Attention: Shayne Vipond Planner III, Rural Policy and Applications, Current Planning
HRM Planning Applications
PO Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

September 28, 2018

Dear Mr. Vipond,

Reference: HYDROGEOLOGY COMMENTS on Case 20929, Peggy's Cove Road, Upper Tantallon

We are a licensed hydrogeologist with over 35 years experience analyzing pumping tests and hydrogeological issues, and a certified regional/environmental planner with over 35 years experience in resource based planning for areas unserviced by public water and/or sewer. We are local residents working pro bono on this case, because we think the proposed density is much higher than the area's environmental carrying capacity can support, regarding quantity of proposed groundwater withdrawal.

We have reviewed Englobe's ***Level 2 Groundwater Assessment***, *Report P-0012667-0-00-200*, for Phase 1 of this proposed development. This represents a groundwater demand of 39,350 L/day, which is, using Englobe's water use figures, a demand of 55 dwelling unit equivalents without the proposed commercial use, which may be dropped. Our review included CBCL Limited's review comments (up to 17 January 2018) and Englobe's responses to CBCL (up to 6 December 2017). A Groundwater Withdrawal Approval application has not yet been submitted to Nova Scotia Environment (NSE) for this proposed development; however, such an approval will be required, unless demand is reduced to under 23,000 L/day, which is 32 - 33 dwelling unit equivalents (using Englobe's and our calculations).

Compliance with Provincial and Municipal Policies
Since an NSE Groundwater Withdrawal Approval will be needed for the proposed Phase 1 demand, we have included in our comments references to the requirements in NSE's ***Guide to Groundwater Withdrawal Approvals***. The guiding principles in this document, Sec. 1.2, are:

- New groundwater withdrawals should not cause any significant adverse effects to existing groundwater users or the environment; and
- Groundwater allocations are based on a “first-come, first-served basis” with priority given to drinking water applications.

Our comments primarily follow NSE's ***Guide to Groundwater Assessments for Subdivisions Serviced by Private Wells,*** which obtains for Level 2 Assessments, whether subdivisions or not. Compliance with this Guide is linked to Federal drinking water standards for groundwater *quality;* however, there is no legislation regulating Level 2 groundwater *quantity* issues, which are approved through municipalities. While there is no groundwater quantity approvals legislation tied to this Guide, the following groundwater policy in the Halifax Regional Municipality (HRM) Municipal Planning Strategy, October 2014, obtains, even for withdrawals under 23,000 L/day. Section 8.5.3 Groundwater Supplies, Policy SU-21, states:

"HRM shall require a hydrogeological assessment for all subdivision applications to be serviced with on-site wells where the number of dwelling units consists of ten or more. Subdivision approval will only be granted where the study determines that the quantity and quality of the groundwater source is sufficient to service the proposed development without adversely affecting groundwater supply in adjacent developments."

After reviewing Englobe's Level 2 Hydrogeological Assessment, CBCL's review comments, and our mass balancing calculations for this case, we conclude that the proposed development will adversely affect the groundwater supply in adjacent developments.

Our Purpose

We seek to help explicate and ensure consideration of this municipal groundwater policy of no harm to abutters, as well as the clear provincial policies of protection of first rights for withdrawals of at least 23,000 L/day. While the main focus of Englobe and HRM's reviewers has been to ensure sustainable yield for the proposed development, our main purpose is to protect existing abutters' wells and the environment (wetlands), from harm. In the absence of density caps policies in the local municipal planning strategy, it is up to HRM Planners, NSE wetlands officers and hydrogeologists, and HRM Councillors to ensure before approving this proposed development, that the groundwater withdrawal, which could conceivably be reduced to under 23,000 L/day, does not cause harm to abutters' wells and wetlands by drawing down the volume of the shared, interconnected deep and shallow water tables.

The Problem

In their review, CBCL has brought many safety factors to Englobe's attention; to which Englobe has responded by reducing their supply figures to *exactly* equal their demand figures for Phase 1 of 39,350 L/day, but without adequate explanation, without adequate consideration of salt water intrusion, and without adequate consideration of existing competing surrounding groundwater demands. Englobe assumes the proposed development will borrow groundwater from surrounding properties. However, surrounding commercial properties are already borrowing groundwater from the subject site, especially during fall high use season, which happens to coincide with low groundwater elevation season, and therefore low groundwater availability. Also, four residential wells on three abutting lots are already experiencing water quantity problems due to commercial development in the past, and drawdown of other surrounding wells, most of which are shallow dug wells, is likely to occur with this proposed development.

Flawed Analysis

We have found numerous flaws in Englobe's testing and analysis, and omissions in following the Guides. Correction of these flaws is needed to accurately analyse sustainable yields versus competing demands. Our comments regarding these flaws is attached in Appendix A. These flaws include:

1. Well pumping tests were incorrectly conducted and analysed, with misleading results.
2. Stormwater management issues were not considered.
3. Piezometer test flawed; false assumptions re. connectivity; 50% of supply not reserved for baseflow.
4. Saltwater intrusion needs further analysis re. over-pumping harming on-site and off-site wells.
5. Safe well yield calculations still do not adequately account for safety factors.

6. Lot water balance calculations show the site must borrow heavily from surrounding lands, not an accepted practice, even before existing surrounding demands are subtracted, which they were not.
7. Well interference analysis is flawed; thus, it fails to show interference problems.
8. Contingency plans are inadequate, mentioned only superficially in correspondence.

Major Revisions to Analysis Needed

These flaws should be corrected by re-testing, re-analysis, and inclusion of groundwater mass balancing with an equation that reserves 50% of available supply for maintenance of baseflow of wetlands and streams, and subtracts existing abutting demands from available supply. Although our mass balancing calculations (attached in Appendix B) show a maximum of 12 dwelling units (= ~8,292 L/day) is sustainable on this site due to existing "first rights" borrowing of the site's groundwater by surrounding commercial development, we contend that the site's maximum sustainable density in isolation, 15 dwelling units (= ~10,365 L/day) should be the absolute upper limit for this 8.34 acre site at the developer's existing bedroom count ratio. However, if supply is augmented or demand is reduced through safe, permanent, effective, quantifiable, and legal water conservation measures, this number could possibly be *slightly* increased. Note: this density discussion assumes sewage effluent is treated to drinking water standards by an on-site package sewage treatment plant.

In Conclusion, we support development of multi-family housing on this site, especially if most of it is built to senior friendly and affordability standards; but only at a density that is sustainable in that it properly considers safety factors, contingencies, *quantified* existing surrounding water demands, and wetlands baseflow maintenance, *even if project demand is reduced to under the regulated withdrawal threshold of 23,000 L/day*. We hope our recommendations and supporting materials in the Appendices will be seriously considered in assessment of groundwater and wetlands issues for this proposed development, and will help set a precedent for *sustainable* development in Upper Tantallon.

Respectfully,

Donald Carey, M.Sc., P.Eng.

Tamara Hill

Tamara Hill, AICP, M.R.P.

Attachments as Appendices:
Appendix A: Our Groundwater Comments re. HRM Case 20929
Appendix B: Our Groundwater Mass Balancing Report re. HRM Case 20929

Copy:
Thea Langille, Principal Planner, HRM
Carl Purvis, Planning Applications Program Manager, HRM
Sherri Kasten, Environment Inspector, NSE
Joe Arab (property owner and developer)
Cesar Saleh, P.Eng., W.M. Fares Group (representing developer)
Aven Cole, Project Engineer, Englobe (representing developer)

Willard D’eon, Process Engineer, CBCL Limited (reviewing for HRM)
Colin Walker, Hydrogeologist, CBCL Limited, (reviewing for HRM)
Matt Whitman and all other HRM Councillors