Wills') and Cambium generally follows regulatory and industry accepted protocols and methodologies. Comments where BluMetric has a difference of opinion or where further work is recommended are included below with respect Septic System Evaluation and Water Supply Potential.

Septic System Evaluation

The Wills' evaluation indicates that the proposed 59 lots would result in unacceptable nitrate concentrations at the down gradient property boundary. BluMetric agrees that reducing the number of lots would allow the off-site nitrate discharge concentrations to be met. Wills' also suggests that advanced septic treatment system on each lot would allow for the proposed 59 lots and acceptable nitrate concentrations at the property boundary. Although this may be technically correct, the Municipality of Port Hope does not accept the use of these type of systems for individual lots. BluMetric agrees with the Municipality since continued effective use of the system is left to the responsibility of the individual lot owner. This is not always done by the owners and is also difficult for the Municipality to enforce.

The Wills' evaluation suggests utilizing the middle of the percolation time range. This may be appropriate for medium to well drained soils, but the middle portion of the site has a lower percolation rate (estimated by Wills at >50 min/cm). Installing septic systems in this type of soil should include the use of raised tile beds and a re-evaluation of minimum set back distances.

The Wills' nitrate calculations assume a background nitrate value of 0.53 mg/L based on the average collected from BH107-22 and BH110-22. Both wells are completed at depths of 2.6 to 6.1 m below ground surface. BH107-22 was completed in both shallow sand and clayey silt and BH110-22 in sand. The overall depths of the wells may not be representative of shallow nitrate concentrations and the discharge depths for the septic systems. Wills disregarded the nitrate concentration of 4.36 mg/L from the shallow monitor MW22-08 since it was likely the result of agricultural activities over

many years. BluMetric agrees with the statement and the concentration observed is in keeping with the average background nitrate concentration of 3.3 mg/L determined by Wills for the proposed development south of the site at Wienfield Subdivision. For that assessment, Wills used this concentration in their nitrate calculations, but it is not known why it was not used for the present proposed development. Elevated nitrate concentrations in the shallow groundwater cannot be dismissed because of the previous land use and no prediction has been provided of nitrate reduction in former agricultural fields without any further nitrate loading. The higher values observed on the two sites is very common throughout southern Ontario in agricultural settings. Further assessment of background nitrate concentrations and calculations will be required.

BluMetric agrees with Wills' conclusion that shallow groundwater depth could affect the design of septic systems on individual lots. Groundwater depths were only measured during the fall of 2021 and 2022. Additional groundwater monitoring is required to determine any seasonality in groundwater elevations.

The Cambium (2022) geotechnical investigation indicates that no work was completed on Lots 18-33 (except Lot 24) since they were either wholly (Lots 18/19) or partially covered by forest. Soil conditions on these lots must be determined prior to the design of individual septic systems.

BluMetric agrees with the Wills' Environmental Impact Study that concludes that site grading and drainage features should be designed to ensure full function of the wetland feature at the north end of the property. Enhanced infiltration using soak away pits on lots adjacent to the wetlands may be adequate to achieve this, although this may not be sufficient given the surface water and shallow groundwater flow to the southwest and away from the wetlands. There should be an evaluation on whether the septic systems in the northwest corner of the property (Lots 56-59) will have any detrimental impacts to the functionality of the wetlands. Nitrate loadings entering the wetlands would be expected to be above 10 mg/L given short flow path between the leaching beds and the wetlands.

Water Supply Potential

A water supply evaluation for the property has not yet been conducted. The work to date includes the review of MECP well records, the drilling of shallow groundwater wells as part of the geotechnical investigation, groundwater level monitoring, groundwater flow direction determination, and limited nitrate in groundwater analysis. The Will's report relies heavily on the Ted Rannie Groundwater Supply Assessment prepared for the Wienfield Subdivision property. The Rannie report concluded that the aquifer at that site could support the proposed 20 lot development with minimal impacts to adjacent groundwater and surface water users, although no

theoretical calculations of potential interference were included to support their assessment. Wills' opines that the conditions at Wienfield Subdivision extend onto the 5868 property and they therefore conclude it is likely that adequate water supply can be met for individual lots. Further work is required to come to this conclusion.

Wills' does, however, acknowledge that a full investigation on the 5868 property, including the drilling of water supply wells and aquifer testing, is required to ensure the required volumes and water quality for individual wells, and indicates that this is scheduled to be completed in 2023. We agree with this recommendation and the completion of this work is paramount before any draft plan approval for the development is provided.

The 2023 investigation proposed by Wills should include drilling at least three water supply wells, preferably completed with the deeper overburden units. The wells must be screened as opposed to the open-bottomed wells as installed at the Wienfield Subdivision. Each well should be pumped for a minimum of 6 hours while measuring water levels in the other test wells, all available monitoring wells and private wells, if available. Normal geochemical testing during the test will be required.

Potential well interference between wells on the site as wells as adjacent private wells must be evaluated. Given the potentially 20 lots to the south, 19 lots to the west and up to 59 lots on the site, the potential cumulative interference effects must be assessed quantitatively using field data derived from pumping tests. The use of up to 88 wells in a relatively small area must be fully evaluated to ensure that all wells will always be able meet the peak water demands. There is not much data on vertical gradients or any potential connection between the deeper overburden aquifer and the shallow aquifer. The calculations should also determine if the predicted cumulative impacts could draw the shallow groundwater that will be impacted with nitrates deeper in the overburden and affect long term deeper aquifer groundwater quality.

LIMITING CONDITIONS

The conclusions presented in this report represent our professional opinion and are based upon the work described in this report and any limiting conditions in the terms of reference, scope of work, or conditions noted herein.

BluMetric makes no warranty as to the accuracy or completeness of the information provided by others, or of conclusions and recommendations predicated on the accuracy of that information.

Nothing in this report is intended to constitute or provide a legal opinion. BluMetric makes no representation as to compliance with environmental laws, rules, regulations, or policies established by regulatory agencies.

This report shall only be relied upon by the Municipality of Port Hope. No other reliance on this report, in whole or in part, shall be permitted without the written permission of BluMetric.

Please do not hesitate to contact the undersigned if you have any questions or concerns.

Sincerely yours,
BluMetric Environmental Inc.

per

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Encl.

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