MEMO

To:	Natalie Kotyck and Carl Cosack (NDACT)
From:	Garry T. Hunter, M.A.Sc., P.Eng.
Date:	March 10, 2025
File:	21-407
Subject	**Proposed Strada Model Calibration Improvements**

Strada has not updated its May 2024 Conceptual and Calibration Model Reports despite a number of prior Peer Reviews including the recent fifth iteration. Strada has ignored these reviews. The Strada modelers are 'strangers from away' and do not understand the model domain landscape or the local community value system fundamental to realistic environmental assessment and compromise.

Fundamentally, my conclusion is that the Strada based May 2024 Model is overestimating runoff and underestimating recharge in the headwaters to the Pine River Provincial Fishing Area (upstream of Prince of Wales, Mulmur) and overestimating recharge and underestimating surface runoff downstream to Everett from the Prince of Wales. **Therefore, quarry groundwater flows are underestimated.**

I recommend the following process adjustments to the May 2024 model calibration.

1. **Prepare model virtual STRs for all Tatham, Genivar and NVCA stream flow stations** to determine where there are significant model virtual deviations from field stream flow observations.

2. **Hard wire the NVCA Site 1 continuous seasonal dry weather 2008 hydrograph** into the model calibration and improve the grid cell resolution in the uplands. (I am sure EJ and Gabriel are objective and up to the task).

3. **Correct the WSC general watershed boundaries in the vicinity of the Strada site to local data** (affects unit catchment calculations not the model itself).

4. **Replace Model Layer 1/ 2 'Tavistock Till' in the Honeywood Soil areas of Melancthon Old Survey and adjacent Mulmur with 'Weathered Till' Hydraulic Conductivities.**

   Note: The 2023 Lundy rain fed potato crop on Prince Farm had similar luxuriant top growth as other potato crops up the Fourth Line. In other words, there was little functional difference between crops grown on the loess mantled sand and gravel deposits of the Prince Pit and the loess mantled coarse pervious shallow tills (likely Newmarket in age) mantling the Guelph formation bedrock epikarst under drains. These Tills have a local subdued drumlinoid character.

   This well drained permeable landscape also creates the conditions for agricultural Nitrate (as N) contamination in the Upper Aquifers (Guelph) above the Goat Island Aquitard.

   The highlands north of the 15th Sideroad are the highest lands in Southern Ontario and are not conducive for formation of lacustrine deposits. Many farms in this area have no runoff, recharge may be up to 300 mm/yr or more. Other sloping fields have only snowmelt or regional storm runoff which may recharge in nearby depressional topography.

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The New Survey of Melancthon west of the Fifth Line has many wetlands, high runoff and low recharge. The Riverview WSC gauge hydrographs are representative of this terrain.

5. **Extend the Model Layer 5 Goat Island Aquitard to the spring / water fall line at the face of the escarpment slopes** (Thin the 'Below Escarpment and Weathered Layer').

6. **Incorporate 12 months of model layer structured site monitoring water level data** (compel Tatham to produce these data sets- Issue 6).

   This Peer Reviewer has been denied access to the model input data and has been unable to determine if any Tatham site water level data has been incorporated into the May 2024 Model Calibration.

   Alternatively, this Peer Reviewer will deliver his Model 4 and Model Layer 6 plot files and database constructed from structured Tatham water level data Fig HA3.6 and HA 3.7.

7. Strada to provide the Peer Reviewer with the **WELLness Survey results to date**.

8. Peer Reviewer to edit the WELLness Survey results into its proprietary Mega Quarry origin Water Well database further updated for NDACT with MECP wells to about 2022, download new recent wells from MECP, undertake confirming LiDAR ground elevation look ups at well heads, undertake error trapping plots and identify and exclude any rogue wells.

9. Peer Reviewer to deliver a consolidated edited Model Layer 1, 3, 4 and 6 and Cabot Head / Manitoulin / Whirlpool water well file update to Strada for model incorporation.

10. Peer Reviewer to work with EJ and Gabriel to achieve acceptable iterated model results as demonstrated by error statistics.

11. Strada Modellers to undertake three basic Quarry dewatering scenarios, the Peer Reviewer Pressure Relief / Extraction Well Scenario, a No Mitigation Scenario and the Applicant's Barrier Wall Scenario with subsets of each scenario reflecting alternative Quarry Plans.

12. Stream Water Quality Validation.

Conclusion:

The above work should increase the confidence in groundwater flow predictions and reduce the model calibration error statistic to a more acceptable 'fit for purpose' 2 to 3 m range compared to 5 to 6 m in the May 2024 Model calibration.

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Garry T. Hunter, M.A.Sc., P.Eng.

Enclosures: NVCA Pine 1: Upgradient (pg 43 Book)
Fig HA2.2: Water Wells (pg 42 Book)
Fig H.10: Stream Water Quality
Fig H.16: Honeywood Soil Profile