Proposed Burlington Quarry Expansion
JART COMMENT SUMMARY TABLE – Natural Environment

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

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
Report/Date: Level 1 and Level 2 Natural Environment Technical Report, April 2020			**Author: Savanta**			
1.	Confirmation of the existence and extent of critical fish habitat within 240.0 metres of any identified key hydrologic feature should be provided though DFO (NEP, Part 2.7.5 & 2.7.6 (d))	General	Niagara Escarpment Commission	DFO has confirmed in the Letter of Advice dated June 23, 2021, and their accompanying email that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	Partially addressed. DFO's support of Nelson's position re: the golf course ponds and interconnecting channels in their email of June 23, 2021 is acknowledged, but we note that the formal letter does recognize the presence of Largemouth Bass, and how they are to be protected in preparation for extraction activities, and so implicitly acknowledges fish habitat in these ponds. As a result, the presence of fish habitat within 240 metres of any key hydrological feature on or adjacent to the subject property is not refuted. The Savanta's letter of August 14, 202, is appreciated for its provision of pre-golf-course (and quarry aerial photographs, but lacks documentation of the same for the south extension, and does not include pre-golf-course (and quarry) national topographic series mapping. All of this documentation would be useful in documenting pre-existing drainage patterns to guide mitigation during extraction and rehabilitation post-extraction.	Given that the Niagara Escarpment Plan definition of fish habitat is based on the Fisheries Act definition, our opinion remains consistent with DFO in that the drainage features on the golf course should not be considered "fish habitat" for regulatory purposes, regardless of the presence of fish and any requirements for mitigation associated with fish removal prior to feature decommissioning. DFO's guidance is clear that not all features that contain fish are considered "fish habitat". The sole intention of the August 14, 2020 letter was to provide DFO with information on the drainage features on the golf course so they could determine if those features are considered to be fish habitat.

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2.	Further clarification should be provided related to assessed significant woodlands on the western expansion site (golf course). The technical report identifies woodlands 'D' & 'M' on the golf course lands as significant; with woodlands 'A' on the opposite side of Colling Road also being significant. • If the technical report identifies these areas as significant woodlands, Part 2.7.3 of the NEP (2017) must be considered in the context of the future health of the feature. Currently the extraction plan proposes to isolate significant woodlands 'D' from surrounding features; NEC Staff are of the opinion this would not maintain or enhance the feature, or associated features through extraction. • The impact of this isolation should be discussed in the report and should take into consideration the wording of Part 2.7.6 (d) & 2.9.3 (e). • Hedgerows are identified in the ELC mapping; typically, hedgerows will be included in the connectivity/wildlife corridor considerations. Please include assessment of hedgerows within the scope of maintenance and enhancement of key natural heritage features and wildlife habitat. • Amphibian movement corridors are considered an important function of significant wildlife habitat, they have been identified as being present impacts/mitigation should be considered in relation to SWH.	General	Niagara Escarpment Commission	As summarized in section 6.2.1, woodland D is relatively isolated and located on the golf course, adjacent to the existing quarry. While a portion of this woodland is native, the cultural woodland area is non-native, with an abundance of Black Locust, an undesirable tree species, and the FOD5/DIST area contains only a canopy layer, along with turf grass and paved golf cart paths in the ground layer (sub- canopy and understory vegetation are absent). There is high potential to enhance this woodland both in species diversity and composition. The proposed rehabilitation plans will create a system that is better connected and functional than what currently exists in the golf course and adjacent quarry. Further details are provided in response #9 below. Hedgerows are not a component of woodlands or SWH and are not a KNHF; therefore, survey effort is not recommended. The amphibian movement corridor will remain untouched. No direct impacts are anticipated due to its location outside of the Study Area at the far edge of the 120 m adjacent lands. Potential hydrological impacts and associated mitigation measures are provided in detail in the Wetland Characterization Summaries – wetland 13203 – appended to this response submission.	Not addressed. Woodland D will be fully isolated by the proposed extraction activity: hedgerows provide connectivity between KNHF, so acquiring baseline data through survey is justified to evaluate impacts of the resulting Woodland D isolation. Hedgerows are also a component of the Open Landscape Character comprising the rural environment of the NEP, and so their conservation is warranted.	During extraction Phases 1 and 2, Woodland D is connected to the overall landscape and NHS. During Phase 3, the hedgerow that runs south from Woodland D to No. 2 Sideroad will be removed as extraction progresses from the existing licence into the golf course. As extraction occurs in Phases 3 and 4, Woodland D will remain connected along the west (area of Phase 6), as well as to the north and west (area of Phase 5). During extraction in Phase 5, rehabilitation in Phases 3 and 4 will be on-going, and the connectivity from Woodland D to Woodland M, south of Phases 3 and 4, will be restored as shown on Page 3 of 4 of the Site Plans. During this time, Woodland D will remain connected to the surrounding landscape since extraction in Phase 6 will not have commenced. During extraction of Phase 6, side sloping of Phase 3 area will be completed, and progressive rehabilitation will continue in Phases 4 and 5, re-establishing the open landscape to the north of Woodland D. Therefore, Woodland D will not be isolated during the extraction phasing and will continue to have access to the adjacent landscape and NHS. The extraction phasing and active rehabilitation commitments have been designed to avoid the isolation of this feature.
3.	In some areas buffers to significant woodlands have been proposed <30.0 metres in width despite lands being available to achieve 30.0 metres. 30.0 metres is a generally accepted standard for protection from an extraction use, please provide further justification for these reductions (relevance to significant woodlands and wetlands) (Part 2.7.6 (c) & 2.7.7) • Reduced setbacks to the FOD7-4 community is of specific concern.	General	Niagara Escarpment Commission	With the exception of the buffer area adjacent to the pine plantation along the east side of the south extension, the buffers in areas that are less than 30 m will be revised on the site plans. In the West Extension, there will be a 30 m setback from the edge of the Weir Pond to the edge of the berm and a 30 m buffer from the edge of the FOD7-4 to the proposed limit of extraction and/or the edge of the berm. In the South Extension, there will be	Partially addressed. Please provide justification for the exception <30m buffer adjacent to the pine plantation on the east side of the south extension.	A 30 m buffer has not been applied to the pine and spruce plantations (located along the east side of the South Extension, Woodland P) based on the ecological form and function of the feature. The Ecological Land Classification (ELC) ecosites that are adjacent to the proposed licence and extraction boundaries consist of two types of coniferous plantations: White Spruce (CUP3-13*) and White Pine (CUP3-2). Thorough field surveys did not identify any

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				a 30 m setback from the FOD7-4 to the edge of the berm.		significant wildlife habitat or species at risk individuals or habitat within these plantations. These plantations are, however, considered significant woodland based on size and proximity to Regulated SAR habit located further east, outside of the 120 m adjacent lands. These plantations are not considered suitable SAR habitat and therefore are not Regulated Jefferson Salamander habitat. These details were discussed with the NDMNRF. It was agreed that the adjacent pine and spruce plantations are not considered sensitive ecosites within the overall significant woodland, and therefore, a smaller buffer could be justified due to the limited feature sensitivity and the proposed adjacent land use. Furthermore, it is understood that JART's natural heritage technical reviewer does not have any concerns with the 15 m extraction setback proposed adjacent to the plantation.
4.	Fulsome assessment of potential endangered species habitat on the golf course lands has not been completed. Golf course ponds were not surveyed for presence of Jefferson salamander. Connectivity between these ponds, and potential salamander corridors are in scope for the study. The presence of predatory fish in the northernmost pond does not justify excluding the more southern ponds from assessment (Part 2.7.6 (d)).	General	Niagara Escarpment Commission	We respectfully disagree with the comment that a fulsome assessment of potential endangered species habitat on the golf course lands has not been completed. All potential salamander breeding habitat was assessed and trapped as required. Discussions with the MECP confirm that the golf course irrigation ponds are not habitat for Jefferson Salamander and did not need to be surveyed. We are continuing to work with MECP for all SAR related matters and are adhering to their survey recommendations and protocols. As a point of clarification to the presence of predatory fish, Largemouth Bass was visually observed in all golf course irrigation ponds in September 2019, not just the northernmost one.	Partially addressed. In light of comment 84, notwithstanding the argument made that Largemouth Bass occupy the ponds that are not fish habitat, survey for Jefferson and other salamander species centered around these ponds and the related drainage channel(s) may provide supporting evidence for the MECP and proponent position on this matter. As with other forms of potential modeling, not surveying in areas identified as being of low resource potential does not test but reinforces the model used. Can the applicant share the MECP correspondence and confirmation that the golf course irrigation ponds are not habitat for Jefferson Salamander? As per comment 25, we recommend that surveying for Jefferson Salamanders is justified here.	MECP has provided verbal confirmation on several occasions, as well as in comment responses that the golf course ponds do not provide habitat for Jefferson Salamanders or the Jefferson-dependent Unisexuals (email correspondence December 3, 2021 – See attached **Tab 1**). In keeping with MECPs direction, the golf course irrigation ponds are not considered Jefferson Salamander habitat and survey efforts are not warranted. Further to this, the MECP confirmed that no impacts to habitat for Jefferson Salamander and Jefferson-dependent unisexuals are anticipated (email correspondence March 14, 2022 - See attached **Tab 2**).

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5.	Only one Turtle basking station was implemented on the southern expansion lands. Clarification sought as to why wet areas farther south were not included in the turtle assessment.	General	Niagara Escarpment Commission	Turtle basking surveys are used to help determine the presence of turtle overwintering habitat. The extent of the Study Area was surveyed for presence of deeper, pooling water wetland characteristics, and where these features were identified, they were further assessed by completing turtle basking surveys. Such features were limited to just the one on the Adjacent Lands of the South Extension.	Addressed.	Resolved - thank you
6.	Amphibian assessment is noted in close proximity to wetland 13200; clarification is sought as to why no amphibian call station was implemented in the feature.	General	Niagara Escarpment Commission	Wetland 13200 did not contain water and therefore was not considered a suitable feature to survey for amphibian breeding.	Partially addressed. It is understood that further monitoring data is being collected to assist in the development of the AMP, given the ca. one year of water level monitoring in wetland 13200. Additional data would be useful to determine whether the absence of surface water at Wetland 13200 is its normal state, and can be an important component in impact assessment, not solely deferred to the AMP.	Wetland 13200 continues to be dry, as determined through the 2019, 2020 and 2021 salamander surveys with MECP. The wetlands have been instrumented, as of April 2020 and further details, including impact assessment and mitigation measures, have been included in the updated Wetland Characterization Summary Reports (2021). NDMNRF is satisfied with the impact assessment and monitoring and treating the feature as an assumed significant wetland for the purposes of this application.
7.	Overall impacts on the hydroperiod for the assessed wetlands should be further assessed taking into account various phases of quarry operation and rehabilitation.	General	Niagara Escarpment Commission	More details are provided in the attached Wetland Characterization Summaries.	Partially addressed. As further assessment of overall impacts on the hydroperiod was requested, more detail than annual summary data is required (such as monthly averages), to make a determination of any variation of values through the year, and provide for more detailed analysis and assessment and subsequent minimization of any ecological impact(s).	These details have been discussed and addressed with the NDMNRF hydrogeologist and ecologist. Additional monitoring and further details are provided in the updated AMP.
8.	It is identified that wetlands 13200 & 13201 will likely be impacted due to a change in catchment area resulting from extraction. • A broader review of impacts should be provided that considers the connectivity of these wetlands (and 13202) as well as the cumulative impact on key natural and hydrologic features demonstrating connectivity within 240.0 metres. (Part 2.2.1, 2.7.3, 2.7.6 (d), 2.9.3(d&e)). • Outlets for these areas should be confirmed. • Maintenance and enhancement of key hydrologic features considered through this report, including wetlands, should be incorporated into the proposed rehabilitation and after-use plans (Part 2.9.3 & 2.9.11 (b)).	General	Niagara Escarpment Commission	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. In conjunction with comment 92. While more data are provided in the attached wetland characterization studies, no further comprehensive review or analysis of the connectivity of wetlands 13200 and 13201 (and 13202), nor discussion of cumulative impacts on and rehabilitation of key natural and hydrological features, are provided.	Please see responses to comments #24, #34 and #37.

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9.	Broadly, the report needs to discuss the impacts of fragmentation on the significant woodlands and wetlands in more depth, and should discuss how this fragmentation may, or may not be addressed through mitigation or rehabilitation. • Scope of consideration for impacts to key natural heritage and hydrologic features extends to connected features within 240.0 metres of the individual feature being assessed. A landscape approach within the site as well as broader capture and discussion of connected features off-site should be incorporated into the report. (Part 2.7.6 (d)).	General	Niagara Escarpment Commission	The proposed Extension Areas are sited within an active golf course and agricultural area. There is a Regional and Provincial NHS that runs north south; however, the area of the proposed expansion does not appear to negatively affect the redundancy of these smaller branches of the RNHS. The major areas of the NHS run along the Medad Valley, which is west of the proposed West Extension, as well as along the Mount Nemo Plateau and Grindstone Creek Complex, located east of the proposed South Extension. The proposed Extension areas are located between these two RNHS branches and are not impeding or removing any of the features that make up these two branches; the Extension areas are well outside of these two large systems. Based on the Region's NHS mapping, there are some smaller systems that lie parallel to, and between, these two major systems; however, these smaller systems do not connect to the larger NHS, north of the Study Area. These smaller branches of the overall NHS do not provide connectivity to begin with, and therefore, the removal or disturbance of golf course features and their potential for enhancement and future connectivity opportunities can only add to the limited contribution being made to the smaller NHS.	Partially addressed. The proposed isolation of features such as Woodland D and Wetland 13200 does have an impact on the overall connectivity of these smaller natural heritage features which should be considered in the context of mitigation and rehabilitation. The smaller scale of NHS systems between the two major systems does not negate their value, and their smaller scale if anything emphasizes their sensitivity to project impacts, and the need for more nuanced mitigation and rehabilitation methodology.	Please see response to comment #2.

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10.	An acknowledgement/assessment of Section 2.2 of the PPS (2020) – Water, does not appear in Section 2.1.1 of the Report. NEC Staff are of the opinion that Section 2.2 of the PPS contains a number of policies linked to natural heritage that should be assessed and incorporate findings from the Hydrologic and Surface Water reports.	General	Niagara Escarpment Commission	Section 2.2 of the PPS identifies the following water- related policies: "Planning authorities shall protect, improve or restore the *quality and quantity of water* by: a)using the *watershed* as the ecologically meaningful scale for integrated and long-term planning, which can be a foundation for considering cumulative impacts of development; b)minimizing potential *negative impacts*, including cross-jurisdictional and cross-*watershed* impacts; c)evaluating and preparing for the *impacts of a changing climate* to water resource systems at the watershed level; d)identifying water resource systems consisting of *ground water features*, *hydrologic functions*, *natural heritage features and areas*, and *surface water features* including shoreline areas, which are necessary for the ecological and hydrological integrity of the *watershed*; e)maintaining linkages and related functions among *ground water features*, *hydrologic functions*, *natural heritage features and areas*, and *surface water features* including shoreline areas; f) implementing necessary restrictions on *development* and *site alteration* to: 1. protect all municipal drinking water supplies and *designated vulnerable areas*; and 2.protect, improve or restore *vulnerable* surface and ground water, *sensitive surface water features* and *sensitive ground water features*, and their *hydrologic functions*; g)planning for efficient and sustainable use of water resources, through practices for water conservation and sustaining water quality; h)ensuring consideration of environmental lake capacity, where applicable; and	The Planning Justification Report cites only Section 2.2.2 of the 2020 PPS, asserting that no sensitive surface or ground water features are present. Section 2.2.1 of the 2020 PPS is not addressed in the above report, as referenced in the applicant's response to comment 10, notably: "Planning authorities shall protect, improve or restore the quality and quantity of water by: a) using the watershed as the ecologically meaningful scale for integrated and long-term planning, which can be a foundation for considering cumulative impacts of development; b) minimizing potential negative impacts, including cross-jurisdictional and cross-watershed impacts; c) evaluating and preparing for the impacts of a changing climate to water resource systems at the watershed level; d) identifying water resource systems consisting of ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas, which are necessary for the ecological and hydrological integrity of the watershed; e) maintaining linkages and related functions among ground water features, hydrologic functions, natural heritage features and areas, and surface water features including shoreline areas; f) implementing necessary restrictions on development and site alteration to: . protect all municipal drinking water supplies and designated vulnerable areas; and . protect, improve or restore vulnerable surface and ground water, sensitive surface water features and sensitive	Section 2.2.1 was not specifically referenced in the Planning report since the policy relates to what "Planning authorities" are to do. The elements of each of these items are addressed throughout the planning report and other technical reports. In summary: The technical reports took into consideration the sub-watershed study completed for the area; The water reports took into consideration the potential for watershed impacts and included recommendations to enhance the watershed compared to existing approvals; The water report and planning report took into account climate change; The natural environment and water reports assessed linkages between features; There are no municipal drinking water supplies in the area; The water resources report took into consideration designated vulnerable areas; and The water report and AMP included recommendations to protect, improve or restore sensitive surface water and sensitive ground water features and their hydrologic features.

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				i)ensuring stormwater management practices minimize stormwater volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces. *Development* and *site alteration* shall be restricted in or near *sensitive surface water features* and *sensitive ground water features* such that these features and their related *hydrologic functions* will be protected, improved or restored. Mitigative measures and/or alternative development approaches may be required in order to protect, improve or restore *sensitive surface water features*, *sensitive ground water features*, and their *hydrologic functions*." The water policies that are relevant to natural heritage are indirectly addressed throughout the NETR, specifically in the sections regarding fish and fish habitat, given the importance of water quality and quantity to maintaining fish and fish habitat. Relevant water policies are also indirectly addressed in other technical reports (i.e., Surface Water Assessment and Hydrogeological and Hydrological Impact Assessment Report)." The overall policy analysis is found in the Planning Report, which includes a review of Section 2.2 of the PPS.	ground water features, and their hydrologic functions. A detailed response to PPS (2020) is warranted here, given the explicit policy directives identifying linkages and related functions between ground and surface water and natural heritage. PPS section 2.2 overall should also be addressed in the Planning Justification Report, and in more detail than an assertion that these policies are being met.	
11.	Additional assessment of downstream impacts to Brook Trout populations related to Willoughby creek is being requested due to the proposed change in water levels and the proposal to utilize perpetual pumping as a mitigation measure to maintain water levels in key hydrologic features.	General	Niagara Escarpment Commission	DFO has reviewed the documentation and issued a Letter of Advice, dated June 23, 2021. One of the requirements is to "maintain an appropriate depth and flow (i.e., base flow and seasonal flow of water) for the protection of fish and fish habitat. This will be addressed though the provisions of the AMP to ensure the pumping regime maintains base flow and seasonal flow of water.	Not addressed. Comparative modeling and analysis of impact to downstream cold-water fish habitat, between perpetual pumping and no pumping rehabilitation alternatives, including respective surface and ground water contributions, and their impacts on depth, base flow and seasonal flow, is not provided but warranted. Specifically, while surface water	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

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				More details are provided in the attached Watercourse Characterization Summaries. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations.	provided by a continued pumping regime would help to maintain volume in the downstream, Brook Trout habitat is characterized in part by cold-water provided through groundwater upwelling that is not provided by surface water.	
12.	The Level 1 and Level 2 NETR describes the current fisheries inventories conducted within the existing quarry (Burlington Quarry) and proposed expansion lands and provides an assessment based on the proposed changes associated with extraction and future operations on those lands. Discussion is limited to within 120.0 metres of the proposed quarry expansion lands. Supporting studies, such as the Surface Water Assessment, as well as hydrogeology submitted as part of the application discuss potential fisheries impacts to surrounding areas beyond 120.0 metres. The aquatic impacts provided in the 2020 NETR do not appear to be integrated with surface and groundwater reports and impacts to fisheries from these studies are not well understood.	General	Matrix Solutions Inc.	The application includes protection of surface water features beyond 120 m which also protects any associated fish habitat. DFO is the regulatory authority and is satisfied that application will not result in HADD subject to its Letter of Advice, dated June 23, 2021. More details are provided in the attached Watercourse Characterization Summaries. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations.	1) The statement from DFO's Letter of Advice is contingent upon the successful implementation of mitigation measures by the applicant. The applicant will need to demonstrate that it is following mitigation recommendations provided in the Letter of Advice. Upon implementation of mitigation measures, the DFO letter states that this is not likely to result in a HADD. Evidence is needed from the applicant to demonstrate that all DFO conditions and mitigations are reflected in the revised AMP. We look forward to further explanations in this AMP reflecting how these recommendations are fulfilled. 2) Beyond 120m, it is anticipated that there would be groundwater impacts extending 1 km from the edge of the West Extension Quarry footprint. Interpretation of how this affects fish production in Willoughby Creek should be included as groundwater input is necessary to maintain the coldwater character of this creek.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

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13.	The inventories presented in the NETR describe the existing fisheries as consisting primarily of warm water species such as Largemouth Bass, which are commonly stocked in warm water ponds, as well as tolerant warm water fish communities typically found in intermittent tributaries. Given that the existing land uses consisted of a golf course and quarry operations, these results are not surprising for the most part, as the golf course has been in operation since the early 1960s and the lands have undergone ongoing disturbances. Since the existing quarry has been in operation, fisheries impacts have existed due to changes in drainage patterns from extraction activities. As the initial placement of the quarry has irreversibly changed the fish habitat conditions within the headwaters, it is more relevant to focus on the effect of the proposed new quarry expansions on the surrounding fish habitat. The 2020 NETR does not include discussion of the cumulative impacts to the surrounding water bodies that have been described in historical studies as being important. The cumulative effect on the surrounding aquatic habitats from the incremental quarry footprint expansion should be included in the discussion.	General	Matrix Solutions Inc.	We agree that the existing land uses in the study area (e.g., quarry, golf course, residential, transportation) have irreversibly changed the natural pre-existing fish and fish habitat conditions. We also agree that the NETR should focus on the effects of the proposed new quarry on surrounding fish habitat. We interpret the second paragraph of this comment to be similar to other comments regarding the request to expand the discussion regarding potential impacts to Willoughby Creek, which has been done in other rows in this table. Additional information on flows in Willoughby Creek will be provided in the AMP. The water resources report does, in fact, clearly delineate the "cumulative effects" of all existing and proposed excavations in the water level maps and hydrographs presented for each development scenario phase. The results were presented in terms of absolute water levels and streamflows, not just in terms of change, so the cumulative impacts were fully taken into consideration. The water resources report presents incremental drawdowns from a fully transient 10-year baseline, and both average and minimum remaining available drawdown in the aquifers. As part of the report, extensive use of observations of change in groundwater levels due to excavation within the quarry footprint was utilized (See Section 6.11.3). This work resulted in a recommendation to revise the rehabilitation plan for the existing quarry to mitigate impacts from the existing approved quarry. As JART is aware the existing approved rehabilitation plan for the Burlington Quarry requires dewatering to stop and the site to naturally flood to a lake with no off- site discharge. As part of the Burlington Quarry Extension application, Nelson has agreed to modify the existing	The need to understand the past history of the quarry's impact to fish habitat allows for the determination of the representative fisheries baseline conditions. Over the course of time, we know that we are dealing already with watercourses that have been already been impacted and future quarry expansions will need to be assessed against this impacted condition. It would be good to know what the incremental effect on the fisheries would be from the additional proposed quarry expansion. As fisheries inventories included in the NETR has been limited to within 120m of the quarry footprint, historical records (2004, 2006) were used to establish what these conditions are like. The applicant's consultant asserts that those historical conditions would be similar to present day conditions. However, this is unlikely as there has been some drought events that have occurred as well as further development in the area that may have affected the current fishery. Due to constraints such as private property, our understanding of fisheries within 120m of the proposed quarry expansion is limited to areas where the applicant's consultant has been able to sample. The NETR suggests that those water features within the existing quarry footprint are not fish habitat. Within the proposed west expansion footprint, the NETR suggests that the water features associated with the golf course are also not fish habitat as they contain an artificial fishery of Largemouth Bass and tolerant warm water fish. The Willoughby Creek system has been defined as an area of active groundwater discharge. The discharge of surface water from the quarry footprint maintains flow but may not supplement the groundwater discharge	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

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				quarry rehabilitation plan to maintain off-site pumping to maintain existing conditions for off- site fish habitat and other water based key natural heritage features which rely on water being discharged from the existing quarry.	reductions. If modelling predictions indicate a reduction in groundwater flow into the Willoughby system, is it possible that infiltration of groundwater at the quarry footprint be better at maintaining this cold-water system downstream? Loss of groundwater discharge to the Willoughby system remains a concern.	
14.	The Level 1 and 2 NETR also states that although that ponds and drainage features within the existing quarry and proposed expansion lands contain fish, these systems are not really fish habitat due to their anthropogenic origin and their isolation from other features, and as a result support no recreational fishery. Given the extent of quarrying, the fish community within the quarry footprint is expected to consist of species that can persist within the changing aquatic habitat conditions that are artificially maintained. The NETR describes the ponds and drainage features as having a hydrologic connection to fish bearing waters in the surrounding watercourses immediately outside of the proposed quarry extension lands. As there are linkages to fish habitat downstream of these areas, it is not clear where does fish habitat begin and end, and if alterations within the quarry in terms of flow, thermal regime, water quality or quantity will affect the downstream fish bearing waters. A table describing the rationale for fish habitat designations, supported by *Fisheries Act* definitions for these habitats should be included. Consistency with the application of fish habitat designations should be demonstrated in this table.	General	Matrix Solutions Inc.	Contrary to this comment, the NETR does not indicate that ponds and drainage features within the existing quarry contain fish habitat. Our interpretation of the limit of what does and does not constitute fish habitat is as follows, as discussed in Section 6.6 of the NETR: • The portion of the Unnamed Tributary of Willoughby Creek between the existing quarry discharge from Sump 0100 and the Colling Road culvert is indirect fish habitat, given that no fish were captured during sampling in this reach in 2019, with exception of Largemouth Bass that were captured in the Weir Pond. It is our opinion that Largemouth Bass are only present in this area as a result of the construction of the golf course drainage feature and therefore, the presence of bass in the Weir Pond, which is part of the commercially constructed golf course water feature, does not constitute direct fish habitat. This reach along Colling	We are interested in determining how the fish habitat classifications are derived from the DFO definition of fish habitat. This is to ensure that these definitions are consistent in its application. Fish habitat is defined in subsection 2(1) of the Fisheries Act to include "all waters frequented by fish and any other areas upon which fish depend directly or indirectly to carry out their life processes. The types of areas that can directly or indirectly support life processes include but are not limited to "spawning grounds and nursery, rearing, food supply and migration areas." Under this definition, clarification is requested to justify the distinction to distinguish the artificial fishery created with man-made ponds are not fish habitat even though they support fish. The applicant is requested to provide DFO policy that supports this distinction. There is an outflow from the irrigation pond which becomes classified as fish habitat. It is unclear how the outflow becomes fish habitat once it leaves beyond the Nelson Quarry properties. The DFO letter recommends protection of downstream waters and places	As previously noted in our original response, DFO has confirmed in their email of June 23, 2021, that they do not consider the drainage features on the golf course to be fish habitat. As the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.

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				Road does provide important functions that contribute to downstream fish bearing waters, including flow conveyance (from the quarry discharge) and organic material inputs. • The constructed golf course drainage features (ponds and interconnecting channels) are not considered to be fish habitat for the reasons outlined in section 6.6.1 of the NETR, as confirmed by DFO in their June 23, 2021, letter. • The reach of the Unnamed Tributary of Willoughby Creek downstream from Colling Road has assumed to be direct fish habitat (i.e., could support direct use by fish), given that no studies have been completed on private property to confirm the presence of fish. • The West Arm of the West Branch of the Mount Nemo Tributary is direct fish habitat downstream from Sideroad 2. • The East Arm of the West Branch of the Mount Nemo Tributary is indirect fish habitat upstream from the buried karst reach and direct habitat downstream from that point. • H2 is indirect fish habitat. DFO has confirmed in letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	requirements on the outflow quality and quantity. If the outflows are not controlled in terms of water quality and quantity, they can result in HADD to fisheries habitat. Aquaculture facilities that are entirely self- contained are defined as not fish habitat. Clarification is requested in how waterbodies with an outflow to existing fish habitat are exempt from being defined as fish habitat. The statement from DFO is contingent upon the successful implementation of mitigation measures (and not intended to be an overall statement) • The definitions for fish habitat seem reasonable but is there DFO policy that supports those definitions? The DFO letter seems to imply the above but does not clearly define what are Canadian fisheries waters. • Interpretation using Fisheries Act policy definitions is requested to clarify which watercourses are fish habitat. This explanation appears to be lacking.	

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15.	Drainage and surface outflows of the existing quarry operations extend beyond the quarry footprints and are maintained through pumping operations, which are recommended to continue in perpetuity, long after the license for extraction has been surrendered. As long-term plans for the quarry contemplates changes to drainage conditions, along with the changes associated with climate change, understanding the effects on the surrounding fisheries habitat within the Niagara Escarpment is a key consideration in the proposed quarry expansion. The rationale for continued pumping operations should be supported by more detailed information on how fish habitats and linkages are to be maintained. Discussion on the existing flow regime and the form and function of watercourses and linkages should be included to determine how future changes with pumping and drainage will impact these watercourses. Hydrograph information and hydroperiods in relation to the surrounding fish habitat should also be included in the discussion.	General	Matrix Solutions Inc.	Continued pumping after the operational period has ceased has been identified in the NETR as a key mitigation measure to prevent long term impacts on fish and fish habitat in Willoughby Creek and the West Arm of the West Branch of the Mount Nemo Tributary of Grindstone Creek (as well as further downstream reaches). Pumping from the existing quarry sumps 0100 and 0200 has been occurring since construction of the original quarry and fish communities in these watercourses, as well as the habitat within the watercourses (i.e., stream form and associated function, such as channel size and biophysical processes such as erosion and sedimentation) are expected to be accustomed to, and reliant upon, the pumped discharge. Elimination of pumped discharge would be expected to have negative impacts on the form and function of these watercourses as they revert back to pre-quarry pumping hydrological regime (recognizing that the rehabilitated quarry will be remaining), which, in the case of the West Arm of the West Branch, would be intermittent and in the case of Willoughby Creek, would involve substantially less flow downstream from the current discharge outlet at the mouth of the Unnamed Tributary. The comment has requested more detailed information on “how fish habitats and linkages are to be maintained”. Essentially, the proposed pumping regime will continue the current flow rates supplied by pumping indefinitely to avoid the substantial change in hydrology that would occur if pumping were to cease after operations are done (as permitted by the current approvals for the existing quarry). Pumping will continue indefinitely to the current outlet locations and at the same general discharge rate regime as currently occurring and will be occurring through the operational scenario. This has been modelled in Rehabilitation Scenario 1 in the integrated stream flow model in the	Although the continuance of drainage flows to the Willoughby Tributary through perpetual pumping may be good option for maintaining a continuous flow of water to the tributary, the pre- quarry conditions indicate that this system was groundwater fed (although likely having reduced flows). The pumping scenario provides flow but maintains a warm/coolwater fish community (ie Blacknose Dace dominated, with occasional salmonid species according to historical records). Pumping of surface water to the Willoughby Tributary does not compensate for the loss of groundwater upwelling that may be lost through the construction of the West Quarry Extension. An understanding of the enhanced groundwater infiltration within the Willoughby system is requested to determine if this can benefit downstream fish habitat conditions, in addition to pumping. To allow for a better understanding of pros and cons of maintaining the pumping operations in Willoughby Creek, the NETR should include discussion of the fish habitat and fish community under both scenarios of pumping vs. not pumping. If the “no pumping “situation was initially approved, do we have information on what that scenario would be in terms of the downstream fishery in Willoughby Creek?	Groundwater mitigation is proposed in the form of the infiltration pond adjacent to the west extension. Through discussions with the Ministry of Northern Developments, Mines, Natural Resources and Forestry (MNDMNRF), a revision to the integrated model was completed and remodeling of the effects of this mitigation has been completed by Earth FX. See attached **Tab 3** for a copy of the presentation and technical memo prepared by Earthfx. The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

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				Hydrogeological and Hydrologic Impact Assessment Report. Hydrological changes in Willoughby Creek and the West Arm of the West Branch are predicted to be minimal relative to existing conditions. Further, the predicted impacts on stream flows outlined in Rehabilitation Scenario 2 depict much more substantial changes in flow relative to current conditions and would be expected to have substantial impacts on fish and fish habitat in these watercourses.		
16.	With respect to the quarry expansion application, the applicant has assessed the fisheries habitat within 120.0 metres of the proposed expansion area. Other studies that relate to fish habitat that are submitted as part of the quarry application discuss impacts beyond 120.0 metres of the proposed quarry expansion area. To have a better understanding of the impacts to fisheries resources, the applicant needs to integrate the 2020 NETR with surface and groundwater studies which extend beyond 120.0 metres. Impacts to fisheries resources needs to be described in relation to future drainage scenarios associated with the changing nature of the quarrying activities over time, as well as the ultimate rehabilitation scenarios involving the creation of landforms, lakes, and changes associated with climate. The following provides a summary of the issues and concerns as they relate to fisheries.	General	Matrix Solutions Inc.	Comment noted. Responses are provided to subsequent comments in the rows below.	The study areas differ in the surface and groundwater studies- ie the surface and groundwater impacts appear to be larger than 120m. Subsequent discussion with JART groundwater experts reveals groundwater impacts associated with the West Extension can be up to 1.0 km from the proposed quarry footprint. The corresponding effects on fisheries in areas where those surface and groundwater impacts are predicted should be included in the discussion.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.
17.	The fish information available in the downstream reaches such as in Willoughby Creek are based on older baseline data (2006) and no further recent information regarding the fish communities in these areas have been made available. The paucity of recent fish data is reflected by the limited study area, no sampling or surveys in private property, and of active sampling gear such as seining, electrofishing methods and visual observations.	General	Matrix Solutions Inc.	Comment noted. The assessment of impacts on fish and fish habitat is based on the predictions of stream flow and groundwater discharge from the integrated model (as documented in detail in the supporting surface water and groundwater technical reports) with knowledge of the fish species that have been confirmed in Willoughby Creek in past studies. Although changes in relative abundance and biomass of fish within watercourses are expected to change over time in natural scenarios, it is reasonable to assume that generally the same species are present, as have been confirmed during previous studies, given	There is a pretty large gap in time between older data in 2003/2006 and 2021 in terms of actual fish sampling. The 2006 historical reports rely mainly on data from 2003. Given the climate related changes and ongoing development, would it reasonable to assume that the fish community has changed (ie more tolerant fish may have become established) during the past 18 years. Evidence of severe droughts occurring during the interim time period have been noted.	We acknowledge the lack of current baseline data regarding the fish community in Willoughby Creek as a result of lack of access to private property. However, in our opinion, mitigating water quality and flow assuming that the requirement is to maintain existing conditions as closely as possible will address potential effects to fish and fish habitat, regardless of the composition of the fish community. Furthermore, DFO is satisfied that maintaining existing flow regimes will protect fish habitat. See updated AMP for the proposed mitigation and monitoring approach to protect surrounding watercourses and associated

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				the lack of available access to complete current fish community studies on Willoughby Creek which is predominantly held in private property. Habitat life history requirements of the species known to be present are well documented in the literature and from those requirements, an assessment of potential impacts on fish and fish habitat can be completed based on the predicted changes in habitat (e.g., stream flow and groundwater discharge). It is not necessary to have recent fish community data to complete an impact assessment based on the minor changes in streamflow that are predicted to occur, particularly when the assessment is primarily based on the presence of Brook Trout and associated habitat, as this species is predicted to be the most sensitive to environmental change of those species known to be present in Willoughby Creek. Section 2.2.9 of the NETR included a summary of Conservation Halton's fish sampling data from stations on Willoughby Creek in 2012. In addition, data collected in support of the original quarry expansion application, as documented in the 2004 Level II Natural Environment Technical Report remains a relevant component of the background knowledge that has supported the impact assessment.	If we are to assess the impacts from the new application, how do we know that self-sustaining Brook Trout population is still present and is in fact reproducing in the Willoughby Creek system? Brook trout is a short-lived salmonid species and its existence would be dependent on groundwater discharge and cold-water conditions.	fish habitat.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
18.	Predicted impacts to downstream watercourses are discerned from the surface water report which can only be based on older baseline data by collected by others, such as records from 2006. As the data has been collected over 14 years ago, changes that have occurred over time regarding the fish community and habitat changes are not accounted for in predictions related to surface water impacts.	General	Matrix Solutions Inc.	Predicted impacts can be assessed based on the fish species that have previously been confirmed in the watercourse (i.e., through previous studies conducted for the original quarry application or by Conservation Halton as part of their Long-term Environmental Monitoring Program) and the known habitat preferences of those species. Also, of key importance is the minimal actual predicted change in habitat (as documented through the surface and groundwater assessment reports and further analysis of changes in water depth, wetted cross-sectional area, wetted width). Based on the minimal habitat change predicted, Savanta is of the opinion that more recent fish community data for Willoughby Creek would not change the assessment of potential impacts. In our opinion, the general composition of the fish community (in terms of species present) is unlikely to have undergone any substantial change over time that would change how the impact assessment is completed.	The point here to note is that baseline data for fisheries will be based on 2006 reports (which cite 2003 fish sampling data, for the most part). Although that applicant may think there will be no need for further fish sampling, a lot of changes have occurred over time that may have resulted in loss to the fish community assemblage or current fish populations. Without knowledge of the present fish populations, it is difficult to assess whether negative changes that have occurred could be attributed to the West Extension. Predicted changes from the application moving forward would be based on 2003, whereupon changes have to the environment (which could be unrelated to quarry operations).	Please see response to comment #17.
19.	The 2020 NETR discusses what is impacted within the existing quarry and extension footprints, it does not provide a more fulsome picture of what happens to the downstream watercourses and particularly the Willoughby Creek system. The applicant should provide more discussion on specific effects to fish habitat as it relates to the receiving waters affected by future drainage and alterations to hydrology and hydrogeology from future expansion. The surface water assessment report provides statements which affirms the sensitivity of Willoughby Creek to changes in baseflow, and the primary concern is that this feature, as well as the other watercourse will be maintained through pumping. Should pumping be subjected to unexpected shutdowns or malfunctions, it is unclear what these effects would manifest to fish habitat. For example, if fish populations are reliant on this flow to successfully spawn and rear their young, what happens during the coldest winters and summer drought conditions is of concern as a sudden withdrawal of flow in the upper reaches may result in fish mortality.	General	Matrix Solutions Inc.	See response to Comments 15, 17 and 18. If the agencies are concerned that any potential impacts of continued pumping outweigh the impacts of ceasing pumping once quarry operations are completed (which is permitted by the current quarry approvals) then the proponent is willing to consider this approach.	The scenario of pumping and no pumping approach should be explained in terms of fishery. This would provide further explanation of potential effects should pumping where to suddenly be shut down due to unexpected failure. There are also some outstanding questions that remain such as allocation of pumping during lake creation.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

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20.	As extraction proceeds to its later stages and progressive rehabilitation takes place, it is unclear how this impacts fish habitat. It is not fully explained how the quality and quantity of discharge water will be maintained. It is anticipated that there will be a lowering of local groundwater and surface water levels from quarry operations and quarry dewatering. It would be good to understand how water quantities will be balanced and water quality will be maintained at various stages during blasting and quarry operations. Furthermore, it is uncertain if ground water conduit flow paths will be interrupted during quarrying operations.	General	Matrix Solutions Inc.	Changes in water quantity through the P3456 and Rehabilitation scenarios have been assessed in the integrated flow model. This has accounted for the predicted lowering of localized groundwater table in vicinity of the quarry as well as predicted increases in some phases as a result of shifting the groundwater volume to the surface water level (i.e., through discharge of intercepted groundwater through sump 0100 into the Unnamed Tributary of Willoughby Creek). Discharge of water will be consistent with current operations and potential impacts to water quantity and quality will be addressed through the provisions of the AMP and MECP approvals. More details are provided in the attached Watercourse Characterization Summaries.	It is anticipated that the updated AMP will contain further details regarding the water quality and quantity through different phases of extraction.	Comment noted. See updated AMP.
21.	There may be contaminants introduced into water bodies from blasting and quarry operations that can affect fish habitat. As blasting will be used for extraction, what is the potential for contaminants to be released or the event of a pipeline rupture from blasting (from the Enbridge Pipeline in Colling Road)?	General	Matrix Solutions Inc.	There will be no difference in the potential for changes in water quality as a result of blasting the quarry extension than there has been for the life of the existing quarry. Appropriate mitigation to prevent impacts on the pipeline will be in place during all quarry blasting activities as per the Blast Impact Analysis (Explotech 2020). This report also recommends monitoring when blasting is occurring in proximity to the pipeline.	Is there monitoring to ensure that the water quality is to remain consistent? - ie the water quality throughout the process is maintained. We anticipate that this will be reflected in the revised AMP.	Surface water quality monitoring will be outlined in the AMP. See updated AMP.
22.	Effects from pumping and lake creation, including shutdown of the pumps, malfunctions or spills at the quarry should be included in the discussion. Furthermore, temperature impacts from the creation of the lake, and other potential effects such as exotic species invasion/blue green algae should also be included in the discussion.	General	Matrix Solutions Inc.	The AMP includes appropriate mitigation and monitoring measures to ensure the effects from pumping and lake creation will not negatively impact the surrounding environment. The AMP includes monitoring, mitigation and reporting requirements during operations and lakefilling. If there are additional requirements that the agencies would like included in the AMP please provide these for Nelson's consideration.	Yes- the following should be included in the AMP discussion: Thermal impacts Backup systems and contingency pumping Maintenance of discharge water quality Invasive species control and prevention Infiltration effects to groundwater discharge to the Willoughby Tributary	The AMP discusses mitigation, monitoring and adaptive management associated with quarrying operations for potential surface water and groundwater related impacts. See updated AMP.

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23.	Future Gaps to be Addressed: The setting for the quarry extension takes place within the Niagara Escarpment Protection Area where the management focus is directed to maintaining the key natural heritage features and key hydrologic features for the movement of native plants and animals across the landscape. The natural feature of concern is in Willoughby Creek, where a remnant Brook Trout population exists. This remnant population presumably still occurs within a short distance within the Willoughby Creek Tributary kept separated from Bronte Creek through a dam from more aggressive migratory salmonid species. This current population is dependent on the existence of baseflows and groundwater discharges that occur in Willoughby Creek. During the previous quarry submission, the Joint Agency Review Team (JART) had requested that discussion of each watercourse should include a detailed description of each of the following: (a) locations of groundwater upwellings (and their significance to fisheries), species composition, distribution, relative abundance, and life history of the fish inhabiting the creek. (b) JART also requested identification of critical or sensitive habitat with reference to species distributions. (c) Considering the pumping which will be used to maintain the current baseflows to the Willoughby Creek and other tributaries, this strategy needs to be further understood with respect to future risks to the fish habitat downstream. For example, if a passive means of supplying water to these downstream systems is possible, this may be a safer alternative rather than relying on pumps that may be susceptible to mechanical failure and regular monitoring to ensure proper function. (d) Some of the information requirements that are relevant to the understanding of the potential impacts of the proposed extension raised by JART include: • predicted flow rates for groundwater discharge for the tributaries • effects of groundwater and surface water changes on the fisheries in each tributary • groundwater disruptions may have a very large effect on fisheries and the effects should be further quantified • threshold flows and predicted effects on fisheries habitat • impact of shortened periods of groundwater contribution on fish productive capacity in intermittent streams • the relative contributions/effects to groundwater should be summarized in a table for each watercourse	General	Matrix Solutions Inc.	DFO has issued a Letter of Advice, dated June 23, 2021, identifying those measures required to prevent the harmful alteration, disruption or destruction of fish habitat. One of the requirements is to "maintain an appropriate depth and flow (i.e., base flow and seasonal flow of water) for the protection of fish and fish habitat. This will be addressed though the provisions of the AMP to ensure the pumping regime maintains base flow and seasonal flow of water. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations. More details are provided in the attached Watercourse Characterization Summaries.	The predictions from water quality modelling provided shows a reduction in groundwater inputs- there is a known dependency on this groundwater input to maintain Brook Trout reproduction. AMP needs to show that the loss of groundwater contribution is effectively offset by the outflow discharges. Outflow discharges maintain flow to the creek but does not maintain groundwater upwellings that allow for trout reproduction and development. There is a need to understand the Willoughby system through more recent data collection so there is baseline data that is more current prior to expansion (ie 2003/2006 data may not reflect today's conditions as there has been some warming trends/droughts). Yes, working through the DFO conditions within the tables would be helpful. This discussion should be reflected in the AMP.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice. Please see response to comment # 17.

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	• potential thermal impacts on the watercourse and whether the quality of groundwater is affected (including thermal pollution) • effect of increased flows on channel stability, fisheries, and productive capacity in Willoughby Creek • effect of mitigation/pumping of water into the ground and the impact on watercourses In addition to these, the applicant should discuss how the progression of quarrying (in various stages) impacts the water quality that is discharged to downstream systems.					

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24.	Discussion of the site's ecoregion, ecodistrict and physiographic context is missing, as is a discussion about the relationship with significant Regional features such as the Mount Nemo Plateau. The previous hearing raised concerns about the variable local groundwater setting within discrete areas of the Mount Nemo Plateau, with concerns that groundwater flows were currently affected by the existing quarry and these impacts could extend further because of the cumulative impacts of the existing quarry plus the extension. There is the potential for significant harm to the off-site Jefferson's Salamander breeding habitat pools (the "wetland vernal pool" and "woodland vernal pool" shown on Figure 4.0), through impacts on their hydroperiod, if the groundwater inputs to the ponds are significantly affected by the extraction. The 2012 decision by the Joint Board noted that monitoring of water levels in the salamander breeding ponds (which are off-property) is critical because of the uncertainty regarding the impacts of lowering the groundwater table. The concern associated with the accuracy of assessment of groundwater inputs to the Jefferson's Salamander breeding habitat ponds was an important issue to the 2011 Joint Board and it is not clear what additional work has been done to address these concerns. Concerns that the connection between groundwater and surface features has been underestimated in the current application have again been noted by many technical experts in their review of this application.	General	North-South Environmental Inc.	This application is significantly different than the previous application. The extraction area is smaller which results in less groundwater drawdown and there is greater separation distance between the extraction area and off-site salamander breeding ponds. These ponds and the lack of potential impact have been extensively studied in the integrated groundwater and surface water model. More details regarding these features are provided in the attached Wetland Characterization Summaries.	A final response will be provided on resolution of groundwater issues, most of which are still in question. Modelling is also questioned by other technical experts. Wetland characterization summaries lack integration between surface water/groundwater findings and ecological implications of these findings. Wetland summaries have also not incorporated past knowledge of the wetlands obtained during the fieldwork for the previous application. During the past field work, some of these wetlands were found to provide habitat for amphibian species and abundance that would now meet criteria for Significant Wildlife Habitat (SWH), and in the absence of more recent field work the context of the past field work is important. The past field work to determine whether wetlands are important breeding sites for amphibians is also important as abundance of breeding amphibians can fluctuate between years due to weather - and amphibians rely on the "good" years to occur from time to time to maintain populations. Analysis of one of the wetlands (13015) has been omitted. This wetland supported breeding Spotted Salamanders, which are an indicator species of SWH for woodland amphibian breeding habitat. Additionally, in the adaptive management plan report, 13027 was used as a surrogate as 13034/13035 as these (the known Jefferson Salamander breeding ponds) were not accessible - do the water experts feel this is legitimate?	Updates and revisions have been made to the AMP, based on numerous and extensive discussions with NDMNRF. In general, these changes include additional monitoring locations (installed in spring 2020, 2021 and 2022), additional data collection and its assessment (and will continue to be collected and assessed), increases to data collection frequency, as well as updated thresholds and triggers and reporting requirements and timing. See updated AMP. The hydrological data, both ground water and surface water inputs, have been discussed and assessed extensively, as they are integral components to the ecological context of the features identified in the Study Area. Hydroperiod and water level data have been collected for years at some features, and other features have relatively less data (i.e., wetlands 13200 and 13201 were instrumented in 2020 and 13015 was instrumented in 2022 (previously, wetland 13015 was assessed with 13016)). This monitoring will continue as committed to in the most recent version of the AMP. Therefore, there will be a minimum of three years of monitoring data for 13015, which is considered an appropriate amount of time to and data to assess for Jefferson Salamander habitat, before the preparation and operation of Phase 1 will begin. See updated AMP. It is recognized that past fieldwork data and assessment for the previous application differ from the fieldwork data that was collected and assessed in 2019 and beyond for this application. Furthermore, SWH criteria and evaluations, along with other applicable policies and regulations, have been updated since the previous application. The recent multi-year and multi-season data, and the current evaluation processes, more accurately reflect current conditions, impact assessments and

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						proposed avoidance and mitigation measures. The water experts, both with JART and NDMNRF, agree that there is no groundwater connection or input to wetlands 13034 and 13035. These two wetlands are perched and are topographically higher than the proposed extraction area of the South Extension. While these inaccessible wetlands could not be instrumented and assessed as part of Nelson's comprehensive field program, the location, surrounding topography, lidar imagery, adjacent surface and groundwater instrumentation data and modeling has provided enough information for the water experts to be satisfied in the conclusion that these wetlands will not be affected by the proposed extraction.
25.	Golf course ponds were omitted from salamander trapping. The report states this is because they have predatory fish in them but the only pond that was electrofished was the northernmost pond. Other ponds were surveyed visually. Largemouth Bass were observed only in the main irrigation pond, the uppermost irrigation pond and the golf course irrigation channel. No fish were observed in the three smaller ponds. The author of this review has personal experience with Jefferson's Salamanders breeding in human-made ponds (and salamanders would be more likely to breed in smaller ponds that might be without fish). Salamander trapping should be conducted in the smaller golf course ponds, particularly smaller ponds that do not contain predatory fish.	General	North-South Environmental Inc.	As a point of clarification to the presence of predatory fish, Largemouth Bass was visually observed in all golf course irrigation ponds in September 2019, including the three smaller ones. All potential salamander breeding habitat was assessed and trapped as required. Discussions with the MECP confirm that the golf course irrigation ponds are not habitat for Jefferson Salamander and did not need to be surveyed. We are continuing to work with MECP for all SAR related matters and are adhering to their survey recommendations and protocols.	We continue to request that these ponds be investigated through minnow trapping for breeding salamanders. Having seen the ponds during the site visit on 24th November, they appear similar to human-made ponds where salamanders have been observed breeding by NSE in the past. The ponds have shallow-sloped edges with abundant leaf litter on the bottom, and there are some attachment sites (vegetation, leaves and twigs) along the edges. According to the Region's fisheries expert reviewer on this file, it may be possible for pond-breeding salamanders to breed in ponds where bass are present because bass are largely dormant (and non-feeding) in early spring just after snow melt, when salamanders move to breeding ponds. Salamander larvae tend to stay in the shallows out of the reach of bass.	Please see response to comment #4.

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26.	Additional surveys should also be conducted for: a. Blanding's Turtle, according to Provincial Blanding's Turtle protocols, b. turtle nesting areas, and c. snakes, according to the protocols for Milksnake.	General	North-South Environmental Inc.	Blanding's Turtle survey effort was discussed with MECP and addressed in the MECP response letter after completing Blanding's Turtle surveys, as per MECP direction, in 2021. Neither Blanding's Turtle nor its habitat were observed and are considered absent from the Study Area. As stated in section 4.2.6, turtle nesting surveys were not completed in 2019 due to the lack of suitable microhabitat conditions. Further mitigation measures have been included in updated site plans. Exclusionary fencing adjacent to the extraction areas will be installed, as per discussions with MECP, to prevent negative impacts. It is unclear which Milksnake protocols are being referred to. However, available occurrence data (as determined in the desktop review of the NETR 2020, sections 2.2.3 and 2.2.5) did not identify SAR snakes in the Study Area or surrounding area. It is understood that snakes are a cryptic species and occurrence data is limited; however, as described in the NETR, habitat assessment surveys and visual encounter surveys during suitable weather conditions did not identify SAR snakes or individual or groupings of snakes large enough to indicate significant wildlife habitat in the 14 areas that were searched specifically for snake presence.	It is understood that Blanding's Turtle surveys were conducted in 2021. We anticipate being able to review the results of the surveys. It was observed during the site visit indicated that the western and southern extensions are potential habitat for Milksnake. For your information the Milksnake protocols being referred to are the MNR Guelph District's 2013 protocols, attached at the back of these responses. Response not accepted. Dates, times and weather conditions should be summarized in Table 1 in the NETR, as this is standard practice for displaying field information. Some dates on data sheets have been obscured during copying and full review of survey dates and weather conditions is important, as bad weather can suppress activity of wildlife, leaving to a false impression that they are absent.	Additional turtle basking surveys were completed in spring 2021, following the Blanding's Turtle survey protocol (OMNR 2015) within all water features in the proposed West Extension Study Area, as per direction and discussion with MECP. No turtles were observed during these surveys. The conclusion remained unchanged: turtle overwintering habitat is absent in the West Extension. Additional turtle basking survey effort was not completed in the proposed South Extension Study Area in spring 2021 due to unsuitable conditions for Blanding's Turtle habitat; therefore, BS6/Wetland 13203 (NETR 2020) is assumed turtle wintering area SWH for this application and carried forward to the Level 2 impact assessment. As per the SWH Ecoregion 7E Criterion Schedule (MNRF 2015), the pond (BS6) is the over-wintering SWH. This feature is located almost 120 m from the proposed Extraction Limit. It was confirmed amphibian breeding SWH in the NETR (2020). The anticipated indirect impact and mitigation measures that have been applied to this amphibian SWH type are the same that will be applied to the assumed turtle wintering area SWH (Wetland 13203; Wetland Characterization Summaries April 2021). The site plans have been revised to include this change (see Page 1 of 4 – Added Turtle Wintering Area). Management actions such as water level, pumping and monitoring details for this SWH type have been included in the revised AMP Version. See attached **Tab 4** for a copy of the Updated Table 1.

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27.	Weather conditions were omitted from the table summarizing field investigations. Though there are general notes about weather conditions in the text describing the field methods, the weather conditions should be shown for each date for amphibian, reptile and bird surveys.	General	North-South Environmental Inc.	In addition to the general notes about weather conditions in the methodology section, full weather details are recorded for each survey and provided on the data sheets in Appendix C of the NETR.	Response not accepted. Dates, times and weather conditions should be summarized in Table 1 in the NETR, as this is standard practice for displaying field information. Some dates on data sheets have been obscured during copying and full review of survey dates and weather conditions is important, as bad weather can suppress activity of wildlife, leaving to a false impression that they are absent.	See attached **Tab 4** for a copy of the Updated Table 1.
28.	The significant Woodlands analysis resulted in several woodlands (E, F and G) identified as Key Natural Heritage Features in the Regional Natural Heritage System being evaluated as non- significant. More discussion should be provided to explain the difference between the Region's and Nelson's analysis of these features. The discussion should include the rationale behind removing from the NHS both the features and the intervening restoration areas that provided a connected north-south linkage between these woodlands.	General	North-South Environmental Inc.	Section 6.2.2 of the NETR (2020) contains complete details on the analysis of wooded and woodland features through application of the Regional OP (2018). Wooded features E, F and G (among others) did not meet the minimum size threshold (0.5 ha), and therefore, did not meet the Regional definition of Woodland. Only Woodlands can be assessed for significance, and therefore, due to these areas not meeting the Regional definition of Woodland, they were not assessed for significance. In addition, section 9 of the NETR (2020) speaks to the Regional NHS; more specifically, it includes language from section 116.1 of the OP, which states that the boundaries of the NHS may be refined, with additions, deletions and/or boundary adjustments through several processes, including completion of an EIA. The technical requirements of an EIA have been met through this process, and therefore this data should be considered when reviewing the Regional NHS. Finally, the RNHS was created through a very high- level desktop exercise with little ability to zoom in and observe a closer look of features. These are highly disturbed patches on a highly active and regularly used golf course. These areas should not have been included in the RNHS. There is a large NHS south of the golf course that consists of the Lake Medad	Woodlands E, F and G were staked during the dripline visit on 3rd December, 2021. Measurement with a tape measure during the 24th November visit indicated that there were points where the edges of Woodland E were closer than 20 m. The revised measurement of woodland areas should be provided, and the analysis of all woodlands should be revised to reflect the new and most accurate measurements. It is understood that the stem count within woodland E was revised following a count of all trees. These results should be provided to JART. However, the woodland is in most respects a functional deciduous forest, and the results of the fauna and flora surveys within the forest indicate that it is functionally part of woodland D. It is dominated by native deciduous tree species. The canopy closure is more than 60%, the threshold required for classification of a woodland in the provincial Ecological Land Classification system. The woodland supports a forest bird Species at Risk and bat maternity colonies. Woodland E is less than 20 m from Woodland D: close enough to Woodland D to be considered a part of it, and the contiguous area of Woodland D and E is more than 0.5 ha. In addition, this woodland serves a function as a linkage through the golf course because of its location. The	The NDMNRF has provided clarification regarding which provincial criteria to use for assessing significance of woodlands for this licence application relative to the PPS and NEP policy requirements. NDMNRF recommended that – the Greenbelt Plan (2005) Technical Definitions and Criteria for Key Natural Heritage Features in the Natural Heritage System of the Protected Countryside (MNRF Dec. 2012) (referred to as Technical Report). The Regional criteria were also considered as it relates to the Region of Halton Official Plan requirements. Polygons E, F and G were each identified as separate patches of treed areas and these three polygons were also identified within the proposed extraction limit of the West Extension. Polygon E contains only a tree canopy layer; there is no sub-canopy, understorey or natural ground cover. It is a stand of mature maples with a regularly maintained turf grass ground cover and paved golf cart paths. It was delineated and classified as an FOD5/DIST to reflect not only the canopy coverage but its existing use and state of management. The tree density composition is well below the minimum density threshold provided in the Forestry Act, which is the same definition and density threshold referenced in the Natural Heritage Reference Manual (MNR 2010). This is

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				Valley, and there is a large NHS east and north of the existing quarry operation that consists of the Mount Nemo Plateau. Creating an arm of the NHS to/through a golf course and active quarry operation does not add to the resiliency of the NHS. Improving the resiliency should be identified in those larger, contiguous features that provide greater connection opportunities.	RNHS is justified in this location as it was created to maintain connection through the landscape after landuse change. However, the quarry will not provide any connection, and the Regional NHS will become critical for linkage in the future. The RNHS in this area provides a connection between the woodland to the north of the golf course and the Escarpment to the south that is not provided by other connections. The RNHS was delineated to maintain connections to smaller features to ensure there is no gradual attrition of features as development proceeds. The golf course does provide some connectivity through the landscape, which was enhanced by the presence of the woodlots.	how this area was identified and defined in the NETR 2020. The Burlington Extension is located outside of the Protected Countryside of the Greenbelt Natural Heritage System; furthermore, woodland identification and assessment are determined whether the area is within one of two identified geographic areas, divided to account for forest cover differences: either the North Area or the South Area. The Burlington Extension happens to be located outside of either of these two identified geographic areas. Therefore, the more conservative assessment (South Area) was applied to this review. Polygon E would now be considered contiguous with, and a part of, significant woodland polygon D. This is due to the canopy coverage and the proximity to an adjacent woodland: polygon E contains >60% canopy cover and therefore meets the woodland definition referenced in the Technical Report (the Forestry Act definition does not apply in this assessment approach). Regarding its proximity to polygon D, the dripline of polygon E is approximately 16 m at its closest point of its western edge from the dripline of polygon D. It is approximately 18 m at its closest point from polygon D at its eastern edge. The remaining section of dripline between the two ends of the feature is >20 m from the dripline of polygon D. The average gap width between the two polygon driplines is >20 m. Based on the ELC canopy cover and the proximity between polygons E and D, polygon E is now identified as significant woodland. Aggregate development is prohibited within a significant woodland, and therefore, this area has been removed from the Limit of Extraction. The site plans have been revised to reflect the removal of polygon E from the Limit of Extraction.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
						Polygons F and G also have been assessed using the South Area criteria of the Technical Report. Neither of these two polygons meet any of the criteria for woodland significance: Size: Polygons F and G are each less than 4 ha (0.31 ha and 0.54 ha, respectively as per staked dripline data collected on Dec. 3, 2021); Natural Composition, Age or Tree Size and Proximity are not applicable due to each of the polygons being less than 1 ha; Rarity: polygon F is too small (<0.5 ha) to apply this criterium; polygon G is >0.5 ha and therefore this criterium has been assessed. Polygon G does not contain any of the following: a provincially rare treed vegetation community, a provincially rare woodland plant species nor a species with a Southern Ontario Coefficient of Conservatism rank of 8, 9 or 10. Therefore, both polygons F and G are not significant woodlands, and therefore do not require any changes to the impact assessment or to the Limit of Extraction. The site plans do not require any revisions with regards to polygons F or G. NDMNRF considers this issue addressed. Please also see response to comment #2.
29.	The function of woodlands E and F, particularly as stepping stones that link Woodland D to adjacent features, should be discussed. This is particularly important for Woodland E, which appears to be less than 20.0 metres from Woodland D on the basis of on-line aerial photography, and would therefore meet the criterion for inclusion as a continuous part of woodland D, as stated in Section 6.2.1 (last paragraph on page 50). Since Woodland E meets the criteria for Significant Wildlife Habitat, its contributing function to Woodland D should be assessed.	General	North-South Environmental Inc.	Section 6.2.1 of the NETR (2020) includes the information that wooded features were considered a contiguous unit if they were <20 m apart. On-site surveys determined that wooded feature E is >20 m from Woodland D and, therefore, is not included as a contiguous part of Woodland D. Not only is wooded feature E <0.5 ha and >20 m from another wooded feature, it is a highly disturbed area that has no understory development due to golf course maintenance, and the ground cover consists of turf grass or sparse cover of Garlic Mustard, Herb Robert and exposed soil. It also includes paved golf cart paths throughout. Full details have been provided in Table 2 of the NETR (2020).	We understand that the individual woodland E may be degraded. However, we continue to dispute that it is more than 20 m from the adjacent woodland D. Measurement of the separation of the two woodlands on 24th November indicated that the separation is 17 m. As noted in Comment 28, the close proximity of the woodland means their functions would complement each other. Similarly, Woodland F is actually connected to Woodland M via a strip of woodland approximately 14 m wide, which is interrupted only by a small cart path. These woodlands would have many functions in common, particularly related to bird habitat - it is likely that	Please see response to comment #28. As was observed during the dripline staking site visit on December 3, 2021, a hedgerow is located between Wooded areas F and M. Wooded area F is also very small (0.31 ha), as staked in the field. This area is too small to be evaluated for significance and therefore is not a key feature of the NHS.

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					all woodlands would be incorporated into one area of habitat, though it may be that woodland D is the core area of the habitat. The linkage provided by these woodlands through a golf course (which in itself provides more connectivity than a quarry), would be more functional than a quarry.	
30.	There is almost no discussion of impacts other than surface water on Woodland D: the area of woodlands that will be retained between the existing quarry and the western extension. This area will become fragmented as it will be surrounded by existing and proposed quarry land. There is a strong north-south emphasis in the Regional Natural Heritage System through the extension lands, and this linkage will be eliminated throughout the extraction. The phasing of the extraction and the placement of the infiltration pond do not mitigate fragmentation. In addition, a note on the Operational Plan regarding the western edge of the existing quarry states that this edge is "subject to separate Site Plan Amendment to reduce setback to 0 m", which would isolate the woodland completely. Clarity is required to describe exactly what changes are proposed to the existing plan, when they will occur, and to assess the cumulative impacts of the increased setback and the extension.	General	North-South Environmental Inc.	Please see attached Wetland Characterization Summaries for details on Wetland 13200. The proposed Extension Areas are sited within an active golf course and agricultural area. There is a Regional and Provincial NHS that does run north- south; however, the area of the proposed expansion does not appear to negatively affect the redundancy of these smaller branches of the RNHS. The major areas of the NHS run along the Medad Valley, which is west of the proposed West Extension, as well as along the Mount Nemo Plateau and Grindstone Creek Complex, located east of the proposed South Extension. The proposed Extension areas are located between these two RNHS branches and are not impeding or removing any of the features that make up these two branches; the Extension areas are well outside of these two large systems. Based on the Region's NHS mapping, there are some smaller systems that lie parallel to, and between, these two major systems; however, these smaller systems do not connect to the larger NHS, north of the Study Area. These smaller branches of the overall NHS do not provide connectivity to begin	The branch of the NHS in this area provides more than simple redundancy. The NHS provided connection between the woodland to the north of Colling Road, and then through the golf course south to the Escarpment in the vicinity of Kerncliffe Park. While golf courses and agricultural land provide somewhat interrupted linkage, they are better than a quarry, which lacks even the cover provided by crops, hedgerows and "rough" areas because bare rock is inimical to wildlife movement. In addition Woodland D is proposed for retention as a significant feature. In order to ensure its continued function it needs to be connected to the adjacent features in the landscape, which is the function that the NHS served here. This significant woodland will lose functions if it is separated from the surrounding landscape. Having seen the woodlands in question during the site visit we continue to contend that Woodland D should be connected to other features within the NHS. Woodland E has less understory, it is true, but it is dominated by native tree species and the canopy closure is sufficient to define it as a woodland. It has been identified as having several functions typical of woodlands (it harbours bat maternity roost habitat and species of Conservation Concern). Herb-Robert,	Please see responses to comments #2 and #28.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				with, and therefore, the removal or disturbance of golf course features and their potential for enhancement and future connectivity opportunities can only add to the limited contribution being made to the smaller NHS.	noted in the understory and discussed in the report as an indicator of disturbance, is noted as a native species by NHIC and VASCAN. It is likely that the understory would re-establish itself within two to three years if the mowing of the understory were to cease. The landscape through the golf course is currently well-connected, and this connection will be severed during and after the proposed extraction.	

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
31.	Fragmentation will in effect create a literal island with no physical connection. Impacts of fragmentation should be described, and appropriate mitigation proposed so sufficient corridors are provided to allow movement of wildlife. Provincial and Regional policies require that the test of no negative impact be met. These two policies will not be met if there is no physical linkage/connection with the woodland to the south. According to the Niagara Escarpment Plan, diversity and connectivity between key natural heritage features must be maintained and/or enhanced. The Regional Official Plan Guidelines' Aggregate Resources Reference Manual also notes that it should be demonstrated that the long-term ecological function and biodiversity of the natural heritage system can be maintained, restored or where possible improved. While the rehabilitation plan shows that the southern linkage will be restored in the final rehabilitation plan, the time frame to restoring this linkage is unclear. Section 4 of the Final Rehabilitation and Monitoring Study (page 14) appears to indicate that it could be more than 30 years before this linkage is restored.	General	North-South Environmental Inc.	The proposed Extension Areas are sited within an active golf course and agricultural area. There is a Regional and Provincial NHS that does run north- south; however, the area of the proposed expansion does not appear to negatively affect the redundancy of these smaller branches of the RNHS. The major areas of the NHS run along the Medad Valley, which is outside and west of the proposed West Extension, as well as along the Mount Nemo Plateau and Grindstone Creek Complex, located outside and east of the proposed South Extension. The proposed Extension areas are located between these two RNHS branches and are not impeding or removing any of the features that make up these two branches; the Extension areas are well outside of these two large systems. Based on the Region's NHS mapping, there are some smaller systems that lie parallel to, and between, these two major systems; however, these smaller systems do not connect to the larger NHS, north of the Study Area. These smaller branches of the overall NHS do not provide connectivity to begin with, and therefore, the removal or disturbance of golf course features and their potential for enhancement and future connectivity opportunities can only add to the limited contribution being made to the smaller NHS. In addition, the Rehabilitation Plan has been revised (and provided to JART) to include additional area and create a connection between the two features.	see response to # 30. The features that are being maintained are significant woodlands, and as such are key features which need to be connected. There is no connection shown in the AMP. The severing of these features from the surrounding area will mean the impacts to the features from the quarry will persist for many years. Woodland D is presently well-connected through the eastern edge of the golf course and the lower quality woodland E enhances this connection. To some extent, woodland F also enhances the connection as it, and the hedgerows and remnant woodlands along the eastern edge of the golf course, are part of the connected system that would allow movement of animals and plants between the Niagara Escarpment and the smaller woodland north of Colling Road. It is understood that the Rehabilitation Plan has been revised to provide a connection to the south. However, we are concerned that the connection is too narrow, and the slopes on each side of the connection too steep, to provide an effective connection between the woodlands and the landscape to the south. In addition, the connection is still severed to the north of Woodland D, removing the NHS connection for the woodland to the north of Colling Road.	Please see responses to comments #2 and #28.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
32.	Exposure to wind and high light levels in Woodland D will likely increase. The population of Large Toothwort (Cardamine maxima), a Provincially rare plant species with a status of S3, is particularly adapted to cool, moist, sheltered forests and would likely be affected by the increase in exposure as it is on the eastern side of Woodland D. The two wetlands within Woodland D that are collectively numbered 13200 (the wetlands between the existing quarry and western extension, which will become physically isolated) are discussed only to say that since the catchment will be removed, mitigation such as discharge of quarry water will have to be used to maintain these wetlands. There should be further discussion of impacts, including isolation, fragmentation of surrounding habitat, noise, drying winds and light, etc., in addition to impacts of pumping quarry water.	General	North-South Environmental Inc.	As summarized in section 6.2.1, woodland D is relatively isolated and located on the golf course, adjacent to the existing quarry. While a portion of this woodland is native, the cultural woodland area is non-native, with an abundance of Black Locust, an undesirable tree species, and the FOD5/DIST area contains only a canopy layer, along with turf grass and paved golf cart paths in the ground layer (sub- canopy and understory vegetation are absent). This feature is highly disturbed. Both the catchment area and corridor will be re-established as part of the Rehabilitation Plan. There is high potential to enhance this woodland both in species diversity and composition. The proposed rehabilitation plans will create a system that is better connected and functional than what currently exists in the golf course and adjacent quarry. If there are additional specific mitigation measures, please provide them for Nelson's consideration for inclusion in the AMP.	See response to #30 above. This comment specifically asked about other mitigation measures that will be used for impacts on the wetlands within these woodland patches. As the comment stated, there should be further discussion of impacts in addition to changes in hydroperiod caused by reduction in the catchments, including isolation, fragmentation of surrounding habitat, noise, drying winds and light, etc., in addition to impacts of pumping quarry water. During the site visit on 24th November, it could be seen that Woodland D is of higher quality than this response implies. The patches are separated by fairways, but the report of their function indicates they are highly connected. The timelines for the restoration between the patches should be fully described. Connections to the NHS should be maintained throughout the life of the quarry, not only following extraction. It is not clear when these connections will be re-established. The timelines for re-establishing the connections to the NHS, and for restoring the connections between the woodlands and wetlands that make up Woodland D, should be described. We would like to review the proposed restoration.	Please see responses to comments #2 and #28 with regard to potential impacts such as isolation and fragmentation. Woodland D is located in an area where it is immediately adjacent to an actively operated quarry along the entirety of its east side and golf course maintenance and activity immediately adjacent to the north, south and west of it. Therefore, the existing conditions already expose Woodland D to noise, wind exposure and/or light (i.e., quarry blasting and operation activities, human activity and movement, regular maintenance, etc.) The proposed setbacks to the Limit of Extraction, the phased operation approach, along with the progressive rehabilitation process all ensure that Woodland D will not be negatively impacted by the quarry extension.
33.	The discussion of wetlands should include Wetland 13203, which is the only wetland identified that provides Significant Wildlife Habitat for breeding amphibians, as well as habitat for painted turtle.	General	North-South Environmental Inc.	Wetland 13203 was evaluated by MNRF and determined to be non-significant and is also reliant on pumping from the existing quarry. Full details are provided in the Wetland Characterization Summaries.	Wetland 13203 may be non-significant in the provincial context but appears to have significance in the Regional context. The significance in Regional context should be described and analysed. We understand that it is proposed to provide additional water to this pond from a sump on the Southern Extension. At the time of the site visit the amount of water was uncertain, but was thought to be in the order of 50L/sec. We are concerned that this amount would overwhelm the pond's function to provide amphibian habitat or turtle overwintering habitat, as it	Similar to that of wetland 13200, the Erosion and Sedimentation Control (ESC) Plan is generally intended to mitigate for potential impacts from quarry construction, operations and rehabilitation activities. This ESC Plan will include incorporation of the following elements to ensure avoiding impacts to any watercourse or wetland habitats. Specifically, pumping from existing sump 0100 will mitigate for any potential hydrological impacts (i.e., hydroperiod) to wetland 13200. Should this feature require pumping from sump 0100 (data collection is on-going), the design will

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					would push water through the pond so fast that the substrate may erode, and any amphibian eggs in the pond would be flushed out. The function of this pond and its significance in a Regional context should be considered when finalization the sump outlet.	include a riprap/apron discharge mat to disperse the flow. Regular monitoring and inspection during pumping discharge will occur and be documented and provided on a regular basis. These measures, committed to with the NDMNRF for pumping to wetland 13200, will also be committed to when pumping to wetland 13203.
34.	There is no discussion of potential cumulative impacts of the existing quarry and the extensions (only a very brief mention of cumulative impacts).	General	North-South Environmental Inc.	See response to Comment 13.	The response to comment 13 takes into consideration only the aquatic aspects of cumulative impacts. Please address this in terms of terrestrial ecological impacts. CH has asked for information that would inform this response.	The amount and extent of natural features within the Limit of Extraction is relatively minimal, considering both the immediately adjacent natural heritage features and the natural heritage features found on the larger landscape (i.e., the Medad Valley and the Mount Nemo Plateau). Wooded area E is now being retained and considered contiguous with Woodland D; therefore, the removal of features (Wooded features F and G) has been reduced to a total of 0.85 ha, 0.31 ha and 0.54 ha, respectively. Wooded feature F is confirmed SWH for bat maternity colony, and wooded feature G is also confirmed SWH for bat maternity colony, as well as confirmed SWH for Eastern Wood-pewee habitat. One singing male was heard during the first round of breeding bird surveys. The adjacent and surrounding landscape is large enough to support the breeding habitat needed by the Eastern Wood-pewee. With regard to bat habitat, and as discussed in other comments in this table for this habitat type (albeit our discussions with MECP were in regards to SAR bats), the adjacent and surrounding landscape is suitable and large enough to support bat species. Therefore, the relatively minimal removal of habitat, which will occur outside of the active season of either wildlife type (tree removal will only occur between December 1 and March 14), will not negatively affect Eastern Wood-pewee or bat maternity colony – individuals or

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						habitat. Also, as explained in comment #2, Woodland D will remain connected to the landscape throughout the extraction phasing, and active, progressive rehabilitation also will be taking place throughout the extraction process. Therefore, connectivity and rehabilitation will ensure that movement and linkage impacts will not occur. Another consideration regarding cumulative impacts is that the existing haul routes will continue to be used; there will be no increase in truck traffic and no increase or change in the haul route. This will all remain consistent with current conditions.
35.	Discussion of mitigation is incomplete: there should be a discussion about the mitigation of impacts in the short term (in addition to impacts related to erosion and sediment control) as extraction progresses (as required by the Aggregate Resources References Manual) – impacts of the quarry will not be addressed by the rehabilitation for many years.	General	North-South Environmental Inc.	Additional mitigation discussion is provided in the Wetland Characterization Summaries and AMP.	Comments on wetland characterization summaries: results from previous investigations for SWH and significant species should have been included, as this would provide information critical to determining the ecological function of the wetlands and ponds in the southern extension. Summaries of the ecological function would inform the mitigation for water balance impacts. We note that wetland 13015 has been omitted. This wetland met the qualifications for SWH in the previous studies in 2015 (it supported Spotted Salamander, an indicator species of SWH) so it should have been included in the analysis. It is unclear whether there would likely be impacts on this wetland's hydroperiod, and what mitigation is proposed for this wetland.	Please see response to comment #24.
36.	Mitigation should include a discussion of Wetland 13203.	General	North-South EnvironmentalInc.	Full details are provided in the Wetland Characterization Summaries.	Discussion of the observation of a Painted Turtle was omitted from this Wetland Characterization Summary. In addition, we understand from discussions with the study team during the November 24th site visit that Snapping Turtle was observed in this pond. The timing of the observations should be provided. If turtles were observed in this pond in early spring, they were likely overwintering in the	Please see responses to comment #26 and #44.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					pond. As noted for comment 33, we have concerns about the proposal to discharge water from dewatering the West Extension into this pond, as it would likely impair the function of the pond to support breeding amphibians or overwintering turtles.	
37.	All studies should be coordinated and integrated. In particular, the findings of the Hydrogeologic and Hydrologic Impact Assessment, Surface Water Assessment and Level 1 and 2 Natural Environment Technical Report should inform each other and should be reviewed for consistency	General	Conservation Halton	The water resources and natural environment team worked very closely on the assessment of the application. To assist the agencies the attached wetland and watercourse characterization summary tables have been prepared to integrate all of the findings from the various technical reports. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations.	The wetland characterization summaries only provide an annual water budget analysis, and the impact assessment and mitigation sections do not include the requested ecological interpretation for existing (as per the TOR with proposed 25-year baseline), interim (for each identified extraction phase) and both post extraction scenarios (rehabilitation scenario 1 and rehabilitation scenario 2). Please revise, present, and summarize daily water balance analyses as average monthly water volumes in tabular format, showing existing, interim and post extraction (as outlined above) with and without mitigation to establish and confirm seasonal variations and include an ecological interpretation of the results. This will set targets/thresholds required to ensure no negative impacts. The watercourse characterization summaries only provide groundwater interactions and proposed reductions, however, do not include surface water flow analysis, impact assessment or mitigation sections for existing, interim and post extraction scenarios (as outlined above). Update to integrate surface water analysis, revise to present and summarize with and without mitigation to establish seasonal variations and include ecological interpretation of the results. This will set targets/thresholds required to ensure no negative impacts. DFO guidance and conditions should be included within the watercourse summaries to ensure all appropriate	All wetlands that could be impacted have been addressed in the updated AMP. The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					mitigation measures are being included as part of the AMP and ensure there will be no negative impacts on the watercourse form and function for existing, interim and post extraction scenarios (as outlined above).	
38.	Not all of the natural heritage features that have the potential to be impacted are identified in the report. For example: • PSWs that are within the zone of influence of the proposed quarry but outside of the 120.0 metres adjacent lands are discussed only at a high level, though potential exists for impact as noted in the Hydrogeological and Hydrological Impact Assessment Report and the Surface Water Assessment. • Significant Wildlife Habitat (SWH) discussions did not include all of the identified SWH in the study area (e.g., FOD7-4, seeps and springs, amphibian movement corridors, etc.). • The extent of fish habitat on the site and within the zone of influence should be confirmed by DFO. • Connectivity across the landscape should be considered in more broader terms. Recommend revising the report to discuss all of the natural features that have the potential to be impacted by the proposed quarry and mitigation measures developed as appropriate.	General	Conservation Halton	Wetland Characterization Summaries provide further details. The FOD7-4 and seeps and springs are discussed in more detail in this submission. The amphibian movement corridor will remain untouched. No direct impacts are anticipated due to its location outside of the Study Area at the far edge of the 120 m adjacent lands. Potential hydrological impacts and associated mitigation measures are provided in detail in the Wetland Characterization Summaries – wetland 13203 – appended to this response submission. DFO has confirmed in its letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat. Connectivity across the landscape and the natural heritage system has been previously addressed in this submission.	Not addressed. Regarding PSWs within the zone of influence but outside the 120 m adjacent lands, see Comment No. 37 above. Not addressed. Include all candidate and confirmed Significant Wildlife Habitat within the wetland and watercourse characterization summaries to determine potential impacts and provide mitigation measures. Partially addressed. The direct and indirect impacts on fish and fish habitat downstream of the ponds (within the zone of influence) during and post extraction will need to be confirmed by DFO and appropriate mitigation measures provided to ensure there is no negative impact. Not addressed. It is unclear where connectivity across the landscape has been addressed.	Please see responses to comments #91 (wetlands), #26, #101 and #124 (SWH), updated site plans and #2 and #28 regarding connectivity. The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
39.	Please include a more detailed discussion on net gain as per Halton Region's Aggregate Resources Reference Manual. Currently direction is to refer to the Site Plan and AMP, which does not give enough detail to ensure that net gain is achieved.	General	Conservation Halton	Limited natural heritage features are proposed for removal and substantial natural heritage features are proposed for creation and enhancement. For example, woodland cover will have a net gain of 28 ha. Wetland cover will have a net gain of 3.6 ha. The native diversity and composition of habitat will increase greatly from that which is golf course and agriculture. We disagree that the site plans do not provide sufficient detail for the creation of these habitats. In addition, MNRF has to be satisfied that these habitats are created prior to the surrender of the license.	Recommend including net gain discussion and summary table within report to demonstrate this.	These details have been reviewed and updated with the NDMNRF and have been further updated on the site plans.
40.	Savanta states: "An assessment of the quality and extent of natural heritage features found on, and adjacent to, the Subject Lands and the potential impacts to these features from the proposed aggregate application will be undertaken in association with the following legislation and policies." It should be clear that the significance of each feature will be evaluated according to the criteria provided by the Province and Region. Two pieces of legislation should be added to the list of policy and legislation in this section: • the *Migratory Birds Convention Act* and • *Fish and Wildlife Conservation Act*.	Section 2.1. Natural Heritage Policy Overview	North-South Environmental Inc.	Comment noted.		No further response required.
41.	Recommend expanding the applicable PPS policies to include those in the Policy 2.2 Water, given that some of these speak to natural heritage features and areas, and the connection to the water system.	Page 9 Section 2.1.1. Provincial Policy Statement	Conservation Halton	See response to Comment 10.	While it is appreciated that this section of the PPS is indirectly covered in various sections, the review agencies are requesting that a specific section be provided to discuss Policy 2.2 of the PPS in the Natural Environment Technical Report. CH also concurs with NEC's response to Comment No. 10 above.	Please see response to comment #10.
42.	Policy 110 (7.2) should be specifically discussed in this section, as it addresses the requirement for a systems-based approach to the assessment of impacts as follows: "In accordance with Section 118(3)d), apply the following systems based approach in the assessment of the impact of a new or expanded mineral aggregate operation on the Region's Natural Heritage System…"	Section 2.1.3. Halton Regional Official Plan	North-South Environmental Inc.	Policy 110 (7.2) has been considered in the preparation of the rehabilitation plan which outlines the short-, medium- and long- term natural heritage features that will be created to enhance the Regional Natural Heritage System compared to existing conditions. The NETR report addresses how the Regional Natural Heritage System will be enhanced both in terms of size, diversity and function. The detailed policy analysis is included in the Planning Report.	Notwithstanding this, we would like to see an analysis that specifically refers and responds to Policy 110 (7.2). The timelines for "short, medium and long-term" should be estimated.	Please see proposed Burlington Quarry Extension site plans. The site plans include the timing requirements for the ecological enhancements. As Nelson has noted, the South Extension will be completed within 10 years and the West Extension will be completed within 20 years of extraction commencing. As noted on the site plans, some elements are required prior to extraction and other features are created during progressive

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						and final rehabilitation. Based on the timelines for the proposed quarry from an ecological perspective, these enhancements would be considered both short and medium term enhancements.
43.	The paragraph in Savanta's report in Section 2.1.6 indicates the following: "Some projects may be eligible for exemption from the DFO review process, as specified under Step 3 of the DFO Fish and Fish Habitat Protection Program review process (DFO 2019b; e.g., artificial waterbodies with no hydrological connection to occupied fish habitat)." In the Fish Habitat Discussion section in 7.2.4, it is mentioned that "There is no direct or indirect fish habitat within the proposed Limit of Extraction within either the South or West Extension areas. Therefore, no direct encroachment into any watercourse providing fish habitat will occur and no direct impacts on fish habitat are anticipated within the Limit of Extraction, during any phase of the Project." Since there is a hydrological connection by way of the outflows to direct and indirect habitat, it would seem that the irrigation ponds within the golf course have been ruled out as not fish habitat. This would suggest that the *Fisheries Act* does not apply to harmful alterations to these ponds. Unless the ponds are self-contained, pollutants could potentially be released into the discharges flowing out of these ponds to direct and indirect fish habitat. It is unclear how the irrigation ponds would not be considered fish habitat if they are hydrologically connected to fisheries habitat and impacts from alterations to these ponds could have a downstream impact.	Section 2.1.6. Federal *Fisheries Act*	Matrix Solutions Inc.	DFO has confirmed in letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	An opinion from the DFO Reviewer was expressed in an email containing the Letter of Advice. This opinion does not seem to tie back to the definition of what is fish habitat, particularly as there is an outflow to fish bearing waters that are affected by quarry activities. Wording in the letter appears to be implied that the waters internal to the quarry are of no concern to DFO providing that the outflows do not impact fish habitat immediately downstream of the quarry.	As previously noted in our original response, DFO has confirmed in their email of June 23, 2021, that they do not consider the drainage features on the golf course to be fish habitat. As the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
44.	The background data collection should have included Citizen Science databases such as eBird and iNaturalist. The report notes that in the NHIC background search, four 1.0 square kilometre "squares" were examined. In fact, six squares are needed to encompass the site: 17NJ 8805, 8905, 9005, 9105, 9104 and 9004. If the search is broadened to include the immediately surrounding habitat (as is the usual approach), approximately 12 squares should have been selected. This larger study area is justified because the locations of significant species are often not known exactly, and many wildlife species are mobile enough to roam more widely within the landscape than where they were reported. This section should be summarized by a more inclusive table listing all the SAR that have been noted by an extensive review of background sources in the general area, with their habitat requirements. This should have directed Savanta's survey methodology and focus. In addition, several Species at Risk were left out of the analysis. The following additional species, noted in the two Ontario Reptile and Amphibian Atlas squares that encompass the site, were omitted from the sources mentioned: Ontario Herpetofaunal Atlas: • Western Chorus Frog (latest record 2019) – Threatened Federally, Not at Risk Provincially. • Blanding's Turtle (latest record 2017) – Threatened Provincially and Federally • Midland Painted Turtle (latest record 2018) – Special Concern Federally • Map Turtle (latest record 2018) – Special Concern Provincially and Federally • Milksnake (latest record 2019) – Special Concern Federally, Not At Risk Provincially.	Section 2.2. Background Data Collection	North-South Environmental Inc.	Both e-Bird and iNaturalist sources are considered citizen science databases that collect, archive and share species observations. As the observations and identifications can be submitted by anyone, and the records are not officially vetted, the data obtained from these tools should not be used as a clear indicator of species presence. Species may be filtered out based on habitat and targeted survey efforts. The following SAR were identified in the citizen science databases: Bald Eagle (special concern – eBird observation near the cliffs of the escarpment near Mount Nemo; preferred habitat absent within Study Area) Barn Swallow (threatened – eBird observation, as well as a confirmed observation within the Study Area and discussed in the NETR 2020) Golden Eagle (endangered – eBird observation near the cliffs of the escarpment near Mount Nemo; preferred habitat absent within Study Area) Blanding's Turtle (threatened – iNaturalist observation 3.5 km from Study Area; preferred habitat absent within Study Area) - Northern Map Turtle (special concern – iNaturalist observation within 1 km of Study Area; preferred habitat and food source absent within Study Area) American White Pelican (threatened – iNaturalist observation within 1 km of Study Area; preferred habitat absent within Study Area. Species range limited to Northern Ontario; observation likely a migrant) Lilliput mussel (threatened – iNaturalist observation within 1 km of Study Area; preferred habitat and host fish species absent within Study Area) Based on the habitat assessments and field survey program discussed in the 2020 NETR, the conclusions remain unchanged.	Response accepted with regard to eBird and iNaturalist sources, however there were, as noted, significant omissions from the Ontario Herpetofaunal Atlas. These should be addressed. Wetland 13203 supports Painted Turtle and Snapping Turtle, and it should have been investigated for Blanding's Turtle as well. It is understood that Blanding's Turtle surveys were conducted in 2021. We would like clarification on whether Wetland 13203 was included and whether the surveys were conducted in early spring. We would like the opportunity to review the additional survey results.	Please see response to comment #26. As noted in the NETR (2020), the Painted Turtle was observed on April 22, 2019 at wetland 13203 (BS6). One individual does not meet the criteria for SWH (minimum five individuals observed at one survey). Also noted in the NETR (2020), the Snapping Turtle was observed on June 11, 2019 at BS3, on the West Extension golf course turf between the golf course irrigation ponds. This date is considered too late to confirm overwintering habitat. In addition, the irrigation ponds are highly managed with water input and levels reliant on the diversion of water at the Weir Pond, which is dependent on the pumping from the existing quarry. The irrigation ponds are not considered suitable habitat for this species.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
45.	This section provides a listing of the natural features within the defined Study Area and the Broader Landscape. The first paragraph in this section states that Savanta has relied, in part, on supporting background information from government agencies and previous site surveys/investigations to provide additional insight into the overall character of these Subject Lands. The second paragraph describes how Savanta was involved in the previous application and states that "given the period of time that has passed, changes in policies and the changes in both the footprint and field conditions, we have not relied on it but have considered the field data and information obtained during that process to enhance the background data collection review and establishment of the field program." The lack of reference to previous historical work from 2004 and 2006 limits the understanding of the fisheries context regarding quarry operations and surrounding fish habitat. The next sections describing the fish habitat in the 2020 NETR are therefore very limited, whereas the fisheries information from the previous work by Stantec is extensive.	Section 2.2. Background Data Collection	Matrix Solutions Inc.	Comments on fish habitat have been discussed extensively above. DFO is the regulatory agency responsible for fish habitat and issued a letter of advice dated June 23, 2021. Nelson will implement the recommendations of DFO to protect fish habitat. More details are provided in the attached Watercourse Characterization Summaries. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations.	Yes, consider previous comments made above.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.
46.	Features on or within the Study Area (bottom of Page 15 and top of page 16) should have included a discussion of the Mount Nemo Plateau. This is a landscape feature that is not mapped per se as an ecological feature – however, it has been identified as an important area for wildlife connectivity and it was identified as a significant recharge zone by the previous study team. Previous findings of groundwater connection with the wetlands in the previous hearing should be addressed.	Section 2.2.1. Natural Features Desktop Summary	North-South Environmental Inc.	The function of the Mount Nemo Plateau as a recharge function is addressed in the water resources report and discussion regarding the important areas for wildlife connectivity on the Mount Nemo Plateau are discussed above.	The comment referred to the Mount Nemo Plateau as an ecological feature, for wildlife connectivity. This should be discussed as well. The second part of this comments is not addressed. There are significant doubts that should be addressed about the groundwater findings regarding connections with wetlands. The infiltration pond has been proposed as mitigation for potential reduction in seepage within the Medad Valley at the edge of the Mount Nemo Plateau. It has also been proposed to discharge to the wetland north of Sideroad 2, at the south end of the Western Extension. However, at the meeting of experts on 21st October, 2021, when the efficacy of the infiltration pond (to provide infiltration) was questioned by JART groundwater experts, Nelson's response was that the infiltration pond had been proposed to	Through discussions with MNDMNRF, a revision to the integrated model was completed and remodeling of the effects of the mitigation from the proposed infiltration pond has been being completed by Earth FX. See attached **Tab 3** for a copy of the presentation and technical memo prepared by Earthfx.. In addition, GEI prepared an updated memo regarding the Medad Valley which confirms with the mitigation and monitoring proposed that there will be no negative impact to the ecological features and functions within the Medad Valley PSW and ANSI. See attached **Tab 5**.

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					replace the golf course ponds as an amenity, and that it was not required. The function of the infiltration pond should be clarified.	
47.	Discussion of the fisheries context is found in Section 2.2.9 Conservation Halton Long-Term Environmental Monitoring Program Data, where characterization of the Grindstone Creek Watershed and Bronte Creek Watershed from Conservation Halton in 2002 was used to describe fish habitat. The fish habitat character from 2002 and fish species data in 2012 provided in this section from Conservation Halton provides a very limited background information despite the wealth of more detailed fisheries information contained in historical reports, which provide an indication of baseline conditions. This section confirms no fish community sampling is known to have been conducted in the unnamed tributary of Willoughby Creek downstream from the Subject Lands. Furthermore, no fish sampling has been completed on the West Branch of the Mount Nemo Tributary of Grindstone Creek. The Mount Nemo Tributary has been characterized as intermittent.	Section 2.2.9. Conservation Halton Long-Term Environmental Monitoring Program Data	Matrix Solutions Inc.	See previous responses regarding fish habitat. Contrary to this comment, as described in NETR Section 5.3.2, starting on Page 43, fish community sampling was completed on the West Arm of the West Branch of the Mount Nemo Tributary. The NETR also references the results of previous fish community surveys completed in the West Arm of the West Branch by Stantec as well as surveys by MNRF in the East Arm of the West Branch.	This comment refers to the approach used in the earlier historical reports as being more extensive in coverage as it also covers areas greater than 120m from the quarry footprint. It is important to understand the effects beyond the quarry footprint as the applicant states that the waterbodies within the footprint are not fish habitat. The fish data that are outside of the quarry footprint appear to be very limited and is dependent on previous work by others.	See response to comment # 17.
48.	This section should have included a description of the Ecoregion and Ecodistrict context of the site.	Section 3. Physiographic Conditions	North-South Environmental Inc.	Comment noted.	We reiterate that the ecoregion and ecodistrict context should be described. The mitigation that is required for potential cumulative impacts to the biophysical attributes of this area cannot be understood without this context.	Comment noted.
49.	In addition to considering individual Coefficients of Conservatism, Floristic Quality Analysis (FQA) should be included to provide an assessment of vegetation quality in each community as a whole.	Section 4. Field Investigations and Methods - Section 4.1.2	North-South Environmental Inc.	The NETR discusses plant species that have a high CC value and their associated communities. At this point, regarding FQA, it is our understanding that baseline values have not been established formally in Ontario (i.e., none that have been peer reviewed and published). Without formal baseline values, relative comparisons of communities are not reliable and would not add value to the current assessment and results. The NETR assesses floristic quality for the Study Area as a whole by using the CC values, and therefore, the vegetation data has been sufficiently assessed and applies appropriate	The FQA would provide an analysis of relative quality for communities on the site, and could provide an explanation for the contention, for example, that woodland D is of low quality. In addition, the comparative analysis may provide a better rationale than is provided currently for communities that are proposed to be removed. For example, during the site visit it appeared that Woodland D was of relatively high quality in relation to many vegetation communities in southern Ontario, and Woodland F appeared to be of similar quality.	Significant woodlands and wetlands are considered components of the NHS. The criteria for each of these component types were considered and assessed when evaluating the field data to determine significance. As explained in the original response to this comment, the approach using the CC values provides good context in the feature characterizations and the identification and evaluation methods are consistent with Regional policy.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				mitigation measures.		
50.	A sampling plot radius of 5.0 metres is smaller than that generally accepted for sampling of woodlands (e.g. the sampling method for determining whether there are enough trees with cavities to meet the threshold for bat maternity colony habitat is 12.0 metres). This small sampling radius could have influenced the assessment of Significant Woodlands, if the small radius was used in the smaller woodlands as noted. A description of how the location of sampling plots were selected should be provided. It would be easy to unconsciously select areas with fewer trees for sampling if plots were selected in the field.	Section 4. Field Investigations and Methods - Section 4.1.4	North-South Environmental Inc.	Woodland stem density surveys and bat maternity colony surveys have differing objectives and should not be compared with respect to plot size. The latter is targeting larger trees capable of supporting bat maternity roosts and therefore requires larger plots. Woodland stem density surveys target all trees measurable at DBH – since many of the trees observed in the 5m plot communities were small diameter, a smaller plot size was deemed appropriate. 5m radius plots were only used in two of the five vegetation communities assessed; the remaining three consisted of 10m radius (two communities) and 15m radius (one community). In these instances, rationale for using the 5m radius plots was based on size of the overall feature and visibility within the plot (i.e., polygon CUT1-1), and observed variability within the community (e.g., varying density of stems in the overall community, varying species, and/or varying maturity; i.e., polygon CUT1b). The issue of visibility, in this case, relates to density of shrub species, where an abundance of Staghorn Sumac, Common Buckthorn, and Multiflora Rose made it difficult to count stems reliably in larger plots. Since 10% community coverage was generally the target, it meant that smaller communities would require fewer large-diameter plots to achieve this target. For these two communities, only one 10m plot would be necessary to exceed that target. For polygon CUT1b, it was determined on site that a single plot appeared unlikely to sufficiently address the variability within the overall community.	Whether sampling for numbers of trees that represent bat habitat (which includes all trees over 10 cm), or sampling for numbers of trees that qualify a polygon as a woodland (which includes all trees), the sampling methods should be very similar, as they are both intended to provide an estimate of numbers for the whole polygon extrapolated from a smaller area. It continues to be our opinion that 5 m plots are too small to provide an accurate estimate of trees within the larger area, especially since the number of plots was not provided. It was noted during the field visit that Polygon G was quite heterogeneous, so larger plots would be more likely to provide an accurate estimate within this polygon. This is an important metric, as it is used to provide the justification for removal of this woodland unit, so the sampling should be rigorous. It was noted by NSE staff during the site visit that 5 m plots could potentially have under-estimated the stem density within polygon E, and potentially stem density could have been under-estimated within other polygons as well. It was understood through discussions during the field visit that a stem count was conducted of all trees within Polygon E, and this is considered more appropriate. We look forward to reviewing the results of the stem density counts in polygons E and G.	To ensure proper coverage and more accurate data, a smaller plot size (5 m radius) can be used. If smaller plots are used, then more plots are simply needed to ensure that suitable minimum coverage is achieved within the feature. Professional experience has shown that more coverage and better representation is determined when using smaller plots in smaller features or in features that are somewhat linear in shape. Smaller plots are also more beneficial for features with high stem density. When the plots are larger in high stem density features, there is a greater chance of missing or double counting the stems. Therefore smaller, but more, plots can provide more reliable results when assessing smaller features, linear features or those with high stem densities.

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				Determination of plot location consisted first of desktop imagery interpretation – selecting locations that appeared to capture community variability, which was then adjusted on site (if necessary) to ensure the pre-planned plots could be safely accessed and that any variability within the community was proportionately represented.		

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
51.	The golf course ponds should have been included in salamander surveys (Figure 4a, Appendix A) and aquatic turtle surveys. Though these are human-made, there is the potential that one or more of them may provide habitat for SAR, including Jefferson's Salamanders (The retained consultant has personally observed this and other Ambystoma species in human-made ponds). There is no detail on time or weather during amphibian, bird, turtle and snake surveys, to permit a full assessment of whether wildlife survey methods were appropriate. Appropriate weather conditions (generally relatively warm, with no precipitation and low winds) are essential for reptile, amphibian and bird surveys. Inappropriate weather conditions can lead to the false conclusion that the species is not present. Surveys did not conform to the MNRF protocols for Blanding's Turtle, for which five visits are required prior to June, in highly specific weather conditions.	Section 4.2. Wildlife Surveys	North-South Environmental Inc.	All potential salamander breeding habitat was assessed and trapped as required. Discussions with the MECP confirm that the golf course irrigation ponds are not habitat for Jefferson Salamander and did not need to be surveyed. We are continuing to work with MECP for all SAR related matters and are adhering to their survey recommendations and protocols. In addition to the general notes about weather conditions in the methodology section, full weather details are recorded for each survey and provided on the data sheets in Appendix C of the NETR. Blanding's Turtle survey effort was discussed with MECP and addressed in the MECP response letter after completing Blanding's Turtle surveys, as per MECP direction, in 2021. No Blanding's Turtle or its habitat were observed and are considered absent from the Study Area.	Please see response to comment 25. We reiterate that the golf course ponds are similar to human-made Jefferson Salamander breeding pond habitat that we have observed in other areas of southern Ontario. Response not accepted regarding timing and weather conditions of field visit. It is standard practice to provide a summary of field visit information for ease of review, and some of this information is obscured on the scanned data sheets. A full list of time and weather conditions for each site visit should be provided.	Please see response to comment #25.
52.	It is not clear that MNRF/MECP were involved in selection of sampling sites; only that they were consulted regarding survey protocols. This should be clarified. Conservation Halton should also have been consulted regarding survey locations and methods. As noted above, the retained consultant has had experience with Jefferson's Salamanders and other Ambystoma species use of human-made ponds, so golf course ponds should have been included in trapping.	Section 4.2.2. Salamander Habitat Assessment and Hydro-period Monitoring Methodology	North-South Environmental Inc.	All potential salamander breeding habitat was assessed and trapped as required. Discussions with the MECP confirm that the golf course irrigation ponds are not habitat for Jefferson Salamander and did not need to be surveyed. We are continuing to work with MECP for all SAR related matters and are adhering to their survey recommendations and protocols.	Following our site visit to the site on 24th November, we reiterate that the golf course ponds appear to be appropriate habitat for breeding salamanders, based on our experience with human-made salamander breeding ponds in southern Ontario (see comment 25).	Please see response to comment #51.
53.	It is not clear whether tail-tip samples were obtained for genetic testing.	Section 4.2.3. Salamander Minnow Trapping Survey Methodology	North-South Environmental Inc.	Table 6 includes full details of the 2019 trapping results. No salamanders were caught during the trapping surveys; therefore, no tail-tip samples were obtained.	Response accepted.	Resolved – thank you

54.	This section states: “Survey protocols were created in consideration of MNRF (2012) and Toronto Zoo (Caverhill et al. 2011) turtle survey methods.” This is imprecise language as it is unclear what “consideration” means: whether MNRF protocols were followed, or whether they were just given “consideration”. If a variation in the protocols was followed this must be fully described. Clear times and weather conditions for each visit have not been provided. The final paragraph in this section notes that turtle nesting surveys were not completed due to absence of suitable habitat. However, turtles are frequently observed to nest on lawns (personal experience of the author), and turtles frequently nest at long distances from their basking habitat. Turtle nesting surveys should have been conducted at the appropriate time of year. There is no indication that methods for surveying non-basking turtles were used. As noted above, Blanding’s Turtle (Threatened) have been noted within the Ontario Amphibian and Reptile Atlas “squares” in the vicinity of the site in addition to Midland Painted Turtle (Recently evaluated as Special Concern) and Snapping Turtle (Special Concern). Blanding’s Turtles bask less often than other turtle species, and must be surveyed particularly early in the year, in ideal weather conditions, as detailed by Blanding’s Turtle survey protocols (MNRF 2013).	Section 4.2.6. Turtle Basking Habitat and Nesting Surveys	North-South Environmental Inc.	In addition to the general notes about weather conditions in the methodology section, full weather details are recorded for each survey and provided on the data sheets in Appendix C of the NETR. The 2019 spring season had a cool and wet start, providing limited ‘ideal condition’ days for surveying for reptile species. Although reptile surveys do have ‘ideal condition’ temperatures and general condition guidelines, these are not always the set standard. Other considerations in determining suitable weather conditions include past weather patterns (i.e., weather leading up to the day of survey) and reptile behaviour in the local landscape (information obtained from the provincially recognized Reptile Course on Beausoleil Island, 2017). Turtle basking surveys are considered appropriate between ice-off and mid-June. Surveys should occur between 6 and 25 degrees during sunny or partly cloudy conditions and be above 15 degrees in fully cloudy, but not stormy, conditions. These conditions were all satisfied when completing the turtle basking surveys in 2019. One of the more important considerations when deciding to commence turtle basking surveys is to ensure that the air temperature is warmer than the water temperature, along with the previous and current weather conditions. April 22: Survey was completed in partial overcast/partially sunny conditions (with a mix of sun and cloud presence – cloud presence was the highest in the morning and decreasing into the afternoon) after a weekend with cool, rainy weather. The previous two days prior to the basking surveys included a partially sunny day, even with temperatures below 15 degrees Celsius, resulting in more active basking observations in the surrounding geographic area. Additionally, the air	We reiterate that a summary of details of weather and timing for each survey for review, as is standard practice. The above text omits several details of weather conditions at the date and time of the surveys. Weather and timing during the surveys are crucial details in determining whether the surveys were conducted appropriately. Blanding's Turtle protocols state that 5 surveys need to be completed in the earliest part of the season. The reason for this is that this species does not bask as much as other turtles, and does not bask as late. Additional turtle surveys should have been conducted in the early part of the season. We reiterate that the dates of the turtle surveys were not according to MNRF protocols for turtle basking surveys, which are focused on the early spring period just after they emerge from hibernation, and which we have found highly effective for detecting basking turtles. It appears that some of the surveys were conducted in cloudy conditions that also would not have been conducive to detecting basking turtles. It should be clarified which ponds were surveyed according to Blanding’s Turtle surveys in 2021, particularly whether these included surveys of the pond within Wetland 13203, the pond where Painted Turtle and Snapping Turtle were seen.	Please see responses to comment #26 and #44. Please also note that a Snapping Turtle was not observed at wetland 13203. As noted in the NETR (2020), the Snapping Turtle was observed on the West Extension at BS3 on the golf course turf grass between the irrigation ponds.

				temperature was higher than the water temperature, further supporting basking conditions. May 10: The two days prior to the survey were cool, and the day prior was rainy. The morning of May 10 was the warmest portion of the day (hovering at 17 degrees) with a mix of sun and cloud conditions. Additionally, the air temperature was higher than the water temperature, further supporting basking conditions. June 11: This survey date falls within the ice-off and mid-June timing window and meets the ideal conditions previously specified. Additionally, the wet and cool spring conditions in 2019 support an early June survey date due to a delayed spring season. The potential basking features that were surveyed are primarily characterized by open irrigation ponds that are mowed to the feature edge and provide limited basking opportunities, given the sloped edges, lack of basking habitat (e.g., rocks, logs) and open water conditions with no vegetation to create visual barriers from predators. The features are deep and generally hold water cooler than the air temperature. Based on the above, this SWH type is still considered absent. As indicated in section 4.2.6, suitable nesting micro- habitat characteristics included open, sunny areas of looser sand and gravel mineral soils adjacent to undisturbed shallow weedy areas of marsh habitat. Such habitat conditions were absent from the Study Area. Turtle nesting surveys were not completed due to absence of suitable habitat. Blanding's Turtle survey effort was discussed with MECP and addressed in the MECP response letter after completing Blanding's Turtle surveys, as per MECP direction, in 2021. No		

				Blanding's Turtle or its habitat were observed and are considered absent from the Study Area.		

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
55.	Times and weather conditions for snake surveys are important, but have not been provided for each survey. It is noted that visual encounter surveys were conducted on mild spring mornings, but the following sentence says they were conducted between 8:00 AM and 5:00 PM, which means not all were conducted in the morning. The first sentence notes that survey methods are based on MNRF species at risk protocols, but the final sentence on the first paragraph of this section notes that specific protocols were not applied as no threatened or endangered snakes have been recorded in the area based on the species desktop summary. Milksnake (a species of Federal Special Concern) has been recorded in this area by the Ontario Herpetofaunal Atlas, so the MNRF protocol for Milksnake surveys (which are often used to guide surveys for non-SAR species generally) could have been followed.	Section 4.2.7. Snake Habitat and Visual Encounter Methodology	North-South Environmental Inc.	In addition to the general notes about weather conditions in the methodology section, full weather details are recorded for each survey and provided on the data sheets in Appendix C of the NETR. The 2019 spring season had a cool and wet start, providing limited 'ideal condition' days for surveying for reptile species. Although reptile surveys do have 'ideal condition' temperatures and general condition guidelines, these are not always the set standard. Other considerations in determining suitable weather conditions include past weather patterns (i.e., weather leading up to the day of survey) and reptile behaviour in the local landscape (information obtained from the provincially recognized Reptile Course on Beausoleil Island, 2017). Snake visual encounter surveys are considered appropriate between April and September (though spring emergence is ideal between April and leaf- out). It is also recommended that surveys should occur between 10 and 30 degrees during sunny or partly cloudy conditions, and above 15 degrees in fully cloudy, but not stormy, conditions. These conditions were all satisfied when completing the visual encounter surveys in 2019. In addition to the weather condition parameters that are recommended during the survey, the weather conditions and pattern from the previous days leading up to the survey date are also of importance. April 22: Survey was completed in partial overcast/partially sunny conditions (with a mix of sun and cloud presence – cloud presence was the highest in the morning and decreasing into the afternoon) after a weekend with cool, rainy weather. The previous two days prior to the basking surveys included a partially sunny day, even with temperatures below 15	Please provide details of weather and timing for each survey for review, as is standard practice. Weather and timing are crucial data in determining whether the surveys were conducted appropriately. Surveys conducted in the wrong weather or timed to the wrong time of day may give false results, with snakes appearing to be absent when they are in fact present. The site appears suitable for Milksnakes, and without the details of survey weather and timing, the survey results cannot be reviewed appropriately.	See attached **Tab 4** for a copy of the Updated Table 1.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				degrees Celsius, resulting in more observations in the surrounding geographic area. Additionally, the majority of the snake surveys were completed in the afternoon with cloud cover between 40-60%, providing suitable sunny conditions. May 10: The two days prior to the survey were cool, and the day prior was rainy. The morning of May 10 was the warmest portion of the day (hovering at 17 degrees) with a mix of sun and cloud conditions, and the afternoon was mostly sunny. June 11: This survey was completed within the suitable timing window (April to leaf-out) and during suitable weather conditions. Due to the cool and delayed start of spring in 2019, leaf emergence occurred into early June. Based on the above, this SWH type is still considered absent.		
56.	It is stated that the MNRF Guidelines for Bobolink and Eastern Meadowlark point counts were followed. These guidelines state that 3 surveys should be conducted, in the early, mid and late season. A third survey date for these species is not listed.	Section 4.2.8. Breeding Bird Surveys	North-South Environmental Inc.	Historical communication with MNRF confirmed that two surveys are sufficient if the species was observed during survey rounds one or two. Bobolink was observed on the Camisle Golf Course, adjacent to the proposed South Extension; therefore, a third survey was not required due to confirming presence with first two rounds.	Response accepted.	Resolved – thank you

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
57.	It is noted in this section that survey methods targeted habitat for Little Brown Myotis, Northern Myotis and Tri-colored Bat, but that surveys were conducted in leaf-off condition, focusing on tree cavity assessment. However, surveys for Tri-colored bat habitat must be conducted in leaf-on condition, as Tri-colored Bats nest in leaf clusters.	Section 4.2.9. Bat Habitat Assessment Survey Methodology	North-South Environmental Inc.	As noted in section 4.2.9, survey methods applied for the 2019 bat habitat assessment surveys include a combination of protocols established by the MNRF (MNR 2011 and MNRF 2017), discussions with MECP and professional experience. Bat habitat survey guidance from the province has been in flux since the release of the MNR 2011 document due to the incorporation of on-going bat research, and therefore discussions with provincial authorities is the preferred approach to establishing survey methods. MECP guidance for assessing forest/woodland habitats for maternity roosting bats does not recommend surveys for leaf clusters. Tri-coloured Bats are known to prefer leaf clusters, with data showing a preference for dead leaf clusters in particular, though cavity and peeling bark roosts have also been identified as roosting habitat for this species. All FO/SW ELC communities (eight were identified) were considered potential habitat for SAR bats (tree cavities, peeling bark and leaf clusters are typically present in all FO/SW communities, so none of these habitats were overlooked). Of these eight communities, three of them fell within the proposed limit of extraction and were further surveyed using acoustic methods to determine species presence.	Response accepted.	Resolved – thank you
58.	It is noted on page 29 that “any calls with a positive identification were manually vetted by a wildlife ecologist with training in bat species identification by sonagram.” Calls noted as “NoID” should also be vetted by an ecologist with training, as Myotis sp. calls are frequently recorded without identification to species. The three Myotis species that occur in southern Ontario (as well as the Tricoloured Bat Perimyotis subflavus) have very similar calls that cannot always be identified by auto-ID algorithms, but all Myotis and Perimyotis species are considered Endangered.	Section 4.2.10. Bat Acoustic Survey Methodology	North-South Environmental Inc.	Correct. To help emphasize the effort applied to the assessment of bat acoustic recordings please note the following clarification to the bat acoustic survey methodology. Due to the challenge in identifying some high frequency calls, wildlife ecologists trained in bat species frequency identification individually assessed the high frequency calls to ensure that the auto-ID results were accurate. If a call could not be identified beyond *Myotis* sp., it was left as *Myotis* sp.	Response accepted.	Resolved – thank you

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				and included in the SAR results.		
59.	Typically, an assessment of potential HDF is done prior to going on site using orthoimage interpretation or ArcHydro analysis to look for drainage features that have a catchment of 2.5 hectares or larger. The report should describe how this was completed.	Section 4.3.1. Headwater Drainage Feature Assessment	North-South Environmental Inc.	Aerial photo interpretation was completed to identify potential HDFs that may need to be looked at and the results of a November 2018 site reconnaissance were considered prior to completion of HDFA Round 1. However, the entire proposed West Extension Subject Lands and South Extension Licensed Boundary and all areas within 120 m were walked during HDFA Round 1 to identify potential HDFs. Therefore, it was not necessary to rely on arc-hydro mapping to identify features, as this was done through field investigation.	Response accepted.	Resolved – thank you
60.	Please discuss how the delay in the Headwater Drainage Feature (HDF) Assessment timing impacted the results of the assessment and provide additional mitigation as necessary. For example, the first round of the HDF Assessment was completed on April 18, 2019 with a temperature of 22.0 degrees, which is outside of the spring freshet of that year. The second round was completed outside of its typical period (June 3, 3019 vs Late April – May) and the last round was at the very end of the window as well (August 26, 2019 vs July-August).	Page 29 Section 4.3.1. Headwater Drainage Feature Assessment	Conservation Halton	Round 1 in 2019 was just beyond the typical window identified by the HDFA Guideline (late March – mid- April) and while not at the peak of the freshet, the timing was sufficient to identify HDFs on the landscape. OSAP (Section 4: Module 11) notes that round 1 should be completed after the spring freshet. Mid to late spring 2019 was very wet and as a result of waiting to get a period of at least 48 hours with no rain (and preferably 72 hours as noted in OSAP Section 4: Module 11), delay until early June was required to achieve appropriate baseflow conditions, per guidelines. The OSAP (Section 4: Module 11) indicates sample event 3 is conducted in July to mid-September following at least 3 days with no flow generating precipitation	Addressed.	Resolved – thank you

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				event. The round 3 survey on August 26, 2019, meets these requirements. The intent of Round 3 is to identify permanent flowing or wetted features during summer baseflow, and this was achieved.		
61.	This section describes the fish community sampling that was completed on June 17 and 24, 2019. Backpack electrofishing (using a Halltech HT-2000 electrofishing unit) and seine netting (using a 30.5-metre long by 1.83-metre high, small mesh seine net) were used in combination to survey all habitats present. The other excavated golf course ponds were steep-sided and too deep to wade; therefore, visual observations of fish presence were recorded. As fish sampling methods are known to be selective to fish, discussion of biases associated with these methods should have been included in this section as the methodology used for fish sampling is biased to larger fish. No attempt was made for example, to use minnow traps in areas that are too deep to wade to obtain an understanding of smaller bodied fish species. Visual fish observations yield limited information and accuracy of fish identification is based on the experience of the observer. At the very least, the mesh size of the netting should have also been indicated as well as catch per unit effort to understand the relative abundance of fish. If the objective of the fish sampling was to demonstrate an understanding of the fish community, including the presence/absence and types of fish inhabiting various watercourses in the study area, a discussion on gear selection and deployment should have been included. The presence or absence of fish is a useful indicator in determining a particular pond's potential to support other species such as the Jefferson Salamander.	Section 4.3.3 Fish Community	Matrix Solutions Inc.	We note these comments relate to the anthropogenic ponds on the golf course, which has been confirmed as not being fish habitat by DFO. We note the following: Although catch per unit effort was not specifically noted in the report or the results table (Table 14) it can be readily calculated based on the reported numbers and effort (electrofishing seconds). However, in our opinion, little relevant information can be garnered from a calculation of catch per unit effort that cannot already be readily discerned from looking at the raw results. Electrofishing within the interconnecting channels between ponds is considered to be a completely effective method to sample the fish community in those areas. DFO has confirmed (via email on June 23, 2021, which accompanied the Letter of Advice) that the ponds and interconnecting channels on the golf course are not considered fish habitat. It is acknowledged that deep water sampling was not completed in the anthropogenic ponds. However, we suggest that the visual assessment methodology was very effective in identifying the species of fish that were observed, given that Largemouth Bass, including YOY, juveniles and adults are readily identifiable to species and viewing conditions during the survey were excellent. It is our opinion that there was	Comments noted. Further clarification required.	If the further clarification requested is in regard to DFO's assessment that the golf course ponds and drainage channels are not considered fish habitat, then we note that, as the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				no opportunity to inaccurately identify those fish that were visually observed in the ponds. Further, the active sampling that was completed in the ponds and interconnecting channel only identified the presence of Largemouth Bass, thereby validating the visual observations of only one species. We cannot discount the possibility that other species could potentially be present in the anthropogenic ponds in areas that were not sampled. It is well documented that fish can invade ponds through a number of means of transport including human induced stocking, accidental release, birds and migration from downstream watercourses. Therefore, is possible that if other gear was utilized, additional fish species could potentially have been captured. However, regardless of whether or not other species were present in the anthropogenic ponds on the golf course, our opinion of whether or not these ponds are characterized as fish habitat under the Fisheries Act would not change for the reasons outlined in Section 6.6.1 of the NETR. Again, DFO has confirmed in letter dated June 23, 2021 that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat. Further to this, regardless of the fish composition of the ponds, in our opinion, it is inarguable that the ponds and interconnecting channels do not provide an important ecological function for the natural fish community in Willoughby Creek. As expanded upon in the NETR, it is our opinion that removal of the ponds and irrigations channels would have a net benefit for the natural watercourse downstream. Therefore, in our opinion, any further studies in these ponds are not warranted, since the long-term management remains the same (i.e., removal). Based on our experience in similar areas, fish from man-made ponds such as this are not typically permitted to		

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				be transferred back to the natural environment elsewhere, given the potential for diseases and contaminants. Largemouth Bass have been visually confirmed in all of the Golf Course ponds and this has been considered in the assessment of potential to provide Jefferson Salamander habitat.		
62.	Giant Swallowtail (S3) was not included in the mapping of significant species on Figures 7a and 7b. It was omitted because its host plant, Prickly Ash, was not observed within the areas where the butterfly was observed. However, nectaring habitat is important for butterfly species and this species should have been added to the mapping in order to inform mitigation.	Section 5.2.1. Insects	North-South Environmental Inc.	Giant Swallowtail observations were made of two individuals moving through the golf course. Therefore, lack of habitat and behaviour of observed species concluded that habitat for this species is considered absent from the Study Area. However, pollinator plant species are recognized as an important component to open areas, and therefore, as noted in the Site Plans, appropriate seed mixes will be applied following Conservation Halton guidelines.	Response accepted.	Resolved – thank you
63.	Please provide the number of surveys, location of sites and dates of the egg mass surveys.	Page 35 Section 5.2.4. Egg Mass Survey Results	Conservation Halton	Egg mass observations were being reported on various message forums for the Burlington and Milton areas in early April. Therefore, as provided in section 4.2.4 and Table 1, egg mass surveys were completed at features V1, V2, V3 and V4 on April 10, 2019.	Addressed.	Resolved – thank you
64.	The report indicates that no amphibians were heard calling from ACC11 however wetland 13037 (PSW12) is identified as an amphibian breeding area in the MNRF Grindstone Creek Headwaters PSW evaluation. Recommend referencing the evaluation and discussing in the report.	Page 36 Section 5.2.5. Amphibian Call Count Survey Results	Conservation Halton	The Grindstone Creek Headwaters Wetland Complex Wetland Evaluation Report (MNRF 2007) does not identify wetland 13037 (PSW12) as amphibian breeding habitat; however, it does indicate so for PSW11, which is what I'm assuming is meant in this comment. The data for this report is dated 2007. As of 2019, amphibians were not heard calling from this feature, nor was any amphibian	Correct, this should be PSW11 not PSW12. Please include the Grindstone Creek Headwaters Wetland Complex evaluation report as species data will help to provide understanding of cumulative impacts for all scenarios and help to form target thresholds for wetland function.	Wetland Evaluation Report is attached as **Tab 6.**

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				captured during salamander trapping surveys in 2019.		
65.	It should be noted that Midland Painted Turtle's S4 status does not indicate "common and secure" as stated on page 36. The S4 status definition, according to NatureServe Conservation Status Ranks (which are used by NHIC) is: "Apparently Secure— At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors." In addition, Midland Painted Turtle has recently been evaluated by the Committee on the Status of Species at Risk in Canada (COSEWIC, 2018) as a Species at Risk in Canada with a status of Special Concern, indicating a greater level of concern about its status. On page 27, it was stated that turtle nesting surveys were not completed due to absence of suitable habitat, so this section should not refer to nesting survey results. It is possible that both turtles observed on the golf course (Snapping Turtle and Midland Painted Turtle) nest on the golf course or in the southern extension study area and surveys should be conducted for nesting habitat. The finding of a Snapping Turtle walking on land from one irrigation pond to another on June 11, 2019 (and described as an observation of a turtle "moving through the area"), is within the nesting window for this species and this was just as likely to have been an observation of a turtle searching for nesting habitat. Locations of turtle observations should have been shown on Figure 7a (Significant Wildlife Habitat and Species at Risk Observations).	Section 5.2.6. Turtle Basking Habitat and Nesting Survey Results	North-South Environmental Inc.	Golf course sand traps and active agricultural fields are not considered suitable turtle nesting habitat and would therefore not be considered candidate habitat requiring further assessment. These areas are not suitable for nesting due to disturbances associated with frequent sand trap raking (e.g., multiple times daily) and disturbances associated with agricultural activities or shading from planted crop vegetation that will prevent the successful incubation and hatching of any eggs, should any be laid in these areas. The EcoRegion Schedule (MNR 2015) does not explicitly state that the species of Special Concern must be on the SARO List; however, it is a document that is an extension and guidance for the SWH Technical Guide (MNR 2000), and it does state that the information within the schedule will require periodic updating to keep pace with changes to wildlife species status in the Species at Risk in Ontario (SARO) list, or as new scientific information pertaining to wildlife habitats becomes available. The SWH EcoRegion Schedule is also a provincial guidance document; therefore, if a species does not have a provincial status of Special Concern, it should not be considered as Special Concern for the purposes of SWH.	This comment did not apply only to golf course sand traps. Other areas of the golf course may provide habitat. In addition, turtles frequently nest at the edge of agricultural fields. Snapping Turtle qualifies as a species of Conservation Concern, while whether Midland Painted Turtle is a Species of Special Concern is, we agree, somewhat ambiguous. However, protection of SAR in Canada requires protection at all scales, including provincial and regional. The SWHTG (MNR 2000) notes that species of Conservation Concern "may refer to species that are rare at some larger scale (ecological region, province, global)" (Page 64). Midland Painted Turtle has similar nesting habitat requirements to Snapping Turtle. We reiterate that searches should be conducted for turtle nesting habitat. The third comment in this row was not responded to. Locations of turtle observations should have been shown on Figure 7a.	Please see response to comment #26. In addition, the site plans have been revised to assume turtle wintering SWH at BS6. As was stated in the NETR (2020), suitable turtle nesting habitat (further defined in the SWH Criteria Schedules for Ecoregion 7E, MNRF 2015) was absent from the Study Area.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
66.	Headwater Drainage Features are discussed in a separate report by a member of the Study Team.	Section 5.3.1. Headwater Drainage Feature and Aquatic Habitat Results	Matrix Solutions Inc.	Acknowledged.	Addressed.	Resolved – thank you
67.	Please note that the identified H2 is a regulated watercourse under Ontario Regulation 162/06 and not a headwater drainage feature as discussed in the report. Please revise the table accordingly.	Page 39 Section 5.3.1. Headwater Drainage Feature and Aquatic Habitat Results	Conservation Halton	In our experience elsewhere in Halton Region, H2 would appear to meet the criteria to be considered a headwater drainage feature. The feature consists of a headwater wetland (which per the TRCA/CVC HDFA Guidelines is considered to be a headwater drainage feature) and a short interconnecting channel. This is a first order feature, is intermittently flowing and has a drainage area less than 50 ha (which has been used as a general guideline threshold to differentiate HDFs from watercourses in other areas of Halton). Based on this, we suggest H2 does meet typical criteria to be an HDF and not a watercourse. We would appreciate further clarification from Conservation Halton as to what criteria has been used to designate H2 as a watercourse and not an HDF and explanation as to how this is consistent with approaches taken elsewhere in Halton Region. In our opinion, whether or not it is classified as a watercourse or HDF does not have any implications for the assessment of potential impacts in the NETR, nor any other project related implications.	Conservation Halton utilizes multiple criteria including hydrology, channel form, hazard risk, aquatic species/habitat, and riparian condition/terrestrial habitat to determine if a feature is a HDF or regulated watercourse. Regarding H2, while the drainage area is less than 50 ha, it is located within important or valued aquatic habitat, riparian conditions, or terrestrial habitat, therefore it is considered regulated. CH staff agree the classification will not change the outcome for the assessment of potential impacts in the Natural Environment Technical Report.	Comment noted. This feature will be considered a regulated watercourse moving forward. We do not expect that there will be any implications associated with it being a regulated watercourse as opposed to our initial assessment of it as an HDF.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
68.	The information provided in this section describes the watersheds associated with the West Extension and the South Extension of the Burlington Quarry. West Extension primarily affects the outflow to the Willoughby Creek Tributary and an unnamed tributary that comes from the Medad Valley which are both in the Bronte Creek Watershed. The South Extension primarily affects the outflow to the Mount Nemo Tributary, which is part of the Grindstone Creek Watershed. The degree to which fish assessment is discussed is not only limited to within 120.0 metres, but the fish sampling is limited to areas where Savanta has been given land access, and where they have been able to sample. This not only provides a limited fish species list but also a much smaller sampling study area. As the reach of Willoughby Creek north of Colling Road was not sampled or visited due to private ownership, characterization of fish habitat and fish presence was inferred from past reports. Given the magnitude of the proposed West Extension and implications on the downstream reaches, information regarding downstream effects is sparse. It is not surprising that only very few fish species are observed and reported in this section. As access has presumably been granted to others such as Worthington to directly observe karsts within the Willoughby Tributary, the applicant should explain if landowner consent to enter private property for the purposes of sampling and investigation was attempted. The baseline aquatic habitat for these receiving stream systems are described in historical ecological reports (e.g., 2004 and 2006 electrofishing surveys). The significance of the Willoughby tributary in terms of fisheries is highlighted within these historical reports. These reports, completed by Stantec as 2004 Level 2 NETR (Stantec 2004) and 2006 Level 2 NETR (Stantec 2006) discuss natural features within a 5.0 kilometre radius of the study area, and was focused on identifying ecological links to environments not immediately adjacent to the Subject Lands. These reports state that “these links are important to understand Regional environmental features that could be impacted by on site operations”. Justification should be provided why a different approach was used in the 2020 Level 1 and 2 NETR.	Section 5.3.2. Fish and Fish Habitat Assessment Results	Matrix Solutions Inc.	See previous responses regarding fish habitat. More details are provided in the attached Watercourse Characterization Summaries.	Justification of why a different approach to fish habitat characterization was used, instead of what was provided historically, which emphasizes the links to adjacent natural features. It seems counter productive to undertake fish sampling activities and have them ruled out as they are not considered fish habitat. Concern is based on: - Limited sampling effort- if artificial ponds were not considered fish habitat – visual sampling and possibility of other fish not noted- seems haphazard- if it is going to be ruled out anyway that whatever fish is going to there it doesn’t seem to matter as it is not fish habitat- why sample effort concentrated there if this was not deemed. - Reliant on older information where fish community sampling does matter- ie outflows- but limited information exists - Sampling only done in specific areas within 120m of quarry footprint- not much to go on Considering that private access is not allowing for Data collection, fish data is very limited.	See response to comment # 17.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
69.	This section discusses how the presence/absence of natural heritage features as defined in the PPS (MMAH 2020) within the Study Area is assessed. The NHRM (MNR 2010), NEP (2017), Halton Region OP (2018) and City of Burlington OP, which provide technical guidance for implementing the natural heritage policies of the PPS, were referenced to assess the potential significance of natural areas and associated functions. Under Subsection 6.6 however, the discussion on Fish Habitat is only limited to what waterbodies are considered fish habitat under the *Fisheries Act*. Key pieces of policy information such as (a) identification of the connections and linkages between natural heritage features and areas, surface water features and groundwater features; and (b) how the diversity and connectivity of the natural features in an area and the long-term ecological function and biodiversity of the natural heritage system can be maintained, restored or where possible improved as they pertain to fish habitat is omitted from this discussion.	Section 6. Natural Heritage Feature Assessment	Matrix Solutions Inc.	The purpose of this section was to identify where direct and indirect fish habitat was present. Reference to potential significance assessment is relevant to other types of natural heritage features and areas (i.e., Significant Woodlands, Significant Wildlife Habitat), but in our opinion, there is no similar "significance" assessment for fish habitat under the PPS; it either is or is not fish habitat for the purposes of this assessment. That is not to say that some fish habitat is not more significant (outside the PPS context of significant natural features and areas). Therefore, it is not clear how the requested content is consistent with the intent of this section of the report. Any discussion on points a) and b) as identified in the comment, would appear more appropriate for the impact assessment section of the report and it is not clear what value they would add to this section, nor how it would be consistent with the other sections in this report (which focus on determining the presence/absence of significant natural features and areas as defined in the natural heritage policies of the PPS).	SAR (Redside Dace) and Brook trout are species that have been identified in past studies. Good to know if there are still these species left as part of the baseline condition. There is significance attached to these species and their habitats.	DFO Aquatic SAR mapping does not identify the presence of Redside Dace within any watercourses in the predicted zone of influence of the quarry, nor has MECP identified any potential issues with respect to Redside Dace. The closest Redside Dace habitat identified on DFO's mapping is located on Bronte Creek approximately 4 km (straight line distance) upstream from the mouth of Willoughby Creek. Also see response to # 17.
70.	Once the additional hydroperiod information for the wetlands is complete, please revise and include an ecological interpretation of the data in this report. The data should be assessed from a dry, wet and average climate conditions perspective to ensure that proposed changes do not exacerbate natural dry conditions.	Page 46 Section 6.1.2. Significant Wetlands – 120 m Adjacent Lands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. See response to Comment No. 37 above.	Please see response to comment #37.
71.	The MNRF Grindstone Creek Headwaters PSW Evaluation notes that the larger wetland of the 13037 (PSW12) is seepage-fed and contains a seep that can be seen discharging to the surface, whereas the report indicates that this wetland is precipitation and surface runoff fed with groundwater contribution to be less than 2.0%. Recommend referencing the evaluation and discussing in the report.	Page 46 Section 6.1.2. Significant Wetlands – 120 m Adjacent Lands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Partially addressed. Discussion is provided within the summary regarding seepage, however reference to PSW evaluation has not been included. Recommend updating the summary to include findings from the evaluation to determine cumulative impacts for existing conditions to help inform appropriate mitigations for wetland function for existing (as per the TOR with proposed 25-year baseline), interim (for each identified extraction phase) and both	Please see responses to comments #34 and #125. Also, the revised AMP includes more monitoring stations, additional data and updated threshold and trigger values for checking and mitigating impacts. See updated AMP.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					post extraction scenarios (rehabilitation scenario 1 and rehabilitation scenario 2).	
72.	All of the PSWs within the zone of influence of the quarry should be discussed in this report, regardless if they are within the 120.0 metres adjacent lands. There are number of PSWs in the Grindstone Creek PSW Complex that may be impacted by the quarry that are not discussed in the report.	Page 46 Section 6.1.2. Significant Wetlands – 120 m Adjacent Lands	Conservation Halton	The Wetland Characterization Summaries (attached) provide feature characteristics, impact assessments by each Phase and mitigation measures.	The characterization summary for Wetland 13015 is missing. Please update to include. See response to Comment No. 37 above.	Please see response to comment #24.
73.	Please confirm the source of water input for the SAS1 inclusion within the MAM2-2/SWT2-2.	Page 49 Section 6.1.3. Other Wetlands within the 120 m Adjacent Lands	Conservation Halton	The SAS1 inclusion is an online pond on the West Arm of the West Branch of the Mount Nemo Tributary. The source of water for this is primarily quarry discharge from Sump 0200.	Addressed.	Resolved – thank you
74.	This section should include a detailed discussion of why the analysis came to a different conclusion regarding the significance of woodlands E, F and G from the Regional Natural Heritage System's analysis. The potential functions of these woodlands to provide connectivity (i.e., stepping stone function) of Woodland D to adjacent features should be discussed. Review of aerial photography for this area indicates that Woodland E is less than 20.0 metres from Woodland D, and should be investigated as a continuous part of Woodland D, as it is noted in Section 6.2.1 that woodlands within 20.0 metres should be treated as a continuous unit.	Section 6.2. Significant and Other Woodlands	North-South Environmental Inc.	Wooded features E, F, G do not meet the definition of Woodland under the ROP (2018), (0.48 ha; 0.22 ha; 0.48 ha, respectively) and are all greater than 20 m apart. Therefore, these are not features, nor should they be considered 'stepping stones' due to their size and distance apart from each other.	See response to comment 29.	Please see responses to comments #28 and #29.
75.	The significance and role of Woodland E relating to the RNHS should be expanded upon. Provide further analysis to confirm the functions and contributions of Woodland E for: • SWH (Eastern Wood-Pewee Habitat, Bat Maternity Roost Habitat); • Separation distance from Woodland D; • Overall connectivity/ linkage opportunities within the RNHS; and • Overall significance. It is recommended that detailed avoidance rationale be provided to reflect the role Woodland E plays within the larger RNHS and all associated impacts.	Page 53 Section 6.2.2. Halton Region Official Plan	Conservation Halton	Wooded feature E is described in detail in Table 2 of the report. It is an area that is <0.5 ha made up of mid-age to mature canopy trees mostly of Sugar Maple. There is no subcanopy or understorey. The ground cover consists of maintained turf grass, Garlic Mustard and some Herb-Robert, all of which is mowed regularly. Paved golf cart paths also make up part of the ground cover in this small stand of trees, serving as an aesthetic feature for the golf course. It is small and isolated (<20 m from other treed areas). High bat activity may serve more of an indicator that this polygon is situated in the flight path of bats moving between the Medad Valley and the open water areas of the active quarry for foraging purposes.	Response does not address the comment. It is understood the Region established driplines for all woodlands including woodland E. Confirmation is needed from the Region regarding boundary delineation and size of the woodland to determine next steps.	Please see response to comment #28.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
76.	This section notes that species of conservation concern include "species listed as S1 to S3 or SH by SRANKS and those listed on the Species at Risk in Ontario List as Special Concern." However, neither the Natural Heritage Reference Manual nor the Ecoregion Schedules state that the species of Special Concern must be on the Species at Risk in Ontario List. As noted in Section 7.4.2.2, Midland Painted Turtle has been evaluated as a Species at Risk in Canada by COSEWIC, and should have been discussed here; its location should also be shown on Figure 7b. The location of the Snapping Turtle (a Species of Special Concern) should have been shown on Figure 7a. This species should have been discussed, as it can rely on human-made habitat. While human-made habitat is excluded from some SWH (such as turtle overwintering habitat) it is not excluded as SWH for species of conservation concern.	Section 6.4. Significant Wildlife Habitat	North-South Environmental Inc.	The EcoRegion Schedule (MNR 2015) does not explicitly state that the species of Special Concern must be on the SARO List; however, it is a document that is an extension and guidance for the SWH Technical Guide (MNR 2000), and it does state that the information within the schedule will require periodic updating to keep pace with changes to wildlife species status in the Species at Risk in Ontario (SARO) list, or as new scientific information pertaining to wildlife habitats becomes available. SWH EcoRegion Schedule is also a provincial guidance document; therefore, if a species does not have a provincial status of Special Concern, it should not be considered as Special Concern for the purposes of SWH.	See response to Comment 65.	Please see response to comment #65.
77.	The FOD7-4 community is rare in the Province and is therefore confirmed SWH, regardless of its frequency in Halton Region. The report should provide the full 30.0 metre buffer for this woodland, an impact assessment for this feature and mitigation measures developed as necessary.	Page 57 Section 6.4.1. SWH Assessment Summary, Table 19	Conservation Halton	A 30 m setback will be applied for this feature, and the site plans will be revised to identify this buffer and the mitigation measures to protect and enhance this feature.	Not addressed. CH undertook a preliminary review of the revised site plans received on January 19 and 20th, 2022, as it relates to this comment. Please accurately show the 30 m setback from the limit of all natural features, as it is unclear on the plans. Please note that this also does not constitute a comprehensive review of the site plans.	A 30 m setback has been applied to the staked dripline of the FOD7-4 communities in both the West and South Extensions. The dripline and the setback distances have been added to the updated site plans.
78.	The Grindstone Creek Headwaters PSW Evaluation notes that a number of the wetlands adjacent to the proposed south extraction support amphibian breeding. Further discussion on the potential use of these wetlands by amphibians and potential SWH should be provided. Recommend referencing the evaluation and discussing in the report.	Page 57 Section 6.4.1. SWH Assessment Summary	Conservation Halton	The Grindstone Creek Headwaters Wetland Complex Wetland Evaluation Report (MNRF 2007) is dated 2007. The existing surface water and ground water reports state that there will be no impacts to the features, once mitigation measures have been applied. Further details are also provided in the attached Wetland Characterization Summaries.	Recommend to reference evaluation within report, as the information can be used to help identify cumulative impacts associated with existing (as per theTOR with proposed 25-year baseline), interim (for each identified extraction phase) and both post extraction scenarios (rehabilitation scenario 1 and rehabilitation scenario 2) to determine ecological impacts and provide appropriate mitigation measures to ensure no negative impacts.	The Grindstone Creek Headwaters Wetland Complex Wetland Evaluation Report was accessed and assessed in discussion and consideration with the NDMNRF.
79.	This subsection starts with providing a definition of what is fish habitat. The paragraph goes on to state that "definition of fish habitat includes direct fish habitat (i.e., habitat that may be occupied by fish on a permanent or periodic basis) and indirect fish habitat (i.e., habitat that would not be used directly by fish, but that may be important for downstream direct fish habitat)." The rest of this section goes on to say that there is no fish habitat in the proposed limit of extraction. The reasons provided for not considering these areas as fish habitat should	Section 6.6. Fish Habitat	Matrix Solutions Inc.	DFO has confirmed in letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	See previous comments	As previously noted in our original response, DFO has confirmed in their email of June 23, 2021, that they do not consider the drainage features on the golf course to be fish habitat. As the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
	include justification to explain why these habitats do not fit the definition of fish habitat.					regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.
80.	The rest of this section goes on to assign fish habitat categories based on their support function to fisheries. As the basis for fish habitat designations appear to be related to hydrologic connections rather than the fish occupancy, as well as origin, and whether the fish population is considered "natural" to the area, this needs to be rationalized back to the *Fisheries Act* (i.e., the basis under the *Act* that these habitat classifications are warranted).	Section 6.6. Fish Habitat	Matrix Solutions Inc.	DFO has confirmed in letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	See previous comments	As previously noted in our original response, DFO has confirmed in their email of June 23, 2021, that they do not consider the drainage features on the golf course to be fish habitat. As the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.
81.	Confirmation from DFO is needed on the status of fish habitat on the site. Until this is confirmed, it is premature to state that no fish habitat is present.	Page 59 Section 6.6. Fish Habitat	Conservation Halton	DFO has confirmed in letter dated June 23, 2021, that the constructed golf course ponds and interconnecting channels are not considered to be fish habitat.	Not addressed. See Comment No. 38 above.	As previously noted in our original response, DFO has confirmed in their email of June 23, 2021, that they do not consider the drainage features on the golf course to be fish habitat. As the regulatory authority on what should be considered fish habitat, we are relying on DFO's decision on this matter. Although we provided DFO with information regarding the golf course drainage features (in our letter dated August 14, 2020), we were not a part of their decision-making process and cannot speak for them in this regard.
82.	Recommend additional impact assessment as it pertains to fish habitat outside of the project footprint, given the potential impact to the water inputs to the offsite watercourses. Until such time that this occurs or direction from DFO is received, a precautionary approach should be taken.	Page 59 Section 6.6. Fish Habitat	Conservation Halton	DFO has provided a Letter of Advice, dated June 23, 2021, indicating that in their opinion no harmful alteration, disruption or destruction (HADD) of fish habitat will occur provided the recommendations in the letter of advice are followed.	Partially addressed. The DFO Letter of Advice provides recommendations and mitigation measures, however predicted flow rates for groundwater discharge to the tributaries and the effects of groundwater and surface water changes on fish and fish habitat for existing (as per the TOR with proposed 25-year baseline), interim (for each identified extraction phase) and both post extraction scenarios (rehabilitation scenario 1 and rehabilitation scenario 2) to	See response to comment # 17. The updated AMP outlines seasonal flow and water temperature thresholds, monitoring and adaptive management measures.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					the offsite watercourses remains a concern. Specifically, as it pertains to the seasonal requirements to sustain the downstream coldwater fish community within the Unnamed Tributary of Willoughby Creek. Recommend including additional discussion within the watercourse characterization summaries in regards to seasonal requirements and include proposed mitigation measures to help sustain overall function within the AMP.	
83.	As noted in Section 7.2 above, there are additional species that are listed in the background review sources that should be discussed in this section. Of these, there is the potential for two of these species to occur in the study area: • Blanding's Turtle • Jefferson Salamander In addition, Snapping Turtle should be added to the discussion of SAR within the Limit of Extraction.	Section 6.7. Habitat of Endangered and Threatened Species	North-South Environmental Inc.	Jefferson Salamander is discussed in Sections 6.7 and 7.2.5. Blanding's Turtle survey effort was discussed with MECP and addressed in the MECP response letter after completing Blanding's Turtle surveys, as per MECP direction, in 2021. No Blanding's Turtle or its habitat were observed and are considered absent from the Study Area. Snapping Turtle is a species of special concern (SC) and therefore is not discussed within Habitat of Endangered or Threatened Species.	See comment 25 with regard to Jefferson's Salamander. As discussed above, we continue to feel that additional effort should have been expended in Blanding's Turtle surveys. We understand surveys were completed in 2021. It should be clarified whether surveys included wetland 13203, which was the only location noted for other turtle species. The Snapping Turtle is considered a Species at Risk (with a status of Special Concern). It should be discussed in its own section within the discussion of SAR within the Limit of Extraction.	Please see responses to comment #26 and #44.
84.	Recommend consultation with MECP regarding Species at Risk for this project to determine if the surveys and associated survey efforts are acceptable and to determine the current regulation limits for those identified. Any feedback from MECP should be provided to JART.	Page 62 Section 6.7. Habitat of Endangered and Threatened Species	Conservation Halton	Species at risk discussions are on-going with MECP. Of note, MECP confirmed that the golf course irrigation ponds are not habitat for Jefferson Salamander and did not need to be surveyed. We are continuing to work with MECP for all SAR related matters and are adhering to their survey recommendations and protocols.	Addressed.	Resolved – thank you

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
85.	Recommend that the general mitigation measures discuss the potential impacts associated with blasting. Currently, blasting is discussed for wetlands, but as there are other natural heritage features present, this should be expanded to a general list.	Page 66 Section 7.1. General Mitigation Measures	Conservation Halton	As per the Memorandum titled *Blast Vibration and Water Overpressure at Adjacent Waterbodies* (Explotech 2021), mitigation has been recommended to prevent negative impacts on fish and fish habitat in adjacent waterbodies during blasting activities. Specifically, maximum recommended explosive loads per delay have been provided for varying separation distances from fish habitat. During the spawning season, maximum vibration limits of 13 mm/s at the closest spawning habitat have been recommendation. Vibration monitoring has also been recommended to confirm compliance with DFO limits for ground vibration.	Partially addressed. To ensure that the reports are comprehensive, we recommend including this information in the Natural Environment Technical Report.	Blasting recommendations to protect fish and fish habitat have been added to the Site Plans.
86.	Without having access to the approved Spills Action Centre report for the existing quarry, it is challenging to know if what is contained in it is appropriate for the proposed expansion. Recommend including this detail in the application.	Page 67 Section 7.1.2. Accidental Spills	Conservation Halton	The Spill Contingency and Pollution Prevention Plan is attached.	Partially addressed. The Spill Contingency and Pollution Plan does not include the proposed expansion areas. Please update accordingly.	As noted in the site plans (page 2 of 4; Note 8 Natural Environment b.), prior to site preparation, the Spill Contingency and Pollution Plan will be updated to include the proposed extension areas.
87.	This section discusses the Level 2 evaluation of the potential impacts due to the quarry development and operation. The Level 2 assessment also includes recommendations regarding any mitigation and/or enhancement measures, as well as rehabilitation plans. The discussion pertaining to fish habitat is in Subsection 7.2.4 where the discussion pertaining to fish habitat impacts are simplified.	Section 7. Level 2 Impact Assessment	Matrix Solutions Inc.	Comment noted – responses to other comments address this general statement.	See previous comments	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.
88.	The location of the berm adjacent to the weir pond should be changed to 30.0 metres from the wetland, rather than 14.0 metres as currently proposed, to ensure the hydrologic and ecologic function of this pond is not impacted.	Page 68 Section 7.2.1. Wetlands	Conservation Halton	A 30 m setback will be applied to this feature, and the site plans will be revised to identify this buffer and the mitigation measures to protect and enhance this feature.	Partially addressed. CH undertook a preliminary review of the revised site plans received on January 19 and 20th, 2022, as it relates to this comment. While the proposed berm appears to be outside the 30 m setback of wetland 13202 and weir pond, it is still shown within the extraction area. Recommend to revise the extraction limit to exclude the proposed berm as well as the 30 m setback to the wetland. Please note that this does not constitute a comprehensive review of the site plans.	A 30 m setback has been applied to the staked wetland community (wetland 13202) in the West Extension. The berm is now situated outside of the 30 m setback. These changes have been added to the updated site plans.
89.	For indirect water quality impacts, recommend including turbidity in the assessment.	Page 68 Section 7.2.1. Wetlands	Conservation Halton	See water resources report. This report addresses the water quality of discharged water.	Partially addressed. To ensure that the reports are comprehensive, we recommend including this information in the Natural Environment Technical Report.	Turbidity monitoring will be completed as discussed in the updated AMP.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
90.	More information has been requested with respect to the water balance assessment for the wetlands adjacent to the extraction areas. Please refer to comments on the Surface Water Assessment and the Level 1 and 2 Hydrogeologic and Hydrologic Impact Assessment. The Natural Environment Report should be revised to provide an ecological interpretation of those changes, as applicable.	Page 68 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. See response to Comment No. 37 above.	Please see response to comment #37.
91.	All of the wetlands that have the potential to be impacted by the quarry application should be discussed in this report. The zone of influence of the quarry is identified as 800.0 metres away and there is potential impact in those PSWs between 120.0 metres to 800.0 metres from the quarry. The Natural Environment Report should be revised to discuss all of the potential features impacted and mitigation measures discussed to ensure they are not impacted. This will ensure that all of the connections and linkages between the NHF, surface water features and groundwater features are identified.	Page 68 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. See response to Comment No. 37 above.	Please see response to comment #37.
92.	Please provide the details of the monitoring collected in the spring 2020 wetlands 13200, 13201 and 13202.	Page 69 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries. Additional data that is being collected will assist in the development of the AMP in consultation with the agencies.	Not addressed. Understanding the monitoring data is an important component to the development of the impact assessment and mitigation measures, additional monitoring data should not be deferred to the AMP. Update characterization summary accordingly.	Please see response to comment #37.
93.	Is it suggested that the catchment areas of the wetlands to the east of the extraction will be maintained, however as noted in the Surface Water Assessment drawings DP-1 and DP-2, it appears that there will be changes to the catchment areas of the wetlands. Please confirm and revise as necessary.	Page 70 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. It is understood that MNRF completed wetland boundary delineation in October, 2021. Based on this updated delineation, please confirm if there are any changes to catchment areas and provide updated information within the Wetland Characterization Summaries.	Please see response to comment #37.
94.	Please include a discussion on the potential impacts of reduced groundwater flows on the wetlands. For example, will less saturated soils lead to a great drawdown in water levels? Will there be impacts to the temperature of these wetlands from less groundwater and will this impact amphibian breeding?	Page 70 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. See response to Comment No. 37 above.	Please see response to comment #37.
95.	In the Hydrogeological Report, Wetland 21 (13201) is considered to be compromised due to the road and culvert, and its water budget is not considered representative of future conditions. Please confirm how changes to this wetland will be assessed and mitigated, especially as this wetland is adjacent to a rare vegetation community.	Page 70 Section 7.2.1. Wetlands	Conservation Halton	More details are provided in the attached Wetland Characterization Summaries.	Not addressed. See response to Comment No. 37 above.	Please see response to comment #37.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
96.	This section discusses indirect impacts to this wetland, but the discussion is restricted to the hydroperiod. This wetland (and the surrounding woodlands) will become isolated from the surrounding landscape; they will be surrounded by the existing quarry to the east, and the quarry extension to the north, west and south. The removal of stepping-stone connections provided by Woodlands E and F will exacerbate the isolation of Woodland D containing the wetlands. Connections to the west will be severed. The remaining patch of natural habitat will be perched above the quarry floor on all sides. The impacts of fragmentation on this wetland should be discussed. Impacts to wetland unit within this area would likely include a more rapid rate of drying in wetland and woodland soils, as well as increased temperature extremes because of increased winds, the increased heat island effect induced by the quarry's exposed rock, and increased ambient sunlight. This would likely affect Significant Woodlands and Significant Wildlife Habitat (Eastern Wood-pewee and Large Toothwort) as well as the wetland environment. A 15.0 metre buffer would likely not mitigate this impact, as physical edge effects can be seen at a distance of greater than 15.0 metres from the edge. Additional mitigation (in addition to the 15.0 metre buffer) and monitoring for this impact should be discussed.	Section 7.2.1. Wetlands (Specifically Units SWD3-2a (Wetland 13200))	North-South Environmental Inc.	As summarized in section 6.2.1, woodland D is relatively isolated and located on the golf course, adjacent to the existing quarry. While a portion of this woodland is native, the cultural woodland area is non-native, with an abundance of Black Locust, an undesirable tree species, and the FOD5/DIST area contains only a canopy layer, along with turf grass and paved golf cart paths in the ground layer (sub- canopy and understory vegetation are absent). There is high potential to enhance this woodland both in species diversity and composition. The proposed rehabilitation plans will create a system that is better connected and functional that what currently exists in the golf course and adjacent quarry.	See response to comment 32. This question specifically addressed wetlands in this area as well as buffers to the wetlands. It was not asking about the woodlands, which have been addressed elsewhere, except in the context of the woodlands' contribution to wetland function. There will be a considerable time lag (potentially decades) between disruption of the connection of the woodlands/ wetlands in this area before rehabilitation of the connection is provided. Connection of the woodland and wetlands should be maintained during extraction, both to the north and to the south.	Please see responses to comments #2, #28 and #32. In addition to the additional information provided in the noted responses above, the AMP has been updated to include further monitoring and thresholds and/or triggers to ensure wetland 13200 is not negatively impacted by the quarry extension. See updated AMP.
97.	As discussed with wetlands, the woodlands within the West Extension will be physically isolated and fragmented by the cumulative effect of the surrounding quarries, especially since the woodlands will become perched above the quarry floors. Woodland D, in particular, will be subject to high levels of drying winds, increased albedo from the surrounding quarries, and their function will decline. In turn, these impacts will likely lead to declines in insect populations that are important as prey species. Connections to the Medad Valley (identified as a Regional linkage) to the west are severed, and this connection would be highly important to animal movement through the landscape and persistence of meta-populations within Woodland D.	Section 7.2.2. Woodlands	North-South Environmental Inc.	As summarized in section 6.2.1, woodland D is relatively isolated and located on the golf course, adjacent to the existing quarry. While a portion of this woodland is native, the cultural woodland area is non-native, with an abundance of Black Locust, an undesirable tree species, and the FOD5/DIST area contains only a canopy layer, along with turf grass and paved golf cart paths in the ground layer (sub- canopy and understory vegetation are absent). There is high potential to enhance this woodland both in species diversity and composition. The proposed rehabilitation plans will create a system that is better connected and functional that what currently exists in the golf course and adjacent quarry. The proposed Extension Areas are sited within an active golf course and agricultural area. There is a Regional and Provincial NHS that does run north- south; however, the area of the proposed expansion does not appear to negatively affect the redundancy of these smaller	Please see response to comment 30. As has been noted above, the RNHS within the eastern part of the western extension is important in maintaining linkage of features both within and outside the golf course. The woodlands in this area are of high quality, and the NHS linking the woodlands to features within and outside the golf course is appropriate.	Please see response to comment #30.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				branches of the RNHS. The major areas of the NHS run along the Medad Valley, which is west of the proposed West Extension, as well as along the Mount Nemo Plateau and Grindstone Creek Complex, located east of the proposed South Extension. The proposed Extension areas are located between these two RNHS branches and are not impeding or removing any of the features that make up these two branches; the Extension areas are well outside of these two large systems. Based on the Region's NHS mapping, there are some smaller systems that lie parallel to, and between, these two major systems; however, these smaller systems do not connect to the larger NHS, north of the Study Area. These smaller branches of the overall NHS do not provide connectivity to begin with, and therefore, the removal or disturbance of golf course features and their potential for enhancement and future connectivity opportunities can only add to the limited contribution being made to the smaller NHS.		
98.	The report indicates that bat maternity colonies in the study are not unique in the subject lands or even the landscape. The Significant Wildlife Habitat Mitigation Support Tool (2014), Index 12, states that Bat Maternity Colonies are critical to the survival of local bat populations and the loss of any site has significant impacts on bat populations. Recommend that this discussion be revised to reflect Provincial policy and direction as it pertains to this type of SWH.	Page 72 Section 7.2.3. Significant Wildlife Habitat	Conservation Halton	The Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; OMNR 2014) was created as a guide for planners to better understand the functions of habitat, potential impacts and possible mitigation techniques. It is a tool that can be considered for mitigation purposes after significant wildlife habitat has been confirmed. It is not a tool that mitigates for candidate features. The management options listed within the SWHMiST are based on the best available information at the time of its publication (e.g., 2014) and are not meant to limit the use of other relevant mitigation information. Therefore, other resources can, and should, be consulted when assessing appropriate and feasible mitigation measures. This will help ensure that those measures provided are	Discussion on this should be included in the report.	The response provide in the July 2021 response submission was pulled from the NETR (2020) and has also been discussed in detail with MECP. We realize that MECP does not oversee SWH bat species; however, SAR bat habitat impacts and species impacts were discussed and resolved through our impact assessment and mitigation approach. The site plans have been updated to expand the tree removal avoidance window (it is now March 15 through November 30), as recommended by MECP. In addition to this, wooded area polygon E, which has been identified as both SWH and SAR bat maternity colony habitat is now being retained and removed from the Limit of Extraction. The site plans have been updated to show these changes.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				consistent with current practices and policies. The SWHMiST also states that suitable maternity sites are limited and that the loss of any site has significant impacts on bat populations. The behavioural activity of the bats when the recordings were collected indicated foraging behaviours. This polygon is surrounded by irrigation ponds on the golf course and open water in the existing quarry. Foraging opportunities are abundant in the area, and this polygon is likely situated in a flight path of foraging bats. There is a total of 0.48 ha of bat maternity colony habitat within polygon E. There is more than 6 ha of FOD and SWD within the 120 m Adjacent Lands northeast and southeast of the Limit of Extraction. There is an even larger tract of NHS that is immediately adjacent to the 120 m Adjacent Lands, that contains the Medad Lake Valley, a significant valleyland and wetland complex. It is not anticipated that the removal of 0.48 ha of highly disturbed habitat will have a negative impact on maternity colonies due to the large contiguous tracts of candidate habitat surrounding the Study Area. Recommended mitigation measures include site selection, minimization of affected habitat (states this is a satisfactory mitigation option), timing, habitat restoration and preservation of bat foraging habitat are all included in the SWHMiST. Each of these measures is addressed and will be achieved.		
99.	The Rare Vegetation Community FOD7-4 is not discussed in this section. As this is a confirmed SWH in the study area (confirmed in Table 19 as well) and as it may be impacted by the proposed quarry, this SWH should be discussed.	Page 72 Section 7.2.3. Significant Wildlife Habitat, Table 19	Conservation Halton	As noted in previous responses, the site plans will be revised to include a 30 m setback to this feature and include mitigation measures to protect and enhance this feature.	Partially addressed. CH undertook a preliminary review of the revised site plans received on January 19 and 20th, 2022, as it relates to this comment. Please accurately show the 30 m setback from the limit of all natural features, as it is unclear on the	A 30 m setback has been applied to the staked dripline of the FOD7-4 communities in both the West and South Extensions. The dripline and the setback distances have been added to the updated site plans.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					plans. Please note that this does not constitute a comprehensive review of the site plans.	
100.	FOD7-4 is not fully protected as it extends out past where the buffer is located. This SWH should be protected with a 30.0 metres just as the rest of the natural features are. Please revise.	Page 72 Section 7.2.3. Significant Wildlife Habitat. Figure 8a	Conservation Halton	In the West Extension, there will be a 30 m setback from the edge of the FOD7-4 to the proposed limit of extraction, as well as to the edge of the berm. In the South Extension, there will be a 30 m setback from the FOD7-4 to the edge of the berm.	Not addressed. See response to Comment No. 99 above.	Please see response to comment #99.
101.	In addition to the SWH discussed, Amphibian Movement Corridors should 9 be discussed as this is identified in Table 19 as present.	Page 74 Section 7.2.3. Significant Wildlife Habitat	Conservation Halton	The amphibian movement corridor will remain untouched. No direct impacts are anticipated due to its location outside of the Study Area at the far edge of the 120 m adjacent lands. Potential hydrological impacts and associated mitigation measures are provided in detail in the Wetland Characterization Summaries – wetland 13203 – appended to this response submission.	Not Addressed. Update characterization report to include discussion regarding all associated SWH present and include within impact assessment.	The site plans have been revised to include the woodland area within 230 m of the wetland (see Page 1 of 4 – Added additional Amphibian Breeding (woodland) area). The impact assessment and mitigation measures that have been applied to the SWH type also apply to the movement corridor. Therefore, the breeding pond, the surrounding woodland habitat, including the movement corridors are all addressed in the NETR (2020), as well as in the updated site plans.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
102.	Fish Habitat, the potential direct and indirect impacts of the proposed development, including during the temporary construction phase, the long-term operations phase and the post- operations rehabilitation phase, are assessed based on direct impacts and indirect impacts. Direct are deemed non-existent in the proposed Limit of Extraction within either the South or West Extension areas as there is no fish habitat present there. Indirect impacts are dealt with as being minimal due to minimal construction work and lack of intrusion outside of the extraction area and continuing to pump quarry water to supplement flow as recommended by the Surface Water Assessment Report (Tatham 2020). The basis for flow supplementation in terms of volume, water quality and quantity should be explained in terms of its effects on fish habitat downstream of the quarry extension areas. In 2006 Level 2 NETR Report (Stantec 2006) Willoughby Creek has been described in previous reports as "the watercourse of greatest ecological sensitivity" as this Bronte Creek tributary was noted to support critical brook trout spawning and rearing habitat, as noted with the presence of juvenile brook trout captured during 2003 surveys. The Level 2 Natural Environment Technical Report notes that Brook Trout are reliant on groundwater for virtually all portions of their life cycle: spawning, incubation, nursery refugia, and thermal refugia during summer. The loss of groundwater discharge to this system would represent a negative effect. The basis for the maintenance of the quarry water in terms of how flow regime quantity and water quality will be maintained is lacking in this section. In the 2004 Level 2 NETR (Stantec 2004), fisheries inventory of the station (Station 1) reports a healthy population of juvenile Brook Trout in the reaches of Britannia Road and Cedar Springs Road Intersection and 80.0 metres downstream, which is located approximately 1.2 kilometres from the confluence of the Willoughby unnamed tributary to the mainstem of Willoughby Creek. This is consistent with the Bronte Creek Watershed Study, which noted extensive spawning activity in the area of the Cedar Springs community and Cedar Springs Road. The details for maintaining flow should be discussed in this section extending beyond 120.0 metres as the reports of the water levels in the Willoughby creek running dry were reported by conservation authority staff and maintaining flow during periods of drought is a concern (Bronte Creek, Urban Creeks and Supplemental Monitoring conducted by Conservation Halton 2012).	Section 7.2.4 Fish Habitat	Matrix Solutions Inc.	DFO has provided a Letter of Advice, dated June 23, 2021, indicating that in their opinion no HADD of fish habitat will occur provided the recommendations in the letter of advice are followed. See additional details in the Watercourse Characterization summary. DFO's guidance and conditions were provided after the Summary tables were prepared and circulated. Nelson is happy to work through the tables with JART to ensure that all DFO conditions and mitigation measures are included in the AMP and that all threshold and trigger values are updated, if needed, based on DFO recommendations.	Where is the AMP which reflects the DFO recommendations- how is this mechanism controlled- flow regime?	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
103.	The proposed settling pond outlet at the bank of the West Arm watercourse and associated longer term sump should be assessed in further detail so that the outlet does not impact the natural features present. Mitigation measures should be developed to limit impact, such as the use of a flow spreader to reduce bank erosion.	Page 76 Section 7.2.4. Fish Habitat	Conservation Halton	Tatham has completed a preliminary design for the outlet of the temporary settling pond/longer term sump in the south extension. As suggested by Conservation Halton, the proposed outlet consists of a stone core wetland pocket set back approximately 5 m from the average annual high-water mark of the West Arm of the West Branch. The wetland pocket will have a level spreader around the perimeter to promote dispersed discharge when flows exceed the storage/infiltration capacity of the structure. This will negate the need for any direct conveyance structure or channel that would directly impact the watercourse and riparian vegetation. The wetland pocket will consist of a 450-mm thick base layer of 100 to 300 mm riverstone. The voids in the riverstone will be filled with topsoil and planted with suitable native wetland vegetation species. The proposed design of the outfall prevents direct impacts on fish habitat in the watercourse as there is no requirement for any in-water work. Alterations to riparian vegetation between the wetland pocket and the watercourse will be minimized to the extent possible with activities of the contractor generally restricted to the landward side of the outfall. An erosion and sedimentation control plan shall be prepared and implemented throughout construction. All areas temporarily disturbed during installation of the outfall will be restored with suitable native vegetation species following construction. ESC measures will remain in place until the disturbed area around the outfall is sufficiently revegetated. Post- construction monitoring will be completed to verify that the outfall is performing as intended and that no unanticipated impacts are occurring as a result of operation. If impacts are observed during monitoring (e.g., unexpected erosion downstream from the outfall) remedial measures will be implemented.	Addressed subject to the site plans being updated to include cross-sections of the design and details within the revised NETR.	The cross section and details will be added to the proposed Burlington Quarry Extension Site Plans.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
104.	Please confirm winter target numbers for baseflow upstream of Colling Road, as only spring, summer and fall are provided.	Page 77 Section 7.2.4. Fish Habitat	Conservation Halton	This will be addressed though the provisions of the AMP to ensure the pumping regime maintains base flow and seasonal flow of water.	Not Addressed. The proposed mitigation measures should be included within the watercourse characterization summaries to demonstrate that the proposed seasonal flows are appropriate to ensure no negative impacts in the existing, interim and post extraction scenarios (as outlined in the response to Comment No. 37 above).	Monthly flow targets are identified in the AMP. See updated AMP.
105.	The potential impact of a 3.0% reduction in groundwater in the creeks and wetlands as it relates to temperature changes has not been provided. Even a small reduction can alter the ecological function of these features and this should be assessed in the report. In addition, consider temperature changes from the proposed mitigation pond.	Page 80 Section 7.2.4. Fish Habitat	Conservation Halton	Given that groundwater discharge only occurs on a seasonal basis and that these wetlands and downstream creeks that are being referenced in this comment (East Arm of the West Branch of the Mount Nemo Tributary and the Unnamed Tributary of Lake Medad) are typically dry from late spring through summer, which corresponds to the time period when resident fish communities are typically most sensitive to water temperature increases. Therefore, the potential effect of water temperature changes on fish is expected to be mitigated by the intermittent nature of the wetlands and watercourses.	Not addressed. The watercourse and wetland characterization summaries (including for the East Arm of the West Branch of the Mount Nemo Tributary) speak to a proposed 1% groundwater reduction and not 3% as stated within the Natural Environment Technical Report. Please update the characterization summaries accordingly to include an impact assessment and potential negative impacts and alteration on ecological function of watercourses and wetlands. The 3% reduction as provided in the NETR is based on an impacted scenario. As such, the impacts may be greater once more information has been obtained.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.
106.	Please discuss and quantify how the 4.0-6.0% reduction in runoff volume compares to a dry year and the potential impacts of this on the creeks and wetlands.	Page 80 Section 7.2.4. Fish Habitat	Conservation Halton	More details are provided in the attached Watercourse Characterization Summaries and will also be provided and discussed in the AMP.	Not addressed. Details regarding 4-6% reduction in run off volumes are not well discussed in the summaries. Include additional information regarding the potential impacts (as it relates to an already impacted scenario) on the watercourses and wetlands between a dry year and wet year to help quantify changes proposed for existing, interim (for each identified extraction phase) and both post extraction scenarios (rehabilitation scenario 1 and rehabilitation scenario 2) to provide the appropriate mitigation measures.	The updated AMP includes flow and temperature mitigation and monitoring requirements within watercourses to ensure no harmful, alteration, disruption or destruction to fish habitat in accordance with DFO letter of advice.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
107.	There is a disagreement about the justification provided with respect to the connectivity of the area. While the proposed expansion lands are currently in a non-natural state, there are limited barriers to obstruct the movement of species across the landscape. The connectivity that these lands currently provide would be lost based on the proposal. The diversity and connectivity of the overall Mount Nemo Plateau should be considered to ensure that the proposal does not restrict wildlife movement.	Page 80 Section 7.2.4. Fish Habitat	Conservation Halton	As summarized in section 6.2.1, woodland D is relatively isolated and located on the golf course, adjacent to the existing quarry. While a portion of this woodland is native, the cultural woodland area is non-native, with an abundance of Black Locust, an undesirable tree species, and the FOD5/DIST area contains only a canopy layer, along with turf grass and paved golf cart paths in the ground layer (sub- canopy and understory vegetation are absent). There is high potential to enhance this woodland both in species diversity and composition. The proposed rehabilitation plans will create a system that is better connected and functional that what currently exists in the golf course and adjacent quarry. The proposed Extension Areas are sited within an active golf course and agricultural area. There is a Regional and Provincial NHS that does run north- south; however, the area of the proposed expansion does not appear to negatively affect the redundancy of these smaller branches of the RNHS. The major areas of the NHS run along the Medad Valley, which is west of the proposed West Extension, as well as along the Mount Nemo Plateau and Grindstone Creek Complex, located east of the proposed South Extension. The proposed Extension areas are located between these two RNHS branches and are not impeding or removing any of the features that make up these two branches; the Extension areas are well outside of these two large systems. Based on the Region's NHS mapping, there are some smaller systems that lie parallel to, and between, these two major systems; however, these smaller systems do not connect to the larger NHS, north of the Study Area. These smaller branches of the overall NHS do not provide connectivity to begin with, and therefore, the removal or disturbance of golf course	Not Addressed. Once the golf course related activities and maintenance of the lands cease, the understory would begin to re-establish. The woodland D provides multiple functions including SWH that is important to consider regarding continued connectivity. Currently the proposed expansion lands are connected and would be lost in the interim and post extraction scenarios. It is this connectivity between the larger RNHS branches that should be considered in regard to wildlife movement. CH concurs with response to Comment Nos. 28, 29 and 30 above.	Please see response to comment #2.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
				features and their potential for enhancement and future connectivity opportunities can only add to the limited contribution being made to the smaller NHS.		
108.	A reduced buffer to some Significant Woodlands is proposed, however justification for this reduction is not included. As these woodlands are also supporting other natural features and functions, and as the site can accommodate full 30.0 metre buffers, this reduction is not supported.	Page 82 Section 8. Niagara Escarpment Plan	Conservation Halton	In the West Extension, there will be a 30 m setback from the edge of the FOD7-4 to the proposed limit of extraction, as well as to the edge of the berm. In the South Extension, there will be a 30 m setback from the FOD7-4 to the edge of the berm.	Not addressed. See response to Comment No. 99.	Please see response to comment #99.
109.	As SWH is a Key Natural Heritage Feature, the vegetation protection zone should be 30.0 metres from these features. Please revise.	Page 82 Section 8. Niagara Escarpment Plan	Conservation Halton	In the West Extension, there will be a 30 m setback from the edge of the FOD7-4 to the proposed limit of extraction, as well as to the edge of the berm. In the South Extension, there will be a 30 m setback from the FOD7-4 to the edge of the berm.	Not addressed. See response to Comment No. 99.	Please see response to comment #99.
110.	The only mitigation proposed for the loss of a unit of Significant Wildlife Habitat (Woodland E) is compensation through the rehabilitation plan. As noted in Halton's EIS guidelines, section 3.7.2., "It is important to note that compensation for feature removal or anticipated negative impacts is not acceptable under the ROP." Thus, removal of this woodland would result in negative impacts to the Natural Heritage System. Avoidance is preferred over compensation. As noted previously, the function of Woodland E to provide linkage and other benefits to the Natural Heritage System should be further examined, particularly as this woodland is considered part of the Regional NHS and is in very close proximity to Woodland D. In Google imagery, the closest distance between Woodland D and Woodland E appears to be approximately 10.0-15.0 metres (i.e. it is not greater than the 20.0 metres considered to be the threshold for considering Woodland E separately), and so the function of Woodland E as a potential part of Woodland D should also be examined. The role of Woodland E in contributing to Eastern Wood-pewee and bat maternity roost habitat (for example in terms of numbers of nest sites, habitat area, foraging habitat, etc., as well as the potential importance of this area in the future when the connections to the north and south are removed) should also be considered in more detail. The rationale for avoidance of, rather than compensation for, impacts should be considered.	Section 9. Regional Official Plan	North-South Environmental Inc.	Wooded feature E is described in detail in Table 2 of the report. It is an area that is <0.5 ha made up of mid-age to mature canopy trees mostly of Sugar Maple. There is no subcanopy or understorey. The ground cover consists of maintained turf grass, Garlic Mustard and some Herb-Robert, all of which is mowed regularly. Paved golf cart paths also make up part of the ground cover in this small stand of trees, serving as an aesthetic feature for the golf course. It is small and isolated (<20 m from other treed areas). High bat activity may serve more of an indicator that this polygon is situated in the flight path of bats moving between the Medad Valley and the open water areas of the active quarry for foraging purposes.	See response to comment 28. Woodland E was assessed in the NETR as habitat for bat maternity roosts (Section 5.2.9). The re-assessment of the same woodland in these responses as a flight path (presumably to explain the high number of calls recorded) is not backed by further evidence. Evidence that has led to the re-assessment of this woodland as a flight path rather than a maternity roost should be provided.	Please see responses to comment #28 and #98.
111.	Please expand the SWH section to include the rare vegetation community FOD7-4 identified in the Level 1 Report. Discussion on how will be protected and any additional mitigation measures should be provided in addition to the SWH included in this section.	Page 84 Section 9. Regional Official Plan	Conservation Halton	As noted in previous responses, the site plans will be revised to include a 30 m setback to this feature and include mitigation measures to protect and enhance this feature.	Not addressed. See response to Comment No. 99.	Please see response to comment #99.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
112.	Cumulative impacts discussed in the report are limited. Recommend that this section be expanded upon to provide more detail and discussion on what the cumulative impacts of the proposed quarry might be. For example, the existing quarry began in the 1950s and has impacted the natural environment since then. If the existing quarry is continued to be used, rather than rehabilitated as originally planned, then this would result in longer, cumulative impacts on the area.	Page 86 Section 10. Regional Official Plan Guidelines – Aggregate Resources Reference Manual	Conservation Halton	See response to Comment 13.	Not addressed. The Natural Environment Technical Report should discuss impacts as it relates to the existing conditions (as per the TOR with proposed 25-year baseline) to identify cumulative impacts and help develop the AMP and rehabilitation plan.	Please see response to comment #34.
113.	This section notes (Paragraph 1) that: "despite that no direct or indirect impacts will occur to Jefferson Salamanders or their habitat, habitat creation and enhancement opportunities have been identified for this species." It is proposed to restore 4.0 hectares of agricultural land between the eastern woodland south of the quarry, where Jefferson Salamander has been noted breeding, to an adjacent woodland to the west, where Jefferson Salamander has not been observed despite repeated surveys in several years, and despite apparently suitable habitat. The objective of the habitat creation is stated in paragraph 3 of this section: "This would enhance JESA habitat by providing increased coverage of summer refuge and overwintering habitat and improve connectivity between the two existing woodlands… The design of this restoration could also increase opportunity for JESA breeding by incorporating pit and mound construction techniques." Though it is not stated in the NETR, it is clearer in the Progressive and Final Rehabilitation and Monitoring Study that the proposed restoration is to address Section 110 of the Regional Official Plan, especially C:) Priorities for restorations or enhancements to the Greenbelt and/or Regional Natural Heritage Systems through post-extraction rehabilitation shall be based on the following in descending order of priority: [i] restoration to the original features and functions on the areas directly affected by the extractive operations, [ii]enhancements to the Greenbelt and/or Regional Natural Heritage Systems by adding features and functions on the balance of the site, [iii] enhancements to the Greenbelt and/or Regional Natural Heritage Systems by adding features and functions in areas immediately surrounding the site, [iv] enhancements to that part of the Greenbelt and/or Regional Natural Heritage Systems in the general vicinity of the site, and [v]enhancements to other parts of the Greenbelt and/or Regional Natural Heritage Systems in Halton.) Restorations or enhancements shall proceed immediately after	Section 11.2. Jefferson Salamander Habitat Creation and Enhancement Opportunities	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	Since the restoration was provided to satisfy Regional policies, the Region should be circulated in reviewing these details. The registration process is a process that will not provide the opportunity for comment by the Region and the opportunity of response to the proposed restoration.	The Jefferson Salamander habitat creation and enhancement opportunity is not to satisfy Regional policies or a requirement of the ESA. No Jefferson Salamander habitat is proposed for removal and the application already includes significant ecological enhancements within the proposed license area for the proposed Burlington Quarry Extension which exceeds the Regional policy requirements. As per our recent meeting with JART's Natural Environment team, we understand that JART is going to further discuss if they would like Nelson to actively plant this area to create a woodland or prefer that this portion of the regulated habitat remain as agricultural area that will ultimately naturally regenerate if the Extension is approved. Nelson remains committed to enhance this area but will wait for further direction from JART. If this area is actively planted, it will be planted in accordance with the species and densities noted on the proposed Burlington Quarry Extension for other areas that will be planted to create woodland conditions.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
	extraction in a timely fashion.					
114.	Comments on the proposed restoration and enhancement are as follows: • This proposal is speculative, without even rudimentary detail to support feasibility. There is no certainty that created ponds would provide a sufficient hydroperiod and water quality for Jefferson Salamander to breed. There are no goals or objectives that drive the restoration, so no assurance that the restoration would create persistently suitable habitat for the long term.	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.
115.	Comments on the proposed restoration and enhancement are as follows: • Jefferson Salamander has a high fidelity to its habitat, and is a notable habitat specialist. If Jefferson Salamanders are not present in the western woodland, there is no basis to speculate that they would use the restored habitat. The western woodland may not be suitable for Jefferson Salamander. There are many habitat needs that must be met for this species that have not been explored, such as the presence of breeding ponds with suitable hydro period and water quality, small mammal burrows to provide overwintering habitat, invertebrate prey populations, and downed woody debris to provide refuge for post-breeding adults and transforming juveniles.	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.
116.	Comments on the proposed restoration and enhancement are as follows: • Salamander breeding and overwintering habitat is associated with mature woodlands, with their associated attributes of deep shade, leaf litter, high soil humidity, small mammal populations to provide burrows and abundant ground dwelling invertebrates to provide prey. It would take decades for the restored area to provide sufficient shade, humidity and hibernation sites to become suitable for Jefferson Salamander. If the quarry extensions had impacts on groundwater, the restoration site (even if it were feasible) would likely be too late to restore sufficient habitat to ensure Jefferson Salamander survival in this area.	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.
117.	Comments on the proposed restoration and enhancement are as follows: • Jefferson Salamander movements are difficult to predict without movement studies. There is no evidence to show that salamanders would move in this western direction so that it could function as a linkage. More detailed studies of salamander movements and habitat needs should be conducted.	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
118.	Comments on the proposed restoration and enhancement are as follows: • The potential for creating an ecological sink should be considered. The western woodland and restoration site would be within 120.0 metres of the southern extension boundary, with the potential that these could be affected by the quarry.	Section 11.2	North-South Environmental Inc.	It is unclear what features are noted and what is being asked.	This comment referred to the potential for a creation of habitat for Jefferson Salamander in an ecological sink in the 120 m zone of influence of the quarry.	Please see response to comment #113.
119.	Comments on the proposed restoration and enhancement are as follows: • This proposal does not address the primary recommendation in the Jefferson Salamander Recovery Strategy (2018): The short-term recovery approaches should focus on the protection of existing populations of the Jefferson Salamander and Unisexual Ambystoma (Jefferson Salamander dependent population) by minimizing further loss or degradation of known habitat or potential recovery habitat. Recovery approaches should also focus on verifying, documenting, and monitoring the distribution and habitats used by extant, historic, and potential subpopulations. Developing and evaluating mitigation and restoration techniques, actively conducting research, and developing long-term management activities should also be prioritized to ensure the recommended recovery goal will be achieved.	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.
120.	There is no evidence that this proposed restoration would enhance habitat for Jefferson Salamander. The restored area would likely function as a small patch of disturbed forest habitat. Sufficient baseline detail should be supplied to show that it is at least potentially feasible. Goals and objectives should be provided to guide the restoration. Even as a preliminary suggestion, the restoration should be proposed according to "SMART" principles: the restoration goals should be "specific, measurable, agreed-upon, realistic and timebound".	Section 11.2	North-South Environmental Inc.	Restoration details and implementation will be determined with MECP and the Registration process.	See response to #113.	Please see response to comment #113.
121.	Recommend including the smaller portion of wetland 13037 on the ELC map. It is currently not identified.	Figure 3b	Conservation Halton	This is included in the Wetland Characterization Summary Tables.	Addressed.	Resolved – thank you
122.	Please discuss why amphibian monitoring was not conducted in the SWS3-2a/b communities in the western expansion area and the SWS/MAM2-2 associated with the West Arm. Table 2 notes that surface water in SWS3-3b was usually present in the spring as well as July and September. Should suitable habitat be present, then recommend that amphibian monitoring occur.	Figure 4a and Table 2	Conservation Halton	There is no SWS3-2a/b; however, it is assumed that this comment is intended for SWD3-2a/b. Therefore, wetland 13200 (SWD3-2a) did not contain water, and therefore was not considered a suitable feature to survey for amphibian breeding. Wetland 13201 (SWD3-2b) did contain water and therefore amphibian call count stations ACC8 and ACC9 (Figure 4a) were surveyed in 2019.	Addressed.	Resolved – thank you

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
123.	Recommend that all of the hedgerows in the proposed extraction areas be assessed for potential bat habitat.	Figure 5a and Figure 5b	Conservation Halton	Section 5.2.9 notes that the 7E Criteria Schedule (MNR 2015) indicates that candidate bat maternity colony habitat is limited to FOD, FOM and SWD and SWM communities that contain a minimum density of >10 habitat trees with a dbh > 25 cm per hectare. Recent and on-going correspondence with MECP indicates that only FO and SW communities (no minimum density requirements) are potential roosting habitat. Therefore, hedgerows were not surveyed based on current provincial guidance at the time of study.	Addressed.	Resolved – thank you
124.	Please clarify why the FOD5-6 south of the proposed south extraction area was not assessed for bats. If suitable habitat is present, recommend that this assessment occur.	Figure 5b	Conservation Halton	This area is assumed candidate habitat for bat roosting habitat, and FOD5-6 is already protected based on the setback and mitigation measures shown on the site plans.	Partially addressed. CH undertook a preliminary review of the revised site plans received on January 19 and 20th, 2022, as it relates to this comment. Please accurately show the 30 m setback from FOD5-6, and highlight as candidate SWH habitat for bat roosting habitat, as it is unclear on the plans. Please note that this does not constitute a comprehensive review of the site plans.	The FOD5-6 is greater than 30 m from the Limit of Extraction. The Limit of Extraction has been placed 30 m from the staked dripline of the cultural plantation. The FOD5-6 is south of the plantation, situated even further from the Limit of Extraction. We realize that MECP does not oversee SWH bat species; however, SAR bat habitat impacts and species impacts were discussed and resolved through our impact assessment and mitigation approach. The site plans have been updated to expand the tree removal avoidance window (it is now March 15 through November 30), as recommended by MECP. Therefore, due to the >30 m setback of the Limit of Extraction to the assumed SWH maternity colony bat habitat and the precautionary mitigation measures provided in the NETR (2020) and updated site plans, it is anticipated that there will be no negative impacts to the assumed bat maternity colony SWH in the FOD5-6 located south of the South Extension. The assumed bat maternity colony SWH in FOD5-6 will be added to page 1 of the proposed Site Plans for the Burlington Quarry Extension.
125.	Seeps were identified by the MNRF PSW evaluation in wetland 13037. This SWH should be considered as candidate and additional surveys done to determine the presence of these seeps.	Table 19	Conservation Halton	See additional details in the Wetland Characterization Summaries. There will be no negative impacts to the ecological features and functions of this wetland.	Response does not address the comment. Provide additional details regarding seeps and candidate SWH as per MNRF PSW evaluation report to ensure there are no	No seeps or springs have been identified within wetland 13037 (Savanta 2020, Tatham 2020). The Karst Report (Worthington 2020) also does not identify

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
					negative impacts and appropriate mitigation measures are provided. Provide details regarding additional surveys to be completed to confirm SWH.	such features within wetland 13037. Worthington (2020) identified sinks and springs approximately 700+ m from wetland 13037, which the report states feed into the West Arm of the West Branch of the Mount Nemo Tributary. Based on extensive field investigations by multiple disciplines, our conclusion stands that there are no seeps within wetland 13037. This item is considered addressed to the satisfaction of the NDMNRF.
126.	Recommend that additional targeted surveys be undertaken to assess the potential for turtle habitat. It is noted that turtles have been known to use irrigation ponds and as there were limitations to being able to sample some of the deeper irrigation ponds, habitat may be present.	Table 19	Conservation Halton	A total of six turtle basking stations were established to survey five features within the Study Area, including the irrigation ponds (see Figure 4a from report). In addition, Blanding's Turtle survey effort was discussed with MECP and addressed in the MECP response letter after completing Blanding's Turtle surveys, as per MECP direction, in 2021. No Blanding's Turtle or its habitat were observed and are considered absent from the Study Area.	Addressed.	Resolved – thank you
127.	The table notes that monarchs were not observed during the insect surveys, however the CUM field sheets note four individuals on Sept 11 and 19. Recommend that host and feeding pollinating plant species be considered when developing restoration plans.	Table 19 and Field Sheets	Conservation Halton	Pollinator plant species are recognized as an important component to open areas, and therefore, as noted in the Site Plans, appropriate seed mixes will be applied following Conservation Halton guidelines.	Partially addressed. CH undertook a preliminary review of the revised site plans received on January 19 and 20th, 2022, as it relates to this comment. Within Section D, CH recommends including a note stating that pollinator plant species are an important component to open areas and incorporate in appropriate areas as part of the rehabilitation plans. Please note that this does not constitute a comprehensive review of the site plans.	The proposed Burlington Quarry Extension site plans will be updated to include a note in Section D (page 3 of 4) on pollinator habitat and species.

	JART Comments (February 2021)	Reference	Source of Comment	Applicant Response (July 2021)	Interim JART Response (February 2022)	Nelson GEI/Savanta Response (June 2022)
128.	The ELC field notes are not complete as soils were not competed. Please discuss how this may impact the classification of the vegetation communities.	Field Sheets	Conservation Halton	The ELC communities range from dry-fresh to fresh- moist, to wetland – showing community type variability was captured. Soil moisture was based on species composition, which effectively informed the accurate classification of vegetation communities. Outside of hydrology, influences associated with soil texture (e.g., sand vs. clay) or influences associated with parent material (e.g., depth to sedimentary bedrock) would also be reflected in the species composition. While soil data can be useful to support above-ground observations, it is not anticipated that the absence of this data will have a significant influence on overall classification.	Addressed.	Resolved – thank you

Tab **1**

Catton, Shannon

From: McAllister, Aurora (MECP) <Aurora.McAllister@ontario.ca>
Sent: Friday, December 3, 2021 10:57 AM
To: Catton, Shannon
Subject: [EXT] Notes from Wednesday's Teams call
Attachments: SAR Bat Building Exit and Roost Survey Protocols.docx; Bat Survey Standards Note 2021.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Follow up

EXTERNAL EMAIL

Hi Shannon,

Here are my notes from our Teams Call the other day:

- One Category 2 Butternut tree was found within the proposed the Limit of Extraction within the West Quarry Extension. The removal of this tree can likely be addressed under the conditional exemption in Ontario Regulation 242/08 (s 23.7).
- Nine Barn Swallow nests were found and will be impacted by the proposed Limit of Extraction and the proposed pond west of the West Extension. The removal of the nesting habitat for this species likely qualifies for registration under the Barn Swallow exemption regulation (s 23.5 of Ontario Regulation 242/08).
- Eastern Small-footed Myotis, Little Brown Myotis and Tri-Colored Bat were detected within a wooded feature located in the proposed Limit of Extraction within the West Quarry Extension (Figure 7A, Appendix A in the Level 1 and 2 Natural Environment Report). Given the size of this feature relative to the forested habitat that will remain on the local landscape, authorization under the Endangered Species Act (ESA) would not be required to remove this wooded feature provided that trees are removed outside of the active season for species at risk bats in order to avoid harming and harassing the species.
- The Ministry has consulted with species experts who have confirmed that Eastern Small-footed Myotis is known to have a longer active season than other species at risk bats (e.g. Little Brown Myotis). The Ministry considers the active season for Eastern Small-footed Myotis to be March 15 to November 30. Tree removals should therefore be undertaken outside of this period.
- Species at risk bats are known to use buildings and other anthropogenic structures. Given the presence of potentially suitable buildings within the proposed the Limit of Extraction, a combination of exit surveys and acoustic surveys should be undertaken to confirm presence / absence of species at risk bats. The Ministry's most recent bat survey guidance is attached. Depending on when the structure(s) will be removed (e.g. in 10 years), additional surveys may need to be completed closer to when demolition is planned.
- Additional surveys were completed for Blanding's Turtle in accordance with the Ministry's 2015 Survey Protocol for sites within 120m of the project. Based on the results of the surveys, it appears reasonable to conclude that this species is not present on the site.
- Habitat assessments and salamander trapping were conducted in 2019, 2020, as well as in 2021. Provided each survey season was considered a 'typical spring' for the local area, no further surveys are required and it would appear reasonable to conclude that neither Jefferson Salamander nor

Unisexual Ambystoma (Jefferson Salamander dependent population) is present within the proposed Limit of Extraction.

- Ministry staff have not required surveys of the irrigation ponds on the golf course given that they appear unlikely to be potential salamander breeding ponds and understand that they contain Largemouth Bass. Potential breeding habitat typically does not support fish capable of eating salamander eggs.
- The Ministry would appreciate more details on the hydroperiods for all surveyed ponds and the ponds that were monitored within the adjacent Jefferson Salamander regulated habitat. Specifically: which ponds were monitored, how many years they were monitored for, the hydroperiod for each of the ponds for each year, etc.
- At this time, the Ministry does not have enough information to agree or disagree with the conclusion that there will be no direct or indirect impacts to adjacent endangered salamander habitat. The Ministry will rely on the professional opinion of the hydrogeologists reviewing the relevant details to assess whether there will be any impacts to the natural features including the wetlands that support Jefferson Salamander and Unisexual Ambystoma (Jefferson Salamander dependent population).

Regards,

Aurora McAllister
Management Biologist
Permissions & Compliance | Species at Risk Branch
Ministry of the Environment, Conservation & Parks

Tab **2**

Catton, Shannon

From: McAllister, Aurora (MECP) <Aurora.McAllister@ontario.ca>
Sent: Monday, March 14, 2022 11:37 AM
To: Catton, Shannon
Subject: [EXT] Notes from Friday's call

EXTERNAL EMAIL

Hello Shannon,

As promised, here are my notes from our call on Friday (I think I captured everything but if I forgot something, let me know):

- No changes to water levels in the wetlands / vernal pools that have been mapped as Jefferson Salamander regulated habitat are anticipated as a result of quarry development.
- Wetland hydroperiod and shallow groundwater monitoring is being undertaken at all vernal pools on the property by the South Extension, including the vernal pools that have been mapped as regulated habitat. At least 3 additional years of monitoring will be undertaken to establish existing baseline conditions for the wetlands and vernal pools in this area.
- Wetland hydroperiod monitoring in the vernal pool located within wetland 13015 (confirmed spotted salamander breeding pond) will commence in 2022. At least 3 years of monitoring will be undertaken to establish baseline conditions.
- Under Section 7 of the Adaptive Management Plan (Version 2.0) several of the wetlands are described as being regulated habitat for Jefferson Salamander and Jefferson Salamander dependent unisexuals based on historical data. Although the salamander records associated with the ponds are older, there is no information that suggests that these two ponds located on the adjacent property are no longer habitat for these species. Please remove the reference to 'historical data'.
- I can confirm that there are no outstanding concerns in relation to species at risk.
- Notes in relation to Species at Risk Bats, Barn Swallow and Butternut have been included in the revised Site Plan.
- No impacts to habitat for Jefferson Salamander and Jefferson-dependent unisexuals are anticipated, therefore no authorization under the Endangered Species Act in relation to these species would be required in order to proceed with the proposed quarry development. I can provide formal correspondence confirming this once the AMP has been finalized.

Kind regards,

Aurora

Aurora McAllister
Management Biologist
Permissions & Compliance | Species at Risk Branch
Ministry of the Environment, Conservation & Parks

Tab **3**

MNRF Technical Discussion

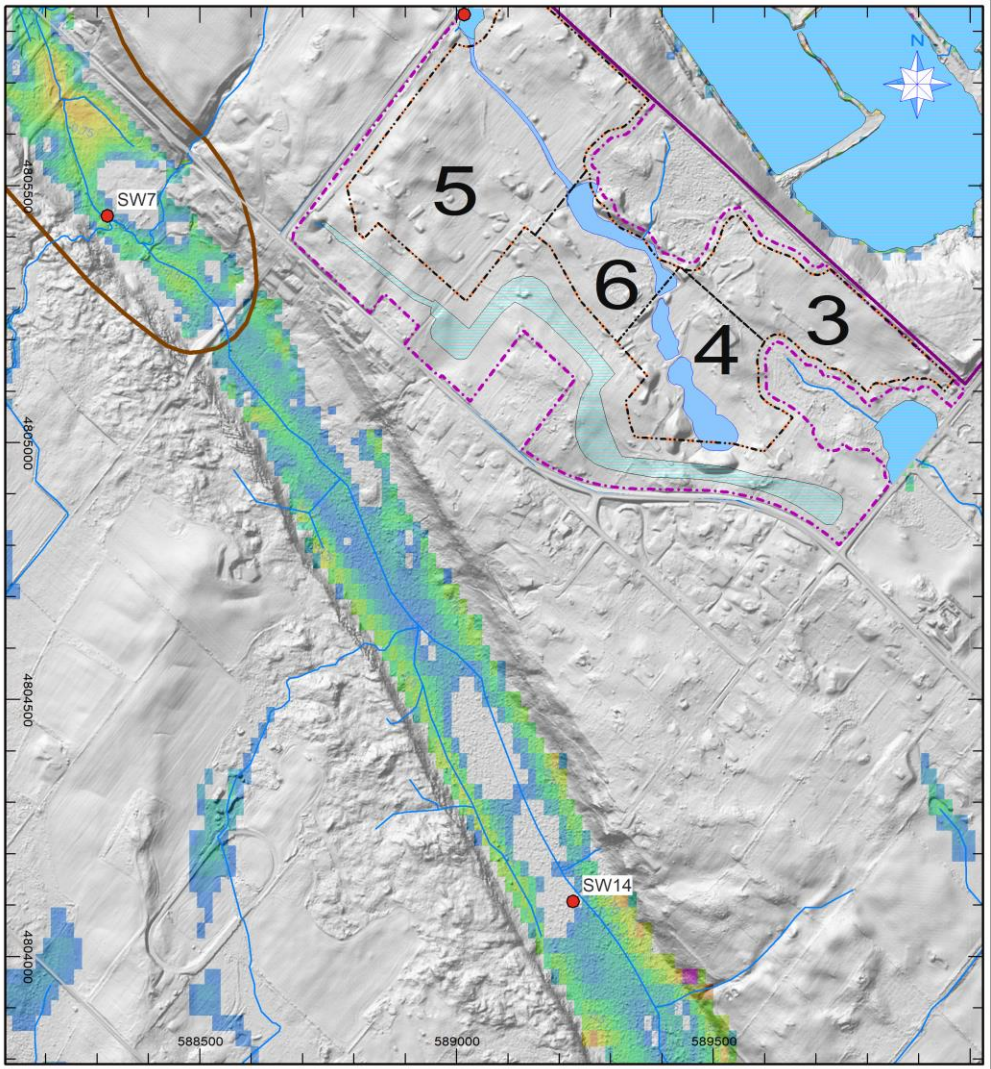
Proposed Burlington Quarry Extension
Nelson Aggregates Co.

Medad Valley Follow-up

May 20, 2022

Baseline Areas of Water Levels above Ground Surface

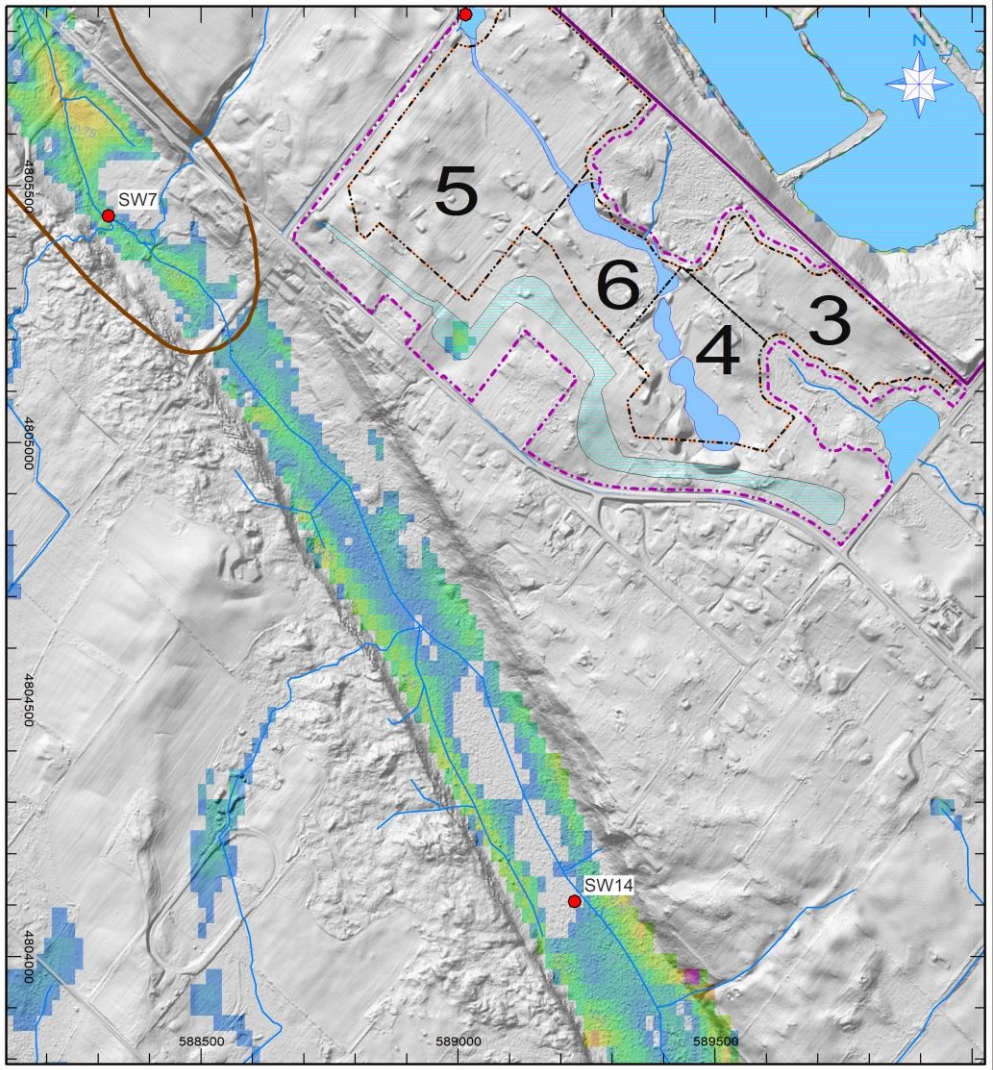
- **BASELINE**
- Baseline L4 average water level above ground surface



Earthfx Incorporated

P3456 Areas of Water Levels above Ground Surface

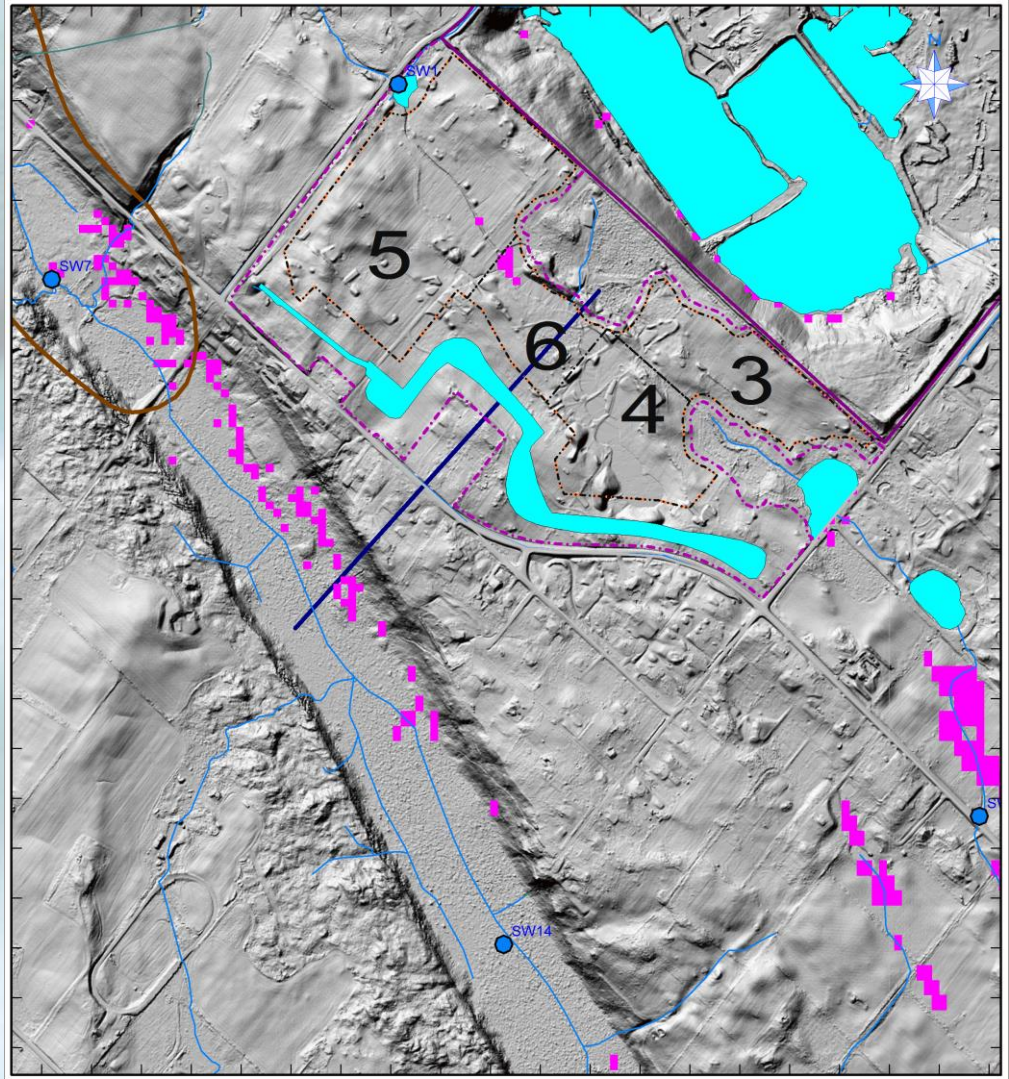
- **Original P3456 Infiltration Pond Design**
- L4 average water level above ground surface



Earthfx Incorporated

P3456 Change in Areas of Water Levels above Ground Surface

- **Original Design**
- L4 change in area where average water level is no longer above ground surface



Earthfx Incorporated

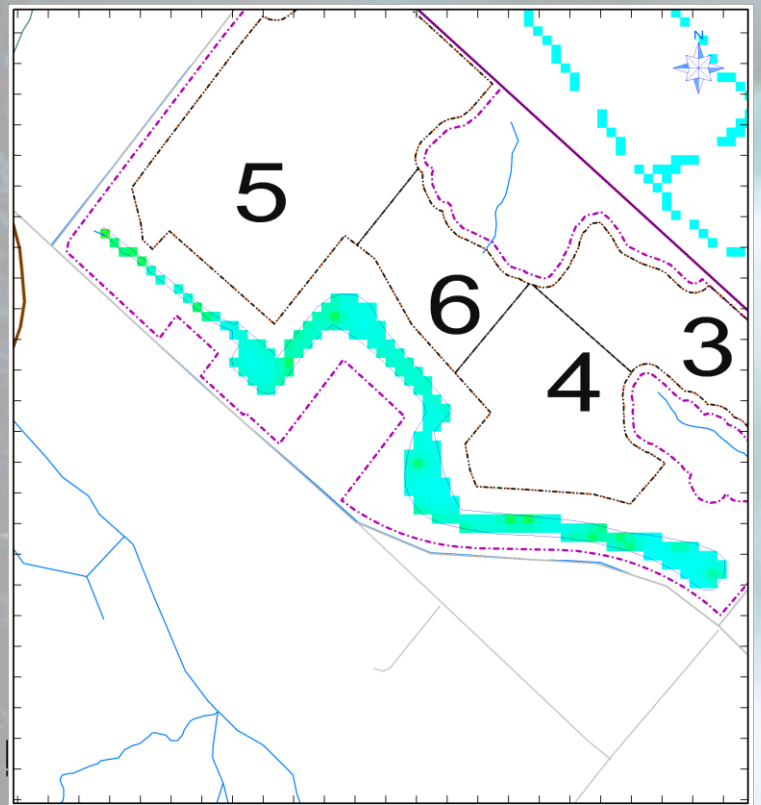
Assessment of Enhanced Infiltration: Deep Ponds

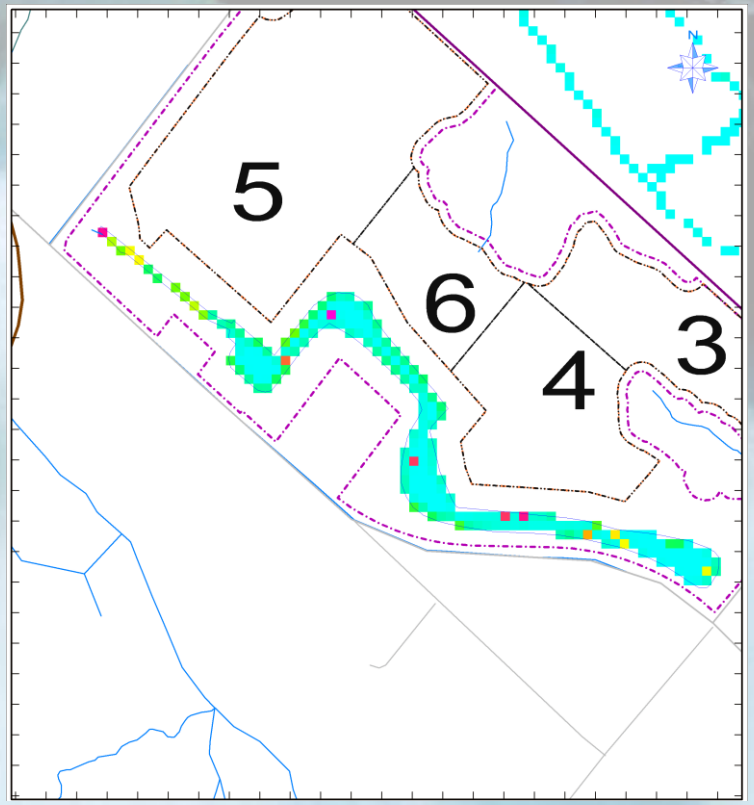
- Current pond purpose and design: Replicate golf course ponds
  - Shallow ponds completed in Halton Till
  - Limited leakage

- New “Deep Pond” Scenario
  - Deepen ponds: Excavate ponds to bedrock
    - Increase lakebed conductance from $1x10^{-6}$ m/s to $1x10^{-5}$ m/s
    - Lake bed K still ½ order less than bedrock K = **Conservative assumption**
  - Raise height of outlet weir at SW1 by 1 m (from 269 masl to 270 masl)

Seepage Increase in Deep Pond Scenario

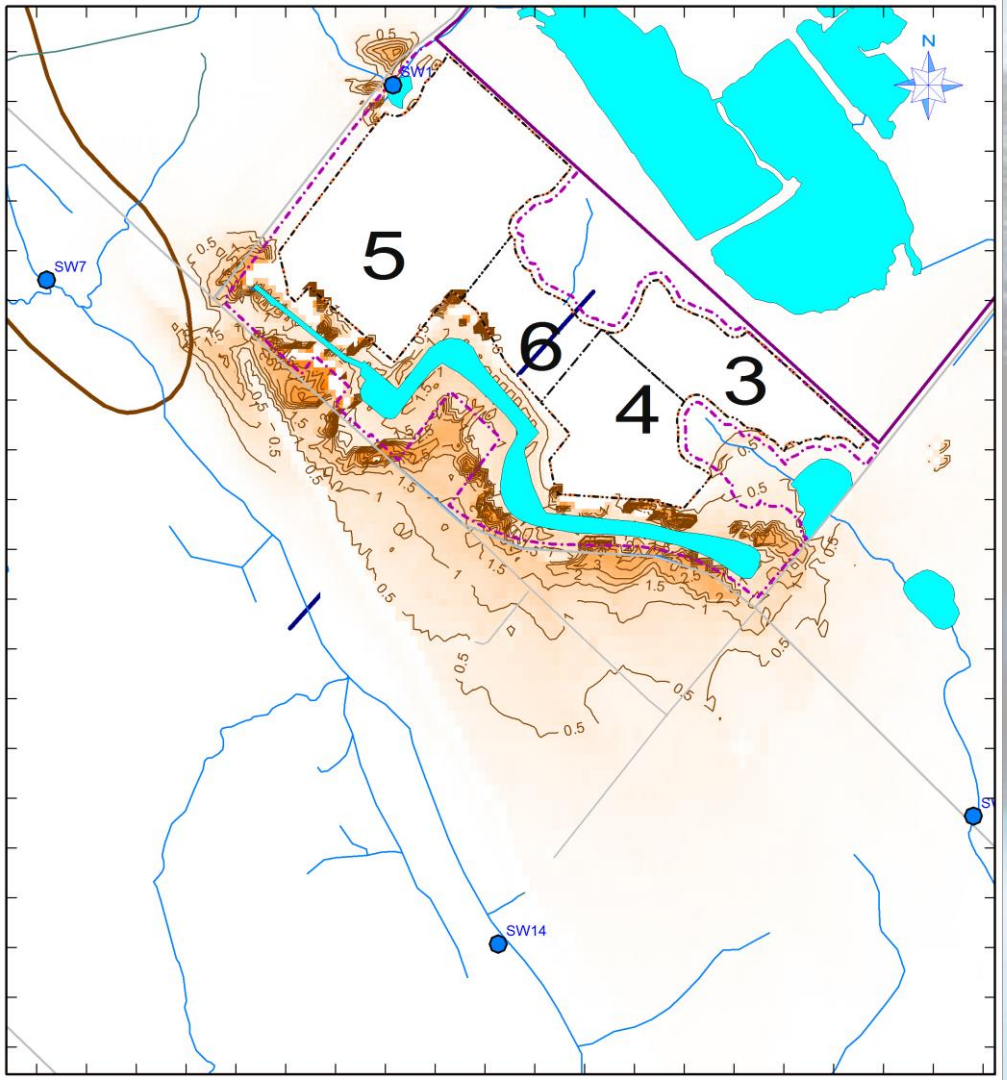
- Lake seepage almost doubles (778 to 1405) m^3/d between P3456 and Deep Pond.





Increase in Heads

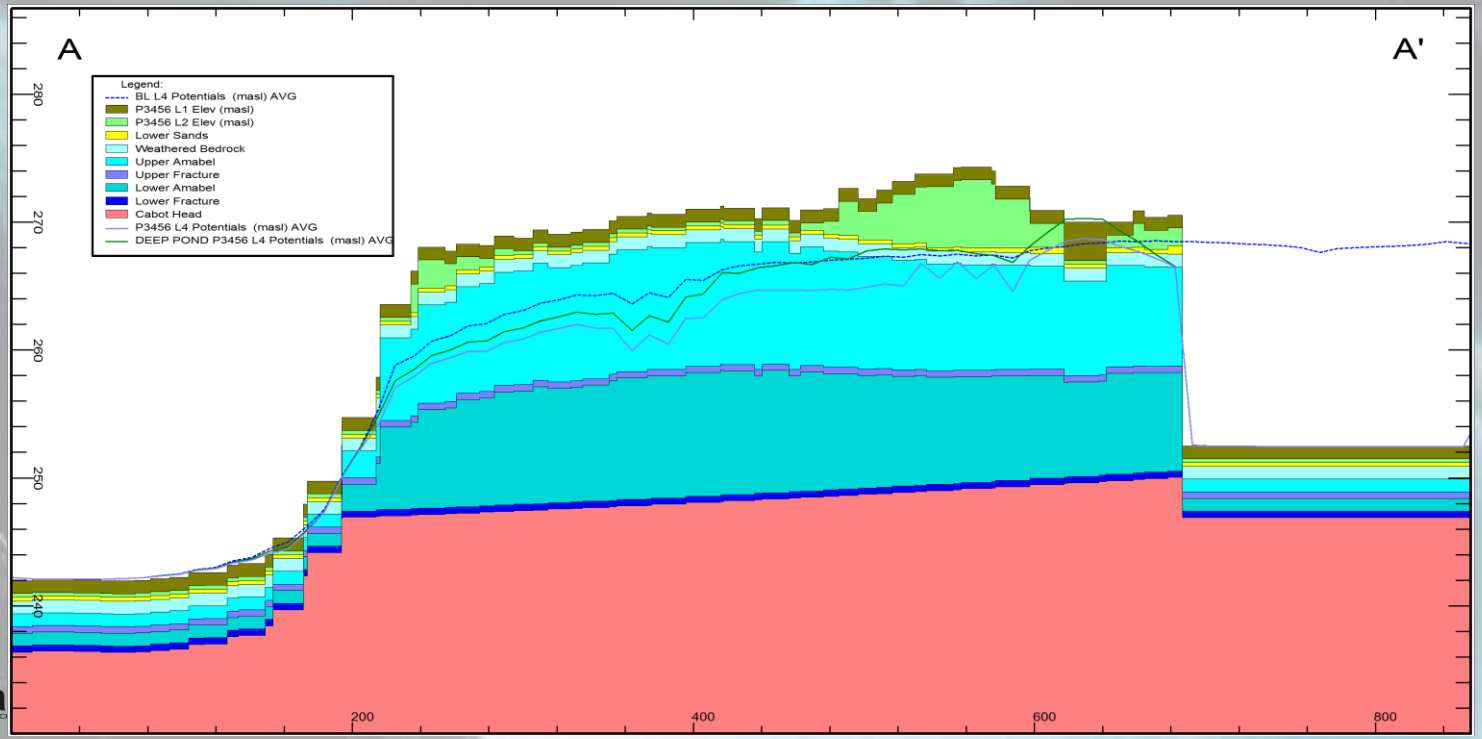
- Shallow heads (Layer 1) increase compared to P3456 along Cedar Springs Rd.
- Head increase can exceed 4 m.
- Heads increase up to 0.5 m at valley bottom edge



Earthfx Incorporated

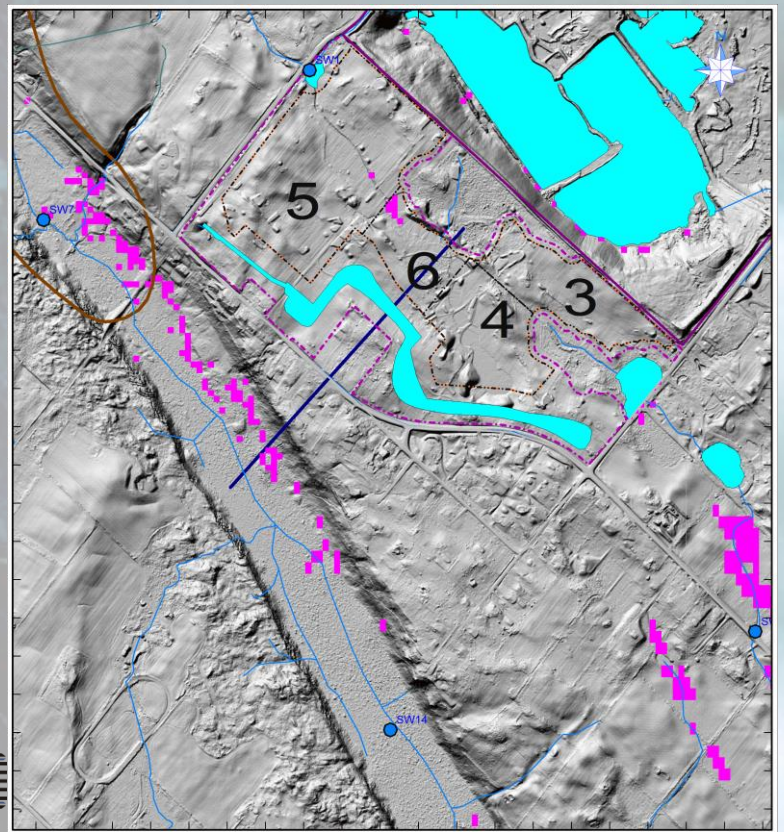
Increase in Heads

- Similar results in Layer 4
- Figure compares baseline (dashed) to P3456 (blue) and Deep Pond (green)

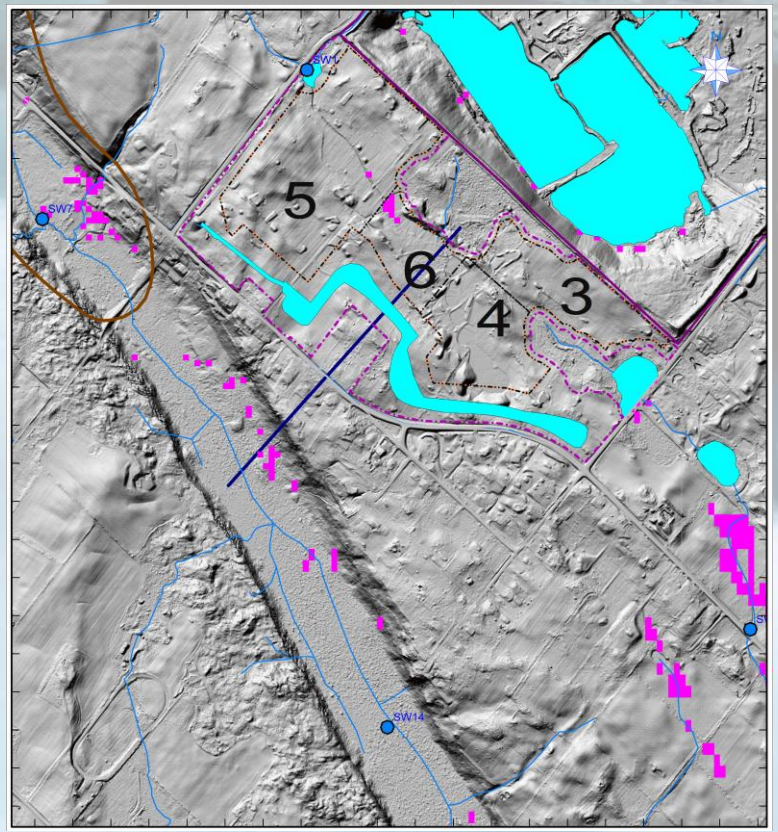


Change in areas of upward gradient: P3456 vs Deep Pond

- L4 change in area where average water level is no longer above ground surface
- P3456 Scenario (116 cells)

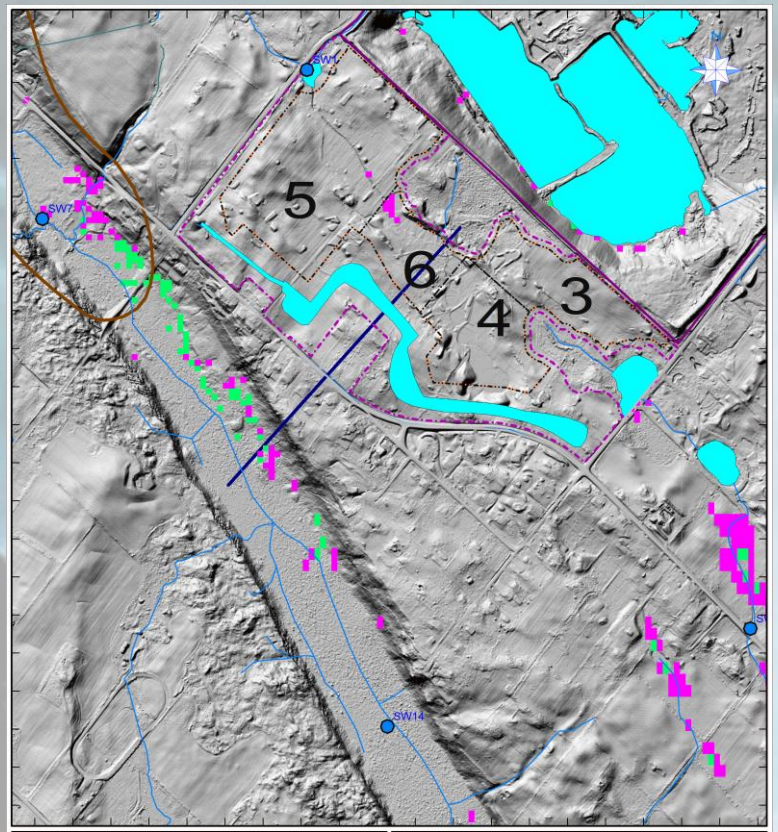


Deep Pond (55 cells – 52% reduction)



Change in areas of upward gradient: P3456 vs Deep Pond

- L4 change in area where average water level is no longer above ground surface
- Deep Pond Scenario



Green cells are no longer affected

Remaining affected area is patchy and related to local topographic variation

Deep Infiltration Pond Summary

- Deepening the infiltration pond and raising the outlet weir increases seepage out.
  - Conservative lake bed assumption: ½ order of magnitude lower K than bedrock
- Heads in the Cedar Springs Road area increase up to 4 m.
  - Heads increase up to 0.5 m in Medad Valley because they are generally close to land surface already
  - Upward gradients are restored in most of the area impacted under P3456.
- Remaining affected area is patchy and related to local topographic variation
- Monitoring will ensure system is working as designed.

MEMORANDUM

To: Nelson Review Team

From: Earthfx Incorporated

Date: May 29, 2022

Subject: Documentation of Deep Pond Simulation Results presented at May 20, 2022 NDMNRF Meeting

1 Introduction

This technical memorandum provides information on the simulation of a new infiltration pond design as discussed at the project meeting on May 20, 2022.

2 Simulation Objectives

The objectives of the new simulation were to determine the effects of modifying the proposed infiltration ponds, as presented in Earthfx, 2020, Scenario P3456, to increase infiltration to the bedrock.

3 P3456 Scenario Summary

Earthfx (2020, Section 8.7) reporting on the likely impact of extracting aggregate from Phases 3 through Phase 6 in the proposed West Extension of the Burlington Quarry. For the purposes of those analysis, referred to as Scenario P3456, it was assumed that extraction was at its maximum depth and dewatering was ongoing in all four extraction areas. The final elevation of the quarry floor is 252.5 masl in the P3456 footprint. Quarry discharge was directed to the existing quarry lakes and eventually discharged from the Northwest sump. Figure 1 shows the topography and drainage in the quarry vicinity in the P3456 scenario.

Results of the analysis were compared against baseline (current) conditions and showed the likely change in groundwater levels, stream flows, and discharge of groundwater to land surface within the

Medad Valley west of the quarry site. These were discussed in detail in Earthfx (2020) and several key figures are reproduced here. Figure 2 shows the average simulated drawdown (decrease in groundwater levels compared to Baseline) in Model Layer 6. The drawdowns decrease rapidly with distance from the excavation, and exhibit less than 2.0 m of drawdown at a distance of 500 m from the active face. Figure 2 also shows the average simulated change in streamflow. Increases in simulated flow occur within the P3456 area, at the Northwest sump, and in the conduits carrying flow to the infiltration pond. Slight decreases in average simulated flow occur in the Medad Valley compared to Baseline Conditions.

Figure 3 shows a hydrograph comparing simulated daily streamflow under Scenario P3456 to Baseline Conditions for SW07 in the Medad Valley. Changes in streamflow are shown (inverted) on the secondary y-axis. Results show very small decreases in baseflow and small losses in peak flows during storm or snowmelt events.

A feature of the P3456 Scenario was the addition of an infiltration pond in the West Extension area between Cedar Springs Road and the extraction area (see Figure 1) for the purpose of replicating existing golf course ponds. Under current conditions, water is routinely diverted from the north quarry discharge pond and conveyed through ditches to the golf course ponds. This water is used for irrigation (a portion of which likely recharges the groundwater system), and in addition the standing water in the ponds also directly leak to the groundwater system. The pond leakage was investigated during a pumping test reported in Earthfx (2020). Figure A12 on page 439 of that report, shows the increase in temperature in borehole BS-06 due to leakage from warmer pond water.

The P3456 infiltration pond was designed intended to function in a similar manner to the irrigation ditches and golf course ponds, and help maintain the existing surface and groundwater system. Water from quarry discharge at the northwest sump will be continuously diverted to the infiltration pond. The proposed infiltration pond was assumed to be shallow, occupying model Layer 1, and underlain by unweathered Halton Till. The proposed P3456 infiltration ponds were not optimized to maximize infiltration, but simply to replicate the existing system. The lake average seepage under this scenario is shown in Figure 4.

Simulations of the P3456 scenario were run with and without the infiltration pond to determine the incremental benefit of the shallow layer 1 pond. Results showed that the infiltration pond raised the groundwater levels in Layer 6 (middle of the Amabel aquifer) by 5.5 m at the pond location1.5 to 3.5 m along Cedar Springs Road, and 0.5 m along the edge of the Medad Valley, when compared to a scenario without the infiltration pond (Figure 5).

The effects on the water levels and gradients in the Medad Valley under P3456 were evaluated by identifying areas where there was a change in water level gradient. Water levels decline modestly in the valley during P3456. One measure of that decline are areas where, on average, water levels in the Layer 4 bedrock will no longer be above ground surface. (Seasonally, water levels may still be above ground surface, however). These areas, shown as purple squares in Figure 6, are generally located along the easter wall of the Medad Valley.

In summary, the original P3456 pond design is effective at generally replicating the effects of the golf course ponds. The effects of the design P3456, including the proposed shallow infiltration ponds, result in minimal impact on water levels in the Medad Valley.

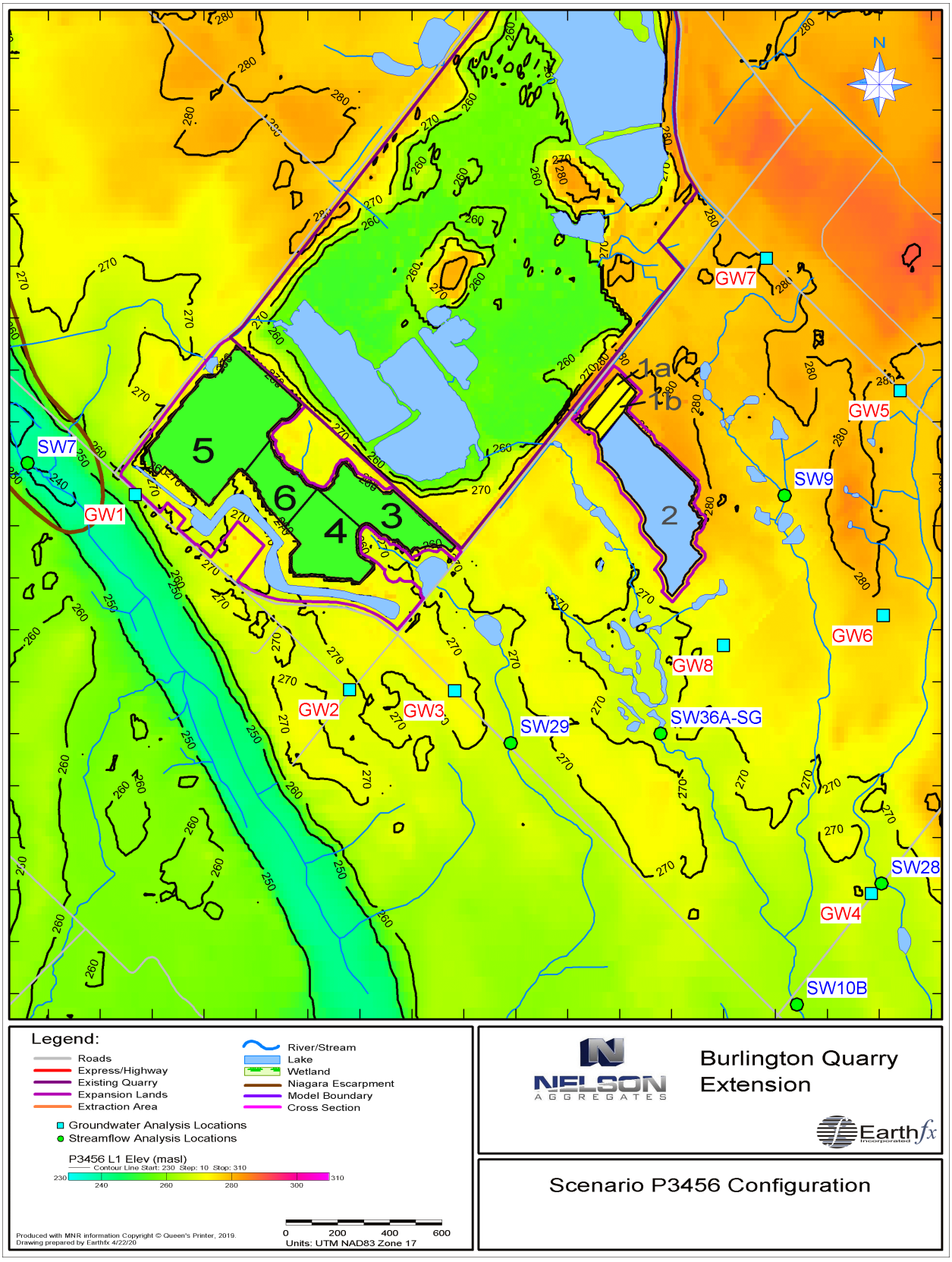


Figure 1: Scenario P3456 and Deep Pond Scenario configurations.

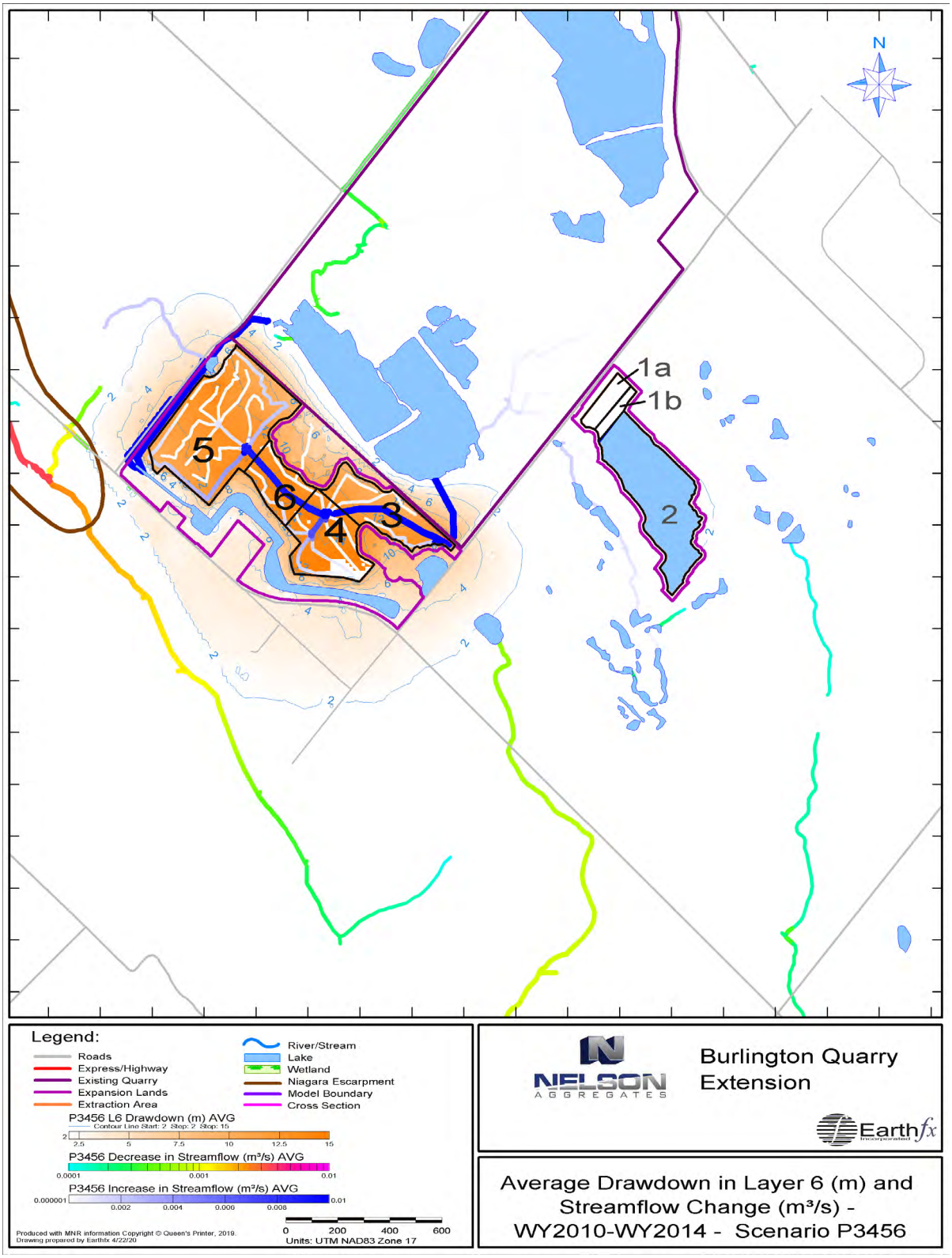


Figure 2: Average simulated drawdown in Model Layer 6 (m) and increase/decrease in streamflow (m3/s) for WY2010 to WY2014 under Scenario P3456.

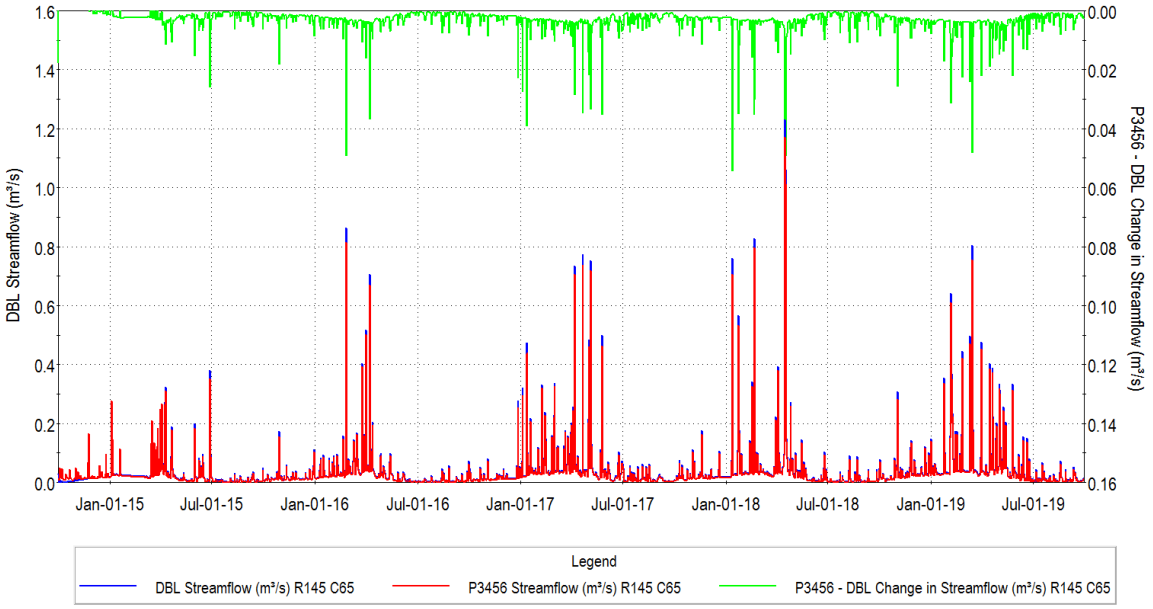


Figure 3: Simulated streamflow at SW07 for WY 2014-2019 – P3456 and Baseline Conditions.

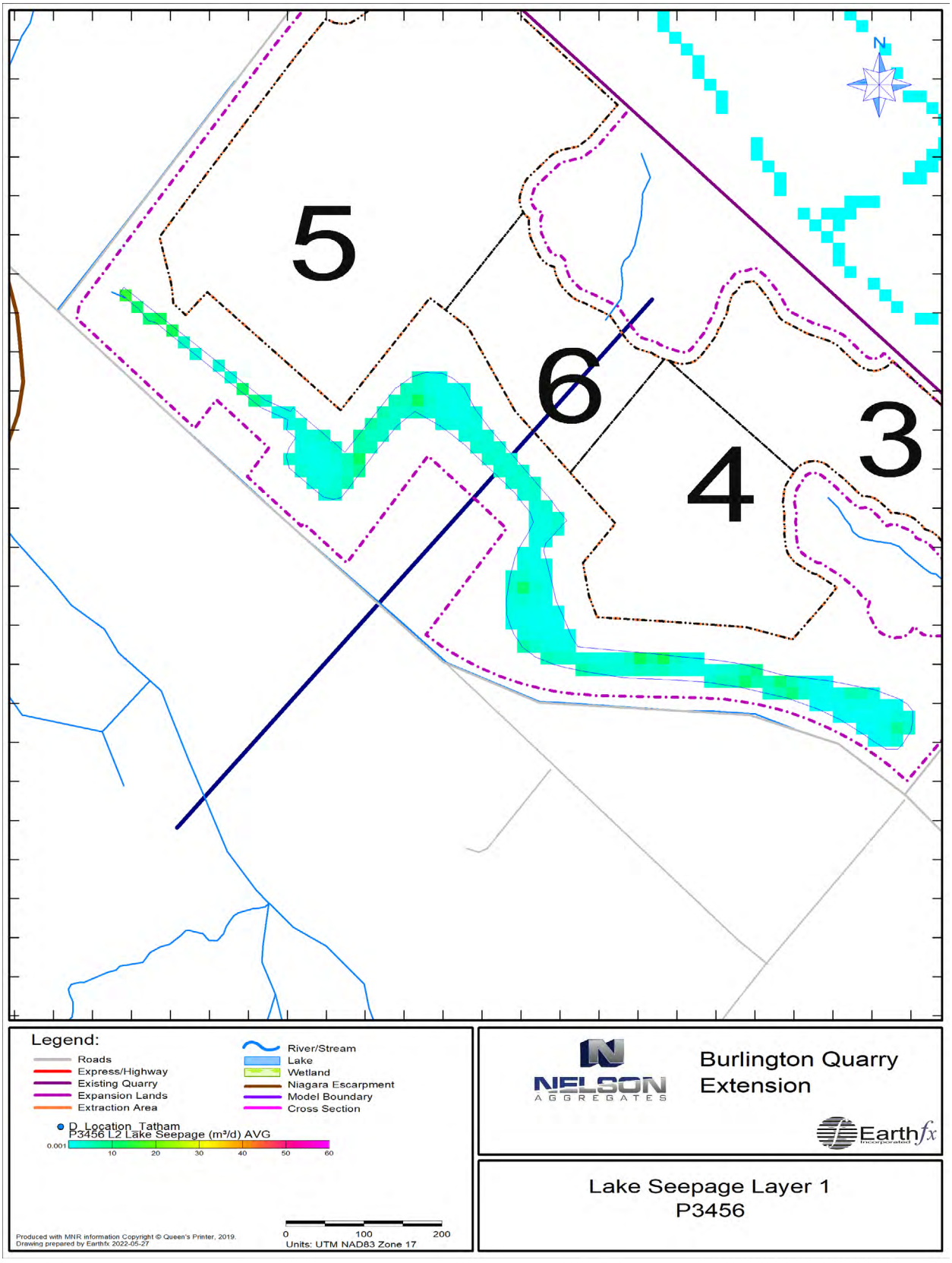


Figure 4: Lake seepage in Layer 1 P3456 Scenario

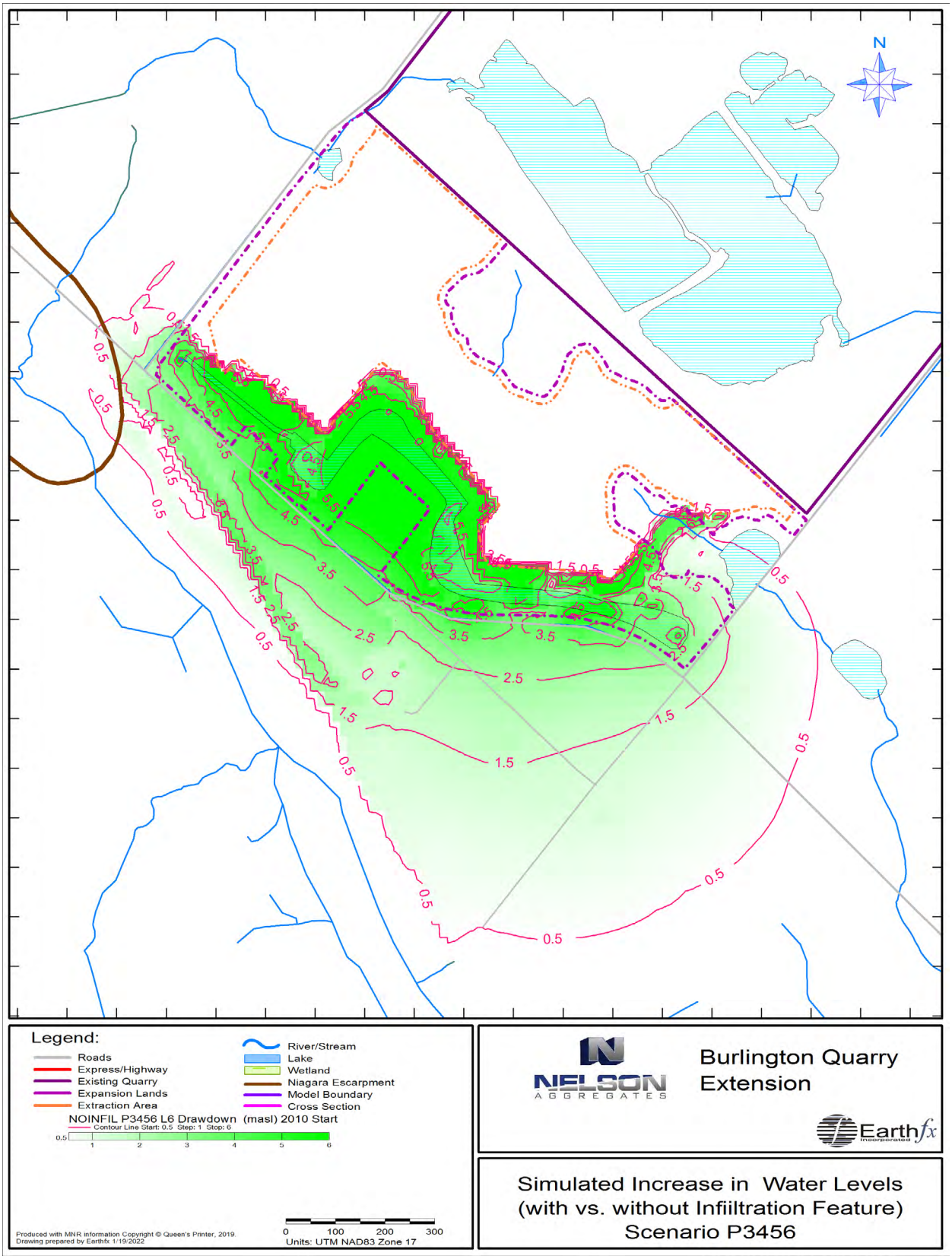


Figure 5: Simulated increase in water levels due to P3456 shallow infiltration ponds

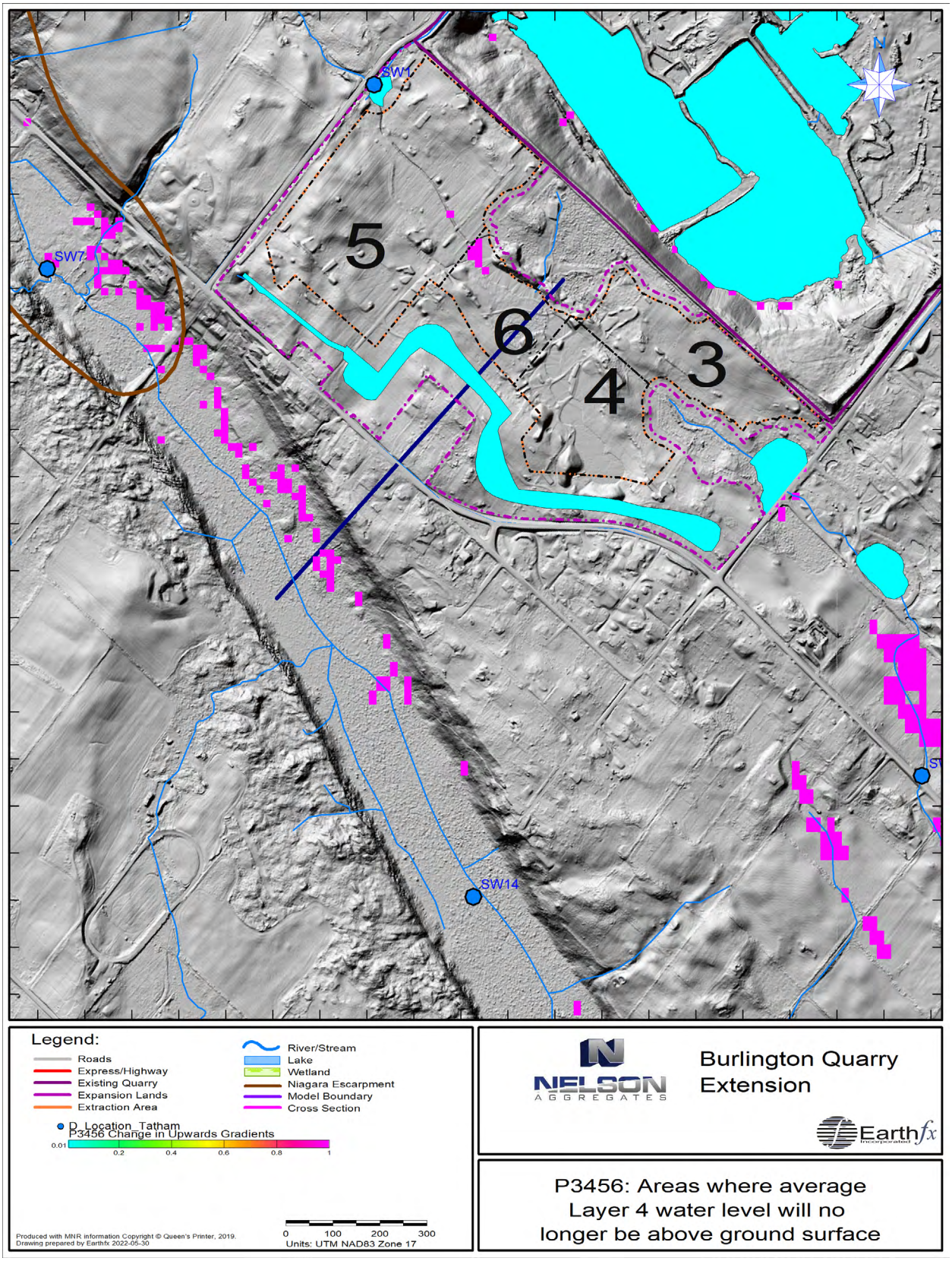


Figure 6: P3456 Areas where average Layer 4 water levels will no longer be above ground surface

4 Modified Scenario P3456: Deep Pond Scenario

The P3456 infiltration pond was not specifically designed to maximize infiltration. During discussions in April, 2022, MNDMNRF reviewers requested that additional simulations be undertaken to determine whether simple changes could be made to the operation and configuration of the infiltration pond to further reduce the impacts of the quarry on the Medad Valley.

A modified Scenario P3456 was run to assess the effects of changes to the infiltration pond. For this scenario the infiltration pond is fully excavated through the Halton till to the bedrock (base of Layer 3). This will provide more opportunity for infiltration compared to the previous P3456 scenario where the ponds were constructed only to the top of the unweathered till (base on Layer 1). To further enhance leakage, the proposed operating water level in the pond was raised from 269.05 masl to 270.05 masl to provide a higher driving head for infiltration.

While a direct excavated connection to the bedrock is proposed, there remains the possibility that some fine-grained sediments may remain (or accumulate) over time on the bedrock surface. This may limit leakage. As a conservative assumption, the hydraulic conductance of the lake bottom sediments was assigned a hydraulic conductivity one-half an order of magnitude lower than that of the Layer 4 weathered bedrock.

As in the previous P3456 simulation, extraction is assumed to be at its maximum depth and dewatering is ongoing in all four extraction areas. The final elevation of the quarry floor is 252.5 masl in the P3456 footprint. Quarry discharge is directed to the existing quarry lakes and eventually discharged from the Northwest sump.

The GSFLOW model was run with the updated inputs. This scenario is referred to as the “Deep Pond Scenario” and model results were post-processed and compared to the original P3456 Design Conditions.

Figure 7 shows the increase in average water levels between the P3456 and new Deep Pond scenario. The increased leakage causes water levels rise locally up to 4 m, and as much as 0.5 m in the eastern portion of the Medad Valley.

Figure 8 shows the average leakage to bedrock under the Deep Pond Scenario. Compared to P3456 (Figure 4), the leakage to bedrock doubles from an average of 778 m^3/d to 1405 m^3/d. As noted above, this is under a conservative assumption of lake bed conductance. Leakage would be still higher if no fine-grained sediments remain or accumulate. Strict settlement and discharge water quality monitoring will be implemented to prevent fine grained sediments from entering the ponds.

As in the previous scenario, the effects on the water levels and gradients in the Medad Valley were evaluated by identifying areas where there was a change in water level gradient. Areas where, on average, water levels in the Layer 4 bedrock will no longer be above ground surface are shown in Figure 9. These areas, shown as purple squares in Figure 9, are generally located along the easter wall of the Medad Valley. Compared to the P3456 conditions shown in Figure 6, the affected area is reduced by over 50% and is now sporadically distributed along the eastern portion of the Medad valley (in areas of slightly higher local relief). Figure 10 compares the P3456 results to those of the Deep Pond scenario, showing the difference as green cells.

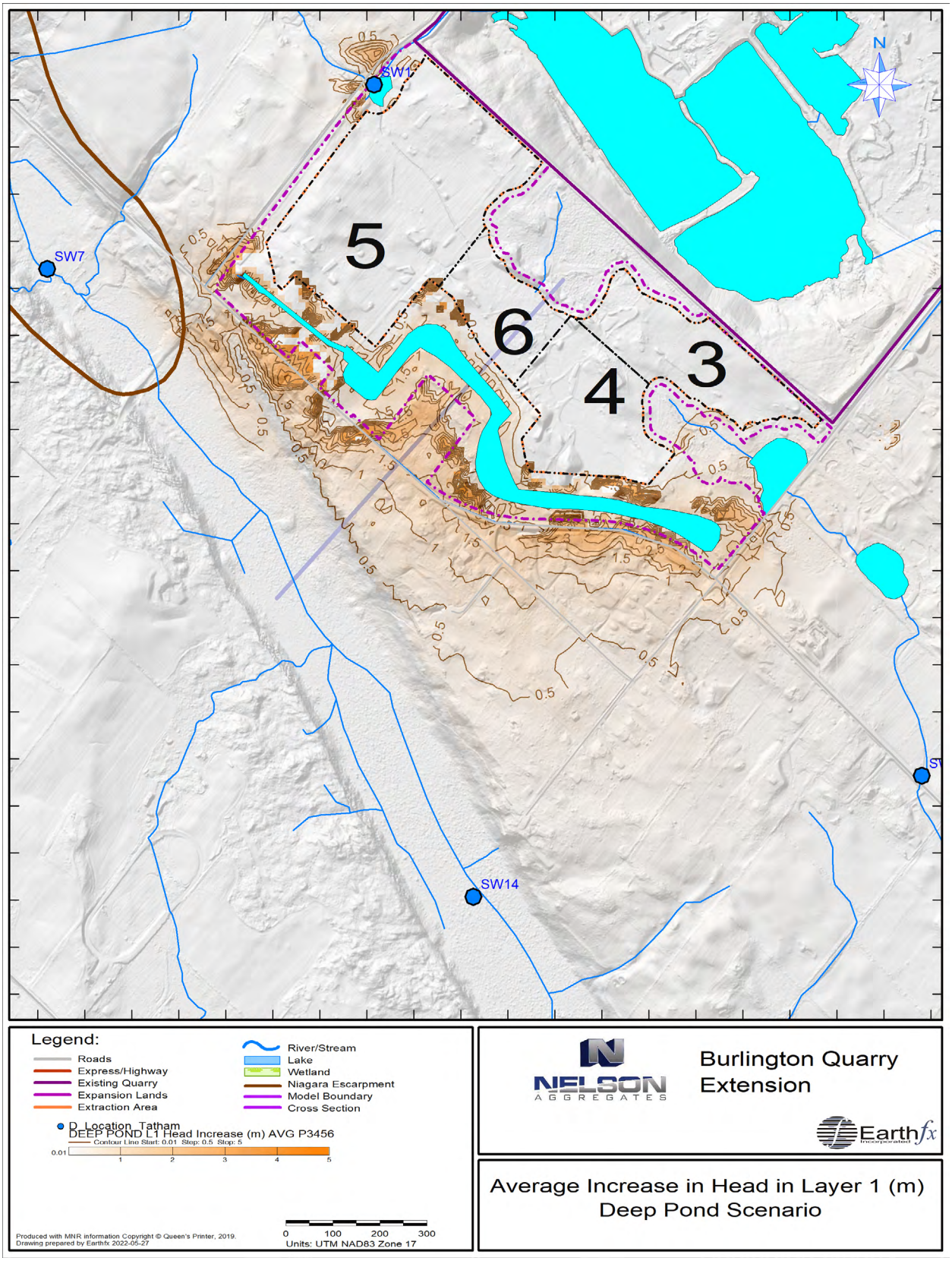


Figure 7: Average increase in Layer 1 water levels between P3456 and Deep Pond Scenario

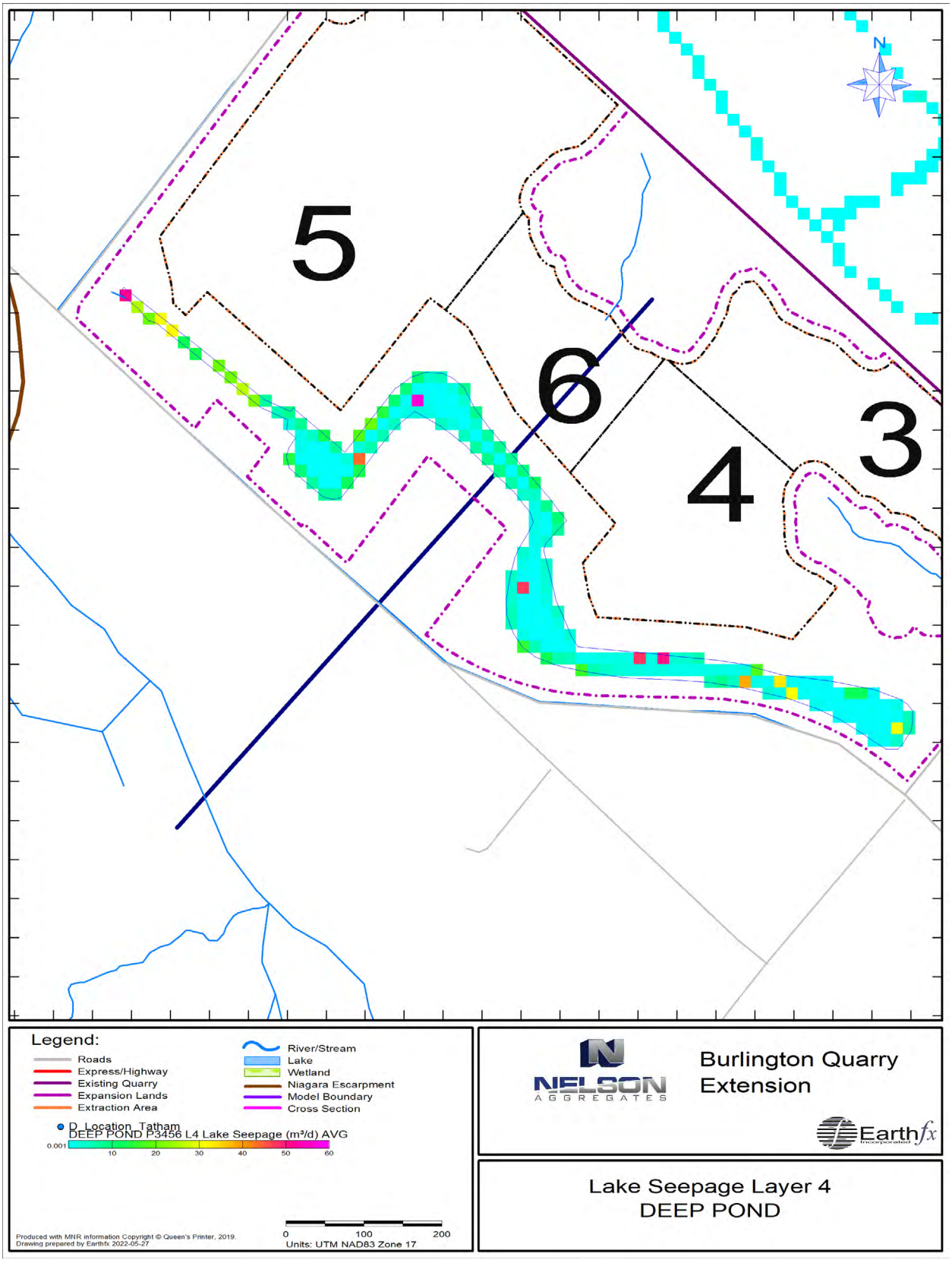


Figure 8: Lake seepage under the Deep Pond Scenario

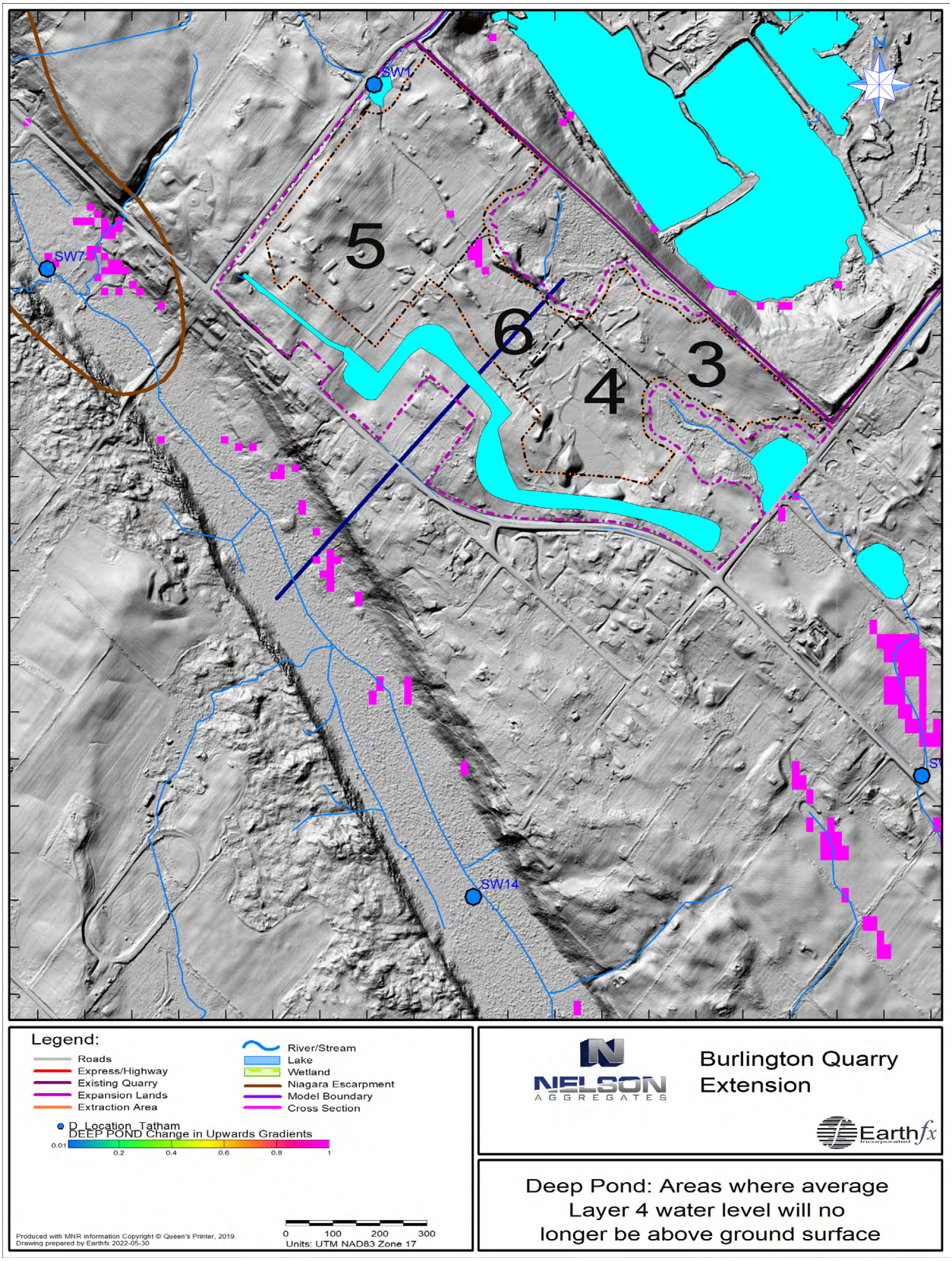


Figure 9: Deep Pond Scenario areas where average Layer 4 water levels will no longer be above ground surface

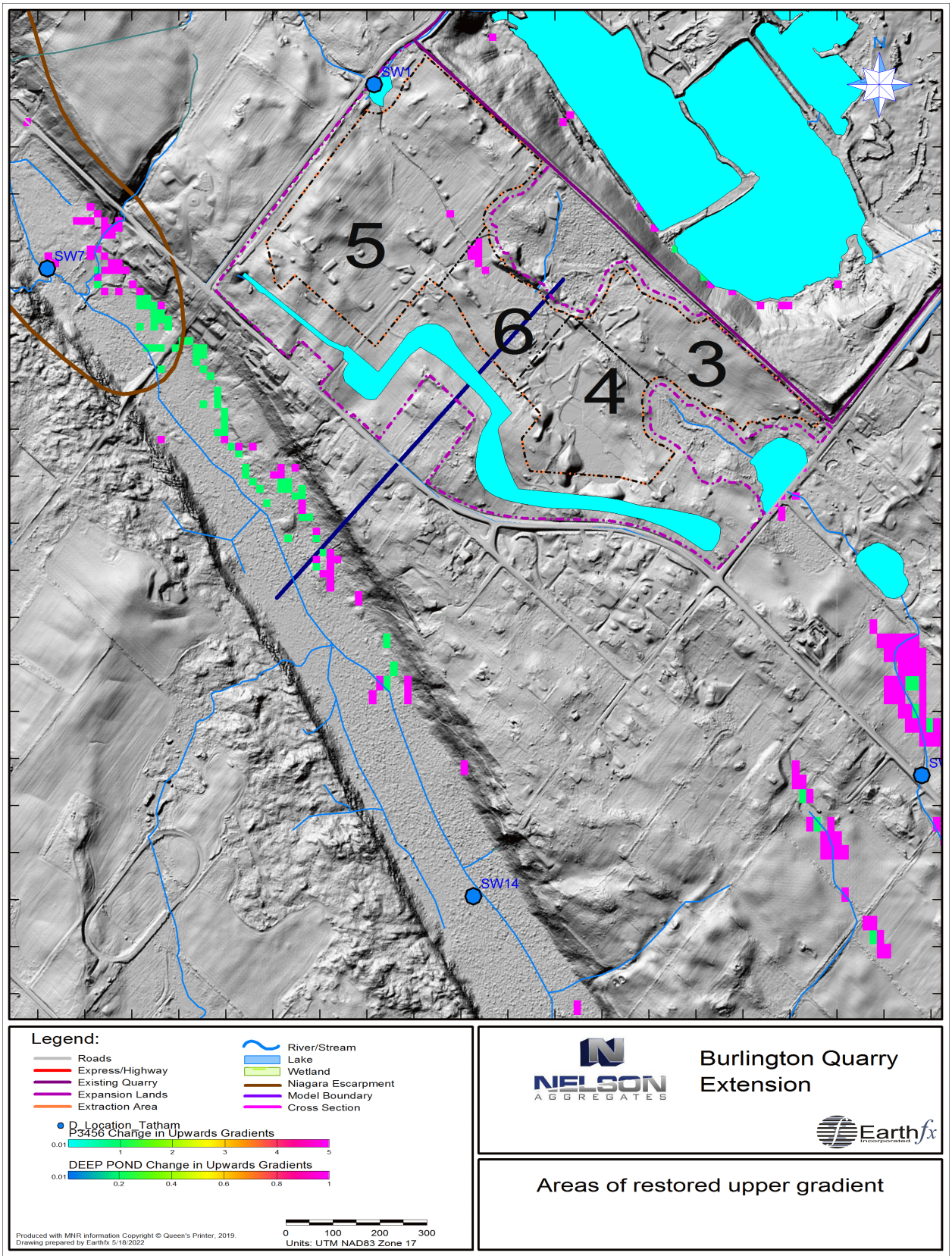


Figure 10: Areas where average water levels will be restored (green cells) between P3456 and Deep Pond scenario. Remaining affected cells are shown in purple.

To conclude, the new Deep Pond scenario demonstrates that modest improvements in the pond design can significantly improve water levels both locally and in the Medad Valley. Conservative assumptions were used to represent the deeper infiltration pond. Under the new design, the effects on the Medad Valley will be very limited and highly dispersed across the extensive wetland feature that occupies the valley.

Yours truly
Earthfx Incorporated

Dirk Kassenaar, M.Sc., P.Eng.
President

E.J. Wexler, M.Sc., M.S.E., P.Eng.
Director of Modelling Services

Tab **4**

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
			2018	
October 5	N/A	N/A	Aquatic Site Reconnaissance	N. Boucher S. Catton
October 19	N/A	N/A	Reconnaissance Site Visit	S. Catton T. Hilditch
November 28	N/A	N/A	Terrestrial Site Reconnaissance Woodland Stem Density Survey	J. Leslie
			2019	
March 25	N/A	N/A	Salamander Site Recon Survey	J. Leslie L. Williamson
March 25	09:00	Cloud (%): 20 Temp (C): -2 Wind: 2 Precip: None Humidity (%): 54	Salamander Habitat Assessment	J. Leslie L. Williamson
April 2	Between 06:00 & 08:00	Cloud (%): 30 Temp (C): 3 Wind: 0 Precip: None Humidity (%): 56	Salamander Trapping	J. Leslie R. Lee
April 2	09:00	Cloud (%): 20 Temp (C): 4 Wind: 1 Precip: None Humidity (%): 54	Salamander Habitat Assessment	J. Leslie R. Lee
April 3	Between 06:00 & 08:00	Cloud (%): 30 Temp (C): 6 Wind: 2 Precip: None	Salamander Trapping	J. Leslie L. Williamson

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Humidity (%): 64		
April 3	09:00	Cloud (%): 20 Temp (C): 7 Wind: 2 Precip: None Humidity (%): 56	Salamander Habitat Assessment	J. Leslie L. Williamson
April 4	Between 06:00 & 08:00	Cloud (%): 20 Temp (C): 1 Wind: 1 Precip: none Humidity (%): 51	Salamander Trapping	L. Williamson E. Lee
April 4	09:30	Cloud (%): 10 Temp (C): 2 Wind: 1 Precip: none Humidity (%): 41	Salamander Habitat Assessment	L. Williamson E. Lee
April 5	Between 06:00 & 08:00	Cloud (%): 30 Temp (C): 2 Wind: 0 Precip: None Humidity (%): 60	Salamander Trapping	L. Williamson E. Lee
April 5	10:00	Cloud (%): 40 Temp (C): 2 Wind: 1 Precip: None Humidity (%): 68	Salamander Habitat Assessment	L. Williamson E. Lee
April 6	Between 06:00 & 08:00	Cloud (%): 30 Temp (C): 2 Wind: 0 Precip: None	Salamander Trapping	J. Leslie L. Williamson

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Humidity (%): 60		
April 6	08:00	Cloud (%): 90 Temp (C): 5 Wind: 2 Precip: None Humidity (%): 85	Salamander Habitat Assessment	J. Leslie L. Williamson
April 10	09:00	Cloud (%): 80 Temp (C): 2 Wind: 3 Precip: None Humidity (%): 64	Bat Habitat Assessment	L. Williamson S. Catton A. Leadbetter
April 10	09:25	Cloud (%): 80 Temp (C): 2 Wind: 2 Precip: None Humidity (%): 70	Amphibian Egg Mass Survey	L. Williamson S. Catton A. Leadbetter
April 10	09:25	Cloud (%): 80 Temp (C): 2 Wind: 2 Precip: None Humidity (%): 70	Salamander Habitat Assessment	L. Williamson S. Catton A. Leadbetter
April 11	09:15	Cloud (%): 80 Temp (C): 1 Wind: 2 Precip: None Humidity (%): 78	Bat Habitat Assessment	L. Williamson A. McLaren
April 15	09:10	Cloud (%): 80 Temp (C): 4 Wind: 2 Precip: None	Bat Habitat Assessment	L. Williamson A. McLaren

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Humidity (%): 80		
April 16	09:10	Cloud (%): 20 Temp (C): 5 Wind: 2 Precip: None Humidity (%): 54	Bat Habitat Assessment	L. Williamson E. Lee
April 18	N/A	N/A	Headwater Drainage Feature Assessment Round 1	M. Letourneau O. Park
April 22	09:14	Cloud (%): 80 Air Temp (C): 10 Water Temp: 6 Precip: none Wind: 0 Humidity (%): 90	Turtle Basking Survey Round 1	L. Williamson R. Lee
April 22	09:24	Cloud (%): 40 Air Temp (C): 14 Precip: none Wind: 0 Humidity (%): 89	Snake Visual Encounter Survey Round 1	L. Williamson R. Lee
April 22	10:00	Cloud (%): 40 Air Temp (C): 10 Precip: none Wind: 0 Humidity (%): 79	Salamander Habitat Assessment	L. Williamson R. Lee
April 25	20:44	Cloud (%): 100 Air Temp (C): 7 Precip: none Wind: 1 Humidity (%): 74	Amphibian Call Count Survey Round 1	L. Williamson O. Park

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
May 10	09:05	Cloud (%): 80 Temp (C): 14 Wind: 2 Precip: None Humidity (%): 74	Bat Habitat Assessment	L. Williamson E. Lee
May 10	10:08	Cloud (%): 80 Air Temp (C): 13 Water Temp: 11 Precip: rained yesterday Wind: 2 Humidity (%): 82	Turtle Basking Survey Round 2	L. Williamson E. Lee
May 10	10:00	Cloud (%): 51 Air Temp (C): 14 Precip: none Wind: 1 Humidity (%): 70	Salamander Habitat Assessment	L. Williamson E. Lee
May 16	12:13	Cloud (%): 51 Air Temp (C): 14 Precip: none Wind: 1 Humidity (%): 72	Snake Visual Encounter Survey Round 2	L. Williamson
May 16	10:00	Cloud (%): 90 Air Temp (C): 9 Precip: none Wind: 1 Humidity (%): 80	Salamander Habitat Assessment	L. Williamson
May 22	21:12	Cloud (%): 85 Air Temp (C): 10 Precip: none	Amphibian Call Count Survey Round 2	L. Williamson A. McLaren

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Wind: 1 Humidity (%): 70		
May 27	N/A	N/A	Ecological Land Classification Spring Botanical Survey	J. Leslie A. Szabo
June 3	N/A	N/A	Headwater Drainage Feature Assessment Round 2	M. Letourneau O. Park
June 10, 11	05:21	Cloud (%): 100 Temp (C): 17 Precip: none Wind: 2 Humidity (%): 92	Breeding Bird Survey Round 1	P. Burke
June 10, 11	05:30	Cloud (%): 100 Temp (C): 17 Precip: none Wind: 1 Humidity (%): 92	Insect Survey Round 1	P. Burke
June 11	11:10	Cloud (%): 0 Air Temp (C): 17 Water Temp: 15 Precip: rained Wind: 2 Humidity (%): 56	Turtle Basking Survey Round 3	L. Williamson M. Green
June 11	09:27	Cloud (%): 0 Temp (C):18 Precip: rained yesterday Wind:1 Humidity (%): 55	Snake Visual Encounter Survey Round 3	L. Williamson M. Green
June 11	10:30	Cloud (%): 5	Salamander Habitat Assessment	L. Williamson

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Temp (C):19 Precip: rained yesterday Wind:1 Humidity (%): 53		M. Green
June 17	09:30	Cloud (%): 90 Air Temp (C): 16 Water Temp: 13 Precip: N/A Wind: N/A Humidity (%): 83	Fish Community Sampling and Aquatic Habitat Assessment (West Arm of the West Branch of the Mount Nemo Tributary Grindstone Creek)	M. Letourneau O. Park L. Williamson
June 17	21:30	Cloud (%): 83 Temp (C):18 Precip: none Wind:0 Humidity (%): 75	Amphibian Call Count Survey Round 3	M. Letourneau O. Park L. Williamson
June 20 – July 3	21:00-07:00	Cloud (%): 90 Temp (C): 18 Precip: none Wind:0 Humidity (%): 87	Bat Acoustic Monitoring	R. Lee
June 24	07:00	Cloud (%): 100 Air Temp (C): 16 Water Temp: 13 Precip: N/A Wind: N/A Humidity (%): 90	Fish Community Sampling and Aquatic Habitat Assessment (Unnamed Tributary of Willoughby Creek and Golf Course irrigation channel/ponds)	M. Letourneau O. Park A. McLaren A. Leadbetter
June 25	05:53	Cloud (%): 80 Air Temp (C): 19 Precip: none	Breeding Bird Survey Round 2	P. Burke

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
		Wind: 1 Humidity (%): N/A		
June 25	06:00	Cloud (%): 40-80 Air Temp (C): 19-22 Precip: none Wind: 1 Humidity (%): 86	Insect Survey Round 2	P. Burke
June 26	06:35	Cloud (%): 5 Air Temp (C): 22 Precip: none Wind: 1 Humidity (%): 77	Breeding Bird Survey Round 2	P. Burke
June 26	10:00	Cloud (%): 30 Air Temp (C): 25 Precip: none Wind: 1 Humidity (%): 64	Salamander Habitat Assessment	L. Williamson
July 22, 31	N/A	N/A	Ecological Land Classification Summer Botanical Survey	J. Leslie
August 9	11:30	Cloud (%): 50 Air Temp (C): 24 Precip: none Wind: 1 Humidity (%): 48	Insect Survey Round 3	P. Burke
August 26	N/A	N/A	Headwater Drainage Feature Assessment Round 3	M. Letourneau A. McLaren
September 11, 13	N/A	N/A	Ecological Land Classification	J. Leslie

Updated Field Investigation Inventory and Weather Conditions

DATE	START TIME (24-HOUR)	WEATHER CONDITIONS	NATURE OF INVESTIGATION	SURVEYOR
			Fall Botanical Survey	
October 8	N/A	N/A	Stem Density Woodland Survey	J. Leslie
November 5	Between 09:00 & 13:00	Cloud (%): 50 Air Temp (C): 7 Precip: none Wind: 4 Humidity (%): 52	Barn Swallow Nest Habitat Assessment	E. Lee

Tab **5**

Technical Memo

To: Graham Buck and Oleg Ivanov, NDMNRF

From: Shannon Catton, GEI

Date: May 31, 2022

Re: Nelson Burlington Extension and the Medad Valley Life Science ANSI and PSW

The Medad Valley Life Science ANSI and PSW contains headwater tributaries of the Grindstone and Bronte Creek watersheds. This feature consists of a valley, forest and wetland habitats.

According to the ANSI Report (MNR 1996), the slopes of the gorge average 20 m in height on the east side and 10-15 m in height on the west side. These cliff walls are predominantly shaded and moist with Bulblet Fern and Herb Robert, along with White Cedars intermittently growing on the cliff faces.

The ANSI Report (MNR 1996) notes that the talus area along the valley consists of White Cedar and White Birch talus stands, Hemlock – Sugar Maple stands in the areas with deeper soils, broadleaf/mixed stands of White Birch, White Cedar and Trembling Aspen, with open talus areas consisting of Fowl Manna Grass and Bulblet Fern. Sugar Maples are also prevalent on the west side of the valley, along with American Yew and Mountain Maple. The valley floor is densely vegetated with mixes of White Birch, White Cedar, White Pine, Tamarack and ash. Red-osier Dogwood and Pussy Willow thickets are also dense within the broader areas of the valley floor. Seeps have been observed along the base of the Medad Valley slope, which contribute water to the PSW (wetland 13204).

These vegetation species are provincially common and abundant and are tolerant to a wide moisture regime range. However, the location and form in which they are found (limestone cliff faces and talus), make these vegetation communities provincially rare and significant, confirming the provincial significance of the ANSI and wetlands. Therefore, though the feature is significant in its form and function, the vegetation species are not overly sensitive and can tolerate varying levels of moisture.

Groundwater and surface water data recently collected by Tatham Engineering and Earthfx indicate that there are two contributing components of groundwater to the stream baseflow in Medad Valley: the groundwater that upwells directly into the watercourse through the streambed and the groundwater that enters the watercourse through seepage along the valley walls and trickles down into the watercourse.

The model of the proposed extraction activity in P3456 predicts that the limited groundwater reduction primarily occurs during spring melt or large storm (rain) events, so it is a highly temporal reduction that occurs when water inputs are typically higher. The reduction also takes place in a relatively small section of the watercourse between No. 2 Sideroad and Colling Road.

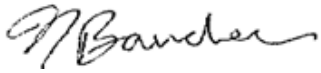
To address this potential impact, a deep infiltration pond has been proposed to mitigate any reduction of groundwater discharging to the Medad Valley. The recent model predicts that the deep infiltration pond reduces the affected area by over 50% (compared to the passive infiltration pond) and is sporadically distributed along the eastern portion of the Medad Valley.

The proposed deep infiltration pond (located between Cedar Springs Road and the West Extension), has been designed to mitigate any negative effects from the extraction of the West Extension on the Medad Valley ANSI and PSW. The deep pond will maintain seepage to the groundwater regime and will aid in maintaining groundwater levels and discharge to the Medad Valley.

Overall, the setback distance from the extraction footprint to the ANSI and PSW, the moisture-tolerant conditions of the vegetation species and communities and the temporal and limited reduction of groundwater, along with the construction of the deep infiltration pond, all indicate that there will be no negative impact on the ANSI and the PSW.

Proposed extraction activities in the West Extension are more than 10 years from now. Therefore, as a precautionary measure, the AMP is recommending that updated ecological surveys in the Medad Valley will occur at least three years prior to the commencement of extraction activities (in addition to the finalization of the surface water and groundwater triggers). This updated baseline data will be re-evaluated to ensure that there will be no negative impacts to the Medad Valley ANSI and PSW.

Sincerely,
GEI Consultants



Shannon Catton
Project Director
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Noel Boucher
Project Director
289-929-6951
nboucher@geiconsultants.com

Tab **6**

Ministry of Natural Resources and Forestry
Aurora District Office
50 Bloomington Road
Aurora, Ontario L4G 0L8

Ministère des Richesses naturelles et des Forêts

Telephone: (905) 713-7400

Ontario

August 14, 2017

ATTENTION:

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SUBJECT:

Addition of five new wetlands (Nos. 16 to 20), and refinement to the existing Wetland No. 15 in the Provincially Significant Grindstone Creek Headwaters Wetland Complex, City of Burlington, Regional Municipality of Halton

The Ministry of Natural Resources & Forestry (MNRF) has incorporated five new wetlands into the provincially significant Grindstone Creek Headwaters Wetland Complex. These additions include two existing wetlands that were formerly part of the Highview Swamp Wetland Complex (Wetland Nos. 18 and 19), and three intervening wetlands (Wetland Nos. 16, 17 & 20).

This update is based on site visits to the area by MNRF Aurora District staff on August 22, 2016, and Conservation Halton staff on August 24, 2016, air-photo interpretation by MNRF staff using spring 2013 ortho-rectified imagery from J. D. Barnes and Land Information Ontario, and previous mapping for the former Highview Swamp wetlands.

Wetland No. 17 mapping is based on an MNRF site visit to 3454 and 3444 Cedar Springs Road (parcel roll numbers: 24020303090350000000 & 24020303090340000000). The northern boundary has been delineated by a wetland survey carried out with a professional surveyor, with the landowner and staff from MNRF Aurora District and Conservation Halton in attendance. The remainder of the wetland was mapped by MNRF staff, and its vegetation and soils were characterized. All parties agreed to the wetland boundaries, at that time.

The mapping for Wetland Nos. 18 and 19 is based on the original mapping from 1984 and air-photo interpretation using spring 2013 aerial imagery.

The mapping for Wetland Nos. 16 and 20 is based on air-photo interpretation and observations by MNRF staff along No. 1 Sideroad and Cedar Springs Road.

Finally, a refinement was made to the southwestern arm of the existing 0.85 hectare (ha) Wetland No. 15 at 2161 No. 1 Sideroad (parcel roll number 24020303080770000000). This boundary refinement is based on a site visit, and a survey of the southern wetland edge carried out by Conservation Halton staff and a professional surveyor on August 24, 2016. All parties agreed to the wetland boundary, at that time.

The five new wetlands support a wide variety of vegetation communities. The four hectare Wetland No. 16 has a Panicled Aster (*Symphyotrichum lanceolatum*) ground cover marsh, Reed Canary Grass (*Phalaris arundinacea*) marsh, cattail (*Typha* sp.) marshes, and a deciduous swamp. The 0.86 ha Wetland No. 17 has a Silver Maple (*Acer saccharinum*) deciduous swamp, a thicket swamp, two small ground cover marshes, and a Lesser Duckweed (*Lemna minor*) open water pond. The 21.61 ha Wetland No. 18 sustains deciduous and thicket swamps and an open water pond, while the adjacent 8.77 ha Wetland No. 19 supports deciduous swamps, a ground cover marsh and Reed Canary Grass marshes. Finally, the 2.81 ha Wetland No. 20 has Green Ash (*Fraxinus pennsylvanica*) deciduous swamps, a Reed Canary Grass marsh and an open water pond ringed by cattail marsh.

The five new wetlands have been incorporated into the Grindstone Creek Headwaters Wetland Complex because they occur in the same watershed as the wetland complex, and they vary from 80, 132, 164, 180 and 192 metres (m) from the nearest wetland (wetlands in a complex are required to be within 750 m of their nearest neighbouring wetland). In addition, the wetlands are connected by intervening riparian habitat, farm fields, regenerating lands and woodlots.

Wetland No. 17 is less than two hectares in size; as a result, additional reasons must be given for its inclusion in the wetland complex. This wetland has been included for the following reasons: 1. it provides intervening habitat between larger wetlands in the wetland complex, 2. it is hydrologically connected to other wetlands in the wetland complex, 3. it supports regionally and locally significant plant species, and 4. it has breeding amphibians. Additionally, this wetland occurs in ecodistrict 7E-3, where wetlands are considered very rare on the landscape, and smaller wetlands make up a large proportion of all the wetlands.

For your information, an enclosed table describes the vegetation communities in the five wetlands. Three attached maps show the wetlands and communities on an ortho-rectified digital photo base. The update has been put into MNRF's web-accessible digital warehouse (LIO – Land Information Ontario), and can be accessed in a few weeks at https://www.javacoeapp.lrc.gov.on.ca/geonetwork/srv/en/main.home. The information is stored under the "Wetland Unit" data class.

If you have any questions please do not hesitate to call Steve Varga, District Management Biologist at 905-713-7370, or e-mail him at steve.varga@ontario.ca.

Sincerely,

Emily Funnell
Resources Management Supervisor
Aurora District
Ministry of Natural Resources and Forestry

1.2.2. Vegetation Communities - Grindstone Creek Headwaters Wetland Complex (2017 Additions of New Wetland Nos. 16 to 20)

Wetland #	Field #, Date	Map Code	Vegetation Forms	Dominant Species[1], Secondary Species[2] (% cover by form) (Size in hectares; site type: Pi- palustrine with inflow & R- riverine; soil type; g- depth to mottling & G- depth to gley in centimeters (cm) when present; O- depth of organics (cm) when present; wt- depth to water table (cm) when available; ow- estimated percent permanent open water; significant species & wildlife records: x- August 22, 2016 observations of Steve Varga & Agneta Szabo (OMNRF, Aurora District), y- recent observations by Steve Wall, RR- regionally rare in MNRF's former Central Region (Riley 1989), LR- locally rare & LU- locally uncommon plant species in the Regional Municipality of Halton (Varga et al. 2004); comments)
16	2016-6	neM2-B	gc,ne*	gc: Symphyotrichum lanceolatum (25); ne: Phalaris arundinacea (80) (1.77; R; loam: loam 20+ cm; g-10; G-10; ow-5; wildlife records: water striders; comments: community based on observed from No.1 Sideroad & Cedar Springs Road and air-photo interpretation, watercourse outlets through a large box culvert under Cedar Springs Road and was flowing during August 22, 2016 site visit with Watercress (Nasturtium microphyllum) present)
16	2016-3	reM7-A	gc,re*,ne	gc: Lythrum salicaria[1], Symphyotrichum lanceolatum[1] (25); re: Typha latifolia (60); ne: Phalaris arundinacea (30) (0.84; Pi; loam: A Horizon- loam 20 cm, B Horizon- clay loam; g-20; G-20; ow-0; comments: community based on observations from No.1 Sideroad and air-photo interpretation)
16	2016-8	reM7-B	gc,re*,ne	gc: Symphyotrichum lanceolatum[1], Lythrum salicaria[1], Solidago altissima[2], Euthamia graminifolia[2] (25); re: Typha angustifolia[1], Typha latifolia[1], Phragmites australis[1] (65); ne: Phalaris arundinacea (40) (0.32; R; loam: clay loam; g-0; G-0; ow-5; comments: community based on observations from Cedar Springs Road and air-photo interpretation, a patch of the introduced European Common Reed (Phragmites australis) is present near the road and should be removed)
16	2016-5	gcM8	gc*,ne	gc: Symphyotrichum lanceolatum[1], Euthrochium maculatum[1], Solidago altissima[2], Lythrum salicaria[2], Euthamia graminifolia[2] (75); ne: Phalaris arundinacea[1], Scirpus atrovirens[1], Juncus effusus (25) (0.85 + 0.12 = 0.97; R; loam: loam 20+ cm; g-10; G-10; ow-5; comments: community based on observations from No.1 Sideroad & Cedar Springs Road and air-photo interpretation, watercourse through wetland was flowing during August 22, 2016 site visit with Watercress (Nasturtium microphyllum) present, two stems of the introduced European Common Reed (Phragmites australis)are present and should be removed)
16	2016-4	hS11	h*,gc,re,ne	h: Salix xsepulcralis (60); gc: Symphyotrichum lanceolatum[1], Epilobium hirsutum[1], Lythrum salicaria[1], Impatiens capensis[1] (30); re: Typha latifolia (25); ne: Agrostis stolonifera (40) (0.10; Pi; loam: A Horizon- loam 20 cm, B Horizon- clay loam; g-20; G-20; wt-10; ow-5; iron precipitates; wildlife records: water striders; comments: community based on observations from No.1 Sideroad and air-photo interpretation, wetland is connected to the mian wetland tothe south by a large 3 metre culvert under No.1 Sideroad, stream was flowing during the August 22, 2016 site visit)

17	2016-10	ffW9	ff*	ff: Lemna minor[1], Ricciocarpus sp.[1] (55) (0.04; P; humic organic: O-40+; ow-50; wildlife: x- scuds, aquatic beetles, pond snails, y- frogs calling in the spring)
17	2016-11	gcM10	gc*,re	gc: Bidens frondosa (70); re: Typha angustifolia (25) (0.02; Pi; loam: clay loam; g-0; G-0; ow-0)
17	2016-12	gcM11	gc*	gc: Symphyotrichum lanceolatum[1], Solidago altissima[2] (0.05; Pi; loam; ow-0)
17	2016-9	hS12	h*,ts,ls,gc,ne	h: Acer saccharinum[1], Fraxinus pennsylvanica[2], Ulmus americana[2] (90); ts: Acer saccharinum[1], Fraxinus pennsylvanica[1] (25); ls: Toxicodendron rydbergii[1], Parthenocissus inserta[2] (30); gc: Symphyotrichum lanceolatum[1], Symphyotrichum lateriflorum[1], Lysimachia ciliata[1], Geum canadense[1], Persicaria virginiana[1] (25); ne: Glyceria striata[1], Carex radiata[2], Carex projecta[2] (25) (0.45; P; loam; ow-0; significant species: x- Carex grayi RR, Persicaria virginiana LR, Carex projecta LU; wildlife: x- Eastern Garter Snake, Leopard Frog)
17	2016-13	tsS13-A	h,ts*,gc	h: Acer saccharinum[1], Fraxinus pennsylvanica[1] (36); ts: Cornus foemina[1], Acer saccharinum[2], Fraxinus pennsylvanica[2] (70); gc: Lycopus americanum[1], Boehmaria cylindrica[1], Symphyotrichum lanceolatum[1], Symphyotrichum lateriflorum[1], Lysimachia ciliata[1], Solidago altissima[2] (25) (0.30; Pi; loam: silty loam; g-5; G-5; ow-0; significant species: x- Persicaria virginiana LR)
18	2016	suW1	su*	su: submerged plants (0.08; Pi; loam; ow-100; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
18	1984	hS5-C	h*,ts,gc	h: Acer saccharinum[1], Acer rubrum[1], Salix sp.[1]; ts: Cornus foemina[1], Cornus sp.[1], Salix sp.[1]; gc: Impatiens capensis[1], Mentha sp.[1] (10.49; Pi; loam; ow-0; comments: soils based on Halton Region soils map)
18	1984	tsS13-B	h,ts*,gc	h: Salix sp.[1], Populus sp.[1], Fraxinus sp.[1]; ts: Cornus sp.[1], Salix sp.; gc: Solanum dulcamara[1], Mentha sp.[1], Symphyotrichum sp.[1] (1.19; Pi; loam; ow-0; comments: soils based on Halton Region soils map)
18	1984	tsS14	h,ts*,gc,re	h: Salix sp.[1], Populus sp.[1]; ts: Cornus sp.[1], Salix sp.[1]; gc: Impatiens capensis[1], Onoclea sensibilis[1]; re: Typha latifolia (5.17; Pi; loam; ow-0; comments: soils based on Halton Region soils map)
18	1984	hS15	h*,ts,gc,re	h: Salix sp.[1], Populus sp.[1], Fraxinus nigra[1]; ts: Cornus sp.[1]; gc: Onoclea sensibilis[1], Solanum dulcamara[1], Impatiens capensis[1]; re: Typha latifolia (4.68; Pi; loam; ow-0; comments: soils based on Halton Region soils map)
19	2016	neM3	ne*	ne: Phalaris arundinacea (0.35 + 0.07 = 0.42; Pi; loam; ow-0; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
19	2016	gcM8	gc*,ne	gc: various herbaceous species; ne: grasses and sedges (1.47; Pi; loam; ow-0; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
19	2016	hS5	h*,ts,gc	h: deciduous trees; ts: tall shrubs; gc: various herbaceous species (0.13 + 0.07 = 0.20; Pi; loam; ow-0; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
19	1984	hS5-D	h*,ts,gc	h: Fraxinus nigra[1], Populus tremuloides[1], Salix sp.[1]; ts: Cornus sp.[1], Viburnum lentago[1]; gc: Impatiens capensis[1], Caltha palustris[1] (1.68; Pi; loam; ow-0; comments: soils based on Halton Region soils map)

19	1984	hS10-B	h*,gc	h: Fraxinus nigra[1], Fraxinus sp.[1]; gc: Impatiens capensis (5.00; Pi; loam; ow-0; comments: soils based on Halton Region soils map)
20	2016	suW1	su*	su: submerged plants (0.13; Pi; loam; ow-100; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
20	2016-1	neM2-C	gc,ne*	gc: Symphyotrichum lanceolatum[1], Euthamia graminifolia[1], Solidago altissima[1] (25); ne: Phalaris arundinacea (80) (1.35; Pi; loam: A Horizon- silty loam 15 cm, B Horizon- silty loam 10+ cm; g-15; G-15; ow-0; comments: community based on observations from No.1 Sideroad and air-photo interpretation, box culvert for the outlet stream under No.1 Sideroad, stream bed dry during August 22, 2016 visit)
20	2016	neM3	ne*	ne: Phalaris arundinacea (0.54; Pi; loam; ow-0; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
20	2016	reM12	re*	re: Typha sp. (0.25; Pi; loam; ow-0; comments: community based on air-photo interpretation, soils based on Halton Region soils map)
20	2016-2	hS16	h*,gc,ne	h: Fraxinus pennsylvanica (70); gc: Symphyotrichum lanceolatum[1], Solidago altissima[1] (25); ne: Phalaris arundinacea (75) (0.16; Pi; loam: A Horizon- silty loam 15 cm, B Horizon- silty loam 10+ cm; g-15; G-15; ow-0; comments: community based on observations from No.1 Sideroad and air-photo interpretation, wetland 5 to 8 metres wide)
20	2016	hS17	h*,ne	h: deciduous trees; ne: Phalaris arundinacea (0.38; Pi; loam; ow-0; comments:community based on air-photo interpretation, soils based on Halton Region soils map)

Legend

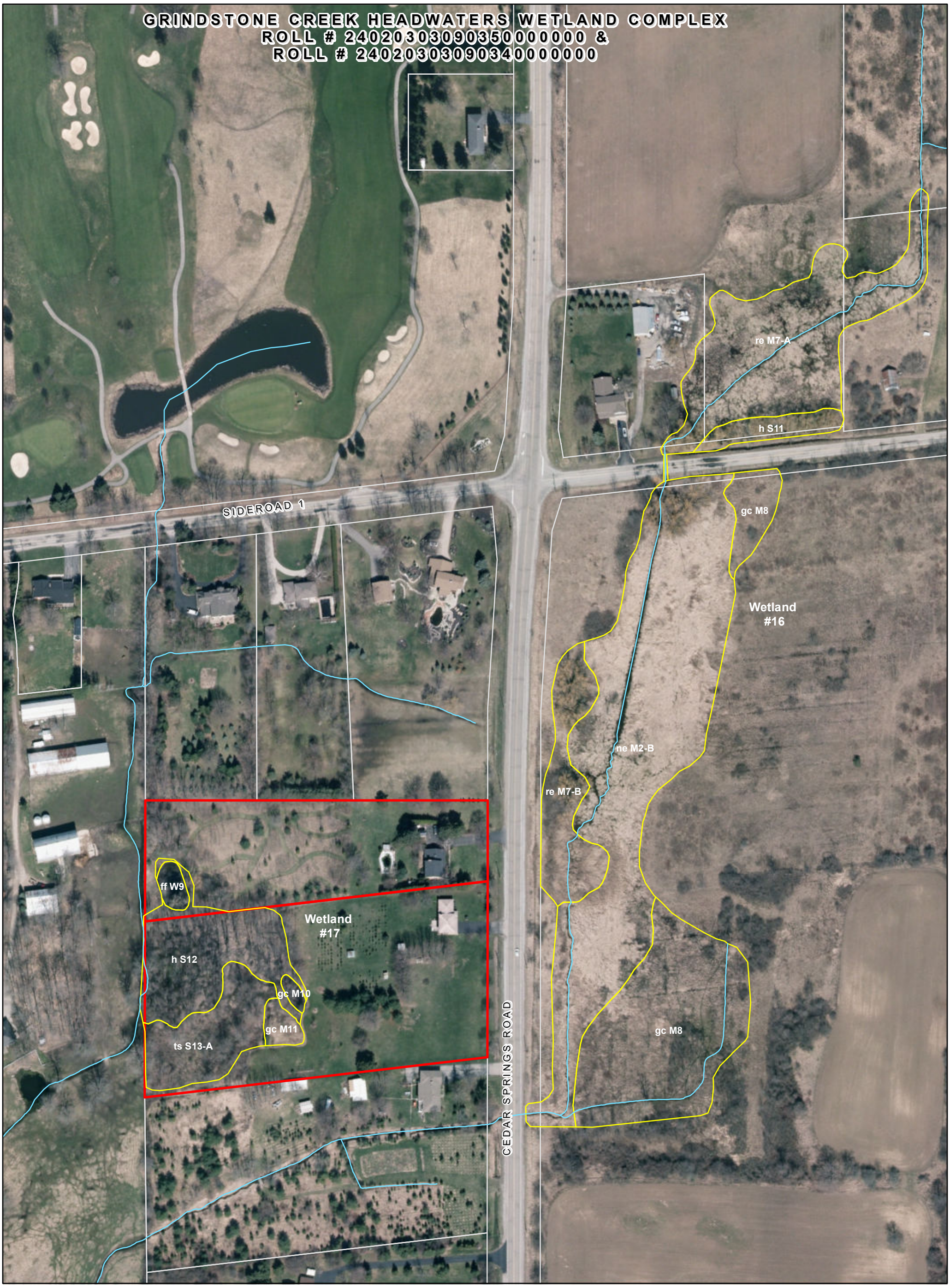
Vegetation Forms:

h- deciduous trees
ts- tall shrubs
ls- low shrubs
gc- ground cover
re- robust emergents
ne- narrow-leaved emergents
ff- free-floating plants
*- dominant form

Map Codes:

S- swamp
M- marsh
W- open water marsh

GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX
ROLL # 2402030309035000000 &
ROLL # 2402030309034000000



Ontario

Scale 1:2,000 (approx.)

0 20 40 80 120 160 Metres

Legend

- Watercourse
- MNRF Evaluated Wetland
- Subject Lands
- Parcel Fabric
- c S17 Wetland Vegetation Community

2016-41-ST

PUBLICATION

Cartography by Aurora District Geomatics.

Universal Transverse Mercator (6 degree) projection, Zone 17. North American Datum 1983

SOURCE OF INFORMATION

Information provided by the Ministry of Natural Resources & Forestry district office in Aurora.
Ministry of Natural Resources & Forestry - Aurora District 50 Bloomington Road West, Aurora, ON L4G 0L8

Base information derived from the Ontario Base Map, 1983 at a scale of 1:10,000 and the Natural Resources Values Information System (NRVIS).

NOTE

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should be viewed as illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

For detailed information on natural features such as their location, size or status, the individual files held by the Aurora district office of the Ministry of Natural Resources & Forestry should be consulted.

GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

MILBURO UGH LINE

su W

ts S14

Wetland #18

h S15

ts S13-B

h S5-C

PARKSIDE DRIVE

CEDAR SPRINGS ROAD

HIGHVIEW DRIVE

EVANS ROAD

Wetland #19

h S10-B

ne M3

h S5-D

ne M3

gc M8

h S5

h S5

X

X

X

X

Ontario

Scale 1:6,000 (approx.)

0 70 140 280 420 560 Metres

2016-41-ST

Legend

- Watercourse
- MNRF Evaluated Wetland
- Parcel Fabric
- c S17 Wetland Vegetation Community

PUBLICATION

Printed in Ontario, Canada
March 1, 2017

Cartography by Aurora District Geomatics.

Universal Transverse Mercator (6 degree) projection, Zone 17. North American Datum 1983

SOURCE OF INFORMATION

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Ministry of Natural Resources & Forestry - Aurora District 50 Bloomington Road West, Aurora, ON L4G 0L8

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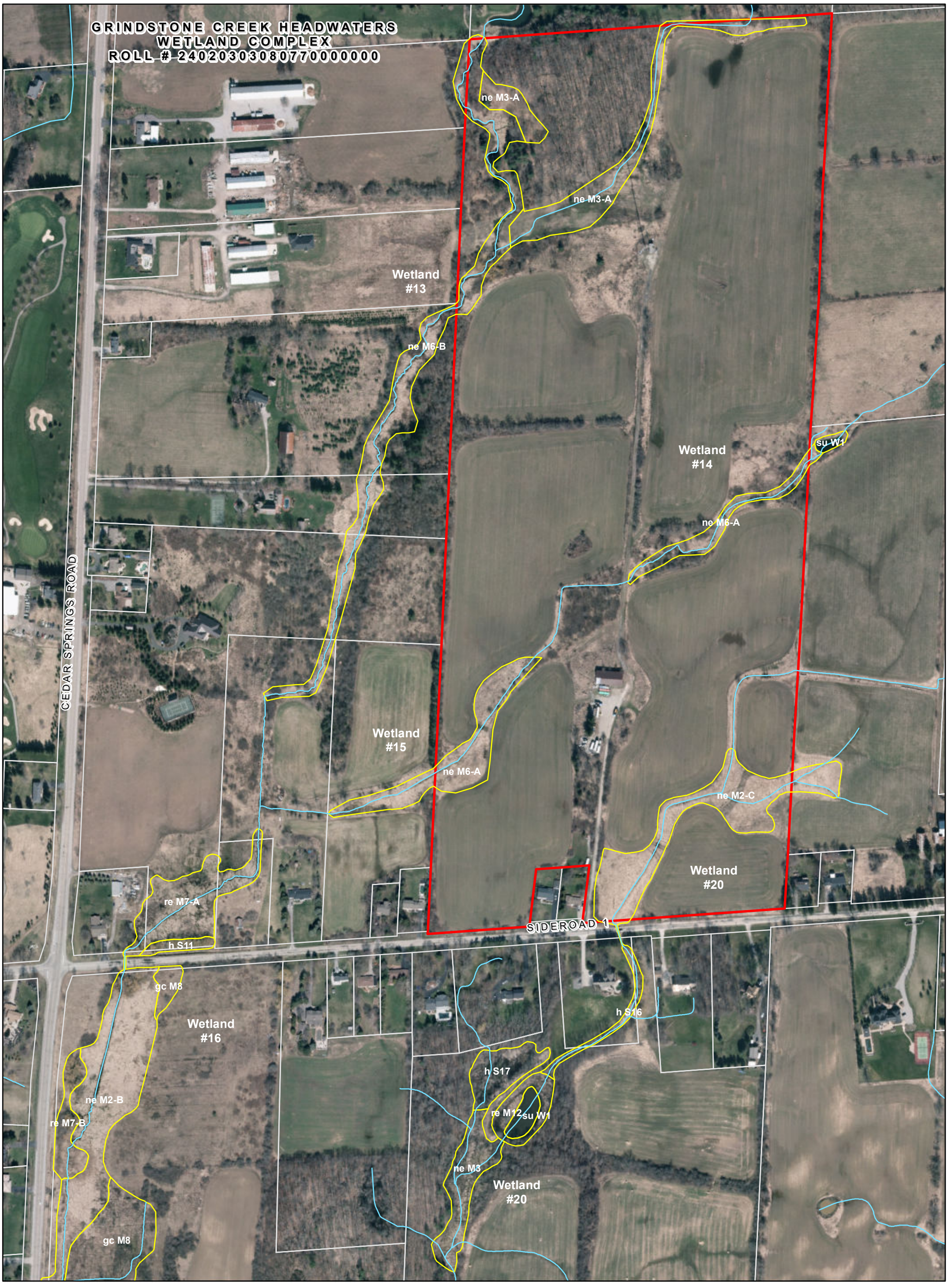
GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX
ROLL # 24020303080770000000



Ontario

Scale 1:4,000 (approx.)

0 45 90 180 270 360 Metres

Legend

- Watercourse
- MNRF Evaluated Wetland
- Subject Lands
- Parcel Fabric
- c S17 Wetland Vegetation Community

2016-37-ST

PUBLICATION

Printed in Ontario, Canada
June 12, 2017

Cartography by Aurora District Geomatics.

Universal Transverse Mercator (6 degree) projection, Zone 17. North American Datum 1983

SOURCE OF INFORMATION

Information provided by the Ministry of Natural Resources & Forestry district office in Aurora.
Ministry of Natural Resources & Forestry - Aurora District 50 Bloomington Road West, Aurora, ON L4G 0L8

Base information derived from the Ontario Base Map, 1983 at a scale of 1:10,000 and the Natural Resources Values Information System (NRVIS).

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Ministry of Natural Resources and Forestry
Aurora District Office
50 Bloomington Road
Aurora, Ontario L4G 0L8

Ministère des Richesses naturelles et des Forêts

Telephone: (905) 713-7400
Facsimile: (905) 713-7361

Ontario

December 11, 2014

Mr. Bob Edmondson
Director, Watershed Management Services
Conservation Halton
2596 Britannia Road West
Burlington ON L7P 0G3
bedmondson@hrca.on.ca

Dear Mr. Edmondson:

Re: Update to the Provincially Significant Grindstone Creek Headwaters Wetland Complex for Wetland No. 2 in and Around 2470 2nd Sideroad (Parcel Roll Number: 2402030308125000000, City of Burlington, Regional Municipality of Halton

The Ministry of Natural Resources & Forestry (MNRF) was requested by Conservation Halton to attend an August 25, 2014 site visit for boundary delineation of the provincially significant Grindstone Creek Headwaters Wetland Complex at 2470 2nd Sideroad in the City of Burlington (parcel roll number: 2402030308125000000). At the site visit, a wetland boundary was delineated based on a surveyed wetland staking carried out with professional surveyors, the landowner, and staff at MNRF Aurora District and Conservation Halton in attendance. The wetland boundary was agreed to by all parties, at that time.

The boundary delineation added to Wetland No. 2 an open swamp community dominated by Reed Canary Grass (*Phalaris arundinacea*), with scattered young trees of Green Ash (*Fraxinus pennsylvanica*) and shrubs of Red-osier Dogwood (*Cornus sericea*). Based on the site visit and aerial photography from spring of 2013, boundary adjustments were also made, on and around the property, to the hardwood swamp that covers most of Wetland No. 2. This swamp is dominated by trees of Green Ash (*Fraxinus pennsylvanica*), and Silver Maple (*Acer saccharinum*).

Enclosed is a table of the updated wetland communities for Wetland No. 2, and a map that shows the updated wetland boundaries on an ortho-rectified digital photo base. The update has been put into MNRF's web-accessible digital warehouse (LIO – Land Information Ontario) and can be accessed at http://www.applio.lrc.gov.on.ca/lids/. The information is stored under the "Wetland Unit" data class.

If you have any questions please do not hesitate to call Steve Varga our District Management Biologist at 905-713-7370 or e-mail him at steve.varga@ontario.ca.

Yours sincerely

Paul Heeney
District Manager

cc. Ms. Leah Smith, City of Burlington
Mr. Sadieh Rajabee
Mr. Ron Glenn, Regional Municipality of Halton

1.2.2. Vegetation Communities - Grindstone Creek Headwaters Wetland Complex (2014 Update for Wetland No. 2)

Wet-land #	Field #	Map Codes	Vegetation Forms	Dominant Species[1], Seconday Species[2] (Size in hectares; site type: P- palustrine with no inflow, Pi- palustrine with inflow, I- Isolated; soil type; O- depth of organics in centimetres (cm); g- depth to mottling & G- depth to gley from top of mineral soil in cm when available; wt- depth to water table in cm from the surface when available; ow- estimated % permanent open water; wildlife records)
2	2014-1	neS10	h,ts,gc,ne*	h: Fraxinus pennsylvanica[1]; ts: Cornus sericea[1], Salix discolor[2]; gc: Symphyotrichum lanceolatum[1], Lythrum salicaria[2]; ne: Phalaris arundinacea[1] Agrostis gigantea[2] (0.27; Pi; loam: clay loam; O-40; g-25 G-35; wt-45; ow- 0)
2	2014-2	hS6-B	h* ts,gc	h: Fraxinus pennsylvanica[1], Acer saccharinum[1]; ts: Fraxinus pennsylvanica[1], Rhamnus cathartica[2]; gc: Impatiens capensis[1], Bidens frondosa[2] (3.39; Pi; loam: clay loam; O-8; g-14; G-14; ow- 0; wildlife: White-tailed Deer, Raccoon, Green Frog, frog just transformed)
2		neS9	ts,ne*,m	ts: Fraxinus pennsylvanica; ne: Phalaris arundinacea; m: mosses (0.12, Pi, loam, ow-0%)

LEGEND:

Vegetation Forms:

h - hardwood trees
c - coniferous trees
dh - dead hardwood trees
dc - dead coniferous trees
ts - tall shrubs
ls - low shrubs
gc - herbs (ground cover)
m - mosses
re - robust emergents
ne - narrow-leaved emergents
be - broad-leaved emergents
ff - free-floating plants
f - fixed-floating plants
su - submerged aquatics
* - dominant form

Map Codes:

M - Marsh
W - Open Water Marsh
S - Swamp

GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX
ROLL #24020303081250000000

Ontario

Scale 1:1,000 (approx.)

0 10 20 40 60 80 Metres

Legend

- MNR Evaluated Wetland
- Subject Lands
- Parcel Fabric
- c S17 Wetland Vegetation Community

2014-48-ST

PUBLICATION

Cartography by Aurora District Geomatics.

Universal Transverse Mercator (6 degree) projection, Zone 17. North American Datum 1983

SOURCE OF INFORMATION

Information provided by the Ministry of Natural Resources district office in Aurora.
Ministry of Natural Resources - Aurora District 50 Bloomington Road West, Aurora, ON L4G 3G8

Base information derived from the Ontario Base Map, 1983 at a scale of 1:10,000 and the Natural Resources Values Information System (NRVIS).

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PROVINCIALLY SIGNIFICANT
GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

February, 2007

Ontario Ministry of Natural Resources
Aurora District

Ontario Base Maps: 10 17 5900 48050, 10 17 5900 48000
National Topographic Series Maps: 30M/5
UTM Reference: 10 17 591200 48048000
Latitude: 43° 23′ 40″ **Longitude**: 79° 52′ 20″
Aerial Photographs: 2002, 2005 Ortho-rectified digital photography, 1:2000
Municipality, Lots & Concessions: Regional Municipality of Halton, City of Burlington: Nelson Twp. Conc. 2N, Lots 16-20
Ownership: 100% private
Conservation Authority: Conservation Halton
Wetland Status: Provincially significant
Number of Wetlands & Area: 15 wetlands, 17.62 ha
Wetland Type: Marsh 47%, Swamp 53%
Wetland Substrate Type: Loam 100%
Wetland Site Type: Palustrine 99.2%, Isolated 0.8%
Wetland Score: Biological Component 108, Social Component 85, Hydrological Component 200, Special Features 250, Total 643
Estimated Field Time: 150 person hours
Investigators: Conservation Halton (CH 1984): D.A. Sutherland, B. Glover, B. de Geus, M. Feth, W. Him, S.M. Griffiths, B.K. Brobst; Natural Resource Solutions Inc. (NRSI 2006): D. Stephenson, S. Nichol, T. Dailey, A. Ryckman; OMNR (2006): Albert Garofalo, Emma Followes, John Pisapio & Bohdan Kowalyk
Data Collection/Field Survey Dates:
Sept. 2, 1983: Sutherland et al (CH 1984); June 5, 1984: Glover et al (CH 1984); Oct. 2, 1984: Him and Brobst (CH 1984); June 2, 13-15, 23, 26, 2006: NRSI 2006; May 7, 2003, June 9, July 16, 23, Sept. 2, 2004, April 1–May 30 2005, April, May 4, June 6, Dec. 1, 2006: OMNR; May 4, 2006: R. van de Lande, City of Burlington; May 4, June 6, 2006: B. Axon, D. Johnson & A. Dunn, Conservation Halton (fish sampling records in OMNR 2006); 2000-2006: Stantec 2006
Compilers: Emma Followes, John Pisapio, Albert Garofalo & Steve Varga

Introduction

The Grindstone Creek Headwaters Wetland Complex is located in the City of Burlington and is bounded by 2nd Sideroad to the north, Cedar Springs Road to the west, 1st Sideroad to the south, and Guelph Line to the east.

The Grindstone Creek Headwaters Wetland Complex incorporates 2 wetlands (Nos. 2 & 7) that were part of the locally significant Mount Nemo Wetland Complex evaluated in 1984, with a desktop update completed in 1998 (OMNR 1998, CH 1984). The other wetlands in the complex were previously unevaluated.

This wetland complex incorporates portions of 3 headwater tributaries of Grindstone Creek and a tributary headwater of Bronte Creek. Wetlands in a complex can cross watersheds in a headwater area. This wetland complex occurs on the Mount Nemo plateau in a headwaters area for both the Bronte and Grindstone Creek watersheds. Wetland No. 2 in the Bronte Creek watershed is 53 metres away, at its closest point, to the wetlands within the Grindstone Creek watershed.

The wetlands in the complex are separated by distances ranging from 5 metres to 220 metres with one being 400 metres (a maximum separation of up to 750 metres is allowed in a wetland complex.

The majority of wetlands in the Grindstone Creek complex are hydrologically connected. The wetlands at the top end of the complex provide a water storage function that regulates hydro-period, flow rate and thermal conditions in the wetlands. The following wetlands in the two major tributaries of the Grindstone Creek watershed (Wetland Nos. 1, 3-7, 10, 14 & 15 and Wetland Nos. 12 & 13) are all connected by water flow. Wetland No. 8 flows into a third tributary of Grindstone Creek. Wetland Nos. 9 and 11 are not hydrologically connected.

The wetlands are linked by woodlands, hedgerows and meadows which serve as a local north-south corridor between larger forested areas. At the broader landscape level, the wetlands and woodlands within the complex also serve as a southwest-northeast corridor for wildlife movement across the top of the Mount Nemo plateau; providing a connection between the Medad Valley Area of Natural and Scientific Interest (ANSI) and the provincially significant Lake Medad Valley Wetland Complex to the southwest, and the Mount Nemo Escarpment ANSI and locally significant Mount Nemo Wetland Complex to the northeast. There is also a north-south corridor down Grindstone Creek to the Grindstone Creek Valley ANSI and the wetlands and forests in the Royal Botanical

Gardens properties (Hendrie Valley ANSI) along the Lake Ontario shore.

Downstream of the complex, Grindstone Creek provides habitat for migratory salmonids. Such areas have been the focus of water quality and habitat restoration efforts that are supported by the protection of headwater wetlands.

The wetland complex supports a breeding population of the nationally and provincially threatened Jefferson Salamander (OMNR 2005 – 2006)**.** This population is in close proximity to other nearby areas supporting the species.

Eight of the 15 wetlands in the complex are less than 0.5 hectares in size (Wetland Nos. 1, 3, 5, 8, 9, 10, 11, & 14) and are included for one or more of the following reasons:

1) Occur in ecodistrict 7E-3 where wetlands are rare (score of 60 points in the rarity within the landscape category). In this ecodistrict wetlands are so rare that small wetlands take on added importance and in some parts of the ecodistrict may constitute the majority of wetlands (Wetland Nos. 1, 3, 5, 8, 9, 10, 11 & 14).
2) Sustain significant species/communities (i.e. rare or uncommon species/communities at the local, regional or provincial/national level based on species lists noted in the Wetland Evaluation Manual or approved by MNR District office or NHIC lists for fauna, flora and communities; conservation priority bird species as defined by Bird Studies Canada; or species tracked by the Natural Heritage Information Centre) (Wetland No. 10).
3) Support wetland types not well represented elsewhere in the wetland complex (Wetland No. 8 supports the only example of a robust emergent marsh in the wetland complex, and Wetland No. 14 supports the only example of a submergent open water marsh in the wetland complex).
4) Function as amphibian breeding areas (Wetland Nos. 1, 5, 8, 9, 10, 11 & 14).
5) Are headwater source areas or contribute annual or seasonal base flows to watercourses (Wetland Nos. 1 & 14).
6) Are part of a larger wetland divided by a road, driveway, trail, or utility corridor (Wetland No. 5).
7) Provide intervening wetland and upland habitat between larger wetlands thereby acting as wildlife stepping stones (Wetland Nos. 1 & 3).

Biological Component

The Grindstone Creek Headwaters Wetland Complex receives a score of 108 for its biological component. It consists of 15 wetlands covering a total of 17.62 hectares.

The wetlands are situated on loam substrates. These mineral soils have poor drainage as indicated by the presence of gleys and mottling near the soil surface.

About 99.2% of the total wetland area is palustrine, being situated in the upper portions of the Grindstone Creek and Bronte Creek watersheds. Of this, 24% is palustrine headwater area with no defined inflows, and 76% is palustrine wetland area that occurs further downstream and with defined stream inflows. Two of the wetlands (Nos. 12 and 14) contain seeps which can be seen discharging to the surface. Four wetlands, (Nos. 4, 8, 10 &14) have some permanent water, indicating a perennial ground water connection. Wetland No. 1 shows evidence of an extended hydro-period consistent with some ground water contributions. The remaining wetlands are typically flooded in the spring but become progressively drier through the summer with some replenishment from precipitation.

The remaining 0.8% of wetland area is isolated with no outflows (Wetland Nos. 9 & 11).

The Grindstone Creek Headwaters Wetlands consist of 53% swamps and 47% marshes. They sustain 24 wetland vegetation communities.

Deciduous dominated swamps cover 41.6% of the total wetland area. Most prevalent in the tree layer are Green Ash (*Fraxinus pennsylvanica*) followed by Freeman's Maple (*Acer X**freemanii).* Common in the understorey are saplings of Blue Beech *(Carpinus caroliniana*) and Green Ash, and herbs and grasses such as Sensitive Fern (*Onoclea sensibilis*), Fowl Manna Grass (*Glyceria striata*), Creeping Bent Grass (*Agrostis stolonifera*), Poison Ivy (*Rhus radicans*), Star-flowered Solomon's-seal (*Maianthemum stellatum*), Marsh Marigold (*Caltha palustris*) and Purple Cress (*Cardamine douglassii*).

Thicket dominated swamps cover 6.4% of the wetland area. They have a shrub layer of Red-osier Dogwood (*Cornus stolonifera*), Gray Dogwood (*Cornus foemina* ssp. *racemosa*), and Green Ash saplings. Common in the understorey are Reed Canary Grass (*Phalaris arundinacea*), Fringed Loosestrife (*Lysimachia ciliata*), Spotted Jewelweed (*Impatiens capensis*), Common Horsetail (*Equisetum arvense*) and Creeping Bent Grass.

About 5% of the wetland area is graminoid dominated open swamps of Reed Canary Grass with scattered saplings of Green Ash and shrubs of Red-osier Dogwood.

Graminoid marshes, largely dominated by Reed Canary Grass, cover 45.2% of the total wetland area. In one community, Fox Sedge (*Carex vulpinoidea*) co-dominants with Reed Canary Grass and in another community Rice Cut Grass (*Leersia oryzoides*) and a horsetail species (*Equisetum* sp.) co-dominate. Secondary species include Spotted Jewelweed, Spotted Joe-pye Weed (*Eupatorium maculatum*), Sensitive Fern, a knotweed species (*Polygonum* sp.), Narrow-leaved Cattail (*Typha angustifolia*) and Common Duckweed (*Lemna minor*).

Robust emergent marshes cover 1.5% of the wetland area. It consists of one community (Wetland No. 8) dominated by Narrow-leaved Cattail with Reed Canary Grass as a secondary species.

Open water marshes cover 0.3% of the wetland area. It consists of an open water community in Wetland No. 14 dominated by a pondweed species (*Potamogeton* sp.).

Graminoids (narrow-leaved emergents) are the most dominant species within the wetland complex, covering 50.2% of the total wetland area (45.2% marsh and 5% open swamp).

Grindstone Creek Headwaters Wetland Complex supports a diversity of surrounding upland habitats such as deciduous forest, conifer plantations, agricultural fields, pastures, meadows and hedgerows. There are woodlots of Sugar Maple (*Acer saccharum*), Sugar Maple – Red Oak (*Quercus rubra*), Sugar Maple – White Ash (*Fraxinus americana*) and Poplar (*Populus* sp.); conifer plantations of White Pine (*Pinus strobus*), European Larch (*Larix decidua*), White Spruce (*Picea glauca*) and White Cedar (*Thuja occidentalis);* and thickets of Staghorn Sumac *(Rhus typhina*) and Common Lilac (*Syringa vulgaris*).

Grindstone Creek Headwaters Wetland Complex and the adjacent uplands support 362 vascular plant species (366 taxa) (Stantec 2006, OMNR 2006, NRSI 2006, JART 2006), 62 bird species (Stantec 2006, NRSI 2006, OMNR 2006, JART 2006), and 12 reptiles and amphibians including Eastern Garter Snake, Common Snapping Turtle, American Toad, Eastern Newt, Jefferson Salamander and complex, Spotted Salamander, Spring Peeper, Gray Treefrog, Wood Frog, Northern Leopard Frog, Green Frog and Bullfrog (Stantec 2006, OMNR 2005, 2006, NRSI 2006, JART 2006). There are incidental observations of 12 mammal species such as Opossum, Woodchuck, Eastern Cottontail, Eastern Chipmunk, Gray Squirrel, Red Squirrel, Beaver, Mink, Coyote, Red Fox, Raccoon and White-tailed Deer (Stantec 2006, NRSI 2006, OMNR 2006, CH 1984, JART 2006). Six fish species are found in streams in and around Wetlands No. 13, 14 and 15 based on OMNR Aurora District fish file records (OMNR 2006).

Adjacent uplands are important for wetland species at Grindstone Creek and are critical for the maintenance of its wetland functions. Jefferson and Spotted Salamanders breed in wetlands, but require upland forests for foraging and hibernation. Woodland frogs such as Spring Peeper, Wood Frog and Gray Treefrog also rely on spring-flooded wetlands for breeding, but forage and hibernate in upland areas. American Toads, while using the wetlands for breeding, forage widely in the surrounding uplands where they also hibernate. Leopard Frogs forage in fields and meadows a considerable distance from their wetlands. They also move between wetlands, hibernating in the bottom of deeper permanent ponds or lakes and breeding in more shallow wetlands. Green Frogs and Bullfrogs occur in more permanent wetland ponds with Green Frogs also foraging in the surrounding uplands. Snapping Turtles utilize various types of wetlands and frequently move overland between them. Wood Ducks nest in trees in or around wetlands.

Social Component

The Grindstone Creek Headwaters Wetland Complex, situated just north of the urban centre of the City of Burlington, receives a score of 85 for its social component. The wetlands support some

economically valuable products and recreational activities such as nature appreciation. All of the wetlands are in private ownership.

Despite some historic efforts to drain some of the wetlands for agricultural purposes, the complex retains fundamental wetland attributes and functions. There has been some recent ditching activities in and around the wetland complex and there has been some mowing and cutting of certain wetland areas. The area between Wetland Nos. 6 and 7 has also recently been dredged and some vegetation removed or covered by spoil piles.

Hydrological Component

The Grindstone Creek Headwaters Wetland Complex has a score of 200 for its hydrological component. The wetlands contribute base flows to tributaries of the Grindstone Creek watershed. They also contribute to flood attenuation, short term water quality improvement and groundwater recharge.

The Grindstone Creek wetlands constitute the major water storage areas in their upstream subwatersheds. They contain 70% of all the water storage areas in the upstream catchment basins. Two of the wetlands are also seepage–fed, and contribute base flows to Grindstone Creek (Wetland Nos. 12 & 14).

The stream exiting Wetland No. 7 disappears into the ground for a length of about 150 metres, re-emerging from the bedrock and discharging into the top end of Wetland No. 14.

Special Features

The Grindstone Creek Headwaters Wetland Complex receives the maximum score of 250 for its special features.

Its wetlands are considered rare in ecodistrict 7E-3 (OMNR 1993-2002). The Ministry has subdivided the province into 65 ecodistricts, which are characterised by similar physiography and climate. Ecodistrict 7E-3 forms the northern extent of the deciduous forest region or the Carolinian zone, which is noted for its southern species of plants and animals. The ecodistrict encompasses a highly urbanized area, the western portion of the Golden Horseshoe. It extends in an arc from Milton Heights and Mount Nemo in southwestern Halton Region, south to the Dundas Valley in eastern Hamilton-Wentworth Region, and then east along Lake Ontario to the Niagara River in the northern portion of Niagara Region. It encompasses such cities and towns as Burlington, Hamilton, Grimsby, St. Catharines and Niagara-on-the-Lake.

Ecodistrict 7E-3 is subdivided into three physiographic units: the Lake Iroquois Plain (the former lake bed of Glacial Lake Iroquois, a larger version of today's Lake Ontario), the Niagara Escarpment, and a small portion of the Norfolk Sand Plain (Chapman & Putnam 1984). The Grindstone Creek Wetlands occur above the Niagara Escarpment crest on its gradually sloping plateau, known as a cuesta. The area is underlain by the dolostone cap rock of the Niagara Escarpment with an overlay of glacial tills. To the west, there is a meltwater channel and deposits in the Medad Valley and, to the east, a till moraine ridge along Mount Nemo.

The Grindstone Creek Headwaters Wetland Complex is given a high score of 60 points for rarity on the landscape in site district 7E-3. This score reflects the historic loss of wetlands in the site district as well as the remaining amount of wetlands (OMNR 1993-2002).

In ecodistrict 7E-3, wetlands cover less than 2% of the surface area. It is estimated that over 60% of the wetlands in ecodistrict 7E-3 have been lost. The remaining wetlands, including the small ones, play a critical role in the overall health of the district's ecosystem. Wetlands on the Niagara Escarpment in southwestern Halton Region and the adjacent Hamilton-Wentworth Region serve as headwater sources for Grindstone Creek, Rock Chapel Creek, tributaries of Bronte Creek, and others.

The Grindstone Creek Wetland Complex has 5 significant species including the nationally and provincially threatened Jefferson Salamander, the nationally and provincially endangered Butternut, and three locally rare plant species (see Table 1).

A breeding population of Jefferson Salamander occurs within the wetland complex. This species requires spring-flooded, or groundwater fed, fish-less wetlands or vernal pools with sufficient hydro-period for breeding, and forages and hibernates in surrounding upland forests. Adults can annually migrate several hundred metres from their breeding pond, while juveniles or sub-adults dispersing from their natal ponds may be capable of longer movements. Ontario populations of Jefferson Salamander have

declined in recent years due to the direct and indirect loss or impairment of habitat.

A Butternut tree is found in one of the wetlands within the complex and other individuals occur in the surrounding upland woodlots. This tree is 17 cm in diameter at breast height and is sufficiently healthy to meet the retention guidelines adopted by MNR (Ostry, Mielke & Skilling 1994). Butternut is a widespread tree of the Deciduous Forest Region in southern Ontario. An introduced disease called Butternut Canker has caused a sharp decline in its numbers throughout its range to the point where it is now considered nationally and provincially endangered (Environment Canada, 2007 in prep). Butternut can tolerate a broad range of soil types. While it typically grows best on rich moist, well-drained loams, such as often found along streambanks, it can also grow in wetlands (swamps) and can occur on drier rocky soils, especially those of limestone origin.

The Grindstone Creek wetlands are also important for wildlife. They support breeding populations of the already noted Jefferson Salamander**,** the Spotted Salamander, woodland frogs such as Spring Peeper, Wood Frog and Gray Treefrog as well as Bullfrog, Green Frog, Leopard Frog, American Toad and Eastern Newt (Wetland Nos. 1, 2, 4, 5, 7, 8, 9, 10, 11, 12 & 14). A waterfowl species, the Wood Duck, breeds in the wetland swamps.

The streams and associated wetlands in the lower portion of the complex (Wetland Nos. 14 & 15) sustain locally significant fish habitat, with Green Sunfish present in Wetland No. 14. Green Sunfish has a limited distribution in Halton Region**.** Other fish species present in and around the wetlands include Bluntnose Minnow, Brook Stickleback, Creek Chub, Fathead Minnow and Pumpkinseed (OMNR 2006).

Its swamps and associated upland forests support sensitive forest bird species (Couturier 1999, Cadman 1999) such as Wood Duck, Pileated Woodpecker and Ovenbird (Stantec 2006, NRSI 2006).

Table 1. Significant Species

Breeding Habitat for an Endangered or Threatened Species
Source: OMNR 2005 - 2006 field observations, and genetic determination in the case of Jefferson Salamander
Status: based on OMNR, Species at Risk Section, Species at Risk in Ontario List
1. *Ambystoma jeffersonianum* (Jefferson Salamander)
2. *Juglans cinerea* (Butternut)

Locally Significant Plant Species (Rare in the Regional Municipality of Halton, being known from 5 or less locations in the municipality)
Source: N – NRSI observation 2006 (NRSI 2006); S – Stantec 2004, 2006 (Stantec 2006)
Status: based on Varga S. et al. 2000. Distribution and Status of the Vascular Plants of the Greater Toronto Area, Ontario Ministry of Natural Resources, Aurora District.
1. *Equisteum pratense* (Meadow Horsetail) N
2. *Lindernia dubia* var. *dubia* (Doubtful False Pimpernel) S
3. *Parthenocissus quinquefolia* (Five-leaved Virginia -creeper) S

Conclusion
The Grindstone Creek Headwaters Wetland Complex is provincially significant with a total score of 643 points and 250 points for the special features component. A wetland that scores 600 or more points or has 200 or more points in either the biological or special features component is provincially significant.

Grindstone Creek's 15 wetlands comprise a diverse range of community types, a diversity of amphibian breeding and are noteworthy for supporting 2 provincially threatened/endangered species.

Recommendations
Major wetland functions and features to be maintained at Grindstone Creek include its water retention functions; its diversity of species and community types; its significant species; its amphibian breeding habitat; its association of wetlands and uplands and its wildlife movement corridors.

To ensure that Grindstone Creek wetland functions are maintained, it is important that the existing water balance, influencing wetland hydro-periods and other functions, be maintained. Alterations to water regimes could have impacts on wetland communities and their associated species.

To maintain species and community diversity, the interconnected network of wetlands and uplands should be maintained and strengthened to the extent possible.

The Grindstone Creek valley corridor provides a connection to the forests and wetlands of the Niagara Escarpment to the south and the Lake

Ontario shore including the Royal Botanical Gardens properties. Overland there is a connection to the southwest via woodlands, hedgerows, and meadows to a north-south corridor of forests and wetlands in Medad Valley (OMNR 1996).

To the northeast there is a connection to a forest and wetland area on the Mount Nemo Niagara Escarpment plateau and its slopes (OMNR 1996). The Niagara Escarpment is recognized as the longest north-south corridor in southern Ontario (OMNR 1996). Valley corridors such as the Grindstone Creek and Bronte Creek provide connections between the Lake Ontario shore and the Escarpment.

Connections should be maintained and improved along these corridors with additional forest cover through plantings and native regeneration.

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Grindstone Creek Headwaters Wetland Complex	
Wetland Evaluation Edition	3rd (1993/1994 with 2002 updates)
February 2007	

Comments

Attached Documents include:

1) Summary for the Provincially Significant Grindstone Creek Headwaters Wetland Complex
2) Rationale for Inclusion of Wetlands Less than 0.5 Hectares
3) List of Vegetation Communities - Grindstone Creek Headwaters Wetland Complex
4) Map of Interspersion
5) Map of Grindstone Creek Headwaters Wetland Complex Catchment Basin
6) List of Fish Species in and around the Grindstone Creek Headwaters Wetland Complex
7) Fish Records in and around the Grindstone Creek Headwaters Wetland Complex
8) List of Vascular Plants in and around the Grindstone Creek Headwaters Wetland Complex
9) List of Birds in and around the Grindstone Creek Headwaters Wetland Complex
10) List of Mammals & Herpetofauna in and around the Grindstone Creek Headwaters Wetland Complex
11) List of Invertebrates in and around the Grindstone Creek Headwaters Wetland Complex
12) List of Investigators
13) Map of the Provincially Significant Grindstone Creek Headwaters Wetland Complex

Additional Information

Wetland Nos. 2 & 7 were part of the locally significant Mount Nemo Wetland Complex, the rest of the wetlands were previously unevaluated. The Mount Nemo Wetland Complex remains locally significant

Official Name:	Grindstone Creek Headwaters Wetland Complex				
Evaluation Edition:	3rd	Class:		Wetland ID.:	
Wetland Significance	Year/Month Last Evaluated			1984 (Mount Nemo Wetland Complex)	
Provincially Significant	Year/Month Last Updated			1998 (desktop update to 3rd Edition)	
Special Planning Considerations:				**Scores**	
				Biological:	108
				Social:	85
				Hydrological:	200
				Special Features:	250
				Overall:	643

WETLAND DATA AND SCORING RECORD

i) **WETLAND NAME:** Grindstone Creek Headwaters Wetland Complex

ii) **MNR ADMINISTRATIVE REGION:** Southern **DISTRICT:** Aurora

AREA OFFICE (if different from District):

iii) **CONSERVATION AUTHORITY JURISDICTION:** Conservation Halton

(If not within a designated CA, check here: ____

iv) **COUNTY OR REGIONAL MUNICIPALITY:** Halton

v) **TOWNSHIP:** City of Burlington

vi) **LOTS & CONCESSIONS:** Concession 2N Lots 16-20
(attach separate sheet if necessary)

vii) **MAP AND AIR PHOTO REFERENCES**

a) Latitude: 43 23' 40" Longitude: 79 52' 20"

b) UTM grid reference: Zone: 17T Block: NU
Grid:E 9 1 2 N 0 4 8

c) National Topographic Series: Easting 591200 Northing 48048000

map name(s) Hamilton-Burlington

map number(s) 30M/5 edition ____

scale 1:50, 000

d) Aerial photographs: Date photo taken: 2002, 2005 Scale: 1:2000

Flight & plate numbers: Ortho-Rectified Aerial Photos

(attach separate sheet if necessary)

e) Ontario Base Map numbers & scale 10 17 5900 48050, 5900 48000

(attach separate sheets if necessary)

viii) WETLAND SIZE AND BOUNDARIES

a) Single contiguous wetland area: _____ hectares

b) Wetland complex comprised of 15 individual wetlands:

Wetland Unit Number (for reference)		Isolated	Palustrine	Riverine	Lacustrine	Size of each wetland unit
Wetland Unit No.	1		0.26			ha
Wetland Unit No.	2		2.58			ha
Wetland Unit No.	3		0.28			ha
Wetland Unit No.	4		3.60			ha
Wetland Unit No.	5		0.16			ha
Wetland Unit No.	6		0.55			ha
Wetland Unit No.	7		5.17			ha
Wetland Unit No.	8		0.27			ha
Wetland Unit No.	9	0.09				ha
Wetland Unit No.	10		0.04			ha
Wetland Unit No.	11	0.05				ha
Wetland Unit No.	12		0.68			ha
Wetland Unit No.	13		2.97			ha
Wetland Unit No.	14		0.41			ha
Wetland Unit No.	15		0.51			ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit No.						ha
Wetland Unit Totals:		0.14	17.48	0.00	0.00	

(Attach additional sheets if necessary)

TOTAL WETLAND SIZE 17.62 ha

c) Brief documentation of reasons for including any areas less than 0.5 ha in size:

see attached

(Attach separate sheets if necessary .)

Rationale for Inclusion of Wetlands Less than 0.5 Hectares

Eight of the 15 wetlands in the Grindstone Creek Headwaters Wetland Complex are less than 0.5 hectares in size (Wetland Nos. 1, 3, 5, 8, 9, 10, 11 & 14) and are included for one or more of the following reasons:

1) Occur in ecodistrict 7E-3 where wetlands are rare (score of 60 points in the rarity within the landscape category). In this ecodistrict wetlands are so rare that small wetlands take on added importance and in some parts of the ecodistrict may constitute the majority of wetlands (Wetland Nos. 1, 3, 5, 8, 9, 10,11 &14)
2) Sustain significant species/communities (i.e. rare or uncommon species/communities at the local, regional or provincial/national level based on species lists noted in the Wetland Evaluation Manual or approved by MNR District office or NHIC lists for fauna, flora and communities; conservation priority bird species as defined by Bird Studies Canada; or species tracked by the Natural Heritage Information Centre) (Wetland No. 10)
3) Support wetland types not well represented elsewhere in the wetland complex (Wetland No. 8 supports the only example of a robust emergent marsh in the wetland complex, and Wetland No. 14 supports the only example of a submergent open water marsh in the wetland complex)
4) Function as amphibian breeding areas (Wetland Nos. 1, 5, 8, 9, 10, 11 & 14).
5) Are headwater source areas or contribute base flows to watercourses (Wetland Nos. 1 & 14)
6) Are part of a larger wetland divided by a road, driveway, trail, or utility corridor (Wetland No. 5)
7) Provide intervening wetland habitat between larger wetlands thereby acting as wildlife stepping stones (Wetland Nos. 1 & 3)

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1 GROWING DEGREE-DAYS/SOILS

GROWING DEGREE DAYS (check one)		
1)		<2800
2)		2800 -3200
3)		3200 -3600
4)	x	3600 -4000
5)		>4000

SOILS Estimated Fractional Area	
1.000	clay/loam
	silt/marl
	limestone
	sand
	humic/mesic
	fibric
	granite

SCORING:

Growing Degree-Days	Clay-Loam	Silt-Marl	Lime-stone	Sand	Humic-Mesic	Fibric	Granite
<2800	15	13	11	9	8	7	5
2800-3200	18	15	13	11	9	8	7
3200-3600	22	18	15	13	11	9	7
3600-4000	**26**	21	18	15	13	10	8
>4000	30	25	20	18	15	12	8

(maximum score 30; if wetland contains more than one soil type, evaluate based on the fractional area)

Steps required for evaluation: (maximum score 30 points)

1. Select GDD line in evaluation table applicable to your wetland;
2. Determine fractional area of the wetland for each soil type;
3. Multiply fractional area of each soil type by score;
4. Sum individual soil type scores (round to nearest whole number).

In wetland complexes the evaluator should aim at determining the percentage of area occupied by the categories for the complex as a whole.

Score		
26	clay/loam	26.00
	silt/marl	0.00
	limestone	0.00
	sand	0.00
	humic/mesic	0.00
	fibric	0.00
	granite	0.00

Final Score Growing Degree-Days/Soils (maximum 30 points) 26

1.1.2 WETLAND TYPE (Fractional Area = area of wetland type/total wetland area)

	Fractional Area		Score
Bog		x 3	0.00
Fen		x 6	0.00
Swamp	0.53	x 8	4.24
Marsh	0.47	x 15	7.05

Wetland type score (maximum 15 points) 11

1.1.3 SITE TYPE (Fractional Area = area of site type/total wetland area)

	Fractional Area		Score
Isolated	0.008	x 1 =	0.008
Palustrine (permanent or intermittent flow)	0.992	x 2 =	1.984
Riverine		x 4 =	0.000
Riverine (at rivermouth)		x 5 =	0.000
Lacustrine (at rivermouth		x 5 =	0.000
Lacustrine (on enclosed bay, with barrier beach)		x 3 =	0.000
Lacustrine (exposed to lake)		x 2 =	0.000
		Sub Total:	1.992

Site Type Score (maximum 5 points) 2

1.2 BIODIVERSITY

1.2.1 NUMBER OF WETLAND TYPES

(Check only one)		Score
1)	one	9 points
2) x	two	13
3)	three	20
4)	four	30

Number of Wetland Types Score (maximum 30 points) 13

1.2.2 VEGETATION COMMUNITIES

Attach a separate sheet listing community (map) codes,vegetation forms and dominant species.
Use the form on the following page to record percent area by dominant vegetation form. This information will be used in other parts of the evaluation.

Communities should be grouped by number of forms. For example, 2 form communities might appear as follows:

2 forms

Code	Forms	Dominant Species
M6	re, ff	re, *Typha latifolia;* ff, *Lemna minor, Wolffia*
S1	ts, gc	ts, *Salix discolor;* gc, *lmpatiens capensis, Thelypteris palustris*

Note that the dominant species for each form are separated by a semicolon. The dominant species (maximum of 2) within a form are separated by commas.

Scoring:

Total # of communities with 1-3 forms = 14	Total # of communities with 4 -5 forms = 2	Total # of communities with 6 or more forms = 0
1 = 1.5 points	1 = 2 points	1 = 3 points
2 = 2.5	2 = 3.5	2 = 5
3 = 3.5	3 = 5	3 = 7
4 = 4.5	4 = 6.5	4 = 9
5 = 5	5 = 7.5	5 = 10.5
6 = 5.5	6 = 8.5	6 = 12
7 = 6	7 = 9.5	7 = 13.5
8 = 6.5	8 = 10.5	8 = 15
9 = 7	9 = 11.5	9 = 16.5
10 = 7.5	10 = 12.5	10 = 18
11 = 8	11 = 13	11 = 19
+.5 each additional community = 9.5	+.5 each additional community = 3.5	+ 1 each additional community = 0.0

e.g., a wetland with 3 one form communities 4 two form communities 12 four form communities and 8 six form communities would score:

9.5 + 3.5 = 13 points

Vegetation Communities Score (maximum 45 points) 13

1. 2. 2. Vegetation Communities - Grindstone Creek Headwaters Wetland Complex

Wetland #	MNR Field #	NRSI Wetland #	NRSI Field #	Map Code	Vegetation Forms	Dominant Species (Size in hectares; site type: P-palustrine with no inflow, Pi-palustrine with inflow, I-Isolated; soil type; O-depth of organics in cm; g-depth to mottling from top of mineral soil in cm; G-depth to gley from top of mineral soil in cm; sw-% standing water-depth in cm; presence of seepage)
1	13	W3		neM3-A	ne*	ne: Phalaris arundinacea (0.26; P; silty loam; g-30; G-30; sw-30%-60)
2	14	W3		hS6-B	h*, ts, gc, ne	h: Fraxinus pennsylvanica; ts: Carpinus caroliniana; gc: Maianthemum stellatum, Rhus radicans ssp. negundo; ne: Carex sp., Glyceria striata (2.46; Pi; clay loam; O-5; g-10, 20; G-10, 20)
	14b	W3		neS9	ts, ne*, m	ts: Fraxinus pennsylvanica; ne: Phalaris arundinacea, m: moss (0.12; Pi)
3	12	W3		neM3-A	ne*	ne: Phalaris arundinacea (0.28; Pi; silty loam; g-40, 44; G-44; sw-10-20%, 0.28ha)
4	17	W3		neS8-A	ts, ne*	ts: Fraxinus pennsylvanica, Cornus stolonifera; ne: Phalaris arundinacea (0.34; P; loam; g-20-35)
	16	W3		hS7-A	h*, ts, ne	h: Fraxinus pennsylvanica; ts: Fraxinus pennsylvanica; ne: Agrostis stolonifera, Carex sp. (0.50; P; loam; O-10; g-20; G-20)
	15	W3		neM3	ne*	ne: Phalaris arundinacea (0.79; P; silty loam; g-28-30; G-30)
	10	W3		hS7-B	h*, ts, ne	h: Fraxinus pennsylvanica; ts: Fraxinus pennsylvanica; ne: Carex sp (0.73; Pi; loam; O-15; g-0; G-0; sw-10%-10-20)
	11	W3		tsS4	ts*, ne	ts: Cornus stolonifera, Cornus foemina; ne: Phalaris arundinacea (0.29; Pi; loam; g-20; G-20)
	11b	W3		neM3-C	ne*	ne: Phalaris arundinacea (0.04; Pi;sw-95%-100+)
	12	W3		neM3-A	ne*	ne: Phalaris arundinacea (0.65; Pi; loam; O-15; g-15, 20, 38, 42; G-20, 35; sw-10-20%)
				neS8-B	ts, ne*	ts: tall shrubs; ne: narrow-leaved emergents (0.26; P; based on airphoto interpretation)
5	17	W3		neS8-A	ts, ne*	ts: Fraxinus pennsylvanica, Cornus stolonifera; ne: Phalaris arundinacea (0.16; Pi; loam; g-0; G-80)
6	9	W3		neM3-A	ne*	ne: Phalaris arundinacea (0.55; P; silty loam; g-30; G-30; sw-5%-30-40)
7	6	W7		hS6-A	h*, ts, gc, ne	h: Acer X freemanii, Fraxinus pennsylvanica; ts: Acer X freemanii, Carpinus caroliniana, Rhus radicans ssp. negundo; gc: Caltha palustris, Cardamine douglasii, Maianthemum stellatum; ne: Glyceria striata, Carex sp. (2.77; Pi; silty loam; O-40+; g-20-30; G-65; sw-60%-40; presence of seepage)
	7	W7		tsS3	h, ts*, gc, ne	h: Ulmus americana, Fraxinus pennsylvanica; ts: Cornus stolonifera, Cornus foemina; gc: Lysimachia ciliata, Impatiens capensis; ne: Agrostis stolonifera (0.52; Pi; silty loam; g-20; sw-30%-30-40)
	8	W7		neM3-A	ne*	ne: Phalaris arundinacea (0.50; P; silty loam; g-40)
				neM3-A	ne*	ne: Phalaris arundinacea (0.14; Pi; silty loam)
		W7	18	neM3-B	ne*	ne: Phalaris arundinacea, Carex vulpinoidea (0.51; Pi; loam)
		W7	6	hS10	h*, gc	h: Acer X freemanii, Fraxinus americana, Ulmus americana; gc: Impatiens capensis, Circaea lutetiana, Hydrophyllum virginianum, Parthenocissus quinquefolium (0.73; Pi; silty clay loam)
8		W4	20	reM5	ne, re*	ne: Phalaris arundinacea; re: Typha angustifolia (0.27; P; silty clay loam; sw-80%)
9		W5	6c	hS5-B	h*, ts, gc	h: Acer X freemanii; ts: Ulmus americana, Fraxinus americana; gc: Geranium robertianum, Rhus radicans ssp. negundo (0.09; I; clay; sw-10%)
10		W6	6b	neM4	ne*, gc, ff	ne: Equisetum sp., Leersia oryzoides; gc: Poygonum sp., Impatiens capensis; ff: Lemna minor (0.04; P; silty clay; sw-90%-10)
11	4	W11		tsS1	h, ts*	h: Salix X rubens; ts: Cornus stolonifera (0.05; I; sw-25%-40)
12	2	W11		neM2	gc, ne*	gc: Impatiens capensis, Eupatorium maculatum, Onoclea sensibilis; ne: Phalaris arundinacea (0.37; P; loam; O-29; g-29; G-29; sw-2%; presence of seepage)
	3	W11		hS5-A	h*, ts, gc	h: Fraxinus pennsylvanica; ts: Carpinus caroliniana; gc: Onoclea sensibilis, Maianthemum stellatum (0.04; P; loam; O-15; g-0; G-0)
	5	W11		tsS2	ts*, ne, m	ts: Cornus stolonifera; ne: Agrostis stolonifera, Equisetum arvense; m: moss (0.27; P; silty loam; g-10; presence of seepage)
13		W10	26	neM3-A	ne*	ne: Phalaris arundinacea (0.90; Pi; silty clay loam)
		W10	27	neM3-A	ne*	ne: Phalaris arundinacea (0.24; Pi; silty clay loam)

	W10	28	neM6-B	ne*, re	ne: Phalaris arundinacea, Carex vulpinoidea; re: Typha angustifolia (1.83; Pi; silty clay loam)
14	W8	21	suW1	su*	su: Potamogeton sp. (0.05; Pi; silty clay loam; sw-100%, presence of seepage)
	W8	22	neM6-A	ne*, re	ne: Phalaris arundinacea; re: Typha angustifolia (0.36; Pi; silty clay loam)
15	W9	23	neM6-A	ne*, re	ne: Phalaris arundinacea; re: Typha angustifolia (0.51; Pi; silty clay loam)

Vegetation Forms:
h - deciduous trees
c - coniferous trees
dh - dead deciduous trees
ts - tall shrubs
gc - herbs (ground cover)
m - mosses
re - robust emergents
ne - narrow leaved emergents
be - broad leaved emergents
f - floating plants (rooted)
ff - free floating plants
su - submerged plants
u - unvegetated
*** - dominant form**

Map Codes:
M - Marsh
S - Swamp
W - Open Water Marsh

Wetland Name: Grindstone Creek Headwaters Wetland Complex

Wetland Size (ha): 17.62

Vegetation Form	% area in which form is dominant
h	0.416
c	
dh	
dc	
ts	0.064
ls	
ds	
gc	
m	
ne	0.502
be	
re	0.015
ff	
f	
su	0.003
u (unvegetated)	
Total = 100%	1.00

1.2.3 DIVERSITY OF SURROUNDING HABITAT

(Check all appropriate items(1))

x	row crop
x	pasture
x	abandoned agricultural land
x	deciduous forest
x	coniferous forest
x	mixed forest (at least 25% conifer and 75% deciduous or vice versa)
	abandoned pits and quarries
	open lake or deep river
x	fence rows with cover, or shelterbelts
x	terrain appreciably undulating,hilly,or with ravines
x	creek flood plain

Diversity of Surrounding Habitat Score (1 for each, maximum 7 points) 7

1.2.4 PROXIMITY TO OTHER WETLANDS

		(Check first appropriate category only)	Scoring
1)	x	Hydrologically connected by surface water to other wetlands (different dominant wetland type) or to open lake or deep river within 1.5 km (Mount Nemo Wetland Complex)	8 points
2)		Hydrologically connected by surface water to other wetlands (same dominant wetland type) within 0.5 km	8
3)		Hydrologically connected by surface water to other wetlands (different dominant wetland type),or to open lake or deep river from 1.5 to 4 km away	5
4)		Hydrologically connected by surface water to other wetlands (same dominant wetland type) from 0.5 to 1.5 km away	5
5)		Within 0.75 km of other wetlands (different dominant wetland type) or open water body, but not hydrologically connected by surface water	5
6)		Within 1 km of other wetlands,but not hydrologically connected by surface water	2
7)		No wetland within 1 km	0

Proximity to other Wetlands Score (Choose one only, maximum 8 points) 8

1.2.5 INTERSPERSION

Number of Intersections (Check one)			Score
1)	26 or less		3
2)	27 to 40		6
3)	41 to 60		9
4)	61 to 80	79	12
5)	81 to l00		15
6)	101 to 125		18
7)	126 to 150		21
8)	151 to 175		24
9)	176 to 200		27
10)	>200		30

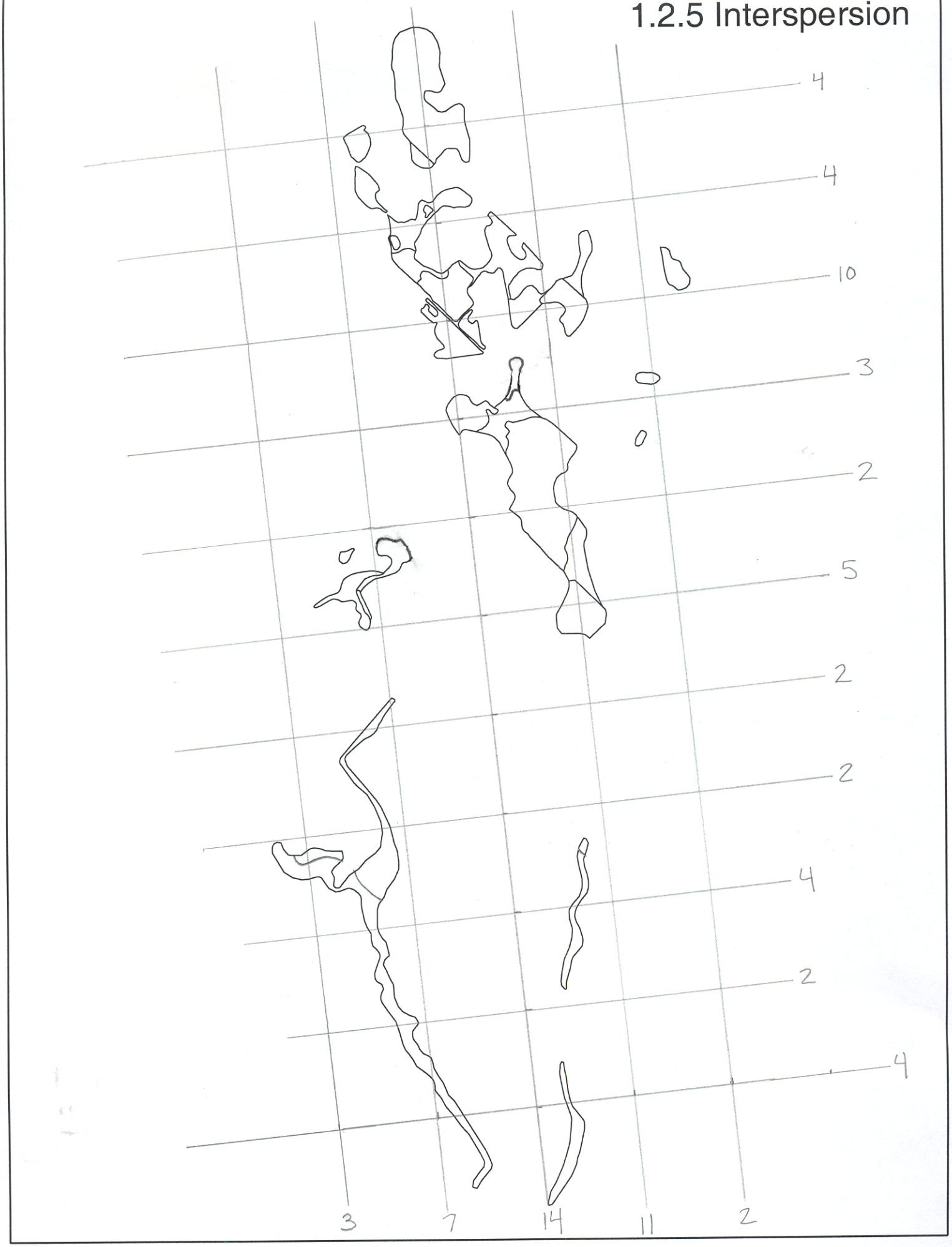
Interspersion Score (Choose one only maximum 30 points) 12

1.2.6 OPEN WATER TYPES

Permanently flooded: (Check one)			Score
1)	x	type 1	8
2)		type 2	8
3)		type 3	14
4)		type 4	20
5)		type 5	30
6)		type 6	8
7)		type 7	14
8)		type 8	3
9)		no open water	0

Open Water Type Score (Choose one only maximum 30 points) 8

1.2.5 Interspersion



25.1 (A) ÷ 12 = 2.1 (B)
Total horizontal intersections = 42
Total vertical intersections = 37

TOTAL = 79

1.3 SIZE

17.62 hectares 61 Subtotal for Biodiversity

Size Score (Biological Component) (maximum 5O points) 8

Evaluation Table Size Score (Biological component)

Wetland size (ha)	Total Score for Biodiversity Subcomponent									
	<37	37-48	49-60	61-72	73-84	85-96	97-108	109-120	121-132	>132
<21 ha	1	5	7	**8**	9	17	25	34	43	50
21-40	5	7	8	9	10	19	28	37	46	50
41-60	6	8	9	10	11	21	31	40	49	50
61-80	7	9	10	11	13	23	34	43	50	50
81-100	8	10	11	13	15	25	37	46	50	50
101-120	9	11	13	15	18	28	40	49	50	50
121-140	10	13	15	17	21	31	43	50	50	50
141-160	11	15	17	19	23	34	46	50	50	50
161-180	13	17	19	21	25	37	49	50	50	50
181-200	15	19	21	23	28	40	50	50	50	50
201-400	17	21	23	25	31	43	50	50	50	50
401-600	19	23	25	28	34	46	50	50	50	50
601-800	21	25	28	31	37	49	50	50	50	50
801-1000	23	28	31	34	40	50	50	50	50	50
1001-1200	25	31	34	37	43	50	50	50	50	50
1201-1400	28	34	37	40	46	50	50	50	50	50
1401-1600	31	37	40	43	49	50	50	50	50	50
1601-1800	34	40	43	46	50	50	50	50	50	50
1801-2000	37	43	47	49	50	50	50	50	50	50
>2000	40	46	50	50	50	50	50	50	50	50

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1 WOOD PRODUCTS

Area of wetland forested (ha), i.e. dominant form is h or c. Note that this is not wetland size. (Check one only)

			Score
1)		<5 ha	0
2)	x	5 -25 ha	3
3)		26 -50 ha	6
4)		51- l00 ha	9
5)		101 -200 ha	12
6)		>200 ha	18

Source of information: field surveys

Wood Products Score (Score one only, maximum 18 points) 3

2.1.2 WILD RICE

(Check one)			Score (Choose one)
Present (minimum size 0.5 ha)	1)		6 points
Absent	2)	x	0

Source of information: field surveys, background sources

Wild Rice Score (maximum 6 points) 0

2.1.3 COMMERCIAL FISH (BAIT FISH AND/OR COARSE FISH

(Check one)			Score (Choose one)
Present	1)	x	12 points
Habitat not suitable for fish	2)		0

Source of infolmation: field surveys, OMNR fish records 2006

Commercial Fish Score (maximum 12 points) 12

2.1.4 BULLFROGS

(Check one)			Score (Choose one)
Present	1)	x	1 points
Absent	2)		0

Source of information: field surveys

Bullfrog Score (maximum 1 point) 1

2.1.5 SNAPPING TURTLES

(Check one)			Score (Choose one)
Present	1)	x	1 point
Absent	2)		0

Source of information: NRSI 2006

Snapping Turtle Score (maximum 1 point) 1

2.1.6 FURBEARERS

(Consult Appendix 9)

Name of furbearer		Source of information
1) Raccoon	3	field observation by JART, Stantec and NRSI
2) Red Squirrel	3	field observation by Stantec
3) Coyote	3	field observation by JART, Stantec and NRSI
4) Red Fox	3	background sources, field observation by NRSI
5) Opposum		field observation by NRSI

Scoring: 3 points for each species. maximum 12

Furbearer Score (maximum 12 points) 12

2.2 RECREATIONAL ACTIVITIES

Type of Wetland-Associated Use						
Intensity of Use	Hunting		Nature Enjoyment/ Ecosystem Study		Fishing	
High	40 points		40 points		40 points	
Moderate	20		20		20	
Low	8		8	x	8	
Not possible/NotKnown	0	x	0		0	x
Totals		0		8		0

(score one level for each of the three wetland uses; scores are cumulative; maximum score 80 points)

Sources of information:

Hunting: field observation, posted

Nature: local landowner use

Fishing: landowner, field observation

Recreational Activities Score (maximum 80 points) 8

2.3 LANDSCAPE AESTHETICS

2.3.1 DISTINCTNESS

(Check one)			Score (Choose one)
Clearly distinct	1)	x	3 points
Indistinct	2)		0

Landscape Distinctness Score (maximum 3 points) 3

2.3.2 ABSENCE OF HUMAN DISTURBANCE

(Check one)			Score (Choose one)
Human disturbances absent or nearly so	1)		7 points
One or several localized disturbances	2)	x	4
Moderate disturbance; localized water pollution	3)		2
Wetland intact but impairment of ecosystem quality intense in some areas	4)		1
Extreme ecological degradation, or water pollution severe and widespread	5)		0

Source of information: field observation

Absence of Human Disturbance Score (maximum 7 points) 4

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1 EDUCATIONAL USES

(Check one)			Score (Choose one)
Frequent	1)		20 points
Infrequent	2)		12
No visits	3)	x	0

Source of information: landowner

Educational Uses Score (maximum 20 points) 0

2.4.2 FACILITIES AND PROGRAMS

(check one)			Score (Choose one)
Staffed interpretation centre	1)		8 points
No interpretation centre or staff but a system of self-guiding trails or brochures available	2)		4
Facilities such as maintained paths (e.g., woodchips) boardwalks, boat launches or observation towers but no brochures or other interpretation	3)		2
No facilities or programs	4)	x	0

Source of information: field observation

Facilities and Programs Score (maximum 8 points) 0

2.4.3 RESEARCH AND STUDIES

(check appropriate spaces)		Score
Long term research has been done		12 points
Research papers published in refereed scientific journal or as a thesis		10
One or more (non-research) reports have been written on some aspect of the wetland ' s flora fauna hydrology etc.		5
No research or reports	x	0

Attach list of known reports by above categories

Research and Studies Score (Score is cumulative, maximum 12 points) 0

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT

Circle the highest applicable score

Distance of wetland from settlement	1) population> 10,000		2) population 2,500 -10,000		3) population <2,500 or cottage community	
1) Within or adjoining settlement	40 points		26		16	
2) 0.5 to 10 km from settlement	26	x	16		10	
3) 10 to 60 km from settlement	12		8		4	
4) >60 km from settlement	5		2		0	
		26		0		0

Name of settlement: Burlington

Proximity to Human Settlement Score (maximum 40 points) 26

2.6 OWNERSHIP (FA= fraction Area)

					Score
FA of wetland in public or private ownership held under contract or in trust for wetland protection		x	10	=	0.00
FA of wetland area in public ownership,not as above		x	8	=	0.00
FA of wetland area in private ownership,not as above	1.00	x	4	=	4.00

Source of information: assessment rolls

Ownership Score (maximum 10 points) 4

2.7 SIZE

17.62 hectares 63 Subtotal for Social

Evaluation Table for Size Score (Social Component)

Wetland Size (ha)	Total for Size Dependent Score									
	<31	31-45	46-60	61-75	76-90	91-105	106-109	121-135	136-150	>150
<2 ha	1	2	4	8	10	12	14	14	14	15
2 - 4ha	1	2	4	8	12	13	14	14	15	16
5 - 8ha	2	2	5	9	13	14	15	15	16	16
9 - 12ha	3	3	6	10	14	15	15	16	17	17
13-17	3	4	7	10	14	15	16	16	17	17
18-28	4	5	8	**11**	15	16	16	17	17	18
29-37	5	7	10	13	16	17	18	18	19	19
38-49	5	7	10	13	16	17	18	18	19	20
50-62	5	8	11	14	17	17	18	19	20	20
63-81	5	8	11	15	17	18	19	20	20	20
82-105	6	9	11	15	18	18	19	20	20	20
106-137	6	9	12	16	18	19	20	20	20	20
138-178	6	9	13	16	18	19	20	20	20	20
179-233	6	9	13	16	18	20	20	20	20	20
234-302	7	9	13	16	18	20	20	20	20	20
303-393	7	9	14	17	18	20	20	20	20	20
394-511	7	10	14	17	18	20	20	20	20	20
512-665	7	10	14	17	18	20	20	20	20	20
666-863	7	10	14	17	19	20	20	20	20	20
864-1123	8	12	15	17	19	20	20	20	20	20
1124-1460	8	12	15	17	19	20	20	20	20	20
1461-1898	8	13	15	18	19	20	20	20	20	20
1899-2467	8	14	16	18	20	20	20	20	20	20
>2467	8	14	16	18	20	20	20	20	20	20

Total Size Score (Social Component) 11

2.8 ABORIGINAL AND CULTURAL HERITAGE VALUES

Either or both Aboriginal or Cultural Values may be scored. However, the maximum score permitted for 2.8 is 30 points. Attach documentation.

2.8.1 ABORIGINAL VALUES

Full documentation of sources must be attached to the data record.

1)	Significant		=	30 points
2)	Not Significant	x	=	0
3)	Unknown		=	0
	Total:	0		see Archaelogix Inc. 2004 Archeological Assessment.

2.8.2 CULTURAL HERITAGE

1)	Significant		=	30 points
2)	Not Significant		=	0
3)	Unknown	x	=	0
	Total:	0		

Aboriginal Values/Cultural Heritage Score (maximum 30 points) 0

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION

If the wetland is a complex including isolated wetlands, apportion the l00 points according to area.
For example if 10 ha of a l00 ha complex is isolated, the isolated portion receives the maximum proportional score of 10. The remainder of the wetland is then evaluated out of 90.

0.14 ha are isolated of a 17.62 ha complex: 0.008 FA x 100 pts = 0.8 points 100 - 0.8 = 99.2 points

Step 1: Detennination of Maximum Score

	Wetland is located on one of the defined 5 large lakes or 5 major rivers (Go to Step 4)
0.80%	Wetland is entirely isolated (i.e. not part of a complex) (Go to Step 4)
99.20%	All other wetland types (Go through Steps 2,3 and 4B)

Step 2: Determination of Upstream Detention Factor (DF)

(a)	Wetland area (ha)	17.62 ha - 0.14 ha isolated = 17.48		17.48
(b)	Total area (ha) of upstream detention areas (include the wetland itself)	17.62+7.5=25.12		25.12
(c)	Ratio of (a):(b)			0.70
(d)	Upstream detention factor: (c) x 2 = (maximum allowable factor = 1)		1.39	1.00

Step 3: Determination of Wetland Attenuation Factor (AF)

(a)	Wetland area (ha)			17.48
(b)	Size of catchment basin (ha) upstream of wetland (include wetland itself in catchment area)			258.52
(c)	Ratio of (a):(b)			0.07
(d)	Wetland attenuation factor: (c) x 10 = (maximum allowable factor = 1)		0.7	0.70

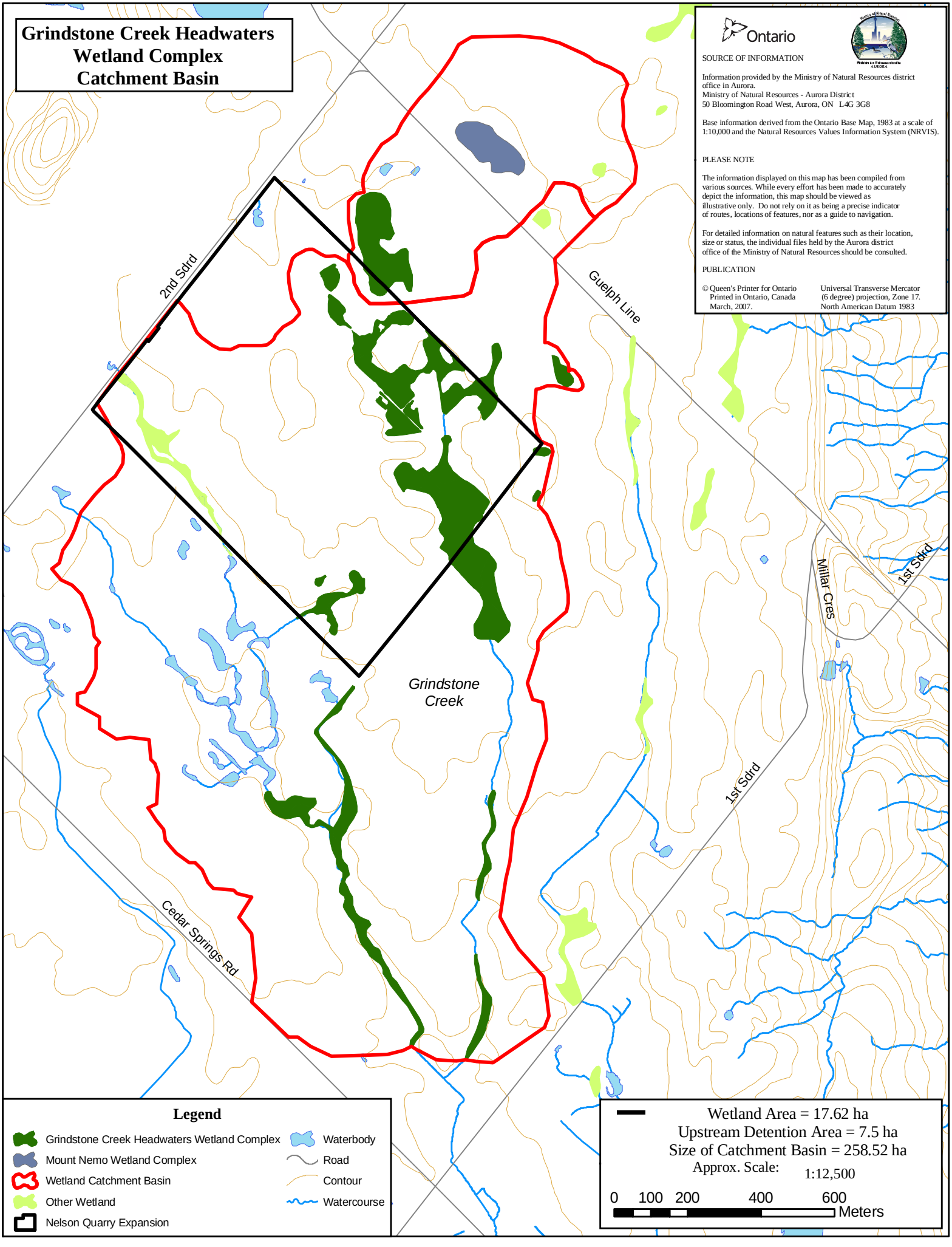
Step 4: Calculation of final score

(a)	Wetlands on large lakes or major rivers			0
(b)	Wetland entirely isolated			l00
(b)	All other wetlands --calculate as follows:			
(c	* Complex Formula - Isolated portion		99.2	1
	Initial Score			100 *
	Upstream detention factor (DF) (Step 2)			1.00
	Wetland attenuation factor (AF) (Step 3)			0.70
	Final score: [(DF + AF)/2] x Initial score =			84.32
(c	* Final score:=84.3 + 0.8 = 85.1		85.1	

*Unless wetland is a complex with isolated portions (see above).

Flood Attenuation Score (maximum l00 points) 85

Grindstone Creek Headwaters Wetland Complex Catchment Basin



Ontario

SOURCE OF INFORMATION

Information provided by the Ministry of Natural Resources district office in Aurora.
Ministry of Natural Resources - Aurora District
50 Bloomington Road West, Aurora, ON L4G 3G8

Base information derived from the Ontario Base Map, 1983 at a scale of 1:10,000 and the Natural Resources Values Information System (NRVIS).

PLEASE NOTE

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should be viewed as illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

For detailed information on natural features such as their location, size or status, the individual files held by the Aurora district office of the Ministry of Natural Resources should be consulted.

PUBLICATION

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Universal Transverse Mercator (6 degree) projection, Zone 17.
North American Datum 1983

Legend

- Grindstone Creek Headwaters Wetland Complex
- Mount Nemo Wetland Complex
- Wetland Catchment Basin
- Other Wetland
- Nelson Quarry Expansion
- Waterbody
- Road
- Contour
- Watercourse

Wetland Area = 17.62 ha
Upstream Detention Area = 7.5 ha
Size of Catchment Basin = 258.52 ha
Approx. Scale: 1:12,500

0 100 200 400 600 Meters

3.2 WATER QUALITY IMPROVEMENT

3.2.1 SHORT TERM WATER QUALITY IMPROVEMENT

Step 1: Determination of maximum initial score

	Wetland on one of the 5 defined large lakes or 5 major rivers (Go to Step 5a)
x	All other wetlands (Go through Steps 2, 3, 4, and 5b)

Step 2: Determination of watershed improvement factor (WIF)

Calculation of WIF is based on the fractional area (FA) of each site type that makes up the total area of the wetland.

(FA= area of site type/total area of wetland)	Fractional Area				
FA of isolated wetland	0.008	x	0.5	=	0.004
FA of riverine wetland		x	1	=	0.000
FA of palustrine wetland with no inflow	0.238	x	0.7	=	0.166
FA of palustrine wetland with inflows	0.754	x	1	=	0.754
FA of lacustrine on lake shoreline		x	0.2	=	0.000
FA of lacustrine at lake inflow or outflow		x	1	=	0.000
			Sub Total:		0.925
			Sum (WIF cannot exceed 1.0)		0.93

Step 3: Determination of catchment land use factor (LUF)
(Choose the first category that fits upstream landuse in the catchment.)

1)	x	Over 50% agricultural and/or urban	1.0
2)		Between 30 and 50% agricultural and/or urban	0.8
3)		Over 50% forested or other natural vegetation	0.6

LUF (maximum 1.0) 1.00

Step 4: Determination of pollutant uptake factor (PUT)

Calculation of PUT is based on the fractional area (FA) of each vegetation type that makes up the total area of the wetland. Base assessment on the dominant vegetation form for each community except where dead trees or shrubs dominate. In that case base assessment on the domininant live vegetation. (FA = area of vegetation type/total area of wetland)

	Fractional Area				
FA of wetland with live trees, shrubs, herbs or mosses (c,h,ts,ls,gc,m)	0.48	x	0.75	=	0.36
FA of wetland with emergent, submergent or floating vegetation (re,be,ne,su,f,ff)	0.52	x	1	=	0.52
FA of wetland with little or no vegetation (u)		x	0.5	=	0.00
			Sum (PUT cannot exceed 1.0)		0.88

Step 5: **Calculation of final score**

(a)	Wetland on large lakes or major rivers	0	
(b)	All other wetlands -calculate as follows		
	Initial score	60	
	Water quality improvement factor (WQF)	0.93	
	Land use factor (LUF)	1.00	
	Pollutant uptake factor (PUT)	0.88	
	Final score: 60 x WQF x LUF x PUT =	49.10	
	Short Term Water Quality Improvement Score (maximum 60 points)		49

3.2.2 LONG TERM NUTRIENT TRAP

Step 1:

____	Wetland on large lakes or 5 major rivers	0 points
x	All other wetlands (proceed to Step 2)	

Step 2: Choose only one of the following settings that best describes the wetland being evaluated

1)	____	Wetland located in a river mouth	10 points
2)	____	Wetland is a bog, fen or swamp with more than 50% of the wetland being covered with organic soil	10
3)	x	Wetland is a bog, fen or swamp with less than 50% of the wetland being covered with organic soil	3
4)	____	Wetland is a marsh with more than 50% of the wetland covered with organic soil	3
5)	____	None of the above	0
		Long Term Nutrient Trap Score (maximum 10 points)	3

3.2.3 GROUNDWATER DISCHARGE

(Circle the characteristics that best describe the wetland being evaluated and then sum the scores. If the sum exceeds 30 points assign the maximum score of 30.)

Wetland Characteristics	Potential for Discharge					
	None to Little		Some		High	
Wetland type	1) Bog = 0		2) Swamp/Marsh = 2	2	3) Fen = 5	
Topography	1) Flat/rolling = 0	0	2) Hilly = 2		3) Steep = 5	
Wetland Area: Upslope Catchment Area =	Large (>50%) = 0		Moderate (5-50%) = 2	2	Small "5%) = 5	
Lagg Development	1) None found = 0	0	2) Minor = 2		3) Extensive = 5	
Seeps	1) None = 0		2) = or < 3 seeps = 2	2	3) > 3 seeps = 5	
Surface marl deposits	1) None = 0		2) = or < 3 sites = 2		3) > 3 sites = 5	
Iron precipitates	1) None = 0	0	2) = or < 3 sites = 2		3) > 3 sites = 5	
Located within 1 km of a major aquifer	N/A = 0	0	N/A = 0		Yes = 10	
Totals		0		6		0

(Scores are cumulative maximum score 30 points)

Groundwater Discharge Score (maximum 30 points) 6

3.3 CARBON SINK

Choose only one of the following

1)	Bog, fen or swamp with more than 50% coverage by organic soil		5 points
2)	Bog, fen or swamp with between 10 to 49% coverage by organic soil		2
3)	Marsh with more than 50% coverage by organic soil		3
4)	Wetlands not in one of the above categories	x	0

Carbon Sink Score (maximum 5 points) 0

3.4 SHORELINE EROSION CONTROL

Step 1:

		Score
x	Wetland entirely isolated or palustrine	0
	Any part of the Wetland riverine or lacustrine (proceed to Step 2)	

Step 2:

Choose the one characteristic that best describes the shoreline vegetation (see text for a definition of shoreline)

			Score
1)		Trees and shrubs	15
2)		Emergent vegetation	8
3)		Submergent vegetation	6
4)		Other shoreline vegetation	3
5)		No vegetation	0

Shoreline Erosion Control Score (maximum 15 points) 0

3.5 GROUND WATER RECHARGE

3.5.1 WETLAND SITE TYPE

		Score	
(a)	Wetland > 50% lacustrine (by area) or located on one of the five major rivers	0	
(b)	Wetland not as above. Calculate final score as follows: (FA= area of site type/total area of wetland)		

	Fractional Area				
FA of isolated or palustrine wetland	1.000	x	50	=	50.00
FA of riverine wetland	0.000	x	20	=	0.00
FA of lacustrine wetland (wetland <50% lacustrine)	0.000	x	0	=	0.00

Ground Water Recharge Wetland Site Type Component Score (maximum 50 points) 50

3.5.2 WETLAND SOIL RECHARGE POTENTIAL

(Circle only one choice that best describes the hydrologic soil class of the area surrounding the wetland being evaluated.)

Dominant Wetland Type	1) Sand, loam, gravel, till		2) Clay or bedrock	
1) Lacustrine or on a major river	0		0	
2) Isolated	10		5	
3) Palustrine	7	7	4	
4) Riverine (not a major river)	5		2	
Totals		7		

Ground Water Recharge Wetland Soil Recharge Potential Score (maximum 10 points) 7

4.0 SPECIAL FEATURES COMPONENT

4.1 RARITY

4.1.1 WETLANDS

Site District 7E-3

Presence of wetland type (check one or more)

	Bog
	Fen
x	Swamp
x	Marsh

Score for rarity within the landscape and rarity of the wetland type. Score for rarity of wetland type is cumulative (maximum 80 points) based on presence or absence.

Slte District	Score for Rarity within the Landscape	Score for Rarity of Wetland Type			
		Marsh	Swamp	Fen	Bog
6-1	60	40	0	80	80
6-2	60	40	0	80	80
6-3	40	10	0	40	80
6-4	60	40	0	80	80
6-5	20	40	0	80	80
6-6	40	20	0	80	80
6-7	60	10	0	80	80
6-8	20	20	0	80	80
6-9	0	20	0	80	80
6-10	20	0	20	80	80
6-11	0	30	0	80	80
6-12	0	30	0	60	80
6-13	60	10	0	80	80
6-14	40	20	0	40	80
6-15	40	0	0	80	80
7-1	60	0	60	80	80
7-2	60	0	0	80	80
7-3	**60**	**0**	**0**	80	80
7-4	80	0	0	80	80
7-5	80	30	0	80	80

Rarity within the Landscape Score (maximum 80 points)	60
Rarity of Wetland Type Score (maximum 80 points)	0

4.1.2 SPECIES

4.1.2.1 BREEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

	Name of species		Source of information
1)	Ambystoma jeffersonianum (Jefferson Salamander)	250	MNR field observation and genetic confirmation 2005, 2006
2)	Juglans cinerea (Butternut)	250	MNR field observation 2006
3)			
4)			
5)			
	Total:	500	

Attach documentation.

Scoring:

For each species 250 points

(score is cumulative, no maximum score)

Breeding Habitat for Endangered or Threatened Species Score (no maximum) 500

4.1.2.2 TRADITIONAL MIGRATION OR FEEDING HABITAT FOR AN ENDANGERED OR THREATENED SPECIES

	Name of species		Source of information
1)			
2)			
3)			
4)			
5)			
	Total:	0	

Attach documentation.
Scoring:

For one species 150 points
For each additional species 75

(score is cumulative, no maximum score)

Traditional Habitat for Endangered Species Score (no maximum) 0

4.1.2.3 PROVINCIALLY SIGNIFICANT ANIMAL SPECIES

	Name of species	Source of information
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		
14)		
15)		

Attach separate list if necessary; Attach documentation

Scoring:

Number of provincially significant animal species in the wetland:

1	species = 50 points		14 species	=	154
2	species = 80		15 species	=	156
3	species = 95		16 species	=	158
4	species = 105		17 species	=	160
5	species = 115		18 species	=	162
6	species = 125		19 species	=	164
7	species = 130		20 species	=	166
8	species = 135		21 species	=	168
9	species = 140		22 species	=	170
10	species = 143		23 species	=	172
11	species = 146		24 species	=	174
12	species = 149		25 species	=	176
13	species = 152				

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

(no maximum score)

Provincially Significant Animal Species Score (no maximum) 0

4.1.2.4 PROVINCIALLY SIGNIFICANT PLANT SPECIES

(Scientific names must be recorded)

	Common Name	Scientific Name	Source of information
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

Attach separate list if necessary; Attach documentation

Scoring:

Number of provincially significant plant species in the wetland:

1 species	=	50 points	14 species	=	154
2 species	=	80	15 species	=	156
3 species	=	95	16 species	=	158
4 species	=	105	17 species	=	160
5 species	=	115	18 species	=	162
6 species	=	125	19 species	=	164
7 species	=	130	20 species	=	166
8 species	=	135	21 species	=	168
9 species	=	140	22 species	=	170
10 species	=	143	23 species	=	172
11 species	=	146	24 species	=	174
12 species	=	149	25 species	=	176
13 species	=	152			

Add one point for every species past 25 (for example, 26 species = 177 points, 27 species = 178 points etc.)

Provincially Significant Plant Species Score (no maximum) 0

4.1.2.5 REGIONALLY SIGNIFICANT SPECIES (SITE REGION)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR.**

SIGNIFICANT IN SITE REGION:

.

	Common Name	Scientific Name	Source of information
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

Attach separate list if necessary .Attach documentation.

Scoring:

No. of species significant in Site Region

1 species	=	20	6 species	=	55
2 species	=	30	7 species	=	58
3 species	=	40	8 species	=	61
4 species	=	45	9 species	=	64
5 species	=	50	10 species	=	67

Add one point for every species past 10. (no maximum score)

Regionally Significant Species Score (Site Region)(no maximum) 0

4.2.1.6 LOCALLY SIGNIFICANT SPECIES (RARE IN HALTON)

Scientific names must be recorded for plant species. **Lists of significant species must be approved by MNR.**

	Common Name	Scientific Name	Source of information
1	Meadow Horsetail	Equisetum pratense	NRSI 2006
2	Five-leaved Virginia-creeper	Parthenocissus quinquefolia	Stantec 2006
3	Doubtful False Pimpernel	Lindernia dubia var. dubia	Stantec 2006
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

Attach separate list if necessary .Attach documentation.

Scoring:

No. of species significant in Site District

1 species	=	10	6 species	=	41
2 species	=	17	7 species	=	43
3 species	=	24	8 species	=	45
4 species	=	31	9 species	=	47
5 species	=	38	10 species	=	49

For each significant species over 10 in the wetland, add 1 point.

Locally Significant Species Score (Site District) (no maximum) 24

4.2 SIGNIFICANT FEATURES AND/OR FISH & WILDLIFE HABITAT

4.2.1 NESTING OF COLONIAL WATERBIRDS

Status	Name of species	Source of Information	Score
1) Currently nesting			50 points
2) Known to have nested within past 5 years			25
3) Active feeding area (Do not include feeding by great blue herons)			15
4) None known			0

Attach documentation (nest locations etc., if known)

Score highest applicable category only; maximum score 50 points.

Score for Nesting Colonial Waterbirds (maximum 50 points) 0

4.2.2. WINTER COVER FOR WILDLIFE

		(Check only highest level of significance) (one only)	Score
1)		Provincially significant	l00
2)		Significant in Site Region	50
3)		Significant in Site District	25
3)		Locally significant	10
4)	x	Little or poor winter cover present	0

Source of information: field survey

Winter Cover for Wildlife Score (maximum l00 points) 0

4.2.3 WATERFOWL STAGING AND/OR MOULTING

(Check only highest level of significance for both staging and moulting; score is cumulative across columns, maximum score 15(

		Staging	Score (one only)	Moulting	Score (one only)
1)	Nationally significant		150		150
2)	Provincially significant		100		l00
3)	Regionally significant		50		50
4)	Known to occur		10		10
5)	Not possible		0		0
6)	Unknown	0	0	0	0
	Total:	0		0	

Source of information: field surveys

Waterfowl Moulting and Staging Score (maximum 150 points) 0

4.2.4 WATERFOWL BREEDING

	(Check only highest level of significance)		Score
1)		Provincially significant	l00
2)		Regionally significant	50
3)	10	Habitat suitable	10
4)		Habitat not suitable	0

Source of information: field surveys, background sources

Waterfowl Breeding Score (maximum lOO points) 10

4.2.5 MIGRATOR PASSERINE, SHOREBIRD OR RAPTOR STOPOVER AREA

(check highest applicable category)

1)		Provincially significant	l00
2)		Significant in Site Region	50
3)		Significant in Site District	10
4)	0	Not significant	0

Source of information: field surveys

Passerine, Shorebird or Raptor Stopover Score (maximum 100 points) 0

4.2.6 FISH HABITAT

4.2.6. Spawning and Nursery Habitat

Table 5. Area Factors for Low Marsh, High Marsh, and Swamp Communities.

No. of ha of Fish Habitat	Area Factor
< 0.5 ha	0.1
0.5- 4.9	0.2
5.0- 9.9	0.4
10.0- 14.9	0.6
15.0 -19.9	0.8
20.0+ ha	1.0

Step 1:

_____ Fish habitat is not present within the wetland (Score = 0)

x Fish habitat is present within the wetland (Go to Step 2)

Step 2: Choose only one option

1) x Significance of the spawning and nursery habitat within the wetland is known (Go to Step 3)

2) _____ Significance of the spawning and nursery habitat within the wetland is not known (Go through Steps 4, 5, 6 and 7)

Step 3: Select the highest appropriate category below attach documentation:

1)		Significant in Site Region	l00 points	
2)		Significant in Site District	50	
3)		Locally Significant Habitat (5.0+ ha)	25	
4)	x	Locally Significant Habitat (<5.0 ha)	15	see fish records, Green Sunfish limited distribution in Halton Region

Score for Spawning and Nursery Habitat (maximum score 100 points) 15

Fish Species Present in and Around the Grindstone Creek Headwaters Wetland Complex

based on fish records at OMNR Aurora District 2006

bluntnose minnow
pumpkinseed
brook stickleback
creek chub
green sunfish
fathead minnow

FISH RECORDS IN AND AROUND THE GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX
based on: fish records OMNR Aurora District 2006

Locality of Station	Fish dot #	collected	Collectors	# caught	Fish type
Grindstone Creek at No. 1 Side Road, 300-325 m south of Wetland Nos. 13 & 15	44	09/08/2006	D. Eusabie	4	creek chub
				10	pumpkinseed
				4	brook stickleback.
	44	01/06/2006	A. Dunn	8	brook stickleback
				-	
North end of Wetland No. 14	94	01/06/2006	A.Dunn	75	green sunfish
			J. Pisapio	50	fathead minnow
			R.Nategaal	25	bluntnose minnow
				10	brook stickleback

Step 4: **Proceed to Steps 4 to 7 only if Step 3 was not answered.**

(**Low Marsh**: marsh area from the existing water line out to the outer boundary of the wetland)

_____ Low marsh not present (Continue to Step 5)
_____ Low marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

Scoring is based on the one most clearly dominant plant species of the dominant form in each Low Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16 Table 16-2) for each Low Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
5	Duckweed				2	
6	Smartweed-Waterwillow				6	
7	Waterlily-Lotus				11	
8	Waterweed-Watercress				9	
9	Ribbongrass				10	
10	Coontail-Naiad-Watermilfoil				13	
11	Narrowleaf Pondweed				5	
12	Broadleaf Pondweed				8	
Sub Total Score (maximum 75 points)						
Total Score (maximum 75 points)						

Step 5: (**High Marsh**: area from the water line to the inland boundary of marsh wetland type. This is essentially what is commonly referred to as a wet meadow, in that there is insufficient standing water to provide fisheries habitat except during flood or high water conditions.)

_____ High marsh not present (Continue to Step 6)
_____ High marsh present (Score as follows)

Scoring for Presence of Key Vegetation Groups

Scoring is based on the one most clearly dominant plant species of the dominant form in each High 1Marsh vegetation community. Check the appropriate Vegetation Group (see Appendix 16 Table 16-2) for each High Marsh community. Sum the areas of the communities assigned to each Vegetation Group and multiply by the appropriate size factor from Table 5.

Vegetation Group Number	Vegetation Group Name	Present as a Dominant Form (check)	Total Area (ha)	Area Factor (see Table 5)	Score	Final Score (area factor x score)
1	Tallgrass				6 pts	
2	Shortgrass-Sedge				11	
3	Cattail-Bulrush-Burreed				5	
4	Arrowhead-Pickerelweed				5	
Sub Total Score (maximum 25 points)						
Total Score (maximum 25 points)						

Step 6: (**Swamp**: Swamp communities containing fish habitat,either seasonally or permanently. Determine the total area of seasonally flooded swamps and permanently flooded swamps containing fish habitat.)

x Swamp containing fish habitat not present (Continue to Step 7)

_____ Swamp containing fish habitat present (Score as follows)

Swamp containing fish Habitat	Present (check)	Total area (ha)	Area Factor (see Table 5)	Score	TOTAL SCORE (factor x score)
Seasonally flooded				10	
Permanently flooded				10	
Sub SCORE (maximum 20 points)					
SCORE (maximum 20 points)					

Step 7: Calculation of final score

Score for Spawning and Nursery Habitat (Low Marsh) (maximum 75) = _____

Score for Spawning and Nursery Habitat (High Marsh) (maximum 25) = _____

Score for Swamp Containing Fish Habitat (maximum 20) = _____

Sum (maximum score 100 points) = _____

4.2.6.2 Migration and Staging Habitat

Step 1:

1) x Staging or Migration Habitat is not present in the wetland (Score = 0)

2) _____ Staging or Migration Habitat is present in the wetland significance of the habitat is known (Go to Step 2)

3) _____ Staging or Migration Habitat is present in the wetland significance of the habitat is not known (Go to Step 3)

NOTE: Only one of Step 2 or Step 3 is to be scored.

Step 2: Select the highest appropriate category below, attach documentation:

		Score
1)	Significant in Site Region	25 points
2)	Significant in Site District	15
3)	Locally Significant	10
4)	Fish staging and/or migration habitat present,but not as above	5

Score for Fish Migration and Staging Habitat (maximum score 25 points) 0

Step 3: Select the highest appropriate category below based on presence of the designated site type (does not have to be dominant). See Section 1.1.3. Note name of river for 2) and 3).

		Score
1)	Wetland is riverine at rivermouth or lacustrine at rivermouth	25 points
2)	Wetland is riverine,within 0.75 km of rivermouth	15
3)	Wetland is lacustrine,within 0.75 km of rivermouth	10
4)	Fish staging and/or migration habitat present, but not as above	5

Score for Staging and Migration Habitat (maximum score 25 points) 0

4.3 ECOSYSTEM AGE

(Fractional Area = area of wetland/total wetland area)

	Fractional Area				Scoring
Bog		x	25	=	0.0
Fen, treed to open on deep soils floating mats or marl		x	20	=	0.0
Fen, on limestone rock		x	5	=	0.0
Swamp	0.53	x	3	=	1.6
Marsh	0.47	x	0	=	0.0
		Sub Total:			1.6

Ecosystem Age Score (maximum 25 points) 2

4.4 GREAT LAKES COASTAL WETLANDS

Score for <u>coastal</u> (see text for definition) wetlands only

Choose one only

____ wetland < 10 ha	=	0 points
____ wetland 10- 50 ha	=	25
____ wetland 51 -lOO ha	=	50
____ wetland > 100 ha	=	75

Great Lakes Coastal Wetlands Score (maximum 75 points)

5.0 EXTRA INFORMATION

5.1 PURPLE LOOSESTRIFE

____ Absent/Not seen

x Present

(a) One location in wetland ____
Two to many locations x

Abundance code
(b) (1 < 20 stems x
(2 20-99 stems ____
(3 100-999 stems ____
(4 >1000 stems ____

5.2 SEASONALLY FLOODED AREAS

Check one or more

Ephemeral	(less than 2 weeks)	____
Temporal	(2 weeks to 1 month)	____
Seasonal	(1 to 3 months)	x
Semi-permanent	(>3 months)	x
No seasonal flooding		____

5.3 SPECIES OF SPECIAL SIGNIFICANCE

5.3.1 Osprey

Present and nesting	____
Known to have nested in last 5 yr	____
Feeding area for osprey	____
Not as above	x

5.3.2 Common Loon

Nesting in wetland	____
Feeding at edge of wetland	____
Observed or heard on lake or river adjoining the wetland	____
Not as above	x

INVESTIGATORS	**AFFILIATION**
see attached	see attached

DATES WETLAND VISITED

see attached

DATE THIS EVALUATION COMPLETED: February 2007

ESTIMATED TIME DEVOTED TO COMPLETING THE FIELD SURVEY IN "PERSON HOURS"

10 hrs (CH 1984), 50 hrs (NRSI 2006), 90 hours (OMNR)

WEATHER CONDITIONS

i) at time of field work

(Continue in the space below if necessary)

ii) summer conditions in general

OTHER POTENTIALLY USEFUL INFORMATION:

CHECKLIST OF PLANT AND ANIMAL SPECIES RECORDED IN THE WETLAND:

Attach a list of all flora and fauna observed in the wetland.

*Indicate if voucher specimens or photos have been obtained, where located, etc.

List of Investigators

Conservation Halton (CH 1984):

- D. Sutherland
- B. Glover
- B. de Geus
- M. Feth
- W. Him
- S.M. Griffiths
- B.K. Brobst

Natural Resource Solutions Inc. (NRSI 2006):

- D. Stephenson
- S. Nichol
- T. Dailey
- A. Ryckman

OMNR 2006:

- A. Garofalo
- E. Followes
- J. Pisapio
- B. Kowalyk

Data Collection (for a variety of purposes) / Field Survey Dates Including:

Sept. 2, 1983	Sutherland et al (CH 1984)
June 5, 1984	Glover et al (CH 1984)
Oct. 2, 1984	Him and Brobst (CH 1984)
June 2, 13, 14, 15, 23, 26, 2006	NRSI 2006
May 7, 2003; June 9, July 16, 23, Sept. 2, 2004; April 1 – May 30, 2005; April, May 4, June 6, Dec.1, 2006	OMNR
May 4, 2006	R. van de Lande, City of Burlington
May 4, June 6, 2006	B. Axon, D. Johnson and Andrea Dunn, Conservation Halton (fish sampling record in OMNR 2006)
2000-2006	Stantec 2006

List of Vascular Plants in and Around the Grindstone Creek Headwaters Wetland Complex

Legend: J - JART, May 4, 2006; S - Stantec Master List, May 2006; N - NRSI, June 2006

L: Locally significant plant species (rare in Halton Region)

E: Endangered (COSEWIC and OMNR)

* Upland species - does not get scored in evaluation

Scientific Name	Common Name	Observer	Rarity
Abutilon theophrasti	Velvet-leaf	S	
Acalypha virginica var. rhomboidea	Three-seeded Mercury	S	
Acer negundo	Manitoba Maple	J, S, N	
Acer platanoides	Norway Maple	J, N	
Acer rubrum	Red Maple	J, S, N	
Acer saccharinum	Silver Maple	J, S, N	
Acer saccharum ssp. nigrum	Black Maple	N	
Acer saccharum ssp. saccharum	Sugar Maple	J, N	
Acer X freemanii	Freeman's Maple	J, N	
Achillea millefolium ssp. millefolium	Common Yarrow	J, S, N	
Actaea pachypoda	White Baneberry	S, N	
Actaea rubra	Red Baneberry	J, S	
Aesculus hippocastanum	Horse Chestnut	S	
Agrimonia gryposepala	Tall Hairy Agrimony	S, N	
Agrostis gigantea	Red-top	S	
Agrostis stolonifera	Spreading Bentgrass	J	
Alisma plantago-aquatica	Common Water-plantain	S, N	
Alliaria petiolata	Garlic Mustard	J, S, N	
Allium sativum	Garden Garlic	S	
Amaranthus powellii	Powell's Amaranth	S	
Ambrosia artemisiifolia	Common Ragweed	S	
Amelanchier arborea	Downy Juneberry	J, S, N	
Amphicarpaea bracteata	Hog Peanut	S, N	
Anemone canadensis	Canada Anemone	S	
Anemone quinquefolia var. quinquefolia	Wood Anemone	J, S	
Anemone virginiana var. virginiana	Thimbleweed	S	
Apocynum androsaemifolium ssp. androsaemifolium	Spreading Dogbane	S, N	
Arctium lappa	Great Burdock	S	
Arctium minus ssp. minus	Common Burdock	J, S, N	
Arisaema triphyllum ssp. triphyllum	Jack-in-the-pulpit	J, S, N	
Asclepias incarnata ssp. incarnata	Swamp Milkweed	J, S, N	
Asclepias syriaca	Common Milkweed	J, S, N	
Asparagus officinalis	Garden Asparagus	S	
Aster cordifolius	Heart-leaved Aster	S, N	
Aster ericoides ssp. ericoides	White Heath Aster	S	
Aster lanceolatus ssp. lanceolatus	Panicled Aster	J, S	
Aster lateriflorus var. lateriflorus	Calico Aster	S	
Aster novae-angliae	New England Aster	S	
Aster puniceus var firmus	Swamp Aster	J, S	
Atriplex patula	Spreading Atriplex	S	
Barbarea vulgaris	Yellow Rocket	J	
Berberis thunbergii	Japanese Barberry	J, N	
Berberis vulgaris	Common Barberry	S	
Betula alleghaniensis	Yellow Birch	J, S, N	
Betula papyrifera	Paper Birch	J, S, N	
Bidens cernuus	Nodding Beggar-ticks	S	
Bidens frondosus	Devil's Beggar-ticks	S	
Bidens vulgatus	Tall Beggar-ticks	S	
Boehmeria cylindrica	False Nettle	S, N	
Bromus ciliatus	Fringed Brome	S	
Bromus inermis ssp. inermis	Smooth Brome	J, S, N	
Calamagrostis canadensis	Canada Blue-joint	N	
Caltha palustris	Marsh Marigold	J, S, N	
Calystegia sepium ssp. americanum	Hedge Bindweed	S	
Cannabis sativa	Marijuana	S	
Capsella bursa-pastoris	Sheperd's Purse	S, N	
Cardamine concatenata	Cutleaf Toothwort	J, S	
Cardamine diphylla	Broad-leaved Toothwort	J, S, N	
Cardamine douglassii	Purple Cress	J, S	
Carduus nutans ssp. nutans	Musk Thistle	S	
Carex albursina	White Bear Sedge	S, N	

List of Vascular Plants in and Around the Grindstone Creek Headwaters Wetland Complex

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Scientific Name	**Common Name**	**Observer**	**Rarity**
Carex bebbii	Bebb's Sedge	S, N	
Carex crinita	Fringed Sedge	S	
Carex deweyana	Dewey's Sedge	S	
Carex gracillima	Graceful Sedge	S, N	
Carex granularis	Meadow Sedge	S	
Carex hystericina	Porcupine Sedge	S	
Carex interior	Inland Sedge	S	
Carex intumescens	Bladder Sedge	N	
Carex laxiflora	Loose-flowered Sedge	N	
Carex lupulina	Hop Sedge	S, N	
Carex pensylvanica	Pennsylvania Sedge	S	
Carex retrorsa	Retrorse Sedge	S	
Carex rosea	Stellate Sedge	S, N	
Carex stipata	Awl-fruited Sedge	S	
Carex tuckermanii	Tuckerman's Sedge	S	
Carex vulpinoidea	Fox Sedge	S, N	
Carpinus caroliniana ssp. virginiana	Blue Beech	J, S, N	
Carya cordiformis	Bitternut Hickory	J, S, N	
Carya ovata var. ovata	Shagbark Hickory	J, S, N	
Caulophyllum giganteum	Giant Blue Cohosh	S, N	
Celastrus scandens	Bittersweet	N	
Centaurea maculosa	Spotted Knapweed	S	
Cerastium fontanum	Larger Mouse-ear Chickweed	S	
Chelidonium majus	Greater Celandine	N	
Chenopodium album var. album	Lamb's Quarters	S, N	
Chenopodium capitatum	Strawberry Blite	N	
Chrysanthemum leucanthemum	Ox-eye Daisy	S, N	
Cichorium intybus	Chicory	J, S, N	
Cicuta maculata	Spotted Water-hemlock	J, S, N	
Cinna arundinacea	Wood Reed Grass	S	
Circaea lutetiana ssp. canadensis	Yellowish Enchanter's Nightshade	S, N	
Cirsium arvense	Creeping Thistle	J, S	
Cirsium vulgare	Bull Thistle	S	
Claytonia caroliniana	Carolina Spring Beauty	J, S, N	
Clematis virginiana	Virgin's-bower	S, N	
Clinopodium vulgare	Wild Basil	S	
Convallaria majalis	Lily-of-the-valley	S	
Convolvulus arvensis	Field Bindweed	S, N	
Conyza canadensis	Horseweed	S	
Cornus alternifolia	Alternate-leaf Dogwood	J, S, N	
Cornus amomum ssp. obliqua	Silky Dogwood	J, S	
Cornus foemina ssp. racemosa	Gray Dogwood	J, S, N	
Cornus rugosa	Round-leaved Dogwood	S	
Cornus stolonifera	Red-osier Dogwood	J, S, N	
Corylus americana*	**American Hazel**	**J, S**	**L**
Crataegus monogyna	English Hawthorn	S	
Crataegus punctata	Dotted Hawthorn	S, N	
Cuscuta gronovii	Gronovius Dodder	J	
Cystopteris bulbifera	Bulblet Bladder Fern	S, N	
Dactylis glomerata	Orchard Grass	S, N	
Daucus carota	Queen Anne's Lace	J, S, N	
Dianthus armeria	Deptford Pink	S, N	
Dipsacus fullonum ssp. sylvestris	Wild Teasel	S	
Dryopteris carthusiana	Spinulose Wood Fern	S, N	
Dryopteris cristata	Crested Wood Fern	N	
Echinochloa crusgalli	Common Barnyard Grass	S	
Echinocystis lobata	Wild Mock-cucumber	J, S, N	
Echium vulgare	Blueweed	S, N	
Eleocharis erythropoda	Red-footed Spike-rush	S	
Elymus hystrix	Bottle-brush Grass	S	
Elymus repens	Quack Grass	S, N	

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Scientific Name	**Common Name**	**Observer**	**Rarity**
Epifagus virginiana	Beech-drops	S	
Epilobium ciliatum ssp. ciliatum	Ciliate Willow-herb	S	
Epilobium hirsutum	Great Hairy Willow-herb	S	
Epipactis helleborine	Common Helleborine	S, N	
Equisetum arvense	Field Horsetail	J, S, N	
Equisetum hyemale ssp. affine	Rough Horsetail	J, N	
Equisetum pratense	**Meadow Horsetail**	**N**	**L**
Erigeron annuus	Annual Fleabane	N	
Erigeron philadelphicus	Philadelphia Fleabane	N	
Erigeron strigosus	Daisy Fleabane	S	
Erophila verna	Spring Witlow-grass	S	
Erysimum cheiranthoides	Wormseed Mustard	N	
Erythronium americanum ssp. americanum	Yellow Trout-lily	J, S, N	
Euonymus obovata	Running Strawberry-bush	J, S, N	
Eupatorium maculatum ssp. maculatum	Spotted Joe-pye Weed	J, S, N	
Eupatorium perfoliatum	Common Boneset	J, S, N	
Euphorbia peplus	Petty Spurge	S	
Euthamia graminifolia	Flat-topped Bushy Goldenrod	S	
Fagus grandifolia	American Beech	J, S, N	
Fragaria vesca ssp. americana	Woodland Strawberry	S, N	
Fragaria virginiana ssp. virginiana	Virginia Strawberry	J, S, N	
Fraxinus americana	White Ash	J, S, N	
Fraxinus pennsylvanica	Green Ash	J, S, N	
Galium aparine	Cleavers	S	
Galium mollugo	White Bedstraw	S, N	
Galium palustre	Marsh Bedstraw	S, N	
Galium triflorum	Sweet-scented Bedstraw	S	
Geranium maculatum	Wild Geranium	J, S, N	
Geranium robertianum	Herb-robert	J, S, N	
Geum aleppicum	Yellow Avens	S, N	
Geum canadense	White Avens	S, N	
Geum laciniatum	Rough Avens	S, N	
Glechoma hederacea	Ground-ivy	N	
Gleditsia triacanthos (planted)	Honey Locust	S	
Glyceria grandis	Tall Manna Grass	S	
Glyceria striata	Fowl Manna Grass	J, S	
Hamamelis virginiana	Witch-hazel	S	
Hesperis matronalis	Dame's Rocket	J, N	
Hieracium aurantiacum	Orange Hawkweed	N	
Hieracium caespitosum ssp. caespitosum	Field Hawkweek	S, N	
Hieracium piloselloides	Glaucous King Devil	S	
Hydrophyllum virginianum	Virginia Waterleaf	J, S, N	
Hypericum perforatum	Common St. John's-wort	S, N	
Impatiens capensis	Spotted Jewel-weed	J, S, N	
Inula helenium	Elecampane	N	
Iris versicolor	Blueflag	J, S, N	
Juglans cinerea	**Butternut**	**J, S, N**	**E**
Juglans nigra	Black Walnut	J, S, N	
Juncus bufonius	Toad Rush	S	
Juncus dudleyi	Dudley's Rush	S	
Juncus effusus ssp. solutus	Soft Rush	S	
Juncus tenuis	Path Rush	S, N	
Juniperus virginiana	Eastern Red Cedar	J, S	
Lactuca serriola	Prickly Lettuce	S	
Laportea canadensis	Wood Nettle	J, S, N	
Lapsana communis	Nipplewort	S	
Larix decidua	European Larch	J, S	
Lathyrus latifolius	Everlasting Pea	S	
Leersia oryzoides	Rice Cut Grass	S, N	
Lemna minor	Common Duckweed	N	
Leonurus cardiaca ssp. cardiaca	Common Motherwort	S, N	

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Lepidium campestre	Field Cress	S	
Ligustrum vulgare	Common Privet	S	
Lilium michiganense	Michigan Lily	J, S, N	
Linaria vulgaris	Butter-and-eggs	S	
Lindera benzoin	Spicebush	J, S, N	
Lindernia dubia var. dubia	**Doubtful False Pimpernel**	**S**	**L**
Lobelia inflata	Indian Tobacco	S	
Lonicera hirsuta*	**Hairy Honeysuckle**	**S**	**L**
Lonicera tatarica	Tartarian Honeysuckle	J, S, N	
Lotus corniculatus	Bird's-foot Trefoil	S, N	
Lunaria annua	Annual Honesty	S	
Lycopus americanus	Cut-leaved Water-horehound	S	
Lycopus uniflorus	Northern Water-horehound	S	
Lysimachia ciliata	Fringed Loosestrife	J	
Lythrum salicaria	Purple Loosestrife	J, S	
Maianthemum canadense	Wild-lily-of-the-valley	J, S, N	
Maianthemum racemosum ssp. racemosum	False Solomon's Seal	J, S, N	
Maianthemum stellatum	Star-flowered Solomon's Seal	J, S, N	
Malus coronaria (may be planted)	Wild Crabapple	N	
Malus pumila	Common Apple	J, S, N	
Malva neglecta	Cheeses	S, N	
Matteuccia struthiopteris var. pensylvanica	Ostrich Fern	J, S, N	
Medicago lupulina	Black Medic	J, N	
Medicago sativa ssp. sativa	Alfalfa	S, N	
Melilotus alba	White Sweet-clover	S, N	
Melilotus officinalis	Yellow Sweet-clover	S	
Menispermum canadense	Moonseed	S	
Mentha arvensis ssp. borealis	American Wild Mint	S, N	
Mitchella repens	Partridge-berry	N	
Myosotis laxa	Smaller Forget-me-not	S, N	
Myosotis scorpioides	Mouse-ear Scorpion-grass	S	
Nepeta cataria	Catnip	S, N	
Oenothera biennis	Common Evening-primrose	J, S	
Oenothera parviflora	Small-flowered Evening-primrose	N	
Onoclea sensibilis	Sensitive Fern	J, S, N	
Ostrya virginiana	Eastern Hop-hornbeam	J, S, N	
Oxalis stricta	Upright Yellow Wood Sorrel	J, S, N	
Panicum capillare	Witch Grass	S	
Parthenocissus inserta	Inserted Virginia-creeper	S, N	
Parthenocissus quinquefolia	**Five-leaved Virginia-creeper**	**S**	**L**
Penthorum sedoides	Ditch Stonecrop	S	
Phalaris arundinacea	Reed Canary Grass	J, S, N	
Phleum pratense	Timothy	J, S, N	
Phragmites australis	Common Reed	J, S	
Physocarpus opulifolius (planted)	Ninebark	S	
Picea abies	Norway Spruce	J, S, N	
Picea glauca (planted)	White Spruce	J, S, N	
Picea pungens	Colorado Spruce	S	
Pilea pumila	Dwarf Clearweed	S	
Pinus banksiana (planted)	Jack Pine	S	
Pinus resinosa (planted)	Red Pine	J, S, N	
Pinus strobus	Eastern White Pine	J, S, N	
Pinus sylvestris	Scotch Pine	J	
Plantago lanceolata	English Plantain	S, N	
Plantago major	Nipple-seed Plantain	J, S, N	
Plantago rugelii	Rugel's Plantain	S	
Poa compressa	Canada Bluegrass	J, S, N	
Poa palustris	Fowl Meadow Grass	S	
Poa pratensis ssp pratensis	Kentucky Bluegrass	J, S, N	
Podophyllum peltatum	May Apple	J, S, N	
Polygonum amphibium	Water Smartweed	N	

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Polygonum convolvulus	Black Bindweed	S	
Polygonum lapathifolium	Pale Smartweed	S	
Polygonum persicaria	Lady's-thumb	S	
Polystichum acrostichoides	Christmas Fern	N	
Populus balsamifera ssp. balsamifera	Balsam Poplar	J, S, N	
Populus deltoides ssp. deltoides	Eastern Cottonwood	J, S, N	
Populus grandidentata	Large-tooth Aspen	S, N	
Populus tremuloides	Quaking Aspen	J, S, N	
Populus X canadensis	Carolina Poplar	J	
Potamogeton crispus	Curly-leaved Pondweed	N	
Potentilla argentea	Silvery Cinquefoil	S	
Potentilla norvegica ssp. norvegica	Rough Cinquefoil	S	
Potentilla recta	Sulphur Cinquefoil	J, S, N	
Potentilla simplex	Old-field Cinquefoil	S, N	
Prenanthes alba	White Lettuce	N	
Prunella vulgaris ssp. lanceolata	Heal-all	S, N	
Prunus americana (planted)	American Plum	S	
Prunus avium	Sweet Cherry	J, S	
Prunus pensylvanica	Pin Cherry	S, N	
Prunus serotina	Wild Black Cherry	J, S, N	
Prunus virginiana ssp. virginiana	Choke Cherry	J, S, N	
Pyrus communis	Pear	N	
Quercus alba	White Oak	S, N	
Quercus macrocarpa	Bur Oak	J, S, N	
Quercus rubra	Northern Red Oak	J, S, N	
Ranunculus abortivus	Kidney-leaved Buttercup	J, S, N	
Ranunculus acris	Tall Buttercup	J, S, N	
Ranunculus hispidus var. caricetorum	Swamp Buttercup	S	
Ranunculus sceleratus var. sceleratus	Cursed Buttersup	S	
Rhamnus cathartica	Buckthorn	J, S, N	
Rhus radicans ssp. negundo	Poison Ivy	J, S, N	
Rhus rydbergii	Western Poison Ivy	S	
Rhus typhina	Staghorn Sumac	J, S, N	
Ribes americanum	Wild Black Currant	J, S	
Ribes cynosbati	Prickly Gooseberry	J, S, N	
Ribes triste	Swamp Red Currant	S	
Robinia pseudo-acacia	Black Locust	J, S, N	
Rosa blanda	Smooth Rose	S	
Rosa carolina	Pasture Rose	N	
Rosa multiflora	Rambler Rose	J, S, N	
Rubus allegheniensis	Alleghany Blackberry	S, N	
Rubus idaeus ssp. melanolasius	Wild Red Raspberry	J, S, N	
Rubus occidentalis	Thimble-berry	S	
Rubus odoratus	Purple Flowering Raspberry	S, N	
Rubus pubescens	Dwarf Raspberry	J	
Rudbeckia hirta	Black-eyed Susan	S	
Rumex acetosella ssp. acetosella	Sheep Sorrel	S, N	
Rumex crispus	Curly Dock	J, S, N	
Rumex obtusifolius ssp. obtusifolius	Bitter Dock	S	
Salix alba	White Willow	S	
Salix bebbiana	Bebb's Willow	J, N	
Salix eriocephala	Heart-leaved Willow	J, S	
Salix exigua	Sandbar Willow	N	
Salix fragilis	Crack Willow	S	
Salix lucida	Shining Willow	N	
Salix purpurea	Basket Willow	S	
Salix X rubens	Reddish Willow	J	
Sambucus canadensis	Common Elderberry	J, S	
Sambucus racemosa ssp. pubens	Red-berried Elderberry	S, N	
Sanguinaria canadensis	Bloodroot	J, S, N	
Saponaria officinalis	Bouncing-bet	S	

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Scirpus atrovirens	Dark-green Bulrush	S	
Scirpus cyperinus	Wool-grass	S	
Scirpus pendulus	Lined Bulrush	S	
Scirpus validus	Softstem Bulrush	S	
Setaria pumila	Yellow Foxtail	S	
Silene latifolia	Bladder Campion	S, N	
Silene noctiflora	Night-flowering Catchfly	N	
Smilax herbacea	Herbaceous Carrion Flower	S, N	
Smilax hispida	Bristly Greenbriar	N	
Solanum dulcamara	Climbing Nightshade	J, S, N	
Solidago altissima var. altissima	Tall Goldenrod	J, S	
Solidago canadensis	Canada Goldenrod	S	
Solidago flexicaulis	Zig-zag Goldenrod	S, N	
Solidago gigantea	Giant Goldenrod	S	
Solidago nemoralis ssp. nemoralis	Gray Goldenrod	S	
Solidago rugosa ssp. rugosa	Rough Goldenrod	S	
Sonchus arvensis ssp. arvensis	Field Sow-thistle	S	
Sonchus asper ssp. asper	Spiny-leaved Sow-thistle	S	
Sonchus oleraceus	Common Sow-thistle	S, N	
Sorbus aucuparia	European Mountain-ash	S	
Stellaria graminea	Grass-leaved Stitchwort	S, N	
Syringa vulgaris	Common Lilac	J, S, N	
Taraxacum officinale	Common Dandelion	J, S, N	
Thalictrum dioicum	Early Meadowrue	J, S, N	
Thelypteris palustris var. pubescens	Marsh Fern	S, N	
Thlaspi arvense	Field Penny-cress	S, N	
Thuja occidentalis	Northern White Cedar	J, S, N	
Tiarella cordifolia	False Mitrewort	S, N	
Tilia americana	American Basswood	J, S, N	
Tilia cordata	Small Leaf Linden	N	
Tragopogon dubius	Doubtful Goat's-beard	S	
Tragopogon pratensis ssp. pratensis	Meadow Goat's-beard	S, N	
Trientalis borealis	Star-flower	N	
Trifolium hybridum ssp. elegans	Alsike Clover	S	
Trifolium pratense	Red Clover	S, N	
Trifolium repens	White Clover	S, N	
Trillium erectum	Red Trillium	J, S	
Trillium grandiflorum	White Trillium	J, S, N	
Tussilago fargara	Coltsfoot	S, N	
Typha angustifolia	Narrow-leaved Cattail	J, S, N	
Typha latifolia	Broad-leaf Cattail	J, S	
Ulmus americana	American Elm	J, S, N	
Ulmus pumila	Siberian Elm	S	
Urtica dioica ssp. gracilis	American Stinging Nettle	S, N	
Verbascum thapsus	Common Mullein	J, S, N	
Verbena hastata	Blue Vervain	J, S, N	
Veronica arvensis	Corn Speedwell	N	
Veronica officinalis	Common Speedwell	S, N	
Veronica peregrina ssp. peregrina	Purslane Speedwell	S	
Viburnum acerifolium	Maple-leaved Viburnum	N	
Viburnum lentago	Nannyberry	J, S, N	
Viburnum opulus	Guelder-rose Viburnum	J	
Viburnum trilobum	High Bush Cranberry	S, N	
Vicia cracca	Tufted Vetch	J, S	
Vicia sativa	Common Vetch	N	
Vinca minor	Periwinkle	S	
Viola canadensis	Canada Violet	J	
Viola pubescens	Downy Yellow Violet	J, S, N	
Viola rostrata	Long-spur Violet	J, S	
Viola sororia	Woolly Blue Violet	J, S	
Vitis riparia	Riverbank Grape	J, S, N	

LIST OF BIRDS IN AND AROUND THE GRINDSTONE CREEK HEADWATER WETLAND COMPLEX

* - breeding in Ontario; N - recorded in north; S - recorded in south

	Bl-bellied Whis-Duck (S)		*Spruce Grouse N/S	S, J, N	*Turkey Vulture N/S
	Fulvous Whistling-Duck (S)		*Willow Ptarmigan N/(S)		*Osprey N/S
	Gr White-fr Goose N/S		Rock Ptarmigan N		Sw-tailed Kite (N)/(S)
	*Snow Goose N/S		*Sharp-tailed Grouse N/S		Mississippi Kite (S)
	*Ross's Goose N/(S)		*Gr Prairie-Chn (N)/(S)		*Bald Eagle N/S
	Brant N/S		*Wild Turkey S		*Northern Harrier N/S
	Cackling Goose N/S		Northern Bobwhite S		*Shp-sh Hawk N/S
S	*Canada Goose N/S		*Red-throated Loon N/S	S	*Cooper's Hawk N/S
	*Mute Swan (N)/S		*Pacific Loon N/(S)		*Northern Goshawk N/S
	Trumpeter Swan S		*Common Loon N/S		*Red-shouldered Hawk N/S
	*Tundra Swan N/S		Yellow-billed Loon (S)		*Broad-winged Hawk N/S
	*Wood Duck N/S		*Pied-billed Grebe N/S		Swainson's Hawk (N)/(S)
	*Gadwall N/S		*Horned Grebe N/S	S, J, N	*Red-tailed Hawk N/S
	Eurasian Wigeon (N)/S		*Red-necked Grebe N/S		Ferruginous Hawk (S)
	*American Wigeon N/S		*Eared Grebe (N)/S		*Rough-legged Hawk N/S
	*American Black Duck N/S		Western Grebe (N)/(S)		*Golden Eagle N/S
S, J, N	*Mallard N/S		Northern Fulmar (N)/(S)		Crested Caracara (N)/(S)
	*Blue-winged Teal N/S		Black-capped Petrel (S)		*American Kestrel N/S
	*Cinnamon Teal (N)/(S)		Greater Shearwater (S)		*Merlin N/S
	*Northern Shoveler N/S		Manx Shearwater (S)		Gyrfalcon N/S
	*Northern Pintail N/S		Audubon's Shearwater (S)		*Peregrine Falcon N/S
	Garganey (N)/(S)		Wilson's Storm-Petrel (S)		Prairie Falcon (S)
	*Green-winged Teal N/S		Leach's Stm-Petrel (N)/(S)		*Yellow Rail N/S
	*Canvasback N/S		Bd-r Storm-Petrel (S)		Black Rail (S)
	*Redhead N/S		Northern Gannet (N)/(S)		*King Rail S
	*Ring-necked Duck N/S		*Am White Pelican N/S		*Virginia Rail N/S
	Tufted Duck (N)/(S)		Brown Pelican (N)/(S)		*Sora N/S
	*Greater Scaup N/S		*Dble-c Cormorant N/S		Purple Gallinule (N)/(S)
	*Lesser Scaup N/S		Great Cormorant (S)		*Common Moorhen (N)/S
	*King Eider N/S		Anhinga (S)		*American Coot N/S
	*Common Eider N/(S)		Mag Frigatebird (S)		*Sandhill Crane N/S
	Harlequin Duck (N)/S		*American Bittern N/S		Whooping Crane (S)
	*Surf Scoter N/S		*Least Bittern (N)/S		Black-bellied Plover N/S
	*White-winged Scoter N/S	J, N	*Great Blue Heron N/S		*Am Golden-Plover N/S
	Black Scoter N/S		*Great Egret (N)/S		Lesser Sand-Plover (S)
	*Long-tailed Duck N/S		*Snowy Egret (N)/S		Snowy Plover (S)
	*Bufflehead N/S		Little Blue Heron (N)/(S)		Wilson's Plover (S)
	*Common Goldeneye N/S		Tricolored Heron (N)/(S)		*Semipalmated Plover N/S
	Barrow's Goldeneye (N)/S		*Cattle Egret (N)/S		*Piping Plover (N)/(S)
	Smew (S)	S	*Green Heron (N)/S	S, J, N	*Killdeer N/S
	*Hooded Merganser N/S		*Bl-cr Night-Heron (N)/S		American Oystercatcher (S)
	*Common Merganser N/S		Y-crowned Night-Heron (S)		*Black-necked Stilt (N)/(S)
	*R-br Merganser N/S		White Ibis (S)		*American Avocet (N)/S
	*Ruddy Duck N/S		Glossy Ibis (S)		*Greater Yellowlegs N/S
	Gray Partridge N/S		White-faced Ibis (S)		*Lesser Yellowlegs N/S
J	*Ring-necked Pheasant N/S		Wood Stork (S)		Spotted Redshank (S)
	*Ruffed Grouse N/S		Black Vulture (N)/(S)		*Solitary Sandpiper N/S

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* - breeding in Ontario; N - recorded in north; S - recorded in south

_____ Willet (N)/S	_____ *Herring Gull N/S	_____ *Great Gray Owl N/S
_____ Wandering Tattler (S)	_____ Thayer's Gull N/S	_____ *Long-eared Owl N/S
S, N *Spotted Sandpiper N/S	_____ Iceland Gull N/S	_____ *Short-eared Owl N/S
_____ *Upland Sandpiper N/S	_____ Lesser Black-backed Gull (N)/S	_____ *Boreal Owl N/S
_____ Eskimo Curlew (N)/(S)	_____ Slaty-backed Gull (S)	_____ *Northern Saw-whet Owl N/S
_____ *Whimbrel N/S	_____ Glaucous Gull N/S	_____ Lesser Nighthawk (S)
_____ Slender-billed Curlew (S)	_____ *Great Black-backed Gull N/S	_____ *Common Nighthawk N/S
_____ Long-billed Curlew (S)	_____ Sabine's Gull N/S	_____ Common Poorwill (N)
_____ Black-tailed Godwit (S)	_____ Black-legged Kittiwake (N)/S	_____ *Chuck-will's-widow (S)
_____ *Hudsonian Godwit N/S	_____ Ross's Gull (N)/(S)	_____ *Whip-poor-will N/S
_____ *Marbled Godwit N/S	_____ Ivory Gull (N)/(S)	_____ White-collared Swift (S)
_____ Ruddy Turnstone N/S	_____ *Caspian Tern N/S	_____ *Chimney Swift N/S
_____ Red Knot N/S	_____ Royal Tern (S)	_____ Green Violet-ear (N)
_____ Sanderling N/S	_____ Sandwich Tern (S)	_____ Broad-billed Hummingbird (S)
_____ *Semipalmated Sandpiper N/S	_____ *Common Tern N/S	_____ *Ruby-throated Hummingbird N/S
_____ Western Sandpiper (N)/S	_____ *Arctic Tern N/(S)	_____ Black-chinned Hummingbird (S)
_____ Little Stint (N)/(S)	_____ *Forster's Tern N/S	_____ Rufous Hummingbird (N)/(S)
_____ *Least Sandpiper N/S	_____ Least Tern (S)	_____ *Belted Kingfisher N/S
_____ White-rumped Sandpiper N/S	_____ Sooty Tern (S)	_____ Lewis's Woodpecker (N)/(S)
_____ Baird's Sandpiper N/S	_____ White-winged Tern (S)	_____ *Red-headed Woodpecker N/S
_____ *Pectoral Sandpiper N/S	_____ *Black Tern N/S	_____ *Red-bellied Woodpecker (N)/S
_____ Sharp-tailed Sandpiper (N)/(S)	_____ Black Skimmer (N)/(S)	_____ *Yellow-bellied Sapsucker N/S
_____ Purple Sandpiper N/S	_____ Dovekie (S)	S, N *Downy Woodpecker N/S
_____ *Dunlin N/S	_____ Thick-billed Murre (S)	S, N *Hairy Woodpecker N/S
_____ Curlew Sandpiper (N)/(S)	_____ Razorbill (S)	_____ *Am 3-toed Woodpecker N/S
_____ *Stilt Sandpiper N/S	_____ *Black Guillemot N/(S)	_____ *Black-backed Woodpecker N/S
_____ Buff-breasted Sandpiper N/S	_____ Long-billed Murrelet (S)	S, N *Northern Flicker N/S (yellow shafl
_____ Ruff (N)/S	_____ Ancient Murrelet (S)	S, J, N *Pileated Woodpecker N/S
_____ *Short-billed Dowitcher N/S	_____ Atlantic Puffin (N)/(S)	_____ *Olive-sided Flycatcher N/S
_____ Long-billed Dowitcher N/S	N *Rock Pigeon N/S	_____ Western Wood-Pewee (N)
_____ *Wilson's Snipe N/S	_____ Band-tailed Pigeon (N)/(S)	S *Eastern Wood-Pewee N/S
S, J *American Woodcock N/S	_____ Eurasian Collared-Dove (S)	_____ *Yellow-bellied Flycatcher N/S
_____ *Wilson's Phalarope N/S	_____ White-winged Dove (N)/(S)	_____ *Acadian Flycatcher S
_____ *Red-necked Phalarope N/S	S, N *Mourning Dove N/S	_____ *Alder Flycatcher N/S
_____ Red Phalarope N/S	_____ *Passenger Pigeon (Extinct)	S *Willow Flycatcher (N)/S
_____ Pomarine Jaeger (N)/S	_____ Inca Dove (N)	_____ *Least Flycatcher N/S
_____ *Parasitic Jaeger N/S	_____ Common Ground-Dove (N)	_____ Gray Flycatcher (S)
_____ Long-tailed Jaeger N/(S)	_____ *Black-billed Cuckoo N/S	_____ Dusky Flycatcher (N)
_____ Laughing Gull (N)/S	_____ *Yellow-billed Cuckoo N/S	S *Eastern Phoebe N/S
_____ Franklin's Gull N/S	_____ Groove-billed Ani (N)/(S)	_____ Say's Phoebe (N)/(S)
_____ *Little Gull N/S	_____ *Barn Owl (N)/(S)	_____ Vermilion Flycatcher (S)
_____ Black-headed Gull (N)/S	_____ *Eastern Screech-Owl (N)/S	_____ Ash-throated Flycatcher (S)
_____ *Bonaparte's Gull N/S	_____ *Great Horned Owl N/S	S, N *Great Crested Flycatcher N/S
_____ Heermann's Gull (S)	_____ Snowy Owl N/S	_____ Sulphur-bellied Flycatcher (S)
_____ Mew Gull (S)	_____ *Northern Hawk Owl N/S	_____ Variegated Flycatcher (S)
_____ *Ring-billed Gull N/S	_____ Burrowing Owl (N)/(S)	_____ Tropical Kingbird (S)
_____ *California Gull (N)/(S)	_____ *Barred Owl N/S	_____ Cassin's Kingbird (S)

LIST OF BIRDS IN AND AROUND THE GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

* - breeding in Ontario; N - recorded in north; S - recorded in south

_____ *Western Kingbird N/S	_____ *Golden-crowned Kinglet N/S	_____ *Pine Warbler N/S
S, J, N *Eastern Kingbird N/S	_____ *Ruby-crowned Kinglet N/S	_____ *Kirtland's Warbler (N)/(S)
_____ Gray Kingbird (S)	_____ *Blue-gray Gnatcatcher (N)/S	_____ *Prairie Warbler (N)/S
_____ Scissor-t Flycatcher (N)/(S)	_____ Siberian Rubythroat (S)	_____ *Palm Warbler N/S
_____ Fork-t Flycatcher (N)/(S)	_____ Northern Wheatear (N)/(S)	_____ *Bay-breasted Warbler N/S
_____ *Loggerhead Shrike (N)/S	_____ *Eastern Bluebird N/S	_____ *Blackpoll Warbler N/S
_____ *Northern Shrike N/S	_____ Mountain Bluebird (N)/(S)	_____ *Cerulean Warbler S
_____ *White-eyed Vireo (N)/S	_____ Townsend's Solitaire N/(S)	_____ *Black-and-white Warbler N/S
_____ Bell's Vireo (S)	N *Veery N/S	_____ *American Redstart N/S
_____ Black-capped Vireo (S)	_____ *Gray-cheeked Thrush N/S	_____ *Prothonotary Warbler (N)/S
_____ *Yellow-throated Vireo N/S	_____ Bicknell's Thrush (S)	_____ Worm-eating Warbler S
_____ Plumbeous Vireo (S)	_____ *Swainson's Thrush N/S	_____ Swainson's Warbler (S)
_____ *Blue-headed Vireo N/S	S *Hermit Thrush N/S	N *Ovenbird N/S
S *Warbling Vireo N/S	S *Wood Thrush N/S	_____ *Northern Waterthrush N/S
_____ *Philadelphia Vireo N/S	_____ Eurasian Blackbird (S)	_____ *Louisiana Waterthrush S
S, N *Red-eyed Vireo N/S	_____ Fieldfare (S)	_____ Kentucky Warbler (N)/S
_____ Gray Jay N/S	S, J, N *American Robin N/S	_____ *Connecticut Warbler N/S
S, J, N *Blue Jay N/S	_____ Varied Thrush N/S	_____ *Mourning Warbler N/S
_____ Clark's Nutcracker (N)	S *Gray Catbird N/S	_____ MacGillivray's Warbler (S)
_____ *Black-billed Magpie N/(S)	_____ *Northern Mockingbird N/S	S, N *Common Yellowthroat N/S
_____ Eurasian Jackdaw (S)	_____ Sage Thrasher (N)/(S)	_____ *Hooded Warbler (N)/S
S, N *American Crow N/S	S, J *Brown Thrasher N/S	_____ *Wilson's Warbler N/S
_____ Fish Crow (S)	S, N *European Starling N/S	_____ *Canada Warbler N/S
_____ *Common Raven N/S	_____ *American Pipit N/S	_____ Painted Redstart (S)
_____ *Horned Lark N/S	_____ Sprague's Pipit (N)	_____ *Yellow-breasted Chat (N)/S
_____ *Purple Martin N/S	_____ *Bohemian Waxwing N/S	_____ Summer Tanager (N)/S
S, N *Tree Swallow N/S	S, N *Cedar Waxwing N/S	_____ *Scarlet Tanager N/S
_____ Violet-green Swallow (N)	_____ Phainopepla (S)	_____ Western Tanager (N)/(S)
_____ *N Rough-w Swallow N/S	_____ *Blue-winged Warbler (N)/S	_____ Green-tailed Towhee (S)
_____ *Bank Swallow N/S	_____ *Golden-winged Warbler N/S	_____ Spotted Towhee (N)/(S)
_____ *Cliff Swallow N/S	_____ *Tennessee Warbler N/S	_____ *Eastern Towhee (N)/S
_____ Cave Swallow (S)	_____ *Orange-crowned Warbler N/S	_____ Cassin's Sparrow (N)/(S)
S, N *Barn Swallow N/S	_____ *Nashville Warbler N/S	_____ Bachman's Sparrow (S)
_____ Carolina Chickadee (S)	_____ Virginia's Warbler (N)/(S)	_____ *American Tree Sparrow N/S
S, J, N *Black-capped Chickadee N/S	_____ *Northern Parula N/S	S, N *Chipping Sparrow N/S
_____ *Boreal Chickadee N/S	J, N *Yellow Warbler N/S	_____ *Clay-colored Sparrow N/S
_____ *Tufted Titmouse S	N *Chestnut-sided Warbler N/S	_____ Brewer's Sparrow (N)
_____ *Red-breasted Nuthatch N/S	_____ *Magnolia Warbler N/S	S, J, N *Field Sparrow (N)/S
N *White-breasted Nuthatch N/S	_____ *Cape May Warbler N/S	S *Vesper Sparrow N/S
_____ *Brown Creeper N/S	_____ *Bl-throated Blue Warbler N/S	_____ *Lark Sparrow (N)/(S)
_____ Rock Wren (N)/(S)	J *Yellow-rumped Warbler N/S	_____ Black-throated Sparrow (N)
_____ *Carolina Wren (N)/S	_____ Bl-throated Gray Warbler (S)	_____ Lark Bunting (N)/(S)
_____ *Bewick's Wren (N)/(S)	_____ *Bl-throated Green Warbler N/S	S, J, N *Savannah Sparrow N/S
S *House Wren N/S	_____ Townsend's Warbler (S)	_____ *Grasshopper Sparrow (N)/S
_____ *Winter Wren N/S	_____ Hermit Warbler (S)	_____ Baird's Sparrow (N)
N *Sedge Wren N/S	_____ *Blackburnian Warbler N/S	_____ *Henslow's Sparrow (S)
_____ *Marsh Wren N/S	_____ Yellow-throated Warbler (N)/S	_____ *Le Conte's Sparrow N/S

LIST OF BIRDS IN AND AROUND THE GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

* - breeding in Ontario; N - recorded in north; S - recorded in south

	*Nelson's Shp-t Sparrow N/S
	*Fox Sparrow N/S
S, J, N	*Song Sparrow N/S
	*Lincoln's Sparrow N/S
	*Swamp Sparrow N/S
S	*White-throated Sparrow N/S
	*Harris's Sparrow N/S
S	*White-crowned Sparrow N/S
	G-crowned Sparrow (N)/(S)
S	*Dark-eyed Junco N/S
	*Lapland Longspur N/S
	*Smith's Longspur N/(S)
	Ch-collared Longspur (N)/(S)
	*Snow Bunting N/S
S, N	*Northern Cardinal N/S
S	*Rose-breasted Grosbeak N/S
	Bl-headed Grosbeak (N)/(S)
	Blue Grosbeak (N)/(S)
	Lazuli Bunting (N)/(S)
S, N	*Indigo Bunting N/S
	Varied Bunting (S)
	Painted Bunting (N)/(S)
	*Dickcissel (N)/S
S, N	*Bobolink N/S
S, J, N	*Red-winged Blackbird N/S
	*Eastern Meadowlark N/S
	*Western Meadowlark N/S
	*Yellow-headed Blackbird N/S
	*Rusty Blackbird N/S
	*Brewer's Blackbird N/S
S, N	*Common Grackle N/S
	Great-tailed Grackle (N)/(S)
S, N	*Brown-headed Cowbird N/S
	*Orchard Oriole (N)/S
	Hooded Oriole (S)
	Bullock's Oriole (N)/(S)
S, N	*Baltimore Oriole N/S
	Scott's Oriole (N)
	Brambling (N)/(S)
	Gray-crowned Rosy-Finch (N)/(S)
	*Pine Grosbeak N/S
	*Purple Finch N/S
	Cassin's Finch (S)
	*House Finch N/S
	*Red Crossbill N/S
	*White-winged Crossbill N/S
	*Common Redpoll N/S
	Hoary Redpoll N/S
	*Pine Siskin N/S
	Lesser Goldfinch (S)
S, J, N	*American Goldfinch N/S
	*Evening Grosbeak N/S
	*House Sparrow N/S
	Eurasian Tree Sparrow (S)

CODES:

J - observed (JART, 2006)

S - observed (Stantec, 2000-2006)

N - observed (NRSI, 2006)

LIST OF MAMMALS & HERPETOFAUNA IN & AROUND GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

Date: 2000-2006 Observer: JART, Stantec, NRSI and MNR

MAMMALS

N	Opossum
	Masked Shrew
	Water Shrew
	Smoky Shrew
	Pigmy Shrew
	N. Short-tailed Shrew
	Hairy-tailed Mole
	Star-nosed Mole
	Little Brown Bat
	Keen's Bat
	Small-footed Bat
	Silver-haired Bat
	Eastern Pipistrelle
	Big Brown Bat
	Red Bat
	Hoary Bat
S, J	Eastern Cottontail
	Snowshoe Hare
	European Hare
S, N	Eastern Chipmunk
N	Woodchuck
S, N	Gray Squirrel
S, N	Red Squirrel
	Southern Flying Squirrel
	Northern Flying Squirrel
N	Beaver
	Deer Mouse
	White-footed Mouse
	S. Red-backed Vole
	Meadow Vole
	Muskrat
	S. Bog Lemming
	Norway Rat
	House Mouse
	Meadow Jumping Mouse
	Woodland Jumping Mouse
	Porcupine
S, J	Coyote
N	Red Fox
	Gray Fox
	Black Bear
S,J,N	Raccoon
	Ermine
	Long-tailed Weasel
W	Mink
	Badger
	Striped Skunk
	River Otter
	Bobcat
S,J,N	White-tailed Deer

HERPETOFAUNA

	Mudpuppy
M	Eastern Newt
M	Jefferson Salamander
	Blue-spotted Salamander
M	Jefferson complex hybrid
	Jefferson complex (undet.)
S, J	Yellow-spotted Salamander
	Dusky Salamander
	Four-toed Salamander
	East. Redback Salamander
	East. Redback Salamander - Grey phase
S,J,N	American Toad
S, J	Spring Peeper
S,J,N	Tetraploid Gray Treefrog
	Midland Chorus Frog
S, J	Wood Frog
S,J,N	Northern Leopard Frog
	Pickerel Frog
N	Green Frog
	Mink Frog
N	Bullfrog
N	Common Snapping Turtle
	Stinkpot
	Midland Painted Turtle
	Red-eared Slider
	Map Turtle
	Blanding's Turtle
	Wood Turtle
	Spotted Turtle
	Box Turtle
	Eastern Spiny Softshell
S, J	Eastern Garter Snake
	Northern Ribbon Snake
	Northern Water Snake
	Redbelly Snake
	Brown Snake
	East. Smooth Green Snake
	Northern Ringneck Snake
	Black Rat Snake
	Eastern Fox Snake
	Eastern Milk Snake
	Eastern Massasauga

Other Observations:

N	Bat sp.

Legend

J - observed (JART, 2006)
S - observed (Stantec, 2000-2006)
N - observed or information from landowner (NRSI, 2006)
M - observed and genetically tested in the case of Jefferson Salamander (MNR, 2005-6)
W - information from Mount Nemo Wetland Complex evaluation (CH 1984)

LIST OF INVERTEBRATES IN AND AROUND THE GRINDSTONE CREEK HEADWATERS WETLAND COMPLEX

Date: 2000-2006	Observer: JART, Stantec and NRSI

BUTTERFLIES AND MOTHS

- S,J,N Cabbage White
- S Orange Sulphur
- S, N Common Wood-Nymph
- S, J Black Swallowtail
- S Mourning Cloak
- S, J Spring Azure
- S, N Monarch
- N Mustard White
- N Crescent sp.
- N Eastern Comma
- N Least Skipper
- N Checkerspot sp.

DRAGONFLIES AND DARNERS

- N Widow Skimmer
- N Four-spotted Skimmer
- N Common Whitetail
- N White-faced Meadowhawk

Additional Species:

- J Fairy Shrimp

LEGEND

J - observed (JART, 2006)
S - observed (Stantec, 2000-2006)
N - observed or information from landowner (NRSI, 2006)

Southern Ontario Wetland Evaluation March 1993

WETLAND EVALUATION SCORING RECORD

WETLAND NAME AND/OR NUMBER: Grindstone Creek Headwaters Wetland Complex

1.0 BIOLOGICAL COMPONENT

1.1 PRODUCTIVITY

1.1.1	Growing Degree-Days/Soils	26	
1.1.2	Wetland Type	11	
1.1.3	Site Type	2	
	Total for Productivity		39

1.2 BIODIVERSITY

1.2.1	Number of Wetland Types	13	
1.2.2	Vegetation Communities (maxixmum 45)	13	
1.2.3	Diversity of Surrounding Habitat (maximum 7)	7	
1.2.4	Proximinty to Other Wetlands	8	
1.2.5	Interspersion	12	
1.2.6	Open Water Type	8	
	Total for Biodiversity		61
	Sub Total for Biodiversity	61	

1.3 SIZE (Biological Component) 8

TOTAL FOR BIOLOGICAL COMPONENT (not to exceed 250) 108

2.0 SOCIAL COMPONENT

2.1 ECONOMICALLY VALUABLE PRODUCTS

2.1.1	Wood Products	3
2.1.2	Wild Rice	0
2.1.3	Commercial Fish	12
2.1.4	Bullfrogs	1
2.1.5	Snapping Turtles	1
2.1.6	Furbearers	12

Total for Economically Valuable Products: 29

2.2 RECREATIONAl ACTIVITIES (maximum 80): 8

2.3 LANDSCAPE AESTHETICS

2.3.1	Distinctness	3
2.3.2	Absence of Human Disturbance	4

Total for Landscape Aesthetics: 7

2.4 EDUCATION AND PUBLIC AWARENESS

2.4.1	Educational Uses	0
2.4.2	Facilities and Programs	0
2.4.3	Research and Studies	0

Total for Education and Public Awareness: 0

2.5 PROXIMITY TO AREAS OF HUMAN SETTLEMENT: 26

2.6 OWNERSH1P: 4

Subtotal for Social Component: 63

2.7 SIZE (Social Component): 11

2.8 ABORIGINAL AND CULTURAL VALUES: 0

TOTAL FOR SOCIAL COMPONENT (not to exceed 250): 85

Southem Ontario Wetland Evaluation, Score Summary March 1993

3.0 HYDROLOGICAL COMPONENT

3.1 FLOOD ATTENUATION		85
3.2 WATER QUALITY IMPROVEMENT		
3.2.1 Short Term Improvement	49	
3.2.2 Long Term Improvement	3	
3.2.3 Groundwater Discharge (maximum 30)	6	
Total for Water Quality Improvement		58
3.3 CARBON SINK		0
3.4 SHORELINE EROSION CONTROL		0
3.5 GROUNDWATER RECHARGE		
3.5.1 Site Type	50	
3.5.2 Soils	7	
Total for Groundwater Recharge		57
TOTAL FOR HYDROLOGICAL COMPONENT (not to exceed 250)		200

4.0 SPECIAL FEATURES

4.1 RARITY

4.1.1 Wetlands		
4.1.1.1 Rarity within the Landscape	60	
4.1.1.2 Rarirty of Wetland Type (maximum 80)	0	
Total for Wetland Rarity		60
4.1.2 Species		
4.1.2.1 Endangered or Threatened Species Breeding	500	
4.1.2.2 Traditional Use by Endangered or Threatened Species	0	
4.1.2.3 Provincially Significant Animals	0	
4.1.2.4 Provincially Significant Plants	0	
4.1.2.5 Regionally Significant Species	0	
4.1.2.6 Locally Significant Species	24	
Total for Species Rarity		524

4.2 SIGNIFICANT FEATURES OR HABITAT

4.2.1 Colonial Waterbirds	0	
4.2.2 Winter Cover for Wildlife	0	
4.2.3 Waterfowl Staging and Moulting	0	
4.2.4 Waterfowl Breeding	10	
4.2.5 Migratory Passerine, Shorebird or Raptor Stopover	0	
4.2.6 Fish Habitat	15	
Total for Significant Features and Habitat		25

4.3 ECOSYSTEM AGE	2
4.4 GREAT LAKES COASTAL WETLANDS	0
TOTAL FOR SPECIAL FEATURES (maximum 250)	250

Southern Ontario Wetland Evaluation, Score Summary March 1993

SUMMARY OF EVALUATION RESULT

Wetland: Grindstone Creek Headwaters Wetland Complex

TOTAL FOR 1.0 BIOLOGICAL COMPONENT	108
TOTAL FOR 2.0 SOCIAL COMPONENT	85
TOTAL FOR 3.0 HYDROLOGICAL COMPONENT	200
TOTAL FOR 4.0 SPECIAL FEATURES COMPONENT	250
WETLAND TOTAL	643

INVESTIGATORS

see page 37

AFFILIATION

see page 37

DATE February 2007

Provincially Significant
Grindstone Creek Headwaters Wetland Complex
February 2007

590000 591000 592000

4806000 4805000 4804000

2nd Sdrd

Guelph Line

Cedar Springs Rd

1st Sdrd

#1 ne M3-A

#2 h S6-B

ne S9

#3 ne M3-A

#4 ne M3-A ne S8-B

ne M3-C ne M3-A ne S8-A

ts S4 h S7-B h S7-A

#5

#6 ne M3-A ne S8-A

#7 ts S3 h S6-A

ne M3-A

#8 re M5

#9 h S5-B

ne M4 #10

#11 ts S1 ts S2

#12 h S5-A

ne M2

ne M3-B

h S10

ne M3-A ne M3-A

#13 ne M6-B

su W1

#14 ne M6-A

ne M6-A #15

Ontario

SOURCE OF INFORMATION

Information provided by the Ministry of Natural Resources district office in Aurora.
Ministry of Natural Resources - Aurora District 50 Bloomington Road West, Aurora, ON L4G 3G8

Base information derived from the Ontario Base Map, 1983 at a scale of 1:10,000 and the Natural Resources Values Information System (NRVIS).

NOTE

The information displayed on this map has been compiled from various sources. While every effort has been made to accurately depict the information, this map should be viewed as illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

For detailed information on natural features such as their location, size or status, the individual files held by the Aurora district office of the Ministry of Natural Resources should be consulted.

Scale 1:10,000 (approx.)

0 50 100 200 300 400 500 Metres

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Legend

- Waterbody
- Watercourse
- Road
- Wetland