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Mr. George Lourenco, P.Eng.
Resources Manager, Capital Paving Inc.
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Dear Mr. Lourenco,

This letter is in response to your letter of October 23, 2020, in which you question various aspects of our review of the Level 1 and Level 2 Hydrogeological Investigation of the Shantz Station Pit Proposal, conducted by MTE Consultants.

Regarding our credentials, Emil Frind is a groundwater scientist and educator with 40+ years of experience in teaching groundwater systems and groundwater modelling. He was one of the first to recognize the lack of groundwater protection in Ontario as the real cause of the Walkerton tragedy of 2000. Michael Frind is a hydrologist/hydrogeologist with 20 years of experience in hydrogeology, hydrology, and other environmental fields.

Why did we do this review? Our motivation is to provide advice to citizens and citizens' groups concerned about their water. We have no personal stake in the issues, nor do we expect to gain financially. Our work is a public service, done on a pro bono basis. In the case of Shantz Station Pit, Mrs. Bonnie Bryant of the Hopewell Ratepayers Association asked us for help because the residents were concerned about their water. We accepted because we felt it is the right thing to do. We have no formal retainer from this group. Mrs. Bryant provided us with the Level 1 and 2 Hydrogeological Assessment by MTE.

This request came on the heels of a similar proposal in Wilmot Township, the Hallman pit, which we also reviewed. That project has now been selected as a core study subject for a high-level graduate course at the University of Waterloo, with us acting as external advisors.

We have meanwhile also read the multi-level peer reviews by BluMetric and the responses by MTE, as well as the comments by the GRCA. Concerns about whether the proposal conforms to current regulations largely seem to have been addressed, and we agree on that aspect.

Beyond that, we note that prevailing standards are generally based on past experience, meaning that everything should be fine as long as the water cycle continues as it has in the past. But can we be sure of that? Climate change can impact the water cycle and can lead to unusual and extreme dry or wet periods. Recent climate records show that climate change is not something for the distant future—indeed, it is already upon us. As far as we can see, there is no mention of climate change in the MTE Report nor in the peer reviews. We also raised this issue in our review of the Hallman pit, and we note that the Region of Waterloo has expressed the same concern.

Current regulations assume that aggregate extraction above the water table will not affect the groundwater, as long as the pit bottom remains at least 1.5 m above the water table. The water table

is established on the basis of past records. But these records say nothing about how the water table will react to an exceptional wet period where the water table rises higher than the highest on record. In such an event, the pit may be flooded, contaminant sources (such as machinery fluids) in the pit may connect to the groundwater, affecting nearby wells. The choice will then be to either dewater the pit, leading to major drawdowns, or to abandon it. In any case, impacts to private wells will occur. This is a key concern that has not been addressed by MTE, nor by the peer reviewers.

In addition to uncertainty about the future climate, there is also the hydrogeologic uncertainty. Moraine-type deposits (sand, gravel, silt, till, etc.) are highly anisotropic and heterogeneous, and heterogeneities are not entirely predictable from the limited data. Since these aspects can influence groundwater movements, we strongly feel that more fieldwork needs to be done.

The peer reviews raised a number of concerns, some of which parallel our concerns. One of these is the myth that because extraction will be above the water table, there will be no impact on the aquifer. For example, BluMetric points out that due to the removal of material above the water table, surface water-groundwater flux may change, which in turn could affect the baseflow to Hopewell Creek, risking the creek's status as a coldwater stream.

Other concerns that will be of interest to residents include:

1-km vs 500-m buffer zone: Is the potential for well interference the only reason for the region's buffer guideline for the door-to-door survey? Should residents not have the right to be fully informed, regardless of the hydrogeology?

Spills Contingency Plan: Monthly tank monitoring is a bare minimum which leaves plenty of opportunities for undetected leaks, sabotage, mischief, etc. to occur. Continuous real-time monitoring (with remote surveillance) is now possible and should be considered.

Baseline geochemistry data: Monitoring just 2 wells may not be enough to confirm the background of the entire site. BluMetric suggests collecting all baseline geochemistry datasets from all five wells to ascertain that the geochemistry is consistent across the site. We agree.

Rehabilitation: Rehabilitation to productive agriculture also raises questions. If the pit floods, it will become a lake or some kind of swamp. If it were to become lake-like, then it could be a possible long-term source of groundwater contamination.

We do need aggregates to keep our economy going. But we also need clean water. The same population growth that drives the demand for aggregate also drives the demand for clean drinking water. People need to feel safe about their water. Beyond following regulations, an understanding of the science and an awareness of the risks is also needed. As with all sciences, understanding is never static but evolves over time, and we encourage scientists to embrace this evolution.

Please let us know if you would like to discuss this further.

Yours sincerely,

A handwritten signature in black ink that reads "Emil Michael Frind". The signature is written in a cursive, flowing style.

Emil Frind, Ph.D., P.Eng. and Michael Frind, M.Sc., P.Eng.