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October 24, 2025

Corporation of the Township of Melancthon
157101 Highway 10
Melancthon, ON
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Re: Peer Review of Hydrogeological Assessment Report
Strada Shelburne Pit/Quarry
437159 4th Line
Shelburne, Ontario

BACKGROUND

This peer review has been conducted at the request of the Corporation of the Township of Melancthon. The report being reviewed, entitled “Strada Shelburne Hydrogeological Assessment” was prepared for Strada Aggregates Inc. by Alicia Kimberley and Alyssa Flaherty of Tatham Engineering Limited on July 30, 2025.

This peer review was completed in accordance with the Professional Geoscientists Ontario (PGO) Professional Geoscientists Reviewing Work Prepared by Another Professional Geoscientist guideline document (2024).

The purpose of this peer review is an unbiased and independent Technical Review of the geoscience content presented in the hydrogeological assessment report.

The intent of the review is to assess:

- Whether the objectives set out for the work were reasonable;
- Whether the completed work has met the objectives;
- The validity of any assumptions, conclusions, and/or calculations made in the report;
- The validity of any recommendations made and their appropriateness to the project objectives; and,
- Whether there were other options that should have been considered in the report.

Chris F Helmer of Hydrogeology Consulting Services Inc. (HCS) is a licensed and practicing geoscientist under the Professional Geoscientists of Ontario specializing in the field of hydrogeology. With more than 22 years of career experience in the field of hydrogeology, Mr. Helmer has worked on numerous hydrogeological investigations throughout Southern Ontario.

Chris F Helmer and HCS have no direct or potential conflict of interest with the Corporation of the Township of Melancthon, with Strada Aggregates Inc., with Tatham Engineering Limited, or with the authors of the report.

TECHNICAL REVIEW OF REPORT

The Tatham Engineering Limited Hydrogeological Assessment Report (the Report) describes the location and physical setting of the subject property (the Site), and identifies the current licensing for the quarry. The Report notes the three properties comprising the Site are integrated, including an existing closed loop washing facility supported by an existing Permit to Take Water (PTTW).

The purpose of the investigation is described as supporting a PTTW for extraction of groundwater and surface water from an unlined closed-loop wash pond system that includes a re-circulation process that treats and re-uses process water with on-site infiltration and no off-site discharge.

The scope of work is described as establishing local and regional geology and hydrogeology; assessing impacts to drinking water wells; and, preparation of a hydrogeological assessment report through completion of desktop review of available resources.

The Report references previously completed annual compliance monitoring reports from 2019-2024, with the 2023 and 2024 monitoring data relied upon for the Report.

The Report notes the existing PTTW was issued in 2017, authorizing takings of up to 2,400,000 L/day over a maximum 10 hour period at rates of up to 4,000 L/min, for up to 230 days per year.

Water taking reports submitted to the MECP between 2017 and 2024 were reviewed, and the Report correctly notes apart from one day (October 17, 2017) during this period all water takings were below permitted volumes.

It is noted; however, the water taking records include many days with no data recorded. Additionally, the water taking records do not indicate durations of the takings or maximum water taking rates. Mathematical calculations indicate on a number of days a 4,000 L/min rate would need to be maintained for 10 hours continuously to withdraw the 2,399,690 L/day reported volume.

SECTION 2

Section 2 of the Report (**Site Setting**) summarizes the findings of the operational plans for the pit/quarry, noting there is no off-site discharge of surface water with stormwater evaporating or infiltrating through the pit floor; fuel is stored in above-ground storage tanks; and maximum predicted groundwater levels range from 498.5-500 mASL to 482.2-489.5 within the three properties that make up the Site.

The Report indicates excavation below the water table will not occur. However, HCS has recently peer reviewed the Tatham Engineering Limited Maximum Predicted Water Table Report (January 13, 2025) for the Site and notes this report describes the proposed implementation of groundwater inflow control barriers along the overburden (and bedrock) benches as pit/quarry development progresses during the proposed pit/quarry expansion, along with proposed groundwater (and surface water) capture and infiltration. The Maximum Predicted Water Table Report describes and illustrates overburden removal to approximate elevations of 490-495 mASL, with overburden groundwater control barriers installed at these elevations. This apparent contradiction may be based on the concept of extraction below an open (exposed) water table vs. extraction from a dewatered/unwatered area where the water table is not exposed, but should be clarified.

The Report correctly describes the physiographic and geologic setting of the Site based on regional mapping, along with a description of the general topography of the Site.

The Report summarizes available MECP water well records, correctly listing sixteen wells identified as domestic/livestock wells and listing six wells identified as commercial/industrial wells. Of the list of fourteen wells with no specified use it is noted four have a diameter of 0.15 m or more, likely indicating they are also supply wells (rather than monitoring wells). Water well record details are generally reasonably summarized; however, it is noted one domestic well (1701316) is completed in overburden at a depth of 15.8 m, and none of the commercial wells identified in the appended list of MECP water well records are completed in overburden (they are all bedrock wells).

The Report correctly notes the Site is not located within a municipal Wellhead Protection Area (WHPA) or Intake Protection Zone (IPZ), but does lie within a Significant Groundwater Recharge Area (SGRA) and Highly Vulnerable Aquifer (HVA) area. The Report reasonably describes the geologic reasoning behind the SGRA and HVA designations.

SECTION 3

Section 3 of the Report (**Groundwater Monitoring**) summarizes the locations and general construction information for on-site and off-site monitored wells, separating the wells into overburden aquifer wells, overburden aquitard wells, and bedrock wells. The Report describes continuous water level data collection using dataloggers along with periodic manual measurements.

The Report describes buried bedrock valley conditions in the southeastern portion of the study area resulting in permanent unsaturated (dry) conditions at OW3A, OW10A, OW14A, OW19A, and OW20A. However, the borehole logs included in the Tatham Engineering Limited Maximum Predicted Water Table report indicate:

- OW3 does not have a well "3A" screened in the sand and gravel aquifer, only a well "3B" screened at the till aquitard/bedrock interface. The borehole log notes the sand and gravel exhibiting dry to wet conditions.
- OW10 does not have a well "10A" screened in the sand and gravel aquifer, only a well (unlabeled) screened in the till aquitard. The borehole log notes the sand and gravel exhibiting dry to wet conditions.
- The borehole log for OW14 notes the sand and gravel exhibiting dry to wet conditions.
- OW19 does not have a well "19A" screened in the sand and gravel aquifer, it is screened in the till aquitard. The borehole log notes the sand and gravel exhibiting dry to wet conditions.
- The borehole log for OW14 notes the sand and gravel exhibiting dry to wet conditions.

Additionally, no manual groundwater measurements for any wells are tabulated in the Report.

The Report reasonably describes seasonal trends in groundwater levels with peaks observed during spring thaw conditions in April and May.

The appended Figure 6 in the Report provides an overburden aquifer groundwater contour map. It is noted the measured groundwater elevation at OW8A and the measured groundwater elevation at OW4A do not seem to correlate with the reported dry condition at OW3A (not shown on the Figure); although this may be the result of the differing stratigraphy of OW3A.

The Report describes groundwater conditions in the underlying till and the weathered bedrock as exhibiting more muted seasonal trends.

The Report describes groundwater levels in domestic supply wells completed in the bedrock aquifer as not exhibiting interference from on-going aggregate operations; however, the appended hydrographs for supply wells DW1-DW5 only include two years of data, making assessment of historical trends impractical. Multiple years of data would be required to evaluate whether a trend in water levels is occurring.

Surface water monitoring locations are also summarized, with surface water hydrographs provided. The Report describes water levels in the North Pond and South Pond also exhibiting typical seasonal trends, and noted observations are consistent with historical trends observed at the Site.

The Report assumes the North Pond and South Pond are perched above the overburden aquifer. It is noted; however, that the borehole log for OW12 included in the Tatham Engineering Limited Maximum Predicted Water Table report (located in proximity to the locations of the North Pond and South Pond shown in the Hydrogeological Assessment Report) indicates at least 12 m of sand/sand and gravel deposits; and, the borehole log for OW10 included in the Maximum Predicted Water Table report (located in proximity to the locations of the North Pond and South Pond shown in the Hydrogeological Assessment Report) indicates approximately 10 m of sand/sand and gravel deposits bisected by an approximately 3 m thick silty clay layer.

Additionally, HCS has recently peer reviewed the EarthFX Incorporated Impact Assessment Report (January, 2025) for the Site and notes the appended North West – South East Cross Section C prepared by EarthFX Incorporated (September 23, 2024) included in the Gemtec (October 4, 2024) Geotechnical Feasibility Study as an addendum to the Impact Assessment Report, which extends through the general area of the North and South Ponds, illustrates vertically extensive sand and gravel deposits where the shallow aquifer is assumed to exist.

Further, the appended Figure 6 in the Report illustrates shallow groundwater elevations at/above the water levels noted in the North and South Ponds; and, the appended Figure 7 in the Report illustrates the wash ponds (in relative proximity to the North and South Ponds) as having groundwater elevations of 492+ mASL, and describes the wash ponds as "…constructed into the groundwater table and shallow aquifer…".

In the absence of a cross section illustrating the stratigraphy beneath and surrounding the North and South Ponds it is challenging to conclusively determine whether the assumption of perched conditions above the overburden aquifer is correct.

SECTION 4

Section 4 of the Report (**Discussion and Analysis**) identifies the required water taking for the proposed aggregate washing facility as 5,000,000 L/day from a closed-loop wash pond system consisting of three settling ponds and one wash/freshwater pond.

It is noted the proposed water taking is slightly more than double the currently permitted taking of 2,400,000 L/day. The reason(s) for the requested increase in the daily water taking volume are not explicitly stated in the Report, although HCS' recent peer review of the EarthFX Incorporated Impact Assessment Report provides the knowledge that significant expansion of the pit/quarry operations is proposed. A "Water taking Needs Attachment" PDF document provided with the Report indicates the proposed increase is intended to support an increase in aggregate production; however, this document has no reference or other association to the Report.

The Report describes the wash process water as discharging to the first settling pond, then draining to the second and third ponds in sequence, and finally draining into the freshwater pond.

The Report explains groundwater feeds the wash ponds and washing operation, with process water re-circulated through the ponds for re-use. While the Report reasonably states the majority of supply water is re-circulated back into the wash pond through the settling ponds and not discharged off-site, the consumptive use of groundwater (i.e. the water that leaves the site via wet aggregate and/or evaporation from the ponds) is not specified.

The Report reasonably notes the wash ponds use groundwater from the shallow overburden aquifer, while identified private water supply wells are using water from the underlying limestone bedrock aquifer (apart from the one overburden supply well noted previously in Section 2 of this peer review report) and as a result would not be expected to be impacted by the expanded aggregate washing operations. As HCS has recently peer reviewed the EarthFX Incorporated Impact Assessment report for the proposed quarry expansion, it is understood mitigation measures are proposed to protect bedrock groundwater resources from the proposed bedrock quarrying operations.

The Report concludes surface water features SW1 and SW2 and the Boyne River would not be expected to be impacted by the proposed expanded aggregate washing operations. While the large open wash ponds are described as being separated by an earth berm, a detailed description of how runoff of contaminants (e.g. fuel spills from heavy equipment operating near the wash ponds) would be prevented from entering the ponds and thereby potentially contaminating the shallow groundwater aquifer that is anticipated to support the identified provincially significant wetland (PSW) and the Boyne River is not provided.

SUMMARY OF ITEMS TO BE ADDRESSED

As a result of the technical peer review, the following items are recommended to be addressed by the author(s) of the Report:

1. Clarification whether data gaps in the reported water taking volumes are non-taking days (i.e. zero water taking), or missing data.
2. Confirmation whether water taking rate and duration information exists for the pit operations.
3. Assessment of the overburden extraction depths reported in the Maximum Predicted Water Table Report, and the requirement for overburden control barriers, vs. the statement in the Hydrogeological Assessment report that extraction will not take place below the water table, with clarification provided as required.
4. Assessment of the location of supply well 1701316 in comparison to the proposed aggregate washing operations, and of whether the overburden supply well could be impacted by the proposed aggregate washing operations.
5. Clarification regarding the well construction details for OW3A, OW10A, OW14A, OW19A, and OW20A with respect to the sand and gravel overburden aquifer, and provision of manual water level measurements from these wells.
6. Assessment of whether the North Pond and South Pond are in fact perched above the overburden aquifer (vs. connected to it); and, if connected whether they could be impacted by the proposed water taking and aggregate washing operations.
7. Confirmation of the reason(s) for the proposed increase in the daily water taking volume.
8. Confirmation of the quantity of the total proposed daily water taking volume that will be consumptive (i.e. lost via off-site hauling of wet aggregate and evaporation); and, whether the consumptive loss has the potential to impact shallow groundwater resources and the surface water features which depend on those resources.
9. Confirmation how runoff of contaminants into the wash ponds will be prevented/mitigated to minimize the potential for impacts to shallow groundwater resources and the surface water features which depend on those resources.

CLOSURE

The Hydrogeological Assessment Report generally provides a reasonable overview of the proposed water taking, and reasonably notes the majority of the proposed water taking is recycled back to the shallow groundwater aquifer through the settling pond process.

The described and implemented scope of work generally provides a satisfactory methodology to accomplish the goal of the Report; however, the Summary of Items to be Addressed above identifies areas where additional information may be beneficial to the overall assessment of the potential for impact from the proposed increase in water taking and washing operations.

The comments provided in this peer review do not necessarily change the overall conclusions and recommendations made in the Report; rather, the recommended Items to Be Addressed will help to confirm and ensure the proposed water taking is sustainable and does not pose a significant threat to shallow groundwater resources and the surface water features which depend on those resources.

The involvement of HCS on this project is limited to review of the existing information provided in the Tatham Engineering Limited Hydrogeological Assessment Report. No field verification of data or duplication of investigations/analyses was conducted.

HCS and Chris F Helmer assume no responsibility or liability, and shall not be held responsible or liable, for any actions or inactions or decisions, or the consequences of any actions or inactions or decisions, made by any individuals or parties in relation to this project.

We trust that this peer review report satisfies your present requirements, and we thank you for this opportunity to be of service. If you have any questions, or require further hydrogeological consulting services, please feel free to contact the undersigned directly.

Sincerely,



Chris Helmer, B.Sc., P.Geo.
Senior Hydrogeologist
MECP Licensed Well Contractor
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