



Proposed Reid Road Reservoir Quarry JART COMMENT SUMMARY TABLE RESPONSE #2

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 comments and individual agency objections. **Additional comments may be provided once a response has been prepared by JDCL 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	Groundwater and surface water monitoring has continued. There are dataloggers now installed in eighteen locations. We have attached data collected up until October 7, 2019 (Appendix A) and data collection is ongoing. Trigger levels will be assigned prior to any extractive activities occurring, therefore an additional several months of data will be available.	<p>Ongoing monitoring is considered essential in establishing baseline conditions prior to commencement of operations. At a number of locations Minimum Water Level Thresholds (MWLT), Warning Water Levels (WWL's), and Target Water Levels (TWL's), are based upon limited (i.e., three or fewer) data points for monthly threshold, warning, and target levels. The resulting levels may not be fully representative of long term baseline conditions. It is therefore questionable whether the available data and related MWLTs, and TWLs are appropriate for protection of the on-site features.</p> <p>A protocol for updating MWLTs, WLTs, and WWLs needs to be established by the JDCL's Team and incorporated into a revised and consolidated implementation document referred here as the Implementation Guide (IG)).</p> <p>Per the January 16-17, 2020 meetings between JART and JDCL's team re. (i) JDCL's responses to JART's hydrogeological-assessment comments, and (ii) JDCL's draft Environmental and Water Management</p>	

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			<p>Operational Guide (Nov/19) (OG) and Supplement (Dec/19) (SOG).</p> <p>A revised and updated version of the OG entitled Draft Environmental and Water Management Implementation Guide dated February 2020 (IG) was submitted February 2020. Information from both the OG and SOG were combined into the IG document. The document referenced as Operational Guide and Implementation Plan (OG&IP) at the January 16th and 17th, 2020 JART meeting with JDCL, should be referred to as the Implementation Guide (IG) for consistency with the February 2020 document by JDCL. Comments may refer to these various documents interchangeably, with the overall JART intent being to see these consolidated into that final monitoring document and ARA Site Plan and notes as required.</p> <p>Note: the difference between “trigger” relative to “threshold” (per MWLTs) and “targets” (per TWLs) need to be clarified (e.g. in the definitions’ section of the IG document). Please provide additional information in the IG.</p>	
<p>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.</p>	<p>Section 2.0</p>	<p>Groundwater and surface water monitoring has continued. There are dataloggers now installed in twenty two locations. We have attached data collected up until October 7, 2019 and data collection is ongoing. Trigger levels will be assigned prior to any extractive activities occurring, therefore an additional several months of data will be available.</p>	<p>It is agreed that additional monitoring data will provide greater reliability in the proposed MWLTs, WWL, and TWLs as being representative of baseline site conditions. Proposed additional groundwater monitors CB12S/D, CB13S/D, CB14, and CB15 are identified in the IG by JDCL.</p> <p>Water quality monitoring for turbidity was included within the IG for the proposed monitors CB15 and for surface water stations SG9 and SG10A to establish baseline conditions.</p> <p>Per the January 16-17, 2020 meetings:</p> <ul style="list-style-type: none"> • In addition to the proposed locations for MWLTs, TWLs, and WWLs, all established and proposed monitoring locations are to be monitored for water levels to facilitate regular re-assessment of groundwater flow conditions. • The complete monitoring plan is to be included in an addendum to the hydrogeological assessment, the IG document, and the Site Plan. 	

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			<p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG and indicate revisions on the updated Site Plan, as applicable.</p> <p>The Environmental and Water Management Implementation Guide, February 2020 (IG) included additional groundwater monitors KC1, CB16S/D, and CB17. Water Quality Monitoring for general chemistry, metals, ammonia, nutrients and BTEX was added for CB17. Turbidity monitoring was added for CB15, CB16D, SG9 and SG10.</p> <p>The following issues remain unresolved:</p> <ul style="list-style-type: none"> <li>• Water quality analysis recommended for CB16S/D is incomplete and lacking sufficient detail for the identification of impact from the proposed quarry operations <li>• There is inadequate monitoring for turbidity and temperature within the existing ponds (West, Central, and East pond). <li>• There is inadequate monitoring for turbidity and temperature for the mitigation facilities, BP1, BP2, DT1, and DT2. <li>• There is inadequate water quality monitoring at the northwest corner of Phase 1 extraction area, the nearest point to Kilbride Creek for this phase of extraction. <li>• Monitoring parameters for new monitor KC1 has not been identified. <li>• Surface water monitoring is considered inadequate without considering the inclusion of selected seepages and springs between West Pond and Kilbride Creek, as well as those between Phase 1 excavation and Kilbride Creek , and seepages within the Tributary valley of Kilbride Creek. <li>• Surface water and groundwater monitoring is considered to be inadequate, lacking comprehensive parameter list including 	

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			<p>critical parameters that could impact fish habitat as well as drinking water supplies.</p> <ul style="list-style-type: none"> • Warning levels, trigger levels, and threshold levels for critical water quality parameters and a mitigation plan for water quality parameters have not been established. This is considered an omission. • Water level monitoring within the existing ponds (West, Central, and East Pond), as well as the mitigation features DT1, DT2, BP1, and BP2 is inadequate. • Sufficient monitoring data for all new groundwater and surface water monitoring stations is required prior to commencement of operations to provide a sound basis for the establishment of baseline conditions representing seasonal and background conditions. • All agreed to monitoring changes should be included in the Site Plan and appropriately documented within the IG. • Monitoring of groundwater and surface water between the East Pond and down gradient private wells is considered inadequate. • The proposed well survey and subsequent monitoring is considered inadequate to effectively monitor potential water level and water quality impacts on down gradient wells. • Mitigation measures for addressing water quality and quantity impacts on down gradient wells is considered inadequate. • Well Interference Complaint Protocol is incomplete. 	
<p>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</p>	<p>Section 2.11</p>	<p>Other than Phase 1, there are already water bodies in the proposed extraction area. Therefore there can only be subtle changes in the water level in these areas as a result of making the existing ponds deeper. Through the effort of maintaining the existing extent of the ponds, the relationship of the ponds to horizontal groundwater flow in the adjacent</p>	<p>The groundwater model is limited in reflecting apparent local conditions due to inherent limitations in stream flow measurements and external upstream influences on stream flow adjacent to the subject property. The significance of this with respect to model predictions of impact from the proposed site</p>	

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<p>extraction and post-extraction impacts on the creek and wetlands in low flow and level conditions?</p>		<p>aquifer will not change. Also, there are no significant vertical hydraulic gradients that will affect water levels in the deepened ponds. In the Phase 1 area it is expected that water levels will rise on the downgradient edge (on the Kilbride Creek side). With a) only small changes on-site and b) those changes increasing hydraulic gradients between the site and Kilbride Creek, there will not be a reduction in flow in Kilbride Creek post extraction. During the extractive periods, the hydraulic gradient between the extraction area and Kilbride Creek will be monitored and maintained, again no significant change in groundwater discharge to Kilbride Creek will occur. The modelling effort provides an adequate platform from which changes in flow in Kilbride Creek can be evaluated. The surface water model parameters were initially derived from the larger scale PRMS calibration to the long-term streamflow gauge Bronte Creek near Zimmerman. The baseflow, peak flow and recession calibration to that gauge, as shown in Figure 6.3, is somewhat better than that predicted at SG9 stream gauge.</p> <p>The reservoir at the Robert Edmondson Conservation Authority, approximately 2 km upstream of the site, likely affects the streamflow patterns at SG9 in a complex manner. While we represented the reservoir as a small lake in the model, no information on lake bathymetry and weir design was available. The calibration to SG13, which is not influenced by the Edmondson reservoir, is somewhat better than SG9. The fact that the long-term regional calibration and SG13 is good may indicate that the reservoir is responsible for the discrepancy at SG9.</p>	<p>Author: Harden Environmental Services Limited</p> <p>operations on Kilbride Creek should be clarified.</p> <p>Depending upon the subsurface conditions between the West Pond and Kilbride Creek, proposed excavations and associated blasting activities have the potential for altering and creating groundwater pathways between the West Pond and Kilbride Creek. Should this occur, there is potential for lowering of the water level within the West Pond by up to 1.5m or more. There is insufficient subsurface information within the area between the West Pond and Kilbride Creek to demonstrate that this will not occur. Understanding the subsurface stratigraphy within this area including, the bedrock surface elevation as well as the bedrock characteristics, are essential in assessing the potential for a significant loss of water from the West Pond both during and following excavation of the underlying bedrock within the West Pond. In consideration that the edge of the proposed excavation within the West Pond is less than 50m from Kilbride Creek at its closest there is a high potential for impact on the lateral groundwater flow between the West Pond and Kilbride Creek especially after removal of a dike east of BP2 to accommodate the Phase 4 extraction. It is noted that WP7 and West Lake Piezometer are located between the West Pond and Kilbride Creek. These monitors are 0.95m and 0.64m deep respectively, although there is no description of the materials encountered during the completion and installation of these monitors. Due to the observed variability of the bedrock surface on the property it is quite possible that lateral groundwater flow between the West Pond and Kilbride Creek is controlled to some degree by the underlying bedrock.</p> <p>Cross-section A-A' Sheet 5 of 5 of the Reid Road Reservoir Quarry Site Plans by MHBC, dated June 17, 2019 incorrectly shows the surface topography and elevation of Kilbride Creek relative to the West Pond. A more accurate representation of the surface topography within this area is illustrated on Figure 4.3, Conceptual Cross-section A-A' of the Level 1 and 2 Hydrogeological Assessment Reid Road Reservoir Quarry, July 23, 2018 by Harden Environmental Services Ltd. The</p>	

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			<p>discrepancies between surface elevations and the subsurface interpretations should be addressed, as they may have a bearing on the design and construction of the mitigation features in this area. Per discussions at the January 16-17, 2020 meetings the revised Site Plan and the IG should incorporate figures with correct elevations.</p> <p>The IG Feb 2020 has included CB16S/D to provide better definition of the subsurface conditions between the West Pond and Kilbride Creek and to provide an additional monitoring point. Proposed monitoring of CB16D is considered to be incomplete. Monitoring of CB16S has not been specified which is considered incomplete and an omission.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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 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.</p>	<p>Section 3.4.2</p> <p>Earthfx , Section 5.2.1 Figures 5.1, 5.3, 7.4, and 7.5</p> <p>Earthfx, Table 7.1, page 44</p>	<p>The Eramosa Formation is not present at the site. There are numerous cored rock boreholes at the site and none of them encountered the Vinemount or Reformatory Formations. The cross-sections are regional in nature and inadvertently show the continuity of the Eramosa Formation in this area. The hydraulic conductivity assigned to the Eramosa Formation is not representative of an aquitard as none is present at the site. Section 3.4.2 of the Harden report identifies the underlying rock formations and these do not include the Eramosa Formation. None of the on-site or local outcrops expose the Eramosa Formation, only the underlying Goat Island/Gasport Formations.</p>	<p>It is agreed that the Eramosa Formation does not exist within the area of the Reid Road Reservoir Quarry property. It is therefore inconsistent to have this formation represented within the regional computer model. It should be removed from the model in the vicinity of the property.</p> <p>The correct geologic cross-section upon which the model hydrostratigraphy was based, should be included in an addendum [re. hydrogeological assessment] and referenced/ included in the IG.</p> <p>Please provide additional information (as noted above) in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment and the IG, as applicable.</p>	
<p>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</p>	<p>Section 3.6 Figures 2.5 to 2.8 Table 10.1, page 69,</p>	<p>A ground elevation survey was conducted in Wetland 7A/B in May of 2018 in order to assist with the modelling exercise. The survey elevation points have been provided as Figure 2 "Pond 7 Survey".</p>	<p>Figure 2.7 (Harden 2018) and more recent topographical data shown in Figure 2 of the JDCL October 23, 2019 Response Table shows limited ground elevation data concentrated in the northern portion of Pond 7A. Figure 2.8 (Harden 2018) shows two</p>	

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<p>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.</p>	<p>Earthfx 2018</p>		<p>ground elevations, both in close proximity to WP3. This represents a very limited characterization of the geometry of the ground surface at ponds 7A and 7B and is insufficient for determining the minimum bed elevation and Pond Elevation Assessment Targets.</p> <p>Measures should be included in the IG to confirm the correlation between per cent of wetland in flooded condition to the groundwater elevations within the respective wetland monitors.</p> <p>Per the January 16-17, 2020 meetings: Where limited wetland bathymetry data is available, wetland reconnaissance, with photographic records, is to be undertaken on a regular basis to monitor wetland conditions at greater distances from the designated water level threshold-target stations. The procedures for wetland reconnaissance should be incorporated into the IG and added to annual reporting requirements.</p> <p>Please provide additional information (as noted above) in the IG.</p>	
<p>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.</p>	<p>Section 3.6</p>	<p>Upward hydraulic gradients do not exist beneath the P7/P7A as nearby groundwater monitors (CB11, CB10) or wetland piezometer WP12 have lower piezometric elevations than observed at WP6 and WP3. Two additional piezometers designated WP3A and WP6A were installed adjacent to WP3 and WP6 respectively. These piezometers were sealed with bentonite in sand sediments below the wetland organic material. Water levels obtained from WP3A are the same as found in WP3 and water levels in WP6A are consistently several centimeters lower than in WP6 indicating a downward gradient. The 10 cm water level observed to be above the Central Pond level suggests a seasonally delayed response to regional groundwater level regression beneath P7A/B. In 2017 the wetland water level was some 10 cm higher than the Central Pond and in 2018 the water levels have been only different by one or two centimeters. These findings do not alter the potential efficacy of Buffer Pond 1 maintaining water levels in P7A/B.</p> <p>Furthermore, we do acknowledge the fact that</p>	<p>It is agreed that, the described additional groundwater level information from the newly installed monitors support the conclusion that there are likely downward hydraulic gradients beneath wetland ponds 7A and 7B. The proposed explanation for higher groundwater levels in the original monitors WP3 and WP6 would suggest that Ponds 7A and 7B would likely support additional water pumped into the wetlands for an extended period of time due to a time delayed drainage resulting from lower water levels in adjacent Pond 6. If the assumption of delayed drainage is correct, this would suggest that, proposed mitigation for Ponds 7A and 7B from lower water levels within adjacent Pond 6 as a result of aggregate extraction, should be effective.</p> <p>What remains uncertain is the degree to which backflow of pumped water will occur into the Central Pond from P7A and P7B and the extent of pumping required to maintain water levels within the wetlands. It is understood that some backflow has been accounted for within the computer model although it is not clear that</p>	

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		<p>P7A water levels at SG3 are up to 10cm higher than the central pond elevation (SG2). Regardless, assuming that the lower lake elevation is representative of the underlying aquifer, natural flow would be downward out of the wetland, not upward into the wetland like suggested by the reviewer.</p> <p>The integrated model simulates the gradient, whether upward or downward, between the wetland and the aquifer. The model does predict downward gradients to occur underneath wetlands P7A and P7B during extraction. The model fully simulates the process of seepage out of the bottom of the wetlands, which in-turn tends to flow back towards the extraction pond where water levels have been lowered. Our analysis showed that back-pumping into the dispersion trenches / buffer ponds was able to maintain water levels in the wetlands despite losses occurring.</p> <p>Loss (or gain) across the bottom of the wetlands, is controlled by the gradient between the wetland stage and the head in the underlying aquifer, the K of the underlying aquifer, the thickness of the wetland "bed", and the K of that bed. The "bed" refers to a virtual layer of material separating the open water within the wetland from the aquifer. We have assumed the wetland bed to be 1×10^{-7} m/s, while the underlying aquifer K is 1.0×10^{-4} m/s. The assumption is based on the likelihood that the bottom of the wetland contains lower permeability muck-type material.</p> <p>A four-hour test conducted in P5 confirms that groundwater mounding beneath Pond P5 is achieved by the addition of surface water. Figure 3 shows the locations of monitoring stations in the wetland. These stations are constructed of 19 mm slotted PVC pipe inserted into the organic substrate of the wetland. Surface water was pumped from the Central Pond at a rate of 76 L/min for 4.5 hours into the wetland. The water was discharged via a pipe designed to disperse the energy of the flow into a series of small streams. No erosion occurred during the test. The water was observed to infiltrate at the discharge location, there was</p>	<p>Author: Harden Environmental Services Limited</p> <p>a sensitivity analysis has been completed to account for varying conditions.</p> <p>Contingency measures should be identified to address the potential for excessive backflow of pumped water into adjacent ponds in reaction to pumping of water into the adjacent wetlands. These measures should be included in the IG and in the Site Plan.</p> <p>Continued monitoring throughout the extraction period is essential to verify the underlying assumptions of the environmental analysis. It is not clear how alterations to the Permit to Take Water will be undertaken once the site operations commence and a Permit to Take Water has been issued by the MECP. Clarification is required.</p> <p>Per the January 16-17, 2020 meetings, the IG is to illustrate integrated water management system (WMS) and all target/threshold and applicable mitigation effectiveness monitoring stations.</p> <ul style="list-style-type: none"> • As water taking and handling would be contingent on the MECP's permits (PTTW and ECA), the interrelationships among constructed features, natural channels, and planned infrastructure are to be displayed on one figure and incorporated into the Site Plan and the IG. • All features are to be identified according to their anticipated function (e.g. surface dispersion trench [e.g. DT1], an infiltration trench [e.g. DT2], infiltration ponds [with and without natural outflows {e.g. BP1 vs BP2}], natural water outflow channel [e.g. from BP1 to P7A/7B], water lines [overland/subsurface], water storage and attenuation features, etc. • DP2 location and designation is to be clearly defined and identified on maps. • Based on the proposed construction details, DT2 should likely be designated an "infiltration trench". Distinction should be made between Infiltration Trench and Dispersion Trench. • BPs and DTs should not be referred to as "environmental protection features" as these are not the features to be protected. • IG is to include an approach to mitigation-related contingencies to deal with rapid- 	

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		<p>no overland flow to the observation stations. Nine stations were monitored during the test for water levels including data loggers in P1, P2, P3, P4, WP8 and CB7D. Figure 4 shows the response as an increase (mounding) of water levels in the wetland. The magnitude of mounding is greatest near to the discharge point and decreases with distance away from the discharge point. The hydrographs show a distinct rise in water during the testing period and confirms that the introduction of surface water can raise water levels in the wetland. Despite the limited duration of the test and the small overall volume of water introduced, water was observed to rise up to 30 m away from the introduction site, indicating that the proposed mitigation will be effective in maintaining water levels in the wetland.</p>	<p>response needs (i.e., direct wetland supplementation, as necessary).</p> <p>It is agreed that the reported pump test results suggest that the proposed mitigation can be effective in introducing water to the wetlands. It is not clear to what extent the proposed mitigation can be maintained and the amount of water that will be required to ensure that the water levels are maintained over a long period of time as opposed to a short pumping test.</p> <p>As noted in the last bullet point above:</p> <ul style="list-style-type: none"> The IG is to describe “rapid-response” contingencies, to be utilized as necessary during ecologically-critical periods (e.g. overland piping to transfer water from storage [to be identified] to affected feature if mitigation via DTs and/or BPs is ineffective). <p>Please provide additional information and clarifications (as noted above) in the IG.</p>	
<p>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?</p>	<p>Section 4.13</p>	<p>A runoff value of 10% is used for terrestrial areas and 100% of the surplus water in micro drainage areas D1, D6 and D8 is assumed to runoff via active streams in the drainage area. This results in greater overall percentage of runoff. No comparison was made between the groundwater model and the water balance.</p>	<p>Runoff value addressed; however,</p> <p>There should be some agreement between the water balance and the computer model as a means of calibrating the model for accuracy and verifying characterization of the site.</p> <p>Per the January 17, 2020 meeting:</p> <ul style="list-style-type: none"> The IG is to include a plan and approach to regular (i.e. annual) water budget reviews, which should be based on the on-site water management and use; and Additionally, provisions for model-based water budget analysis at key milestones to be considered. <p>Please provide additional information (as noted above) in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, as part of the IG, and/or as a detail on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>Section 5.0</p>	<p>The extraction will not change the water shed boundary between Sixteen Mile Creek and Bronte Creek. The Conservation Authority and the MNRF currently have incorrect boundaries for these watersheds. The base map for the Halton Conservation watersheds</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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		<p>has the KOA Tributary reporting to Bronte Creek whereas it reports to Sixteen Mile Creek. Our observations are that this area of Sixteen Mile Creek has been permanently altered by the site access road, Twiss Road, stream re-alignment on the KOA property and Hwy 401 construction. Until the recent construction effort in 2019 we observed two years of flooding north of Reid Side Road which prompted the Ministry of Transportation to improve ditching alongside the southbound ramp to westbound Hwy 401 and the Town of Milton is replacing the CSP culvert on Reid Sideroad with a box culvert.</p>		
<p>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.</p>	<p>GWS, 2018, Section 4.3, page 21, 6th paragraph</p> <p>Section 3.6</p>	<p>Our field observations confirm that there is groundwater flowing westerly from the West Pond towards Kilbride Creek. This is confirmed by visual observations of seepage and measured thermal plume migration between West Lake Piezometer and monitor WP7. Groundwater discharge is also noted in the headwater area of the Kilbride Tributary. Four seepage monitors were installed in Kilbride Creek upstream of SG21 and each confirms upward groundwater gradients in the creek bed. This groundwater flow is reflected in the groundwater model. Mitigation measures, threshold and trigger values and contingencies have been designed to maintain this groundwater flow to Kilbride Creek.</p>	<p>Field observations during the site visit November 1, 2019 support the conclusion that there is groundwater discharge occurring within portions of Kilbride Creek and the Tributary to Kilbride Creek. This however does not explain the measured stream flow results that suggest that Kilbride Creek is losing water to the groundwater system between SG9 and SG21. Details of seepage monitors including installation details, location and monitoring data were not available for this review. These data should be provided to confirm the upward groundwater gradients within Kilbride Creek upstream of SG21.</p> <p>Per the January 16-17, 2020 meetings:</p> <ul style="list-style-type: none"> The IG is to include an approach to monitoring accessible seeps west of the West Pond and known upwellings within the Kilbride Creek west and southwest of the West Pond and west and southwest of Phase 1 extraction area. <p>Please provide additional information in the IG.</p>	
<p>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 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.</p>	<p>Section 3.6</p>	<p>Prior to exploring any extraction scenarios at this site it was determined that this site does not require any long term maintenance to prevent impacts to the adjacent wetlands. Having determined that no maintenance is required post closure, the operation of the site needs to balance out extraction of the rock and pumping of water to wetlands in order to maintain the lifecycle of the most sensitive species. The proposed monitoring during the operations is designed to ensure that each of the wetlands has sufficient water</p>	<p>It has not been fully demonstrated that the site will not require long term maintenance. It is assumed that the existing pond levels will return to their original pre-development levels and that the groundwater flow system will not be significantly altered. There remains some uncertainty regarding potential alteration of lateral groundwater flow between the West Pond (P1) and Kilbride Creek, especially after the removal of BP2 for the Phase 4 extraction stage.</p>	

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		<p>at critical times of the year. It may be that pumping must be increased and extraction reduced or suspended to maintain the necessary wetland moisture conditions. There are surface water and groundwater monitoring stations in each wetland except P15 which is located centrally between P9, P8 and P14.</p>	<p>The lack of subsurface information within this area has raised questions regarding the predictions of post-development water levels within the excavated existing ponds, especially the West Pond. See Item # 3 above.</p> <p>Similar concerns exist for the Phase 1 extraction area and Kilbride Creek and the Tributary to Kilbride Creek. See Item #2 above.</p> <p>Per the January 16-17, 2020 meetings, the IG is to include an approach to post-development contingencies, as may be necessary before the deepened extraction ponds return to their natural water level conditions.</p> <p>Additionally, the IG and Site Plan need to identify stations for post-extraction monitoring as well as any post-extraction decommissioning needs.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>Section 6</p>	<ol style="list-style-type: none"> 1) The monitoring plan includes a minimum water level target for the Kilbride Tributary measured at WP4 located upstream of main groundwater seepage. 2) Water levels in BP2 are designed to maintain groundwater flow to Kilbride Creek and the Kilbride Tributary. 3) Minimum threshold values are set for CB9S and CB4S needed for maintaining the hydraulic gradient to Kilbride Creek. <p>This adequately addresses the monitoring for and mitigation of potential changes in groundwater flow to Kilbride Creek. There are too many off-site variables to create targets for stage or streamflow in Kilbride Creek.</p>	<p>It is not clear how the target levels for DP2, BP1, and BP2 shown on Graphs 10, 11, and 12 respectively of the Operational Guide Supplemental (December 2019) were calculated. Target levels were described as, ‘<i>target water levels represent the pre-extraction levels of the extraction ponds that influence the water levels in the adjacent that are being protected</i>’ [page 13, Operational Guide] ... ‘<i>target water levels in DP2 are set at historical water levels observed in the Central Pond (based upon SG3 levels) and water levels in BP2 are set at historical water levels observed in the West Pond (based upon West Lake Piezometer)</i>’ [page 4, Operational Guide Supplemental]. Target levels on graphs 10, 11, and 12 appear to be offset from measured water levels. The IG is to include the corrected table(s), as applicable; the hydrographs are to incorporate installation details for each applicable station designated for MWLTs, WLTs, and WWL setting. Are the target levels to be fixed at an elevation determined from the average of historical levels shown on graphs 10, 11, and 12 or will they change with ongoing monitoring data? Clarification is required.</p> <p>Per the January 17, 2020 meeting:</p>	

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			<ul style="list-style-type: none"> JDCL's procedures for adjustments to the MWLTs, TWLs, and WWL (i.e., based on longer-term pre-extraction data) are to be included in the IG. <p>Please provide additional information in the IG.</p>	
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	The water comes from storage in the existing ponds, the regional groundwater flow system and retention of storm water.	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
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	Any increase will be subtle caused by a minor increase in hydraulic gradient. The Kilbride Creek system is very large and has an extreme range in flow measured in stream by Harden to be from 16 L/s to 783 L/s. Using $Q = kiA$ where $k = 1 \times 10^{-4}$ m/s (bedrock), $i = 0.00927$ (existing gradient between Pond 3 and Kilbride Creek) a depth of 25 metres and a width of 150 metres results in the rate of groundwater flow is 3.5 L/s towards Kilbride Creek from Phase 1. If the water level in Phase 1 pond increases by 0.5 metre at the downgradient edge of the pond and all else stays the same, the groundwater flow increases to 4.7 l/s. Given the measured range of flow in Kilbride Creek, there will not be any potential erosion from this increase in groundwater discharge. It should be noted that surface water flow in Kilbride Creek is significantly affected by the control structure at the Robert Edmondson Conservation area.	<p>See Items # 3 and 10 above.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
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	<p>The water balance in the hydrogeology report uses an average climate condition to estimate on-site water balance changes.</p> <p>The climate dataset used in the integrated model was developed through interpolating 69 EC stations proximal to the model domain. An interpolated dataset was used for the integrated model for two reasons:</p> <p>1) To capture spatial variability, if any, in the climate dataset; and 2) To create a continuous dataset - very few stations offer completely continuous period of record, which was required for our long term 25-year</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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			simulations, hence multiple different sources were required.		
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	Water used for dust control is assumed to evaporate and there is also entrainment of water in aggregate shipped from the site. This was accounted for in the model and also in Table 6.2 Operational Water Balance of the Harden Report. Wash water will be recycled. The washing plant will be located in Phase 5 and operated as a closed loop. Make up water will be pumped from P6 and/or P11.	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	
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	There is variability in the spring levels and we recommend reviewing all data prior to below-water-table extraction to determine minimum water levels for the spring time.	Per the January 17, 2020 meeting, JDCL’s procedures for adjustments to the MWLTs, TWLs, and WWL (i.e. based on longer-term pre-extraction data) are to be included in the IG and referenced in the Site Plan. Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.	
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	Sphalerite, a lead mineral, occurs in the Eramosa Formation at the Guelph Limestone Quarry as observed (and collected) by Harden staff in core samples and quarry rock samples. This lead mineral has not been observed in any core samples taken from the Goat Island or Gasport Formations. The depositional environments of the Eramosa Formation (inter-reefal) and the Gasport/Goat Island Formations (reefal) result in the significantly different mineralogy and the absence of concentrated lead, zinc and petroliferous compounds at the Reid Road site.	The absence of the Eramosa Formation within the Reid Road property suggests that a comparison of water quality results taken at the Guelph Lime quarry which contains the Eramosa Formation to the anticipated Reid Road Quarry water quality is inappropriate. There is no mineral analysis of the rock found within the Reid Road for comparison to the Guelph Lime quarry. Sphalerite is a zinc sulphide; galena is the lead sulphide. Water quality monitoring is addressed in the IG, Section 5.2.2. Additionally see Item #2 above.	
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	The only potential mechanism for the transfer of TSS to the features is through the pumping system. Only clear, turbid free water will be pumped from the main ponds to Buffer Ponds 1 and 2 and Dispersion Trench 1 and 2. There are no direct connections between Kilbride Creek and the extraction areas therefore there is no potential to add turbidity to the surface water feature. Any subsurface connections will attenuate any turbidity in the water prior to discharge to Kilbride Creek. Turbidity levels measured in	It is agreed that there are and will be no direct surface water connections between Kilbride Creek and the extraction areas. The analysis to date fails to recognize the potential of groundwater movement through fractured bedrock capable of transmitting suspended solids from extraction areas nearest to Kilbride Creek to Kilbride Creek. No measures have been proposed to ensure that the act of pumping water into Ponds 1 and	

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		<p>the Guelph quarry were very low (1-2 NTU) and observations at the time indicated that turbidity generated by blasting was local to the area blasted and cleared very quickly due to the large particle sizes created by blasting. Turbidity will be measured on a monthly basis (ice free) at SG9, SG10A and CB15.</p>	<p>2 will not result in turbidity from discharging water into these ponds.</p> <p>Section 3.3 3) Water Quality Mitigation Strategy of the IG proposes to separate water sources for mitigation from areas where turbidity may be generated by mining or blasting activities. Additional information is required on how this will be achieved.</p> <p>Per the January 16-17, 2020 meetings. The IG is to include an approach to monitoring water discharge conditions at key seeps west of the West Pond.</p> <p>Suspended solids/turbidity sampling has been included in IG with the addition of groundwater monitors in key locations and monitoring for turbidity as well as general chemistry. Mitigation measures for water quality impacts are outlined in Section 5.2.2 of the IG.</p> <p>See also Items # 2, 3, 10 and 13 in this table.</p>	
<p>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.</p>	<p>Section 6.5.3</p>	<p>JDCL has agreed to only use water for dust suppression.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
<p>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 <i>'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.'</i> (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.</p>	<p>Section 6.5.1, Table 6.3, page 38</p>	<p>The water samples taken before and after the blast observed, not only allow for the identification of chemical changes from that specific blast, but are also an indication of all previous blasts. The concentrations of nitrate, ammonia and TKN are low in each sample set, including the pre-blast sample, therefore there is no significant loss of these compounds to the surface water. This mining technique is very common in Florida, USA and occurs without buildup or retention of nitrogen compounds.</p>	<p>It is acknowledged that the water quality samples taken at the Guelph Limestone Quarry likely represent the cumulative impacts of previous blasting activities prior to taking of the water samples. It is not clear however, that the blasting activities at the Guelph Limestone Quarry is comparable to that proposed at the Reid Road Quarry Reservoir.</p> <p>Provide a comparison of the blasting at the Guelph Limestone Quarry to that proposed in the Reid Road Quarry in the Addendum Report.</p>	
<p>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</p>	<p>page 37, last paragraph</p>	<p>There is a very brief period of time after the blast that the water is turbid. Photos taken within four hours of a blast at the Guelph Limestone quarry show clear water. Blasting is not designed to produce silt and clay sized particles and according to the Blaster's Handbook, none are created. Turbidity in the</p>	<p>It is acknowledged that blasting impacts on water turbidity may be limited and localized. The impact of drag line operations on rock excavation is however not clear. This may potentially be significant. No evidence has been provided that this will not be a potential source of impact to water quality.</p>	

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<p>were turbid. Proposed dragline operations are expected to result in high turbidity within the excavated ponds.</p>		<p>ponds cannot be transmitted to Kilbride Creek even through fractures as there is no bedrock outcropping in Kilbride Creek and any fine-grained material, although unlikely to be transported via fractures, will be filtered out before reaching the creek bed. Also, groundwater will flow into the extraction ponds, not out, thereby prohibiting the migration of turbidity into the bedrock.</p>	<p>Groundwater outflow is anticipated during extraction from the West Pond toward Kilbride Creek if water levels are to remain within historical levels within West Pond during extraction. See also Items # 2, 3, 10, and 13 in this table.</p> <p>There is a lack of subsurface information between Phases 2 & 4 and Kilbride Creek and there is potential for increased flow through subsurface to Kilbride Creek and permanently lowering water levels in West Pond and Central Pond – Note that turbidity monitoring and general chemistry has been included IG Feb 2020 – Groundwater monitoring between Phase 1 excavation and Kilbride Creek is inadequate. Warning and trigger levels and mitigation for water quality parameters are required.</p>	
<p>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.</p>	<p>Section 7.4</p>	<p>See response to Comment #9.</p>	<p>See Item # 9 in this table.</p>	
<p>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.</p>	<p>Table 7, page 63</p>	<p>The trigger levels are set at the lowest observed water level to-date. The warning level is estimated to provide a 14-day period before the trigger level is breached.</p>	<p>Additional information was provided in the Draft Environmental and Water Management Operational Guide, November 2019 (OG) and Draft Operational Guide Supplemental Monitoring Program, December 5, 2019 (SOG). Warning levels are set at 0.05m above the trigger levels and are intended to provide a two week warning before the feature's water level falls below the Minimum Water Level Threshold (MWLT). It is not clear how this was determined. It is also not clear what actions are to be taken once warning levels have been reached or exceeded.</p> <p>Refer to Item # 25 re: the need for clear response action framework.</p> <p>Please provide additional information in the IG.</p>	
<p>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.</p>	<p>Table 7, page 63</p>	<p>CB12 will be installed to monitor water levels between the East Pond and the residence at 9256 Twiss Road where a dug well is used for a water supply. Water levels in the future location of CB12 are expected to decline as a result of lower water levels in the East Pond during extractive operations. It is estimated that drawdown in the vicinity of the private</p>	<p>The applicant response has not fully provided clarification regarding the original JART comment; additional information is required and should be documented as an addendum to the Level 1 and 2 Hydrogeological Assessment Report, as part of the IG, and as a detail on the updated Site Plan. The proposed warning and trigger levels for the</p>	

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		<p>well will be less than 0.30 metres. Our observations to date are that annual variation in water levels is in the order of 0.6 to 0.8 metres, therefore the predicted water level change at the private well is less than natural variation. The private well survey will confirm the amount of available drawdown in the private well while the well is in service. There will be no long-term water level change at the well once operations at the site cease. Warning and trigger levels in CB12 cannot be set at historical values as drawdown east of the east pond is expected to occur during operations. The warning and trigger values will be set at the historical low plus the expected drawdown value. James Dick Construction Ltd. has committed to replacing this well with a drilled well should the need arise.</p>	<p>eastern Wetland Complex (OG, page 15, section 3.2.2 (November, 2019) assume that the Eastern Wetland Complex can tolerate 0.3m of drawdown. This requires a biological response. See Item # 40. Procedures for setting Warning and Trigger values for CB12 (i.e., that are yet to be determined from historical low values minus 0.3m) should be included in the IG and site plans.</p> <p>The warning and trigger level determination for CB12 should consider the historical variation in water levels as well as the available drawdown in the dug well supplying the residence at 9256 Twiss Road.</p> <p>As noted under Item 1 of this table, definition for “trigger” [i.e. as compared to “threshold” (per MWLTs) and “targets” (per TWLs)] should be included in the IG document, if it is to be used in the Site Plan.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>Tables 8.9 and 9.1</p>	<p>Water level recorders with connections to a cellular network will be used in key locations such as BP1, BP2, WP8, WP6, WP3, WP9, WP12, WP5, WP13, WP4 and WP14. This will allow real-time evaluation of the performance of the mitigative measures.</p>	<p>Additional information is required as discussed during the January 2020 meetings and as noted below.</p> <p>Monitoring program has been expanded to include Water Quality Objectives including turbidity monitoring at selected surface water and groundwater monitoring stations (Operational Guide, November 2019). Surface water stations SG9 and SG 10A are subject to external influences from the Kilbride Creek watershed and may not be useful in detecting influences from the subject property.</p> <p>See Item # 2 above.</p> <p>An implementation process tied to the proposed target, warning, and minimum water level thresholds for groundwater monitoring is lacking. It is therefore unclear how mitigation efforts will be implemented and documented.</p> <p>Per the January 16-17, 2020 meetings, the IG should include a response action framework (i.e., structured response including decision flow charts and step-by-step actions to be</p>	

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			<p>taken if threshold/target/warning level is breached).</p> <p>Can agency staff be provided access to the monitoring data?</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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 <i>‘Smaller ponds to the south and southwest of P7A and P7B benefit from the mitigation efforts in BP1’</i> 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.</p>	<p>Section 6.2.6, page 35</p>	<p>In general, the water levels obtained from the existing monitoring network can adequately determine minimum water levels in each of the wetlands. However, it may be possible and advantageous to optimize the locations as discussed herein; WP8 is located within 20 metres of the lowest elevation measured in P5. It is our opinion that this provides adequate verification of water levels in P5, particularly when the greatest potential impact occurs along the southern edge of the wetland where WP8 is located. WP12 could be moved 40 metres to the northwest to capture water levels in the lowest ground surface elevation. WP5 could be relocated 40 m to the northeast where the ground surface is 14 cm lower. WP13 and WP14 are located on the upgradient edge of their respective wetlands, the edge closest to the proposed extraction. These do not need to be relocated.</p>	<p>There is no topographical data within the majority of P5 to the north of the property upon which to evaluate the effectiveness of the proposed pumping mitigation measures. If off site monitoring locations are not possible, photographic evidence as part of the monitoring program would be useful in assessing the effectiveness of the mitigation measures in achieving recovery of amphibian pond levels by late winter (Environmental Objective 1) and maintaining 10% wetted area in amphibian ponds until July 31st of each year (Environmental Objective 2).</p> <p>Re. highlights to the left: Instead of “relocation”, supplementation of monitors is a better approach to monitoring enhancement, as it allows building on the historical data moving forward.</p>	
<p>27. To the above, the licence proposal is for 990,000 tonnes /yr. Analysis should be undertaken using the proposed licence maximum.</p>	<p>Section 6.2.2, page 35</p>	<p>There is no intention of extracting 990,000tonnes/year from the site. The 990,000 tonnes per year is the sum of all shipped materials regardless of the origin of the materials or the year the materials were stockpiled. The tonnage limit is a composite of: 1. Material extracted above water table, processed and shipped in the calendar year, 2. Material extracted below water table, processed and shipped in the calendar year, 3. Material extracted in previous years, processed and shipped in the calendar year, 4. Material processed in previous years and shipped in the calendar year, 5. Material to be recycled that is received at the site, 6. Material recycled and shipped from the site. The 350,000 tonne number represents one scenario for item “2.” in the list above. It is important to note that this quarry will operate in harmony with the ability of the environment to sustain it, based on the trigger levels</p>	<p>The tonnage specifics provided in the JDCL’s response should be incorporated into the IG and the Site Plan notes, including the maximum limit of sustainable extraction identified by the model.</p> <p>The maximum annual extraction rate should be fixed at the limit used in the impact assessment and should not be exceeded in response to natural changes in annual precipitation.</p> <p>It is noted that the proposed on-site climate monitoring is only recommended for a five year period as stated Section 4.4 Climate Monitoring of the Environmental and Water Management Operational Guide November 2019, by JDCL. Without having onsite climatic data this would result in basing the extraction rate only on water levels within wetland ponds, which appear to react on a time delayed basis. This would put the sensitive wetland features</p>	

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		<p>established by the monitoring program. In a wet year more can be extracted from below water table, in a dry year less.</p>	<p style="text-align: center;">Author: Harden Environmental Services Limited</p> <p>in precarious situation of being subject to adverse negative water level changes if even on a temporary time delayed basis.</p> <p>An on-site climate station at the proposed scale house is included in Table 11 of the IG. Hourly monitoring of temperature and barometric pressure is included. Precipitation monitoring is lacking. More detail is required for the duration of monitoring.</p> <p>No direct monitoring of water levels has been recommended from the source of the mitigation waters, i.e. West Pond, Central Pond, and East Pond. This could potentially allow a dewatering situation in these ponds where increased pumping is required to maintain water levels within the wetland ponds.</p> <p>Confirm that the monitoring locations designated as surrogates for the main ponds provide representative water levels for the main ponds.</p> <p>Minimum ponds elevation (MPE) should be established for the existing pond to avoid excessive drawdowns.</p> <p>Per the discussions during the January 16-17, 2020 meetings, if aggregate extraction causes larger than anticipated drawdown in the extraction ponds, mitigation enhancement around the ponds may be necessary. The proposed BPs and DTs may be inadequate to support the entire wetland.</p> <p>As noted above, rapid-response contingencies (e.g., direct discharge to affected features via overland piping) should be planned well in advance. As such, an approach to rapid-response contingencies should be part of the IG.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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 <i>'The model results indicate that there are sufficient quantities of water on-site to support the sensitive wetland features during operations.'</i> (Earthfx, 2018, Section 11.6, page 85). From these results, and the</p>	<p>Section 11.6, page 85</p>	<p>The proposed works consisting of pumps and berms is conventional construction practice. The construction of the proposed buffer ponds and dispersion trenches will not impact the wetlands as works remain out of the wetlands. The efficacy of the works will</p>	<p>The additional information provided as a result of the trial pumping test into Pond P5 suggests that pumping may be an effective mitigation measure against lowering of water levels within the excavation areas. The extent to</p>	

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<p>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.</p>		<p>be determined by water levels obtained in the wetlands and appropriate mitigation is proposed should trigger levels be breached. See also response to Comment #6 that describes how the mitigation has been proven to be effective in this environment.</p>	<p>which pumping may be effective remains to be verified with longer term pumping trials.</p> <p>Per the discussions during the January 16-17, 2020 meetings, removal of a dike separating the West Pond extraction area from BP2 for the purpose of the Phase 4 extraction, may lower water levels in P1 and, consequently, alter seepage conditions west of the West Pond. Contingencies are to be planned for the seeps (also applicable to Item # 29 below) and an approach to supporting the western seeps needs to be built into the IG. See Item # 2 above.</p>	
<p>29. The hydrological or surface water component of the model (PRMS) is influenced by topography, soil properties, and land use. Earthfx notes that <i>'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.'</i> (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 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.</p>	<p>Figure 3.4, Earthfx, 2018</p> <p>Earthfx 2018, Section 6.5 PRMS-only Calibration Results 3rd paragraph, page 35</p>	<p>The loss of water over the short reach of Kilbride Creek was not modelled. See also response to Comment # 9. The model adequately identifies groundwater flow towards Kilbride Creek and an increase in streamflow between SG9 and SG10.</p> <p>The approach was more of a quasi-monte carlo approach because Earthfx has previously developed an understanding, through experience in the area (i.e., the Milton Tier 3 Study), which parameters are the most sensitive and what reasonable starting values for different parameters might be. Suitable PRMS parameter values were identified by iteratively completing PRMS submodel simulations and varying parameters over range in values. The value that produced the best streamflow statistics (Nash Sutcliffe, Log-Nash Sutcliffe, % Vol difference) was selected. The results of the PRMS submodel (before integration) are presented in Section 6. A full optimization of the PRMS submodel was not completed because the PRMS submodel does not simulate groundwater processes and final calibration could only be completed in GSFLOW.</p> <p>There seems to be some confusion with how streamflow was represented in the model. A GSFLOW model consists of a groundwater submodel (MODFLOW) and a hydrologic submodel (PRMS). These submodels are initially developed and pre-calibrated in a standalone manner, and then brought together to form the integrated GSFLOW model. In GSFLOW the two submodels communicate with one another on a daily</p>	<p>The lack of full optimization of the PRMS model and the discounting of the apparent streamflow loss along Kilbride Creek suggests a level of uncertainty in characterizing the surface water/groundwater interaction in the area of Kilbride Creek and the subject property between SG9 and SG21. This is an area of particular concern with respect to impacts on Kilbride Creek from on-site extraction activities particularly in the area of the West Pond and the Phase 1 extraction. See Items # 3, 10, and 13 in this table.</p> <p>Per the discussions during the January 16-17, 2020 meetings (and as noted under Item #28 above), direct supplementation may be required to alleviate any observable impacts in the western seeps and Kilbride Creek's flow. An approach to dealing with potential needs of this nature should be built into the IG and documented in the Site Plan.</p> <p>Please provide additional information in the IG and include in Site Plan.</p>	

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		<p>basis. SFR2 is the streamflow routing module in the MODFLOW submodel. During a GSFLOW simulation the SFR2 streams receive runoff and interflow from the PRMS soil zone and interact with the groundwater system via head dependant leakage/discharge.</p> <p>Figure 3.4 from Earthfx is purely conceptual showing that the hydrology component of the GSFLOW model (PRMS) may be constructed on a grid resolution ranging from 5 to 50m. The PRMS model was constructed on a 30m grid, while the MODFLOW model used a variable cell</p>		
<p>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.</p>	<p>Earthfx, 2018, Section 8</p>	<p>Calibration of the GSFLOW model occurs in two stages. First the MODFLOW and PRMS submodels are pre-calibrated as independent models to a reasonable level, then the two submodels are integrated and the GSFLOW model is then final-calibrated. Both submodels achieved a good calibration to regional static groundwater levels and WSC Streamflow gauges, respectively. The PRMS submodel performed well at the Bronte Creek catchment scale, which represents an area of 242km² (Figure 6.3). In contrast, the Killbride creek catchment upstream of SG9 is less than 10km². Testing the calibration against small catchments with low streamflows magnify the uncertainty in the model. The issues related to the calibration and effects analysis at SG9 are discussed in detail in the response to Comment 3 (above). The climate data used in the model made use of 69 Environment Canada sites proximal to the model domain. The strong regional calibration of the PRMS submodel gives confidence that the climate dataset used in the model was an adequate representation of the Bronte Creek watershed. There will always be uncertainty surrounding the distribution and continuity of climate data. We acknowledge it is always useful to have local data but our long-term simulations would have required on-site data collection to have begun more than 25 years ago. The issue of less streamflow at SG21 vs SG9 is described in response to Comment 22.</p>	<p>The level of uncertainty in characterizing the hydrogeological setting on a local scale appears to be magnified when testing regional calibration against small catchments. The modelling effort appears to have limitations to accurately reflecting local conditions due to the necessity of calibration to regional control points. A comprehensive ongoing site monitoring program is essential especially in areas of conflicting data not accounted for in the integrated surface water/groundwater model completed for the subject property.</p> <p>A complete monitoring plan is to be included in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and on the updated Site Plan, as applicable.</p>	
<p>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</p>	<p>Earthfx, Section 9</p>	<p>Upon closure, modelling indicates that the probability of Ponds 5 and 7B retaining 10 cm of water over 10% of the wetland until July 31st decreases by 8% and 20%</p>	<p>No consideration was given to the possibility of permanent lowering of water levels in the West Pond due to increased lateral groundwater</p>	

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<p>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.</p>		<p>respectively. The threshold of maintaining 10% inundation to 10 cm depth is intended to provide sufficient time for salamanders to transform into juveniles. The decrease in Pond 5 by 2 years out of 25 is not considered a limiting factor to salamanders. Salamanders are long-lived (20 to 30 years) and individuals typically breed in alternate years or even longer intervals. A small reduction in the number of years when the threshold is attained will not affect the viability of the breeding population of Pond 5. In addition, 10% of Pond 5 represents approximately 2,700 m² of pond area. In years when the threshold is not attained, it is possible that there will still be adequate water present to allow salamanders to transform.</p> <p>Pond 7B currently does not support salamanders due to the presence of predatory fish such as pumpkinseeds and largemouth bass. As part of the mitigation, a pea-gravel barrier will be constructed between Pond 7 and the Central Pond. This will prevent additional fish from accessing Pond 7B, but the existing population may still be able to persist. The occasional drying out of Pond 7B will eradicate the local population within this basin and may eventually result in this pond becoming suitable for salamander breeding. Under closure, it has the potential to have a hydroperiod long enough to produce salamanders in 72% of years. At present, it is suitable in 0% of years due to the presence of fish.</p>	<p>flow toward Kilbride Creek. See Item # 3 in this table.</p> <p>Given that the targets used to direct the mitigation approach are based on professional opinion, assumptions should be validated through baseline monitoring. The proposed methods and approaches can be provided in the Operation Guide and Implementation Plan.</p> <p>Additional input should also be provided regarding mitigation approaches, monitoring, and contingency plans for changes in hydrology associated with anticipated drawdown of the water table in the east wetland, south of the east pond. See Item # 29 in this table.</p> <p>Please provide additional information in the IG.</p>	
<p>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 than 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.</p>	<p>Figures 2.5 to 2.8</p> <p>Section 4.5.2 Amphibians, page 31, last three bullet points</p> <p>GWS 4.5.2</p>	<p>The difference in bathymetry between <i>minimum</i> surveyed elevations and <i>minimum</i> modelled elevations is unlikely to have a significant effect on the overall conclusions and comparison of pre and post hydroperiods presented in Table 10.5. This is because the pre-development analysis was conducted with the same overall wetland basin geometry, substrate hydraulic conductivity and ET rates as for the post development analysis. Therefore, although the simulated number of pre development years that the wetlands have 10 cm of inundation over 10% of the surface area may be different with a better match to surveyed wetland geometry, the % change between pre and post development will be similar because</p>	<p>The bathymetry of wetlands P7A and P7B have limited elevation data to define the surface of these wetlands as per Item #5 above. It is not clear how the elevations in the right-hand column in Table 10.1 provides an accurate representation of 10% inundation area for these wetlands when there are no more than two elevation points to define the geometry of these wetland surfaces. Similarly, in wetland P5, the available surface elevations are clustered in a relatively small area of this wetland along the southern boundary of the wetland within the subject property and do not provide a characterization of the entire wetland. It is not clear how the elevations in the right-hand column of Table 10.1 were determined.</p>	

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		<p>the overall geometry, properties and processes are the same.</p> <p>The geometry of each wetland is unique and modeled as such. It does not necessarily follow that 10% inundation with a minimum depth of 10 cm occurs with 10 cm of water above the minimum elevation stated in Table 10.1. For example, 10 cm of inundation over the minimum elevation stated may only occupy 1% of the wetland area. In order to inundate a larger area, the water level must be higher as reflected in the threshold values in the right-hand column of Table 10.1</p>	<p>Per the discussions during the January 16-17, 2020 meetings: In addition to the point-based water levels' monitoring, wetland-by-wetland site reconnaissance including photographic records, are to be included in the ecological monitoring plan to ascertain sufficient inundation during critical periods for amphibians, and to observe vegetation-conditions long-term. The supplemental-monitoring tasks are to be built into the IG.</p> <p>Please provide additional information in the IG.</p>	
<p>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 <i>'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.'</i> (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.</p>	<p>Section 6.0, Level 2 Hydrogeological Assessment, page 30</p>	<p>There is no intention of extracting 990,000tonnes/year from the site. The 990,000 tonnes per year is the sum of all shipped materials regardless of the origin of the materials or the year the materials were stockpiled. See response to Comment #27.</p>	<p>It is clear that the annual tonnage shipped will not necessarily be equivalent to the annual tonnage of material excavated. The maximum limit of excavated tonnage should be fixed to that used in the impact analysis and should not exceed this limit according to annual weather conditions, as suggested in the JDCL response to Item # 27 in this table.</p> <p>The tonnage-related specifics provided in the JDCL's response should be incorporated into the IG and Site Plan notes, including the maximum limit of sustainable extraction identified by the model.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>34. Table 11.1 from Earthfx, 2018, shows extraction ratios for the major ponds including the equivalent total water demand in m³/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 (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</p>	<p>Section 6.3.1, Water Taking For Aggregate Processing, page 35</p>	<p>Table 11.2 of Earthfx report is mislabeled - the Dust control column includes the aggregate washing operations and associated losses.</p> <p>The integrated model was configured such that buffering capacity is supplemented by all of the ponds where necessary. Section 11.2 of the Earthfx report states:</p> <p>"In developing this general extraction framework plan, it was assumed that rock extraction and pumping from the four ponds are equivalent (interchangeable), because the ponds will be either hydraulically connected or it will be possible to move water from one pond to another."</p>	<p>The underlying assumption of hydraulic connectivity of the various on-site ponds is not unreasonable for the large existing West Pond (P1), Central Pond (P6), and East Pond (P11). However, Pond P3, Phase 1 of the extraction sequence, is to be significantly enlarged and is located somewhat remote from the three large existing ponds. The assumption is therefore not applicable to the site as a whole. As indicated water can be pumped between ponds to approximate the underlying aggregate extraction rates upon which the groundwater/surface water model is based. This enters a level of complexity of extraction operations that the model may not necessarily reflect. The differences between the modelled extraction scenario and efforts to operationally mimic the modelled extraction rate provides some uncertainty with respect to site specific</p>	

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<p>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.</p>		<p>In other words, as rock is removed from one pond, water can be supplied from the others to offset the effects.</p> <p>Please consider the following example with extraction occurring in the Phase 1 pond. Table 11.1 indicates that the total yearly volume of water and rock-water equivalent extracted was 333,679m³/y, 139,239m³ of which was rock-water equivalent and 194,440 m³ was for buffer ponds, dispersion trenches and dust/plant operations. Table 11.2 indicates that the Phase 1 pond is relied upon for providing a volume of 66,736, much less than the 139,239m³ described above. However, the East and the Central/West ponds together are capable of supplying a total of 266,944m³, a surplus of 72,504m³ over the 194,440 m³ required for the other site features. This surplus would then be added into the Phase 1 pond allowing the extraction rate of 139,239 m³ with no additional drawdown because the net rock-water extraction does not exceed 66,736m³. The same logic could be applied to the other ponds. With Phase 1 being completed first, the reviewer is correct in stating that without the buffering effect of pond water storage, drawdowns will be larger. To counter that point, however, less water from the other ponds will be required to offset the drawdowns because volume of the excavation will initially be small. As the size of the excavation grows, so does its buffering capacity. Regardless of the size of the ponds, the simulation confirmed that there is sufficient water to offset the extraction volume.</p> <p>We acknowledge that the model does not account for the temporary loss of storage in the East pond during construction of the processing area. This will likely reduce the ability of the east pond to buffer itself against extraction and supplementation driven drawdowns, particularly during Phase 2-4. All other extraction rates from Earthfx Table 11.1 being equal, this would reduce the ultimate extraction rate, however, it may be possible to achieve higher rock or rock water equivalent extraction rates from the other ponds and during wetter periods. In the same respect, the model does not credit the excess water available during the filling of the East Pond. Nevertheless, the ultimate extraction rate will</p>	<p>predictions of impact from a groundwater level perspective.</p> <p>As stated, the <i>'ultimate extraction rates will be governed by the trigger levels and the ability of the natural environment to sustain the extraction rate.'</i> The mechanism for controlling the extraction rate in response to monitoring data collected on an ongoing basis is not well documented or spelled out in detail. If the warning and trigger levels are to be meaningful, a mechanism for ensuring that the appropriate water levels are maintained within the wetlands, within the proposed mitigation facilities (Buffer ponds and Dispersion trenches), and within the excavated ponds West Pond, Central Pond, and East Pond is required. This will require detailed training of operational staff and diligence in obtaining and responding to changes in on-site trigger and warning levels for both water levels and water quality. Clarification is required.</p> <p>A response action framework is required (as identified under Item # 25 in this table).</p>	

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		<p>be governed by the trigger levels and the ability of the natural environment to sustain the extraction rate.</p> <p>As noted, the model was used to demonstrate that there is sufficient water and buffering available to support the proposed extraction rates and wetland supplementation strategy across a range of seasonal and inter-annual variation in climate. The extraction rate proposed in Earthfx report does not necessarily reflect the maximum achievable rate. Ultimately extraction rates will be dictated by monitoring and the effectiveness of the mitigation measures.</p>		
<p>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.</p>	<p>Table 4.3, page 20</p>	<p>The modelled extraction (rock water equivalent) is specified as 894.4m³/s for April and May, 804.9m³/d for June - Sept, and 715.3m³/d for October and November. Earthfx acknowledges that the maximum extraction rate may change based on seasonal and inter-annual availability of water and corresponding monitoring levels. Earthfx elected to take a conservative approach and evaluate specific extraction rates that are expected to be achievable across a range in 15 years of real climate conditions. See also response to Comment #27.</p> <p>Regarding the second part of the comment, wetlands are fully represented in GSFLOW as lakes. The model simulates a complete water balance for each wetland on a daily basis which includes, seepage into and out of the lake (i.e., gradient driven interaction with the underlying aquifer), precipitation, evapotranspiration, surface runoff, and supplemental pumping of water into the wetland. Vertical gradients develop between the lake stage and the aquifer - these can be upward or downward depending on difference between the simulated groundwater level and the simulated lake stage. We do not specify any of these gradients or quantities. The integrated model handles every aspect of the wetland/aquifer interaction.</p> <p>Loss (or gain) across the bottom of the wetlands, is controlled by the gradient between the wetland stage and the head in the underlying aquifer, the K of the underlying aquifer, the thickness of the wetland "bed", and the K of that bed. The</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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		"bed" refers to a virtual layer of material separating the open water within the wetland from the aquifer. The assumption is based on the likelihood that the bottom of the wetland contains lower permeability muck-type material.		
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	The proposed works consisting of pumps and berms is conventional construction practice. The construction of the proposed buffer ponds and dispersion trenches will not impact the wetlands as works remain out of the wetlands. The efficacy of the works will be determined by water levels obtained in the wetlands and appropriate mitigation is proposed should trigger levels be breached. See also the response to Comment 6 regarding effectiveness of mitigation.	An implementation process for mitigation and contingency measures need to be established and documented, and incorporated into the site plans and IG as part of the site operations (refer to Item #25 in this table, "response action framework"). Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.	
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	See Comment 6 for a description of the demonstration of proof of concept undertaken at the site this fall. The introduction of even small quantities of water was observed up to 30m away from the introduction point.	See item # 6 response in this table. Per the discussions during the January 16-17, 2020 meetings, in addition to the proposed BPs and DTs, direct supplementation may be required to alleviate any observable impacts on wetlands. The efficacy of the mitigation and any contingencies are to be verified by means of a complete and integrated (groundwater, surface water, ecology) monitoring program (refer to Items # 2 and 32 in this table).	
38. Earthfx recognizes that <i>'The model is, however, a simplification of the real world and should be considered an approximation of the system behavior and response.'</i> 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 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.	Page 51, Section 8.3 Calibration Conclusions , Earthfx 2018	Section 8.0 lists several contingencies that can used to address deficiencies in the mitigation program. Moreover, at this site because only minor long-term changes are anticipated, following the suspension of below-water-table extractive activities and relatively brief recovery period for the main ponds, pre-extractive conditions will be achieved. This allows environmental conditions during the operations to dictate how much and when extraction can occur with only temporary (if any) impact.	The operational modifications to address environmental impacts to adjacent areas appear reasonable. They do not however consider the possibility of alteration of lateral groundwater flow between the West Pond and Kilbride Creek. Given the relatively short distance between the western limit of extraction in the West Pond and Kilbride Creek (especially after Phase 4 is extracted) there is potential for permanent alteration of the groundwater flow path due to blasting activities especially if the intervening material between Kilbride Creek and the West Pond includes bedrock. There is currently insufficient subsurface information within this area to confirm the presence or absence of bedrock within the intervening materials. This concern may also apply to the area between the northwestern limit of the Phase 1 extraction area and Kilbride Creek. See associated comments for Items # 3,10,13,18, 21, and 28.	

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			<p>Per the January 16-17, 2020 meetings (and as noted in Item #9 of this table), the IG is to include an approach to monitoring key seeps west of the West Pond and within the Kilbride Creek.</p> <p>Please provide additional information in the IG.</p>	
<p>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.</p>	<p>Tables 2.3 and 8.1</p> <p>Monitoring and Mitigation Notes, page 3 of 5 of the site plans</p>	<p>JDCL concurs.</p>	<p>The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.</p>	
<p>40. It is not clear why the Trigger Level in the Eastern Wetland Complex for operational modifications <i>'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.'</i> (Harden 2018, Section 8.1.3, page 54, 1st paragraph, 4th line).</p> <p>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.</p> <p>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.</p>	<p>Section 8.1.3, page 54, 1st paragraph, 4th line</p>	<p>See Response to Comment #67 in Natural Heritage Section.</p>	<p>See Natural Environment Comment Response #67.</p>	
<p>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 <i>'Direct pumping into wetlands may occur with approval of MNRF and Halton Conservation'</i>. 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).</p>	<p>Section 8.1.2, Active Actions, page 51, footnote</p>	<p>There is a surface water channel between the Central Pond and Ponds 7A/B that is up to a metre deep (below the water level). This channel extends into both of the wetlands from the Central Pond and by maintaining water levels in the channel via connection to BP1, water levels in Ponds 7A/B will be also maintained. The wetlands farthest from mitigation are also farthest from potential impact. Once licensed the Conservation Authorities Act is not operable on the site and only approval from MNRF would be required.</p>	<p>Does this not require a Permit to Take Water and Approval from the MECP if additional pumping is required? PTTW requirements should be identified on the Site Plan.</p> <p>As noted in Item #6 of this table re. classification, consolidation and integration of Water Management System (WMS) components with mitigation/contingency functions and monitoring program, as may be required for the MECP's permits (PTTW and ECA) and the need to incorporate the integrated figures in the Site Plan and the IG.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	

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<p>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:</p> <ul style="list-style-type: none"> 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 <p>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.</p>	<p>Section 11.1 Recommended Site Plan Notes, page 61</p>	<p>The contingencies are triggered by constraints provided in Tables 3, 4, 5, 6 and 7 which detail minimum acceptable threshold water levels for wetlands, buffer ponds, the Kilbride Tributary and future monitor CB12. The ultimate safety response is suspension of extraction below the water table where after water levels will return to pre-development conditions.</p>	<p>As noted in items # 3, 10, 13, and 38, in this table, the potential for permanent alteration of the lateral groundwater flow between the West Pond and Kilbride Creek has not been considered. There is insufficient subsurface information within the area between Kilbride Creek and the West Pond to rule out this possibility. There is also insufficient monitoring surface water and groundwater proposed within this area to identify impacts on Kilbride Creek.</p> <p>See Item# 2 above.</p> <p>Per the January 16-17, 2020 meetings, the IG is to include rapid-response contingencies (e.g., direct pumping into the natural feature, to address unanticipated effects promptly).</p> <p>Additional groundwater monitors are recommended in the IG. See associated comments in Items # 3, 10, 13, 18, 21, 28, and 38.</p>	
<p>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.</p>	<p>Section 11.1 (3)</p>	<p>JDCL concurs with this comment.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
<p>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 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.</p>	<p>Table 9.1 page 57</p>	<p>Surface water stations for the main ponds may need to be re-located and surveyed to the geodetic benchmark. See Comment 26 with respect to the adequacy of the wetland monitoring locations</p>	<p>Surface water monitoring locations should be identified and located prior to approval and should provide baseline data against which future water levels are compared. These should be identified in the IG and on the Site Plan.</p> <p>Changes have been proposed to the monitoring program within the IG. Additional monitoring issues are identified in Item # 2, above.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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</p>	<p>Section 9.0 and 11.0</p>	<p>There is a very brief period of time after the blast that the water is turbid. Photos taken within four hours of the blast at Guelph</p>	<p>It is agreed that turbidity resulting from blasting activities will likely be temporary and localized. Excavation activities from the proposed</p>	

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<p>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.</p>		<p>Limestone quarry show clear water. Blasting is not designed to produce silt and clay sized particles and according to the Blaster's Handbook, none are created. Turbidity in the ponds cannot be transmitted to Kilbride Creek even through fractures as there is no bedrock outcropping in Kilbride Creek and any fine-grained material, although unlikely to be transported via fractures, will be filtered out before reaching the creek bed. Only low-turbidity water will be discharged to the buffer ponds and dispersion trenches. See also response to Comment 18.</p>	<p>backhoe and/or dragline operations is of greatest concern with respect to resulting in high levels of turbidity within the existing ponds. The conclusion that fine grained material will be filtered out before reaching Kilbride Creek appears to be based upon speculation rather than evidence. No evidence has been presented to support the conclusion that any fine grained material will be filtered out before reaching Kilbride Creek. There is a lack of subsurface information in the area between the West Pond and Kilbride Creek to confirm the presence or absence of bedrock materials separating the West Pond from Kilbride Creek. It is noted that the West Lake Piezometer and WP7 are located between the West Pond and Kilbride Creek. They are 0.95m and 0.64m deep respectively, which suggests overburden materials of this thickness, although there is no description provided for the materials encountered in the completion and installation of these monitors. Given the irregular bedrock surface noted on the property, this does not preclude a bedrock pathway for groundwater movement between the West Pond and Kilbride Creek. Turbidity should be included in water quality monitoring in both the overburden and bedrock in the area between West Ponds and Kilbride Creek. This should include the West Lake Piezometer and/or WP7 and groundwater seepages between the West Pond and Kilbride Creek. Groundwater and surface water temperature monitoring should also be considered within this area.</p> <p>See also related comments in Items # 3, 10, 13, 18, 21, 28, and 38.</p>	
<p>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.</p>	<p>Section 9.0 and 11.0</p>	<p>Table 8.1 clearly identifies which monitors will be used to verify water level conditions between the site and Kilbride Creek. It is our opinion that off-site water quality sampling is not necessary as no water quality changes are anticipated. In response to water quality concerns, JDCL will obtain an annual water sample following the last blasting event of the year will be obtained from the active extraction area. The water quality parameters will include, anions, metals, pH, conductivity, turbidity, TSS, Total Petroleum Hydrocarbons, nutrients (nitrate, nitrite, TKN, ammonia)</p>	<p>Surface water quality monitoring has been added to include SG9 and SG10A in the May IG (Section 4.5.3.2 pages 22-23). Turbidity monitoring has been included for these monitoring stations. SG9 is located near the upgradient edge of the property. This may potentially be impacted but may also represent baseline conditions. SG21 located directly opposite the West Pond should be added to serve as a potentially impacted location. Baseline water quality is lacking for the existing West Pond (P1), Central Pond (P6), and East Pond (P11). Water quality including temperature should be monitored within these ponds during extraction.</p>	

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			<p>The IG includes water quality sampling in the West, Central, and East Ponds during extraction. Water quality sampling within these ponds and within BP1, BP2, DT1, and DT2 is considered Incomplete.</p> <p>See related comments in Item # 2 above.</p>	
<p>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.</p>	<p>Section 9.0 and 11.0</p>	<p>As discussed in response to Comment 44, existing surface water stations in the main ponds may need to be re-established to geodetic datum if they are moved to accommodate extractive activities.</p>	<p>See Item # 44 in this table.</p>	
<p>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.</p>	<p>Section 9.0 and 11.0</p>	<p>Contingency and mitigative measures will be invoked should a threshold water level be breached. As recommended in Comment 25, there will be several monitoring stations reporting via a cellular network. This will be checked on a daily basis and response initiated if necessary</p>	<p>A protocol designating reporting requirements, responsible parties, and specific actions requires more detailed documentation as part of the site plan. An implementation document (i.e., the IG) should be completed and become part of the Site Plan (refer to Item # 25, “response action framework”).</p> <p>As noted during the January 17, 2020 meeting, the annual report to MNRF, MECP, CH, HR, and Milton (per JDCL’s November 2019 Guide) should include, but not be limited to, the components provided in the “draft implementation-related document listing”.</p> <p>Please provide additional information in the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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?</p>	<p>General comment</p>	<p>There is no discharge to creeks and permission to discharge water off-site is not being sought. The flooding north of Hwy 401 is sourced from the KOA Tributary flowing southward from Sideroad 10. The MTO is presently (August 2019) conducting works to prevent road bed deterioration from flood water levels and the Town of Milton has replaced the blocked culvert causing the flooding at Reid Sideroad.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
<p>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.</p>	<p>General comment</p>	<p>The predicted drawdown at the nearest dug well is less than 0.3 metres. It is our opinion that this is not likely to impact on the functioning of the well and this will be confirmed through the well site survey. The following condition is on the site plan:</p>	<p>The applicant response has provided clarification regarding the original JART comment; JART recommends that turbidity be added to the water quality sampling during the well survey for a more complete baseline characterization.</p>	

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		<p><i>A door-to-door well survey for the wells shown on Figure 3 of Harden Environmental Services Ltd. Correspondence to the Ministry of the Environment Conservation and Parks (December 7, 2018) will be conducted prior to any extractive operations. Water quality samples will be obtained from the wells. The water samples will be analyzed for the following parameters: general chemistry (pH, conductivity, anions), metals, nutrients, microbiology and BTEX. The well survey and water quality sampling is subject to landowner permission and is access dependent.</i></p>	<p>It is recommended that turbidity be added to the water quality sampling during the well survey for a more complete baseline characterization.</p> <p>As discussed during the January 16-17, 2020 meetings and per the “draft implementation-related document listing” discussed during the January 17, 2020 meeting:</p> <ul style="list-style-type: none"> • Turbidity monitoring should be part of the long-term water quality monitoring plan and is to be included in an addendum to the hydrogeological assessment, the IG, and the Site Plan. • See Item #2 above. • The private water supply protection and mitigation strategy should be inclusive of: water supply monitoring and early warning response strategy; communication protocols & water supply interference procedures, and augmentation plans. <p>The IG February 2020 shows the extent of the proposed well survey. The area southwest of the site is identified as down gradient from a groundwater perspective (Harden, 2018, Figure 4.8). It is considered an omission to not include this area within the well survey area. This includes the area in and around First Line Nassagaweya.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>General comment</p>	<p>The East and Central ponds will be the main sources of water and through the integrated surface water/groundwater model it is shown that extraction can occur and water levels can be maintained to the wetlands within ecological constraints recommended by the natural heritage specialists. This is all subject to verification monitoring. Upon cessation of water taking or aggregate extraction, the water levels will return to pre-extraction conditions.</p>	<p>Additional information is required to address the original JART comment, as discussed during the January 2020 meetings and as noted below:</p> <p>It is indicated that <i>‘Pumps will be located in clear water locations separated from areas where turbidity may be generated by mining or blasting activities to minimize turbidity being discharged to wetland features.’</i> (Environmental and Water Management Operational Guide, Section 3.4, pg. 18.) There is no provision for monitoring the turbidity of the source water for ensuring that the</p>	

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			<p>discharge of water into the buffer ponds and dispersion trenches does not have high levels of turbidity. The water quality of the buffer ponds and dispersion trenches should also be monitored for turbidity to ensure that high turbidity water is not discharged into the wetland ponds or to the groundwater system within the wetlands. See response to Items # 2, 3, 6, 10, and 50 in this table with respect to water levels returning to pre-extraction levels.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>General comment</p>	<p>Verification of the effectiveness of the proposed mitigation works was undertaken in the field this fall. See response to Comment 6.</p>	<p>Additional information is required to address the original JART comment, as discussed during the January 2020 meeting, and as noted below:</p> <p>Although it was shown that dispersion trenches can influence water levels in P5, the same test showed a response in water levels in well CB7D, which has a top of the screened interval at about 24 metres depth. This suggests that there is a good connection between the wetland and the underlying bedrock aquifer. See Item # 69 in this table.</p> <p>Also, extracting the rock in the area adjacent to P5 can increase the wetland water losses and blasting close to P5 can increase the hydraulic conductivities in the P5 underlying bedrock aquifer (halo effect), again, increasing P5 water losses. This may require changes to the water handling on site and should be investigated prior to extraction. We recommend that using the numerical model, a sensitivity analysis is completed and contingency measures provided in IG. See Item # 6 in this table.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, and the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>General comment</p>	<p>Turbid water will not be introduced to the wetlands at any time and turbid water will not discharge to Kilbride Creek or its tributary.</p>	<p>Additional information is required to address the original JART comment, as discussed</p>	

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		<p>The water quality in the extraction area is not expected to be harmful to ecological receptors.</p>	<p>during the January 2020 meeting, and as noted below:</p> <p>Water quality monitoring for turbidity within the pumped water has not been recommended. This should be included in the monitoring program to ensure turbid water will not be discharged to Kilbride Creek, its tributary or the wetlands. See related comments in Items #2 and 50 in this table.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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?</p>	<p>General comment</p>	<p>A septic system will be installed near the shop for washrooms to be used by employees. This will be designed to satisfy the Ontario Building Code. A June 17, 2019 letter sent to the MNR regarding fuel storage and recycling is found in Appendix B.</p>	<p>Additional information is required to address the original JART comment, as discussed during the January 2020 meeting, and as noted below:</p> <p>Proposed new monitor CB14 has been recommended for installation down gradient of the proposed recycling area only if recycling is to occur (Environmental and Water Management Operational Guide, Section 4.2, pg. 19). Details are lacking regarding the level and type of monitoring to occur at this monitor should it be installed.</p> <p>Per the January 17, 2020 meeting, testing of CB14 for PAH is to be built into the monitoring plan if asphalt is to be used as part of the planned on-site aggregate-recycling.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	
<p>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.</p>	<p>General comment</p>	<p>Any increase in precipitation rates or storm intensity will decrease the pumping into the buffer ponds or dispersion trenches. All of the wetlands have been observed to be dry except for the channel area in P7A/7B. With extreme dry conditions it is likely that extraction rates would decrease and pumping rates increase thereby keeping the wetland wetter than atmospheric conditions would otherwise allow. The only additional pond evaporation occurs from the proposed</p>	<p>Minimum water level thresholds should be identified for the extraction ponds in the event of extreme dry conditions when an increase in pumping rates are addressed. Clarification is required.</p> <p>Per the January 16-17, 2020, meetings, rapid-response contingencies (i.e. direct pumping) may cause greater than anticipated drawdown at constructed ponds.</p>	

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		<p>Phase 1 pond. The increase in evaporative losses is small relative to existing conditions and will have an unmeasurable effect off-site.</p>	<ul style="list-style-type: none"> JDCL should demonstrate [through the IG] how the integrated WMS system would best facilitate meeting all environmental objectives, etc. <p>Please provide additional information in the IG.</p>	
<p>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.</p>	<p>General comment</p>	<p>Warning and trigger water levels will be established immediately prior to below-water-table extraction to allow for the review of the largest dataset available. This will allow for the longest period of monitoring to establish water level and hydraulic gradient threshold values.</p>	<p>Limited data currently exists for setting warning and trigger levels. These levels may not be representative of longer term conditions. See item # 1 and 2 in this table.</p> <p>Warning levels, Trigger Levels, and Minimum Water Level Thresholds (MWLTs) need to take into account longest period of onsite water level data available prior to commencing operations.</p> <p>Refer to Item #1 in this table (i.e., protocol for thresholds/targets adjustments).</p>	
<p>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.</p>	<p>General comment</p>	<p>The infrastructure needed would be either flexible or rigid piping between a pump and each wetland. Discharge will occur via a diffuser to minimize erosion at the discharge location. The short test conducted pond P5 confirms that discharge to a wetland can maintain or increase water levels in the wetland.</p>	<p>See Item # 6 in this table.</p>	
<p>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.</p>	<p>General comment</p>	<p>The site plans are the comprehensive document that governs operations on site. Meetings are being held with commenting agencies to describe the implementation details of the mitigation and contingency measures.</p>	<p>See Item # 48 in this table.</p> <p>The site plan must include a compendium of all the threshold and trigger levels and monitoring requirements, and must reference the IG, where the detailed information can be found.</p> <p>Refer to Item #25 in this table (i.e., “response action framework”).</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.</p>	

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59.	The internal use and movement of water between extraction phases should be described in more detail for our understanding.	General comment	The only internal movement of water between extraction phases presently considered is between Phase 2/3 and Phase 1. As rock is extracted out of Phase 1 it may be necessary to compensate with water from either Phase 2 or Phase 3 in order to maintain hydraulic gradient to Kilbride Creek. Otherwise, the internal movement of water is only anticipated between the three existing ponds and the proposed buffer ponds and dispersion trenches.	The applicant response has provided clarification regarding the original JART comment. The IG should take into account “direct supplementation” as a component of the internal movement of water. Please provide additional information in the IG and Site Plan.
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	There is no evidence that blasting emulsion will become a contaminant source. It is expected that 100% combustion of the emulsion will occur. The same blasting materials will be used in Phase 1 above the water table as in the other Phases. There is no evidence to suggest nitrogen compounds from the emulsion explosives contaminate the pond water. The flow through rates have not been estimated considering that during active extraction groundwater will flow into the pond, not out. JDCL will obtain an annual water sample following the final blast of the year as detailed in response to Comment 46.	Additional information is required to address the original JART comment, as discussed during the January 2020 meeting, and as noted below: Target water levels should be proposed for the extraction ponds to ensure that groundwater would flow into the ponds and ensure no potential contaminants leave the pond. Since the ponds are proposed to be used as a source of water for mitigation measures (buffer ponds and dispersion trenches), a pond water quality monitoring and threshold levels for (turbidity and nitrates) should be proposed. See items # 2 and 46 in this table. Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.
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	The complaint protocol is clear that residential, agricultural and industrial water supplies are safeguarded. Only minor water level changes will occur on-site, let alone off-site. No change to any private water usage is expected to occur.	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time. As noted during the January 17, 2020 meeting, trucked-in water is not considered to be an appropriate long-term water supply augmentation in Halton Region.
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	Dedicated monitors are more suitable for recording water level conditions between the site and private wells. The site is not being dewatered; therefore, only minor water level changes can occur. A baseline water quality program will be undertaken to obtain baseline water quality in nearby	Turbidity analysis should be included in baseline water quality characterization for private wells. Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and

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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	downgradient private wells. See also response to Comment #50.	indicate revisions on the updated Site Plan, as applicable.	
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	There is no hydrogeological advantage to maintaining buffer ponds or dispersion trenches. Once water levels in the main ponds equilibrate, the water levels in BP1 and BP2 will be the same as the main ponds and will be removed.	Should water levels within the main ponds not return to predevelopment levels when expected, there may be a requirement for the buffer ponds and trenches to be left in place until such time as the water levels return to pre-development levels or other adequate contingency measures should be provided. Rehabilitation and related contingencies should be included in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment, the IG, and indicate revisions on the updated Site Plan, as applicable.	
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	Current Ontario Drinking Water Quality Standards are available from the most up to date release of Ontario Regulation 169/03. Our review of the latest version and comparison those values presented on Table 2.7 do not reveal any different drinking water quality standards.	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	
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, 3 rd paragraph.	Appendix F, Figure 6.2	The GSFLOW stream network corresponds to Harden Report Section 3.6.1 (Figure 3.3) across the site and until south of the 401 however a KOA segment is not shown on the modelling figures. The flow from the KOA site exits the model through 16 Mile creek. There is an error in the model here. The stream network does correspond to Harden Report Section 3.6.1 (Figure 3.3) until south of the 401 where the stream ends and does not connect to Sixteen Mile creek at Campbellville Road. It goes to far field flow (i.e., out of the model) rather than being routed through to Sixteen Mile creek. Flow still accumulates naturally in Sixteen Mile creek, however the flow is not as high as it would be had the stream segment been properly connected. The consequence on the flow system of not routing streamflow through is believed to be minimal because water levels here are already at surface. Had the stream network been connected there would have been opportunity for flow to be exchanged across the streambed. That opportunity still exists to some extent as the GSFLOW model allows for discharge to surface, which may then in-turn be routed to a stream via overland flow. Overall the change to groundwater levels would be	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	

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<p>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?</p>	<p>Appendix F Figure 6.3</p>	<p>subtle and not significant enough to influence flow on the Reid Road site.</p> <p>Each model cell in the PRMS submodel are assigned a land use, geology, and soil texture type codes. Table 6.1 through Table 6.3 represent the model input parameters associated with each land cover type, surficial geology type, and soil texture type code, respectively. Additional parameters such as slope and aspect ratio (angle to the sun) are assigned from other data sources such as the DEM. All of these PRMS soil zone properties are independent from the groundwater submodel properties, which were primarily assigned by hydrostratigraphic unit.</p> <p>The PRMS submodel computes a soil water balance and determines quantities of ET, runoff, interflow, and groundwater recharge at each cell. None of either porosity, field capacity, or wilting point are direct input parameter for PRMS. They are all auxiliary parameters we use to give context to the modeller for defining the size of the PRMS soil zone reservoir. The PRMS soil zone reservoir is broken into two main components: 1) The capillary reservoir, and 2) the gravity reservoir. Conceptually, the capillary reservoir is the amount of water stored between wilting point and field capacity and is available for evapotranspiration. The gravity reservoir is the amount of water stored between field capacity and saturation and is available for interflow and groundwater recharge. The storage capacity of these reservoirs depends not only on these three parameters but also on the soil zone thickness of each cell (assigned by land use type in Table 6.1).</p> <p>While there is generally a close correspondence between the soil zone properties and groundwater properties, in reality there are different processes, inputs and model simulation representations. For example, ET, frozen ground, interflow and percolation processes in the PRMS soil zone are different than the 3-D groundwater flow formulation in the groundwater model. Further discussion of groundwater model properties and porosity are discussed in</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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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	response to a similar question below (question 70). 7.1 shows KOA as it is shown on all agency mapping including Halton Conservation Watershed Base Map. Figure 7.2 accurately shows KOA Tributary not to be continuous.	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	
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	During preliminary calibration simulations we noted that the native bulk K produced a larger head difference between the ponds. The measured difference between the east and west pond varied by only 0 - 25 cm. We were able to improve the match to observed conditions by increasing the hydraulic conductivity between the ponds allowing for better connectivity. There is some anecdotal evidence of interconnection, increased weathering or perhaps even an increase in K related to railway operations. Under extraction and closure conditions, a blasting halo was represented in the lake bed conductance parameter. The lake bed is a virtual model layer that separates the open water from the underlying aquifer/aquitard. The lake connectivity described above was not included to represent any form of blasting halo, rather to improve the match the current day conditions.	See item # 52 and 69 in this table. Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment.	
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	The model does not account for spatial variation in the reported hydraulic conductivities due to the spatial uncertainty associated with bedrock fractures. Accurately mapping fractures is a difficult task, and one that is even more difficult to model, particularly in a regional context. The MODFLOW submodel uses an equivalent porous media approach to represent bedrock where it assumes that the rock matrix, as a whole, behaves similar to that of a porous media at a large enough scale. We therefore apply a bulk value for hydraulic conductivity that attempts to honour the overall behaviour of the unit. Note that lower down in the table where the layer column states "Where Bedrock Present". The hydraulic conductivity of the upper 3m of bedrock was adjusted across the model. The value assigned to the weathered bedrock depended on which unit was encountered. In the vicinity of the Reid Road Quarry, the weathered bedrock	Comment partially addressed. It is usual practice to complete onsite hydraulic properties testing to characterise the underlying aquifer/s. It is unclear why an average regional hydraulic conductivity is preferred to model a local response of underlying aquifers with onsite wetlands and streams. Considering that the model is used to show the wetland and stream response to extraction, as a sensitivity analysis it is recommended that the model be run as per discussions at the January 16-17 th meeting (i.e. when conducting sensitivity analysis in specific areas of concern) with adjusted hydraulic properties using the onsite data. In particular, an area of wetland P5 which is up-gradient of the Central Pond and where testing in CB7 showed higher hydraulic conductivities. It should be noted, that	

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		<p>corresponded to "Weathered Gasport" with a value of 8.0E-5 m/s.</p>	<p>coincidentally in the same general area, hydraulic conductivities were increased under the railway tracks and between the West and Central ponds due to problems with calibration.</p> <p>See Item # 52 in this table.</p> <p>Please provide additional information in an Addendum to the Level 1 and Level 2 Hydrogeological Assessment.</p>	
<p>70. Please review the following, provide explanation and/or adjust the values if needed:</p> <ul style="list-style-type: none"> • 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. 	<p>Appendix F Table 7.1</p>	<p>Specific yield can be thought of similar to porosity. Unconsolidated fine-grained deposits like silt, clay or till often have a higher porosity, and in turn a higher specific yield. Todd (1980) and Freeze and Cherry (1979) give the following for porosity:</p> <p>Gravel: 0.25-0.5</p> <p>Silt: 0.35-0.5</p> <p>Clay: 0.4-0.7</p> <p>Silt Till: 0.34</p> <p>Sand Till: 0.31</p> <p>While fine grained soils tend to have a high porosity, the specific yield refers to how much of the porosity is readily drainable. The Wentworth till (Layer 3) is a sandy silt till. While 0.4 may be slightly high we do not feel is it is an unreasonable value for this type of material because the sandiness limits the capillary forces, giving it a lower retention. Generally, however, the Wentworth till is not present in the model area and thus the upper till more likely corresponds to Newmarket Till. Tightly consolidated Newmarket till is more likely to have a low specific yield because the material has been heavily worked and a large portion of the water may be retained through capillary forces. Hence while it may have a high porosity, the drainable porosity (i.e., specific yield) is' quite low.</p> <p>The specific yield value of the groundwater model should not be confused with or related to the porosity value in table 6.3. Table 6.3 summarizes soil zone parameters for the PRMS hydrologic submodel. The PRMS</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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		<p>model computes a soil water balance and determines quantities of ET, runoff, interflow, and groundwater recharge. Porosity is actually not even an input parameter for PRMS. It is an auxiliary parameter we use to give context to what is referred to as the "gravity reservoir". The gravity reservoir refers the soil water above field capacity but below saturation. This water is allowed to percolate out of the gravity reservoir in the form of groundwater recharge or interflow. The size of the reservoir, which is all that PRMS is concerned about, is calculated at each HRU as the difference between porosity and field capacity multiplied by the soil zone depth (Table 6.1). Conceptually, "rock" is not an overly compatible material for representing the soil zone because it does not always retain water similar to a porous media. Fortunately, the only areas with surficial soils classified as rock were located over 5km east of the study site and did not influence the local hydrologic behaviour in any way.</p> <p>Water from the gravity reservoir is transferred to the MODFLOW submodel. Porosity is not an input the groundwater model and the values listed in table 6.3 are in no way intended to represent porosity values of the hydrostratigraphic units of the groundwater model. The groundwater model is only concerned about Specific Yield, which were determined independently.</p>		
<p>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.</p>	<p>Appendix F Table 7.1</p>	<p>The upper 3 meters of bedrock is considered "weathered" and has an anisotropy of 2. See the values posted in "Weathered" rows in the lower section of Table 7.1.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
<p>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?</p>	<p>Appendix F Section 11</p>	<p>A fulsome water well survey will be conducted with owner's permission. There is limited drawdown anticipated at any private well, including the dug wells along Twiss Road. There is a dedicated groundwater monitor (CB12) that will be used to gauge potential offsite impacts near the dug wells. JDCL has committed to replacing the dug wells with drilled wells at their expense should the need arise. See also response to Comment #50.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	

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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	<p>Dispersion trenches: these were modelled as direct diversions into the receiving feature at a prescribed rate in Table 11.2.</p> <p>Buffer ponds: where overburden existed, the buffer ponds were sunk into the existing material. In the event that a berm was needed to enclose the pond, elevation was added to layer 1 of the groundwater model and the hydrologic model topography was modified. The berm material was given the same properties as layer 1 recent deposits. The buffer ponds themselves were represented as small MODFLOW lakes. The lakes allowed for all the integrated components of the hydrologic cycle including, precipitation, ET, runoff, interflow, groundwater seepage, and pumping.</p>	<p>The applicant response has provided clarification regarding the original JART comment.</p> <p>No additional information or documentation are required at this time.</p>	
74.	(Additional discussion during November 1, 2019, JART meeting: Municipal Source Water mapping.)		It was agreed that the site is outside the municipal well head protection areas and that municipal water supplies will not be affected by the proposal.	<p>It was agreed that the site is outside the municipal well head protection areas.</p> <p>No additional information or documentation are required at this time.</p>	

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<p>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.</p>	<p>General comment</p>	<p>At the Reid Road Reservoir Quarry there is little difference in results if one uses the Significant Wildlife Habitat Technical Guide (SWHTG) or the Significant Wildlife Ecoregion Criteria Schedules (SWHECS). If the SWHECS is used, habitat for the bullfrog becomes significant but the locally significant species do not qualify as significant wildlife habitat. We identified significant wildlife habitat for the black spruce, ciliolate aster, Labrador tea, leatherleaf, swamp black currant, swamp dock, whorled loosestrife, brook trout, Nashville Warbler, snowshoe hare, and porcupine. The habitat of these 11 species does not qualify as significant wildlife habitat when using the SWHECS. In our response to comment #53 we explain why the proposed quarry will have no negative impact on the bullfrog, even though we do not agree that this qualifies as significant wildlife habitat</p>	<p>The response has provided clarification regarding the original JART comment.</p> <p>Any new information and/or interpretations regarding the presence/location of, and/or potential impacts to SWH can be documented in an addendum to the Level 2 Natural Environment Report.</p> <p>In addition to the SWH types identified by the applicant’s team, examples of other SWH that require clarification/consideration as part of the addendum to the Level 2 Natural Environment include, but are not limited to:</p> <ul style="list-style-type: none"> • Turtle Wintering Areas; • Reptile Hibernacula; • Turtle Nesting Areas; and • Terrestrial Crayfish. 	
<p>2. Section 1.3 suggests that applicable legislation and land use planning policies are to be presented. The summary in this section includes:</p> <ul style="list-style-type: none"> • 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) <p>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.</p>	<p>Section 1.3</p>	<p>Since this site is zoned to permit aggregate extraction, no <i>Planning Act</i> approvals are required. Consequently, we focused our attention on the <i>Aggregate Resources Act</i> (ARA) and only briefly mentioned the existing land use designations applicable to the subject lands. Although we did not provide a discussion of the ‘Endangered Species Act, Conservation Authorities Act or the Fisheries Act we addressed this legislation elsewhere in the report as required under the ARA.</p>	<p>These are planning and land use considerations that must be addressed.</p>	
<p>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.</p>	<p>Section 2.0</p>	<p>We would be happy to review any information that CH has that may be relevant to the study. Please consider this our request for such information.</p>	<p>CH staff provided the required Data Licencing Agreement (DLA) forms to Grey Owl November 1, 2019; a completed form was submitted to CH on January 16, 2020; the requested data has been provided.</p> <p>As noted during the January 16, 2020, meeting with JDCL, the additional background information should be reviewed and documented in an addendum to the Level 2 Natural Environment Report.</p>	
<p>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.</p>	<p>Section 2.1</p>	<p>We did look at background information on aquatic features within the general area, but found nothing directly relevant to our study. Consequently, we did not reference this information. We examined the 2016 Halton</p>	<p>As noted during the January 16, 2020, meeting with JDCL, and in Comment #3, above, background information is available should be reviewed and documented in an</p>	

			Regional Forest Health Report Card and the 2011 Grindstone Creek, Sixteen Mile Creek and Supplemental Monitoring Report. Again, if CH has more relevant information, we would be pleased to review it.	addendum to the Level 2 Natural Environment Report.	
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	We concur that electrofishing is a much better fish sampling method than minnow trapping. We made a conscious decision not to electrofish. We already knew that Kilbride Creek supported brook trout, so there was little to be learned by electrofishing. This is an invasive technique that requires a minimum of 2 individuals walking through the stream and often more. Although electrofishing seldom causes direct fish mortality, it clearly stresses fish. In addition, the survey results in disturbance of the stream sediments and probably mortality of some aquatic invertebrates that are stepped upon. So there seemed to be little point in electrofishing and placing stress on fish and their habitat to attempt to prove what was already common knowledge. Because brook trout are the most sensitive species, our rationale was that if we protected them and their habitat, all other species that are present should be protected.	As noted during the January 16-17, 2020, meetings with JDCL, the additional background information should be reviewed and documented in an addendum to the Level 2 Natural Environment Report.	
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	The protocols that we used to conduct the inventories are stated in the methods section of the report (Section 2.0). Most of the information requested is provided in that section. All fieldwork was done by two individuals who were inventorying several things at once while undertaking fieldwork. Thus it is difficult to present start and finish times of individual surveys. All inventories were done under suitable weather conditions. In the case of wildlife surveys, they were completed on calm days when there was no precipitation. The fact that we detected 401 plant species and 196 wildlife species, a high proportion of those reported from the entire Guelph Junction Woods Natural Area, attests to the fact that the field methods were rigorous. We address the specific comments on survey protocols as they appear below. In most cases, we exceeded the requirements of specific protocols.	As noted during the January 16-17, 2020, meetings with JDC, where additional site investigations are conducted for baseline monitoring purposes, ancillary information (such as, but not limited to, time, duration, and weather conditions) be identified for collection as part of the methodology presented in the IG.	
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	Section 2.2.1	The text did not state that only areas within 120 m were surveyed. On page 5, the report states the opposite that the study area was expanded beyond the traditional 120 m. The four reasons for doing so are outlined on	The applicant response has provided clarification regarding the original JART comment.	

	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.		page 5 of the report. The confusion may have been because our figures showed the 120-m area around the proposed licensed area and called it the 120-m investigation zone. This should have been called the 120-m adjacent lands, or should have been left off the figures. As outlined in the report, adjacent lands were considered to be the entire JDCL property in addition to the area that was within 120 m of the proposed licensed area. This area was included in the field assessment and impact analysis.	No additional information or documentation are required at this time.	
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	Although Newmaster may not be the most recent source document, procedures for species identification have not changed significantly and most keys to identification use the older nomenclature. Regardless of which nomenclature source document is being used, it is still clear which species is being indicated. Botanical nomenclature is still in a state of flux as MNRFB botanists, in consultation with other experts, continue to make changes to species names or decide that a subspecies or variety should be considered a distinct species. In any event, we are confident that any species of local, regional or provincial significance has been appropriately identified in our list of 401 species based on our review of Riley (1989), Crins et al. (2006) and our selective checking of the NHIC website. Please advise us if there are any species we may have overlooked in our analysis of plant significance	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	
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	In our opinion, our ELC mapping of vegetation communities provides sufficient information to assess the sensitivity of wetlands to possible changes in surface water and/or groundwater levels. Wetlands, by definition, are adapted to changing water levels but different types of wetlands are adapted to different fluctuations in hydroperiod. The issue is how much change these communities can tolerate without changing their vegetative form (i.e. a swamp is converted to a marsh) and /or species composition. We consider conservative species, rare species and obligate wetland species to be the best barometers of community sensitivity to disturbance and we based our analysis on the presence of these kinds of species.	As noted during the January 16-17, 2020, meetings, additional information is required to clarify how wetland species that are sensitive to changes in soil moisture could be affected by reductions in the water table. This is particularly relevant to areas in the east wetland that are expected to see lowering of the water table between 30 cm and 50 cm. It is recommended that these areas be identified as potential locations for monitoring purposes and should be documented in an addendum to the Level 2 Natural Environment Report. Where monitoring is proposed for these species, it is recommended that the general locations of monitoring plots and methods be identified on the Site Plan and that specific details be proved in the IG.	

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	Terrestrial snails were searched for while conducting other fieldwork.	The applicant response has provided clarification regarding the original JART comment. No additional information or documentation are required at this time.	
11.	<p>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.</p> <p>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).</p>	Section 2.2.3 Section 14.3	We did not sample fish in the small tributary to Kilbride Creek because it is very small and we already consider it to be brook trout habitat. The stream is too small to even put a minnow trap in it and, as we explained earlier, we saw no need to disturb habitat by electrofishing to prove what we already knew. The other tributary that arises in the on-site swamp and flows southward has no distinct pathway or channel, even though it is depicted as a flowing channel on Report Figures. Southerly flow has been observed in the ditch parallel to the railway on the east side before going beneath the railway tracks. There was no effective means of sampling fish within this tributary where it occurs within the swamp habitat and there was no water in the culvert beneath the access road. Railway staff were adamant that no trespassing occur within the railway right-of-way, so we could not sample there	As noted during the January 16-17, 2020, the outstanding issue is the inconsistency between Paragraph 1 of Section 4.3 and the first paragraph of Section 14.3. Unless evidence is provided to the contrary, the locations of potential fish habitat identified in Section 4.3 should be included as areas of fish habitat in Section 14.3. The revised information should be documented in an addendum to the Level 2 Natural Environment Report.	
12.	<p>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.</p> <p>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.</p> <p>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.</p>	Section 2.2.3 Section 4.3	Although brook trout spawning may be initiated as early as mid-October, it may also be delayed as long as January. We are involved in another project in Puslinch Township where brook trout spawning surveys have been conducted annually for several years. We scheduled the survey in Kilbride Creek to coincide with the time when brook trout were spawning at the other site in Puslinch Township. The beaver dam clearly holds back water and creates a pond behind it. The presence of the pond probably increases evaporation rates and increases stream temperatures. Increased temperatures in turn result in lower levels of dissolved oxygen concentrations. We acknowledge that it is possible that brook trout may spawn in this reach in some years if conditions are favourable. A hydrogeology monitoring and mitigation plan has been included on the Site Plan to ensure that the hydraulic head and pressure between the West Pond and Kilbride Creek and any areas of upwelling within the stream will be maintained. Groundwater is observed to discharge as seeps above the elevation of Kilbride Creek in the area west of the West	<p>The presence or absence of brook trout spawning may be addressed through brook trout spawning surveys that have been proposed as part of the draft monitoring plan. Any future monitoring plan should be incorporated into the IG.</p> <p>We note that the proponent's response to Item #9 in the hydrogeological summary table indicates that there is an upward groundwater gradient in Kilbride Creek which was determined with seepage monitors. That response appears to conflict with the last sentence of the JDCL's response to the original JART comment.</p>	

			Pond and then flows into the creek. Upwellings have not been observed in the Kilbride Creek creekbed in this area		
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	The Jefferson salamander survey protocol used at the Reid Road Reservoir Quarry site has been reviewed by MECP and staff from that Ministry have visited the site to review the results of our habitat assessment. As a result of comments received from MECP staff, we have revised the Site Plan to remove Pond 4 from the extraction area and add a 10-m buffer around it. This has been agreed to by MNRF and MECP and will ensure that no Jefferson salamander habitat is within the extraction area.	The response has provided clarification regarding the original JART comment. Outcomes that have been realized in consultation with the province should be documented in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan.	
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	See response to #13. The timing of the original survey was consistent with when salamanders were known to be moving to the breeding ponds. We are involved in two studies where drift fences and pitfall traps are operated daily: one at the Milton Quarry and the other in the Dundas Valley. We timed the sampling at Reid Road Reservoir so that it coincided with known movements at these two sites, which occurred simultaneously.	The response has provided clarification regarding the original JART comment. Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	The purpose of these visits was to determine if there were on-site snake hibernacula, especially in the vicinity of a rock pile within the proposed Phase 1 area of the extraction area. It is a well-known fact that snakes emerge from their hibernacula even on what are relatively cold days in spring as long as the sun is out. They remain close to the hibernaculum and retreat to it overnight or if it gets too cold during the day. On a property near Cambridge eastern gartersnakes were emerging around these same dates. The maximum temperatures achieved on those two days were 6 and 10°C. We observed three male eastern gartersnake copulating with a large female at the Reid Road Quarry site on one of those days. Searching for snakes around potential hibernacula should be part of a protocol for surveying for snakes. If we had adhered strictly to the rigid protocol guidelines, we would not have observed these snakes.	The response has provided clarification regarding the original JART comment. Additional information and documentation regarding survey methods are not required at this time. Additional information regarding reptile hibernacula has been requested to be included in the addendum to the Level 2 Natural Environment Report (see JART response to Natural Environment comment 1).	
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	We searched for all species of snakes whenever we were in the field. As mentioned in the report, the area where we considered the best on-site habitat for the eastern ribbonsnake had considerable undergrowth so that snakes could easily have gone	The response has provided clarification regarding the original JART comment. Any new information and/or observations should be documented in an addendum to the Level 2 Natural Environment Report.	

			undetected. We designated this area significant wildlife habitat for the eastern ribbonsnake despite the fact that we did not find it. Consequently, the eastern ribbonsnake and its habitat would be protected if it were there. During a 2019 site visit, the presence of the ribbonsnake was confirmed. This snake was observed in very cold water and the air temperature was below what is recommended for doing snake surveys. Again, if we had rigidly been following the snake sampling protocols and looking specifically for eastern ribbonsnakes, this particular snake would not have been detected because conditions when it was found would have been considered unsuitable for surveying		
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	Targeted turtle surveys in all ponds were conducted on April 10, April 26, May 3, May 19, and May 31, 2017 to look for basking turtles. The early surveys were important to determine which ponds were being used for overwintering by turtles. Survey timing coincided with the emergence of turtles at a pond near Cambridge that supports both Midland painted turtles and snapping turtles. Notes were made on basking turtles on every trip to the site. In addition to the dates when the targeted surveys were made, visits were made to the site on 16 other dates in May and June of 2017. Turtle nests were looked for during all site visits and these included 17 visits in the month of June when most turtle nesting activity takes place. During these surveys all ponds were visited and the perimeters of them were walked several times. Staff from MNRF and MECP have reviewed the turtle nest survey protocol as outlined in the Report.	The response has provided clarification regarding the original JART comment. Additional information and documentation regarding survey methods are not required at this time. Additional information regarding Turtle Wintering Areas and Turtle Nesting Habitat has been requested to be included in the addendum to the Level 2 Natural Environment Report (see JART response to Natural Environment Comment 1).	
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. The 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	Pond 3 was not specifically surveyed for marsh birds due to the general lack of habitat for them. Most of the pond consists of open water with a community of submergent aquatic vegetation. There is a small patch of common reed at its south end, habitat that is unsuitable for most marsh-breeding birds. The patch is so small that if any marsh birds were present they would have been detected visually or aurally. All ponds support food for a variety of species. MNRF and MECP have reviewed the survey methods outlined in our Report. A representative from MECP inspected this pond on June 5, 2019.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time. JART understands the updated site plan will retain Pond 3, which we look forward to seeing in an updated site plan.	

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	<p>As stated in the description of methods, typical breeding bird surveys were completed by walking slow meandering transects through each habitat type, stopping frequently to listen for bird calls. This was the standard method that everyone used prior to the completion of the second Ontario Breeding Bird Atlas (OBBA). The objectives of the OBBA are entirely different from those for a site-specific area. The purposes of the OBBA were to determine which species bred within each 10 by 10 km square, or an area of 100 km², in southern Ontario (and each 100 by 100 km block in northern Ontario) and to determine how populations changed over a 20-year period. At the site-specific level, the objective is to determine all species that breed on the site. Individuals using the OBBA methods on an individual parcel of land typically do a few 5-minute point counts spaced a minimum of 250 m apart and make casual notes on species they encounter while moving between points. This is a completely inadequate method of surveying for birds. Numerous studies have demonstrated that less than 50% of the birds that are actually present are detected during a point count. Wandering transects are still the superior method of conducting breeding bird surveys on an individual property.</p> <p>What we said in our discussion on methods for breeding bird surveys is that we did not use the breeding bird codes used in the OBBA. It is explained on pages 11 and 12 of the report (Section 2.2.6) why these are not applicable to breeding bird work done on an individual site.</p> <p>We did not use the protocol for the Forest Bird Monitoring Program, which also consists of doing point counts. We did use the recommended timing for conducting breeding bird surveys that is specified in that program because they are broadly applicable to breeding birds in general, except for very early nesting species such as waterfowl, raptors, and shorebirds.</p>	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We did conduct a third Least Bittern and marsh bird survey on July 3, 2017 as indicated in Table 1 of the Report on Pg. 6. The reasons why we considered ponds other than Pond 12 to be generally unsuitable are presented on page 56 of the Report. Water levels in some of the ponds had declined significantly by	The response has provided clarification regarding the original JART comment. The clarification provided and any direction provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report.	

			early July. Staff from MECP have visited the site and have reviewed the Natural Environment Report.		
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	It is correct that specific weather information was not provided for when the Least Bittern surveys were conducted. All breeding bird work was done on calm days when there was no precipitation. Weather was not a limiting factor that affected the results.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	<p>The use of a standardized owl protocol is not appropriate for an individual property. The Bird Studies Canada (BSC) owl survey protocol consists of 13-minute long point counts conducted from roads; point-count stations must be a minimum of 2 km apart. During the point count, calls of the Boreal Owl and Barred Owl are played for the southern and central Ontario protocol. The point counts are surveyed twice during the breeding season. If this protocol were applied to the Reid Road Reservoir site, there would only be room for a maximum of two point counts and possibly only one given the required spacing of a minimum of 2 km apart. One of the calls that would be played would be of a species that does not even occur in this area (Boreal Owl). Within an individual 13-minute point count, only 20 seconds of Boreal Owl calls and 1 minute and 40 seconds of Barred Owl calls are played. The rest of the point count is spent in passive listening. Assuming that two point counts were surveyed twice using the BSC protocol, a total of 1 minute and 20 seconds of Boreal Owl calls (an irrelevant species) and 6 minutes and 40 seconds of Barred Owl calls would be played.</p> <p>During our surveys, which were also conducted twice, broadcast calls were played for all five owl species that occur in the general region. The total amount of broadcast calls played for individual species was 20 minutes for Northern Saw-whet Owl, 25 minutes for Eastern Screech-Owl, 20 minutes for Long-eared Owl, 15 minutes for Barred Owl, and 15 minutes for Great Horned Owl. These were actual times of calls played and additional time was spent in silent listening. On the second visit, more targeted surveys were completed, selecting sites that had the greatest potential to support the Eastern Screech-Owl, Long-eared Owl, and Northern Saw-whet Owl. There is no point in playing screech-owl calls</p>	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	

			<p>at a coniferous forest because it avoids these habitats. Similarly, the Long-eared Owl and Northern Saw-whet Owl are most likely to occur in coniferous woods and would not be expected in pure deciduous stands.</p> <p>We note that most consultants do not survey for owls when doing inventories.</p>		
23.	<p>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.</p>	Section 2.2.7	<p>The SWHECS section on bat maternity colonies states that these colonies occur only in mature deciduous or mixed stands with ELC codes of FOD, FOM, SWD, and SWM. The Site Plan has been revised to remove small areas of these mature deciduous and mixed stands from the extraction area and to also add a 10m buffer from them. Bats will not be directly affected by operation of the quarry as none of the treed areas within the extraction area qualify as bat maternity colonies according to the SWHECS. In the event that bat maternity colonies occur in adjacent lands, they will not be affected by extraction activities.</p>	<p>The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.</p>	
24.	<p>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.</p>	Section 2.2.7	<p>The areas where treed cover will be removed are very small. The bat detectors have a detection distance of approximately 30 m, so if they were installed within the wooded areas that may be removed, it still would not be known where the bats originated because the sampling area would mostly include areas outside of the wooded areas. We opted to use the detector in areas near the large ponds. The little brown myotis in particular is known to preferentially forage over water so these were the locations where it was most likely to be encountered. Similarly, water bodies attract many other species of bats because they provide a richer source of insects than does terrestrial habitat. Both MNRF and MECP have reviewed our methods and results concerning bats. In our report, we identified the areas over the large pit ponds and the proposed Phase 1 area as foraging habitat for the little brown myotis and even the northern myotis which we did not detect but presume occurs at least occasionally. MECP have visited the site and reviewed the Report relative to habitat for endangered and threatened species within the proposed extraction area.</p>	<p>The response has provided clarification regarding the original JART comment. Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.</p>	
25.	<p>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</p>	Section 3.1.1	<p>It is correct that the tributary that arises in the wetland south of the West Pond was not specifically mentioned in Section 3.1.1. However, its presence is considered throughout the study, it is shown on all figures,</p>	<p>The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time. References to fish</p>	

	the Sixteen Mile Creek Watershed. Section 3.1.1 does not mention the watercourse that originates south of the West Pond.		and it is mapped as providing significant habitat for the brook trout.	habitat should be consistent in future documents.	
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	You are correct that the Town of Milton Official Plan includes the Greenlands Designation. The Town of Milton Official Plan (1997) designates the JDCL property as Mineral Resources Extraction Area. In the Town of Milton Zoning By-Law (144-2003), the proposed Licence area is zoned "MX" (Extractive Industrial Zone). The surrounding area is zoned Greenlands A and Greenlands B which correspond to natural heritage features, including wetlands and Environmentally Sensitive Areas. The intent of the licence boundary, as shown on the Site Plan, is to avoid the natural heritage features zoned Greenlands A and Greenlands B. The JDCL property, including the proposed licence area, is located within the Greenbelt Natural Heritage System, as mapped in the Region of Halton Official Plan.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We have reviewed the CH watercourse mapping. Since it was prepared, the configuration of the watercourses has been altered, mostly due to the industrial area that has been established off Twiss Road south of the area. The original construction of the internal haul road may also have had an influence. Water in the vicinity of what is now Ponds 12 and 13 originally flowed to the southwest but now flows northeastward. The original mapping of this area has stream flow flowing southwesterly and now it is northeasterly.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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 " <i>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.</i> " 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	The reasons for not sampling for fish in the two tributaries to Kilbride Creek that originate on site are provided in our response to comment #11. These tributaries are less than 30 cm wide and only a few centimeters deep. We have designated the tributary that originates in the wetland south of the West Pond as significant habitat for the brook trout.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time. References to where fish habitat is present should be consistent in future documents.	
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	Section 4.3 Section 7	There is a man-made channel coming out of P3 leading to the small wetland in the south corner of the property adjacent to the railway. Further field investigations have determined that water exits this wetland and flows to	The response has provided clarification regarding the original JART comment.	

	<p>least seasonally, from Pond 3 to Kilbride Creek. If there is, then Pond 3 would be considered fish habitat under the <i>Fisheries Act</i>. Field investigations should determine if an ephemeral, intermittent or permanent surface connection exists between Pond 3 and Kilbride Creek.</p> <p>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</p>		<p>Kilbride Creek during high water conditions only (there was no flow observed in late summer/fall). It is our opinion that the warmwater discharge is deleterious to the coldwater fish habitat in Kilbride Creek. Once the Licence is granted, the connection between Pond 3 and the creek will be blocked. We are in the process of consulting with DFO regarding this connection.</p>	<p>JART understands the updated site plan will retain Pond 3, which we look forward to seeing in an updated site plan.</p>
30.	<p>On page 21, the report states that a large spring “<i>just above the railway bridge</i>” 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.</p>	Section 4.3	<p>Upon further review of the literature, we find that brook trout may spawn in water as warm as 10°C, so the water temperature within this spring is just within the upper temperature threshold for spawning. In our experience, we have not observed brook trout spawning in such deep organic soils with such strong upwelling, but we cannot entirely preclude the fact the trout may spawn at this location. According to the Habitat Suitability Index (HSI) model for the brook trout, spawning success for this species is lower as the amount of fine sediments increases and the inter-gravel oxygen is diminished. We did not take a dissolved oxygen level reading in the spring, but levels are typically low within springs. The HSI model provides a graph showing the suitability of spawning habitat relative to the size of the stream substrate, where a score of 0 represents unsuitable habitat and 1 is optimum habitat. The optimum size of the substrate is 3-6 cm. Silt has a diameter considerably below 1 cm and is defined as particles with a diameter of 0.0039 to 0.063 mm. At best, silt would score a maximum of 0.01 on the HSI model, thus indicating that the substrate in the spring is very marginal spawning habitat. The character of this spring varies considerably in response to water-table levels. Consequently, it is conceivable that it may occasionally be used as spawning habitat. The spring is downgradient of the site and will not be affected by extraction activities</p>	<p>The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.</p>
31.	<p>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 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</p>	Section 4.3	<p>We have mapped the entirety of Kilbride Creek as brook trout habitat and are treating it as a significant and sensitive resource that will be protected through the monitoring and mitigation program. The beaver dam does degrade the stream somewhat, but that is a natural phenomenon that does not detract from the fact that it does support brook trout. According to the HSI model for brook trout, the optimum maximum water temperature for brook trout in stream habitats is 15 to 18°C.</p>	<p>The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.</p>

	presence indicates that Kilbride Creek is functioning as a coldwater stream.		An upper temperature of 20 scores about 0.7 on the HSI model, indicating that it less than ideal. Habitat suitability drops off precipitously as water temperatures increase above 20°C and streams are completely unsuitable when temperatures reach 22°C. There is no doubt that the beaver dam and associated pond are responsible for the increased water temperature in this area of Kilbride Creek.		
32.	The report also states “ <i>It is concluded that the entire reach of Kilbride Creek along the western edge of the subject property does not support spawning brook trout.</i> ” 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	Not all aquatic habitat that supports fish is suitable spawning habitat. This is true for all species of fish, but particularly for brook trout which has exacting microhabitat requirements for spawning. Spawning is concentrated in areas with groundwater upwelling and mostly in gravelly substrates 3 to 6 cm in diameter. Trout are highly mobile species and may move considerable distances to spawn and then spread out to occupy other areas of a watercourse. After the fry emerge from the gravel, they also disperse from the actual spawning area. Therefore, it is quite common for a reach of stream to support a brook trout population but not actually have any spawning habitat present provided that trout have access to suitable spawning areas somewhere within the stream.	The response has not provided clarification regarding the original JART comment. Additional information is required in an addendum to the Level 2 Natural Environment Report, and spawning surveys should be conducted as part of the IG. This is particularly important because groundwater discharge has been observed in Kilbride Creek within the study area (refer to response to Hydrogeology comment #9).	
33.	<p>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 “<i>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.</i>”</p> <p>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 “<i>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 l/s. The loss may be attributed to underflow occurring beneath or adjacent to the creek.</i>” This is not consistent with the suggestion in the Natural Environment Report that water is lost to the water table.</p> <p>Determination of the direction of groundwater gradients through this reach is required.</p>	Section 4.3	See Harden Hydrogeological Response # 9.	The response has not provided clarification regarding the original JART comment. Additional information is required and should be documented in an addendum to the Level 2 Natural Environment Report. New information provided in the response to Hydrogeology comment #9, indicates that there is groundwater discharge into Kilbride Creek. Groundwater discharge is an important component of Brook Trout spawning habitat. The presence of groundwater discharge and its relevance should be recognized.	

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	The ELC manual does recommend that information on the dominant species within each polygon be provided. In Table 3 (pages 24-27), for each community, we have provided information on the overstorey tree cover, the woody understorey layer, and the ground flora. Detailed information is also provided on the composition of the overstorey, its age, average diameter at breast height, average height, and percent canopy closure. All of this is consistent with the requirements of the ELC manual. Detailed notes on the ground flora were not provided but the dominant species were indicated. Essentially, that is all that is required to be consistent with the ELC manual. In most vegetation communities, the composition of the ground flora is not consistent throughout. It may be different in areas where sun can access the ground as a result of a fallen tree than in areas that are in full shade all the time. These differences often occur in small patches that are not large enough to separate as a unique community. In addition, the composition of the ground flora may change year to year in response to whether it is a wet or dry year. So it is often difficult to accurately define which species are most prevalent in the ground flora. As part of our review on background information, we examined the ELC information collected as part of the Halton Natural Areas Inventory. All that is provided is a map of the communities with no information on vegetation community structure and species composition.	Species lists with relative abundance for each vegetation unit would provide additional information on the sensitivity and potential response of projected changes to the water resource system. Additional information should be documented in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
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	We concur that the SWC3-2 feature along the haul route has some characteristics that are typical of a more northern community. These features are widely scattered throughout the community, which is a more typical white cedar swamp. They do not form a distinct community that would warrant a separate ELC unit. They are simply more boreal inclusions that are scattered within the cedar swamp.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We summarized Riley's information for locally significant plant species, but used the more recent document by Crins et al. to determine which species were actually significant at the local municipal level. So we discounted those species that Riley identified as being significant in Halton Region since Crins et al. had more recent information demonstrating that they were more widespread than in 1989 when Riley's work was completed. We stated	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	

			<p>in this section of the report that only three of the plants that Riley identified as being locally significant were still considered significant in Halton and noted the presence of five additional species considered significant by Crins et al.</p> <p>According to the SWHTG, the scale for regionally significant species is either an Ecoregion or one of the old MNR regional districts. Species that are significant at the municipal level are considered locally significant by the SWHTG. We concur that Riley's publication is old and dated but it the only one available that addresses rarity at the regional level as defined by the SWHTG. In this case, Riley's document is relevant to the old Central Region of MNR. The publication by Varga deals only with individual municipalities or the GTA, but not Ecoregion 6E or the old Central Region of MNR. The only species that this was relevant to in this study was the chinquapin oak. We did not identify its habitat as being significant wildlife habitat because it is not rare within Halton Region and it was a seedling in atypical habitat so its viability was uncertain. We checked for this tree later and it is no longer extant. If the SWHECS are used, regionally significant species do not qualify as significant wildlife habitat.</p>		
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	On page 5 of our report, it is stated that the study area included the entire property owned by the proponent in addition to all lands within 120 m of the proposed licence area. Four bullets are provided on that page explaining our rationale for expanding the study area beyond that which is required by the <i>Aggregate Resources Act</i> . Therefore, the eastern deciduous forest and the coniferous swamp that are bisected by the internal haul road were included as part of the study. Breeding bird surveys and other wildlife surveys were completed within this area as well as botanical surveys and ELC work. We may have confused this by adding a line on some of the figures that indicated the 120-m zone.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	The report states that there were 5 species found with very high CC scores and that they were found within the western deciduous forest (FOD5-2) and the coniferous swamp (SWC3-2). These species included bog sedge (<i>Carex magellanica</i>), leatherleaf, Labrador tea, three-leaved solomon's-seal,	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	

			and chinquapin oak. The bog sedge and three-leaved solomon's-seal occurred in the coniferous swamp and the locations of the other species are shown on Figure 14. As noted in our response #36, chinquapin oak is no longer extant on site. All of these species are outside of the proposed extraction area and will not be affected by the quarry		
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: <i>Calla palustris</i> , <i>Carex aurea</i> , <i>Carex magellanica</i> , <i>Carex scabrata</i> , <i>Carex viridula</i> , <i>Chamaedaphne calyculata</i> , <i>Cypripedium spp.</i> , <i>Equisetum variegatum</i> , <i>Galium tinctorium</i> , <i>Glyceria borealis</i> , <i>Glyceria canadensis</i> , <i>Ilex verticillata</i> , <i>Larix laricina</i> , <i>Ledum groenlandicum</i> , <i>Lysimachia thyrsoiflora</i> , <i>Maianthemum trifolium</i> , <i>Osmunda cinnemomea</i> , <i>Osmunda regalis</i> , <i>Picea mariana</i> , <i>Potentilla palustris</i> , <i>Rubus hispida</i> , <i>Spiraea alba</i> , and <i>Thelypteris palustris</i> .	Section 4.4.2	None of these species is an obligate fen or bog species, occurring only in those habitats. The ones that are closest to requiring fens or bogs are leatherleaf and Labrador tea, but they also occur outside of these habitats. It would be more accurate to state that these species are associated with high water tables, and not necessarily groundwater discharge. We found some of these species in marsh habitats and even in disturbed areas of cultural meadows. The most significant of these are also locally significant and we have mapped their locations on Figure 14. Within the swamps, there are numerous upland plant species growing on hummocks or upturned root wads. We have not claimed that there are upland inclusions in the wetlands and attempted to map them as separate vegetation communities.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We rechecked the NHIC website and determined that there is only one plant species with an S-rank of "S1" to "S3", the butternut with an S-rank of "S2?"	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	Soil conditions within ELC communities are described in Table 3 (pages 24-27) as per ELC requirements. Organic soils occurred in 4 swamp communities coded as SWD 7-1, SWD 6-2, SWM 4-1 and SWC 3-2. In each of these communities the organic soil was greater than 60 cm in depth. Although some bog/fen affinities were found in some of these areas, particularly SWC 3-2, there were no distinct inclusions of bog or fen vegetation that could be identified or mapped within these swamps.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	Agreed. This should be modified to state that no significant terrestrial snails were found. For methods, we simply looked for snails while doing other fieldwork. The site is heavily infested with the introduced banded wood snail. It would undoubtedly have adverse effects on any native snails that might be present.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
43.	The report states that none of the odonates observed are significant at any level; however, the black-tipped darner is considered rare in	Section 4.5.1	Agreed, we overlooked this fact in the NAI list of odonates. As noted in the wildlife list, it was observed only on adjacent lands. If the	The information provided, including the location of the observation, should be	

	Halton Region. This should be revised and mitigation measures developed, as necessary.		SWHECS are used, its habitat would not qualify as significant wildlife habitat.	documented in an addendum to the Level 2 Natural Environment Report.	
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	All on-site and nearby-off-site wetlands that were determined to have suitable salamander habitat were treated specifically and evaluated with the integrated surface water and groundwater model. All other wetland areas are included in the model but are not specifically targeted.	The response has clarified part of original JART comment (i.e. that all wetlands were included in the integrated hydrologic model), however additional information is required regarding hydrologic changes to the east wetlands and should be documented in an addendum to the Level 2 Natural Environment Report. Mitigation approaches in the area south of the east pond discussed during the January 17, 2020, meeting should be identified on the Site Plan. Monitoring locations and methods can be included/updated in the IG.	
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	Consistent with the SWHTG, we identified the best examples of amphibian breeding habitat as significant wildlife habitat, including Ponds 5, 7, 9, and 10. The remaining ponds either have limitations due to hydroperiod for amphibians (Ponds 4, 8, 14, and 15) or have fish populations that limit amphibian production (Ponds 1, 2, 3, 6, 11, 12, and 13). If one uses the SWHECS, ponds must either support 20 egg masses of two of the listed species or two species with call counts at Level 3. With the information provided in Table 4 of the Natural Environment report (results of the call-count surveys) and the table provided in response #13 of this document, it is concluded that none of the ponds that we did not identify as significant wildlife habitat meet these criteria.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We agree that COSEWIC has recently identified the Midland painted turtle as a special concern species. This does not affect our analysis because the PPS, NHRM, SWHTG, and SWHECS only recognize provincial designations of significance. In Ontario, the Midland painted turtle is not designated as special concern. Its S-rank has been changed from S5 (secure in Ontario) to S4 (apparently secure in Ontario). So the federal designation has no effect on the status of this species on the subject lands.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
47.	The report states, " <i>Bats in general were not very common at the site.</i> " 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	We stand by our statement that bats do not appear to be very common within the study area. The number of recordings on the three sampling dates included 4, 10, and 20 and it is probable that multiple recordings were obtained from some bats. This is a very low count. We have done similar surveys in	The response has provided clarification regarding the original JART comment. Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	

			<p>numerous sites and the low numbers suggest that there are no roosts nearby. In areas with nearby roosts, it is common to get 50 to 100 calls within a very short period between dusk and a few minutes after official sunset time. We have completed a detailed bat acoustic study at one site where we deployed detectors within woodlots as per MNRF's protocol and also installed detectors outside the wooded areas adjacent to an aggregate pond. The detection rate at the pond was 6 times higher than it was within the wooded area. This was true even for the northern myotis, which is considered a forest species that forages under the tree canopy. So we selected the areas for sampling that had the highest probability of detecting bats because it is a well known fact that water bodies are particularly rich in invertebrates and are highly attractive to foraging bats, especially for the little brown myotis. There are no implications from the perspectives of the ESA or significant wildlife habitat. Although we mapped the habitat above the ponds created by previous extraction activities and the proposed Phase 1 area as foraging habitat for both the little brown myotis and northern myotis, MECP staff have visited the site and are reviewing the report and Site Plans relative to habitat for endangered or threatened species. Foraging habitat for bats will be enhanced by the conversion of Phase 1 from a cultural meadow to a pond. The small areas in which trees will be removed have limited potential to support roosting bats as these are comprised of early successional trees and coniferous plantation. In addition, the site plan requires that tree removal be done during the period November 1 to March 31 to ensure that no roosting bats are present when this occurs. Because use of tree cavities as roosts by bats is very short-term, the loss of a few trees during a period when bats are absent will have no effect on populations.</p>		
48.	<p>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.</p>	Section 5	<p>Based on the available mapping, the southern portion of the KOA tributary connects to the Kilbride Creek at the Campbellville Road as shown in Figure 8. However, the northern portion of the KOA tributary now flows north as shown in Figure 9 and does not currently connect with Kilbride Creek. It appears the haul road which was likely built in the 1980s altered the natural flow direction of the stream. So now</p>	<p>The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.</p>	

			the tributary that arises in Ponds 12 and 13 is a tributary to the KOA tributary. The inconsistency in the mapping of the tributary reflects the different dates when these provincially generated maps were created. The only relationship that the on-site portion of this stream has with the PSW is to drain stormwater that is generated on the industrial lands adjacent to the eastern wetland complex.		
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	Yes, we are reviewing Butternut Habitat with MECP.	The response has provided clarification regarding the original JART comment. Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	See response #13.	The response has provided clarification regarding the original JART comment. Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	The intent of the application is to avoid the removal of trees in significant woodlands. Changes have been made to the Site Plan (Aug. 2019) to remove small areas of woodland from the extraction area of Phase 1 and apply a 10 m buffer. In addition, the site plan commits to tree planting in areas within and outside of the extraction area to compensate for any losses in tree cover. See additional information provided by email (from James Parkin) on November 8, 2019.	The additional information regarding Woodlands and Significant Woodlands presented to JART during meetings on March 5th and March 31st, 2020 should be incorporated into an addendum to the Level 2 Natural Environment Report. Additionally, JART understands that the updated site plan will result in several woodland areas being retained that were previously proposed for removal, which we look forward to seeing in an updated site plan.	
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	The monitoring and mitigation plan included on the site plan will ensure that the Kilbride Creek Valley and its ecological functions are protected. The proposed quarry and activities associated with it will have no effect on the vegetative cover within the valleyland or on the fish habitat and other aquatic resources associated with the valley. If the Kilbride Creek Valley is considered a significant valleyland, the proposed quarry will have no negative effects on it.	The response has provided clarification regarding the original JART comment. Interpretation of whether the Kilbride Creek valley is a Significant Valleyland should be included in the addendum to the updated Level 2 Natural Environment Report.	
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	Section 10.1	The presence of very low numbers of bullfrogs (only 1 or 2 individuals) was confirmed in Ponds 2, 3, and 11. As outlined in our previous	The response has provided clarification regarding the original JART comment.	

	<p>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 (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.</p>		<p>response, we do not think this constitutes significant. Nonetheless, on-site habitat for bullfrog will be maintained throughout extraction activities and additional habitat will be created through rehabilitation activities.</p> <p>The phasing of quarry extraction ensures that bullfrogs will have an undisturbed “refuge” area available during extraction activities. The extraction areas are phased (see revised phasing note on pg. 6 of this correspondence) and there will always be inactive areas. In addition, most of the bullfrog habitat in Pond 3 and all its habitat in Pond 2 will be retained. The only bullfrog habitat that will be temporarily lost is a small area of emergent vegetation in the East Pond where a maximum of one bullfrog was detected. This area will be temporarily filled in as part of the plant area.</p> <p>Through rehabilitation activities, the amount of suitable habitat for bullfrog will be increased. Shallow water habitat will be created where Buffer Pond 1 and Buffer Pond 2 will be located in addition to the creation of shallow littoral areas in phase 2 and phase 5, and a shallow amphibian pond in the north corner of Phase 2. Because bullfrog habitat will be maintained during extraction, bullfrogs in the area will be able to readily colonize the new habitats created through rehabilitation and there is no loss over the term of the proposed operation.</p>	<p>Additional information and documentation are not required at this time.</p>	
54.	<p>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.</p>	Section 10.2	<p>We concur that we omitted to map the location of the spring near the railway tracks. GPS coordinates for the location of the spring will be obtained and the feature will be mapped on any revised figures. Phase 1 is the nearest extraction phase to this spring. A positive hydraulic gradient will always be maintained toward the spring and it is expected that upon closure, the hydraulic gradient between the Phase 1 pond and the spring will be of greater magnitude than presently occurs.</p>	<p>The information provided (spring location) should be documented in an addendum to the Level 2 Natural Environment Report.</p>	
55.	<p>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.</p>	Section 13	<p>As required by the <i>Aggregate Resources Act</i>, all potential impacts of the quarry have been considered in the technical reports, including the Natural Environment Report. The site plan includes a comprehensive list of monitoring and mitigation requirements, which have been developed based on the impact assessment, to ensure that there will be no negative impact from the operation of</p>	<p>Additional assessment is required regarding impacts, mitigation, and contingency measures in the event that blasting and extraction result in exposing unidentified channels within the groundwater flow system. As discussed during the meeting held with JDCL on January 17, 2020, this is of particular interest in the west pond and Phase 1 areas adjacent to Kilbride Creek and Pond 5. Where</p>	

			the quarry (both during extraction and through to after final rehabilitation is completed). In addition, the quarry operation is sequential and only involves deepening the ponds in one small area at a time. As such, most of the site will continue to function as it does today, either in an untouched state or in a rehabilitated condition.	any additional mitigation strategies are required, they can be added to the Site Plan, and monitoring and contingency plans can be identified in the IG.	
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: <ul style="list-style-type: none"> 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	The report, including Environmental Objectives, have been reviewed by other environmental agencies including the MNRF and the MECP from both water management (water quality and quantity, hydrology, and hydrogeology) and Natural Heritage (natural features, functions, endangered and threatened species and their habitats etc.) perspectives. The five high-level objectives were determined in order to maintain or enhance the site conditions. By meeting the Environmental Objectives 3, 4, and 5, all watercourses will be protected. Environmental Objective 2 ensures that hydroperiod of the wetlands is maintained during the critical lifecycle of breeding amphibians (i.e. maintaining a minimum of 10% wetted surface 10 cm deep in salamander breeding ponds). This applies to all wetlands/ponds except those that are permanent water bodies. This satisfies the comment regarding environmental objective 5. In order to predict the hydroperiod of the amphibian ponds under varying conditions, detailed field topographic surveys and an integrated surface water/groundwater model simulations were undertaken. In order to meet the Environmental Objectives, a comprehensive monitoring and mitigation plan was developed and is included on the site plan. The monitoring and mitigation plan includes minimum monthly water levels that must be maintained in specific protection areas, including wetlands. See also the Environmental and Water Management Operational Guide circulated on November 29, 2019	As noted during the January 16-17, 2020, meetings with JDCL, a revised and updated monitoring, mitigation and contingency plan is to be built into the IG, which is to be referenced in the Site Plan. Additionally, any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	Maintaining 10% wetted area in the ponds for salamanders does take into account other ecological functions of the wetlands. Essentially, there are two types of ponds within the study area: ephemeral and permanent ponds. The salamander ponds are the ephemeral ponds and the salamanders are the most sensitive of the features in these	As noted during the January 16-17, 2020, meeting with JDCL, where pond-specific mitigation strategies are proposed, these can be identified in the IG. Monitoring approaches discussed during the meeting with the JDCL on January 17, 2020, can be incorporated into the IG.	

			<p>ponds and they also require the longest hydroperiod of any of the amphibian species that these ponds support. By ensuring that the hydroperiod is long enough so that salamanders have the opportunity to transform into juveniles, we are also ensuring that the other amphibian species within these ponds will also have sufficient time to transform. Species that require longer hydroperiods than the salamanders, such as the bullfrog, are confined to the permanent ponds. These will remain as permanent ponds thus protecting habitat for these species. In many cases, maintaining 10% wetted area to a depth of 10 cm will be an enhancement; some of these ponds do not currently achieve this objective. As discussed in our response #66, Pond 5 typically contains water until July 31st, but it may be reduced to small puddles. If 10% of it is maintained with a water depth of 10 cm, there will be 0.27 ha of water this deep on every July 31st while the quarry is in operation. During this period, the hydroperiod of all the salamander ponds will be suitable for production of salamanders. This is not currently the case. We would be happy to further discuss the Environmental Objectives and the monitoring and mitigation plan with you.</p> <p>See also the Environmental and Water Management Operational Guide circulated on November 29, 2019.</p>		
58.	<p>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.</p>	Section 14	<p>All of the wetlands can be thought of as having a dependency on groundwater in that the underlying water table supports the surface water in the wetlands. No distinct groundwater discharge areas have been observed in any of the wetlands other than the spring associated with SWD7-1 which is more related to the Kilbride Tributary. As such, the standing water in the wetlands is surface water and any pumping conducted is designed to maintain surface water levels during critical periods. The addition of pumped surface water to the wetlands, via the buffer ponds and dispersion trenches, is to replace surface water being drawn down through the base of the wetland as a result of increased downward gradients.</p>	<p>As noted during the January 16-17, 2020, meeting with JDCL, additional information is required on the proposed mitigation approaches and how the efficacy and adequacy will be assessed through monitoring and contingency planning.</p> <p>Key issues include ensuring the mitigation approaches result in hydroperiods that support full development of amphibian eggs to juveniles that disperse from ponds, and that the pond conditions created by pumping do not negatively affect the development conditions (e.g. reducing temperatures, introducing biological and/or chemical contaminants). Additional information should be documented in an addendum to the Level 2 Natural Environment Report. Mitigation strategies, monitoring and contingency plans are to be identified in the IG.</p>	

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	We disagree with this comment. Section 14.1, which is 5 pages in length, discusses how the proposed mitigation will affect each wetland and each pond. MNR and MECP are currently reviewing this information.	As noted during the January 16-17, 2020, meeting with JDCL, additional information is required for the wetlands east of the rail line and should be documented in an addendum to the Level 2 Natural Environment Report. Additionally, any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	Although the Harden report is more detailed than the Natural Environment report in discussing the mitigation, all the relevant information is summarized in Sections 14.0 and 14.1, Table 5, and Figure 17. We worked closely with Harden in developing the monitoring and mitigation plan.	As noted at the meeting with JDCL on January 17, 2020, additional information is requested for potential changes in the water table in the wetlands on the east side of the study area, and the implications that the expected changes will have on the moisture regime and capacity support a wetland vegetation type. Additional information should be documented in an addendum to the Level 2 Natural Environment Report.	
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	<p>The environmental objectives, and corresponding monitoring and mitigation plan have been reviewed and discussed with the MECP and MNR. We would be happy to further discuss the Environmental Objectives and the monitoring and mitigation plan with you.</p> <p>See also the Environmental and Water Management Operational Guide circulated on November 29, 2019</p>	<p>Additional information regarding objectives as they relate to Significant Wildlife Habitat, Significant Woodlands, and Provincially Significant Wetlands should be documented in an addendum to the Level 2 Natural Environment Report. Mitigation, monitoring and contingency measures required to meet the environmental objectives, should be identified in the IG.</p> <p>This includes, but is not limited to, mapping the limits of the Guelph Junction PSW on Map 1 of 5 of the site plan (Existing Features Plan). As well, providing comments on how the objectives conform to Section 7.3 of the Greenbelt Plan Technical Paper 1 and the stated requirement for setbacks from significant wetlands.</p> <p>Additionally, any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report.</p>	
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	On pages 80 to 84 we provide an overview of our proposed protocols for protecting aquatic natural heritage features, including passive actions, active actions and operational modifications. We then go on to describe how potential impacts to each wetland and amphibian breeding pond will be mitigated on page 85 to 88. For readers who want more details they are referred to the Harden and/or	<p>As noted during the January 16-17, 2020, meeting with JDCL, additional information is required regarding the approach to warning, minimum thresholds and target levels as these relate to mitigation and contingency planning and should be included in the IG.</p> <p>Additionally, any direction that has been provided by the Province in this regard should</p>	

			<p>Earthfx reports. We worked closely with Harden in developing the monitoring and mitigation plan.</p> <p>See also the Environmental and Water Management Operational Guide circulated on November 29, 2019</p>	<p>be documented as a supplement to the Level 2 Natural Environment Report, as part of the Implementation and Operations.</p>	
63.	<p>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.</p>	Section 14	<p>Each phase does not correspond to one year. See response to comment #62. The monitoring and mitigation plan and notes that are included on the site plan have been included to address all aspects of quarry operation, including potential direct, indirect and cumulative impacts. MNRF is in the process of reviewing this information.</p> <p>See also the Environmental and Water Management Operational Guide circulated on November 29, 2019</p>	<p>The response has provided clarification regarding the original JART comment. Information related to monitoring, mitigation and contingency planning, should be included in the IG, which is to be referenced in the Site Plan. Additionally, any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report and the IG, as applicable.</p>	
64.	<p>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.</p>	Section 14	<p>See response to comment #62. The approach taken by the hydrogeological investigators was to: a) obtain background data; b) evaluate the hydrogeological properties of the hydrostratigraphic units; and c) prepare a predictive hydrologic model that was used to evaluate firstly the closure conditions of the site and secondly operational conditions at the site. It was determined that upon closure, the site does not need any on-going maintenance (e.g. pumping or hydraulic barriers) in order to have the natural environment revert back to pre-extractive conditions. This being determined, the hydrogeological investigators, in consultation with the ecologists, evaluated the extractive conditions with the greatest potential for impact to water levels in the nearby natural heritage features. It was determined that with relatively simple methods of pumping water into buffer ponds or dispersion trenches that the natural heritage features will be maintained during the extraction phase. At any time that water-level changes cannot be managed through the pumping system, a reduction in extraction rate or in the worst case, a cessation of below-water-table extraction will resolve the issue.</p>	<p>As noted during the January 16-17, 2020, meeting with JDCL, additional information is required regarding the approach to warning, minimum thresholds and target levels as these relate to mitigation and contingency planning, and should be included in the IG.</p> <p>Additional clarification is requested to fully integrate the ecological and water resource strategies for wetlands in the east area of the subject property, adjacent to the east pond. The requested updates should be provided in the addendum to the Level 2 Natural Environment Report.</p>	
65.	<p>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.</p>	Section 14.1	<p>See response to comment #62. The operational modifications are not vague as they relate to specific environmental objectives. There is a very detailed monitoring and mitigation plan including trigger levels shown in Tables 3 through 7 on the site plan and outlined in detail in the Hydrogeology</p>	<p>Clarification is required in regards to whether water level targets/thresholds may need to be adjusted based on feature-specific conditions, and/or to mimic annual variability in conditions.</p>	

			<p>Report. The predictive modelling concludes that there is sufficient water in storage to maintain water levels above the trigger levels for the critical periods. It is not necessary to dictate pumping rates in the approved monitoring plan.</p> <p>See also the Environmental and Water Management Operational Guide circulated on November 29, 2019</p>	<p>Additional clarification is required to fully integrate the ecological and water resource strategies based on feature-specific conditions, and areas (e.g. wetlands in the east area of the site) that were not explicitly addressed in the Natural Environment Report.</p> <p>As noted during the January 16-17, 2020, meeting with JDCL, protocols for adjustments to thresholds and target levels should be provided in the IG.</p> <p>Any amendments to the proposed monitoring, mitigation and contingency planning should be addressed in the IG.</p>	
66.	<p>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.</p>	Section 14	<p>We agree that Pond 5 is the most productive salamander pond. It does not support bullfrogs as is stated in the comment, but we have identified it as significant wildlife habitat for breeding amphibians. No in-wetland work would be required to improve the outlet to Pond 5. The pond overflows into the West Pond over a hump of upland habitat. The outlet was created by the previous operator of the gravel pit, who not only created the West Pond but dug an outlet from Pond 5 to it. The suggested alteration is to slightly raise the dry area so that the pond retains a little more water. The hydroperiod of this pond is currently marginal for producing salamanders. In most years, it supports enough water until the end of July, but in drought years it may not. The following picture was taken on July 31, 2018 in the deepest area of the pond, demonstrating how low water levels are in a fairly "normal" year from a precipitation perspective. The pond was reduced to a very small puddle at that time. In spring, the location where the individual is standing is 50 to 60 cm deep and floods the trees behind him.</p>	<p>The response has provided clarification regarding the original JART comment. Monitoring, mitigation and contingency plans should be built into the IG.</p>	



(#66 con't) It is our opinion that management that enhances the hydroperiod of this pond would be beneficial and would have no adverse effects on the provincially significant wetlands or its functions. Work can also be completed without creating any disturbances or site alterations within the wetland itself

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

Again, the wetlands east of the railway were studied as intensively as the remainder of the property. Please see page 5 of the report. We apologize if the 120m line on some of the figures was confusing. During extraction operations in the East Pond (i.e. 5 to 6 years) the Earthfx model predicts up to a 0.5m drawdown along the northern edge of the eastern wetland complex and a maximum of 0.3m drawdown in the more central portion of this area with progressively less effect as one moves further southward, particularly south of the haul road in the higher-quality areas of the wetland. The wetland area north of the haul road has been subjected to abnormally high groundwater levels for several decades due to the damming effect of haul road construction in the 1980's. The entire wetland complex was similarly impacted prior to this date by construction of the railway. The presence of year round high water levels in the cedar swamp north of the haul road is indicated by the abundance of dead and dying trees found in this area. Although the groundwater level in this swamp will be temporarily lowered, it is expected that this will simply return the area to more natural pre-development conditions. The wetland will continue to remain wet to moist due to spring snowmelt and rainfall. In any event, growing conditions for wetland vegetation will improve during aggregate extraction in the East Pond

Monitoring, mitigation and contingency plans need to be built into the IG.

			and should continue to more closely approximate natural conditions in the future due to the installation of the proposed western culvert.		
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	In the Earthfx Report, Figures 9.6 and 11.7 show the magnitude of the maximum water level influence that will occur from the main ponds on the wetland features. Figure 9.6 shows water level change under closure and Figure 11.7 shows the maximum temporary water-level change during extractive operations. In addition, Figures 11.8 to 11.13 show anticipated water levels in several wetlands under a variety of precipitation conditions and maximum anticipated interference conditions. We have interpreted these graphs as clearly showing that the protection strategies (Table 2 on Page 3 of 5 of the Site Plan) can maintain appropriate hydroperiods in the wetlands during operations. In the event that actual conditions differ, there are several mitigation efforts available including suspension of below-water-table extraction at which point water level conditions will revert back to pre-development conditions. See also the Environmental and Water Management Operational Guide circulated on November 29, 2019	The response has provided clarification regarding the original JART comment. The information provided should be documented in an addendum to the Level 2 Natural Environment Report, in particular, it is recommended that maximum model-simulated drawdown information be identified on a map with ELC communities to identify where soil moisture regimes may change, and affect existing vegetation. Additional clarification is still required to confirm the efficacy of the proposed mitigation strategies as part of the mitigation and contingency plan; to be included in the IG.	
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	Please see response #67	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. In particular, it is recommended that maximum model-simulated drawdown information be identified on a map with ELC communities to identify where soil moisture regimes may change, and affect existing vegetation. Additional clarification is still required to confirm the efficacy of the proposed mitigation strategies as part of the mitigation and contingency plan; to be included in the IG.	
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.		As shown on several figures in the Natural Environment report and the site plans, the access road will not be included within the licensed area. As previously noted, detailed environmental work did occur within the wetlands that straddle the road. This was explained on page 5 of the report but probably was confusing because of our showing the 120-m zone on the figures.	The response has provided clarification regarding the original JART comment. As the access driveway is not proposed to be included as part of the licenced area, Conservation Halton's regulation and policies apply. 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.	

				We acknowledge JDCL's December 2019 response to a similar comment made by JART in the site plan and summary statement response table; refer to that response table for additional comments regarding CH's regulatory/permitting requirements.	
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	Although Pond 5 is hydrogeologically connected to Pond 6 it takes several days for groundwater to travel from Pond 5 to Pond 6, so with continuous pumping and this time lag, sufficient surface water can be maintained in this wetland to ensure successful amphibian breeding. Dispersion Trench 1 and 2 are not necessarily designed to infiltrate all of the water. The intention is for the trench to disperse the energy of the water being pumped into the trench and allow for the water to trickle over the surface into the wetland under controlled non-impactful conditions. See also Hydrogeological response #52.	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. Additional information should provide details on the source of water for pumping and contingency measures in the event that drawdown of Pond 5 is faster than expected during and post extraction. This information can be included in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
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	We anticipate no significant changes to the hydroperiod in any of the ponds. The overall objective for Pond 7 is to make this pond more viable for breeding salamanders by excluding fish and having a more natural vegetation community. Pond 7 will continue to support obligate wetland plant species.	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. Additional information will be required with regard to monitoring and contingency measures to confirm that the proposed mitigation approaches result in the predicted outcomes. This information can be included in in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
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	The 2 box culverts are intended to improve the flow of water and facilitate the movement of reptiles and other wildlife species. The more westerly culvert should help to lower the unnaturally high water levels in the wetland communities on the north side of the haul road and may also allow for the re-establishment of a south flowing stream through the cedar swamp (SWC3-2) as was the case in the past (see also response #75). The most significant wetland species are located south of the road, and installation of the western culvert has the potential to improve conditions for them by allowing more natural flow of water to this area. The eastern culvert will not change existing hydraulic conditions because it simply replaces an existing culvert. The water levels in Ponds 12	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. Since the access driveway is not proposed to be included as part of the licenced area, Conservation Halton's regulation and policies apply. As noted previously, 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 should be contacted prior to submitting a permit application to confirm permit submission requirements.	

			and 13 are very similar, indicating good connection through the existing culvert. The eastern box culvert will enhance this hydraulic connection but will not change flow conditions between the two ponds. We have never observed flow in the western culvert area. A small culvert presently exists but water levels have never been high enough on the north side of the road to cause flow within the culvert. The elevation of surface water (when present) at SG12 is lower than elsewhere in the Eastern Wetland Complex and yet there is no flow. Since conditions around the culvert will not change, no change in hydrology is expected to occur with the box culvert.	Details should also be provided regarding the type of culverts proposed for installation, and monitoring to assess efficacy of use by wildlife.	
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	Water levels in Ponds 12 and 13 are essentially the same, indicating that the existing culvert between these two ponds is functioning at least marginally. This is the only location that makes any sense for connecting the two ponds. It is not possible to avoid impacts resulting from any discharges from Pond 13, and these discharges have been approved by MNRF and presumably by CH, as part of the industrial development to the south. It is essential that a connection between the ponds be maintained to prevent damming by the road and flow over the road. In addition, a connection between the ponds at this location allows us to install safe passage for turtles and other wildlife species.	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. Since the access driveway is not proposed to be included as part of the licenced area, permission would be required from Conservation Halton. 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 should be contacted prior to submitting a permit application to confirm permit submission requirements. We acknowledge JDCL's December 2019 response to a similar comment made by JART in the site plan and summary statement response table; refer to that response table for additional comments regarding CH's regulatory/permitting requirements. Refer to Item #14 in the Summary Statement table below.	
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	The cedar trees in the Eastern Wetland Complex have been under stress for several decades due to unnaturally high water levels in this wetland. Lowering the water table during the operational period of the site development will only improve tree health and growth, as well as habitat conditions for ground flora that are typically found in this community. The water table in other wetlands will be protected through the system of buffer ponds and dispersion trenches. By maintaining the hydrological regimes in the	The response has provided some clarification regarding the original JART comment; additional information regarding the location of sensitive wetland species is required and should be documented in an addendum to the Level 2 Natural Environment Report. Details regarding the proposed monitoring and contingency plan are also recommended to assess whether or not the improvements to the wetland occur as predicted. Details regarding monitoring and contingency planning can be included in an addendum to	

			salamander ponds, the water table in the adjacent wetlands will also be retained.	the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
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	Improvements to the road are mainly related to environmental enhancements associated with wildlife crossings. The road bed is wide enough to accommodate two on-coming trucks so there is no need to widen its base and it will not be paved. Water will be used for dust control rather than chemicals. Some trimming of branches overhanging the road may be required, but this will be the extent of disturbance. While some repair of the road surface has been made using recycled aggregate (rap) over the years, a paved surface wide enough for two trucks to pass is currently in place.	Refer to Item # 74 in the GWS Natural Environment Review table above. Refer to Item # 14 in the Summary Statement table below.	
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	MECP is currently reviewing the hydrogeological information regarding the Jefferson salamander suitable breeding ponds as defined under the ESA regulations. We are working with them to ensure that the ESA requirements are met.	Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and where requested, monitoring requirements be incorporated into the IG.	
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	The purpose of the buffer ponds is to maintain the hydraulic head between the quarry ponds and adjacent wetlands, ponds, and Kilbride Creek. By maintaining the hydraulic gradient, groundwater discharge will continue to occur in these features. Presently, pond water migrates from the West Pond to Kilbride Creek through sandy deposits between the two features. There is a significant temperature decrease over the 21 metres of separation. This condition will not change as the water level in Buffer Pond 2 will not be higher than it is found presently. There is no change to the transmissivity of the 21 m of unconsolidated material between the pond and the creek. Therefore all conditions remain the same during extractive operations and post closure. See also the Environmental and Water Management Operational Guide circulated on November 29, 2019	As noted during the January 16-17, 2020, meeting with JDCL additional information is required regarding the potential for surface water infiltrated via Dispersion Trench 2 to affect the temperature of the tributary that arises south of the West Pond. Additional information should be documented in an addendum to the Level 2 Natural Environment Report or as part of the IG.	

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	We concur that we omitted to map the location of the spring near the railway tracks. GPS coordinates for the location of the spring will be obtained and the feature will be mapped on any revised figures. Phase 1 is the nearest extraction phase to this spring. A positive hydraulic gradient will always be maintained toward the spring and it is expected that upon closure, the hydraulic gradient between the Phase 1 pond and the spring will be of greater magnitude than presently occurs.	The omitted information provided should be documented in an addendum to the Level 2 Natural Environment Report.	
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	Under existing conditions, 25°C water enters the groundwater flow system at West Pond in July and discharges at a temperature of 16°C at Kilbride Creek approximately two months later. In the winter, 0°C water enters the groundwater flow system at the West Pond and discharges at a temperature of 8°C, again two months later. These are the conditions measured at the top of the groundwater flow system. The existing ponds are relatively shallow with little thermocline. A deep quarry pond will have cooler water at depth, less affected by solar radiation than the shallow pond water. Therefore, it is possible that cooler water will enter the groundwater flow system from the deeper pond. The sand and gravel deposits have an attenuating affect on the temperature of thermal plume and small changes in surface water temperature (if any) will not be significant at the discharge point. It is expected that a deeper West Pond (and Phase 4 pond) will have subtle impacts on the temperature of groundwater discharging at Kilbride Creek. The Phase 1 pond represents a new condition, however, Pond 3 is presently closer to Kilbride Creek than the future Phase 1 pond. Pond 3 is very shallow and water migrating from the pond is presently moving toward the spring adjacent to Kilbride Creek. The Phase 1 pond will be deeper and farther away from the spring neither of which condition will result in a greater impact to the spring than is already occurring (if any). As shown between the West Pond and Kilbride Creek, there is approximately a nine degree change in only 20 metres of travel distance. Assuming similar thermal properties, the temperature change at 180 m will be negligible. The estimated groundwater velocity in the southwest corner is estimated to be four metres per year based on a hydraulic	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	

			gradient of 0.009, hydraulic conductivity of 2.15×10^{-6} m/s at CB4S and a porosity of 0.15. The travel time is therefore 45 years, more than sufficient to attenuate the thermal plume. See also hydrogeological response #12 and response #81 and 82 below.		
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	The potential effect of the Phase 1 pond on groundwater discharge to the Kilbride Tributary was considered and shown on Figure 9.9 in the Earthfx report. There will be small increases in groundwater levels in the Tributary after closure. Considering that hydraulic conditions are not expected to change, there will be no significant impact on the temperature of discharge water in the Kilbride Tributary.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	The distance of 180 m is not the minimum impact distance for a thermal plume from a gravel pit. On-site data already shows that 20 metres of sand greatly attenuates a thermal plume. Based on the on-site observations and estimates of groundwater flow we are confident that there will be no impact to Kilbride Creek or springs associated with Kilbride Creek southwest of Phase 1. All other ponds already have associated thermal plumes which will not be significantly affected by being deeper.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
83.	<p>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.</p> <p>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.</p> <p>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</p>	Section 14.3	To ensure that there is no effect of blasting on spawning fish species, blasting must follow DFO guidelines as outlined on the Site Plan. According to DFO, the spawning period for coldwater fish species, which applies to Kilbride Creek, is October 1 to May 31, and the spawning period for warmwater fish, which applies to the Pond 12 and Pond 13 area, is March 15 to July 15. If CH has different timing windows, it would be appreciated if they could be supplied to us.	<p>As the proponent has indicated that they will be in discussions with DFO (Response #28) we respectfully request that they confirm the appropriate blasting timing windows with DFO, noting that there are also both fall-spawning and spring-spawning fish species present in Kilbride Creek.</p> <p>Additional information should be documented in an addendum to the Level 2 Natural Environment Report, as part of the IG, and referenced the updated Site Plan.</p>	

	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	See response 51. The limit of extraction in Phase 1 has been revised to remove wooded areas and apply a 10m buffer. Only the southern portion of Phase 4 and the southern boundary of Phase 3 proposes a limit of extraction directly adjacent to upland treed communities that could be classified as significant woodlands. These extraction limits directly correspond to the existing pond edges that were previously disturbed. In all other locations, the extraction areas are located adjacent to non-forested areas (i.e. CUM 1-1, DL, AG) or are located adjacent to plantation areas. See additional information provided by email (from James Parkin) on November 8, 2019.	The additional information regarding Woodlands and Significant Woodlands presented to JART during meetings on March 5 and March 31, 2020 should be incorporated into an addendum to the Level 2 Natural Environment Report. Additionally, JART understands that the updated site plan will result in several woodland areas being retained that were previously proposed for removal, which we look forward to seeing in an updated site plan. As well, where direction has been provided by the Province in this regard, it should be documented in an addendum to the Level 2 Natural Environment Report.	
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	In most wetlands and woodlands, there will be no change in water levels because of the mitigating effects of the buffer ponds, dispersion trenches and on-site management of water among operating phases. The only wetland/woodland complex that will experience any change in water table is the Eastern Wetland Complex (see Response #67). Furthermore, growing conditions for trees, shrubs and typical ground flora species established in SWM4-1 and SWC3-2 will be improved with a lowering of the water table during the growing season as these wetland communities have experienced unnaturally high water levels for several decades. Wetland plants are adapted to this type of annual drawdown in the water table, so minimal effects are predicted to occur. There will be no negative impacts on any adjacent woodlands.	The information provided should be documented in an addendum to the Level 2 Natural Environment Report. Mitigation strategies can be identified on the Site Plan. Any monitoring and contingency plans can be identified in the IG. Additional information is requested regarding the anticipated hydrologic changes in the east wetland, the anticipated ecological changes, and a monitoring and contingency plan to assess if outcomes reflect what is predicted. This information can be included in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
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	We disagree that the SWHTG analysis is a done at a high-level. It is much more detailed and considers many more potential habitats than does the SWHECS. As stated before, the only difference that occurs when the two different documents are used is that bullfrog habitat becomes significant wildlife habitat	Any new information, additional monitoring requirements, or contingency plans resulting from field investigations and/or assessment can be provided in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	

			<p>when using the SWHECS and habitat for the 11 locally significant species that we identified significant wildlife habitat for do not qualify as significant wildlife habitat. We have discussed the potential effects and mitigation on the bullfrog in our response to comment #53.</p> <p>In our report, we identified significant wildlife habitat for reptile hibernacula, habitat for area-sensitive breeding birds, amphibian breeding ponds, seeps and springs, the snapping turtle, eastern ribbonsnake, Eastern Wood-Pewee, and Wood Thrush as well as 11 locally significant species. The potential effects and mitigation for each of these species is discussed in Section 14.5 of the report. In most cases, we have simply avoided having any effect on the species or their habitats. Others are protected through the monitoring and mitigation measures included on the site plan.</p>	<p>As outlined in the response to Natural Environment Comment #1, in addition to the SWH types identified by the applicant's team, examples of other SWH that require clarification/consideration as part of the addendum to the Level 2 Natural Environment, as part of the IG, and/or as a detail on the updated Site Plan (as applicable) include, but are not limited to:</p> <ul style="list-style-type: none"> • Turtle Wintering Areas; • Reptile Hibernacula; • Turtle Nesting Areas; and • Terrestrial Crayfish. 	
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	<p>We see no need to change the restoration as a result of addressing comment #86. We are currently working with MNRF on the restoration aspects of the project, and as a result, additional details on specific aspects of proposed restoration work have been added to the revised Site Plan. MNRF is responsible for approving the details related to the restoration of the site. We are currently discussing the species composition of the wet meadow seed mix with them. A wet meadow seed mix was selected for the above the water table areas in Phase 1 and 2 as these areas are anticipated to be wet for a portion of the growing season and also contain riparian areas associated with the shallow shore and littoral areas that will be created in the adjacent ponds. This seed mix will contain facultative species that can tolerate seasonally wet conditions as well as dryer conditions later in the growing season.</p>	<p>The information provided should be documented in an addendum to the Level 2 Natural Environment Report and Site Plan as need. As well, information regarding the proposed monitoring and contingency planning can be included in the IG.</p> <p>Additionally, any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.</p>	
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	<p>MNRF is responsible for approving the details related to the restoration of the site. We are currently discussing the species composition of the wet meadow seed mix with them. A wet meadow seed mix was selected for the above the water table areas in Phase 1 and 2 as these areas are anticipated to be wet for a portion of the growing season and also contain riparian areas associated with the shallow shore and littoral areas that will be created in the adjacent ponds. This seed mix will contain facultative species that can tolerate</p>	<p>Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.</p>	

			seasonally wet conditions as well as dryer conditions later in the growing season.		
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	We are discussing tree planting with MNRF and a planting protocol, including species list, has been added to the site plan. Approximately 2.0 ha of tree planting will be carried out to enhance existing woodland edges and reforest disturbed areas, within and outside the licence area in order to improve woodland connectivity.	Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, and monitoring requirements be incorporated into the IG.	
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	The intent of the rehabilitation plan is to maximize the extraction of a provincially significant aggregate resources while creating environmental enhancement areas, including the shallow littoral areas identified on the site plan. Details on the creation of these shallow littoral areas are included on page 3 of 5 of the Site Plan under <i>Environmental Enhancement Measures</i> . We are working with MNRF on the final rehabilitation plan for the site.	Any direction that has been provided by the Province in this regard should be documented in an addendum to the Level 2 Natural Environment Report, on the Site Plan, and where monitoring requirements are proposed, that they be incorporated into the IG.	
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	All applicable DFO requirements will be adhered to for the replacement of the culverts. Timing is just one of the many requirements that must be considered. As mentioned in response #83, this is a warmwater fish community and DFO recommends that no activity be conducted in these waters from March 15 to July 15. Because there is minimal flow between Ponds 12 and 13 and no flow at the other location where a culvert will be installed, we will be able to do the work in the dry.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	We have experience implementing phragmites control measures and are aware of MNRF guidelines on phragmites control and will comply with their recommended methods. Cutting phragmites before seed set, but after the tubers have expended much of their energy in vegetative growth, has been an effective strategy to weaken and finally eradicate stands, without the use of chemical herbicides.	The information provided and the location of invasive species control should be documented in an addendum to the Level 2 Natural Environment Report. Actions that are proposed as part of this undertaking can be included in the IG, and as a detail on the updated Site Plan (as applicable).	
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	We are aware of the BMPs prepared by the Ontario Invasive Plant Council and on other projects we have implemented their methods of controlling these invasive species.	The information provided and the location of invasive species control should be documented in an addendum to the Level 2 Natural Environment Report. Actions that are proposed as part of this undertaking can be included in the IG, and as a detail on the updated Site Plan (as applicable).	
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	We assume that this comment refers to Pond 15. We walked by Pond 15 on numerous occasions while doing nocturnal work such as amphibian call-count surveys and owl	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	

			surveys and never heard any amphibians calling from this pond. Amphibians also commonly call during the day and none were ever heard during the day. In 2017, this pond dried up completely very early in the year, except for a small puddle that remained in an area where the previous pit operator had dug a test pit. This pond was examined in 2019 and no egg masses of any species were detected.		
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	Page 3 of 5 of the site plan includes a detailed monitoring and mitigation plan for the operation of the quarry. We see no need to do any wildlife monitoring during or after the operation of the quarry. There will be extensive hydrogeological monitoring and provided that the mitigation measures maintain water levels in ponds and wetlands as projected, there will no effects on wildlife. If the hydrogeological monitoring determines that targets are in danger of not being met, mitigation measures will be implemented to ensure that the targets are attained. See Environmental and Water Management Operational Guide circulated on November 29, 2019.	As noted during the January 16-17, 2020, meeting with JDCL, protocols and specifics regarding mitigation approaches, monitoring, and contingency planning should be documented in an addendum to the Level 2 Natural Environment Report and Site Plan and should be included in the IG.	
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	It is best to refer directly to the current site plans, which include 5 drawings, rather than the versions in the Natural Environment report. A revised version of the Site Plans has been included with this response.	The response has provided clarification regarding the original JART comment; the information provided should be documented in an addendum to the Level 2 Natural Environment Report, as part of the IG, and/or as a detail on the updated Site Plan (as applicable).	
97.	Figure 16 - Under "proposed vegetation" "nodal clusters of native woodland and meadow species" are proposed, however species are not given.	Section 14.6	The site plan has been updated to provide more information on tree planting, including a species list. Only native species of trees and shrubs will be utilized.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	Based on discussions with MNR and MECF, the reference to improving Pond 15 has been deleted from the site plan.	The response has provided clarification regarding the original JART comment. Additional information and documentation are not required at this time.	
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	Only native grass seed mixes will be used to stabilize stockpiles of topsoil or overburden and thereby avoid introducing more non-native species into the area. Species such as Canada Bluegrass (<i>Poa compressa</i>), Switchgrass (<i>Panicum virgatum</i>), Virginia Wild Rye (<i>Elymus virginicus</i>) and Fowl	The information provided should be documented in an addendum to the Level 2 Natural Environment Report and/or as a detail on the updated Site Plan.	

			Meadowgrass (<i>Poa palustris</i>) should be suitable for this purpose.		
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	Monitoring details and contingency measures are all described in detail on Page 3 of 5 of the Site Plans. It is our preference to have all relevant information on these matters in one easily accessible location rather than in a separate document entitled Adaptive Management Plan. See Environmental and Water Management Operational Guide circulated on November 29, 2019.	As noted during the January 16-17, 2020, meeting with JDCL, protocols and specifics regarding mitigation approaches, monitoring, and contingency planning should be documented in an addendum to the Level 2 Natural Environment Report and Site Plan and should be included in the IG.	
101.	Please provide all field data sheets digitally for the surveys undertaken		Our field data sheets are filled with our own personal codes and short forms for species, vegetation conditions and general comments. All of the information from our field notes has been incorporated into the Natural Environment Report.	Clarification was provided at the January 16-17, 2020, meeting with JDCL. The information provided, and data/information required as part of the baseline monitoring, should be documented in an addendum to the Level 2 Natural Environment Report and the IG, as applicable.	

Initial JART Comments (July 2019)	Page / Section	Applicant Response (Dec 2019)	JART Response (May 2020)	Applicant Response
Report: Transportation Impact Study – June 2018				
Author: Paradigm Transportation Solutions Ltd.				
<p>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.</p>	<p>Sections 4.0, 5.0 and 6.0</p>	<p>Reid Side Road was constructed to safely accommodate truck traffic from this site. The following potential safety concerns, outlined in the Halton Region’s TIS Guidelines, for the study area intersections include:</p> <ul style="list-style-type: none"> • Weaving/Merging; <ul style="list-style-type: none"> ○ All traffic using Highway 401 interchanges are required to occasionally weave/merge with prevailing traffic. • Transit operational conflicts: N/A • Corner clearances; <ul style="list-style-type: none"> ○ No corner clearance issues are identified. The site driveway is over 500 metres in length. • Sight distances; <ul style="list-style-type: none"> ○ There are no sight distance issues identified. • Vehicle-pedestrian conflicts; <ul style="list-style-type: none"> ○ With exception to Guelph Line within the built-out area of Campbellville, the study area roadways currently do not have dedicated pedestrian facilities. The pedestrian facilities at the Guelph Line intersection with Reid Side Road includes a sidewalk along the west side of Guelph Line with a pedestrian crosswalk at the signal. The sidewalk continues north over the Highway 401 bridge and then terminates into a gravel shoulder. ○ The existing count data for the study area intersections indicate very low pedestrian volumes within the study area. This is not anticipated to be a safety concern. • No site traffic infiltration is expected. Site generated heavy vehicle trips will adhere to the designated haul route. Trips made by employees may originate or be destined to all other areas. • No access conflicts are expected. The site driveway forms the existing fourth leg to the Twiss Road intersection with Reid Side Road. 	<p>The applicant provided in October 2019 what appears to be conclusions from a safety analysis. The Region and Town require the detailed supporting documentation in order to review and provide comment on these conclusions.</p> <p>At a minimum, for each of the safety concerns outlined in Halton Region’s TIS Guidelines, the safety report is required to:</p> <ol style="list-style-type: none"> 1) define the potential safety concern (for example, in the corner clearance section, the reader should understand what a corner clearance is); 2) explain how each safety concern is considered in the analysis (see below for additional detail); and 3) identify any potential impacts the additional truck traffic associated with the development application would have on safety. <p>The following are examples of what we would expect in a safety report:</p> <p>Weaving/Merging:</p> <ul style="list-style-type: none"> • Discuss potential for weaving and merging within the study area. Review the collision history to confirm there are no existing safety concerns that could be further impacted by the additional truck traffic associated with the development application. <p>Corner Clearances:</p> <ul style="list-style-type: none"> • Confirm if corner clearances related concerns are applicable to this development application. <p>Sight Distances:</p> <ul style="list-style-type: none"> • Sight distance measurements are to be supported with pictures, dimensions and references to the standards in the most current version of the Transportation Association of Canada (TAC) Manual in order to confirm there are no sight line issues. <p>Vehicle-Pedestrian Conflicts:</p> <ul style="list-style-type: none"> • Vehicle-pedestrian conflicts and cyclist movements should be supported by a 	

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		<p style="text-align: center;">Author: Paradigm Transportation Solutions Ltd.</p> <ul style="list-style-type: none"> • Cyclist movements; <ul style="list-style-type: none"> ○ All roadways, with exception of the Highway 401 ramps and the Highway 401 mainline, are Shared Roadways where both motorists and cyclists share the same vehicular travel lane. • Heavy truck movement conflicts; <ul style="list-style-type: none"> ○ Heavy vehicle movements impacted by site generated traffic are as follows: <ul style="list-style-type: none"> ▪ Reid Side Road & Highway 401 EB ramp, Eastbound left-turn – The turning movement is permissive with a turn lane provided. The observed 8-hour TMC volume for this movement is noted to be 895 vehicles of which 64 vehicles are heavy vehicles (7%). ▪ Guelph Line & Highway 401 WB Ramps, Westbound left-turn – The turning movement is currently stop controlled and operates as a single lane approach. The observed 8-hour TMC volume for this movement is noted to be 468 vehicles of which 32 are heavy vehicles (7%). ▪ Guelph Line & Reid Side Road, Southbound left-turn – The turning movement is permissive, under an all-red with operation controlled by a traffic control signal. The observed 8-hour TMC volume for this movement is noted to be 1710 vehicles of which 89 are heavy vehicles (5%) • Queuing conditions are outlined in all intersection operation tables contained in the TIS Report. <p>JDCL has professional driver training for its employees and has comprehensive trucking safety policies. These policies promote Safe Work Practices/Procedures and provide drivers with appropriate training related to the operation of their trucks in compliance with the Highway Traffic Act.</p>	<p>graphic illustrating the infrastructure in the study area dedicated to accommodating these movements. In addition, a review of existing collision history and traffic count information should be undertaken to confirm there are no existing safety concerns that could be further impacted by the additional truck traffic associated with the development application. The supporting collision and traffic count data should be provided in the appendices.</p> <p>Traffic Infiltration:</p> <ul style="list-style-type: none"> • Confirm how trucks will be compelled to use the designated Haul Route as opposed to traveling through adjacent residential neighbourhoods. <p>Access Conflicts and Heavy Truck Movement Conflicts:</p> <ul style="list-style-type: none"> • The analysis for access conflicts and heavy truck movement conflicts needs to be supported by a review of existing collision trends, traffic count information and auto turn drawings to confirm there are no existing safety concerns that would be further impacted by the additional truck traffic associated with the development application. The information provided by the applicant in October 2019 describes the existing traffic control infrastructure and states the existing traffic volumes without any discussion on how this relates to access and heavy truck movement conflicts. <p>Queueing:</p> <ul style="list-style-type: none"> • Please reiterate or provide a specific reference to where in the TIS queuing information is provided. The queuing results should be reviewed with a focus on safety and the results documented. <p>It should be noted that upon receipt of this supporting information the Region may have additional points of clarification or requirements.</p>	

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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	<p>A PCE is used for more conservative analyses, as it accounts for the relative performance of vehicles. Heavy vehicles take up more time and space. More importantly, they have lower acceleration/deceleration rates.</p> <p>It may be a reasonable assumption to use a lower PCE for vehicle trips returning to the site empty, as the vehicle's performance would be improved. However, to remain conservative in the intersection capacity analysis, a constant PCE factor has been applied for all truck trips in all directions of travel.</p> <p>No justification for use of a 3.0 PCE factor is provided.</p> <p>The FHWA sponsored study, <i>the passenger car equivalency factor ranges from 1.1 to 2.5. An average representation can be assumed; that is, an average truck, a recreational vehicle or a bus is equivalent to 2.0 pc¹.</i> Highway Capacity Manual² offers a PCE domain for trucks and buses. Trucking and buses on level terrain are noted as 1.5 PCE. Rolling terrain as 3.0 PCE and Mountainous terrain as 6.0.</p> <p>As outlined in the Canadian Capacity Guide for Signalized Intersections,³ <i>“Where specific counts by heavy vehicle types are not available, a combined passenger car unit equivalent of 2.0 may be used as an approximate value for trucks and buses.”</i></p> <p>The Canadian Capacity Guide, Table 3.2, notes a PCU of 2.5 for <i>Multi-unit trucks and 3.5 Multi-unit trucks heavily loaded.</i></p> <p>The base year traffic conditions converted all observed medium and articulated trucks into PCU using a factor of 2.0 PCE per vehicle. As the makeup of the goods being shipped by the trucks observed in the TMC data is unknown a combined passenger car unit equivalent of 2.0 is supportable and has been carried forward to be applied to site generated traffic.</p>	<p>Per Section 1.22 of the Town of Milton's Transportation Impact Study Guidelines, for planning purposes, a PCE of 2 can be assumed for trucks, buses, and recreational vehicles. In situations where a high percentage of multi-unit or heavily loaded vehicles can be reasonably expected, the use of a higher PCE may be warranted.</p> <p>As the applicant has noted, the Canadian Capacity Guide, Table 3.2, notes a PCE of 2.5 for Multi-Unit Trucks and 3.5 for Multi-Unit Trucks Heavily Loaded.</p> <p>In order to remain consistent with MTO requirements, the Town requires that a PCE of 2 be used for heavy trucks, and PCE of 3 be used for loaded heavy trucks. As such the TIS needs to be revised accordingly and resubmitted for review by the agencies.</p>	

¹ Ontario Geometric Design Standards for Ontario Highways, Section B.7.2.2 Equivalent Vehicle Volumes

² Highway Capacity Manual Special Report 209 Third Edition, Washington D.C. 2994 Table 3-3: Passenger Car Equivalents on Extended General Freeway Segments

³ Canadian Capacity Guide for Signalized Intersections Section 3.1.2 Units of vehicle flow

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<p>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.</p>	<p>Section 2.0 and 3.2</p>	<p>The existing capacity issues are outlined in Section 2.3 of the TIS. The existing intersection capacity issues are not attributable to the subject site and would therefore be the responsibility of the road authority to address. Traffic control upgrades could be considered at the two Highway 401 Ramps. However, existing volumes do not meet the minimum criteria outlined by the Ontario Traffic Manual Book 12 for traffic control signals. A more comprehensive intersection control study would be the responsibility of the road authority, as would any required intersection upgrades. All impacts assessed in the study, regardless of the PCE factor are considered conservative. No additional analysis should therefore be required to review intersection capacity.</p>	<p>This is not an MTO comment but impacts the effected intersections that are under the MTO's jurisdiction. Based on the capacity analyses results, it cannot be concluded that the study area road network can accommodate the site-generated traffic associated with the proposed development. Regardless that some of the critical movements occur under existing conditions, it is the applicants responsibility to adequately justify whether the study area road network can accommodate the anticipated site generated traffic and recommend any potential mitigation measures that would be required. This has not been completed and will need to be documented in the updated TIS, which will need to be resubmitted for review by the agencies.</p>	
<p>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).</p>	<p>Section 3.2</p>	<p>The TIS forecast traffic for three horizon years, consistent with the MTO TIS guidelines. The horizon years include:</p> <ul style="list-style-type: none"> • Opening date (2020); • five years after opening date (2025); and • ten years after opening date (2030). <p>Background traffic, non-site traffic increases, were forecast using a generalized background traffic growth rate of 1% per annum compounded to the respective horizon years. This growth rate is considered conservative, as the historical growth in traffic along the Highway 401 corridor between 2008 and 2012 was 0.26% per annum. The noted capacity deficiencies under existing conditions will occur under future conditions even without the proposed development (background traffic only). As no site related traffic has been included under the future background conditions, these deficiencies are not related, nor a result of the potential additional traffic generated by the subject site. If required, the road authority is responsible for addressing these existing capacity issues.</p>	<p>The Town did not state that it is or is not JDCL's responsibility to provide improvements at the Highway 401 ramps. That would be at the discretion of the MTO as these intersections are under their jurisdiction.</p> <p>The site generated traffic is triggering a critical movement. In the AM peak hour, the intersection of Guelph Line & Highway 401 WB Ramp has reserve capacity in the Future Background scenarios (without site generated traffic) but is over capacity in the Future Total scenarios (with site generated traffic).</p> <p>Please refer to Response #6 for further clarification from MTO.</p>	
<p>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.</p>	<p>Section 3.2</p>	<p>Operational assumptions regarding the proposed pit were provided by the applicant as noted in Section 3.2 of the report. The applicant currently operates a fleet of approximately 85 vehicles including:</p>	<p>A revised TIS report must outline the similarities between the proxy site and the subject site and explain why they will generate similar truck traffic volumes. More information regarding the "Erin Pit" is required to be</p>	

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		<ul style="list-style-type: none"> • 21 Tri-Axel Straight trucks – 22.7 tonne payload, • 18 Tri-Axle Tractor Trailer – 35.1 tonne payload • 16 Quad-Axle Tractor Trailer – 39.1 tonne payload • 30 Tri-Axel Pony Pub Combinations – 41.4 tonne payload <p>The total payload for the fleet is 2,976 tonnes with an average payload of 35 tonnes per vehicle. To be conservative, a load size of 33 tonnes per truck was assumed in the trip generation calculations.</p>	included in the revised TIS. Any raw data to confirm the information outlined in Section 3.2 should be appended to the report.	
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	Capacity issues are present under existing conditions without the potential additional traffic generated from the subject site. The existing form of traffic control at the Highway 401 Ramps may require improvement regardless of the proposed quarry operation. The forecast traffic volumes do not satisfy the OTM Book 12 signal warrant requirements. See also response #3.	Site generated trucks at the north ramp terminal is triggering a critical movement which will result in increased delays and extended queues especially in the AM peak period. It is the responsibility of the applicant to demonstrate the study area road network can accommodate the anticipated site generated traffic and recommend any potential mitigation measures that would be required. This has not been completed and will need to be documented in the updated TIS, which will need to be resubmitted for review.	
7. In Section 3.2.2, please clarify which month the data was extracted for hourly shipping activity.	Section 3.2.2	Operational assumptions regarding the proposed pit were provided by the applicant. The daily and hourly distribution of truck trips was previously utilized for the James Dick Construction Limited Revised Traffic Impact Study Eramosa Quarry, Township of Guelph-Eramosa, Cole Engineering Group Ltd. April 2016 Project No.:Tr12-0013. The temporal data set provided by the applicant includes 23 days of truck shipments from the Erin Pit site from August 2011 representing the peak month of that year. The historical data referenced the real operational characteristics of the Erin Pit site. A transposition error Table 3.2 (Historical daily Shipping Activity by Hour) of the TIS is noted under the 06:00hr. The transposition error has no impact the analysis as the average number of loads per hour (approximately 12 or 9% of daily shipping) is unchanged. The AM peak hour occurs at 08:00hr with approximately 12% of daily shipping occurring. The revised 06:00hr date points are noted as follows:	MTO are satisfied with the applicant's response. Please update the TIS to reflect the new information.	

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The expected value is 100%. The difference is attributable to years where the pit did not extract material to the licence limit.</p>	Day/Time	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	Day 1	14	21	20	12	20	16	16	20	8	17	2		Day 2	10	4	7	5	5	4	7	5	10	6	1		Day 3	12	14	12	16	16	12	19	16	22	14	2		Day 4	10	12	13	17	13	8	17	12	10	11	0		Day 5	12	8	12	10	16	5	22	12	17	13	1		Day 6	8	14	13	10	5	4	7	5	5	1	1		Day 7	6	13	13	7	17	7	13	8	11	11	0		Day 8	5	15	7	18	14	10	12	11	5	3	2		Day 9	13	15	14	13	20	7	17	8	12	8	2		Day 10	6	2	5	4	2	3	0	0	0	0	0		Day 11	13	7	24	17	21	14	22	14	18	19	1		Day 12	11	8	11	8	24	6	15	17	11	14	1		Day 13	17	14	19	13	22	16	16	17	15	18	5		Day 14	21	16	23	18	12	17	19	20	16	20	2		Day 15	12	14	17	15	11	5	19	12	13	16	2		Day 16	13	13	22	13	22	8	23	18	20	17	4		Day 17	10	10	12	10	11	4	16	5	12	5	6		Day 18	9	12	15	10	7	17	11	22	13	13	9		Day 19	19	12	20	14	24	15	21	11	15	10	1		Day 20	13	10	19	12	15	8	18	12	13	13	7		Day 21	16	12	13	14	15	14	14	13	15	12	7		Day 22	16	12	20	13	22	18	16	19	10	21	2		Day 23	16	5	17	11	12	12	11	12	7	8	1		Total	282	263	348	280	346	230	351	289	278	270	59		Average	12	11	15	12	15	10	15	13	12	12	3		Percent	9%	9%	12%	9%	12%	8%	12%	10%	9%	9%	2%	0	Road Peak			± AM								± PM			
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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	See comment response #2.	MTO has completed different analyses in the past related to trucking routes, and studies have shown that loaded heavy trucks require more time and space. MTO requires that a PCE of 3 be used for loaded heavy trucks exiting the site, and a PCE of 2 be used for heavy trucks entering the site.																																																																																																																																																																																																																																																																																																																																																																													
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	Reid Side Road is an east/west local road that was originally constructed to carry truck traffic from the subject site. The road was constructed in conjunction with the approval of the former Springbank Pit in the late 1970's. There is an executed Road Agreement with Springbank, the Town, the Region and the MTO. Reid Side Road (formerly known as Springbank Haul Road) was constructed specifically to service the quarry at the expense of the quarry operator. While the current Official Plan designation is a local road, the traffic to the quarry is specifically exempted as it is a local delivery. Consequently, should the application be approved, heavy vehicles generated by the subject site would be permitted to use Reid Side Road. See also comment #14.	The additional level of detail noted in the applicant responses (October 2019) should be provided in a revised TIS report. Furthermore, Reid Side Road should not be referred to as a truck route. Information regarding the Town of Milton's Schedule 26, By-Law No. 1984-1 should be noted in a revised report.																																																																																																																																																																																																																																																																																																																																																																													
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.	Section 4.0 and 5.0	See comment response #1.	This information should be provided in a revised TIS report. Please refer to Response #1 for further clarification.																																																																																																																																																																																																																																																																																																																																																																													

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11.	Further to this, people tend to make more risky manoeuvres when in traffic congestion as is expected per the future conditions analyses. 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	The haul route between the first pond and Reid Side Road is over 700 metres in length. No queueing activity will occur off-site along Reid Side Road or Twiss Road. The on-site driveway and staging area(s) were previously used for aggregate hauling and have been designed to accommodate the intended heavy vehicles. All trucks that access the site will enter and exit the site in a forward fashion via the Reid Side Road intersection with Twiss Road. JDCL trucks must operate in compliance with the Highway Traffic Act, including yielding to emergency vehicles.	In order to confirm the functionality of the site, please provide cross-sections of the driveway in a revised TIS, confirming that two heavy trucks can simultaneously navigate in opposing directions without striking. Mitigation measures are required for any pinch points where the driveway width cannot safely accommodate two-way heavy truck traffic flow. Considering the design vehicles that need to be accommodated (heavy trucks) a general minimum pavement width of 6.6m (preferably 7.0m) should be provided. A wider pavement width would be necessary along horizontal curves to accommodate heavy truck turning radii. These dimensions are based on the Transportation Association of Canada's heavy truck design vehicle width of 2.6m plus the side-rear mirrors, which typically project approximately 30cm on both sides. This results in a total heavy truck width of 3.2m. A minimal buffer of at least 10cm would be required so that the truck mirrors do not strike when two trucks are travelling simultaneously in opposing directions. This results in a need for minimum 3.3m lanes in each direction (6.6m total pavement width, plus additional width for curves). Please address these concerns in the revised TIS, including the recommendation of any required mitigation measures.	
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	The TIS recommends, "The MTO consider implementing unwarranted traffic control signals at the Reid Side Road and Guelph Line Off-Ramp with the Highway 401 to accommodate the existing and forecast background and total traffic volumes". See also comment response #3.	This is not an MTO comment, however, the MTO ultimately has jurisdiction over these intersections. Any proposed mitigation measures should consider feasibility and any potential negative impacts that it may cause to the overall road network.	
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	Can the reviewer explain how access of emergency vehicles might be affected? The EMS station has two driveways to Reid Side Road. The western most driveway measures approximately 26 metres in width and is unlikely to be completely blocked by stopped traffic or traffic generated by the subject site. No stopping any time signage is present along Reid Side Road in proximity to the EMS station. The signage is intended to	As previously noted, there is a Fire/EMS station located on Reid Side Road. The additional traffic generated by the subject site could potentially negatively affect emergency response times. A revised TIS report needs to evaluate and comment on this potential issue. It will be through the revised TIS that this matter will be reviewed and hopefully resolved. Halton Region's objection on this matter would be resolved, per the January 16, 2020,	

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		<p>discourage vehicles from stopping near the EMS driveways. No queueing activity related to the Quarry's operation will occur off-site along Reid Side Road or Twiss Road. Queueing of vehicles will be accommodated on-site. Under the Highway Traffic Act (HTA) all vehicles are required to stop to the right-hand curb or edge of the roadway when approached by a vehicle with flashing lights or bell or siren sounding.</p>	<p>experts meetings, if JDCL provides the agreed upon roadway markings and roadside signage ("upcoming EMS entrance") to the satisfaction of the Town of Milton and Region of Halton.</p>	
<p>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.</p>		<p>See comment response to #9.</p>	<p>Information provided in comment #14 should be included in a revised TIS report.</p>	
<p>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.</p>		<p>Reid Side Road was originally constructed to a standard appropriate for use by heavy trucks and has been used by gravel trucks from the site as well as the Campbellville Industrial Park for several decades. A copy of the Report has been requested by JDCL and is currently being reviewed.</p>	<p>The submitted geotechnical assessment of Reid Side Road is unsatisfactory. The reports received to date from JDCL seem more opinion based in our opinion. The Town wants to see specifics (i.e. traffic volumes, structural capacity, ESAL calculations, specific design recommendations) before we can make a decision, provide additional direction and provide any clearance from a Reid Road perspective. The Town requires the following from the applicant:</p> <ol style="list-style-type: none"> 1. Prepare an updated, comprehensive geotechnical report and associated pavement design report, to address the following: <ol style="list-style-type: none"> a. Recommend a rehabilitation method for the road, using updated traffic volumes (to reflect current and future (a generalized traffic growth rate of 1.0 percent compounded per annum can be assumed for Reid Side Road. This is consistent with the assumptions in the TIS), without the Quarry traffic, to reflect a 20 year design life (i.e. 20 years until next rehabilitation/overlay required); b. Recommend a rehabilitation method for the road, using updated traffic 	

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			<p>volumes AND the anticipated traffic and increase in truck volumes from the Quarry (these volumes to match those in the updated TIS);</p> <ul style="list-style-type: none"> c. Pavement design report to include ESAL calculations to support the recommended pavement designs; d. If additional/increased pavement design is required due to the increased Quarry traffic, then a cost estimate of all work will need to be included (1. Cost to improve without Quarry traffic considered, 2. Cost to improve with quarry traffic considered), the difference in cost between these 2 methods will be paid to the Town by the applicant, to use towards the rehabilitation of this road (which will occur in the Town’s capital rehabilitation program, currently forecast for 2022, subject to budget and council approval) – this will account for Quarry associated traffic); e. All costs associated with this geotechnical and pavement design report will be borne by the applicant; and f. The Town reserves the right to peer review this report, and the costs associated with peer review will be recovered from the applicant. <p>2. Geotechnical Site Investigation for the Reid Side Road to include, but not be limited to, the following:</p> <ul style="list-style-type: none"> a. Borehole layout; b. Clearance and protection of underground utilities; c. Boreholes in mid driving lanes (alternating, every 100m) to a depth of 1.5m, with gradations performed on samples; d. Boreholes in shoulder (alternating, every 300m) to a depth of 1.0m, with gradations performed on samples; e. During drilling, soil and groundwater conditions will be recorded and soil samples collected; f. Backfill all boreholes and resurface with cold patch; g. Ensure safety of public and staff involved in site investigation; h. Protect utilities and property from damage; 	

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			<ul style="list-style-type: none"> i. Restore the site to as near original conditions as practical; j. Avoid having equipment/vehicles/staff on shoulders when any seasonal maintenance operations are anticipated (i.e. plowing, grading etc.); k. All signage and traffic control to be in accordance with OTM Book 7; and l. Prepare Pavement Design Report/Geotechnical Investigation Report that is to include the following: <ul style="list-style-type: none"> i. Pavement rehabilitation recommendations in accordance with the MTO’s “Pavement Design and Rehabilitation Manual” and applicable Town design standards; and ii. Identification of soil type and pavement conditions in areas of investigation. <p>If the applicant is of the opinion that they don’t need to perform field work, and can rely on the information already provided to them from the Town (i.e., previous studies), they will need to justify this in writing and submit this opinion along with that a comprehensive pavement design report, which addresses all items listed in #1 a-f above.</p> <p>Once a report is submitted, the Town may opt to have this peer reviewed and will look to the applicant to recover any costs associated with this.</p>	
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.		See comment response #15.	See response to Item # 15.	
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.		See comment response #15.	See response to Item # 15.	
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.		See comment response #1	A safety analysis should be included in the revised TIS report. Please refer to Item # 1 for further clarification.	

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19.	Proposed elements impact the north and south ramp terminals due to the site traffic generated. Please provide mitigation methods to improve intersection operations. The area is located in an intermediate commuter corridor, seasonal factors are not required to be applied. Please provide turning movement counts in the updated submission.	The noted capacity deficiencies under existing conditions will occur under future conditions without the development (background traffic). As no site related traffic has been included under the future background conditions, these deficiencies are not related, nor a result of the subject site. The existing capacity issues should be addressed by the road authority. See also comment response #3.	Provided turning movement counts were not used in the updated resubmission. Site generated traffic will result in accelerated intersection improvements. It is the responsibility of the applicant to demonstrate the study area road network can accommodate the anticipated site generated traffic and recommend any potential mitigation measures that would be required. This should be provided in the updated TIS.	
20.	Please provide electronic copy of synchro files of updated analysis to the MTO for review and comment.	Synchro files can be provided upon the request from the MTO	Provide electronic copy of synchro files to MTO for review.	
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.	Initial review of the use of a 1219x1219 Reinforced Concrete STD Box Culvert manufactured to CSA A23.4 standards indicates that it will be more than adequate to support continued truck use of this road.	<p>The culvert that was installed on Reid Side Road is a 1.2x1.2m reinforced concrete box culvert, in accordance with CSA-A23.4 and as per CSA-S6-14, and replaces the previous 900mm CSP culvert.</p> <p>The design life of the culvert is 75 years and typically the structural capacity of the culvert, at the depth installed, would allow for loaded trucks/local heavy traffic to travel overtop.</p> <p>There may be other, smaller, cross culverts along Reid Side Road; if this is the case (JDCL should confirm), then these should be analyzed to ensure they are structurally adequate to accommodate the anticipated heavy traffic. If analysis indicates they are not, then replacement would be required as dictated by a structural analysis (to be completed by the applicant at their cost).</p>	
22.		MNR is looking for confirmation from the Town that the road allowance at the west end of the JDCL Reid Road site is closed. JDCL is proposing a 15m setback between Phase 1 and this closed road allowance as shown on the ARA site plans. Please confirm that this is a closed road allowance.	This is a closed road allowance as per unregistered bylaw 153.	

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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 cross referenced in the review.	Executive Summary	Agreed. Revised BIA contains the site plans.	<p>The responses and updated draft BIA have answered and satisfactorily addressed the peer view comments.</p> <p>It is agreed that there should not be any risk of fly rock if common best practices are followed as outlined in the BIA.</p> <p>It is agreed that vibration and noise from blasting may be noticeable but should not be a significant concern to residents living in Campbellville given the Ministry limits that have to be satisfied.</p> <p>It is agreed that complaints can be effectively dealt with through the usual regulatory mechanisms in place. The Town would like to see this better explained for public information. JDCL agrees to incorporate this into publicly available information.</p>
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	Corrected in the revised BIA.	See Item # 1.
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	The elevations are located on the site plans which has been put in the revised BIA.	See Item # 1.
4.	<p>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:</p> <ul style="list-style-type: none"> • 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. <p>Difficulty in rectifying collapsed or plugged drill-holes.</p>	Proposed Aggregate Extraction, pg. 7	All of the concerns listed will be mitigated through the use of best practices, including observing drilling performance, selection of appropriate; drill technology and procedures, hole diameter, the requirement to use water resistant blast hole casing, the diameter of the casing in conjunction with the drilled hole etc. Phases 2 through 5 will be drilled through a shot rock layer that will require casing.	See Item # 1.
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,	Proposed Aggregate Extraction, pg. 7	Agreed. There are three tables in the revised BIA that satisfy this concern.	See Item # 1.

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<p>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.</p>				
<p>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.</p>	<p>Blast Vibration and Overpressure Limits</p>	<p>Agreed. The original AND revised BIA include the following recommendation: An attenuation study shall be undertaken by a competent independent blasting consultant during the first 12 months of operation in order to obtain sufficient quarry data for the development of site specific attenuation relations. This study will be used to confirm the applicability of the initial guideline parameters and assist in developing future blast designs.</p>	<p>See Item # 1.</p>	
<p>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.</p>	<p>Blast Vibration and Overpressure Limits; Appendix C</p>	<p>The revised BIA includes nine (9) equations which accommodate a range of geological conditions and blasting methodologies. All equations are evaluated utilizing the initial blasting parameters and the maximum calculated value is provided.</p>	<p>See Item # 1.</p>	
<p>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.</p>	<p>Blast Mechanics and Derivatives; Appendix C</p>	<p>Through proper blast design and diligence in inspecting the geology before every blast, flyrock can readily be maintained within the quarry limits. It may be necessary to increase collars when blasting along the perimeter. The operational plan for the quarry has been designed to retreat towards the closest receptors thereby projecting flyrock and overpressures away from the receptors.</p>	<p>See Item # 1.</p>	
<p>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</p>	<p>Proposed Aggregate Extraction</p>	<p>For a maximum 32m bench, and the utilization of a 76mm to 153mm diameter blast hole, emulsion would provide 180kg to 720kg of explosives per loaded hole. Given the configuration of the proposed quarry relative to the surrounding receptors and the plan not to dewater, decking of blast holes will be necessary. With decking being</p>	<p>See Item # 1.</p>	

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Author: Aercoustics Engineering Ltd. ("AEL")				
<p>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).</p>		<p>required underwater, an enhanced level of diligence will be required in all stages of the drill blast process. The utilization of decks will ensure the maximum load per period is reduced to a level at which the blast will remain compliant with MECP guidelines as blasting operations migrate across the quarry. The distance to the closest sensitive receptor will determine the number of decks required per hole.</p>		
<p>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 decrease 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.</p>	<p>Proposed Aggregate Extraction</p>	<p>The intent is to use top hammer drills to drill blast holes on site. We can cite numerous examples where blast holes were successfully drilled to these depths with minimal drill deviation using top hammers. Should drill deviation prove to be an issue, there are several options available to efficiently eliminate the concern. These include the implementation of down-the-hole (DTH) hammer drills which have been proven to significantly mitigate drill deviation and are currently available to diameters below 76mm allowing for an abundance of blast design modifications to meet MECP guidelines and operational constraints. Additionally, the option exists to drill larger diameter holes and sleeve the hole to a smaller diameter using rigid water-resistant blast hole casing if reduction in explosive loads per delay is necessary. Sleeves would also be utilized in the event of voids in the rock mass in order to prevent bulk explosive product migration.</p>	<p>See Item # 1.</p>	
<p>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?</p>		<p>Suitable explosive products will be employed. It is the intent to use both bulk emulsion and cartridge explosive products. Explosive products must be resistant to dead-press and sympathetic detonation as well as display excellent sleep times in case of delays between loading and detonation. The appearance of wet holes at quarries in Ontario is extremely common such that blasters are familiar with best practices required to address the condition and a variety of explosive products are readily available which are formulated for these conditions. Detonators employed shall be restricted exclusively to electronic detonators or similar type products that may be developed in the future which can conclusively assess product performance post-blast to ensure that all holes are detonated as designed.</p>	<p>See Item # 1.</p>	

Initial JART Comments (July 2019)	Page / Section	Applicant Response (Dec 2019)	JART Response (May 2020)	Applicant Response
Report: Blast Impact Analysis – June 2018				
Author: Aercoustics Engineering Ltd. ("AEL")				
12.		The option exists to drill larger diameter holes and sleeve the hole to a smaller diameter using rigid water-resistant blast hole casing if reduction in explosive loads per delay is necessary. Sleeves would also be utilized in the event of voids in the rock mass in order to prevent bulk explosive product migration.	Once explosives are detonated there is no residual that can contaminate water. Use of common best practices such as appropriate explosive products, "sleeving" of blast hole and good housekeeping in the blast area should ensure that water quality is protected. JDCL agrees with this approach – the BIA has been updated to reflect this. This commitment should be noted on the ARA Site Plan.	
13.		Please see the Harden Environmental response #20 in the hydrogeology. There is a Spill Response Protocol Appendix G and a Well Complaint Protocol in Section 11 Recommendations item #7.	See Item # 1.	
14.		Prevention of this from occurring is by use of best practices following the recommendations in the BIA. Part of the mitigation is the use of double priming and electronic detonators which appears in recommendation #7 of the BIA. Electronic detonators provide knowledge of detonation post blast to the computer. Best practices involve removal of the material during the excavation process. Any material contained in the blast sleeve in the muck pile will be removed during the excavation and once on the surface will be removed by the blasting technician. A water monitoring program will be in effect as well.	See Item # 1.	
15.		There is no cumulative effect expected. Please see Harden Environmental response #20 in the hydrogeology replies. Using best practices for loading with care for hygiene practices will minimize any exposure on the surface. The water monitoring program will provide detection prior to anything reaching drinking water quality levels.	See Item # 1.	
16.		The site plans contain the monitoring program on page 3 in the Hydrogeology section. It is proposed to have a combination of on-site staff and Harden Environmental perform monitoring and analysis.	See Item # 1.	

Initial JART Comments (July 2019)	Page / Section	Applicant Response (Dec 2019)	JART Response (May 2020)	Applicant Response
Report: Noise Impact Study – Project 16424, Reid Road Reservoir Quarry – December 2017				
Author: Aercoustics Engineering Ltd. (“AEL”)				
<p>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.</p> <p>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 split 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.</p> <p>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).</p> <p>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.</p> <p>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.</p>	Pg. 4-8 Section 4.2	<p>Aercoustics used Average Annual Daily Traffic (AADT) count information to predict the road traffic generated noise levels. This assumes that the traffic volumes are the same throughout the day and night. With the assumption that the actual daytime traffic is higher than during the night-time, the predicted levels will underestimate the daytime noise and overestimate the night-time noise. Although trees can provide some attenuation, it is Aercoustics’ experience that it is generally low, in the order of 0-2 dBA.</p> <p>With the operation of the quarry limited to the daytime period, with only shipping operations occurring as early as 6am, using the predictions as the basis for the MECP sound level limits, the sound level limits are considered conservative.</p>	<p>The ambient noise monitoring and the corresponding changes to the noise mitigation plan (noise barrier/berm locations and heights) outlined in the Aercoustics memorandum “Reid Road Quarry, Noise Monitoring Results and Updated Noise Control Recommendations, Aercoustics Project #: 16424.00”, dated December 4, 2019, address our final technical concerns.</p> <p>The updated noise control measures shown in this memorandum will need to be transferred onto the Site Plans for the quarry, specifically the Operational Plan and Monitoring and Mitigation Notes Plan.</p> <p>The current Monitoring and Mitigation Notes Plan references the December 2017 Aercoustics report. This reference will need to be updated:</p> <ul style="list-style-type: none"> • Ideally, a final revised noise study incorporating the information from the December 2019 memorandum would be produced and referenced here. • Alternatively, the December 2019 memorandum should also be referenced. 	
<p>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</p>	Pg. 4-8 Section 4.3	Aercoustics followed generally accepted protocols of addressing noise impact at representative noise receptor locations in all directions around the proposed quarry. In some instances the noise receptors represent individual dwellings, while in others	See Item # 1.	

	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.]		represent dwelling groups. With the sound level limits satisfied at the representative receptors, it is our opinion that the sound level limits will be satisfied at all of the dwellings near the quarry. To satisfy JART, noise receptors were added as shown in Figure 1. Tables 1 and 2 present the predicted noise impact of the operations, with the recommended noise controls, at the noise receptors. The sound level limits are predicted to be satisfied at all receptors. Although not an MECP noise receptor, an additional receptor location was added at the Storage Solutions property representing the expected location where a night watchman may sleep (NW-01).		
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-storeys 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	Aercoustics used a receptor height of 4.5m for all MECP noise receptors.	See Item # 1.	
4.	Aggregate Quarry Noise Sources: Table 1 provides the reference sound power levels used in the assessment. Based on our review: <ul style="list-style-type: none"> 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 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. <p>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.</p> <p>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.</p>	Pg. 5-9 Section 5.2	The equipment noise emission used in Aercoustics report is representative of the noise emission of actual equipment measured by Aercoustics. It should also be noted that the equipment noise emission is part of the noise control design of the quarry operation. The equipment operating on the site is required to satisfy the listed noise emission levels.	In the October 31, 2019, JART meeting, JDCL agreed to further develop a Noise Complaint protocol, including a reference on the Site Plan. This document has not been provided at this time.	

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	With the responses provided by Aercoustics, the recommended noise controls are considered sufficient and appropriate.	See Item # 1.	
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	<p>Aercoustics' opinion is that a noise complaint response procedure can be more effective in addressing concerns or complaints of neighbours.</p> <p>We recommend the following note be added to the Operational Plans:</p> <p>The licensee will institute a complaint procedure. As part of this procedure, complainants will be requested to identify the location of the incident, as well as the time of the day that the incident occurred and any other information that they feel is relevant. The licensee will keep a complaint log book containing a record of all complaints as well as all complaint responses, which log book shall be accessible to the MNRF and Township on request. A noise consultant may be retained to address complaints, if required.</p>	In the October 31, 2019, JART meeting, JDCL agreed to further develop a Noise Complaint protocol, including a reference on the Site Plan, similar to the Best Management Practices Plan for dust. This document has not been provided at this time.	

Initial JART Comments (July 2019)	Page / Section	Applicant Response (Dec 2019)	JART Response (May 2020)	Applicant Response
Report: Reid Road Quarry Air Quality Assessment – June 2018				
Author: RWDI				
<p>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.</p>	Figure 2a through 2e	<p>While the figures label these sources as line sources, the AERMOD model does not have a line source option. Line sources are represented by adjacent volume sources, in accordance with MECP Guideline A11. The dimensions of each volume source are defined by the road width and the height of the vehicles (for two-lane haul roads), or the width and height of the vehicle (for single lane haul roads). A table has been attached that provides a summary of all model parameters.</p> <p>The dispersion modelling files are available upon request.</p>	<p>The Best Management Practices Plan completed on behalf of JDCL by RWDI was reviewed as part of the peer review. The general contents were found to follow the Provincially recommended guidance for preparing these plans, as detailed in Section 7.4 of the Procedure for Preparing Emission Summary and Dispersion Modelling Report (Guideline A-10), Version 4.1, March 2018, as issued by the Ministry of Environment, Conservation and Parks. Using this guidance for preparing an appropriate plan for managing dust is the accepted approach for aggregate facilities in Ontario.</p> <p>The site plans to be submitted to the Ministry of Natural Resources and Forestry should reference the Best Management Practices Plan and directly include any activities that are intended to be permanent during operation of the quarry.</p>	
<p>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.</p>	Figure 2a through 2e	<p>The labelling on the figures is incorrect and should indicate "volume sources". These are indeed volume sources, modelled in accordance with guidance from the National Stone Sand and Gravel Association, and MECP Guideline A11. A table has been attached that provides a summary of all model parameters.</p> <p>The dispersion modelling files are available upon request.</p>	<p>Following the October 31st JART meeting, SLR Consulting (Canada) Ltd. (SLR) was to review the air dispersion modeling conducted by JDCL's consultant, RWDI for the air quality assessment. The models were received by SLR, November 1, 2019. The modelling conducted by RWDI follows the methods and general guidance provided by the Province of Ontario for completing air quality assessment for aggregate operations.</p>	
<p>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.</p>	Table 1	<p>RWDI agrees that this justification should have been provided.</p> <p>The Guelph monitoring station was considered adequate given that the predicted impacts of the proposed quarry are low compared to the relevant AAQCs, leaving room for uncertainties in background levels. In the case of fine particulate matter, background levels in Southern Ontario are not very sensitive to the proximity of major roadways and vary relatively little from one monitoring station to another.</p> <p>The MECP monitoring station at 125 Resources Road in Toronto is located next to one of the busiest sections of the 401 (approximately 150m away from the traffic</p>	<p>The site chosen to represent a reasonable background should be independent of the predicted impacts from the quarry operation. Whether the predicted results are low or high, the site chosen for background should be, at the least, representative of the local conditions when local data are not available. As we understand from studies conducted within the Province and within Halton Region, road transportation, with combustion of fossil fuels, is a significant source of particulate matter, and in particular, fine particulate (PM2.5). Please provide a more fulsome clarification of why ambient conditions for fine particulate would not be higher in close proximity to a major transportation route, such as Highway 401.</p>	

			lanes). The air quality data from this station are in fact comparable to that of the Guelph Station with respect to fine particulate. NO2 levels are higher at Resources Road. This is shown in the revised copy of Table 1: Ambient Air Quality Data, attached to this response (the 5-year averages now reflect 2012-2016, as the 2016 values are now available)	Using the station at 125 Resources Road in Toronto is a reasonable choice for background conditions, considering the proximity to a well travelled portion of Highway 401.	
			A revised version of Table 2: Emission Summary Table - Cumulative Effects Analysis has been attached used the ambient levels from MECP station 35125 Toronto West. Using this version of Table 2, the conclusions of the study remain unchanged.		
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 <u>not</u> be assumed and is non-conservative. Justification for the use of a 100% control factor at the Central Plant was not provided.	Appendix A	The washed aggregate leaving the wash screen would contain little to no fine particulate, and would be completely saturated with water. The subsequent processing steps would therefore be fully controlled. The MECP has accepted this approach for ECA applications on numerous occasions, and is consistent with the approach used in other jurisdictions as well. The ECCC reporting guide has no specific section on emissions from wash plant operations. A review of available literature (e.g., San Joaquin Valley Air Pollution Control District, University of Minnesota, Golder) show a similar approach in other jurisdictions.	Comment is adequately addressed in response. Please provide specific instances of where this level of efficiency for this particular control measure has been used .	
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	A wash plant is not the same as using spray bars to control dust on an otherwise dry screen deck. Wash screens uses much higher volumes of water to completely saturate and wash the aggregate, and is not accurately represented by the ECCC reporting guide (there is no section on wash plants). The MECP has accepted this approach for ECA applications on numerous occasions, and is consistent with the approach used in other jurisdictions as well (e.g., San Joaquin Valley Air Pollution Control District, University of Minnesota, Golder). Common practice is to exclude the wash screen entirely.	Comment is adequately addressed in response. Please provide specific instances of where this level of efficiency for this particular control measure has been used .	
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 <u>up to</u> a 90% control of particulate emissions can be assumed if watering treatment is also	Appendix B	The 90% control refers to the washed nature of the material handled, not the application of water (although the material will indeed also be inherently wet due to the washing process). Our field experience has indicated that dust emissions from this type of material	Please provide specific instances of where this level of efficiency for this particular control measure has been used.	

	coupled with continuous chemical suppressant treatment. The assumed control of 90% may be non-conservative and further justification should be provided.		are significantly reduced compared to unwashed materials. We consider 90% control to be conservative. The MECP has accepted this approach for ECA applications on numerous occasions.		
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	<p>The requirement for a BMPP is included on Page 3 of the Site Plans, and therefore this requirement can be legally enforced by the Ministry of Natural Resources and Forests under the ARA.</p> <p>The site may be exempt from requiring an Environment Compliance Approval (ECA), in accordance with s. 1. (1) 13. iv. of O.Reg. 524/98, provided that a mobile processing plant is operated below grade. In that case, the ARA Site Plans always provide the necessary legislative instrument.</p>	<p>The site plans to be submitted to the Ministry of Natural Resources and Forestry should also directly include any activities that are intended to be permanent during operation of the quarry along with reference on Page 3 of the Site Plans.</p> <p>With respect to an environmental approval, it is requested that JDCL acquire an environmental approval under Section 9 of the Ontario <i>Environmental Protection Act</i>.</p>	

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Report: Aggregate Resources Act (ARA) Summary Statement Report		Author: MHBC Planning		
Report will need to be updated to reflect updated technical reports			Further comments on the Summary Statement Report are anticipated on a go-forward basis as JDCL continues to work through the issues identified by the Province, Municipalities, and Conservation Halton.	
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	Yes, the potential for impacts on sensitive land uses is being further explored and assessed through the application review and consultation processes. This will be documented in the ARA reporting to MNRF.	Please share the information provided to the Province and ARA objectors with JART members in a comprehensive manner. Please also notify JART members when new information is posted on the JDCL RRRQ Project Website.	
2. In the 7 th 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, 2 nd paragraph, page 15, Section 7.0 bullet 3, and on page 26, Section 11.0 in the 2 nd paragraph.	Summary Statement 7 th paragraph and other references noted in comment	Reid Side Road is being used by trucks from the industrial park hence the use of the terminology in the Summary Statement Report. The Environmental Assessment for Twiss Road improvements describe this as an industrial area with heavy slow moving trucks and the section of Twiss Road (to the south) was improved accordingly. Reid Side Road itself was constructed to serve as a truck route (for the Springbank pit).	The Town appreciates the acknowledgement of the designation, restrictions and the local delivery interpretation and opportunities for JDCL. On the Haul Route Agreement issue, the Town does not necessarily agree with the interpretation of the applicability of the Springbank agreement to JDCL. Whether JDCL is assigned or is a successor it not clear. As the Licence was revoked and separately that JDCL is not a corporate heir of Springbank, the ability to be either assigned or a successor is in question. The agreement also refers to a specific licence, which adds clarity on the applicability and to whom. Lastly, as such it is unclear if the agreement would be binding today given the above and the lack of clarity in the agreement as to how it was to be applied in the future.	
3. Page 2, 2 nd 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	We are not aware of any such deficiencies. This is something that can be dealt with between MNRF and JDCL as required if the site is licenced.	MNRF has confirmed that there are no residual rehabilitation issues (refer to email correspondence from MNRF to JDCL/MHBC on November 8, 2019). This matter is resolved.	
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	Trucks arriving at the pit will not be permitted to queue on public roads.	Documenting the agreement with the Town that there will be no staging of trucks waiting to enter the property on public lands and any time through a note on the Site Plan to the satisfaction of the Town is required.	
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	Yes, this can be provided.	MTCS clearance letter provided on October 31, 2019. This matter is resolved.	
6. The portion of the haul route located on the subject property should be included within the proposed licence area boundary and provided	Section 7.0	The driveway is not part of the proposed licenced area. Nonetheless, it has been	Refer to Item # 74 in the GWS Natural Environment Review table above.	

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Report: Aggregate Resources Act (ARA) Summary Statement Report		Author: MHBC Planning		
		considered in the impact assessments (e.g. Natural Environment, Noise, Air quality) and JDCL is considering any comments about potential impacts through the application review.	Refer to Item # 14 in the Summary Statement table below.	
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	Noted – the need for improvements (if any) and cost sharing remain to be determined. Please refer to the road agreement.	A revised TIS is required to address all comments provided through the transportation review.
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	The zoning bylaw regulates land uses and the proposed use is permitted.	These are planning and land use considerations that must be addressed.
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	MHBC has been discussing the zoned area with Town staff so this will be clarified through the review.	Further conversation on the known minor zoning discrepancies will be undertaken as JART finalizes their comprehensive review of all other subject matter areas noted in this consolidated response document
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., MNR 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	The applicability of the PPS and Greenbelt Plan will be determined by the enabling legislation (more so than by MNR policy documents). For the time being there does appear to be a disagreement on applicability. Regardless the application materials do discuss the GBP and PPS policies and JDCL is fine having the consistency/conformity discussion with the JART agencies if they want to apply the policies to their reviews.	These are planning and land use considerations that must be addressed.
11.	No recourse has been identified should a blasting issue be identified after the licence has been issued.	Section 9.1	All blasts will be monitored. The licence will operate to ensure compliance with provincial guideline limits. This is achieved through adjustments to the blast design as outlined in the Blast Impact Analysis and site plan requirements.	Monitoring measures should be noted in the IG.
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	The JDCL commitment is to meet all applicable air quality standards, permit conditions, prescribed conditions and operate in accordance with the recommended Best Management Practices Plan.	Monitoring measures should be noted in an appropriate location.
13.	It appears from the text in the 2 nd 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	Phase 3 and 5 are in the same pond (East Pond) so that may be causing the confusion. There are 4 ponds in total. Please refer to the site plan drawings.	This matter is resolved.
14.	The summary statement should address the applicability of the <i>Conservation Authorities Act</i> 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.		CH staff have visited the site and JDCL is not aware of any issues or concerns with current conditions or activities. We assume any CH comments on the proposed licence are included in these consolidated JART comments. JDCL acknowledges and agrees that if driveway is not licenced it will be subject to CAA regulations and a permit would be	The information provided should be documented in an addendum and/or update to the Summary Statement. The Site Plan should also note that any development proposed in Conservation Halton's regulated area that is outside of the ARA licensed area will require permission from Conservation Halton. In addition, Conservation Halton should be contacted prior to submitting a

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Report: Aggregate Resources Act (ARA) Summary Statement Report				
Author: MHBC Planning				
Conservation Halton's <i>Policies, Procedures and Guidelines for the Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document</i> can be found at: www.conservationhalton.ca .		required for any substantial improvements beyond regular maintenance such as culverts, widening, filling etc. See additional information on Driveway provided Dec. 3, 2019.	permit application to confirm permit submission requirements.	
15. The summary statement should also address the applicability of the <i>Clean Water Act</i> .		Please refer to the Hydrological Report for information on source water protection.	Comments to be addressed within the Hydrological Report table.	

Initial JART Comments (July 2019)	Page / Section	Applicant Response (Dec 2019)	JART Response (May 2020)	Applicant Response
Site Plan: ARA Site Plan Package – July 2018				
Author: MHBC Planning				
<p>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.</p> <p>The following preliminary technical comments are available immediately.</p>			<p>JART approach remains to only undertake the fulsome review on layout, notes, and conditions to be applied on the operation once issues with the reports identified above are resolved.</p>	
<p>1. Five Phases of the proposed quarry operations are illustrated in Drawing 2 of 5 Operational Plan by MHBC (Revisions as per MNRFC 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.</p>	Operational Plan, Drawing 2 of 5			
<p>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.</p>	Operational Plan, Extraction Sequence Schematic, Drawing 2 of 5			
<p>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 is 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.</p>	Rehabilitation Plan, Drawings 4 and 5			
<p>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</p>	General comment			

	extracted, and, if yes, where will this portable crusher and stockpiles be located.				
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			
6.	<p>(Additional site plan notes requested by the Town of Milton at the October/November 2019 meetings.)</p> <p><u>Pg. 1</u></p> <ul style="list-style-type: none"> Note 4 – the wording for zoning should be revised to remove “contractor’s yard” and indicate that property includes areas zoned Greenlands A and Greenlands B. The colour of ponds P9 and P10 should be updated. <p><u>Pg. 2</u></p> <ul style="list-style-type: none"> Note 1.2.11 requires additional detail to address recycling. Clarify how the Phase 1 berm will work within the extraction area. Clarify how extraction and rehabilitation of the vertical faces along the pond edges will occur. Add additional information regarding the internal haul road to notes 1.2.4 and 1.2.5 (e.g. Queuing, dust, no staging on public right-of-way etc.). 1.2.22 Hours of Operation – Confirm with Town’s noise by-law. There are typo’s/ in the Phase notes regarding rehabilitation of phases. The wording in note 1.2.1 should be revised regarding the timing of rehabilitation. Rehabilitation should occur as quickly as possible. <p><u>Pg. 3</u></p> <p>Dust Notes - Add additional mitigation measures for internal haul road dust.</p>		The revised Site Plan will address these comments.	Further changes and additional notes to the Site Plan drawings will be provided once the technical review and ongoing discussions with the applicant and their consultants are substantially completed and the JART comments on the applicant’s reports are addressed.	
7.	As discussed at the January 16, 2020 meeting, JDCL will need to demonstrate that there will be no impacts to the flood storage associated with Kilbride Creek as a result of the proposed noise berms (refer to berms proposed on the Operation Plan, received October 2019). Any proposed mitigation measures (e.g., culverts, gabion baskets) will need to be signed and stamped by a Water Resources Engineer (P. Eng.). Please provide additional information in the OG&IP and any design changes should be shown on the Site Plan.			A flood impact analysis report was provided on May 11, 2020 and the associated HECRAS modelling was received on May 15, 2020. The conclusions presented in the Flood Impact Analysis and the HECRAS modelling are satisfactory. No additional information is required.	