

MEMO

To:	Alicia Kimberley
From:	Garry T. Hunter, M.A.Sc., P.Eng.
Date:	September 12, 2024
File:	21-407
Subject	Peer Review of Strada Conceptual Model Report Appendix C

Strada Appendix C Conceptual Model Report (August 2024)

A. OVERVIEW

The Appendices appear to be written in the sequential zigs and zags of the model development process, rather than as concise, efficient submissions.

These Modelling Reports CDE are full of technical jargon, technical myopia and trivia. Whole blocks of text and figures repeat in the various Appendices and even within the Appendices themselves. Why?

Other than the titles, there is no apparent logical organization to CDE. As a result, the reports are nearly incomprehensible and unreadable.

The reports are focused on the assumed model attributes. We don't really care! We are not comparing or proposing different software tools.

What we really want to know is the model calibration / validation to the real site static water level data by Model Layer monitor screen, the stream flow data and the TPA water well data.

The Modelling Appendices should be reduced by at least 50% so they are readable by everyone.

Real Baseline Figures should be included in the Real Baseline-Centric Appendix AB.

The Conceptual Model Report and the Calibration Report should be combined.

Virtual Model Figures should be combined into a separate volume without duplications.

To avoid repetition, the Model Virtual Baseline Condition and Validation information should be included in the Calibration Appendix, not the Model Scenario Assessment Appendix.

The first initial Scenario Assessment Appendix is 295 pages long. The presentation of model scenarios must be more streamlined and efficient (reduced effort). Is every Model Scenario going to require 295 pages?

The first Impact Assessment Scenario Appendix was prepared by modellers who do not understand NDACT community values and imposed their own values. For example, the NDACT community may be acceptable of drawdowns west of the Quarry but not to the east.

Honeywood is mislocated on many Figures throughout ABCDE. This is disrespectful to NDACT.

B. SPECIFICS (page by page)

Peer Review comments follow the flawed organization and extreme repetition within these documents. Updates will be required in due course as dialogue continues. There is little evidence of regard for the Peer Review Matrix comments. Indeed, the comments frequently are ignored or not understood.

Fig 2.4 (pg C-14)	The modellers have now accepted the Peer Reviewer's earlier position that the MHBC / OGS (2014) ARIP mapping is the most current. Fig 2.6 and 2.7 appear elsewhere in Strada Reports, only need to see these once.
Fig 2.9 (pg C-20) and Fig 3.38 (pg C-60)	This Surficial Geology consolidation map appears elsewhere and should be eliminated. It does not recognize the different hydrological / hydrogeological terrain recharge characteristics of Melancthon Old versus New Survey as known to all Melancthon farmers and beyond.
pg C-21 to C-43	This section is processed and interpreted real baseline data, not modelling. It appears elsewhere in ABCDE. It should appear only once in the Appendices, preferably in the Appendix AB Real Baseline Reports.
pg C-44 to C-58	This section is also processed and interpreted smoothed real baseline data, not modelling. It is repeated elsewhere in ABCDE.
Fig 3.29 to Fig 3.36 (pg C-50 to C-57 inclusive)	Why can't the Strada consultants produce similar static water level spatial plots by Model Layer from the high quality 10 to 20 cm potpourrie of Groundwater Monitor downhole static water level data collected at great expense by Strada?
pg C-59 to C-64	The legacy referenced and mapped Quaternary units, especially Tavistock Till, are simply wrong north of the Proposed Quarry. These descriptive materials need to be brought into coincidence with the Genivar (2011) Appendix 4, the County Agricultural Soils Mapping and the GEMTEC Geotechnical report – sandy silt, some gravel till or as GEMTEC may finally report. The Genivar (2011) Mega Quarry Model Layer 1 immediately to the north of the Strada site describes the majority of the area as a till plain over bedrock that consists of carbonate derived silty to sandy till with varying portions of gravel. Genivar also noted some fine grained till areas.
pg C-65 to C-77	This real data information should appear only once and preferably abbreviated in the Appendices. Where is the precipitation distribution map?
pg C-77 to C-82	Table 4.1 and Table 4.2 are calculated based on the locally incorrect Pine / Boyne catchments. They should appear at most once in ABCDE but are insignificant and may be eliminated.

Fig 4.16 is the fundamental Hydrological / Hydrogeological Recharge Map for the model area. **The surficial geological mapping is not more descriptive or appropriate for spatially distributing values to model parameters.**

Every local farmer and beyond knows that the Melancthon Old Survey north of 15th SR and east of the 5th line and the Shelburne north and Whitfield outliers have internal free draining soil conditions, will readily absorb 25 mm (one inch) of rainfall and has high capillarity to maintain rainfed agriculture. Most farms are not irrigated.

In contrast, the remaining area of Melancthon especially in the New Survey for the most part has imperfect internal drainage (recharge) and requires tile drainage for productive agriculture. A map of Melancthon specialty crop areas is provided separately.

The Tills under the Melancthon potato fields of the Melancthon Old Survey have subdued fluted (drumlinized) topography indicative of torrential glacial meltwater flows. These Tills are compact sandy silt with frequent stones. These Tills are not fine textured or glaciolacustrine derived or stone poor. They are not Tavistock Tills as mapped by the legacy Quaternary Hydrogeologists and the terminology incorrectly adopted by Strada's hydrogeologists and modellers.

This Peer Reviewer has questioned the use of 'Tavistock Till' terminology north of Strada pits and prioritizing Quaternary Mapping for determining model parameters since review of the first Model Report in 2023 (see Matrix). The modellers need to talk to the Melancthon farmers, including Lundy (Prince Farm).

The Strada modeling team have little apparent experience in local agriculture.

pg C-83 to C-85

Table 4.3 only needs to appear once in ABCDE preferably in AB with the real baseline data. The Genivar Apr/2008 to July/2010 stream gauge information has been provided only for DP-SW7 and DP-SW10 but not for DP-SW8. Despite prior communications that this Genivar data may be used to validate the Strada Groundwater Model, the Modellers have avoided this exercise.

The Calibrated Model virtual baseline conditions should be compared to this real data (STRs) to determine the goodness of fit. Unexplained The Scenario One Model generated no or near zero flow (STR2) whereas the Genivar DP-SW8 observed mean flows of 0.35 m³/sec (apparent error). This is a major difference. These locations are coincidental with the Aquaculture Permit to Take Water at the Newell / Funston Fish Hatchery and Fish Rearing Ponds. This aquaculture operation is also described on social media as referenced in the Matrix (Item 147, March 11, 2024).

Peer Review Inspection (March and September 2024) of E½ Lot 15 Con 3 OS confirms groundwater discharge in the 3rd Line adjacent sloping roadside field.

The Calibrated Model Virtual Base Line Conditions should also be validated Genivar Stations DP-SW7, DP-SW10 and other nearby locations. It is already clear that the model is not validated (wrong) and poorly calibrated at DP-SW8.

This station is only about one km from the proposed Strada Quarry northeast infiltration area.

This poor calibration confirms the need for comprehensive systematic calibration/validation to all the Stream Flow monitoring Stations as proposed by Hunter on March 11, 2024 (see Figure). Subsequent Strada evidence indicates the need for continuous flow monitoring at the Pine River Honeywood Line (2nd Line WHS) upstream of the Pine River Provincial Fishing Area or at Genivar DP-SW8 and subsetting the Groundwater Model to this location.

pg C-91 to C-92

As stated frequently elsewhere Strada informed by the TPA survey needs to rigorously edit the well geographic locations and well head ground elevations in the standard raw MCEP WWIS.

The PGMN data should be located in AB with the real baseline data.

Fig 5.2 (pg C94)

This Figure is very misleading and is repeated throughout the ABCDE.

Confirmation that monitor wells are actually functional or that water levels are regularly observed (active) is required (Figure required).

Equally as important, the geographic spatial distribution (3D) of monitor screens classified by the adopted Model Layers (Geologic Formations) is required in separate Figures for objective analysis of monitor distribution sufficiency.

The Water Survey of Canada catchments in the Strada Pit area are simply wrong and should not be displayed or given credibility in any ABCDE document.

s5.1.3 (pg C-95)

The monitoring locations map is very misleading as it only appears to indicate comprehensive spatial coverage. Which monitors are active or inactive? There is no 3D analysis of active monitor locations by Model Layers. Very little monitoring data is provided from the first decade of pit operation.

The Model L3, L4 and L6 inserted zones of model higher hydraulic conductivity are poorly defined on site by the existing nested well monitor network. Additional groundwater monitors are required for improved definition and developing of an informed Site Mitigation Plan.

MHBC are proposing the opening Phase of the Proposed Quarry in this zone of enhanced hydraulic conductivity (highest groundwater flow) more or less equivalent to this Peer Review groundwater flow convergence zone.

Strada modellers have not disclosed a Quarry monthly water balance by Phase to assist development of the Site Plan.

s5.2 (pg C-95 to C100)

Again, the water well locations and ground elevations must be edited informed by the TPA. Why keep talking about the MECP WWIS problems, interpolation and nugget values? Why not just edit the records in the TPA?

Why is a shallow vs deep system being used rather than the Model Layers? Is this environment too complicated for the model?

All Figures have Honeywood in the wrong location.

All Figures use the wrong WSC catchment boundaries. Are the Strada modellers not aware of the contradictory Strada real water level site data?

The perimeter berms of the Strada and Duivenvoorden pits block surface flow. Natural and pit infiltration depressions west of the 4th Line in Lots 12 to 14 flow towards the Strada Pits and the Pine River.

Fig 5.3 and 5.5 with 20 m contours are of little significance.

Fig 5.4 and 5.6 take the 10 cm accuracy Strada Pit site static water level data obtained at significant expense, blend it in the model and output it in degraded 5 m accuracy form, why? Although the contours on this plot are generated at 3 m intervals, smoother versions would be generated at 4 or 5 m contour intervals.

This is no substitute for plotting Model Layer specific site data as performed by this Peer Reviewer in Fig H1 and H.2 at one m contour interval. Furthermore, the modeller's degraded solution does not permit error trapping and anomaly identification (including potential hydraulic connections). This Peer Reviewer has now plotted a Hydraulic Head difference map across the Goat Island aquitard. It does not show the Shelburne 25 m difference so often quoted by the modellers.

s5.3 (pg C-101)

There are no ponds on the Strada pit site with water surface elevation of 503 m asl. This is an error.

pg C-102 to C-111

This information appears in whole or in part in this and other ABCDE documents. Once is enough in consolidated form preferably in AB as real site data.

Furthermore, there are no bore hole logs with monitor screen elevations and Model Layer equivalents for reference.

pg C-113 to C- 115

Table 6.1 and Fig 6.1. Where is Shelburne Golf Course, does it not irrigate? Why isn't an allowance estimated? Have you asked?

Where is the maximum taking of 50,406 m³/day (s6.1 para 2, pg C-112). This error was identified in Matrix Item 96 on October 18, 2023. Failure to correct this item clearly demonstrates that Strada is simply using the Matrix to 'park' the Peer Reviewer comments. This item is still 'open' notwithstanding the matrix 'closed' entry based on a Strada consultant promise.

Assumed pumping rates at maximum daily values will overestimate takings.

pg C-116 to C-118

Fig 6.3 shows the Newell / Funston Commercial Aquaculture Permit to take Water (note typo in title) discussed previously in relation to inadequate model calibration/ validation

at Genivar DP-SW8 location and Model Assessment location at STR2. The data is fragmented or absent in the reports and needs to be connected.

This Peer Review has performed this connection through search of the ABCDE and Genivar (2011) Mega Quarry documents (see also Peer Review Figure).

- Notes:
- 1) *Genivar (2011) Table H-27 reported simulated Groundwater Discharge Rate at SW8/STR2 at 3,520 m³/day (40.7 L/s) and **calculated observed low baseflow at 3,575 m³/day (41.4 L/s).***
 - 2) *Newell / Funston Commercial Aquaculture (Fish Hatchery / Rearing Ponds) MECP Permit PTTW #7121-9Y7HP7 total is **741 m³/day (8.6 L/s)** (Earthfx Aug 2024, pg D-102) immediately downstream of SW8/STR2.*
 - 3) *Genivar DP-SW8 reported **Mean Flow at 0.35 m³/sec (350 L/s)** in Earthfx Aug 2024 Table 3.6, pg D-57. **This flow is an obvious error.***
 - 4) *Earthfx (August 2024) Fig 3.22 pg 37 Simulated Virtual Model Baseline Condition Dry Weather Flow at SW8/STR2 is at 0.0 L/s.*

The Earthfx Model Calibration for Baseline Conditions is obviously not validated for assessment prediction purposes.

This 0.0 L/s STR2 Flow suggests that the current Groundwater Model may not include Layer 3 Goat Island Aquitard as the Streambed is reported at 484 m asl (CGVD28).
