Proposed Reid Road Reservoir Quarry – JART COMMENT SUMMARY TABLE

Please accept the following as feedback from the Reid Road Reservoir Quarry Joint Agency Review Team (JART). Fully addressing each comment below will help expedite the potential for resolutions of the consolidated JART objections and individual agency objections. **Additional comments may be provided once a response has been prepared to the comments raised below and additional information provided**.

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1.	The bottom of each of the three existing ponds was surveyed for bottom elevations through manual measurements from pond surface. Water samples from both groundwater and surface water were taken and analyzed for a variety of parameters. Field measurements of water levels were taken both manually and with installed dataloggers which also recorded field water temperature at regular intervals. Water level measurements were taken over a period between July 2016 and April 2018. The monitoring period is considered to be a minimum for representing seasonal variations. The monitoring period is inadequate for determining minimum water levels for purposes of establishing trigger levels.	Section 2.0	
2.	Twenty-three surface water staff gauge locations SG1 to SG23 located both on and off the site were monitored. Manual water level measurements were taken at SG1 to SG 20. Datalogger readings of water levels were obtained every 30 minutes over the monitoring period at SG9, SG10, and SG13. Figure 2.3 also indicates that SG17 had a datalogger installed although not mentioned in the report text. Streamflow measurements were obtained at stations SG9, SG10, SG13, SG17, SG18, SG19, SG20, SG21, SG22, and SG23. Monitoring data was collected over the period of July 2016 to April 2018. There are a limited number of surface water monitors in the vicinity of the wetlands which limits our understanding of water level changes within these wetlands. It is not clear whether the number and location of surface water monitoring stations is adequate or appropriate for wetland monitoring.	Section 2.0	
3.	Section 2.11 mentions calibration figures. The stream flow calibration data would be better understood if the flow data is presented on a log scale. The low flow conditions are of a particular interest as it relates to sustaining local wetlands, streams and their habitat. As presented on Figures 8.13 and 8.14 the model seems to overestimate the low flow conditions at SG9 and SG10. Considering this, is the model calibration sufficient to use the model to assess the extraction and post-extraction impacts on the creek and wetlands in low flow and level conditions?	Section 2.11	
4.	Earthfx provides a detailed description of the local and regional bedrock geology. There is no discussion of the Eramosa Formation shown on the regional cross-section (Earthfx 2018, Figure 5.3), and the cross-sections through the property (Earthfx 2018, Figures 7.4, and 7.5). There is also no mention of these bedrock units within the Harden report. In the Harden Report, Table 3.1, Thickness of Rock Formations Found at Site, has no reference to the Eramosa Formation. The Eramosa Formation is shown to exist to the west of the subject property on Figure 5.1 (Earthfx, 2018). The Earthfx report shows the Eramosa/Upper Amabel Formation as layer 7 in the hydrostratigraphic model of the property. (Earthfx, Table 7.1, page 44). Layer 7	Section 3.4.2 Earthfx , Section 5.2.1 Figures 5.1,	

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	includes the Eramosa/Upper Amabel as subunits of model layer 7 which have distinctly different hydraulic conductivities by two orders of magnitude even though layer 7 is represented as one layer in the model. Figure 7.4 suggests that the Eramosa/Amabel bedrock unit is portrayed as one unit within the computer model. Figure 7.5 indicates that the Eramosa/ Amabel bedrock unit is assigned a hydraulic conductivity of 10E-05 m/s. It should be clarified whether the Eramosa Formation exists within the subject property and whether it has been included within the computer model as a distinctly separate bedrock unit as suggested in Table 7.1.	5.3, 7.4, and 7.5 Earthfx, Table 7.1, page 44	
5.	There are three main on-site ponds, East Pond (P11), Central Pond (P6), and West Pond (P1). These ponds were created from the previous sand and gravel operations through excavations below the water table. Pond bathymetry was determined manually measuring the depth of the East Pond P11, Central Pond P6, and West Pond P1 on July 22, 2016 (Harden 2018, Section 2.8, page 6). Smaller ponds, P2, P3, P4, and P15 are also considered to have been created from previous sand and gravel extraction operations. Pond P15 and associated wetland appears to have been created in a former test pit that was excavated below the water table. A number of natural wetlands with associated seasonal ponds occur within and adjacent the property and include P5, P7A, P7B, P8, P9, P10, P12, and P13. Railway construction is believed to have either created or modified wetland P14. A number of these wetlands appear to be hydraulically connected to the three main ponds either as providing a source of water or as receivers of water from the main ponds. Geodetic level survey was completed for wetlands P5, P7A, P7B, P8, P9, P10, and P14 (Harden Figures 2.5 to 2.8). It is noted that limited ground elevation data are available for P7A and P7B. The ground elevation was determined at monitor WP3 and at one nearby location in Pond P7B and at only one location, WP6, in Pond P7A. These elevations were used to establish minimum bed elevation and Pond Elevation Assessment Targets, (Table 10.1, page 69, Earthfx 2018). The lack of ground surface elevation data for Ponds P7A and P7B is inadequate for determining the minimum ground elevation for these ponds. It is questionable whether the number and location of water level monitors are adequate for assessing impact from the proposed aggregate operations on the wetlands.	Section 3.6 Figures 2.5 to 2.8 Table 10.1, page 69, Earthfx 2018	
6.	Measured water levels within Pond 7A are generally about 0.10m higher at WP6 and SG3 than in the adjacent Central Pond P6. The water level in Pond 7B as measured in WP3 is also about 10cm higher than in Central Pond P6. Water levels at wetland monitors WP3 and WP6 are generally higher than the ground elevation at these monitors suggesting upward hydraulic gradients beneath these wetlands. Lowering of the groundwater level by rock excavations in the adjacent Central Pond P6 and by pumping from the West Pond P1, Central Pond P6, and Eastern Pond P11 may interfere or disrupt the upward gradients from beneath these wetlands and result in a downward gradient. Depending upon the amount of leakage from wetlands P7A and P7B, it is not clear that the proposed pumping into the wetlands will achieve the objective of maintaining water levels within wetlands P7A and P7B under conditions of downward hydraulic gradients. It is not clear that these conditions have been accounted for in the integrated model. Questions therefore remain regarding the effectiveness of the proposed mitigation measures of pumping into buffer ponds and dispersion trenches to maintain water levels within adjacent wetlands and headwater areas of Kilbride Creek.	Section 3.6	
7.	Table 4.5 Hydrologic parameters lists runoff as 10% of surplus, while Table 4.6 Pre-Extraction Water Balance shows that runoff is over 23% of surplus. How was the Pre-Extraction Water Balance Table 4.6 developed? How does it compare to the GSFLOW model results?	Section 4.13	
8.	The report should indicate if extraction will change the watershed boundaries between Sixteen Mile and Bronte Creek. Discharge should be maintained to the appropriate watershed.	Section 5.0	
9.	Stream flows recorded along Kilbride Creek on June 17th, September 17th, and October 17th, 2017 show consistently lower flows in SG21 compared to stream flow measurements upstream at SG9. Although there are no groundwater monitors within this area of Kilbride Creek to confirm downward hydraulic gradients, the stream flow data suggests that either Kilbride Creek is losing water to the groundwater system along this stretch of the Creek during this time period or the stream flow measurements are not accurate. It is not clear that this condition was accounted for in the integrated surface water/groundwater model.	GWS, 2018, Section 4.3, page 21, 6th paragraph Section 3.6	
10.	Portions of the Guelph Junction Provincially Significant Wetland (PSW) Complex occurs on the James Dick property. This is described in detail in the GWS 2018 report. The preservation of amphibian habitat, as well as habitat for other marsh dependent species, provides the rationale for maintaining water levels within the on-site and adjacent wetlands. Maintenance of springs and groundwater discharge to Kilbride Creek and associated aquatic habitat provides the rationale for maintaining groundwater levels in headwater discharge	Section 3.6	

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	areas adjacent to Kilbride Creek. It is unclear whether the proposed monitoring program is adequate for assessing impact of the proposed aggregate operations on the wetlands.		
11.	Similar to Table 5.1, a hydrogeological assessment should assess impacts to the local streams and creek flows. Page 31 lists "hydrologic and hydrogeological limitations" established by the natural heritage consultants, the limitation for Kilbride Tributary is to maintain water levels within the historical range. This is rather vague, more details are needed and clear targets should be provided in terms of either stage or flows.	Section 6	
12.	The report is silent on the methodology used to ensure that the required "hydrologic and hydrogeological limitations" will be followed. Where will water used to fill the excavation area come from?	Section 6	
13.	The report indicates there is a potential increase in groundwater discharge to Kilbride Creek and tributary post-closure. There should be some quantification of the potential increase as well as an impact assessment to the creek such as erosive impacts.	Section 6.1.2	
14.	The source of climate data used in the GSFLOW simulations is unclear; the report mentions interpolating from nearby Environment Canada Atmospheric Environment Service stations. Please confirm the source. The main Harden report, Section 2.1, argues that the Kitchener/Waterloo climate station is representative. Both reports should use the same climate data in the assessment.	Section 6.2	
15.	What is the direct source of the aggregate processing water and dust control water (page 35)? This volume could pose a significant impact on the seasonal water balance. Will wash water be recycled? Where will this system be located and designed? (not included on Page 2 of 5).	Section 6.3	
16.	Page 30 listed limitations should be clear and quantifiable. Measurable targets must be set (e.g., instead of "ensure that the amphibian pond levels recovered completely by early spring" a clear water level elevation target should be set for all the ponds). The corresponding monitoring proposed will need to ensure that the targets are being met.	Section 6	
17.	The effects of blasting on water quality within the ponds was addressed by examining chemical data from sub-aqueous mining at the Guelph Limestone quarry. A sample was taken within the quarry pond in the area of the broken rock pile four hours after detonation of explosives in 2012. The sample was analysed for metals, polyaromatic hydrocarbons, volatile organic compounds and hydrocarbons. Although Harden states that these water quality results are in Appendix E none were found in Appendix E. The results indicated that there were no exceedances of Ontario Drinking Water Standards for inorganic compounds. Exceedance of surface water standards were found for lead, zinc, and cobalt. These were thought to relate to the petroliferous Eramosa Formation which does not occur at the site.	Section 6.5.1, page 37	
18.	The report is silent on the levels of total suspended solids within the pond water as a result of blasting. If increased levels are experienced, the report should indicate what methods will be used to ensure this increased sediment concentration is not transferred to environmental features.	Section 6.5.1	
19.	Water quality monitoring by the proponent has determined that increased chloride levels are already a concern. As such, the use of calcium chloride as a dust suppressant may not be supported. An alternative dust suppression mechanism is recommended.	Section 6.5.3	
20.	Four water samples were taken from the Guelph Limestone Quarry in April 2014 to evaluate the water quality impact of explosives in the pond. One sample was taken before the blast and three samples were taken at intervals after the blast. Samples were tested for nitrate, nitrite, total kjeldahl nitrogen (TKN) and ammonia. Results are summarized in Table 6.3, page 38). Samples following the blast were turbid and were not filtered prior to analysis. Low levels of nitrate and TKN were observed before and after the blast. From these results Harden concluded that *'The data therefore shows that the use of explosives in a subaqueous mining operation does not affect the nitrogen levels in the water of the quarry pond.'* (Harden 2018, Section 6.5.1, page 38, 2nd paragraph). It is not clear how the results of this test compare to the proposed blasting operations in the Reid Road Quarry and whether the results reflect the solubility of decomposition products of the blast material.	Section 6.5.1, Table 6.3, page 38	
21.	There is no discussion of the blasting and excavation operations on turbidity within the excavated ponds and the potential for turbid water to be transmitted to Kilbride Creek through fractured bedrock especially in areas closest to the Creek such in Stage 1 and 2 of the quarry operations. Monitoring for turbidity has not been included in the recommended monitoring program. Harden acknowledges that samples taken in the Guelph Limestone Quarry at the time of a blast were turbid. Proposed dragline operations are expected to result in high turbidity within the excavated ponds.	page 37, last paragraph	

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22.	The report states there is a 6 L/s loss of flows in Kilbride Creek but there has been no indication as to where this flow is going. Is there an increase in West pond levels or an increase in flows to the small tributary? The modelling should clarify what is causing the loss and if excavation works onsite will result in an increase of this loss.	Section 7.4	
23.	The table provides warning and trigger levels for protection areas but does not provide supporting documentation as to how these levels were determined. There is no correlation between the environmental monitors and the groundwater monitors used for warnings/triggers. Supporting information should be provided.	Table 7, page 63	
24.	Trigger and warning levels for monitor CB12 is listed as TBD. Please provide a methodology for determining these levels prior to commencement of quarry operations.	Table 7, page 63	
25.	The monitoring program must have more details and be clearly tied to wetland, stream and groundwater target set to meet the Environmental Objectives (noting there are further comments raised elsewhere with respect to the Environmental Objectives being proposed). The automatic level and temperature monitoring should have live feed to be able to proactively and effectively apply mitigation measures.	Tables 8.9 and 9.1	
26.	Dispersion Trench 1 and 2 will be constructed around the periphery of Central Pond P6 for the maintenance of minimum water levels in adjacent wetland P5 and the maintenance of baseflow to the tributary to Kilbride Creek respectively. Buffer Pond 1 (BP1) will be constructed at the edge of Central Pond P6 for the maintenance of minimum water levels in wetlands P7A and P7B. It is thought that '*Smaller ponds to the south and southwest of P7A and P7B benefit from the mitigation efforts in BP1'* Harden 2018, Section 6.2.6 Ponds P10, P9, P4, P14, P8, page 35). The construction of Buffer Pond 2 (BP2) along the western edge of the West Pond P1 is intended to provide for the maintenance of spring discharges that provide baseflow to Kilbride Creek. It is assumed that minimum water levels can be maintained within the adjacent wetlands by pumping from the main ponds based upon the modelling results. The proposed monitoring network is inadequate for assessing the impact of the proposed quarry operations on the wetland features. It is not clear that sensitivity analysis has been completed to consider the range of operating conditions. The modelling of impacts is based upon the lower range of reported extraction rates of 350,000 tonnes /yr instead of the upper end of the anticipated extraction rate of 500,000 tonnes /yr.	Section 6.2.6, page 35	
27.	To the above, the licence proposal is for 990,000 tonnes /yr. Analysis should be undertaken using the proposed licence maximum.	Section 6.2.2, page 35	
28.	Computer model simulations of surface water and groundwater changes in response to anticipated quarry operations were determined by Earthfx (2018). It was concluded by Earthfx that *'The model results indicate that there are sufficient quantities of water on-site to support the sensitive wetland features during operations.'* (Earthfx, 2018, Section 11.6, page 85). From these results, and the results of the Level II Natural Environment Report by GWS (2018), Harden (2018) determined that mitigation measures would be required to address anticipated impacts to the groundwater system from the proposed quarry operations. These measures are intended to maintain groundwater and surface water conditions within on-site and adjacent wetlands primarily for the protection of amphibian habitat. This is to be achieved largely by pumping water from the main ponds into constructed buffer ponds and dispersion trenches as part of the mitigation measures. This approach has not been proven effective nor is there an approach proposed to verify its effectiveness prior to extraction initiation.	Section 11.6, page 85	
29.	The hydrological or surface water component of the model (PRMS) is influenced by topography, soil properties, and land use. Earthfx notes that *'All the model parameter values were regionalized by the land use, soils mapping, or surficial geology mapping… A Monte Carlo approach was undertaken to identify optimal model input parameters.'* (Earthfx 2018, Section 6.5 PRMS-only Calibration Results 3rd paragraph, page 35). No explanation is provided of the Monte Carlo approach. Data available for these parameters resulted in a more refined model grid in the order of 5 to 50m (Figure 3.4, Earthfx, 2018). The regional surface water model (SFR2) for streams was calibrated against the long term Bronte Creek stream gauge located to the south near Zimmerman (Station No.02HB011). The boundaries of the regional scale model were selected to include this stream flow station in order to have a surface water calibration point. The local scale stream module of the integrated model was calibrated against the measured onsite stream flow measurements as well as the flows of the downstream gauging station which in turn was integrated into the regional model. The limited on-site stream flow data covers a relatively short period of time from July 2016 to April 2018 and may not be representative of the long term range of conditions expected for the subject	Figure 3.4, Earthfx, 2018 Earthfx 2018, Section 6.5 PRMS-only Calibration Results 3rd paragraph, page 35	

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	property. It is also not clear how/if the loss of stream flow along portions of Kilbride Creek was accounted for in the PRMS model.		
30.	The GSFLOW integrated model was initially calibrated against the measured on-site water levels as described in Section 8 of the Earthfx 2018 report. Water level simulations were compared to and calibrated against measured stream flows, baseline surface water levels, and groundwater levels observed on-site between July 2016 and April 2018. Comparisons between simulated and measured baseline surface water and groundwater levels as shown on Figures 8.2 to 8.15 produce a reasonably good match to the timing of flows and baseflows at the two downstream monitoring locations SG10 and SG13. The GSFLOW model match to measured stream flows at the upstream location SG9 is poor. Earthfx attributes this to difficulties in measuring flow at the natural channel location compared to downstream culverts. It is noted that the few measured stream flows at SG 21 downstream of SG9 are consistently lower than upstream at SG9 suggesting that Kilbride Creek is losing water to the groundwater system within this area. This condition may have contributed to the poor correlation between measured and simulated water levels at SG9 although it is not clear what the impact of this condition has on the model. This suggests a level of uncertainty with the predicted impacts on surface water and groundwater levels within this portion of the property. The climatic data is based upon data collected from locations removed from the property and may therefore be limited in representing on-site conditions.	Earthfx, 2018, Section 8	
31.	The simulations presented in Figures 9.2 to 9.5 and 9.7 to 9.9 show the wetland water levels approximately 10 to 15cm lower under closure conditions. Examination of hydrographs suggest that Wetland P7B and Wetland 5 will reach the threshold levels specified in Table 10.1 an increased number of times due to the lower predicted water levels. There is no discussion of the significance of the predicted lower water levels within wetlands after quarry closure with respect to the recommended threshold levels. The corresponding groundwater analysis showed that deepening of the existing ponds would result in a lowering of groundwater levels. The largest change is observed along the north edge of the east pond where expansion of the pond area results in a lowering of the groundwater level by about 0.5m (Figure 9.1). It was concluded that long term changes in shallow groundwater levels are relatively minor. No actions were recommended for long term closure. Long term monitoring locations in the predicted area of greatest drawdown are lacking. This is considered a deficiency in the proposed monitoring program.	Earthfx, Section 9	
32.	Wetland bathymetry or ground surface elevations as shown on Figures 2.5 to 2.8 in the Harden report does not correlate with the Minimum Bed Elevations in Table 10.1 of the Earthfx report. The assumed 10% Inundation Threshold elevations for wetlands indicated on column 4 of Table 10.1 are questionable and should be confirmed (as noted in comments on the Natural Heritage System report, there are further ecological questions related to the appropriateness of this mitigation measure). It is also not clear how 10 cm of water within each of the wetlands translates into the 10% inundation threshold on Table 10.1. It is anticipated that the geometry of each pond bottom would have a significant effect upon the 10% inundation threshold which should be unique to each pond. It follows from this description that the 10% inundation threshold would be 10cm higher in elevation that the Minimum Bed Elevation of Table 10.1. This is not reflected in Table 10.1. The rationale for the 10cm inundation criteria is described by GWS 2018 (Section 4.5.2 Amphibians, page 31, last three bullet points). However, it is unclear as to how this criterion is sufficient.	Figures 2.5 to 2.8 Section 4.5.2 Amphibians, page 31, last three bullet points GWS 4.5.2	
33.	The modelled impact analysis was based upon operational assumptions. This included a maximum annual excavation of 350,535 tonnes of bedrock material. Drawing 2 of 5 Operational Plan, note 1.2.27 indicates that the maximum annual tonnage limit to be shipped from the property is 990,000 tonnes. Harden notes that *'Although the potential shipping tonnage is 990,000 tonnes per year, the anticipated rate of extraction from below the water table will more likely be between 350,000 and 500,000 tonnes per year. The rate of extraction will ultimately depend on observed water level conditions in the ponds and in the nearby wetlands.*' (Harden, 2018, Section 6.0, Level 2 Hydrogeological Assessment, page 30). The Operational Plan, page 2 of 5 provides no mention of the modelled extraction rate upon which the impact assessment was based. Extraction rates other than that used in the impact assessment should not be approved without a corresponding impact analysis of the requested extraction rate of 990,000 tonnes /yr and should be accompanied with a comprehensive water monitoring and management strategy.	Section 6.0, Level 2 Hydrogeological Assessment, page 30	
34.	Table 11.1 from Earthfx, 2018, shows extraction ratios for the major ponds including the equivalent total water demand in m^3/yr. This includes rock excavation as well as water pumping to buffer ponds and dispersion trenches from South Pond (new) Phase 1, Central and West Ponds (Phase 2 & 4) and East Pond	Section 6.3.1, Water Taking For Aggregate	

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	(Phase 3 & 5). Also included is the estimated amount of water pumped for dust control. Missing is the estimated amount of aggregate washing water. Harden estimates a potential consumption of 75,000 L/day for aggregate washing that is estimated to occur for 200 days per year. Table 11.1 includes all of the major extraction Phases. Extraction Phase 4 and 5 represent extraction in areas previously filled during extraction Phase 2 and 3 respectively to accommodate aggregate processing and storage facilities. It is not clear that this approach accurately reflects the proposed sequence of extraction. Nor is it clear that the actual impacts of the specific phase of extraction will result in the predicted impacts. For example, it is not clear whether the extraction phases will be completed sequentially rather than simultaneously. Splitting up the expected annual aggregate extraction over three phases rather than concentrating the extraction in one area, is expected to have significantly different local impacts on groundwater and surface water levels. For example, impact of extraction of Phase 1 which, at the beginning, would have limited benefit of pond water storage that is available for Phase 2 and 3. The existing West, Central, and East ponds will have the benefit of stored pond water to buffer the impacts on surface water and groundwater levels. Without the buffering effect of pond water storage, draw downs in adjacent areas could be higher than in situations where there is a relatively large reservoir of surface water to offset the removal of rock water equivalent. It should be confirmed that the integrated surface water and groundwater model reflects the proposed operational phases for purposes of quantifying potential impacts on the surface water and ground water system of the subject property and adjacent areas.	Processing, page 35	
35.	The computer model simulations of operations cover a 15-year time span with climatic data taken for the years 2003 to 2017. Model simulated drawdowns in the West Pond P1, Central Pond P6, East Pond P11 and Phase 1 area predicted that water level drawdowns of less than 1.0 m would occur in all ponds during operations. The model simulations are based upon operational conditions summarized in Table 11.2. The total annual rock extraction rate is 139,239.4 m3/yr. of rock extraction water equivalent. This is equivalent to 350,535 tonnes/yr of rock extracted. It is not clear why the modelling did not consider the impacts of the upper range of extraction of 500,000 tonnes/yr stated by Harden, or the 990,000 tonnes /yr representing the maximum extraction rate requested. The extraction of rock is spread out over several months from April through November of each year. Earthfx concluded that there is sufficient water on-site to support the sensitive wetland features during aggregate operations. The modelling analysis did not take into consideration reasonable seasonal variations in extraction rates over any given year. Groundwater recharge/discharge conditions and surface water through flow conditions for water level simulations within the wetlands are not stated. Harden reports both vertically upward and downward hydraulic gradients within the property. It is therefore uncertain whether this has been taken into account and the proposed pumping scenarios will result in the desired water levels in adjacent wetlands.	Table 4.3, page 20	
36.	Proposed mitigation for the maintenance of wetland water levels is by pumping from the existing ponds into buffer pond 1 and 2 and into dispersion trenches 1 and 2 through a triggering mechanism. Warning and triggering water levels are to be monitored at selected locations. This approach has not been proven effective nor is there an approach proposed to verify its effectiveness prior to extraction initiation.	Section 8.0	
37.	The proposed measures assume that the pumped water will be distributed throughout the wetlands. The analysis does not consider the possibility of disproportionate distribution of the pumped water due to the underlying pervious materials. Even though the wetlands are generally underlain by organic soil, the thickness, lateral extent and continuity have not been verified. Without proof to the contrary, it is possible that the underlying highly permeable sand and gravels and /or fractured bedrock may restrict the distribution of the pumped water to a limited area around the point of discharge from the buffer ponds and trenches. The implications of this have not been addressed. Operational contingency measures have been proposed in the Harden report. There is no demonstration that the proposed mitigation measures will be effective, nor is there a clearly defined implementation process for the recommended contingency plan.	Page 62 first paragraph	
38.	Earthfx recognizes that *'The model is, however, a simplification of the real world and should be considered an approximation of the system behavior and response.'* Given the relatively flat topography of the site and the on-site wetlands, a small variation in water level elevation may result in a significant difference in the degree and extent of saturation of the wetland areas. Given that the modelling results represent an approximation of site conditions, actual site conditions in terms of wetland inundation may vary significantly from the predicted inundation thresholds. There is very limited data of the wetland ground surface for wetlands P7A and P7B upon which the minimum bed elevation and 10% Inundation Threshold of Table 10.1	Page 51, Section 8.3 Calibration Conclusions, Earthfx 2018	

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	are determined. No mechanism is provided for an adjustment to the monitoring and mitigation program should the water levels within the wetlands and ponds not respond as predicted.		
39.	The monthly water elevation minimums for Buffer Pond 1 (BP1) shown in Table 8.1 correspond to minimum measured water levels at SG2 with the exception of March and May minimum water levels. The minimum March water level on Table 8.1 should be 291.02 metres above sea level (masl) measured in March 2018 instead of 291.14 masl on Table 8.1 (from Table 2.3, of the Harden report). The May minimum water level should be 291.24 masl measured May 18, 2017 instead of 291.14 masl on Table 8.1. (from Table 2.3 of the Harden report). These are also noted as typographical errors in the row below. These levels should be confirmed and corrections made to the Monitoring and Mitigation Notes, page 3 of 5 of the site plans.	Tables 2.3 and 8.1 Monitoring and Mitigation Notes, page 3 of 5 of the site plans	
40.	It is not clear why the Trigger Level in the Eastern Wetland Complex for operational modifications *'was calculated as the lowest recorded water level elevation in WP9 (290.51 m AMSL) minus the predicted 0.3 metre water level change occurring during active extraction.'* (Harden 2018, Section 8.1.3, page 54, 1st paragraph, 4th line). This suggests that the wetland can tolerate the predicted 0.3 metre drawdown without adverse impacts in addition to the lowest water level under driest conditions. This requires clarification and/or justification. This is a particular example of a proposed measure not included in the Natural Environment Review Report. A detailed assessment of the data collected related to the lowering of the water table and the impact on the wetland features, plant species, and wildlife species present in this area should be undertaken and provided.	Section 8.1.3, page 54, 1st paragraph, 4th line	
41.	It is assumed that the maintenance of the recommended minimum water levels in BP1 will maintain minimum water levels within wetlands P7A, P7B, P10, P9, P8, and P14. Questions remain regarding the effectiveness of the proposed mitigation measures of pumping into buffer ponds and discharging to wetlands. Those wetland ponds located farthest from the point of discharge of pumped water are at greatest risk of not benefiting significantly from the proposed discharge of pumped water from the buffer ponds. Harden has suggested *'Direct pumping into wetlands may occur with approval of MNRF and Halton Conservation'*. This alternative has been proposed without full analysis or consultation with Conservation Halton (CH). The suite of backup options needs to be appropriately considered, and the contingency plans proposed be incorporated into the site plans drawing notes as part of the site plan operations (along with plans for obtaining whatever additional permissions may be required).	Section 8.1.2, Active Actions, page 51, footnote	
42.	Harden has recommended a Contingency Plan in the event that minimum water level elevations are not maintained at the specified monitoring locations. These include the following: a) Modifying the rate of below water-table extraction on a seasonal basis, b) Mining in a different Phase, c) Match extraction rate to pond-filling rate (Phase 1 and 5), d) Relocation of pumping, e) Internal water exchange between Phases, f) Increase pumping rates to Protection Areas The above contingency measures may have the potential to address the issue of water level maintenance within the wetlands. This is contingent, to a large extent, on monitoring water level changes within the ponds created throughout the various phases of excavation and water levels within wetlands. It is not clear how the above mitigation measures will be triggered and implemented. There are no provisions for adaptive management in the event that measures are found to be not as effective as anticipated. The proposed monitoring is inadequate to ensuring that a robust monitoring network would be present to address these items both during extraction and post-closure.	Section 11.1 Recommended Site Plan Notes, page 61	
43.	An annual monitoring report should be produced, as noted on page 59 and Site Plan 3 of 5; however, the content should be established in consultation with review agencies after all technical comments are addressed.	Section 11.1 (3)	
44.	The monitoring program proposed is summarized in Table 9.1 page 57, Harden 2018. This has been included in the site plan notes as recommended by Harden. The recommended monitoring program is lacking monitoring stations that reflect water levels within the three main ponds over the period of time during	Table 9.1 page 57	

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	which extraction will occur. For example, SG1 at the edge of East Pond P11, is located within an area that is to be filled for the construction of the aggregate processing facilities. This area is Phase 5 of the excavation sequence. SG1 will be of little value in monitoring water levels in the East Pond during Phase 3 excavations as it is located in an area to be filled. SG2 located at the eastern edge of Central Pond P6, has not been included in the monitoring program and there are no other surface water monitoring stations that will record the water level in Central Pond P6 during the various phases of excavation. No surface water monitoring stations are recommended for West Pond P1 during various stages of excavation. The adequacy of the recommended monitoring locations within the wetlands is questionable.		
45.	No water quality monitoring is recommended by Harden for the ponds to be excavated (West Pond P1, Central Pond P6, East Pond P11, and P3). There is no provision for monitoring turbidity within the excavated ponds as well as discharges into and out of the buffer ponds and dispersion trenches as well as down gradient monitors and receiving wetland ponds and Kilbride Creek. Turbidity of the receiving water bodies such as Kilbride Creek and the unnamed tributary of Sixteen Mile Creek has not been addressed from a monitoring or mitigation standpoint.	Section 9.0 and 11.0	
46.	Above surface water monitoring deficiencies and omissions prevent verification of the predicted impacts of the proposed aggregate excavations on surface water levels and surface water quality.	Section 9.0 and 11.0	
47.	The recommended wetland monitors adjacent to the three main ponds will be influenced by the proposed dispersion trenches and buffer ponds. These water levels are not considered to be representative of the water levels within the ponds themselves during active excavation. These wetland monitors may be useful in measuring the local effect of the mitigation measures and/or changes resulting from the proposed aggregate operations. They will be of little use in monitoring the drawdown impacts of aggregate extraction on the three main ponds.	Section 9.0 and 11.0	
48.	The recommended annual monitoring report does not provide sufficient guidance for documenting the implementation of contingency measures and the resulting changes in wetland water levels or water quality impacts. If impacts have been observed such that warning and trigger levels have been reached, there is little guidance provided in the Harden report for implementation of various possible contingency measures. A contingency measure protocol should be developed and integrated into the monitoring plan and ongoing monitoring results rather than waiting for an annual report to take actions. Also missing is a clearly defined mechanism or procedures as well as the appropriate level of documentation required for implementing mitigation measures and/or contingency plans.	Section 9.0 and 11.0	
49.	Flooding is mentioned along the north side of Hwy. 401. Has the source been confirmed? Will discharges to creeks flowing in this direction continue unaltered to assist with assimilative capacity?	General comment	
50.	A door to door private well survey would improve the dataset. On page 41 it is predicted that there will be quantity impacts on two dug wells on Twiss Road. A well inspection and monitoring is recommended. However, a conclusion is drawn (page 57) that there will be no impacts on private wells. This conclusion is unlikely given the previous statements.	General comment	
51.	Mitigation using buffer ponds and trenches is proposed and more specific detail is required to understand the impacts of the water source used, the pumping periods and rates, and the impacts on the source pond water levels and surrounding wetlands.	General comment	
52.	Additional information is needed to demonstrate that the proposed mitigation measures will be effective. Verification testing of the ponds and trenches, with appropriate groundwater and surface water monitoring stations, should be required prior to extraction as they must be shown to work as designed and not just circulate pumped water back to the source pond.	General comment	
53.	Although impacts on private well water quality are not expected (page 42, s.7.1.2), there is no discussion on the possible ecological receptors and potential negative impacts. Please discuss.	General comment	
54.	Contrary to Section 3.9, the site is at least partially within a significant groundwater recharge area and a highly vulnerable aquifer as reported page 42, Section 7.1.3). However, there is no discussion on the implications of this and possible negative impacts on the quantity or quality of the drinking water source based on proposed site activities. For example, it is proposed that used asphalt will be stockpiled on site and fuel will be stored in various locations. It would be helpful to understand better the quantity of fuel on-site, the exact locations and proximity to water and wetlands, and the measures in place to prevent negative impacts. Furthermore, what sewage system(s) will be used on-site?	General comment	

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55.	What would the impact be on the proposed quarry operations and mitigation measures if extreme weather events/conditions are experienced (e.g., more intense rain storms, warmer winter with more rain, more extreme temperatures in summer, more drought periods)? How will these changes impact surface water and groundwater levels, the need for additional mitigation measures, the water cycle (e.g., evaporation)? This evaluation should be documented in a monitoring, mitigation and contingency plan.	General comment	
56.	The surface and groundwater dataset for on-site water levels, temperatures, water quality is small (< 2 years) and there is no discussion as to what trends exist, seasonal variability, what would be expected due to year over year changes in weather, or discussion on how the monitored and modelled data compare with data normals for the area. Please note that Section 8.22.2 of the Earthfx report, page 50, last paragraph mentions lack of data making it difficult to fully assess seasonal behaviour for wetlands P4 and P9. Also, water levels will change faster during rock extraction and data should be collected at all stations more frequently using dataloggers to establish baseline and to track operational influences. Following improvement of the dataset, it is suggested that these assessments be completed and the measured dataset placed in context for the site. Baseline conditions should be quantified, including creek levels, groundwater/surface water interactions, vertical and horizontal gradients, and natural variations for comparison with data collected during operation. Finally, using a larger more detailed dataset, the relevancy of the warning and trigger thresholds provided should be confirmed.	General comment	
57.	Direct pumping of water into the wetlands is proposed as a contingency measure if the buffer BP1 does not maintain water levels. Please provide the specifics on the infrastructure required, construction details, and the criteria that will be used to initiate this mitigation measure.	General comment	
58.	A comprehensive document should be developed to assist local agencies in the understanding of when and what actions will be taken should the mitigation measures fail to meet their objective and when and how the agencies will be notified. The ultimate action is the cessation of extraction until the situation is rectified.	General comment	
59.	The internal use and movement of water between extraction phases should be described in more detail for our understanding.	General comment	
60.	The “Recommended Procedures for the Prevention and Mitigation of Contaminant Spills at Reid Sideroad Quarry” does not include the release of blasting emulsion to the environment as a contaminant source. Please discuss the implications of a release of blasting compound to the environment on land and in the water. Will the same blasting compound be used for blasts above the water table in Phase 1? What is the efficiency of the blasts using the specified emulsion and what is the fate of the nitrogen compounds? What is the flux of water into and out of the ponds (i.e., flow-through period for dilution of contaminants left in the water)?	General comment	
61.	Water well complaint procedures should include providing water supply that is equivalent to the complainant’s normal water supply immediately and throughout the investigation.	General comment	
62.	It is recommended that private wells be added to the monitoring plan for both water quality and quantity for such duration and frequency as might be warranted to protect private water supplies. The data will then be available to assist with a well complaint investigation, should one be received.	General comment	
63.	Upon closure, the buffers and trenches will be left in place. Is there a requirement for the buffers and trenches to remain post closure or can they be removed? Are there benefits to leaving them in place?	General comment	
64.	Please compare groundwater quality analysis results to Ontario Drinking Water Quality Standards currently in use where they differ from the old Ontario Drinking Water Standards.	General comment	
65.	Does the cascade flow map coalesce with the stream alignment and flow as described in the Harden Environmental report section 3.6.1? It is unclear if the Sixteen Mile Creek tributary (designated as KOA in the Harden report) flowing south under Highway 401 and Reid Side Road is represented in GSFLOW as described in the main Harden Report section 3.6.1, 3rd paragraph.	Appendix F, Figure 6.2	
66.	Porosity values seem to be rather high for some of the soils. Are these total porosities or effective porosities? Also, the Harden report states that porosity for dolostone ranges between 2 and 15% at the site with the upper 1 to 2 metres of the rock highly fractured. Has this been represented in the model or is the dolostone porosity a constant 10% value for all the model dolostone layers?	Appendix F Figure 6.3	
67.	The KOA tributary section flowing south under Highway 401 and Reid Side Road does not seem to be represented as a stream on Figures 7.1 and 7.2. On Figure 7.1, KOA is shown to flow into Kilbride Creek and on Figure 7.2 it does not have an outfall.	Appendix F Figure 7.1	

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68.	Hydraulic conductivities seem to be a couple orders of magnitude higher in Layers 3 through 6 under the Railway Line and in-between Central and West Lakes. Staff cannot locate in the report an explanation why. Have the hydraulic conductivities been adjusted for effects of blasting around the quarried areas, as a halo effect?	Appendix F Figure 7.5	
69.	The results of hydraulic conductivity testing for dolostone (as presented in the main Harden report Tables 2.5 and 2.6) are as high as 6.29E-04 m/s, meanwhile as presented in Table 7.1, the reported hydraulic conductivities in model layer 7 through 9 are 3.00E-05 m/s. Have the hydraulic conductivities been spatially distributed to account for local variations and to represent the site specific investigation? The Harden report states that the upper 1 to 2 metres of bedrock is heavily weathered, suggesting hydraulic conductivities even higher than the ones estimated in competent bedrock, has this been represented in the model?	Appendix F Table 7.1	
70.	Please review the following, provide explanation and/or adjust the values if needed: • Model Layer 3 has a low hydraulic conductivity typical for fine grained deposits, however the corresponding specific yield at 0.4 is indicative of coarser grained deposits • Layer 7 - specific yield for Eramosa is reported at 0.1 equaling porosity as reported in Table 6.3 for rock with no room for retention. Layer 7 specific yield for Upper Amabel is reported at 0.05 (porosity of 0.1 in Table 6.3) suggesting half of water within the rock would be retained, a value closer to 0.1 would be expected.	Appendix F Table 7.1	
71.	The anizothropy value of 10 for the upper most bedrock layer (model Layer 7), which as stated in Harden Report is heavily weathered seems to be high. A Kh/Kv value of 2 would be more representative. It is unclear how the weathered bedrock has been represented in the model.	Appendix F Table 7.1	
72.	This section does not discuss water quantity impacts on private wells. As per the Harden report there are two private dug wells servicing residence on Twiss Road. Have the well depths and potential groundwater level lowering been assessed to show that there is enough available drawdown during and post extraction?	Appendix F Section 11	
73.	There are no details provided of how the dispersion trenches and buffer ponds were represented in the model. The results of borehole drilling show that there is between 8 and 10 metres of sand and gravel, which suggests it may be difficult to avoid seepage back into the ponds. More details are needed to show the construction of the buffers and trenches and how they were represented in the model.	Appendix F, Section 11.3	

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1.	The report uses the Significant Wildlife Habitat Technical Guide (2000) rather than the Significant Wildlife Habitat Ecoregion Criteria Schedule 6E (2015). This should be revised to reflect Provincial direction and the Province's current standards. Mitigation measures should be consistent with the Significant Wildlife Habitat Mitigation Information Support Tool (SWHMiST), 2014. In light of this, only high level deficiencies have been identified. Additional comments will be provided, as needed, once that revision has been made.	General comment	
2.	Section 1.3 suggests that applicable legislation and land use planning policies are to be presented. The summary in this section includes: • a summary of triggers under the Aggregate Resources Act that result in the need for a Level II Natural Environmental Technical Report • reference to the Region of Halton Official Plan (ROP) • reference to the Town of Milton Official Plan (MOP) A summary of other relevant legislation and/or policies should be covered in this section (e.g., Endangered Species Act, Greenbelt Plan, Conservation Authority Act, Fisheries Act). Additionally, relevant sections of the ROP should be elaborated, particularly those related to elements of Halton's NHS that are present within and adjacent to the study area.	Section 1.3	
3.	Conservation Halton (CH) has long term monitoring data that would be of benefit to this study. We recommend that a data request be submitted to CH to obtain any relevant data and that this information be incorporated into the report and updates made, as necessary.	Section 2.0	
4.	There was limited background information reviewed from an aquatic perspective. It is reasonable to expect that past fish sampling within or in proximity to the study area would have been reviewed and summarized.	Section 2.1	
5.	The fish surveys conducted for the study did not follow generally accepted protocols. Minnow traps, which are an ineffective gear for capturing many fish species, were the only gear used to sample fish. It is generally accepted that backpack electrofishing is the most effective, and therefore the preferred, sampling method in streams and other shallow wadeable habitats.	Section 2.2.3	
6.	Confirmation of all survey protocols/methodologies is needed to ensure that all field surveys meet Provincial and Federal protocols/methodologies. Provide the list of survey protocols used for each of the different surveys, start and stop times, the weather during the survey and the time of day that the surveys occurred, as well as any justification of altering protocols. Table 1 should be revised to reflect this information. More comments related to specific surveys are noted below.	Sections 2.2, 2.2.2, 2.2.4, 2.2.5, 2.2.6	
7.	As noted in the text, inventories were only conducted for the study area proper, not adjacent lands. There may be other rare or potentially sensitive species on the adjacent lands that are affected by the proposed project. In order to fully appreciate the potential for indirect impacts and the efficacy of the proposed mitigation strategies, a conservative approach should be taken that assumes presence of rare and/or sensitive species that may occur in areas that will be affected, but that were not surveyed.	Section 2.2.1	
8.	The Natural Heritage Information Centre (NHIC) is a more up-to-date source for plant names/taxonomy, and should be used over Newmaster et al. (1998). Names of numerous species listed in Appendix B are out of date, and possibly S-ranks (which are important for determining presence of Significant Wildlife Habitat if S1, S2 or S3 species are present).	Sections 2.2.1, 2.2.6	
9.	Although measures of species sensitivity such as coefficient of conservatism (CC) were reviewed, they were used to list a few highly sensitive species at the scale of the entire study area. Analysis/discussion of CC (and coefficient of wetness values) for individual features is required, as it allows a screening of those communities that have a higher sensitivity to changes in ground water and thus a higher priority from wetland management perspective.	Section 2.2.1	
10.	Species at Risk (SAR) land snails were searched for, which is commendable, although no methodology was provided. The dates and times of the searches were appropriate.	Section 2.2.2	
11.	The fish surveys did not examine all of the relevant areas. Paragraph 1 of Section 4.3 (Surface Drainage and Aquatic Resources) states that there are two small tributaries that originate on the property and supplement the flow in Kilbride Creek and a third watercourse that originates on the property that flows east and is part of the Sixteen Mile Creek Watershed. It is stated that all these watercourses may potentially support fish and other aquatic organisms; these watercourses were not sampled.	Section 2.2.3 Section 14.3	

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	The first paragraph of Section 14.3 reiterates that there are two areas of fish habitat within the study area: Kilbride Creek and Ponds 12 and 13, including the stream that runs out of them. As stated previously, no fish sampling was conducted in the two tributaries to Kilbride Creek that arise on the study property and the field investigations did not determine if there is a surface connection between Pond 3 and Kilbride Creek (refer also to Comment 91, 109, and 110.		
12.	A brook trout spawning survey was conducted on a reach of Kilbride Creek and a tributary to Kilbride Creek that originates on the site on December 1, 2017. The efficacy of a single survey this late in the season is questionable. The timing of Brook Trout spawning varies among streams and can begin by mid-October in southern Ontario. On some substrates, trout redds can be difficult to discern a month or more after spawning occurs. A single survey for brook trout redds was completed on December 1, 2017; however, no other surveys were completed to determine if brook trout spawn in Kilbride Creek. CH has records/observations of brook trout (spawning size and young of the year) both upstream and downstream of this site. Potential for brook trout spawning in this portion of Kilbride Creek should not be ruled out. The report states that beaver dams may have contributed to the low flows in Kilbride Creek and that the low flows have the potential to create stress on Brook Trout and may make the stream marginal for spawning by this species. The mechanism(s) by which beaver dams may have contributed to low flow should be explained. The mechanism(s) by which the low flows have the potential to create stress on Brook Trout and make the stream marginal for spawning by this species should also be explained. Electrofishing to determine the abundance and size distribution of Brook Trout would be extremely useful in evaluating the suitability of this reach of Kilbride Creek and the tributary that arises south of Pond 1 for Brook Trout.	Section 2.2.3 Section 4.3	
13.	Only two nights of salamander trapping were undertaken. For Jefferson Salamander, this is less than that recommended by MNRF when ruling out presence, which requires five nights of survey effort and multiple years of trapping (e.g. up to 5 years). If the alternative methodology was approved by MNRF, the correspondence should be included as a personal communication reference and/or an appendix. If not, additional surveys maybe required to ensure the appropriate protocol is followed. Direction should be confirmed with the Province.	Section 2.2.4	
14.	Weather data and reference to confirmed migration times for other Ambystoma salamanders in this Ecodistrict/Ecoregion should be provided (i.e., to confirm that the trapping was conducted when salamanders are present in breeding ponds). Reference to the number of traps that were deployed should also be provided as this is important to confirm sample effort was appropriate.	Section 2.2.4	
15.	Snake surveys were conducted on March 28 and 29, 2018. Weather data should be provided to justify doing them early (e.g. unusually warm conditions for that time of year).	Section 2.2.5	
16.	For the Ribbonsnake surveys, no weather data or information that demonstrated the degree of effort (i.e., start/stop times) could be found in the report. Without this information, it isn't possible to conclude whether the surveys were conducted under suitable conditions and with an appropriate level of effort.	Section 2.2.5	
17.	No details are provided that speak to how turtle nest searches were carried out, how long they were, and whether they were conducted consistent with MNRF recommendations. As far as the number of visits made, the June and July dates total five. If the May 31 date is included, it matches one of MNRF's recommended minimums.	Section 2.2.5	
18.	As Pond 3 is the only identified wetland within the western field/extraction area, this feature should have been specifically surveyed for marsh birds, including Least Bittern. T he report noted that four species of fish were detected in this feature (see Table 2, page 20), as well as Snapping and Midland Painted Turtles, which suggests that it supports food for a variety of species. Additional investigation and/or interpretation of wetland characteristics and wildlife habitat provided by pond 3, particularly given that it is located within Phase 1 of the proposal are needed.	Section 2.2.6	
19.	Please confirm which protocol and reporting system used for the breeding bird surveys, as the report indicates that the Ontario Breeding Bird Atlas (OBBA) was not used. Forest Bird Monitoring Program (FBMP) is discussed; however, since the site is not fully forested, it may not be the appropriate system.	Section 2.2.6	

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20.	The National Least Bittern survey protocol indicates that it can take more than two visits to determine if Least Bittern are present; however, the report notes that only two visits occurred before survey sites were removed from the study. Please confirm why Pond 12 was considered as the only potential site for Least Bittern.	Section 2.2.6	
21.	Weather information is missing for marsh bird/Least Bittern surveys. The only data that is provided is for July 3, which was extrapolated from the weather data for the general breeding bird surveys completed on the same day.	Section 2.2.6	
22.	The number of owl surveys was not consistent across the study area, which makes it difficult to compare the results of the surveys. We recommend that standardized survey protocols be undertaken.	Section 2.2.6	
23.	The report indicates that it used the Guelph District MNRF survey methodology for bat surveys; however, that only covers SAR bats. The Significant Wildlife Habitat Ecoregion Criteria Schedule for 6E provides the direction for surveying for bats covered under Significant Wildlife Habitat (SWH). Additional surveys are warranted to characterize the site appropriately and mitigate as warranted.	Section 2.2.7	
24.	Acoustic monitoring for bats took place on three evenings, however the location of these surveys did not correspond to the wooded areas that are likely to be removed. Where standard method deviate from the standards typically expected by MNRF, a clear rationale should be provided and/or correspondence with MNRF.	Section 2.2.7	
25.	Paragraph 1 of Section 4.3 (Surface Drainage and Aquatic Resources) states that there are two small tributaries that originate on the property and supplement the flow in Kilbride Creek and a third watercourse that originates on the property flows east and is part of the Sixteen Mile Creek Watershed. Section 3.1.1 does not mention the watercourse that originates south of the West Pond.	Section 3.1.1	
26.	This section makes reference to Greenlands designations, which are covered in the Town of Milton's Official Plan, not the Region of Halton's Official Plan. Additional discussion should be provided for the designation of features as they relate to Halton's NHS.	Section 3.1.5	
27.	The figures provided differ from CHs watercourse mapping. As noted above, we recommend that a data request be made for CHs mapping, aquatic resources data and other relevant natural heritage data. Table 2 will need to be revised to reflect any additional records, as well as the figures, as necessary.	Section 4.3	
28.	It is indicated that, in addition to Kilbride Creek and the larger ponds on the site, there are three small watercourses that originate on the property and several old pit ponds and natural waterbodies in the study area, and that all of these water bodies may potentially support fish and other aquatic organisms. Based on Table 2 in this section, fish sampling was not conducted in any of the three small watercourses. This section further states "*Fish sampling revealed that the site supported fish habitat in two general areas: the ponds near the entrance to the site, including the watercourse that flows out of them, and Kilbride Creek.*" This statement might be interpreted as indicating that these two locations are the only locations where fish habitat is present but that is not necessarily the case. The two tributaries to Kilbride Creek that originate on the property were not sampled to determine if fish are present. They should be.	Section 4.3	
29.	The assertion that the ponds that were created as a result of the previous aggregate extraction that support fish are not considered fish habitat is contingent upon those waterbodies having no surface connection to natural watercourses or waterbodies. It is unclear from the figures in the report whether there is a watercourse that flows, at least seasonally, from Pond 3 to Kilbride Creek. If there is, then Pond 3 would be considered fish habitat under the *Fisheries Act*. Field investigations should determine if an ephemeral, intermittent or permanent surface connection exists between Pond 3 and Kilbride Creek. Concerns regarding statements made in Section 4.3 with respect to where fish are found and what is and is not fish habitat also pertain to Section 7.0	Section 4.3 Section 7	
30.	On page 21, the report states that a large spring "*just above the railway bridge*" was 9.6°C which is too warm and therefore unsuitable for Brook Trout spawning. The rationale for concluding that an abundance of groundwater would render an area unsuitable for Brook Trout spawning, given that this species actively selects areas of groundwater discharge for spawning, requires explanation.	Section 4.3	
31.	At the bottom of page 21, and continuing on page 22, it is stated that the temperature range of 0°C to 20.2°C indicates that Kilbride Creek is not functioning as a coldwater stream at the northern end of the property. It is stated that a true coldwater stream would not get as cold in the winter or as warm in the summer. It further states that the beaver dam that is present negates any positive effects that seeps and springs may have on water temperatures. These definitive statements are not supported by data or by references to the scientific	Section 4.3	

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	literature. This watercourse contains Brook Trout; they were caught by the investigators at the one location where minnow traps were set, which is near the northern edge of the property. Their presence indicates that Kilbride Creek is functioning as a coldwater stream.		
32.	The report also states "*It is concluded that the entire reach of Kilbride Creek along the western edge of the subject property does not support spawning brook trout.*" This stream does support Brook Trout and spawning must occur for a self-sustaining population of Brook Trout to be present. Please clarify.	Section 4.3	
33.	The interaction between groundwater and Kilbride Creek is important, as groundwater affects both discharge and temperature as well as the suitability of this reach of Kilbride Creek for Brook Trout spawning. The Natural Environment report states "*There appears to be a loss of water in the creek as it flows through the site, but flow is augmented again as the creek flows near the proposed Phase 1 area. This suggests that the creek encounters an area of high permeability through the site and that surface water is lost to the water table.*" The Level 1 and Level 2 Hydrogeological Assessment (Harden Environmental Services Ltd.) does not discuss Kilbride Creek in Section 4.10 - Groundwater/Surface Water Interaction. In Section 7.4 (Impact Discussion - Kilbride Creek) it states "*Kilbride Creek is located downgradient of the site and is an area of potential groundwater discharge. However, streamflow measurements have determined that there is a loss of water occurring in Kilbride Creek along the western edge of the West Pond. It is estimated that the loss is up to 6 1/s. The loss may be attributed to underflow occurring beneath or adjacent to the creek.*" This is not consistent with the suggestion in the Natural Environment Report that water is lost to the water table. Determination of the direction of groundwater gradients through this reach is required.	Section 4.3	
34.	Since the plant list is not linked to specific ELC units within the study area, and the description of vegetation communities is very brief, it is difficult to determine what the composition of vegetation communities was, and hence which species may be impacted if hydrology changes. Following ELC standards, the plant species and relative abundances for each ELC polygon should be provided.	Section 4.4.1	
35.	The species composition of the SWC3-2 feature east of the existing haul road is typical of vegetation communities that are found in Ecoregions further north. Based on the presence of Black Spruce, Tamarack, and/or Leatherleaf, areas of low tree cover, and potentially sphagnum or sedge ground layers, if there are unique inclusions of these community types they should be described in text and identified on the relevant mapping.	Section 4.4	
36.	It is unclear why the 1989 Riley report is used for Regional status on this property, when the 2000 Varga document is more recent and applicable to this site. We recommend revising to reflect the Varga document for Regional rarity.	Section 4.4.2	
37.	The methods section states that a detailed vegetation inventory was only completed within the study area (extraction area plus 120 m of adjacent lands). However, in Section 4.4.2 it states that "The most conservative species are generally found in the western deciduous forest (FOD5-2), and the coniferous swamp (SWC3-2) that is bisected by the internal haul road." As these communities are both mostly outside of the study area, clarification regarding the level of effort and data collected should be provided, as well as the specific location of Regionally rare species and species with high CC values.	Section 4.4.2	
38.	Reference is made to various species that have high CC values and are thus sensitive to specific habitat conditions. As presented, it is not clear where these species are on the landscape, their abundance, and other relevant information.	Section 4.4.2	
39.	While not strict indicators, several species listed in Appendix B (plant list) are associated with bog and/or fen habitats, as well as groundwater discharge. This should at least be noted, and ideally would be discussed in relation to the ELC findings. This includes, for example: *Calla palustris, Carex aurea, Carex magellanica, Carex scabrata, Carex viridula, Chamaedaphne calyculata, Cypripedium spp, Equisetum variegatum, Galium tinctorium, Glyceria borealis, Glyceria canadensis, Ilex verticillata, Larix laricina, Ledum groenlandicum, Lysimachia thyrsiflora, Maianthemum trifolium, Osmunda cinnemomea, Osmuda regalis, Picea mariana, Potentilla palustris, Rubus hispidus, Spiraea alba, and Thelypteris palustris.*	Section 4.4.2	
40.	Ensure reference for Provincial status (S-ranks) is accurate (Check NHIC). If present, list or summarize low S-rank (S1-S3) species other than just Butternut.	Section 4.4.2	

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41.	Additional information is required in Table 3 to confirm local soil conditions within ELC features. In particular, the characteristics of organic soils in the organic swamp communities is requested to confirm whether or not bog or fen inclusions are present.	Section 4.4.2	
42.	The report states, "The site supports no significant terrestrial snails." This seems overly definitive, especially since the methods used to survey for land snails were not described in detail.	Section 4.5.1	
43.	The report states that none of the odonates observed are significant at any level; however, the black-tipped darner is considered rare in Halton Region. This should be revised and mitigation measures developed, as necessary.	Section 4.5.1	
44.	Reference to the EarthFX modeling approach used to evaluate potential impacts to the hydroperiod of vernal pools should be described in more detail. Some concerns were raised in the review of the hydrogeology reporting with regard to the model assumptions and inputs and their applicability to assessing frequency and amount of inundation. Additionally, it is not clear why an integrated approach to modeling the hydrologic system was not applied at a feature scale for all wetlands present on and/or adjacent to the property that will be affected by the proposed extraction (e.g. wetlands east of the rail line will be affected by extraction in the East Pond).	Section 4.5.2	
45.	The report should provide an assessment on whether the ponds can be considered SWH. There are a number of categories this could be included in such as Amphibian Breeding Habitat (Woodland), Seeps and Springs, Amphibian Breeding Habitat (Wetland), etc.	Section 4.5.2	
46.	As of April 2018, COSEWIC listed midland painted turtles as Special Concern species. Please revise the report and provide discussion on this in the relevant sections.	Section 4.5.3	
47.	The report states, "*Bats in general were not very common at the site.*" This seems too definitive given that only three locations were surveyed acoustically. This assessment also seems to assume that all bats present on the property would be foraging over or near the Central and East Ponds, as opposed to other potentially attractive foraging locations on the property. Clarify implications for both SAR and SWH.	Section 4.5.5	
48.	Clarify the connectivity and direction of flow within the watercourses flowing through the property/study area, and how these relate to existing PSW mapping and functions. Clarify if the KOA tributary is actually connected with Kilbride Creek. The report states that the haul road dividing the eastern half of the study area has altered the hydrology by increasing the water table. Based on Figure 9 it appears that there is a watershed divide in this area, with the Kilbride Creek tributary flowing south and the KOA tributary flowing north. Furthermore, Figure 8 is inconsistent with Figure 9 in that it shows KOA Tributary flowing south into Kilbride Creek.	Section 5	
49.	The area shown as Butternut Habitat on Figure 12 is within 50m (possible 25m) of the extraction area, and is very close to the haul road. Please clarify if MECP has been informed of Butternut, and if they provided feedback regarding BHA requirements.	Section 6.1.1	
50.	Although the discussion and rationale regarding a high likelihood that Jefferson Salamander is absent, the small sample size of individual salamanders that were captured should be recognized (only 13 individuals were captured). As well, discussion elsewhere in the report regarding the demographics of salamanders that are present should be recognized (i.e., that it was interpreted that there is low recruitment rate of young salamanders). In addition to the lower than usual sampling effort (two nights of trapping), both of these considerations would suggest that ruling out presence of Jefferson Salamander should not be definitive.	Section 6.2.1	
51.	The Significant Woodland assessment provided does not follow Regional standards. Significant Woodland criteria should follow those outlined in the ROP. These areas should be identified on a map to validate the study findings.	Section 8	
52.	Significant Valleylands could be evaluated based on presence of a confined system where other key features are present. We recommend that the Significant Valleylands definition from the PPS and Greenbelt Plan be used to determine significance. In the absence of such an assessment, Kilbride Creek should be considered significant and appropriate recommendations made to protect that system. These areas should be identified on a map to validate the study findings.	Sections 9, 12, 14	
53.	The text on page 64 addresses American Bullfrog under Significant Wildlife Habitat as concentration areas for this species is a category under the SWH Technical Guide (but not the SWH Criteria Schedules). The report states that the habitat of American Bullfrog is not SWH and notes that the SWHCS "*no longer recognize bullfrog habitat as being significant*". This is an incorrect interpretation as the SWH Criteria Schedules for Ecoregions 6E and 7E states, under Defining Criteria for the category Amphibian Breeding Habitat	Section 10.1	

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	(Wetlands), "Wetland with confirmed breeding Bullfrog are significant." Survey locations with confirmed American Bullfrog were adjacent to Pond 2, 3, and 10; the report should be updated to reflect the correct SWH designation and potential for impacts and/or mitigation strategies.		
54.	Section summarizing seeps and springs is missing reference to all features that have been documented on or adjacent to the property (e.g. on page 21, there is reference to a large spring that is present north of the railway bridge near Kilbride Creek. This feature is not discussed and is not mapped on Figure 13.	Section 10.2	
55.	Description of proposed development is too general. For example, presenting a structured analysis that identifies each key feature type, functions, and sensitivities crossed with specific activities associated with site preparation, transportation/hauling upgrade requirements, activities/actions will occur during each Phase would help to better understand anticipated impacts.	Section 13	
56.	The Environmental Objectives do not reflect Provincial direction or policies related to impacts on natural features, their ecological functions or the adjacent lands. We recommend that discussion take place with the agencies and the proponent to identify Environmental Objectives that will better satisfy all interests. For example, some concerns with the objectives include, but are not limited to, the following: • Environmental Objective 4 should be expanded to cover all watercourses. • Environmental Objective 5 should be revised to ensure that no drawdown should occur in any of the wetlands from the proposed works or as the worst case, a maximum allowable drawdown for each wetland should be set depending on the pre-extraction hydroperiod monitoring data.	Section 14	
57.	Maintaining 10% wetted areas in the ponds is focused on salamanders and does not take into consideration the other ecological and hydrological functions the wetlands provide. The specific ecological and hydrological needs of each pond should be established and appropriate mitigation measures identified and connected back to the updated Environmental Objectives. Similar comments can be found in the hydrogeological report comments.	Section 14	
58.	One of the key considerations missing from the impact assessment is the loss of groundwater on groundwater fed features. Replacing groundwater with surface water is not discussed in the Level II Report although it is discussed in other reports. The report should be revised to assess this impact and proposed mitigation.	Section 14	
59.	The Level II Natural Report does not include a fulsome impact assessment of the proposed application on the hydrologic function of the wetlands on site, in order to determine if the proposed mitigation measures are acceptable. Discussion on this should be included in the Level II report and the impacts/mitigation measures should be from an ecological perspective.	Section 14	
60.	While the Level II report refers the reader to the Harden report for more details, there should be an ecological interpretation provided in the Level II report for any of the proposed mitigation outlined in the Harden document so that a comprehensive assessment of the proposal can occur. Currently it is unclear how all of the proposed measures will interact with the natural environment. Please revise.	Section 14	
61.	As noted above, the Environmental Objectives should be amended in consultation with the relevant agencies. The proposed Active Actions could differ based on ultimate, agreed upon objectives, as the objectives are directly tied to the actions. We defer comment on the Active Actions until such time that the objectives have been updated.	Section 14	
62.	Any mitigation measures proposed in the other reports, that could have ecological impacts, should be discussed in this report. For example, the Harden report includes discussion on warning and trigger levels for water level minimums but these are not discussed in this report. What are these levels based on and how to they relate to the aquatic community and NHS on the site? Please amend.	Section 14	
63.	Additional details regarding the time frame and proposed actions and activities associated with each phase of the proposed project is required. Does each phase correspond to one year? If so, please clarify. Additionally, a more comprehensive summary of direct, indirect, and cumulative impacts associated with each phase of the proposed project, along with direction on strategies to avoid, mitigate, and/or rehabilitate this site in accordance with MNRF best practices are required.	Section 14	
64.	Although the authors direct the reader to the Earthfx (2018) report to review the simulated hydrological functions assessment, a detailed summary with regard to pre, interim/operating, and post (with and without mitigation) disturbance water balance and hydroperiod should be presented in the natural heritage report.	Section 14	
65.	The operational modifications are generally vague and not quantified. For example, "modify rate of extraction on a seasonal basis" is stated with no numerical values stating how the rate could be modified. These modifications should be adjusted to provide more quantifiable actions.	Section 14.1	

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66.	Pond 5 is located in a PSW and is the most productive of all of the ponds surveyed for salamanders. It is also confirmed SWH, as it provides habitat for bullfrog. Alteration of the existing outlet is not supported.	Section 14	
67.	For those wetlands that are within the zone of influence, additional details for each unit that discuss the occurrence and distribution of wetlands plants with higher CC values should be presented and can be used to rationalize the ecological response to potential changes in hydrology and degree to which mitigation is necessary. This is particularly important for wetland features located east of the rail line that were not studied in detail with regard to anticipated changes to hydrology, for example wetland features located south of the east pond may experience a 0.3 m or greater drawdown in ground water.	Section 14.1	
68.	To appreciate the scale of influence on the groundwater system related to drawdown of main ponds it would help to see this presented on one of the maps with wetland features. This will help with evaluating the associated risk to the various wetland features that are located in and adjacent to the proposed extraction areas. Generally, a clearer integration between the hydrology, hydrogeology study and the natural environment study to characterize the wetland hydrologic functions; for example, a graph showing the average depth to ground water for all wetland features under existing conditions, during aggregate pond drawdown without mitigation, during aggregate pond drawdown with mitigation could be presented in the Natural Heritage report.	Section 14.1	
69.	Report states that based on the Earthfx modeling, `Simulated groundwater drawdowns indicated that this wetland would not be affected by a water-level reduction of 1 m if phases 1, 2, and 3 were extracted concurrently. Is this referring to just the water levels within the wetland or will wetland vegetation be affected? A 30 cm water level reduction over 5 - 6 years may significantly affect wetland vegetation, in particular where sensitive species are present. It's not clear if this has been evaluated at a spatial scale that is relevant to individual features and/or inclusions within features. Additionally, to evaluate the potential change(s) in water levels should also include a measure of variability (presumably the changes presented are the model averages).	Section 14.1	
70.	With the request to include the access road within the license area boundary, adjacent features and functions should be evaluated (120 m boundary) and any recommendations implemented accordingly.		
71.	For Pond 5, it is not clear how dispersion trench 1 will mitigate impacts when the water table is lowered from drawdown in ponds 1 and 6. The direction of groundwater flow identified in hydrogeology study (Figure 4.8) is from north to south, suggesting that the pumped water will infiltrate back into pond 6, not into the wetland area associated with Pond 5.	Section 14.1	
72.	Although there are potential benefits to amphibian habitat identified for the proposed management strategy for Pond 7 (A and B), consideration should also be made for potential impacts to obligate wetland plants that may be present and affected by the proposed hydroperiod changes.	Section 14.1	
73.	To what extent will installation of the culverts affect the hydrology of the Wetland Complex south of Pond 11? Was this included in the modelling by Earthfx? Given the uncertainty around flow of surface water between these features, clarification is warranted.	Section 14.1	
74.	Text for Pond 12 indicates that water levels are controlled by discharge of stormwater into pond 13, but discussion regarding wetlands north of the internal road indicates that the wetlands are also linked to damming of the groundwater flow (function of complex of wetlands north of internal road, pg. 86). Hydrologic function in this general area should be clarified (i.e. to what degree does the wetland depend on ground water and/or surface water). The report also identifies there is an existing, non-functioning culvert or culverts between ponds 12 and 13. A new culvert is proposed in this area to reconnect Pond 12 and 13; additional consideration should be given as to the proposed location of the culvert to avoid impacts associated with runoff that enters Pond 13.	Section 14.1	
75.	It is not clear if or how CC/CW values were used to support the statement(s) that wetlands will not be impact by the anticipated reduction in water level within several wetland communities. A more detailed analysis is required to support this statement, such as using CW values, or consulting literature and case studies that document the range of tolerances, especially for species that are likely to be more sensitive to changes in hydrology/hydroperiod.	Section 14.1	
76.	If the haul road needs improvements, will adjacent natural features and functions within vicinity of the haul road be impacted?	Section 14.2.1	

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Report: GWS Natural Environment Review – July 2018		**Author: Grey Owl Environmental Inc.**	
77.	As noted in the report, there are regulated Jefferson Salamander breeding ponds present in the study area and the 120 m investigation zone. Although it is stated that these ponds will not be impacted, this inference relies on the ponds being outside of the 'zone of influence' of potential changes to the water table. The EarthFX report indicates a 0.1 m to >0.2 m draw down for ponds occurring in this area (Fig 9.1), which suggests hydro-period may be affected and appropriate mitigation actions identified. As noted in previous comments, based on mapping provided in the Natural Heritage report, it is not clear where the 'zone of influence' exists. This should be presented on a map in the Natural Heritage report, preferably overlaid with wetland features to clearly show where draw down is expected relative to wetland features.	Section 14.2.2	
78.	More detail on the proposed Buffer Pond 2 is needed. How will it function and how will it ensure that there will be no impact on the water quality, temperature and baseflow of the creek? A more thorough discussion of the buffer ponds is needed. The conversion of groundwater to surface water via Overflow Ponds to feed groundwater fed features is not supported. An alternative should be presented.	Section 14.3	
79.	In Section 4.3 (page 21) there is reference to a large spring that is present north of the railway bridge that flows to Kilbride Creek. A large spring would be expected to affect both the volume of flow and water temperature of Kilbride Creek. This feature is not discussed in this section and is not mapped on Figure 13. The potential impact of the proposed quarry on this feature and on Kilbride Creek should be assessed.	Section 14.3	
80.	The report states that if a positive hydraulic gradient between the West Pond (Pond 1) and Kilbride Creek is maintained there will be no effect on the water quality, temperature, or baseflow of the creek or the seeps and springs that contribute to it. The Hydrogeological Report states on Page 46 "The cyclical movement of warm and cool water from the West Pond will continue as presently occurring. There may be a moderation of the higher temperatures as a result of deeper, cooler water in the West Pond." The possible effects of the deeper West Pond, the Phase 4 quarry and the Phase 1 quarry on water temperature in Kilbride Creek, the tributary to Kilbride Creek that arises south of the West Pond, and the large spring just north of the railway tracks should be discussed in greater detail. The nature of the "cyclical movement of warm and cool water" is unclear. Will a deeper West Pond actually result in cooler water discharging near Kilbride Creek?	Section 14.3	
81.	The proponent should also discuss whether the presence of the new Phase 1 pond will affect the volume of groundwater discharge or the temperature of groundwater discharging to the Kilbride Creek tributary that arises south of the West Pond post-closure?	Section 14.3	
82.	The Hydrogeological Assessment report states (p 47) that the minimum distance between the Phase 1 pond and Kilbride Creek is 180 m and therefore no effect on the temperature of groundwater discharging to Kilbride Creek is predicted. A figure showing a 180 m buffer around the Phase 1 pond and other ponds is requested, so that it can be readily determined if any springs or watercourses are within that distance.	Section 14.3	
83.	The potential effect of increased turbidity due to blasting is discussed in the Natural Environment report. The potential for direct effects of blasting on fish is not discussed. The direct effects are discussed in the Blasting Impact Analysis and should be included in the Natural Environment Report. Fisheries and Oceans Canada (DFO) has published guidelines for determining the potential for blasting to affect fish (http://publications.gc.ca/collections/Collection/Fs97-6-2107E.pdf). The Blast Impact Analysis (Explotech Engineering Ltd, 2018) considers blast impacts on adjacent fish habitats in the context of those recommendations. The report states that the two watercourses in which fish habitats are present are Kilbride Creek, located approximately 50 m offset from the Southwest portion of Phase 4, and two ponds located along the access road that drain into watercourse approximately 300 m Southeast of Phase 3. Based on these separation distances, it is concluded that water overpressures generated by the blasting will be below the DFO 100 Kpa guideline limit and will have no impact on the adult fish populations present. No calculations are provided to support this statement. The supporting calculations should be provided. The report recommends that, during active spawning periods, vibrations be monitored at the closest spawning habitat to ensure compliance with the DFO vibration limit of 13 mm/s. No calculation to estimate the distance required to attenuate vibrations to this level is provided. To address this question, the locations where fish	Section 14.3	

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	habitat is present should be re-evaluated based on fish sampling in the two tributaries to Kilbride Creek that arise on the site, as well as the determination as to whether or not Pond 3 has a surface connection to Kilbride Creek. The distances required to ensure that water overpressures are less than 100 Kpa, and to attenuate vibrations to 13 mm/s, should be calculated and a figure (map) provided showing areas where extraction is proposed that are less than that distance from fish habitat, if there are any such areas. This will allow an assessment of the potential interactions between blasting and fish.		
84.	There was no mapping to show extent of Significant Woodlands. There are at least two areas where woodlands are proposed for removal as a result of the proposed extraction; other woodland areas are directly adjacent to the proposed extraction areas. As Significant Woodlands have not been mapped in accordance with the ROP, it is not clear where overlaps with other significant features are present and where mitigation strategies are required. Mapping should be provided to clearly show where Significant Woodlands are present, and where mitigation strategies such as buffer areas may be required.	Section 14.4	
85.	There is no analysis and little discussion of how the specific woodland and/or swamp vegetation communities will respond to reduced water levels. The specific location of Significant Woodland areas should be identified on a map; for each Significant Woodland unit, other significant features should be identified, as well as the occurrence of all plant species. Assessment of species' CC/CW scores of species present within each vegetation community area should be used to evaluate the potential for indirect impacts based on proposed changes in ground water. Updates resulting from this comment apply to all Significant Woodland features that are within the subject lands and the 120m investigation zone, or which have the potential to be impacted by the proposal.	Section 14.4	
86.	This section addresses potential impacts and provides high-level mitigation recommendations for SWH types based on those identified using the SWH Technical Guide criteria. The section should be updated to document any other SWH types (based on Ecoregional Criteria) that are present, direct/indirect impacts, and mitigation strategies.	Section 14.5	
87.	The proposed restoration may need to change as a result of addressing the above comments. Additional comments may be provided on the restoration once changes have been made.	Section 14.6	
88.	Planting of "wet meadow seed mix" proposed, however without species the appropriateness of this mix cannot be confirmed. Conditions on a 3:1 or 2:1 slope will likely be too dry for a wet meadow seed mix.	Section 14.6	
89.	Planting of "tree & shrub plantings" proposed for 15m setback along west property line (Phase 1 pit), however without a proposed species list, the appropriateness of the species chosen cannot be confirmed. Species and size details required.	Section 14.6	
90.	"Shallow littoral areas" are proposed in 5 locations, however the majority of the pond edges do not have this treatment. Consider expanding extent of shallow littoral areas so that stated benefits to wetland flora and fauna can be realized. Section 14.6 of report notes that the intent with these areas is to create shallow marsh habitat, however no details on vegetation in these areas are provided. The report states that additional details are provided on figure 16, however no additional details are provided.	Section 14.6	
91.	Page 97 - Bullet point 1 recommends replacing culverts. Depending on fish communities in existing ponds timing windows may apply - more detail required.	Section 14.6	
92.	Page 97 - Bullet point 2 recommends management of Phragmites, however more detail is required about product to be used, methods, and timing windows. Recommend referring to BMPs which have been prepared by the Ontario Phragmites Working Group.	Section 14.6	
93.	Page 97 - Bullet point 3 recommends management of Common Buckthorn, Dog Strangling Vine, and Garlic Mustard. Recommend referencing BMPs prepared by the Ontario Invasive Plant Council regarding product to be used, application rates and timing. BMPs should also be provided to avoid introduction and spread of invasive species that are not currently present on the site.	Section 14.6	
94.	Should mention what surveys were done to determine presence/absence of amphibian or is presence assumed? Also how it was determined they breed unsuccessfully as it is somewhat unclear.	Section 14.6	
95.	In general, a monitoring plan should be presented that provides more detail. Text should indicate whether monitoring will continue to be done during or post extraction to ensure there are no impacts on wildlife? Or is it just assumed?	Section 14.6	
96.	Figures 15 and 16 - Notes refer to maps 3 of 5 and maps 5 of 5 however only maps 2 and 4 are provided as part of the natural environment report. Other relevant maps/figures should be provided.	Section 14.6	

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97.	Figure 16 - Under "proposed vegetation" "nodal clusters of native woodland and meadow species" are proposed, however species are not given.	Section 14.6	
98.	Figure 16 - A "constructed salamander breeding pond" is proposed within P15, however no details are provided about this in either section 14.6 or on figure 16. Due to the location of P15 within a natural forest, construction of this salamander breeding pond could adversely affect other vegetation or wildlife habitat which otherwise not be impacted by the extraction operations.	Section 14.6	
99.	Figure 16 - Under "topsoil and overburden" the following note is provided about revegetation: "Adequate vegetation will be established and maintained to control erosion…" Further detail required on species proposed, as use of non-native seed mixes could adversely impact surrounding natural vegetation communities.	Section 14.6	
100.	Although Section 15 provides direction on Mandatory Environmental Protection Measures, Operational Environmental Enhancement Measures (During and Pre-extraction), and Environmental Enhancement Measures (Progressive and Final Rehabilitation), there is no monitoring plan outlined that would allow for the validation and/or adaptive management of the proposed actions. This section should be updated with a comprehensive monitoring plan that address the efficacy of management actions, and provides recommendations for adaptive management in the event that the proposed actions do not work.	Section 15	
101.	Please provide all field data sheets digitally for the surveys undertaken		

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Report: Transportation Impact Study – June 2018		**Author: Paradigm Transportation Solutions Ltd.**	
1.	Consistent with the Halton Region Transportation Impact Study Guidelines Section 3.6.2 Safety Analysis, the Report should be updated to include a “Safety Analysis” section to discuss potential safety or operational issues in the Haul Route study area. The Safety Analysis should consider potential safety or operational issues associated with elements such as corner clearances, sight distances, access conflicts, heavy truck movement conflicts, etc. A review should be completed and documented in the Transportation Impact Study.	Sections 4.0, 5.0 and 6.0	
2.	The Transportation Impact Study significantly underestimates the impact of additional heavy trucks to the road network by using a passenger car unit equivalent (pcu/veh) of 2 for heavy trucks. Loaded heavy trucks should have a factor of 3 pcu/veh applied.	Sections 3.0, 4.0 and 5.0	
3.	Under existing conditions, several intersections within the study area / haul route operate with critical movements (LOS F & over capacity). The additional truck traffic generated from the subject site would exacerbate these issues. This is evident in the future conditions analysis even though the incorrect pcu/veh have been utilized. Therefore, operating conditions will actually be worse than indicated in the report.	Section 2.0 and 3.2	
4.	The site generated traffic triggers critical movements at some of the study area intersections, which are operating satisfactorily in the future background conditions (without the site-generated traffic).	Section 3.2	
5.	It is noted that the average load per truck is estimated at 33 tonnes per truck but no information is provided to determine the legitimacy of this assumption. Further to this, the forecast site activity appears to be based on a proxy site (Erin Pit) but no information is provided to verify these assumptions.	Section 3.2	
6.	Additional trucks generated at north ramp terminal results in significant delays, please provide improvement recommendations as MTO does not install traffic signals, which are not warranted.	Section 3.2	
7.	In Section 3.2.2, please clarify which month the data was extracted for hourly shipping activity.	Section 3.2.2	
8.	In Section 3.3 (Trip Generation), outbound truck volume from rock quarry, should have a Passenger Car Equivalent factor of 3 (1 truck =3 passenger cars) when calculating trip generation.	Section 3.3	
9.	Reid Side Road is designated as a Local roadway in the Town’s Official Plan. It is not meant to carry a significant amount of traffic or truck traffic. The proposal would result in Reid Side Road not functioning as intended. A comment stated on Page I of the TIS under the Assumptions section that Reid Side Road is a Truck Route is incorrect. Reid Side Road is not a Truck Route. Given that this fundamental assumption is incorrect, the validity of the rest of the findings in the report are called into question.	Page I in the Executive Summary	
10.	The TIS has not considered the potential safety impacts from the increase in truck traffic that could result in a higher number of collisions in the area, as well as increase the severity of the collisions. Further to this, people tend to make more risky manoeuvers when in traffic congestion as is expected per the future conditions analyses.	Section 4.0 and 5.0	
11.	The TIS has not confirmed whether truck traffic can enter and exit the site in a forward motion or that the access road and site can safely accommodate two-way truck traffic. No review of on-site queuing while trucks are waiting to be loaded/unloaded has been provided. No review of potential queueing into municipal right-of-way has been provided.	Section 4.0 and 5.0	
12.	The TIS recommends installing unwarranted traffic signals at the intersection of Reid Side Road and Guelph Line Off-Ramp. While this intersection is not under the jurisdiction of the Town or Region, it would not meet minimum signalized intersection spacing requirements outlined in OTM and could result in other operational, safety, and queuing issues. This issue should be explored further and documented in the updated TIS in conjunction with comments 17-22 below.	Section 5.0	
13.	A Town Fire Station and Region EMS station are located on Reid Side Road and the additional truck traffic could negatively impact emergency response times. Opportunities to maintain or enhance the safe and responsive operation of the emergency services station on Reid Side Road in its current location should a quarry be approved by the Province need to be explored in the TIS.	Section 5.0	
14.	As per Schedule 26, By-Law No. 1984-1, heavy traffic is prohibited all year on Reid Side Road, as well as Twiss Road (Derry Road to North Limit of Roadway). Naturally, this regulation comes with a necessary exemption that stipulates the prohibition does not apply to any vehicle actually engaged in making a delivery or a collection from a premises that cannot be reached except by way of a road or portion of road where heavy trucks are prohibited. These vehicles may only travel on that road to the extent that is unavoidable in getting to/from that premises. Trucks making collections / deliveries to / from the Reid Side Road Quarry (if a Licence is issued by the Province) would fall under this exemption. However, as previously stated Reid Side Road is currently designated as a local roadway and is not intended to carry significant truck traffic.		

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Report: Transportation Impact Study – June 2018		**Author: Paradigm Transportation Solutions Ltd.**	
15.	The Town of Milton completed a geotechnical investigation for Reid Side Road in 2016. It has to be noted that this study was done and focused for asphalt overlay purposes. This study identified that Reid Side Road is a local rural road. The geotech investigation (2 boreholes for this section of Reid Side Road) indicated an asphalt thickness of 180 – 200mm and granular thickness ranging from 410-560mm. It would therefore appear there are areas within the road structure that do not have the granular thickness required by the Town standards for an industrial road in this location. A copy of this report is available upon request.		
16.	In order to determine if the existing road structure or make up is sufficient to accommodate the anticipated heavy truck traffic expected to be generated by this development, the Town will require the applicant to have a Geotechnical Investigation completed, which shall address the suitability of the existing road to accommodate the anticipated traffic and loading associated with this development. This report should make a recommendation as to whether the road is suitable in its current condition or if improvements are required to accommodate the anticipated site generated traffic.		
17.	The Town will review the Geotechnical Investigation and will have this peer reviewed. The Town will look to recover any fees associated with this peer review from the applicant.		
18.	An assessment in the TIS of the impact on the safe operation of Reid Side Road (and any other road proposed to be used by the aggregate trucks) by cyclists and pedestrians needs to be provided including mitigation measures necessary to provide a safe environment for both cyclists and pedestrians and to separate the cyclists and pedestrians from the proposed truck traffic.		
19.	Proposed elements impact the north and south ramp terminals due to the site traffic generated. Please provided mitigation methods to improve intersection operations. The area is located in an intermediate commuter corridor, seasonal factors are not required to be applied. Please use provided turning movement counts in the updated submission.		
20.	Please provide electronic copy of synchro files of updated analysis to the MTO for review and comment.		
21.	There is a culvert being replaced within the Reid Side Road right-of-way this summer. Should the road need to be upgraded to accommodate the heavy trucks associated with the JDCL RRRQ, this culvert may need to be replaced again as would others along with others along Reid Side Road.		

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Report: Blast Impact Analysis – June 2018		**Author: Aercoustics Engineering Ltd. (“AEL”)**	
1.	In their executive summary, Explotech states that they have reviewed the available site plans. They should append that in their report so that it can be crossed referenced in the review.	Executive Summary	
2.	In their executive summary and introduction sections and cover page, Explotech has identified the legal description of the property as Part of Lots 6, Concession 2. This should be corrected to correspond to information in the site plans.	Executive Summary; Introduction	
3.	The current elevations and the final elevation of the proposed quarry floor cannot be confirmed from the Aerial Photograph of Property and Environs Operational Plan in Appendix A of BIA report.	Appendix A	
4.	Explotech has consistently based their predicted Peak Particle Velocity (PPV) calculations on the use of 76 mm diameter drill-holes for depths in excess of 22 m. The proposed drill-hole size is questionable, if not applicable, particularly for the proposed extraction method (drilling and blasting in wet) for the following reasons: • Expected drill-hole deviation for depths greater than 10 m. • Expected difficulties loading holes for depths greater than 10 m. • Expected inconsistency in maintaining the burden and spacing between drill-holes along the depth of the drill-holes for depths greater than 10 m. • Expected hole-to-hole propagation resulting in detonation of more than one hole per delay period, should the holes intersect each other at depths. • Difficulty in employing liners to control migration of bulk explosives in regions of rock-mass beyond the blast-hole, particularly in strata layered rock-mass formations. Type of liners (sleeves) should be identified. • Difficulty in rectifying collapsed or plugged drill-holes.	Proposed Aggregate Extraction, pg 7	
5.	Explotech indicates that quarries in Ontario employ drill-hole size ranging from 76 mm to 152 mm. Although employing larger diameter drill-holes will alleviate problems associated with the smaller diameter drill-holes, particularly for the proposed extraction method, and depths in excess of 10 m, it will necessitate a good control on the quantity of explosives per delay period by introducing multiple decked charges within a single borehole in order to meet the vibration and overpressure level requirements. In this respect, Explotech should include a table identifying allowable quantities of explosives per delay period for given standoff distances as a guideline based on their vibration prediction formula.	Proposed Aggregate Extraction, pg 7	
6.	Based on experience and analysis of large volume of vibration data, USBM concludes that generally vibration character is most affected by the blast design, shot geometry, charge weight per delay period, delay sequence, and other blast design parameters at distances closer to the blast, whereas, at large distances from the blast, these parameters become less critical and transmitting medium will play a more dominant role in the character of the vibration wave. It is therefore important to collect vibration data at various standoff distances from the blast, far, close and in between, in order to establish a more reliable attenuation curve.	Blast Vibration and Overpressure Limits	
7.	Using vibration data from other quarries with similar ground characteristics would be typical when developing vibration prediction models for new operations where site-specific data is not available. Explotech has used their in-house vibration data collected from such quarries. The attenuation curve presented in Appendix C of their BIA report is based on 43 data points from various quarries. We question the reliability of the attenuation curve based on such limited number of data points. In addition, we are not sure what percentage of this data was collected in relation to subaqueous blasting. It is our understanding that the proponent is presently operating a quarry in Guelph area using subaqueous blasting method. It would be prudent to include vibration data acquired from this operation, if such data is available.	Blast Vibration and Overpressure Limits; Appendix C	
8.	Although use of empirical formulas such as United States Bureau of Mines (USBM) model in determining range of flyrock escaping the blast site is useful, there is no replacement for careful site assessment prior to every blast. This is because, empirical models lack critical site-specific conditions, such as presence of loose material on top bench and potential depleted burden at the face and along the first row. Use of models such as USBM model for determination of flyrock range as a function of shot conditions is a norm in the industry for predicting flyrock range as a tool at the startup of the operation. The question will remain that Explotech has only provided model’s estimated safe range for 76 mm diameter holes. In addition, since the upper 5 m of the top bench will be exposed, presence of water will have no influence on the range of flyrock produced from cratering on top bench.	Blast Mechanics and Derivatives; Appendix C	

	Comments	Page / Section	Applicant Response
Report: Blast Impact Analysis – June 2018		**Author: Aercoustics Engineering Ltd. (“AEL”)**	
9.	In their BIA report, Explotech indicates that the quarry will not be dewatered, and as such, extraction will take place in single bench. This will subsequently eliminate the possibility of reducing the quantity of explosives per delay period by employing multiple bench blasting. The single bench height varies from 22 m+/- to 35 m+/-, with initial blasting (sinking cut in Phase 1A) having a 30 m+/- bench height. Since the elevation of existing water table is estimated to be at or slightly below the top of rock, drilling will be possible from dry area for some portion of the proposed extraction. However, majority of, if not all, blasting will be underwater (note the close proximity of the existing Central Pond). Assuming, 76 mm diameter holes can be drilled for a depth of 30 m+/-, and allowing a 2 m+/- collar, and explosive density of 1.25 g/cc (for most emulsions) a single explosive deck charge of 134 kg will be required per hole. This will exceed the allowable quantity of explosive per delay period based on Explotech’s suggested regression formula (decking the charges for sinking cuts, particularly in heavily saturated ground is not recommended).	Proposed Aggregate Extraction	
10.	Drilling 76 mm diameter holes are only possible using top-hammer drill rigs, with questionable drilling accuracy for drill-holes greater than 10 m in depth. Drilling accuracy increases significantly using In-The-Hole (ITH) drill rigs. The cost of drilling will also decreases significantly using ITH drill rigs. The only problem is that, presently use of ITH is limited to drill-holes greater than 89 mm (3.5”) in diameter.	Proposed Aggregate Extraction	
11.	Nearly all commercial explosives contain compounds that are considered groundwater contaminants toxic ingredients, such as nitrates, hydro-carbonates and ammonia. What type of explosives will be used as part of blasting operations? Packaged or Bulk?		
12.	If bulk explosives are used, more information with respect to mitigating measures to ensure confinement of explosives in the borehole and to eliminate the risk of migration of explosive-source-contaminants in the water, should be discussed		
13.	If the quarry is not dewatered, there exists a potential for migration of water within the quarry to aquifers supplying the existing wells in the area. What mitigation measures will be put in place to address this should monitoring results confirm exceedance(s)?		
14.	Although rare, in any blasting operations, detonation failure of one or more hole(s) may occur. How would the quarry operator ensure the undetonated explosive products are identified and handled to minimize contamination of water within the quarry?		
15.	What would be the potential effect of repeated (cumulative) exposure of the water within the quarry to explosive products, particularly from the established free-face region, and spillage from top bench?		
16.	Who will be monitoring changes to existing well and ground water in the surrounding area during the extraction operations? What monitoring protocols will be in place?		

	Comments	Page / Section	Applicant Response
Report: Noise Impact Study – Project 16424, Reid Road Reservoir Quarry – December 2017		**Author: Aercoustics Engineering Ltd. (“AEL”)**	
1.	Noise Criteria: Section 4 of the AEL Report discusses the applicable noise criteria for the project. Ambient sound levels at the modelled residences are predicted using STAMSON v5 road traffic noise prediction model. Model results are provided in Appendix B. The report states that “consistent with the ORNAMENT prediction procedure, the traffic volumes were taken to be the same throughout the day or night”. This is incorrect. The ORNAMENT document is simply a noise propagation algorithm and does not specify what traffic volumes should be used in assessment. Historically, when assessing transportation noise impacts from 400-series highways, and in the absence of additional information, the MTO has recommended using an even spilt between daytime and night-time traffic volumes, i.e., that “the traffic volumes were taken to be the same throughout the day or night”. However, this is for assessing longer-term sound levels (16 hour L_{eq} Day sound levels, and 8-hour L_{eq} Night sound levels), and <u>not</u> for determining L_{eq} (1 hr) sound level limits for stationary noise assessments. Based on our experience in the area, traffic on Highway 401 in this area is not evenly distributed over the day. There is a definite diurnal pattern. In addition, high traffic volumes on the highway will contribute to slow-downs during peak periods (morning and evening rush hours), which can result in lowered ambient sound levels during key periods (e.g., the 6 am hour when shipping and receiving from the quarry are occurring, and the 7am hour when operations begin). In addition, a review of the STAMSON modelling inputs provided in Appendix C indicates that attenuation from woods has not been included in the predictions of ambient road traffic noise levels. There are significant woodlots in the area, which between Highway 401 and the affected residences, which will substantially reduce ambient sound levels. Parenthetically, from the noise model outputs provided in Appendix C, AEL <u>included</u> attenuation from woods when evaluating the impacts from the quarry, making their assessment inconsistent and non-conservative. The effect of the ambient modelling issues identified above are that the guideline limits identified in Section 4 and used in the assessment for the design of noise mitigation measures are not accurate; the ambient sound level limits in the area should have been confirmed through noise monitoring; the actual limits are likely to be substantially lower; as a result, the mitigation measures outlined in the report are unlikely to be sufficient; and the noise guideline limits are likely to be exceeded at some residences.	Pg 4-8 Section 4.2	
2.	Table 2 provides a list of the receptors considered in the assessment. Eleven existing residences and 8 zone-for-sensitive use vacant lot receptors were identified. The report does not note that this is not every residence in the area – rather, it is a subset. For example, there are additional residences along 1st Line which were not specifically assessed. Given the complexity of the site and the requirement for noise mitigation, all existing receptors near the site should have been included in the noise modelling. [Also raised in the Summary Statement section.]	Pg 4-8 Section 4.3	
3.	The modelled receptor heights for the stationary noise assessment are not provided. The existing residences in the area range in height from 1 to 2-steroeys tall. Under NPC-300 guidelines, the worst-case point of reception would be the upper storey windows typically assumed to be at 1 .5 m above ground for a 1-storey home, and 4.5 m above ground for a 2-storey home. If an incorrect lower receptor height were to be used, it would over-estimate the effectiveness of noise barriers and therefore underestimate potential noise impacts.	Pg 5-9 Section 5.1	
4.	Aggregate Quarry Noise Sources: Table 1 provides the reference sound power levels used in the assessment. Based on our review: • Rock Drill - the value of 74 dBA at 30 m is on the low end of typical values and suggests that the rock drill would need to incorporate source-based noise mitigation to achieve these levels. If this is the case, it should be noted as a mitigation requirement. • Extraction Loader – The AEL report uses the same noise emission level of 69 dBA at 30 m for both extraction and shipment loaders. However, for noise assessments at other sites AEL has used a	Pg 5-9 Section 5.2	

	Comments	Page / Section	Applicant Response
Report: Noise Impact Study – Project 16424, Reid Road Reservoir Quarry – December 2017		**Author: Aercoustics Engineering Ltd. (“AEL”)**	
	value of 74 dBA at 30 m for extraction loaders, which is representative/ typical of larger loaders which would likely be required for extraction here (removing the material from under the water). • Dragline – in our experience we would expect the sound power level for a dragline to be similar to a larger excavator, in the 74 dBA at 30 m range, as opposed to the modelled level of 69 dBA. The effect of the noise modelling issues identified above are that the off-site sound levels from facility operations may be underpredicted. As a result the noise mitigation requirements will not be adequate. This issue conflates with the previously identified issue concerning the guideline limits. The mitigation measures outlined in the report are unlikely to be sufficient; and the noise guideline limits are likely to be exceeded at some residences.		
5.	Recommended Noise Controls: As discussed above, the recommended noise controls are unlikely to be sufficient, to ensure compliance with the noise guidelines, given the issues identified with the noise modelling.	Pg 5-10 Section 5.3	
6.	Given that the noise control measures require limitations on noise emissions from specific items of equipment, and the installation of significant noise barriers, a noise monitoring program is warranted.	n/a	

	Comments	Page / Section	Applicant Response
Report: Reid Road Quarry Air Quality Assessment – June 2018		**Author: RWDI**	
1.	Figures 2a through 2e, indicate that all unpaved roadways were modelled using line sources in AERMOD. As per Section 4.5.3 of the MECP Air Dispersion Modelling Guideline (A-11), the use of line sources to simulate roadways can be inappropriate due to model limitations of this source associated with low release heights and the lack of plume rise. The MECP recommends the use of a series of adjacent or separated volume or area sources. The US EPA provides further guidance on the modelling of haul roads using this methodology.	Figure 2a through 2e	
2.	Figures 2a through 2e, indicate that all loading, crushing, and conveyor transfer points may have been modelled using a series of point sources. No further information is provided in Section 6 of the report detailing the methodology employed to simulate these sources in AERMOD. The use of point sources may be inappropriate as the emissions from these sources are not through the release of a stack. The loading, crushing, and conveyor systems are all best simulated with volume or area sources.	Figure 2a through 2e	
3.	Table 1 of the Report indicates that the Guelph monitoring station data was used in the assessment of cumulative impacts from background data. This monitoring station is located in a suburban park well away from industrial sources and major roadways. The Reid Road Reservoir Quarry is located immediately adjacent to the provincial highway 401, where background levels may be more elevated due to major road traffic. Justification for the use of the Guelph monitoring station over other available data sets was not provided.	Table 1	
4.	Appendix A: Processing Emissions Spreadsheet indicated that no emissions from central plant were estimated as 100% control was assumed because of the water spray bars as lined out in the Best Management Practices Plan. As per Section 8.5 of the Environment Canada Pits and Quarries Reporting Guide, a 50% control factor can be applied due to water spray activities, and 50% can be applied because of wet material. It is our opinion that 100% control should not be assumed and is non-conservative. Justification for the use of a 100% control factor at the Central Plant was not provided.	Appendix A	
5.	Appendix A: Processing Emissions Spreadsheet for the screening source at the central plant indicated that the controlled AP 42 emission factor was employed. As AP 42 emission factor for controlled screening sources is estimated from sources employing wet suppression techniques, to then apply a further reduction of 90% due to the use of a wash screen is inappropriate and underestimates the emission rate. Either the uncontrolled emission rate should be used in conjunction with the 90% reduction or the controlled emission rate alone should be used.	Appendix A	
6.	Appendix B: Bulk Material Handling Emissions Spreadsheet indicated a 90% control factor was applied to the stockpiles due to water application techniques as outlined in the Best Management Practices Plan. Section 13.2.4.4 of the AP 42 chapter on Aggregate Handling and Storage Piles, indicates that up to a 90% control of particulate emissions can be assumed if watering treatment is also coupled with continuous chemical suppressant treatment. The assumed control of 90% may be non-conservative and further justification should be provided.	Appendix B	
7.	It is uncertain how the mitigation measures recommended would be regulated. Is the proponent planning to acquire approval from the Ontario Ministry of Environment, Conservation and Parks and will the Best Management Practices Plan for dust management be imbedded in the site plans? There should be a legislative instrument in place that requires the mitigation to be implemented and followed during the life of the facility to ensure compliance with the air quality regulation.	Review of air quality assessment materials	

	Comments	Page / Section	Applicant Response
Report: Aggregate Resources Act (ARA) Summary Statement Report		**Author: MHBC Planning**	
	Report will need to be updated to reflect updated technical reports		
1.	There are 23 residential uses within 500 metres, 55 residential uses within 1000 metres and 131 residential uses within 1500 metres of the quarry licence boundary. Clarity of the potential for impacts to these sensitive land uses needs to be explored and assessed more comprehensively.	Section 1.2, Section 9.3	
2.	In the 7th paragraph of the Summary Statement, last sentence, it states that "the subject lands will utilize an existing truck route…" Reid Side Road is not a designated truck route by the Town of Milton. This error is repeated on page 7, Section 1.4, 2nd paragraph, page 15, Section 7.0 bullet 3, and on page 26, Section 11.0 in the 2nd paragraph.	Summary Statement 7th paragraph and other references noted in comment	
3.	Page 2, 2nd paragraph, it is unclear if there any rehabilitation that was not completed to the satisfaction of the MNR on the subject property when the licence was revoked. If so, these deficiencies need to be addressed in accordance with MNRF best practices prior to the consideration of any new licence being issued on the subject lands.	Section 1.2	
4.	How will trucks waiting to enter the property in the morning be accommodated on the subject land and without negatively impacting the adjacent uses, public right-of-way or the normal and safe operation of Reid Side Road and Twiss Road?	Section 1.4	
5.	Can an update of the review and clearance by the Ministry of Tourism, Culture and Sport be provided and should a clearance be provided to the applicant? If so, it should be provided to the agencies.	Section 4.0	
6.	The portion of the haul route located on the subject property should be included within the proposed licence area boundary and provided the same level of comprehensive review as all other parts of the proposed quarry application.	Section 7.0	
7.	Page 17, bullets 5 and 6, the capacity deficiencies notes in the TOS will however be exacerbated by the new demands generated by the proposed quarry and need to be mitigated. All improvements need to be paid for by JDCL.	Section 8.0	
8.	The proposed use does not conform to the Regional Official Plan. Based on the technical review outlined above, many additional issues remain to be addressed for JDCL to have appropriately demonstrated conformity to the Regional Official Plan.	Section 8.1	
9.	It is unclear whether all lands proposed for extraction are zoned for the proposed use. It should be demonstrated that all components of the use can be undertaken within the lands currently zoned Extractive Industrial (MX).	Section 8.2	
10.	The agencies disagree with MHBC's opinion that the Provincial Policy Statement and Greenbelt Plan are not relevant to the review of this application. The ARA Licence Application requirements, Natural Environment Report Standards and current provincial guidance material (e.g., MNRF policies and procedures, Natural Heritage Reference Manual) indicate that the Provincial Policy Statement and the policies of the Greenbelt Plan need to be considered. This consideration needs to be demonstrated and documented.	Section 8.3 and 8.4	
11.	No recourse has been identified should a blasting issue be identified after the licence has been issued.	Section 9.1	
12.	On page 25, the report should be updated and JDCL shall commit in writing that any impact from an air quality perspective shall not be permitted to extend beyond the licence boundary area.	Section 9.2 and 9.3	
13.	It appears from the text in the 2nd paragraph at the top of page 26 that there is also a pond in Phase 5. So would there be 5 ponds in total? Please clarify what is being proposed in the Phase 5 area.	Section 10.0	
14.	The summary statement should address the applicability of the *Conservation Authorities Act* pre-, during and post-operation. Although areas licensed for aggregate extraction under the ARA are exempt from conservation authority permitting activities, Conservation Halton's regulation and policies are applicable prior to a license being granted and once a license is surrendered or revoked. Pursuant to Ontario Regulation 162/06, Conservation Halton regulates, all development in or adjacent to river or stream valleys, wetlands, shorelines or hazardous lands; alterations to a river, creek, stream or watercourse; and interference with wetlands. Conservation Halton's *Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document* can be found at: www.conservationhalton.ca.		
15.	The summary statement should also address the applicability of the *Clean Water Act*.		

	Comments	Page / Section	Applicant Response
Site Plan: ARA Site Plan Package – July 2018		**Author: MHBC Planning**	
	Until such time as all the issues identified by the Province, Municipalities and Conservation Halton have been addressed, detailed comments on the proposed site plan package cannot be provided. A fulsome conversation on layout and conditions to be applied on the operation will be warranted once issues with the reports identified above are advanced. The following preliminary technical comments are available immediately.		
1.	Five Phases of the proposed quarry operations are illustrated in Drawing 2 of 5 Operational Plan by MHBC (Revisions as per MNRF comments July 16, 2018). Phase 1 includes excavation above and below water table in the area of Pond P3. Site preparation prior to commencement of excavation include the installation of supplementary pumping infrastructure as well as the construction of fencing and acoustic barriers. Monitoring of vibrations and over pressure created from blasting activities will be part of the quarry operations. There is no mention, in the Operation Plan Page 2 of 5, of the assumed operational extraction rate upon which the impact assessment was modelled.	Operational Plan, Drawing 2 of 5	
2.	As part of Phase 1, the western portion of the East Pond P11 will be filled with materials from the Phase 1 excavation for construction of the processing facilities temporarily located within the Phase 5 extraction area. These facilities include; weigh scale, scale house, office and shop. Excavations into the bedrock are to extend to a maximum depth of 30 m with base elevation of about 262 masl. Extraction of bedrock materials will be achieved with the creation of a shot rock pad constructed within the existing ponds through which drill holes will be completed for rock blasting. The rock will be blasted in one lift of about 25m. The shot rock will be removed by a drag line and/or excavator working from a shot rock platform created adjacent recently blasted area. Groundwater level monitoring of selected monitors will be part of the quarry operations. It is questionable whether the number and location of groundwater and surface water monitoring points are adequate for assessing impact from the proposed aggregate operations. Warning levels and trigger levels have been established using historically low groundwater levels measured on-site. The limited monitoring data is considered inadequate for establishing historically low water levels and for establishing trigger water levels.	Operational Plan, Extraction Sequence Schematic, Drawing 2 of 5	
3.	There is an inconsistency in the Rehabilitation Plan, Drawing 4 of 5 of the Reid Road Reservoir Quarry Drawings. This drawing shows the perimeter of the excavated pond areas as having a slope which in indicated in the drawing notes as “1:1 (vertical) Side Slope Below Water)”. A slope of 1:1 is a 45 degree angle. Drawing 4 of 5 clearly shows sloped sides to the excavated pond sides. Cross- Sections on Drawing 5 of 5 contradict Drawing 4 by showing rehabilitated ponds having vertical sides below water level. This inconsistency requires correction.	Rehabilitation Plan, Drawings 4 and 5	
4.	A crusher is proposed to be set up in Phase 5. There is no indication if a portable crusher will be used when the rock under the crusher is extracted, and, if yes, where will this portable crusher and stockpiles be located.	General comment	
5.	There is no indication of the direct source of aggregate processing water and dust control water, if wash water is proposed to be recycled, where will this system be set up, and what system will be used.	General comment	