

DRAFT MEMO

To:	Mayor Darren White and Council, Township of Melancthon Denise Holmes, CAO
Cc:	Undisclosed
From:	Garry T. Hunter, M.A.Sc., P.Eng.
Date:	June 5, 2025
File:	21-407
Subject:	Strada Proposed Quarry Fifth Cycle Peer Review Comments January 13 to April 17, 2025

Table of Contents

	<i>Page</i>
Introduction	2
Supporting Exhibits	2
 A. Maximum Predicted Water Level Report (Tatham January 13, 2025)	 4
 B. Level 1 and 2 Hydrogeological Assessment Report January 31, 2025	 5
B.1 Summary Report.....	5
B.1.1 Section 3: Site Development.....	5
B.1.2 Section 4: Results and Conclusions	5
B.1.3 Section 5: Source Water Protection.....	6
B.1.4 Section 6: Water Management Plan	6
B.1.5 Section 7: Proposed Groundwater and Surface Monitoring.....	7
B.1.6 Section 9: Site Plan Recommendations	8
B.2 Appendix A and B Compilation and Methodology (Release October 22, 2024).....	8
B.3 Appendix C and D (Dated October 2024).....	9
B.4 Appendix E (Updated January 2025)	10
B.4.1 Section 2: Baseline Conditions	10
B.4.2 Section 3: Future Conditions	11
B.4.3 Section 4: Groundwater Monitoring	15
B.4.4 Section 5: Surface Water Monitoring.....	15
B.4.5 Section 6: Stormwater Management.....	16
B.4.6 Section 7: Summary and Conclusions	16
B.4.7 Section 10: Geotechnical	16
 C. NRSI (January 2025)	 17
C.1 S7.0 Impact Assessment	19
C.2 S7.4.4 (pg 231) Water Quality.....	21
 D. Earthfx April 14, 2025 Response to Mediation Questions	 21
D.1 Issue 1: Is Groundwater Model Fit for Purpose?	22
D.2 Issue 2: Is Quarry Diversion of Pine River groundwater headwater tributary streamflows to the Boyne River Tributaries acceptable?	 23
D.3 Issue 3: Do the October 2024 Site Plans incorporate appropriate Water Quantity Management and Operational Performance Criteria?	 24

D.4	Issue 4: Do the October 2024 Site Plans incorporate appropriate Drinking Water Aquifer and Protection of Aquatic Life Water Quality Infiltration / Injection Operation Performance Criteria?.....	24
D.5	Issue 5: Do the October 2024 Site Plan Notes adequately incorporate the Geotechnical Consultant Contingencies?	24
D.6	Issue 6: Does the Quarry Groundwater Monitoring Network meet the requirements for Efficient Long Term water level (potentials) monitoring requirements?.....	24
D.7	Earthfx Fig 6, 7 and 8 / Table 1 and 2	24
D.8	Response to Earthfx Detailed Responses to Issues (Earthfx pg 3 to 12)	25
D.8.1	Hunter Comment 1.1	25
D.8.2	Hunter Comment 1.2	25
D.8.3	Hunter Comment 1.3	25
D.8.4	Hunter Comment 1.4	26
D.8.5	Hunter Comment 1.5	26
D.8.6	Hunter Comment 2.1	26
D.8.7	Hunter Comment 2.2	26
D.8.8	Hunter Comment 2.3	27
D.8.9	Hunter Comment 2.4	27
D.8.10	Hunter Comment 2.5	27
D.8.11	Hunter Comment 3.1	27
D.8.12	Hunter Comment 3.2	27
D.8.13	Hunter Comment 4.1	28
D.8.14	Hunter Comment 4.3 and Comment 5.1	28
D.8.15	Hunter Comment 6.1	28
D.8.16	Hunter Comment 6.3 and 6.4.....	28
E.	WSP Assessment of Earthfx Technical Report(s).....	29
F.	Site Plan (January 31, 2025) Comments	29

INTRODUCTION

This 29-page Memo technically addresses, in part, the more than 1,000 pages of fifth cycle Strada Quarry documents released since January 1, 2025. These releases include and may be found at <https://stradaquarry.com>:

- A. Maximum Predicted Water Level Report, Tatham January 13, 2025
- B. Level 1 and 2 Hydrogeological Assessment Report, January 31, 2025
- C. NRSI Natural Environmental Assessment (January 29, 2025)
- D. Earthfx Response to Mediation Questions, April 14, 2025
- E. WSP Assessment of Earthfx Technical Report, entitled ‘Response to Mediation Questions’, April 17, 2025

This Peer Reviewer’s Response to the most recent Site Plan and Conditions (January 31, 2025 release) is enclosed under separate cover. These documents and the Site Plans contain conflicting and contradictory information.

This 5th Cycle Peer Review does not replace earlier Peer Reviews. Most of the earlier Peer Review factual comments have been ignored by Strada and remain outstanding at this date. An index of selected Peer Review communication history is enclosed. These documents are available on request.

Italics in this text represent direct or slightly edited quotes by Strada's Consultants. Repetition in this Peer Review reflects repetition in the original documents.

Supporting Exhibits

The following related exhibits are provided by separate email from these Fifth Cycle Peer Review Comments. These exhibits also support the simultaneous Peer Review of the January 31, 2025 Strada Site Plans. The reader is advised to review the Exhibits prior to the text.

Ex H.1	Extract Table: Calibration Statistics for the Groundwater Model from May 2024, August 2024 and October 2024 Appendix D: Model Development and Calibration Report (not changed in 2024 or in January 2025).
Ex H.2	Extracts from Earthfx (April 14, 2025) Response to Mediation Questions, Peer Review Amended Fig 2, 4 and 5. (Simulated base flow only 25% of NVCA Pine 1)
Ex H.3	Strada Model vs Observed Stream Flows
H.3.1	Strada Observed Dry weather Stream Base Flow Monitoring Aug 15, 2024 (with Genivar Sept 17, 2009)
H.3.2	Model vs Observed Stream Flows
Ex H.4	Extract from April 14, 2025 Response to Mediation Questions, Peer Review Amended Table 2, Fig 6, Fig 7 and Fig 8 (pg 13 to 17) with Inactive, Destroyed and Dry Monitors.
Ex H.5	Extract from Earthfx January 31, 2025 Appendix E Impact Assessment (pg 85) (no change since October 2024).
Ex H.6	Extract from October 2024 NRSI Natural Environmental Assessment (pg 223).
Ex H.7	Extracts from October 4, 2024 Geotechnical Berm and Slope Stability Feasibility Study and Earthfx January 31, 2025 Appendix E Impact Assessment
H.7.1	Pgs 4 to 7 Peer Review Amended Figure.
H.7.2	Cross Section shows Phase 2 Extraction (Uplift Hydraulic Pressures on Lift 2 Floor)
Ex H.8	Stormwater Management Fluxes, Excerpts from Appendix E: Impact Assessment January 31, 2025. Only 12 L/s allocated to injection wells.
Ex H.9	MECP Water Well Location Maps:
H.9.1	Lot 8 to 16, Con 3 & 4 – Melancthon Old Survey, Scale 1:15,000 at 11x17”
H.9.2	Lot 13 to 16, Con 1 & 2 – Melancthon Old Survey, Scale 1:15,000 at 11x17”
H.9.3	Horning's Mills, Scale 1:6,000 at 11x17”.
Ex H.10 Site Photos:	
H.10.1	Spring with Bored Well at 177 Main Street, Horning's Mills (May 8, 2025)
H.10.2	NAT-3 Noble Farm Tile Drain Outfall (June 3, 2025)
H.10.3	NAT-19 Inlets and Outlets
H.10.4	NAT-19 Outlets / 3 rd Line Recharge
H.10.5	Spring Flooding 4 th Line and 3 rd Line
Map 1-1	NRSI Environmental Assessment (North)
Map 1-2	NRSI Environmental Assessment (South)

A. MAXIMUM PREDICTED WATER LEVEL REPORT (TATHAM JANUARY 13, 2025)

1. This Tatham Report was not previously made available to this Peer Review. My comments below follow the Report Sections and Figure References.
2. **S2.1.4 (pg 3):** There is no Gasport Aquifer opening left in the existing underground stream area downgradient of the permanent water control barriers of the Quarry. **How will the downgradient Gasport Aquifers be recharged?**
3. **S2.1.3 and 2.1.4 (pg 3):** Although the water collected by the 4th Line Drain is Non-Contact Water it is not ‘clean’ but agriculturally contaminated water exceeding Canadian Nitrate Objectives for Long-Term Protection of Aquatic Life and approaching Ontario Drinking Water Quality Standards.
4. **S2.6 (pg 5) Fig 7:** The Overburden above the Guelph Dolostones is very thin in mid-Township Lot 13. Recharge to the deeper aquifers is required. **How will downgradient drawdowns in the Guelph / Gasport Aquifer be eliminated?** Has the CBM neighbour agreed to accept recharge into the overburden? **This statement contradicts s6.1 of the Level 1/2 Hydrogeology Report Summary.**
5. **S2.6 (pg 5):** How will any excess water in the constructed wetlands overflow into NAT18 wetland at Horning’s Mills Lake? Does the author mean NAT19 on the Squirrel Farm?
6. **S3.2:** Once again Tatham does not classify the Strada Groundwater Monitors by Model Layers and groups the Layer 4 and 6 Groundwater Monitors in a common confusing undifferentiated ‘C’ classification bucket (see also Fig 10 pg 21).
7. **S4.0:** The last paragraph should likely read maximum elevation 441.5 m asl to the east and 437.9 m asl to the west.
8. **Fig 9: a number of these proposed Strada Site Groundwater Monitors are dry, inactive or destroyed (see Part ‘D’ of this Report and Exhibits).**
9. **Fig 13 dated January 2025: shows the Tatham predicted maximum groundwater level. The 404 m asl contour illustrated by Tatham in Melancthon Pit #2 indicates Strada has extracted below the maximum or ‘established’ water table plus 1 m vertical buffer and is in non-compliance with its Pit Licence (See also LiDAR topographic mapping in Hunter Feb 7, 2025 Memo).**
10. This Peer Reviewer also notes that Strada is non-compliant with respect to fencing on the mid-Township Lot rear boundary of the Licenced Pit boundary.
11. **Appendix A:** Borehole Log OW2 shows Guelph Formation directly on top of the Cabot Head Shale. This is not possible.
12. **Appendix B:** Fig B.15, B-16, B-19 and B-20 indicate groundwater potentiometric levels at OW14C, OW16C and OW19C typical of the Gasport Aquifers likely demonstrating hydraulic

connection across the Goat Island Formation Aquitards (see also Fig 2.9 Average Depth to Water Table Appendix E January 2025).

13. **All Appendix B Hydrographs terminate in early 2024 despite the Report date of January 2025. Many groundwater monitors only have 1 or 2 months of observation data versus a minimum of 12 months data required to establish on-site seasonal transient water level conditions. Did Earthfx not use this Site Data in its May 2024 model calibration?**

B. LEVEL 1 AND 2 HYDROGEOLOGICAL ASSESSMENT REPORT JANUARY 31, 2025

14. I have again Peer Reviewed this Report version (now an unnecessary repetitive 5th Cycle) and provide the following general comments. Most earlier Peer Review comments have not been addressed (see Jan 10, 2025 communication).

B.1 Summary Report

B.1.1 Section 3: Site Development

15. **S3.1.4:** The water from the buried tile drain proposed to reduce mounding west of the 4th Line and proposed to be injected into the downgradient Drinking water Aquifers is contaminated agricultural water exceeding Nitrate Objectives for Protection of Aquatic Life and approaching Ontario Drinking Water Quality Standards. **This is not ‘clean water from the drains’ as hypothesized in this report.**
16. **S3.2:** Strada’s proposed Phase 1 extraction initial sinking cut area is in the maximum groundwater flow zone of the quarry. This is the Peer Reviewer’s three dimensional ‘underground stream’ area or the modeller’s inferred zone of increased hydraulic conductivity (groundwater) flow. **This is not an appropriate area for initiating extraction.** The overburden water table and the Upper Aquifer water table are similar elevations at this location.
17. **Groundwater inflows to the proposed quarry will be much lower within the northeast or southwest quadrants of the Applicant’s proposed Quarry footprint than in the northwest or southeast quadrants.**
18. **S3.6:** Please clarify ‘Any excess water in the constructed wetland will overflow into NAT19 (not NAT18)’. This statement is in conflict with Site Plan notes.
19. **Fig 3:** Contains illegal 35 m high Vertical Faces. The 2 m thick remnant Layer 5 will rupture under the high water pressures of Model Layer 6 (Gasport Aquifer).

B.1.2 Section 4: Results and Conclusions

20. **S4.0:** Does not accurately state the magnitude of streamflow reductions resulting from the proposed quarrying.

21. **Fig 8:** Final Rehabilitation Hydraulic Barrier Configuration contradicts s6.1 below.
22. **Fig 9:** The Infiltration infrastructure location is not optimized for maintenance of existing downgradient aquifer flows to the Pine River headwaters.
23. **S4.2: Confirms that at NAT19 (Squirrel Farm) the water table is expected to rise. This will lead to increased groundwater discharge to land surface (adverse surface flow to farm fields). NAT19 is the default Quarry surface runoff route.**
24. **S4.2, 4.3 and 4.4:** Contradicts the January 2025 and October 2024 Hydrogeology Report Appendix E and the NRSI 2025 Report with respect to stream flow impacts. **GWP-4** location is biased and not located in a critical aquifer drawdown area.

B.1.3 Section 5: Source Water Protection

25. **S5.2:** Identifies the proposed Quarry site as a Significant Groundwater Recharge Area. Although the Quarry area is not a regulated Provincial Source Water Protection Area, there are upwards of two hundred and fifty drinking water wells and likely about 600 people within the recognized Quarry 2 km influence area.

B.1.4 Section 6: Water Management Plan

26. **S6 states:** *the Water Management Plan is to maintain dry operating conditions within the extraction and operations area within the Quarry while mitigating off-site impacts.* However, the water management plan is not comprehensive and does not protect the community.
27. **S6.1 states:** *following completion of extraction 365 m of the water control barriers (overburden, Bench 1 and Bench 3) along the east face of the extraction area is to be removed allowing groundwater to continue draining west to east, mitigating potential long term impacts to the surface and groundwater systems east of the Strada Pit Quarry.*
28. **This statement is contradicted by Fig 8, Appendix E of the Strada Hydrogeology Report and the January 31, 2025 Site Plan Notes. What is actually being proposed and modeled?**
29. **S6.3 states:** ... *the injection wells will be constructed beneath the acoustic berm prior to Phase 1 extraction.*
30. **Burying injection wells under acoustic berms is not acceptable.** These wells will require replacement / rehabilitation / expansion over the life of the proposed quarry. An adaptive management zone about 150 to 200 m wide is required along the east side of the quarry to accommodate progressive introduction of infiltration/ injection infrastructure as needed during the life of the Quarry to more or less equally recharge Model Layer 4 and 6 Aquifers separated by the Layer 5 Aquitard.

31. **S6.4 states:** *The ‘treated water’ from the settling pond will enter a ‘clean water’ pond constructed in the floor of the operations area of the Strada Pit/ Quarry.*
32. This Peer Review considers this treatment to only refer to reduction of suspended sediments not to reduction of nutrients and contaminants in the Quarry Contact water. Quarry Floor water is unlikely to be ‘clean’ Drinking or Aquatic Life sustaining water.
33. **S6.5 Table 2:** **The south infiltration pond has a proposed bottom on the primary Guelph epikarst groundwater drainage zone at about 480 m asl . This Infiltration Pond is nearly two times the volume and has a floor area approximately two times the combined total area of the other three infiltration ponds and trenches.**
34. **S6.6 Table 3:** **Notwithstanding the flawed groundwater model predictions, this South Infiltration Pond is likely to become the main functional infiltration facility over the life of the proposed Quarry.** At 494 m asl surface water elevation (5 m above existing water tables at 489 m asl) it will increase shallow groundwater seepage and surface flows to the NAT2, NAT3 and NAT 19 wetlands and farmer fields in the Boyne headwaters and divert water away from the Pine River headwaters and Horning’s Mills community.
- B.1.5 Section 7: Proposed Groundwater and Surface Monitoring**
35. **S7.1 Fig 10 and Table 4:** **The proposed on site groundwater monitor program contains dry, inactive and destroyed wells (see Part ‘D’ of this Report and Exhibits).** Furthermore, Monitor Wells within the Pit / Quarry footprint will be destroyed as extraction progresses. The effective Quarry monitoring well network is exaggerated and contains areas of sparse and no monitors when examined by model layers.
36. Water Quality monitoring of Quarry Contact infiltration / injection water will need to be undertaken more frequently, say weekly, and non-contact infiltration / injection water, say monthly.
37. **S7.2 Fig 11:** Off-site pumping private wells with operational pump on drawdowns are not appropriate for quarry interference monitoring. **Third Line Dairy Farm Well DW3 with pump off / pump on drawdown in the order of 10 m will require pump lowering or well replacement prior to quarry operations as proposed by Strada Site Plans.**
38. **S7.3 Table 6:** NAT18 wetland / lake is controlled by an outlet structure. There appears to be little benefit to water level or quality monitoring within this private estate. Alternatively, in addition to NAT19, water level monitoring is recommended within NAT01, NAT02 and NAT03 wetlands considered most likely to be impacted by rising water levels (not drawdowns).
39. **S7.3 Table 8:** No rational is provided for the proposed streamflow water network monitoring. Tatham’s SW18 under County Rd 124 will nearly always be dry and offers little known monitoring benefit. Tatham SW4, 5, 6, 13, 14 and 24 are appropriate stream monitoring sites (365 days/year).

40. To these proposed monitoring stations, we recommend addition of a monitoring station at the outlet structure of the River Road Mill Pond (downstream of NAT16), at Tatham SW25 and the spring between the houses at 177 Main Street, Horning's Mills (Hunter SW28) omitted from my prior single day dry weather flow request to Tatham. **This spring may be the 'canary' in the Quarry streamflow monitoring system.** My single day Mill Lane dry weather flow requests (Hunter SW26 and SW27), including 177 Main Street, still remain outstanding.
41. Semi-annual water quality monitoring at each station is recommended with at least one sampling during the dry weather August / September period and one during higher flows in April and May.

B.1.6 Section 9: Site Plan Recommendations

42. **S.9:** Site Plan Notes (see additional June 5, 2025 communication)

B.2 Appendix A and B Data Compilation and Methodology (Release October 22, 2024)

43. Prior Peer Review comments were issued on this Version 4 Report on January 10, 2025.
44. The apparent philosophy of Appendices A and B is to establish pre-quarry baseline data at selected monitoring points for future post Quarry comparison through compliance monitoring.
45. Appendices A and B make little attempt to predict impacts or to inform Site Plan development.
46. There is no apparent performance or compliance strategy in the proposed monitoring program for future quarry management purposes.
47. Water level monitoring in these Appendices are reported on a 'downhole' well by well basis and not stratified by the accepted Geological Formations and Model Layers.
48. No independent water quantity and quality data proof plots have been undertaken except by this Peer Reviewer (see March 10, 2025 communication). No water level data anomalies have been identified by Tatham.
49. No statement is provided as to currency and details of water level monitoring data actually delivered to and utilized by the modelers despite repeated requests by this Peer Reviewer.
50. Only three months of water level monitoring data is provided for deep Gasport monitor wells. This is not sufficient. At least 12 months of data is required for analysis.
51. No groundwater quality data or mapping has been disclosed in this Report for the agriculturally contaminated Upper Aquifers or for the Pristine Lower Aquifers.

B.3 Appendix C and D (Dated October 2024)

52. Peer Review Comments on this 4th Cycle version were released on January 10, 2025.
53. **Appendices C, D and E are extremely repetitive with much duplication of content as well as internal contradiction.** Review of these documents is tedious and time consuming (expensive). There are many more pages spent on wetlands than on farms or people.
54. We really don't need to read everything 2 or more times in the multiple release versions. **Two or three cycles should have been enough. One thousand versus five thousand pages should have been enough.** Is this a strategy to obfuscate, discourage public reading of these documents and complicate the Peer Reviews?
55. **The modelers continue to refuse my repeated requests to disclose the model input data including the Tatham site water level monitoring actually used (or if even used) to inform the model and the edited (if actually edited) MECP water well record versions.**
56. Apparently only about 3 months of transient site water level data was available to inform Model Layer 6, the Gasport Aquifer.
57. The model has not been informed by the Tatham, Genivar and / or NVCA observed dry weather base streamflow data. The model has not been informed by the Strada WELLness surveys.
58. The modelers have never understood the different surficial geology / soils / hydrogeology of the Melancthon 'Old Survey' Pine River headwater potato fields and the underlying coarse textured tills and bedrock epikarst drainage system versus the Melancthon 'New Survey' Grand River headwater fine textured tills where fields require tile drainage to support productive agriculture.
59. The modelers apparently preferred the surficial geology mapping references which are also wrong rather than consult the local knowledge of the Melancthon farm community.
60. **The fundamental model is significantly underestimating (2 to 4x) transient headwater groundwater discharge and stream dry weather (base) flows (see Exhibits).**
61. **The modelers have an over-riding unwarranted conviction that all model results are correct and absolute and that any field data which contradicts the model must be wrong.**
62. **The Strada Site Plans and Environmental Assessments are based on complete trust that the groundwater model is correct.**
63. **Rather than correcting the model, Strada has recently elected to adjudicate or mediate the facts and rely on process.**

B.4 Appendix E (Updated January 2025)

64. This is the 5th Cycle Peer Review of Appendix E. The 4th Cycle Review was released on January 10, 2025. Strada has mainly ignored this 4th Cycle and prior reviews.
65. Earthfx has refused to run systematically model virtual STR's at all Tatham and Genivar streamflow field observation sites as requested by this Peer Reviewer. Earthfx also did not research the availability of NVCA baseflow data until identified by this Peer Reviewer. Earthfx has also refused to run additional critical Quarry scenarios requested by this Peer Reviewer.

B.4.1 Section 2: Baseline Conditions

66. **Fig 2.4 and 2.5:** Potential groundwater contours coincide with the Model Location of Increased Hydraulic Conductivity and are offset from the Tatham observed corresponding water level survey data.
67. **Fig 2.9:** Demonstrates Non-Compliant Extraction below the Water Table in the southern Strada Pit Area.
68. **Fig 2.11:** No Model virtual GWPs have been provided on the critical thin Dolostone / Cabot Head Shale lowlands in Horning's Mills community. No comprehensive rationalization of STRs to Tatham stream flow gauge sites has been undertaken.
69. **Fig 2.12 GWP1** at 4th Line and 15th Sideroad illustrates that **Model Layer 1 Overburden and Layer 4 Guelph Formation are connected aquifers supported by the Goat Island Aquitards** at about elevation 470 m asl. Model Layer 6 Gasport Formation is a separate deeper aquifer with lower hydraulic head at this location.
70. **Fig 2.14 GWP3** at 3rd Line and 15th Sideroad show reversal in hydraulic heads indicating Deep Aquifer upward gradients and groundwater discharge potential. Quarry Hydraulic Barrier perimeter groundwater flow diversions and/or infiltration infrastructure will raise water levels in this vicinity.
71. **Fig 2.15:** Model virtual **GWP4** demonstrates that upgradient Quarry groundwater diversions in Aquifer Model Layer 4 and **downgradient Quarry infrastructure infiltration into the Model Layer 4 Guelph Upper Aquifers will not significantly recharge into the Model Layer 6 Gasport Aquifers upgradient of Horning's Mills and the Pine River headwaters.**
72. **Fig 2.17:** Model virtual **GWP6** also shows that **upgradient infiltration of Quarry water into the Model Layer 4 Upper (Guelph) Aquifers also will not significantly recharge the deep Gasport Aquifers of Horning's Mills and the Pine River headwaters.**
73. **Fig 2.13:** Model virtual **GWP2** and Fig 2.17b **GWP6** show decreased aquifer hydraulic separation between Model Layer 4 and Model Layer 6.

74. **There is very little hydraulic separation between Model Layer 1 and Layer 4 in these GWP Figures supporting hydraulic connection.**
75. **Fig 2.18: Dry weather flows at County Rd 124 (Golf Course) STR14 are estimated near 0.0 versus Tatham August 15, 2024 observed flows at 28 L/s. Other flows are too low to compare.**
76. **Fig 2.20: Main Street Model virtual STR 8 model dry weather flow is shown at about 60 L/s versus Tatham on August 15, 2024 at 140 L/s (2.3x higher).**
77. River Road Mill Pond stream inlet **STR7** model dry weather flow is estimated at about 95 L/s versus Tatham August 15, 2024 at 211 L/ s and Genivar in 2009 at a similar 174 L/s (**2x higher**).
78. No comparable dry weather flow is available at **STR9** or **STR10**. STR10 is a poor site selection due to very low flows in this usually dry swale. Tatham SW6 would be a better choice for Model virtual STR comparison.
79. **Fig 2.22: Model virtual STR2 model dry weather flow at 3rd Line and 15th Sideroad is shown at near 0.0 L/s versus Tatham observed flow at 39 L/s and Genivar 2009 observed flow at a similar 30 L/s.**
80. Model virtual STR3 at County Road 124 is estimated at about 20 L/s versus Tatham Sideroad 15 upstream August 15, 2024 observed dry weather flow at 62 L/s (**3x higher**).
81. **Table 2.2 (pg 43) reports Horning's Mills Lake / NAT18 model virtual results under baseline conditions for August inflow at 38 L/s and August outflow at 62 L/s. This compares to Tatham observed August 15, 2024 SW5 immediately downstream flow at 140 L/s (2.2x higher) (see Exhibits).**
82. The modelers have refused to provide model STRs for other Tatham / Genivar stream gauge locations for systematic comparison.

B.4.2 Section 3: Future Conditions

83. **Table 3.1:** This Table does not show flow gradients between the central and southern infiltration gallery (ponds) or the method of routine discharging to the higher northern trench from the southern infiltration pond.
84. **Fig 3.2:** Unexplained, shows water levels substantially above the control elevations in the Northern pond at about 496 m asl and the Southern Pond at about 498 m asl. **The Southern Infiltration Pond existing site has a water level of about 489.6 m asl (LiDAR).** As shown in Fig 3.2 maximum hydraulic head will be about 9 m above existing water levels. These ponds are proposed to have an impermeable liner on the proposed Quarry side.

85. **These ponds are therefore designed to seep under the berms into NAT19 and recharge mainly to the Boyne and not to the Pine watershed.**
86. **S3.4:** This Peer Review again requests the following additional extraction scenarios subject to resolution of the headwater stream groundwater discharge / dry weather baseflow model underestimate. These model scenarios include:
- Quarrying without mitigation by Phases
 - Sudden Lift 2 Quarry Floor Rupture, Flooding and Pump Out
 - Use of pressure relief wells to lower water levels below the top of the Gasport in combination with Upper and Lower Hydraulic Barriers
 - Conditions for ‘Excess Fill’ at about 11,000,000 m³
 - Conditions 2 Years after Quarry Closure during initial Lake Filling
 - Lower Lake Levels with partial Gasport Hydraulic Barrier Removal at the east Quarry limit
87. **Appendix E does not contain an estimated time to fill the Quarry excavation with water. Time to fill may be decades in duration.**
88. S3.5.4 and Fig 3.15 and 3.16: *The wetlands to the south and northeast of the development are expected to receive an increase in surface leakage from the infiltration systems.*
89. **Table 3.5: reports Horning’s Mills Lake / NAT18 model virtual results under Phase 1 conditions for August at 25.7 L/s for stream flow in and 48.5 L/s for stream flow out. This compares to Tatham August 15, 2024 observed flow immediately downstream at SW5 at 140 L/s (nearly 3x higher).**
90. **S3.5.6: At NAT19 (during Phase 1) the water table is expected to rise leading to increased groundwater discharge to land surface.**
91. **S3.6.2 Fig 3.22: Phase 2 simulated drawdowns (averages) and zone of impact defined at 0.5 m extend an average of about 2,000 km from the quarry in Layer 1, 2 and 4. There is an ... increase in stream flows north, south and west of the quarry site due to the infiltration systems and the overburden and Bench 1 hydraulic barrier implantation proposed.**
92. **Drawdowns and decrease in stream flow is expected in NAT16 and NAT18 Wetlands and the Head Ponds as well as in spring fed constructed ponds on the escarpment slopes.**
93. **Fig 3.23: Phase 2 C Layer 1, 4 and 6 average drawdowns extend strongly into Horning’s Mills Pine River headwaters and towards 5th Line and 15th Sideroad. Layer 1 and 4 infiltration mounding (rises) extend strongly through NAT19 and NAT2/NAT3 across the Third Line and County Rd 17 farm fields to the east and south towards County Rd 124. The central and southern Infiltration Pond mounding is not consistent with the pond design elevations specified above.**

94. **Fig 3.26:** shows an increase in Phase 2C stream flow east of NAT19, at NAT2/NAT3, STR13 and STR14 as a result of the Central and Southern Infiltration infrastructure.
95. **Fig 3.22:** The proposed 2 m thick remnant Ancaster / Niagara Falls (Goat Island Formation) aquitard will rupture likely suddenly without warning during Lift 2 initial phases extraction and flood the operating quarry floor drawing down the Gasport Aquifers and reducing groundwater flow to Horning's Mills Community and the Pine River headwaters.
96. Strada will be under extreme pressure to pump out the quarry floor to recover Quarry processing equipment. Where will pumped water be discharged in an emergency – into farm fields?
97. *S3.6.3: Headwater stream virtual model location STR9 stream flows will be reduced 40% during the dry season and 50% during the wet season during Phase 2 and by 30% at STR8 immediately downstream.*
98. Similar flow reductions are expected in springs discharging to NAT16. The spring at 177 Main Street discharging into NAT16 has not been recognized by Strada's Consultants (NRSI / Tatham / Earthfx). This may be the drawdown 'canary' in the system.
99. S3.6.3: Phase 2C STR7 streamflows are expected to be reduced 10 to 20%. However this estimate includes the effects of increased diversion and infiltration flows to NAT14 (Marshall Brook) from Strada's proposed Northern Infiltration trenches and diversions. It does not include the anticipated reductions of groundwater flow to the NAT16 wetlands and Mill Pond, also fed by the Gasport Aquifers hydraulically connected to the proposed Strada Quarry site.
100. A more strategic integrated effects monitoring location would be at the privately owned River Road Mill Pond outlet structure downstream of both NAT16 and NAT18 for both comparative SWs and STRs.
101. **S3.6.5:** Wetland Water budgets with the exception of NAT18 are presented in mm/month. There is no apparent method of converting these units to the flows (L/s) necessary for comparison.
102. **Table 3.13:** reports Horning's Mills Lake / NAT18 model virtual results under Phase 2C Conditions for August at 27.9 L/s streamflow in and 48.3 L/s for streamflow out. This compares to Tatham August 15, 2024 observed existing flows immediately downstream at SW5 at 140 L/s (nearly 3x higher).
103. **Fig 3.39:** The upper portions of the deep Bench 3 hydraulic barriers wedges as sketched will be unstable (fail) under the natural high water pressures resulting from damming the flows in the Gasport Aquifer.
104. **Fig 3.40 and 3.41:** show average water level rises in both Layer 1 and Layer 4 (into farm fields) and average drawdowns extending into Horning's Mills community and the Pine River Headwaters. Extreme drawdowns will be greater by unknown amounts than the modeler's averages.

105. **Why aren't extreme transient (seasonal) drawdowns being modelled?**
106. **Fig 3.42:** Average Gasport drawdowns extend into Horning's Mills. There is significant 'average' mounding in the Gasport Aquifer northwest of the Quarry.
107. **S3.7.3:** *The Phase 4A model predicted reduction of stream flow at STR9 inlet to Horning's Mills Lake is about 50% and at STR8 15%.*
108. **Table 3.21:** The Phase 4A Model water budget under Phase 1 Conditions predicted stream flow into NAT18 and Horning's Mills Lake for August month at 29.8 L/s and stream flow out at 51.1 L/s . This Outlet flow compares to Tatham August 15, 2024 observed flow at immediately downstream SW5 at 140 L/s (2.7x).
109. **The model predicted stream flow under Phase 4A conditions is only about 35% or conversely a dry weather streamflow reduction of 65% compared to existing. This model is dramatically underestimating groundwater and streamflows.**
110. **S3.8.1 and Fig 3.55:** This Rehabilitation Scenario contradicts this Level 1/2 Hydrogeology Report Summary (s6.1). This Scenario, on the east side of the Quarry, only proposes an opening in the Overburden Barrier and not in the Guelph Model Layer 4 or Gasport Layer 6 Hydraulic Barriers.
111. **This Rehabilitation Scenario is based on mature conditions after the Quarry Lake is filled. No final lake level has been disclosed or the rationale for lake level selection in this version of Appendix E.**
112. Critical model scenarios are required immediately after Quarry closure at the start of lake filling. No time for the excavated lake filling is provided.
113. The statement '*constructed wetlands will be allowed to overflow into Wetland NAT18*' appears to be incorrect – should this wetland be NAT19? **In contradiction, the January 31, 2025 Site Plan notes advise there will be no surface outflow from the quarry.**
114. **S3.8.5:** In addition to mm/month in the Wetland Water Budgets, L/s units are required for flow comparison.
115. **Table 3.29:** The Rehabilitation Model water budget predicted Rehabilitation stream flow into NAT18 and Horning's Mills Lake for August month at 38.3 L/s and stream flow out at 62.7 L/s. This compares to Tatham August 15, 2024 observed flow immediately downstream at SW5 at 140 L/s. The Tatham observed existing baseflow is 2x higher.
116. **The model predicted streamflow under Rehabilitation conditions is only about 45% of existing flows or conversely a stream flow reduction of 55%. This model is dramatically underestimating existing stream and groundwater flows.**
117. **S3.8.6:** These are not small differences as claimed by the modelers.

118. **S3.9.2 Fig 3.7.2:** Again, this Peer Reviewer is not concerned with averages but with dry weather flows, which are shown by the modelers at about 10 to 12 L/s, compared to Tatham August 15, 2024 observed streamflows at SW 17 at 39 L/s and Genivar September 2009 observed streamflows at a similar 30 L/s. **The model is again underestimating existing stream baseflows by about 3 times.**
119. **S3.9.4 Fig 3.7.5, 3.7.6, 3.7.7 and 3.7.8:** Earthfx does not understand, there is not a concern for septic beds at these specific residences located on relatively high ground for the water table rises predicted by the model.
120. However there is a concern about septic beds in close proximity to NAT1, NAT2, NAT3, NAT14 and NAT20 as well as adjacent field depressions and tile drainage systems and outlets where water table rises are anticipated.

B.4.3 Section 4: Groundwater Monitoring

121. **S4.1 Table 4.1:** This Table does not specify continuous monitoring. See Peer Review Exhibit - Amended Earthfx Table 2 and Figure 6, 7 and 8 illustrating Strada's proposed monitoring program on April 25, 2025.
122. **S4.2 Fig 4.2:** As of July 2024, 198 property owners had registered for a WELLness check in the Quarry influence area. How many checks have actually been completed? Which wells will be included in the long term groundwater program? Who owns this data?
123. **Fig 4.3:** Private Monitoring Wells. Private pumping wells are not appropriate for monitoring quarry impacts. Multi-level sentry wells are required as described in this Peer Review February 7, 2025 communication.
124. **What are the recommended Performance Criteria for compliance determination? What are the penalties for non-compliance?**

B.4.4 Section 5: Surface Water Monitoring

125. **Table 5.1:** Surface Water Level Monitoring. This Peer Review Surface Water Level Monitoring recommendations are described elsewhere in this report.
126. **Table 5.3 Fig 5.1:** Streamflow monitoring. This Peer Review Surface Water Level Monitoring recommendations are described elsewhere in this report.
127. **What are the recommended Performance Criteria for compliance determination? What are the penalties for non-compliance?**

B.4.5 Section 6: Stormwater Management

128. **S6.0 Table 6.1:** The Stormwater management fluxes (flows) are significantly underestimated by the model as confirmed by the above Appendix E discussions.
129. **At face value the water management volumes not including flows to the proposed injection wells are similar to the Fergus and Elora communities (Central Wellington) and about three times that of the Shelburne community.**
130. **At the model face value, only 12 L/s is allocated to the injection wells and about 50% or 6 L/s to each of the Guelph (Layer 4) and the deep Gasport (Layer 6) Aquifers.**
131. **By comparison Table 6.1 allocates 71 L/s from Phase 2 and 41 L/s from Phase 4 A to the Upper Layer 4 Guelph Aquifers for infiltration.**
132. **Why so little allocation to the Gasport Aquifers? How will the Gasport Aquifers be recharged?**
133. **S6.1 Fig 6.3 and 6.4:** appear to be mis-titled. These water level predictions appear to be for the Central and South Infiltration Ponds not the Infiltration Trenches.
134. **S6.2 Fig 6.5:** This text again references NAT18 but likely intends NAT19. The wetland is proposed to be constructed to overflow at 495 m asl about 6 m above existing established water levels. Together with the increased hydraulic head related seepage under the berms will result in runoff to NAT19 on the adjacent private property.
135. **This runoff to NAT19 does not exist at present and will contribute to additional adverse downgradient farm field wetness.**
136. **The proposed Quarry will produce additional water surplus as topsoil stripping reduces evapotranspiration. Additional flows will also result from upgradient migration and expansion of catchments into the Grand River watershed.**

B.4.6 Section 7: Summary and Conclusions

137. Summary and conclusion comments are addressed above and not repeated here.

B.4.7 Section 10: Geotechnical

138. **S4.1.1 (pg 5):** This Peer Review supports the specific and precise language of the October 4, 2024 Geotechnical Berm and Slope Stability Feasibility Study with respect to Factor of Safety for global stability or sliding and due to high hydraulic heads, groundwater punching through the lowest (Model Layer 6) hydraulic barriers where the berms are thinnest (see Exhibits).

139. **S4.3 para 1 (pg 7):** This Peer Review also agrees with the Geotechnical Consultant with respect to the effects of groundwater uplift on the underside of the 2 m layer of the Ancaster/ Niagara Falls Formation aquitard remaining below Lift 2 and above the permeable Gasport Unit (see Exhibits).
140. Although the Modellers may have modelled this virtual geotechnical condition, the January 31, 2025 Appendix E and Site Plans do not capture the ‘real world’ intent of the Geotechnical Consultants.
141. **This ‘real world’ intent will likely include implementation of pressure relief wells either to replace the hydraulic barriers or control water levels behind the deep hydraulic barrier berms to below the Top of the Gasport Formation. This mitigation measure will require discharge and infiltration of greater water quantities than anticipated by Strada Consultants.**
- C. NRSI (January 2025)**
142. **This NRSI report provides no acknowledgement of the historical fish hatcheries and rearing facilities (at least three) in the Pine River Headwaters or the history of the Pine River Provincial Fishing Area. No offroad surveys of critical fish habitat in the Pine River Provincial Fishing Area, NAT16 and NAT18 or the upstream extension of NAT14 into Melancthon Con 3 OS have been undertaken.**
143. **The NRSI report does provide an overview of the fisheries of the Pine and Boyne Headwater tributaries as summarized herein and confirms the importance of dry weather (base) flows. These fisheries habitat descriptions contradict the Strada groundwater model transient flow results.**
144. **S5.1.1 (pg 34 & 35):** NRSI (Jan 2025) relied almost completely on Earthfx (2024a) groundwater modelling for predictive impact assessment (pg 34 and pg 35). Earthfx (2024a) is the September 2024 Impact Assessment Report (NRSI Bibliography, pg 253).
145. **The NRSI (Jan 2025) Report is not synchronized with other Strada documents or up-to-date, but for unknown reasons, departs from the Earthfx January 2025 Appendix E Report with respect to predicted drawdowns.**
146. **Revision to the Groundwater Model Scenarios will result in revisions to the NRSI wetland impact assessments (interpretations).**
147. **Unexplained, this NRSI Report does not integrate the Tatham dry weather Streamflow information.**
148. **S3.1.3 (pg 14):** *Brook Trout rely on cold, clean water through the summer months and areas of groundwater upwelling for spawning and incubation through the fall and winter months (NRSI January 2025, pg 14).*

149. *The main branches of the Pine River and Boyne River support resident and migratory trout populations, including both Brook Trout and Rainbow Trout, while the headwaters and some escarpment tributaries support Brook Trout populations (NVCA 2018a, b). Where they exist, these trout populations are supported in part by groundwater inputs to the watercourses, which help to maintain relatively consistent water temperatures throughout the year. **This is particularly important for Brook Trout, which rely on cold, clean water throughout the summer months and areas of groundwater upwelling for spawning and incubation through the fall and winter months (Scott and Crossman 1998).***
150. **S5.5.3 (pg 80):** *At NAT14, groundwater seepage features occur as broad bands of saturated organic soil within the mixed and conifer-dominated swamp communities along the watercourse, both on the north and south side of Sideroad 15. **Seepage was particularly evident on the south side of the road where water was emanating from a gentle slope and slowly trickling across the organic substrate to reach the watercourse.***
151. **NAT14 South slope seepage will be increased under the hydraulic barrier and infiltration trench scenarios proposed by Strada. This seepage discharge will move upslope adversely impacting farm fields in Lot 15 on either side of the Third Line (see Exhibit Photos).**
152. **S6.1.2 (pg 141):** *The majority of the watercourses that were investigated within the Study Area exhibit characteristics associated with **groundwater influence, which includes a permanent flow regime and consistent flow throughout the year**, the presence of Watercress, iron staining, cool-and-coldwater thermal regimes, and/or the presence of coldwater fish species, including Brook Trout (NRSI Map 6-1 through 6-12). Due to their interrelatedness, many of these identifying characteristics were found at the same locations. No watercourses were identified within the subject lands themselves.*
153. **S6.1.2 (pg 141):** *Groundwater is integral for sustaining aquatic ecosystems by supplying **baseflow (the lowest flows of late summer to winter)** and maintaining water temperatures and other water quality requirements, including dissolved oxygen, that are conducive for fish (Hynes 1983, Blackport et al. 1995). **Groundwater plays a vital role in the habitat of Brook Trout, a species highly dependent on clean, coldwater environments.***
154. *Brook Trout are sensitive to changes in water temperature and quality, making groundwater a crucial factor in their survival, optimal growth and to carry out their various life history stages (e.g., spawning, incubation etc.). Groundwater discharge can help maintain stable stream temperatures, especially during hot and dry periods, providing essential refuges for Brook Trout populations. Additionally, groundwater inputs contribute to stream flow, ensuring sufficient oxygen levels and habitat connectivity for the fish.*
155. **S6.1.2 (pg 141):** *Brook Trout populations were confirmed within watercourses associated with **five NAT complexes where fish sampling was conducted**, or where incidental observations were made. These included NAT1, NAT4, NAT14, NAT15 and NAT16. These NAT complexes align with the hydrogeologically sensitive wetlands discussed in Section 6.1. In addition to Brook Trout, 13 other fish species were confirmed within the Study Area, including 12 coolwater species and one warmwater species.*

156. NAT14, NAT15 and NAT16 (and NAT18 not surveyed by NRSI) are located in the critical Pine River Headwaters.
157. **S6.1.2 (pg 143):** NRSI (Jan 2025) has described potential impacts of quarrying activities, *Consistent baseflows (dry weather flows) are important for maintaining the quantity of living space, cover and food for fish (Blackport et al. 1995). The relationship between the annual flow regime of a watercourse and the quality of trout habitat has been well-documented. In general, a base flow of 55% of the average annual daily flow is considered excellent, a base flow of 25 to 50% is considered fair, and a base flow of <25% is considered poor for maintaining quality trout habitat (Raleigh 1982).*
158. *It is important to consider the potential effects from the quarry activities on groundwater quality and quantity throughout the study area, especially since the groundwater system currently supports healthy, self-sustaining Brook Trout populations in many of the watercourses surrounding the subject property.*
159. *The excavation process can alter the hydrogeological characteristics of an area, leading to changes in groundwater flow patterns and the potential for contamination from sediment, chemicals, and other pollutants.*
160. *Changes to groundwater expression in the study area could result in less baseflow to sensitive watercourses, which could; reduce the overall habitat quantity and quality, reduce coldwater inputs, thereby raising water temperatures in the summer and lowering them in the winter, and lowering dissolved oxygen levels. Potential changes could affect all life history stages of Brook Trout within the study area including eggs, fry, juveniles, and adults.*
161. This Peer Review considers the Pine River headwater tributaries to historically and at present have a base to average flow greater than 50%.
162. **This greater than 50% ratio is not apparent in the Strada groundwater model simulated transient (monthly) streamflows, in contradiction to the NRSI fisheries evidence.**

C.1 S7.0 Impact Assessment

163. **NRSI (Jan 2025)** provides a general description of the undertaking as currently proposed in s7.1 (pg 167); an approach to impact assessment in s7.2 (pg 168); a description of Direct Impacts in s7.3 (pg 169 to 178) and a Description of Indirect Impacts in s7.4 (pg 179 to 231).
164. **S7.4.1.2 (pg 185):** NAT1 water balance at the easterly limit groundwater outlet will be determined by the proposed Quarry Overburden Hydraulic Barrier. NAT1 discharge to shallow groundwater in the marsh pond fringe currently provides make up water to the current Strada ‘closed loop’ washwater system (see Exhibit Photos).

165. **S7.4.1.3 (pg 192):** NAT14 and NAT15 wetlands are supported by the Goat Island aquitards with top at 470± m asl. **Most of the groundwater in these wetlands is sourced from Model Layer 4 (Guelph) not from the Model Layer 6 (Gasport) despite the upward gradient potential.**
166. **S7.4.1.4 (pg 199-202):** *During Phase 1, groundwater modelling indicates mounding will occur at the northeastern tip of NAT2 (near NAT3) between 0.5 to 1.0 m above baseline elevation with mounding effects diminishing further to the south and east (Fig 3.6, Earthfx 2024a).*
167. *Groundwater mounding effects during Phase 2C are nearly identical to Phase 1. During Phase 4A, NAT2 groundwater mounding will extend to 1 m above base line levels at the northwest tip of the complex.*
168. *NAT3 will experience a minor amount of (average) mounding (0 – 0.25 m) during Phases 1 and 2C. Nevertheless, mounding of even a few centimeters will have adverse impacts on adjacent low-lying fields (see Exhibit Photos).*
169. *During Phase 4A, minor groundwater mounding is expected to occur relative to baseline levels (<0.25 m).*
170. **S7.4.1.7 (pg 226):** NRSI states that:
A portion of the NAT-19 complex (from the Squirrel Farm) extends onto the Melancthon Pit #2 property.....The following is a brief summary of groundwater mounding effects for the western portion of NAT-19 that extends onto the subject lands.....
The west side of NAT-19 complex will experience changes to the groundwater table, relative to baseline condition, during all phases as listed below:
 - *Phase 1 – 1.5 – 2.0 m of groundwater mounding*
 - *Phase 2 – 1.5 – 2.0 m of groundwater mounding*
 - *Phase 4A – 1.0 – 1.5 m of groundwater mounding*
 - *Rehabilitation Phase – 0.01 – 0.25 m of groundwater drawdown**Since the groundwater table is approximately 1.5 m below the surface under average baseline conditions, the mounding effects in Phases 1, 2C, and 4A are expected to result in groundwater discharge to the wetland surface. This will change the hydrology of the wetland from a perched system to a discharge system. The extra water within the soil layer and at the surface of the wetland is not anticipated to cause negative impacts to the western portion of NAT-19 within the subject lands.*
Tatham’s groundwater monitoring and Earthfx have concluded that there is little hydraulic difference between Model Layer 1 and 4. The NRSI assumption that NAT19 wetland is perched is unproven. Significant water table rise in NAT19 and surface water outflow with adverse impacts on downgradient recharging farm field depressions is anticipated.
171. **S10.0 (pg 239):** *The NAT19 wetland feature contains natural outlets to the south, potential increases in standing water are expected to be mitigated by throughflow towards these features. Localized wetter conditions are expected within the NAT19 feature.*

172. Farmers have observed recent increased surface water discharge from NAT19 and across the Third Line into Lot 11, Con 2 OS. This is likely due to reduced evapotranspiration and consequent greater water surplus in Strada Melancthon Pit No. 2 under recent granular extraction expansion.
173. A Water Budget, if available, would likely also indicate increased Pit site water surplus after topsoil stripping of the Prince Pit overburden deposits is completed.
174. Additional water surplus may be expected due to catchment drawdown expansion into the Grand River watershed.
175. Strada will need to manage this additional water.

C.2 S7.4.4 (pg 231) Water Quality

176. *NRSI advises that water quality treatment will be determined in consultation with MECP through the ECA Application Process. Sampling and monitoring of the discharge water to the infiltration facilities will be required as a condition of the ECA.*
177. NRSI in its October 2024 Report on pg 223 (enclosed) states: ***The proposed Quarry operation is expected to result in a temporary reduction in stream flow up to a maximum of roughly 40 to 50% during the times of the year that may see water depths drop below the optimal depth for Brook Trout during the low flow period.***
178. **NRSI does not define temporary but it may be decades. This October 2024 statement is consistent with Earthfx October 2024 and January 2025 Appendix E – Impact Assessments.**
179. NRSI in its January 2025 Report on pg 225 (enclosed) provided the following revised statement despite referencing early documents in its bibliography:
- The proposed Quarry operation is expected to result in a temporary reduction in stream flow up to approximately 15% during all seasons that may see water depths drop below the optimal depth for Brook Trout during the low flow period.*
180. This NRSI statement contradicts Earthfx Appendix E conclusions in both the October 2024 and January 2025 version Assessments. The source of NRSI's inconsistent 15% streamflow reduction statement is unknown.

D. Earthfx April 14, 2025 Response to Mediation Questions

181. **Contrary to the Earthfx assertion, this Mediation Response document does not satisfactorily address the Six Major Issues identified by this Peer Reviewer on January 10, 2025 and as further articulated by this Peer Reviewer at the March 6 Mediation Meeting.**

182. **Notwithstanding Earthfx's statements, the March 6 Peer Review Mediation Meeting did not achieve agreement.** This Peer Reviewer had expected Earthfx to disclose the groundwater model input for audit but Earthfx did not facilitate this. New stream flow information, not seen by this Peer Reviewer, was presented visually but copies were refused for analysis.
183. **There were a number of clarifying follow-up Peer Review communications from March 7 to the March 10, 2025 Peer Reviewer Termination by NDACT / Strada.** These follow-ups included Pine River Baseflows, CBM Quarry MECP / MNRF Memos, Proposed Strada Model Calibration Improvements, Model Layer 4 and 6 High Quality Hydraulic Surfaces and Pine River Headwater Stream Aquitard Support (see enclosed Index).
- D.1 Issue 1: Is Groundwater Model Fit for Purpose?**
184. **This Peer Reviewer does not subscribe to the Earthfx oft expressed hypothesis that the model virtual flows are correct and absolute and that the infield streamflow observations including those of NVCA, Tatham and Genivar are invariably wrong.**
185. **Earthfx now reports that the modelled simulated dry weather flow (baseflow) at NVCA Pine 1 (outlet of Pine River Provincial Fishing Area) stream flow observation site is only 160 L/s for the period 2016 to 2024 (see Exhibits).**
186. **This Pine 1 modelled dry weather flow is only about 25% of the NVCA observed flow in 2008 (see enclosed Fig H.100) The NVCA field observed baseflows are almost 4 times higher than the Earthfx simulated baseflows.** The simulated Baseflow to Average Annual Flow rates is only 22% (see Exhibits).
187. By comparison, Tatham field observed dry weather flows on August 15, 2024 upstream at Honeywood Line (SW25) at 450 L/s, at the entrance to Mill Pond River Road at 210 L/s and at Main Street Horning's Mills at 140 L/s. **Earthfx simulated dry weather transient results are not credible.**
188. Tatham August 2024 streamflow observations are more or less consistent with those of Genivar in 2009 (See my March 7, 2025 communication and June 5 Exhibits). **I have no reason to disbelieve the Tatham and Genivar field streamflow observations (with the exception of Tatham mixed up stations). The Model Dry Weather Flows to April 14, 2025 are simply wrong.**
189. **This Peer Reviewer places little weight on Earthfx continuing 'red herring' comments about why the field observed flow data is wrong:**
- **2008 was a wet year.** These Pine River headwater streams have relatively constant dry weather flow from year to year (high ratio baseflow to average flow).
 - **there is a good match of average stream flows.** This Peer Reviewer, consistent with NRSI, is primarily interested in the dry weather and transient flows, not averages (see NRSI s6.12, pg 143).

- **there are many ponds in the watershed that moderate flow.** Ponds were constructed from the early 1800s to the early 1960s in the Pine River headwaters. The pond effects are already included in the model simulations.
- **the former Fish Hatchery is affecting flows.** Although the foundations and inflow plumbing is still relatively intact, the former site is on a single tributary below Earthfx STR 10 and above convergent tributaries upstream of Tatham SW 6. The fish hatchery has been abandoned since the early 1950s and any residual effect is already included in the model simulations.
- **the NVCA baseflow stations only include three months of measurements between July 10 to October 13, 2008.** Three months of dry weather flow data exceeds any other source other than possibly Tatham data in 2024/25 (undisclosed).
- **There is no power dam (only century old remnants) downstream of the Pine River Provincial Fishing Area although there is a control structure.** This structure has also been in place throughout the model simulation period.
- With the exception of the April 14, 2025 NVCA Pine 1 STR, Strada has refused to provide simulated STR streamflows for the additional Tatham and Genivar field observed stream flow sites.

190. Strada refused my requests on December 10, 2024 and more recently on May 14, 2025 for undisclosed Tatham real stream flow monitoring observations conducted from 2024 to present.

191. **As dry weather (base) streamflows are a strong indicator of groundwater flows, I have no reason to revise my previous conclusion that the Strada's current model is significantly under-estimating groundwater flows and is 'not fit for purpose' including support for Site Plan Development and Specific Conditions.**

192. **On March 10, 2025, I summarized my suggested improvement to the Earthfx Model Conceptualization and Calibration Reports (Appendix C and D). This Earthfx conceptualization and calibration has not significantly changed from May 2024 to January 2025 (see Exhibits).**

D.2 Issue 2: Is Quarry Diversion of Pine River groundwater headwater tributary stream flows to the Boyne River tributaries acceptable?

193. Earthfx has not specifically addressed the significant hydrogeological Site Plan issues identified in my January 10, 2025 Major Issues List and further discussed in my extensive Peer Review memos up to March 10, 2025 as well as in this Memo.

194. Strada / Earthfx have rejected my December 10, 2024 and subsequent requests to run other model scenarios which may reasonably anticipated to result in greater Headwater Pine River streamflow reductions in Horning's Mills community and downstream.

D.3 Issue 3: Do the October 2024 Site Plans incorporate appropriate Water Quantity Management and Operational Performance Criteria?

195. Issue 3 has not been addressed in a meaningful way.

D.4 Issue 4: Do the October 2024 Site Plans incorporate appropriate Drinking Water Aquifer and Protection of Aquatic Life Water Quality Infiltration / Injection Operational Performance Criteria?

196. Issue 4 has not been addressed at all. Can the lower hydraulic barriers be successfully constructed as shown in model simulations and on the Site Plan sketches? If pressure relief sumps (or wells) are implemented, why are the lower hydraulic barriers needed?

D.5 Issue 5: Do the October 2024 Site Plan Notes Adequately incorporate the Geotechnical Consultant Contingencies?

197. Issue 5 has not been addressed in a comprehensive way on the Site Plans.

198. No Model scenario has been provided as requested for a sudden rupture and flooding of the Lift 2 quarry floor for the proposed Strada extraction scenario as articulated in the Site Plans.

199. Where will the Quarry floor flood waters be discharged under an emergency scenario?

D.6 Issue 6: Does the Quarry Groundwater Monitoring Network meet the requirements for Efficient Long Term water level (potentials) monitoring requirements?

200. Contouring of potentiometric (hydraulic potential) surfaces is required to identify monitoring screen gaps not just classification by geological formations / model layers. There are anomalies identified in the data sets (see Peer Review March 10, 2025 communications).

201. These Strada documents avoid and do not address the Peer Review Site Plan Issues as articulated in prior and subsequent Technical Submissions.

D.7 Earthfx Fig 6, 7 and 8 / Table 1 and 2

202. **These Figures are very misleading as they contain destroyed, dry and inactive wells not monitored** (see Tables 1 and 2):

- Fig 6 contains 9 dry or destroyed and 12 actively monitored wells. Dry wells are an indication of extraction water level lowering and/or installation errors (not recognizing low water tables).

- Fig 7 contains 3 destroyed and 17 actively monitored wells.
 - Fig 8 contains 1 destroyed, 2 inactive and 7 actively monitored wells.
203. **In other words, 25% of the wells shown in Earthfx Table 1 and 2 and on Fig 6, 7 and 8 are not or cannot be monitored. Furthermore a number of wells are within proposed extraction areas and are not suitable for long-term baseline monitoring and comparison.**
204. This Peer Review has amended Earthfx Table 1 and 2 (see Exhibits). Does Strada intend to replace ‘dry’ and ‘destroyed wells’? This Peer Review format style is more appropriate for the Site Plans than the smorgasbord of monitor wells included in the current Site Plan conditions.

D.8 Response to Earthfx Detailed Responses to Issues (Earthfx pg 3 to 12)

D.8.1 Hunter Comment 1.1

205. Comparison to the Shelburne Model is no longer relevant. Table 4.4 (pg D109) has not changed since May 8, 2024 despite considerable new data collection and four cycles of Peer Reviewer comments.

D.8.2 Hunter Comment 1.2

206. The evidence is overwhelming that dry weather baseflows are being underestimated by Earthfx transient (monthly) model simulation.
207. The former fish hatchery upstream of Tatham’s SW6 and downgradient of Earthfx STR10 was abandoned in the 1950s and any effect is already built into the model simulation (this is a red herring also repeated by WSP).

D.8.3 Hunter Comment 1.3

208. This comment confirms that Highland’s transient data was used to inform the model, not Tatham’s on-site data (only 2 or 3 months monitoring available for Gasport monitor wells).
209. The on-site test wells are Open Hole and do not isolate Model Layer 4 and Model Layer 6 separated by the Goat Island Aquitards (Model Layer 5).
210. PW1 was terminated on top and does not ‘fully’ penetrate the Gasport Aquifer.
211. Pump tests screened in Model Layer 4 (Guelph) and Model Layer 6 (Gasport) in the inlet and outlet area of the Underground Stream are required to further validate the model.
212. New model independent pump tests will take advantage of a much improved monitor network compared to that available for the original Goffco pump tests.

213. New model independent pump tests will improve the real world hydrogeological characterization of the proposed Strada Quarry site.

D.8.4 Hunter Comment 1.4

214. In response, I enclose amended combined Earthfx April 25, 2025 Fig 2, 4 and 5 (see Exhibits).
215. My dry weather streamflow reductions are quoted from Tatham / Earthfx documents as repeated above.
216. The Earthfx simulated dry weather flows do not fall within the NRSI range of the fisheries critical Pine River Headwater baseflows.

D.8.5 Hunter Comment 1.5

217. The simulated dry weather (base) flows do not fall within the range of observed dry weather streamflow measurements.

D.8.6 Hunter Comment 2.1

218. The NRSI October 2024 Report quoted up to 50% flow reductions for some phases similar to that in Earthfx October 2024 and January 2025 Appendix E Reports. NRSI January 2025, unexplained, no longer tracks the fundamental Earthfx January 2025 Report flow reductions.
219. **NRSI fishery predictions are dependent and premised on the results of the Earthfx groundwater model. Earthfx and NRSI are assessing wetlands, not farm fields.**
220. **This Peer Reviewer is assessing rising water table levels due to groundwater and streamflow increases to agricultural fields (see Exhibits). Agriculture field depressional areas adjacent to wetlands have zero tolerance for water table rises.** Furthermore, the Earthfx Model is significantly underestimating dry weather flow at STR14.
221. Quoting flow differences at Earl Rowe Park (or Everett) is irrelevant.

D.8.7 Hunter Comment 2.2

222. The Fish Hatcheries abandoned in the 1950s are irrelevant to the recent model simulations.
223. Average flow reductions are of little relevance (Table 1). NRSI (January 2025) is very clear that dry weather flows are critical to maintenance of Trout populations. **Furthermore, high quality Trout habitat occurs typically where Base to Average Flows are greater than 50% as is typical in the Pine River headwaters.**

224. The appropriate comparison data is included in Earthfx Jan 31, 2025 Appendix E (pg 43). Table 2.2 (pg 43) for NAT 18 (Horning's Mills Lake) Groundwater Budget at 61.9 L/s outflow compared to Tatham August 15, 2024 observed flow at nearby downstream SW5 at 139.7 L/s (**Model simulation at only 44% of observed or underestimated by 2.3x**).

D.8.8 Hunter Comment 2.3

225. Page E145 discussion is irrelevant. These residences are located on relatively high ground. My concern are residents within and immediately adjacent to wetland depressional areas including NAT1, NAT2, NAT3, NAT14 and/or NAT20 with rising water levels.

D.8.9 Hunter Comment 2.4

226. Strada has not modelled the critical drawdown condition or explicitly stated on its Site Plans how infiltration compensation will be facilitated and achieved after Quarry closure.

D.8.10 Hunter Comment 2.5

227. Even though tens of model scenarios may have been conducted, Strada has never demonstrated model assessment runs for this Peer Reviewer's alternative Site Plan scenarios as proposed in July 2024 and February 7, 2025 Memos or herein.

D.8.11 Hunter Comment 3.1

228. Earthfx (January 31, 2025) Appendix E or the MHBC January 31, 2025 Site Plans do not demonstrate how outgoing water quantity and quality will be managed on an ongoing four season basis.

229. Strada is apparently proposing a Run of the Quarry infiltration scenario without regulation.

D.8.12 Hunter Comment 3.2

230. Tatham in its January 31, 2025 Reporting or MHBC on the January 31, 2025 Site Plans has not addressed this issue.

231. A Site Plan framework is required to set the stage for the subsequent PTTWs and ECAs. These are not independent tasks.

D.8.13 Hunter Comment 4.1

232. Appendix B sB.7 (pg B-36) does not disclose the Tatham collected groundwater quality data or provide any water quality spatial analysis. Strada has not responded to my May 15 request for the undisclosed Strada Pits 2024 Compliance Report (Tatham, March 2025).
233. Discussion of Nitrate treatment at a mediation meeting, without inclusion of Site Plan infrastructure or conditions is irrelevant.
234. No recommendations are provided to inform the Site Plan development process.

D.8.14 Hunter Comment 4.3 and Comment 5.1

235. The Model incorporation of Deep Gasport (Model Layer 6) hydraulic barriers and the Site Plan sketches do not capture the essence of the geotechnical recommendations of Oct 4, 2024 for the hydraulic barriers. The deep barriers as proposed on the Site Plan sketches will fail.
236. With respect to groundwater uplift of the Lift 2 floor, this is already anticipated. Rupture will be sudden with little warning or time for advance consultation with the Ministry.
237. **A contingency plan is required in the Site Plans recognizing where quarry floor flood waters, under emergency conditions, will be temporarily stored without uncontrolled release to neighbouring farm fields.**

D.8.15 Hunter Comment 6.1

238. Earthfx April 14, 2025 Tables on page 13 and 14, and Figures 6, 7 and 8 on pages 15 to 17, unexplained, contain inactive, dry and destroyed Monitors. Hunter Amended Earthfx Table 2 and Figures 6, 7 and 8 illustrate the location of these inactive, dry and destroyed monitor wells (see Exhibits).
239. This Peer Review had previously requested Strada re-activate OW1 and PW1 to support Site Plan development. Does Strada propose to replace the dry and destroyed wells?

D.8.16 Hunter Comment 6.3 and 6.4

240. My amended Earthfx Figures 6, 7 and 8 display significant data gaps in the monitoring network as I have advised since the beginning of this Peer Review. How does Strada intend to close these network gaps?

E. WSP Assessment of Earthfx Technical Report(s)

241. **With respect to the WSP Assessment of the Earthfx reports, it is apparent that WSP is referring to Report Appendices that have not been disclosed to this Peer Reviewer.** These updates have been requested from Strada on May 15, 2025 but to no avail.
242. **Based on analysis of data available to us at this date, this Peer Reviewer does not agree with WSP that the January 10, 2025 issues of concern to the Horning's Mills community have been adequately addressed.**
243. WSP demonstrates a lack of familiarity with the site as illustrated by the following comment: *'except at SW6, where a fish hatchery is modelled discharge explains the discrepancy'*. As explained above, this Fish Hatchery has not operated since the early 1950s. This is a red herring.
244. WSP reference to the reduction of the mean error from 1.31 to -0.97 is a reference to the reduction from the Earthfx 2022 Shelburne Wellhead Protection Study to the May 2024 Earthfx Model Report. There has been no change in mean error during the progress of this Peer Review since May 2024 (see Exhibits). This is a red herring.
245. Furthermore, WSP is an Aggregate Industry Consultant that derives most of its Aggregate Income from supporting Licence applications and not by undertaking low budget Peer Reviews. For unexplained reasons, WSP also addresses NDACT at 30 Floral Parkway, Concord.
246. **My conclusion is that WSP is not fully familiar with this complex file.**

F. Site Plan (January 31, 2025) Comments

247. Site Plan Comments are provided under separate cover.

Garry T. Hunter, M.A.Sc., P.Eng.
Civil Engineer, Hydrogeologist and Environmental Systems Planner
Hunter and Associates

Enclosure: Index of Selected Peer Review Communications April 25, 2024 to June 5, 2025

STRADA

Proposed Melancthon Quarry

Peer Review Technical Submissions (Selected)

April 25, 2024 to June 5, 2025

2024:

Apr 25	(Email + 4 Figures)	Email to A. Kimberley (Tatham Engineering) re: Groundwater Quality - Nitrates and Sodium 2019 to 2023
Oct 4	(Memo + Fig H.29)	Proposed Strada Quarry - Deep Gasport Aquifer Water Quality Sampling - Sept 11, 2024
Dec 10	(Memo)	Strada Peer Review Supplemental Hydrogeological Information Requests
Dec 20	(Email)	Email C. Cosack and N. Kotyck re: Options to deal with Strada's refusal to respond to G. Hunter's requests for supplemental information

January 2025:

Jan 10	(Email + Issues List)	Strada Proposed Quarry Major Issues List
Jan 10	(Email + Memo)	Strada - Level 1 and Level 2 Hydrogeological Assessment Summary including Appendices A to E
Jan 10	(Memo)	Strada October 2024 Proposed Quarry Site Plans and Impact Assessment
Jan 10	(Email + Draft Letter)	Strada 4 th Release Peer Review - Overview Summary January 10, 2025
Jan 21	(Email + Memo + Photos)	Dec 10, 2024 Strada Peer Review Supplemental Hydrogeological Information Request
Jan 22	(Email + Fig H.3 + Memo)	Preliminary Phasing Extraction Plan - Possible Alternative for Consideration
Jan 23	(Email Chain)	Potential Presentation - DRAFT3 - up to 50% flow reduction
Jan 27	(Memo)	Strada January 24, 2025 Meeting - Continuing Discussion

February 2025:

Feb 7	(Email + Draft Memo + 7 Figures)	Strada Proposed Quarry Alternative Site Plan / Water Management Concept and Supporting Figures
Feb 7	(Email)	CBM Quarry - Blast Impact Assessment Report (revised July 2023)
Feb 7	(Email Chain)	Strada Proposed Quarry Site Plan Concept - Support Figures

March 2025:

Mar 7	(Email + Attachments)	Pine River Baseflows - Meeting Follow-up
Mar 10	(Email + 2 Memos)	CBM Quarry - FOI - MECF /MNRF Memos - with NDACT Peer Reviewer Annotations
Mar 10	(Email + Memo + 4 Figs)	Proposed Strada Model Calibration Improvements
Mar 10	(Email)	Model Layer 4 and 6 High Quality Hydraulic Surfaces (Potentials) and Subtraction - Offset Model Inferred Zones of Increased Flow
Mar 10	(Email)	Pine River - Headwater Streams Aquitard Support

May 2025:

May 14	(Email)	Request to Strada for clarifications
May 30	(Email)	Vulnerable Water Wells with less than 10 m drawdown

June 2025:

June 5	(Email + Memo)	Strada Proposed Quarry Fifth Cycle Peer Review January 13 to April 17, 2025
June 5	(Email + Memo)	Strada Proposed Quarry ARA Site Plans January 31, 2025
June 5	(Emails + Memo)	Strada Proposed Quarry Related Exhibits to May 30 and June 3, 2025 communications

June 5, 2025