MEMO

To:	Natalie Kotyck
From:	Garry T. Hunter, M.A.Sc., P.Eng.
Date:	January 10, 2025
File:	21-407
Subject	**Strada – Level 1 and Level 2 Hydrogeological Assessment Summary including Appendices A to E**

This Memo provides a page by page summary of the Level 1 and 2 Hydrogeological Assessment including Appendices A, B, C, D and E. This is the fourth review cycle. The failure to adequately address many of the issues identified in the previous three (3) Project Matrix review cycles has resulted in continuing inefficient repetition.

LEVEL 1 AND LEVEL 2 – SUMMARY	
Fig 1 (pg 2)	Honeywood is plotted at the correct location, unlike on many other maps.
s6.1 (pg 25)	This section follows the Geotechnical Report, except for the likely need for relief wells to excavate the Lift 2 / 3 underground stream area and progressively construct the Lift 3 / Bench 3 water control barriers. **The text specifies removal of 365 m of water control barrier but is contradicted by Fig 8 and Appendix E, which does not specify Lift 3 Barrier removal on the east side of Melancthon Pit No. 1.** How will the Gasport Aquifers be recharged after Quarry closure if the water control barriers remain in place?
Table 5 (pg 39)	This Peer Review agrees with the water quality parameters to be observed in monitoring wells on a semi-annual and annual basis. Annual water analysis to be in October / November months nearing completion of seasonal extraction. Water infiltration and injection well facilities to be analyzed quarterly for all parameters listed in Table 5.
pg 1 to 48	Detailed comments are provided elsewhere in the Matrix and in Appendices A, B, C, D and E below and are not repeated herein.
APPENDIX A & B	
Appendix A and B (pg i)	Note, this is now Document Release 4. Many prior Peer Review comments have not been resolved and remain outstanding. The Matrix and many other comments are repeated herein.

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APPENDIX A	
Fig A.5, Table A.1 (pg A-8, A-9, A-10)	Monitor screens are not classified by Model Layer. Many monitors located within the extraction and infiltration facility areas will be destroyed and are not suitable for long-term monitoring.
Fig A.6 (pg A-11)	Requested 2024 surface stream flow monitoring is incomplete at Mill Lane and 177 Main Street.
pg A-17	Other than mainly irrelevant Piper Diagrams, no hydrogeochemical data or interpretation is contained in the Strada documents to inform the Site Plans. The only water quality analysis including visual plotting of data has been performed by this Peer Reviewer.
sA.9.1 (pg A-18)	Wash water is currently derived from surface water within the Site Plans (closed loop) reflecting the Till aquitard, upward groundwater gradients and groundwater inflow from NAT-01 west of the 4th Line within E½ Township Lots 11 and 12, Con 4 OS.
Fig A.26 (pg A-46)	Guelph Formation does not directly overlay Cabot Head Shale. 'Occasional' misspelled on many logs.
APPENDIX B	
Fig B.22 (pg B-18)	Insufficient hydrograph data to interpret OW30C (only 3 months).
Fig B.37 (pg B-26)	Insufficient hydrograph data to interpret OW28A and OW28C (only 3 months).
Fig B.38 (pg B-27)	Insufficient hydrograph data to interpret OW27C (only 3 months). This plot should be paired with OW13C and OW2C.
Fig B.39 (pg B-28)	Insufficient hydrograph data to interpret OW24A and OW24C (only 3 months). OW24H suggests open hole drainage downwards to deep Gasport Aquifer.
Fig B.40 (pg B-28)	Insufficient hydrograph data to interpret OW25A and OW25C (only 3 months). Data indicates upward gradient of 4 m across Goat Island aquitard. Open Hole OW25H suggests upward flow from the Gasport to the Upper Aquifer.
Fig B.41 (pg B-29)	Insufficient hydrograph data to interpret OW26A and OW26C (only 3 months). Open Hole OW26A suggests downward gradients.
Fig B.42 (pg B-29)	Insufficient hydrograph data to interpret OW27C (only 3 months). This plot should be paired with OW23A.
Fig B.43 (pg B-30)	Insufficient hydrograph data to interpret OW28A and OW28C (only 3 months).

Fig B.44 (pg B-30) Insufficient hydrograph data to interpret OW29A and OW29C (only 3 months). This plot should also be paired with OW4C.

Fig B.45 (pg B-31) Insufficient hydrograph data to interpret OW30C (only 3 months). Where is the referenced OW30 Well Nest? This plot should also be paired with OW13C.

Fig B.46 (pg B-31) (see pg A-11, Fig A.6) for Domestic Well locations.

Private Well DW1 is located on W½ Lot 9, Con 2 OS within NAT-02 on the 4th Line south of County 17.

Private Well DW1 had **Nitrate (as N) at 2.59 mg/L, Sodium at 14.3 mg/L** on February 8, 2023 and **Total Dissolved Solids at 387 mg/L** on February 8, 2029.

DW1 Well (W½ Lot 9, Con 2 OS) has a base at about 460 m asl and is interpreted to extend into the top of the Gasport aquifer. Static water level at the time of drilling was about 495 m asl versus 479 m asl on January 10, 2024.

Fig B.47 (pg B-32) Private Well DW2 is located on Ashlea Lane about the one km east of the proposed Quarry boundary.

Domestic Well DW2 in an Estate Subdivision had **Nitrate (as N) at 4.0 mg/L, Sodium at 3.2 mg/L and TDS at 295 mg/L** on October 4, 2022.

DW2 Well has a base intersecting the Cabot Head Shale at about 442.2 m asl. Static water level at the time of drilling was about 476 m asl versus about 474 m asl on January 10, 2024. This is a Gasport Aquifer Well.

Fig B.48 (pg B-32) Private Farm Well DW3 is at a Dairy Farm located on E½ Lot 12, Con 3 OS about 100 rods east of the proposed quarry boundary. This well hydrograph shows summer season daily drawdowns of about 7 m with pump on / pump off water levels ranging between 468.5 and 478 m asl (9.5 m range). This operational range significantly contrasts with wells DW1, DW2, DW4 and DW5.

Farm Well DW3 had **Nitrate (as N) at 7.4 mg/L, Sodium at 3.5 mg/L and TDS at 292 mg/L** on October 4, 2022.

DW3 Farm Well had a base at about 445 m asl. Water found was reported at 451 m asl. The static water level at the time of drilling was 477 m asl vs 475 m asl on January 10, 2024. Recommended Pumping Rate was 15 gpm. The Epikarst layer was intersected at 482 m asl and hard blue grey limestone at 465 m asl. This is interpreted to be a Gasport Aquifer Well but Open Hole through higher formation.

This well will be vulnerable to Quarry induced drawdowns.

Fig B.48 (pg B-32) Domestic Well DW4 is located northeast of the 3rd Line and Sideroad 15 intersection.

	Domestic Well DW4 had **Nitrate (as N) at 9.0 mg/L, Sodium at 3.3 mg/L, TDS at 314 mg/L** on October 4, 2022. Domestic Well DW4 had **Nitrate (as N) at 8.17 mg/L** and Sodium at 3.2 mg/L on October 17, 2023. TDS was not calculated. Well DW4 intersected Limestone at about 479 m asl and drilling was terminated at about 462 m asl (may be top of the Gasport). Water level was about 481 m asl at the time of drilling and 481 m asl on January 10, 2024.
Fig B.48 (pg B-32)	This farm Well DW5 is located at Sideroad 15 and the 5th Line OS on W½ Lot 16, Con 4 OS. Farm Well DW5 had Nitrate at 9.8 mg/L and Sodium at 6.4 mg/L on October 17, 2023. TDS was not calculated. No well record was found for Farm Well DW5. Monitor level was reported at 509 m asl on January 25, 2024 and 511 m asl on March 28, 2024. This is interpreted to be an Upper Aquifer shallow well.
Fig B.51 (pg B-34)	Misclassified Model Layer 6 (Gasport) groundwater monitors OW24C, OW25C, OW26C, OW27C, OW28C, OW29C and OW30C should be plotted on a separate hydrograph to be meaningful.
sB.7 (pg 36)	The groundwater hydrogeochemistry discussion does not present the geographic and Model Layer distribution of water quality parameters. Nowhere does Strada address the mixing of the 'pristine' deep Gasport aquifer waters with the lower quality Upper Aquifer waters and ANFO residues within the Quarry extraction floor sump and via the proposed 4th Line Upper Aquifer interceptor drain. Why is degraded water quality proposed to be discharged into the Quarry Drinking Water Infiltration and Injection infrastructure?
APPENDIX C	
s3.4.1 (pg C-59)	As stated a number of times previously, the glacier lacustrine derived silty clay till Tavistock Tills in the Shelburne Source Water Protection Area and in the south area of the Strada Melancthon Pits are not the same as the stoney, older, coarser, shallow, fractured Tills in the Melancthon Old Survey north of County Road 17. Every Melancthon Farmer knows these differences!
s4.4.1, Fig 4.14 (pg C-60?)	The Model Calibration Report does not recognize continuous stream flow monitoring in Mulmur Township by the Nottawasaga Valley Conservation Authority below the Pine River Provincial Fisheries Area or Strada's own August 15, 2024 dry weather streamflow monitoring. Genivar at DP-SW7 observed a mean (average) flow of 420 L/s, at DP-SW8 40 L/s and at SW10 1,040 L/s during the 2008 to 2010 period. Are these flows actually incorporated into the Model calibration?

Table 4.6 (pg C-80)	Genivar mean flow at 0.04 m^3/s (40 L/s) has now been corrected from 0.35 m^3/day in May and August 2024 Report versions.
Fig 5.7, Fig 5.8 and 5.9 (pg C-100)	Only about 3 months of transient data is included for the Strada recently constructed Gasport Monitoring Wells OW24C to OW30C inclusive. The only other Gasport Wells are PW1 / OW1. Does this mean that the current October 2024 Groundwater Model is not informed by 12 months of recent seasonal Gasport Aquifer transient water level data?
Fig 5.5.2 (pg C-102)	Shelburne Wells are remote from the Niagara Escarpment compared to the Strada Site. Comprehensive independent on-site pump tests are required rather than extrapolation of data from the distant Shelburne PW-7 site, remote from the Niagara Escarpment.
Fig 5.13 (pg C-104)	Bonnefield Wells are also more remote from the Niagara Escarpment compared to the Strada site. Comprehensive, independent on-site pump tests are required on-site versus extrapolation from the Bonnefield site.
Fig 5.17 (pg C-108)	This multi-level groundwater monitor is located adjacent to the 4th Line on the north side of W½ Lot 15, Con 3. These Hydrographs appear to reflect water tables at 502 m asl, similar to NAT-01, Guelph/Eramosa potentials at about 498 and Gasport potentials at 496 m asl, each slightly higher than at the Strada site.
APPENDIX D	
s1.5 (pg D-8)	The authors of Appendix D state: *This report includes terminology that are highly advanced in surface water and groundwater modeling and analysis. The report should only be reviewed by experts with suitable experience and knowledge of these techniques.* Apparently the authors do not consider this report suitable for public consumption or challenges by non-modellers. This Appendix D is opaque. This Peer Reviewer is concerned with the lack of local terrain knowledge of the modellers, validation of the model and suitability for prediction, not the modelling techniques.
Fig 3.31, Fig 3.32, Fig 3.33 and Fig 3.34 (pg D-62 and D-63)	These stream gauges in Simcoe County are distant from the proposed Strada Quarry site. On top of the Niagara Escarpment, Intermediate gauge sites are required in the general location of the Pine River Provincial Fishing Area and closer to Horning's Mills.
Fig 3.4 (pg D-23)	Once again, the modellers misrepresent the Strada site as being in the Boyne catchment instead of the Pine River catchment (occurs throughout the section).
Fig 3.5 (pg D-26)	Once again, the modellers misrepresent the Strada site as being in the Boyne catchment instead of the Pine River catchment (occurs throughout the section).

	Strada August 25, 2024 dry weather stream flow stations and NVCA 2008 stream flow stations Site 1, Site 2 and Site 3 and later 2013 base flow data are not recognized.
Fig 3.8 (pg D-30)	Catfish Creek Till is identified in Melancthon OS north of Sideroad 15 not Tavistock till as employed in the Model.
Fig 3.9 (pg D-32)	Silt loam soil shown in Melancthon Old Survey north of Sideroad 15. Organic and loam soils shown in Melancthon New Survey.
Fig 3.10 (pg D-34)	This Figure again shows Catfish Creek Till north of Sideroad 15 in Melancthon OS. Tavistock Till shown west and south of Strada Site.
Fig 3.11 (pg D-35)	Despite the prior Figures, Hydraulic Conductivity and recharge values for Tills / Silt / Loam soils are not varied between Melancthon Old Survey and New Survey.
Table 3.6 (pg D-59)	Drainage Areas and Specific Discharge estimates are questioned due to erroneous designation of Pine / Boyne headwater catchments. Genivar Mean Flows exceed Modeled STR Flows by significant amounts.
Fig 3.36 (pg D-66)	Still not clear what this Figure adds to report.
Fig 3.49 and Fig 3.50 (pg D-85 and D-86)	These Figures with uniform Hydraulic Conductivities (recharge) in the glacial till areas of both the Old and New Surveys of Melancthon Township are not credible.
Table 3.10 (pg D-87)	The average Recharge in the Grand River Catchments at 185 and 222 mm/year are more typical of the Melancthon New Survey.
Fig 4.1 (pg D-94)	The Model is being calibrated to far away stream flow stations in Simcoe County at Everett (Pine River) and Earl Rowe Provincial Park at Alliston (Boyne River) without intermediate way points.
Table 4.2 (pg D-103)	Simulated rates likely significantly overestimate annual takings. The Bonnefield PW1 and PW2 each Permitted at maximum **3,273 m^3/day (38 L/s) and Home Farm #1 Permitted at maximum 2,937 m^3/day (34 L/s) are likely located on karstic bedrock lineaments** radiating out into the uplands from the Horning's Mills Pine River headwater streams. Similar and greater yields due to complete Quarry dewatering may be expected in the Strada underground stream pressure relief (dewatering) wells through the Prince and Melancthon Pit No. 1 properties.
Table 4.3 (pg D-106)	Weathered fractured Till (Catfish Creek?) 10^{-5} or 10^{-6} m/sec Hydraulic Conductivities should be applied in Melancthon Township Old Survey north of Sideroad 15.

Table 4.4 (pg 109)	The Strada Model Calibration statistics are similar through the May 2024, August 2024 and October 2024 Calibration Reports. The modellers have not responded to the Peer Reviewer's prior comments (see Matrix). These errors are not acceptable to support Site Plan development. No error statistics by Model Layer for on-site water level monitoring data has been provided as requested. The modellers are degrading the high quality Strada site water level monitoring data (10 – 20 cm vertical accuracy) to ± 5 m or more as indicated by residuals.
Fig 4.10 (pg D-172) **Fig 4.11 (pg D-113)**	This Review has prepared one (1) m hydraulic head contours for the Model Layer 4 and 6 on the Strada proposed Quarry site utilizing the high accuracy site water level data.
Fig 4.13 (pg D-115) **Fig 4.14 (pg D-116)**	The Peer Reviewer's site hydraulic head contours (water levels) for Model Layer 4 and 6 have residuals in the one meter range versus the modeller's Fig 4.13 and Fig 4.14 with residuals up to 10 m or more. The reason for high on-site residuals are not explained in the Model Reports.
s4.10.3 (pg D-118)	The model may have achieved an acceptable level of calibration when compared to published and commonly used performance measures. However, the modellers had the opportunity to pre-stratify the site water level data by model layer, integrate the WELLness Surveys, editing the standard run-of-the-mill MECP water well databases and integrate (fuse) the Genivar 2008/2010, the NVCA 2008 / 2013 and the Strada August 15, 2024 stream flow data but have not done so.
pg D-119 to D-122	The Scatter Plots (Fig 4.16, 4.17, 4.18 and 4.19) on these pages are similar to those in the prior May and August 2024 document releases.
Fig 4.2.1 (pg D-125)	Blue dots (cross section?) through water wells not shown. Water well logs not provided for reference.
pg D-127 to D-132	This section mainly repeated elsewhere.
Fig 4.28, Fig 4.29 and Fig 4.30 (pg D-133 to D-136)	This Peer Reviewer agrees with the concept of a zone of enhanced conductivity within the weathered bedrock zone (Model Layer 3), the Guelph / Eramosa (Model Layer 4) and the Gasport (Model Layer 6). However, the modellers' geographic expression of this feature should reflect Strada's on-site groundwater monitoring results and center on Horning's Mills Lake and the River Road as an improvement to the modellers' 'inferred' location. The modelers' inferred location distorts the location of the modelled drawdown contours east of the proposed Strada Quarry.
s4.10.6 (pg D-137)	It is not apparent what has been updated in the model calibration from previous Calibration Report versions. The Calibration statistics remain unchanged since at least the April 2024 second document release. Similarly, the groundwater parameters taken from the 2022 Shelburne wellfield have not been updated through these four report cycles despite these Peer Review comments.

Fig 4.31, Fig 4.3.2 and Fig 4.3.3 (pg D-139 to D-141)	There are frequently differences of 5 m between predicted and observed water levels in the site vicinity and even more at the key Horning's Mills Pine River headwaters.
Fig 4.3.4, 4.3.5 and 4.3.6 (pg D-142 to D-145)	These Scatter Plots are repeated elsewhere and have not been updated since the August 2024 third document release.
APPENDIX E	
Fig 2.3 (pg E-15) Fig 2.4 (pg E-16) Fig 2.5 (pg E17)	The Modellers are using their 'inferred zone of increased hydraulic activity' to inform the site groundwater contours (Gasport potentials) rather than the high accuracy site groundwater monitoring data informing the Model. The 'inferred' zone of increased hydraulic conductivity should also be centered on the geomorphic expression of the Horning's Mills Lake, Main Street / River Road Pine River Stream Valley. This will change the location of the modelled drawdown contours and related impact assessment. This inferred location distorts the groundwater mounding and drawdown Figures throughout.
Fig 2.7 (pg E19)	This Figure shows the thinning of the Gasport dolostone aquifer above the Cabot Head aquitard at the Escarpment front. This is the critical area for drawdown analysis, not at the benign GWP3, GWP4, and GWP6 as utilized elsewhere in Appendix E for drawdown analysis.
Fig 2.8 (pg E-20)	Available drawdowns less than about 10 m, not 5 m, are considered critical by this Peer Review. See Dairy Farm description in Fig B.48.
Fig 2.9 (pg E-21)	This Figure shows areas sensitive to water table rises in the County Road 17 and southern areas. However, areas at 3rd Line and 15th Sideroad OS and 15th Line and Sideroad 280 NS are missing (omitted).
Fig 2.11 (pg E-23)	Wetland designations are not consistent with the NRSI October 2024 document.
Figures (pg E-24, E-25 and E-26)	No Baseline water levels are provided for thin dolostone aquifers.
Fig 2.19 (pg E-29)	Model STRs are required at all Stream Flow Stations as observed on August 15, 2024 by Strada and at missing stations as requested by the Peer Review in March 2024. Also at Genivar and NVCA Stream Flow Stations.
Fig 2.20 (pg E-30)	STR10 should be relocated to SW6 (38 L/s on August 15, 2024). STR9 is not comparable to a surface flow measurement station. STR8 compares to SW5 'dry weather flow'. STR7 compares to SW24 'dry weather flow' at 211.4 L/s on August 15, 2024.

Fig 2.22 (pg E-32)	Figure not updated from August 2024 Appendix E, still shows near 0 dry weather flow at Model STR2 (Newell/Funston Fish Hatchery / Rearing Facility) versus Strada August 2024 Dry Weather Flow at nearby SW17 at 38.9 L/s.
Table 2.2 (pg 43)	Shows August modelled dry weather flows out of NAT-18 Horning's Mills Lake at 61.9 L/s versus dry weather stream flow on August 15, 2024 at 139.7 L/s as measured at SW5 Main Street/ River Road by Strada at 2.26x higher. The design apparently relies on diversion of pumped quarry floor sump water to specific individual infiltration facilities (not shown on October 2024 Site Plans). Conceptual contact water discharge pipe networks are not shown.
Table 3.1 (pg 50)	For the Central Infiltration Gallery to overflow to the Southern Infiltration Gallery requires a lower water control elevation at the Southern Gallery. Infiltration galleries apparently filled by direct pumping of contact water from the quarry sump. Site Plan note?
Table 3.1 (pg 50) and s6.1 (pg 167)	How does excess discharge from the Southern Infiltration Gallery get to the 15 m higher northern Infiltration Trench? Is this actually via direct pumping from the quarry floor sump?
Fig 3.2 (pg 50)	The Stage Area relationship at about 497 m asl for the Central Infiltration and 499 m asl for the Southern Infiltration ponds suggest 3 m and 5 m freeboards for these facilities. Fig 3.2 is not consistent with the October 2024 Site Plans (pg 2 of 5) which generally show top of berm contours as low as 495 m asl? These Central and Southern Infiltration Ponds under existing conditions will have water levels of about 488 and 492 m asl respectively. These diagrams are misleading with respect to implied storage volumes.
Fig 3.3 (pg 51)	Similarly, the Stage Area Relationship diagrams are not consistent with the Site Plan (pg 2 of 5) which shows the top of the North Trench at about 512 m asl and the top of the southern trench at 508 m asl. Allowance for freeboard is also required.
Fig 3.4 (pg 55)	Proposed Quarry Phase 1A and Phase 2A areas are required to be protected for strategic location of infiltration area contingencies upstream of the Horning's Mills community and the local Pine river headwaters.
Fig 3.5 (pg 56)	The Active Face for Phase 1B is about 35 m in height, exceeding the 25 m Ministry regulatory limit for bench heights.
Fig 3.5 (pg 56)	Fig 3.5 shows a 2 m thin remnant of the Model Layer 5 Ancaster / Niagara Falls Aquitard Formation. This 2 m thin aquitard, even if originally continuous across the site, will be compromised by Lift 2 blast hole over drilling and blast fracturing of the aquitard. Also of concern, the Lift 2 floor will rupture under the high pressure Gasport aquifer with likely quarry floor and processing equipment

	flooding. Pressure relief wells may be required to complete Lift 2 as well as to support Lift 3 extraction, especially in underground stream areas.
Fig 3.6 (pg 58)	The modellers do not provide any GWP locations in locations of thin dolostone (Gasport) Aquifers. SR10 is located in a dry swale and not at the downstream monitoring station SW6. Model Layer 'average' drawdown is shown upgradient of Horning's Mills and mounding is shown in the vicinity of Infiltration Ponds and Trenches. Water is being inappropriately diverted from the Pine to the Boyne River headwaters. Model Layer 1 Groundwater Mounding is a threat to low-lying agricultural fields and residential lots within and adjacent to wetlands.
Fig 3.7 (pg 59)	Phase 1 Layer 4 'average' groundwater drawdowns and mounding indicate diversion of groundwater to the Boyne River from the Pine River headwaters.
Fig 3.8 (pg 60)	'Average' Phase 1 Layer 6 (Gasport) drawdowns extend to Horning's Mills. The full Gasport drawdown cannot be determined from this Figure. Drawdowns will likely be greater due to the rupture of the Lift 2 floor or alternatively, the introduction of pressure relief wells will be required with discharge to infiltration facilities.
Fig 3.9 (pg 61)	Fig 3.9 shows the increase in stream flow within farmers fields with swale recharge east of NAT-19 label and east and south of GWP5 label. Similarly, there is increased streamflow in the NAT-02 (not labelled), NAT-03 and NAT-04 wetlands threatening farm fields and residences contiguous with or within these wetlands. Also agricultural tile drainage outlets into these wetlands need to be protected from increased water levels.
Fig 3.10 (pg 62)	Fig 3.10 shows the 'average' and is not a 'dry weather' decrease in stream flow at Horning's Mills. This decrease is likely underestimated. Again STR10 and also STR9 locations selected at dry swales are of little practical relevance.
Fig 3.14 (pg 65)	STR8 is at the Main Street / River Road intersection in Horning's Mills. STR8 Model Layer L1 shows Model virtual base (Dry Weather) flows at about **60 L/s** versus Strada observed Dry Weather Flow at **139 L/s** on August 15, 2024. STR7 Model Layer L1 at the Mill Pond inlet shows Model Base Flows at about 80 L/s compared to Strada observed dry weather flows **at 211.4 L/s** on August 15, 2024. **Based on these criteria, the Groundwater Model is underestimating dry weather flows by about 2.3x at STR7 and STR8. These results also mean that Quarry groundwater flows and infiltration requirements are likely underestimated by a similar amount.**
s3.5.6 (pg 75)	This report is comparing drawdowns at GWP-4 at a location of thick dolostone aquifers rather than at a thinner dolostone aquifer section at Horning's Mills.

	This report for Phase 1 acknowledges that the water table is expected to rise at NAT-19 and that stream flow measured impacts penalize headwater streams with low flows (significant flow reduction).
Fig 3.2.1 (pg 77)	Strada has now adopted, in part, injection wells in Phase 2 as proposed by this Peer Reviewer in July 2024 (see Matrix).
Fig 3.22 (pg 78)	The Phase 2C Active Face is shown higher than the 25 m Ministry regulated bench height limit. The remnant '2 m' Niagara Falls Aquitard Unit is apparently assumed to be 'competent' in the Model.
Fig 3.23 (pg 86)	Phase 2C Layer 1 Average Drawdown is showing extending into NAT-20 area at Sideroad 280 (NS) and the 5th Line (OS). Aggregate producers and farmers will favour this drawdown. However, quarry drawdowns propagating to the Horning's Mills Pine River headwaters will adversely diminish groundwater flows and dry weather stream flows with adverse effects on Brook Trout habitat.
Fig 3.24 (pg 81)	Drawdowns adverse to stream and groundwater flow extend into Horning's Mills. The contour artifact at GW14 indicates an input data error.
Fig 3.25 (pg 82)	Drawdowns for Phase 2C Layer 6 (Gasport) extend strongly into Horning's Mills community. The extreme drawdowns under the proposed quarry drawdown levelling out at 12 m (? illegible) depth may reflect the Model 2 m competent aquitard assumption at the base of Lift 2.
Fig 3.26 (pg 83)	Unexplained is the average Phase 2C increase of stream flow at Honeywood Brook (NAT-15). This would seem to be a modelling artifact. Stream flows are increased in the dry swales east and south of NAT-19 as well as in NAT-03 wetland.
Fig 3.27 (pg 84)	Stream flows are decreased in the Horning's Mills headwaters.
s3.6.3 (pg 85)	**The groundwater modellers acknowledge, similar to Phase 1, a Phase 2 very low flow reduction of 40 to 50% during the dry and wet season at STR9 (Fig 3.30).** **A reduction between Model base line and Phase 2 is acknowledged to be 30% at STR8. At STR7 the modellers state the reduction is expected to be 10 to 20% (Fig 3.31).**
Fig 3.28 and 3.29 (pg 86)	Again, the modellers should be utilizing a location where the dolostone aquifers are thinning towards the Cabot Head shale subcrop aquitard platform.
Fig 3.31 (pg 87)	Again, STR8 Phase 2C Layer 1 Base Flow conditions are about 60 L/s versus Strada observed similar station SW5 dry weather stream flow on August 15, 2024 at 139.7 L/s (underestimated 2.3x).

s3.6.6 (pg 97)	**The modellers again acknowledge that the drawdowns for Phase 2C reduces stream flow and surface leakage into NAT-18 (Horning's Mills). Stream flow (and groundwater flow) reduction is expected to be between 10 and 20%. Small headwater streams are expected to have greater reduction impacts.**
Fig 3.40 (pg 102)	The average Phase 4A Model Layer 1 drawdown extends westerly under the Duivenvoorden Aggregate properties and easterly to Main Street Horning's Mills. Layer 1 mounding extends under NAT-04, NAT-02 and NAT-03, potentially impacting agriculture fields and tile drainage outlets contiguous with these wetlands, as well as residential / commercial properties and 'lots of record' adjacent and within these wetlands. The Groundwater Modellers NAT wetland boundaries are not consistent with the updated NRSI October 2024 wetland boundaries.
Fig 3.4.1 (pg 103)	Phase 4A Model Layer 4 Guelph Drawdowns extend to Main Street Horning's Mills despite that the Guelph Formation is mainly absent here at lower elevations.
Fig 3.42 (pg 104)	Phase 4A Model Layer 6 Gasport drawdowns extend 2 km easterly to beyond Main Street Horning's Mills. Groundwater mounding extends towards the 5th Line OS. High mounding elevations west of the Prince Pit are not legible. Mounding elevations may now be controlled by the proposed interceptor tile drain.
Fig 3.4.3 (pg 105)	**The Model predicts an increase in 'average' flow in the Boyne tributaries.**
Fig 3.44 (pg 105)	**The Model predicts a decrease in 'average' flows in the Horning's Mills Pine River tributaries.**
Fig 3.49 (pg 111)	**The Model predicts increased surface leakage in the Boyne River NAT-02 and NAT-03 wetland tributaries.**
Fig 3.50 (pg 112)	**The Model predicts decreased surface leakage in a number of Horning's Mills NAT-15 and NAT-18 tributaries.**
s3.7.6 (pg 119)	**The Modellers again acknowledge that drawdowns reduce stream flow and leakage into Pond NAT-18 (Horning's Mills Lake).** **Pine River headwater stream flow at location STR8 / SW5 (Main Street / River Road) is expected to be significantly reduced throughout the year.**
Fig 3.55 (pg 121)	The final rehabilitation barrier configuration may require a Gasport opening on the east side, not just an overburden barrier opening (Also, see Level 1 and Level 2 Summary, pg 25).
Fig 3.6.4 (pg 130)	Model baseline stream flows at STR8 / SW5 (Main Street and River Road) are shown at 50 to 60 L/s compared to Rehabilitation dry weather flows at roughly

	similar values. By comparison, Strada observed dry weather flows at 139.7 L/s on August 15, 2024. These modelled dry weather flows are based on a fully recovered (flooded) Quarry to an assumed elevation of 487 m asl. Modelling of interim partially filled Quarry conditions are required for evaluation of post Quarry closure stream flow reductions. On December 11, 2023, the following existing low water levels were reported by Strada at Pit Monitors OW14C 480.4; at OW16C 477.8; at OW19C 483.9; at OW25A 479.5; and at OW25C 484.4 and at OW28C 483.7 m asl. The assumed recovered Quarry Rehabilitation water level of 487 m asl appears to be based on Model assumed hydraulic barrier closure of the Gasport Aquifer on the east quarry boundary. What is the basis for this arbitrary decision? Why was not a lower reservoir water level chosen?
s3.9.4, Fig 3.75, Fig 3.76 and Fig 3.77 (pg 145 to 147)	The Modellers selected 3 residences A, B and C on County Rd 17 to assess impacts of mounding on residential properties (Fig 3.75). The Modellers predict a 1 m rise in Model baseline for Model Layer 1 Water Table at Residence A, 0.5 m at Residence B and 0.65 m at Residence C (Fig 3.75). However, these residences are all constructed on locally higher ground - residence A at 495 m asl, B at 497.8 m asl and C at 493 m asl. The dry weather water level rise at Residence A was from about 490 to 492 m asl (Fig 3.76). The dry weather water level rise at Residence B was from about 492 to 493 m asl (Fig 3.77). The dry weather water level rise at Residence C was from about 487 to 488.3 m asl (Fig 3.78). These selected residences are not critical and the Model predicted water level rises at face value do not represent impacts to these residential lands. **However, this data demonstrates that lower elevation residences and farm fields contiguous with and within Boyne River headwater wetlands NAT-02, NAT-03 and NAT-04 will be impacted by wetter conditions and related water table rises.**
Fig 3.79 (pg 149)	This Figure needs to extend downstream to STR14 to include NAT-02, NAT-03 and NAT-04 and have a minimum dry weather change (rise) of about 0.2 m.
s3.96, Table 3.36 (pg 150)	**The Modellers finally acknowledge that the southern boundary of the Strada property is at the divide between the Pine and Boyne River watersheds and that the wetlands immediately south of the site will receive additional seepage from the Central and Southern Infiltration ponds.** Table 3.36 reports model virtual 'average' baseline flows at 26.5 L/s. However, the Strada actual stream flow surveys reports 99.6 L/s on May 30 and 28.2 L/s dry weather flow on August 15, 2024. **These modelled 'average flows' are significantly underestimated and the Strada conclusions are questioned.**

Table 6.1 (pg 166)	**At 'face value', based on the August 15, 2024 Strada dry weather stream flows, the Model Quarry water management fluxes are all underestimated by a factor of 2 to 3 times. Similarly, the Quarry infiltration facilities are likely all undersized and underdesigned.** Strada has not demonstrated that there will be no incidental surface discharges from the Quarry site to wetland NAT-19. Furthermore, the contaminated quarry floor stormwater (MECP sewage) being pumped from the quarry floor sump pond (flux of water from the quarry) is apparently being pumped to the various Infiltration Trenches and Ponds without treatment, except for quarry sump pond partial turbidity reduction, for direct infiltration of contact water to Horning's Mills Community Drinking Water Aquifers. No seasonal quarry flux water balance is provided. The proposed buried tile interceptor drain at the 4th Line is capturing agriculture contaminated (Nitrate-N) rich groundwater. Degraded quality Guelph / Eramosa aquifer water is proposed to be directly injected into downgradient Guelph/ Eramosa and high quality Gasport Drinking Water Aquifers. To inform the Site Plans, Strada has not compiled the existing ambient aquifer water quality data or provided estimates of Agricultural Contaminants, Oil and Grease, Hydrocarbons, and Ammonium Nitrate / Fuel Oil residues in the Quarry floor sump water pumped directly to Drinking Water Aquifer Infiltration facilities.
Fig 6.1 (pg 167)	The modelled Phase 2C top water elevation shown at 509 m asl is lower than the 512 m asl top of containment berm on the Site Plan (pg 2 of 5). However, these levels do not recognize the modellers' likely under-estimates of quarry sump flows. The 3 hydrographs in Fig 6.1 demonstrate ranges of water levels in Model Layer 1 from about 497 m asl to 509 m asl. **These hydrographs demonstrate the Northern Infiltration Trench is being managed simply to get rid of seasonal water from the quarry floor and not to manage decreased downgradient off-site water levels and groundwater flows.** The October 2024 Site Plans (pg 2 of 5) specify the base of the Northern Infiltration Trench at 503.4 m asl, suggesting the trench may be dry in the winter season for Phase 2C Layer 1 and dry for about 50% of the year for Phase 4A Model Layer 1 and for almost all year for Phase 1 Layer 1.
Fig 6.2 (pg 168)	The Southern Infiltration Trench Phase 2C Model water level at 503 m asl is 5 m lower than the Site Plan (pg 2 of 5) containment berm at 508 m asl. The Southern Infiltration Trench also has a base of 503.4 m asl (October 2024 Site Plan, pg 2 of 5). Fig 6.2 indicates the infiltration pond is dry throughout most of the time period.

Fig 6.3 (pg 168)

The Central Infiltration Pond for Phase 1, Phase 2C and Phase 4A show for Model Layer 1 is above 494.0 m asl and at this level will overflow to NAT-19 wetland unless the Quarry floor sump pump is redirected.

The model hydrograph indicates seasonal operation of the quarry floor sump pump with reduced winter infiltration as required to sustain Horning's Mills groundwater and stream flows. Similarly, infiltration varies by Quarry Phase, not by the requirement for continual groundwater flow maintenance to Horning's Mills community and the Pine River headwaters.

The Central Infiltration Pond has a base (bottom) level at 477 m asl, about coincident with the local top of Guelph bedrock epikarst and above the Goat Island aquitard. The overlying fine textured glacial till overburden has been removed to facilitate infiltration. The existing Upper Aquifer bedrock water level (dry weather) is at about 486 to 488 m asl at this Pond versus the design water level of 494.0 m asl.

The Model water levels seasonal fluctuation is only one metre, indicating little active storage under this scenario. However, this Pond will infiltrate (and mound) to the Guelph bedrock epikarst due to the 6-8 m hydraulic head.

Fig 6.4 (pg 168)

The Southern Infiltration Pond modelled hydrographs also indicate that the Pond is being operated in accordance with Strada incidental needs for removal of water from the quarry floor sump. The 494 m asl top level is at the same top water level as the Central Infiltration Pond which is lower than the 495 m asl containment berms.

The Southern Infiltration Pond has a base following the local epikarst slope with elevation varying from 481 to 490 m asl and a design water level of 494 m asl (October 2024 Site Plan, pg 2 of 5). Fig 6.4 indicates an operational water level range of about 1 m for the selected quarry Phases. The existing dry weather water levels are about 490.6 m asl in the current pit ponds. This Pond has about 3.4 m of active storage potential, much greater than the Northern and Southern Infiltration Trenches and the Central Infiltration Pond combined.

This Pond bottom is also constructed, more or less, on the top of the Guelph Formation epikarst and above the Goat Island Aquitard. The overlying fine textured glacial Till overburden has been removed in this Site Plan scenario to facilitate infiltration to groundwater.

The Pond is also located in an area of existing upward groundwater gradients and on the groundwater divide between the Boyne and Pine Rivers. **This pond will infiltrate to the Guelph Eramosa Upper Aquifers and will raise local water table levels by about 3.6 m. The extensive footprint area and active storage indicates that this Pond may be the actual principal infiltration pond for quarry sump disposal.**

However, Table 6.1 (pg 166) shows low modelled flows to the South Infiltration Ponds.

Fig 6.5 (pg 169 and 170)	Fig 6.5 indicates the Constructed Wetland will have a top elevation of 495 m asl higher than the nearby Central Infiltration Pond and the Southern Infiltration Pond at 494 m asl and higher than the nearby existing pit floor (Site Plans, pg 2 of 5). However, the Site Plans show a surface outlet at about 493.5 m asl to the 492 m asl elevation NAT-19 (Note 'NAT-18' typo error throughout pg 169 text). **The Site Plans do not specify areas for wash water settlement ponds (currently closed loop) on the impermeable pit floor in the proposed constructed wetland area. The existing washwater make up source is mainly groundwater inflow from NAT-01 recharge depression on Lot 12 west of the 4th Line.**
Fig 3.72 and Table 3.35 (pg 142)	The critical assessment parameter for the fish hatchery / farm at 3rd Line and 15th Sideroad is 'dry weather flow', not average flow. As stated elsewhere, the Strada observed August 15, 2024 dry weather flow at SW17 is 38.9 L/s. This is higher than the modelled baseline average flow at 31.9 L/s (STR2) and the modelled average dry weather flow at about 15 L/s. **Again the October 2024 model is underestimating actual real dry weather stream flow by 2 to 3 times.**