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December 31, 2025

The Corporation of the Town of Caledon
6311 Old Church Road
Caledon, ON L7C 1J6

Attention: Kyle Munro, Genevieve Scott

PEER REVIEW OF HYDROGEOLOGICAL REPORTING
PROPOSED CBM CALEDON PIT & QUARRY

INTRODUCTION

In 2024, ARL Groundwater Resources Ltd. (ARL) was retained by the Corporation of the Town of Caledon (Town) to undertake a peer review of the hydrogeological reporting for a Proposed Official Plan Amendment (POPA 2022-0006) and Zoning By-law Amendment (RZ 2022-0010) associated with the proposed CBM Caledon Pit & Quarry.

The first phase of the review was performed in 2024 and the results were documented in a letter-report to the Town dated December 5, 2024. The main focus of the first phase peer review was the Water Report Level 1/2, prepared by Golder Associates Ltd. (dated December 2022, revised July 2023). Other reports and site plans were also reviewed as part of the work. Refer to the December 2024 letter-report for more details.

The first phase of the peer review concluded that the proponents hydrogeology and water resources work was sufficient to support the proposed OPA and Zoning amendments. However, it was recommended that additional work be undertaken to improve the presentation of the site conceptual hydrogeological model that had been developed as part of the work. Specifically, it was recommended preparation of additional hydrostratigraphic cross-sections and maps on both a local and regional scale, showing local landmarks and illustrating the relationship between the main hydrostratigraphic units, water table/piezometric surface, Cataract PSW and private water supply wells.

The second phase of the review was performed in 2025 and is documented in this letter-report. The work included a review of the following documents:

1. Final CAART Comment Summary Table Response #1 (Hydrogeology)
2. WSP Water Report Addendum - March 2025
3. WSP Groundwater Mitigation System Design Report - May 2025.
4. GeoMorphix Fluvial Geomorphic Assessment Report - February 2025.

REVIEW COMMENTS – Final Comment Summary Table Response #1 (Hydrogeology)

Six comments related to hydrogeology and groundwater supply were provided in the table of initial CAART comments (December 2024) on the proposal and the applicant is shown to have provided a response to all six (February 12, 2025). We have nothing further to add other than our comments #5 and #6 still stand and will become more relevant once quarry operations begin to occur in the South Area of the proposed pit/quarry.

REVIEW COMMENTS – Water Report Addendum (WSP, March 2025)

The Water Report Addendum is structured as a technical response to comments received from the various agencies during the first round of peer review in 2024. At the beginning, the report lists the agencies that provided comments and the number of comments received from each agency. The report then groups the comments into the following categories:

Water Balance Comments
Additional Hydrostratigraphic Cross-Sections
Potential Private Well Impact Clarification
Updated Well Response Plan
Potential for Groundwater Contamination
Updated Groundwater Quality Assessment and Revised Monitoring Program
Spill Response Plan
Replotted Hydrographs
Pumping Test Maps and Cross-Sections
HGS Model Clarifications.

The report text is relatively short (14 pages) and provides a brief statement of the agency comments received for each category followed by a response to each one. The appendices to the report (more that 500 pages) include results from the additional work undertaken in addressing the comments received. The effort is comprehensive.

The additional cross-sections provided in Appendix C of the report improves the presentation of the site conceptual hydrogeological model and addresses, in part, the recommendation from the first phase of our peer review on behalf of the Town. However, groundwater level information is not provided in the cross-sections and wetland features in the area (including the Cataract PSW) are not shown. No isopach maps or geological surface structure maps were provided.

In November 2025, WSP provided a technical memorandum that included predicted surface water level changes at the study surface water monitoring stations, in response to one of our comments from the first phase of peer review. The predictions are based on the results presented in Section 9 (Table 9.2) of the Water Report Level 1 & 2 (Golder 2023). The results show essentially no change at any of the surface water monitoring stations either during operational stages of the pit/quarry operation or post-rehabilitation. Some of the data presented in Table 1 of the technical memorandum are unusual. For example, at SW11 predicted change in operational water level is 0.00, whereas the percentage change is shown to be -12%.

The private well impact clarification and updated well private well response plan are comprehensive and provide a reasonable basis for responding to private well complaints. As

there are no onsite investigations to verify the locations and conditions of private wells in the Cataract area (to the east of the proposed pit/quarry South Area), a significant level of uncertainty exists with respect to potential adverse impacts to private wells. The operational plan indicates that the South Area is the last area to be extracted, so there should be many years of monitoring data available before extraction begins in the South Area.

In the section on Potential for Groundwater Contamination, WSP notes that nitrogen-based residuals from blasting activities associated with the quarry are a potential contaminant of concern. The discussion indicates that anaerobic conditions occur below the water table, leading to nitrate biodegradation by denitrification. The comments do not appear to align with what the groundwater sampling data show nor what occurs at many sites in Southern Ontario where nitrate concentrations are high. For example, the tables of water quality data show that many of the monitoring wells sampled as part of the spring 2024 groundwater quality sampling event detected nitrate at levels above 2 mg/L N including the four monitoring wells downgradient of the South Area (nitrate concentrations reported at approximately 3 – 10 mg/L N at wells MW20-03, MW20-04, MW20-05, MW20-06). If WSP believes that nitrogen loadings from blasting could potentially add to nitrate concentrations in groundwater at the site, a more detailed groundwater contaminant assessment should be undertaken to determine whether there will be an adverse impact to downgradient water supplies.

The re-plotted hydrographs show that groundwater levels in the Gasport Fm. and the underlying Shaley Dolostone/Cabot Head Fm. at many of the monitoring well sites are similar (vertical hydraulic gradients are low) and follow a similar seasonal pattern. This indicates that the deeper formations appear to be well connected hydraulically to the upper bedrock formations where extraction and dewatering are proposed. This has some relevance to the potential for impacts to private well with deeper completion depths and some of our later comments concerning the groundwater mitigation system.

REVIEW COMMENTS – Groundwater Mitigation System Design Report (WSP, May 2025)

The report provides a detailed description and supporting analysis of the groundwater mitigation system proposed for the quarry operation. The system is intended to mitigate (reduce) the potential effects of the pit/quarry operations on natural features and groundwater users to the south and southwest.

The proposed groundwater mitigation system includes a series of infiltration trenches along the southwest side of the Main and South Areas and the southeast side of the South Area. Water collected during Phases 4 – 7 of the pit/quarry operations is to be directed to the infiltration trenches in an effort to maintain groundwater levels west and south of the proposed pit/quarry at levels close to the current (pre pit/quarry) conditions. The report acknowledges that there is a risk that water directed to the trenches could flow back into the quarry and therefore not have the intended mitigation effect. To reduce this risk, installation of slurry walls are proposed in the **overburden sediments** between the infiltration trenches and the edge of the quarry excavation along the infiltration trench alignment. In addition, consideration will be given to grouting the **upper bedrock zone** beneath the overburden sediments to reduce flow back into the quarry from that groundwater flow pathway.

To support the design, the report describes a desktop review of infiltration trench technologies, a field investigation undertaken along the proposed trench alignment, and numerical modelling simulations of how the mitigation system might perform. Updates to the pit/quarry Water Management Plan and Mitigation Design System are also presented based to the results of the work.

The field investigation included the borehole drilling and installation of monitoring well nests at seven locations along the general infiltration alignment (refer to Figure 3 in the WSP report), lab testing of soil samples collected from the drilling, groundwater level monitoring over a period of approximately 4 months, single well response tests and water quality sampling.

The results from the field investigation were used to update the conceptual hydrogeological model and the HGS numerical model that had been developed previously and used in the Water Level 1 & 2 Report (Golder, 2022; revised 2023). The HGS model was recalibrated and 8 new model forecast steady state predictions were made to estimate the extent and magnitude of the drawdown for each phase of the pit/quarry development. Changes were made to the base elevation of the infiltration trenches and hydraulic barrier in some areas to account for the groundwater level information collected as part of the work.

The report notes that the HGS model simulations indicate that "the proposed mitigation system can maintain groundwater levels within their current typical range during the later stages of pit/quarry operations".

Section 6.0 of the report provides an updated mitigation system design based on the results of the work. Construction details for the infiltration trenches are provided including (a) depth of the trench (to the shallowest of annual average water table, top of bedrock, or a maximum of 8.5 m), (b) use of perforated 200 mm horizontal infiltration pipe placed 1 m above the base of the trench and having assumed 1.8 mm sluice perforations, and (c) clear stone trench backfill with a geotextile fabric. A design cross-section drawing is provided as Figure 7 in the report. Another design cross-section drawing focussing on the proposed infiltration vault detail is provided in Figure 8 of the report.

On page 23 (third bullet), it is noted that "a soil slurry wall may need to be amended". It is not clear on what this means, but it appears to be an important consideration that should be explained.

In Section 7.3, the report provides a general timeline for construction of the hydraulic barrier, which includes both the slurry wall and grouting of the weathered bedrock zone, and construction/operation of the infiltration trenches. Later in Section 8.1 the report indicates that grouting of the upper bedrock will be optional and only undertaken "if required". Further explanation should be provided regarding why the grouting is considered optional, and the process that will be used to determine whether or not it will be implemented.

The performance of the mitigation system is based on the HGS numerical model predictions. Regardless of how well the model appears to represent the natural hydrogeological system there is always uncertainty in model predictions. This includes predictions about the groundwater mitigation system performance and effectiveness of the system in maintaining pre-extraction groundwater conditions downgradient and avoiding adverse impacts. One area that does not

appear to be addressed is the potential for infiltration water from the trenches to flow back into the quarry through the lower parts of the Gasport Formation (below the upper weathered zone). The vertical hydraulic connection between the sand/gravel, upper bedrock weathered zone and the main part of the Gasport Fm. (and indeed the shaley dolostone/Cabot Head Fm.) appears good at the site based on the monitoring well nest hydrographs provided in the Water Addendum report. With flow to the quarry through the shallow groundwater zone presumably cut off by the hydraulic barrier, a component of the infiltration from the trenches could extend down into the Gasport Fm. and flow back into the quarry through the Gasport Fm. The model simulations under steady state conditions appear to be the only evidence to suggest that this is unlikely to occur.

The pilot testing proposed during Phase 4 and 5 should provide important information on operational performance of the groundwater mitigation system. However, it is not clear what will happen should the groundwater mitigation system not perform as expected and, in a worst case scenario provide insufficient mitigation to prevent potential adverse impacts to natural features and groundwater users downgradient of the site.

REVIEW COMMENTS – Fluvial Geomorphic Assessment at Credit River and Tributary System in Caledon, Ontario (GEO Morphix, February 2025)

On page 2 of the letter report, the objectives of the study are stated as follows: "Based on the above, GEO Morphix was tasked to complete a fluvial geomorphic study at the subject channels of the Credit River and tributary system (specifically Tributary 4 and the East Ponds Outlet Channel, given that each feature was identified as a potential conveyance path alternative) to assess the potential for Project-related effects on characteristic erosion-sedimentation processes, and, where appropriate, to identify suitable mitigation measures. The results of the geomorphic assessment will be used to address the comments from CVC, and, as part of this, to inform the discharge capacity and control requirements at the subject receiving channels, as well as to comment on the preferred conveyance path alternative."

The work sets out to assess the existing conditions at the subject channels. The report adequately describes the approach and methods used and the findings. Water flow velocity measurements were reportedly obtained using a "floating ball method" rather than a flowmeter (such as a Swoffer meter). Photographs of the areas investigated and the field investigation sheets (Appendix B) are presented with detailed sketches for each section of watercourse studied.

The report concludes that the effects of proposed discharge water originating from the quarry on the "characteristic erosion-sedimentation processes at Tributary 4, the East Ponds Outlet and the Credit River (receiving environment) are expected to be negligible. The Tributary 4 route for conveyance of quarry water is identified as the preferred route to the Credit River, although the East Ponds outlet could also be viable if alterations were made to that channel to improve physical stability and drainage capacity of the outlet area.

The report also concludes that channel protection measures are not required. Some recommendations are provided regarding flow rates to protect the erosion thresholds of the channels.

CONCLUDING COMMENTS

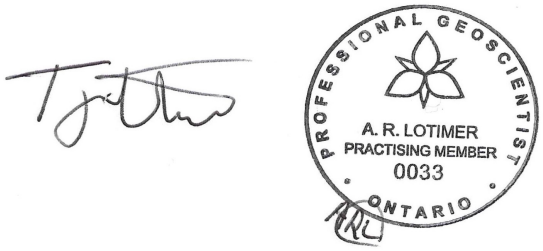
The technical work presented in the reports reviewed is significant and of high quality.

A technical area of concern that does not appear to have been discussed in the reporting relates to the groundwater mitigation system and the potential for trench infiltration water to flow back into the quarry through the Gasport Formation (below the upper weathered bedrock zone and the overburden). If this were to occur, it could potentially undermine the effectiveness of the mitigation system in the current design.

The potential impacts of the proposed Caledon pit/quarry are based on predictions using a sophisticated numerical water resources model. Despite the high quality of the work, there is uncertainty in the model predictions and no way to know for sure that the groundwater mitigation system will work as intended until after extraction operations are wide-spread at the site. One way to address the uncertainty (and corresponding risk of adverse impacts on natural features and groundwater users) is to establish a contingency mechanism that includes setting target groundwater and surface water level conditions that are to be maintained at important monitoring stations during all phases of the pit/quarry operations. The target water levels would be supplemented by trigger levels (to be set above the target levels) to allow for remedial action prior to reaching (or going below) the target levels.

If the mitigation system works as intended the target water levels would be maintained and there would essentially be no risk of adverse impacts to natural features and existing groundwater users. If the system does not work as intended, other remedial measures would need to be taken to ensure the target water levels are maintained. Such measures could include only allowing extraction operations to occur above the water table in the South Area, or possibly allowing extraction to occur only under subaqueous conditions (no dewatering allowed) in the South Area.

Respectfully submitted,
ARL GROUNDWATER RESOURCES LTD.



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