Comment(s)	Proponent's Response
Air	
(i) The experts hired by the Capital Region Citizens Coalition for the Protection of the Environment (CRCCPE) reported that the air quality/odour effects assessment were not considered adequate since the proponent used the Emission Summary and Dispersion Model (ESDM) rather than follow the standard Environmental Assessment methodology. Until the landfill is completed and capped and the gas collection system is installed, it will emit odours and adversely affect air quality in the area. Golder Associates, the engineering company hired by Taggart Miller, simply state that the potential effects of the proposed CRRRC on air quality were assessed as reported in the EA and demonstrate compliance with MOECC standards. Who is right? (ii) The greenhouse gas (GHG) assessment completed by Taggart Miller for the project compares GHG emissions if landfilling all the waste versus diverting some of the waste, and concludes that the proposed CRRRC will reduce GHG emissions. The assessment does not address tracking of GHG's. The activities proposed at the CRRRC, including trucking, landfilling, heating of buildings, outdoor composting were not considered; the CRRRC will increase GHG emissions, not reduce them, which is contrary to the need for overall reduction of GHG emissions.	Approximate Number of Times Comment Received Individuals: 470 Groups[1]: 3 (i) As contemplated on page 48 of the approved Terms of Reference (TOR) for the Environmental Assessment (EA), the air quality and odour assessment was carried out to an Environmental Protection Act (EPA) level of detail as part of the EA assessments. The air quality assessment was reported in a technical supporting document (TSD #3) submitted as part of the Environmental Assessment Study Report (EASR). An Emission Summary and Dispersion Modelling (ESDM) report was included in the EA document package in the Volume IV, Design and Operations Report. The assessment indicates that the proposed facility will be in compliance with O. Reg. 419/05. Concerns regarding the air impact assessment were submitted by the experts retained by the CRCCPE. Questions were also provided by the MOECC air technical staff reviewers. Golder, on behalf of Taggart Miller, prepared responses to both, and also prepared an Addendum to TSD #3 that was posted on the project website. The MOECC technical reviewers are satisfied with the clarifications and additional information provided, as reported on in the government review. The air impact assessment, which included air quality, odour and dust components, considered all the significant potential sources of these emissions at the CRRRC. The studies took into account the relevant atmospheric conditions, including prevailing winds, and considered potential effects on any potential receptor. The studies show that the applicable provincial regulations and standards will be satisfied at those potential receptors closest to the Site.

[1] Groups include: Citizens' Environmental Stewardship Association – East of Ottawa, Capital Region Citizens Coalition for the Protection of the Environment and Vars Community Association

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	The proposed CRRRC will divert a large percentage of organic materials from landfilling, the handling and decomposition of which is a primary source of odours and air quality emissions from landfills. There will also be a much higher level of diversion of other materials received at the Site compared to current practices at other sites that dispose of whatever they receive. These diversion activities will occur indoors or within encapsulated cells (organics, hydrocarbon-impacted soils), with their air emissions captured and appropriately treated prior to discharge. This diversion, coupled with accepted best practices of landfill operations (such as minimizing the active working area, use of daily cover etc. as described in the EA) will control potential odour emissions. In addition, the proposed landfill gas collection system (which will capture and process both GHG's and those that create odour) consists of a network of horizontal collectors installed within the waste as landfilling progress. Gas collection will be ongoing both during operations and after the cells are completed and the final cover constructed. (ii) The comment regarding the tracking of GHG's is not correct. The potential greenhouse gas (GHG) effects are presented in Section 11.2.2.2 of the EA and in Section 5 of TSD #3. The results of the GHG emissions inventory including the summary of predicted annual GHG emissions rates and the GHG emission estimates by emission type are presented in Tables 5-1 and 5-2 of TSD #3, respectively. The quantification methodologies used are based on the Ontario Regulation 452/09 Greenhouse Gas Reporting. Internal to the project, the proposed composting of organic materials from the IC&I waste stream and the proposed collection of landfill gas using a system of horizontal collectors installed within the waste will reduce GHG generation and increase capture of whatever GHG that is generated. External to the project, the management of waste currently being generated by the IC&I sector is presently mostly by landfilling, with a low rate of diversion. The majority of the waste that will be received at the proposed CRRRC will be generated from the City of Ottawa, and is

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	currently being trucked to landfills, some of which are outside of and some distance from the City. The proposed CRRRC will provide a facility for management of IC&I materials closer to their source (which will reduce trucking and associated vehicle emissions). In comparison to simply landfilling the waste as is currently mostly the case, the increased diversion that will be accomplished through the CRRRC will reduce potential air emissions including GHG's. A comparative life cycle assessment of the proposed CRRRC was carried out to illustrate the GHG benefits of diverting a significant portion of the incoming waste from landfill (see EA Executive Summary page ix). The model used was the GHG calculator created by Environment Canada. As reported, using the permitted annual maximum waste receipts at the CRRRC, the estimated annual GHG emission reductions range from 113,000 tonnes at the low end of assumed diversion to 257,000 tonnes CO2 equivalent at the higher end, compared to straight landfilling of these same wastes.
Shallow Dug Wells and Surface Water	
(i) Concerned about the impact of the proposed landfill by Taggart Miller on local surface water and shallow wells. Not everyone in our community is hooked to the municipal water system (trickle feed). For those who do not benefit from this system, contamination of our groundwater represents a huge risk. Not only will property value be affected, it will also have an impact on personal health and large repercussions on commercial farms. There is no plan as to how the trickle feed system will be extended to those whose water will be affected. Who will pay for providing water when groundwater contamination occurs and influences wells and the Bearbrook and eventually the Ottawa River? There is no way groundwater contamination can be mitigated other than by selling to the polluter. (ii) The site is very flat with a high water table, which drains via the Simpson Drain system into the Bearbrook, in the South	Approximate Number of Times Comment Received Individuals: 457 Groups: 2 (i) The direction of both groundwater flow and surface drainage from the proposed CRRRC Boundary Road Site is eastward. There are no water supply wells for at least 2.5 kilometres east of the proposed CRRRC site. . As reported in the EA, Taggart Miller studied the recharge of shallow wells through a dug well testing program, and assessed the potential effects of the proposed CRRRC on both shallow groundwater quality and quantity. The studies, which are reported in the EA, concluded that the proposed CRRRC will affect neither off-Site dug well water quality nor quantity of supply for these wells. There is a high degree of natural groundwater protection at the CRRRC Site due to the thick, very low permeability clay deposit, and surface water discharges from the Site will be carefully monitored and controlled prior to discharge. These

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Nation River watershed. The CRCCPE Reviewers state that the EAR does not contain adequate modeling of downstream effects of possible breaches or failures in leachate and run-off containment from the flood-prone landfill site. The proposed site's water management ponds could discharge into existing waterways and bring the site into concern under the Federal Fisheries Act. Phosphorus loads are particular concerns downstream of landfills, and are already a concern in the watershed. Golder Associates, the engineering company hired by Taggart Miller, simply state that they expect to ensure surface water will remain comparable to existing conditions, and not increase discharge to the Simpson Drain and Bearbrook downstream receiving waters . These appear to be conflicting scientific statements between experts.	findings were accepted by the MOECC groundwater technical reviewer as well as the South Nation Conservation (SNC) hydrogeologist. Should the CRRRC unexpectedly affect off-site water supply, as per provincial requirements Taggart Miller would be responsible for providing an alternative water supply to the affected location. (ii) In its present condition the flat-lying Boundary Road site is prone to periodic flooding because of the lack of an established drainage system on the property. This is similar to many undeveloped properties that are poorly drained and therefore have a high groundwater level. As described in the EA, there will be a surface water drainage and management (SWM) system established as part of the CRRRC site development, which will be designed to handle the 100 year storm event as required by O.Reg. 232/98 and will be adaptable to larger storm events as required. This system will ensure that the property will not be prone to flooding once the CRRRC is developed. Under the existing conditions, as described in the EA the Site has three 3 existing drainage outlets. The proposed SWM system will use these same three drainage outlets, with some minor adjustments in each of their drainage catchment areas accommodated in the design of the Site's SWM system such that post-development flows will match pre-development flows to these drainage outlets. The experts retained by the CRCCPE did not comment on the potential effects on surface water in the vicinity of the proposed CRRRC (the concerns expressed by Dr. Ken Howard regarding the modelling predictions of leachate effects are addressed in the response below). Potential sources of phosphorus from the CRRRC are the leachate within the landfill and ponds associated with the leachate pre-treatment facility. The design for containment of leachate within the landfill is discussed below in the response to Leachate and Groundwater. The leachate holding pond and treated effluent holding pond will be lined facilities. The Site surface water management system ponds have been sited and designed to ensure their separation from potentially leachate-impacted waters (from both the landfill and the

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	leachate pre-treatment facility ponds). The MOECC and SNC reviewers have indicated their satisfaction with the approach.
Leachate and Groundwater	
(i) The experts hired by the CRCCPE reported that the landfill leachate permeating into the Leda clay will weaken its structure. The complex chemical mixture arising from the interaction of a vast array of waste materials could lead to catastrophic failure. (ii) The weight of the waste will cause large settlements of the underlying clay; how can that not cause problems for the leachate collection system and result in leakage of leachate? The CRCCPE experts indicate that since there are layers of sand running through the Leda clay, the chance of leachate escaping in the ground water is high. The landfill itself will not have a liner. (iii) Golder Associates, the engineering company hired by Taggart Miller, state leachate from their landfill will be captured, pre-treated onsite, and then trucked for disposal at Ottawa's waste water plant. Operators of Ottawa's waste water plant say they cannot guarantee acceptance of the volume of trucks, nor the leachate which has not been sampled for compliance. This significant, unresolved disagreement of facts has major consequences for the design and function of the proposed landfill.	Approximate Number of Times Comment Received Individuals: 487 Groups: 3 (i) The geotechnical experts hired by the CRCCPE, LRL Associates, submitted their comments and questions about the clay soils and the expected performance of the landfill in a letter dated February 13, 2015. Golder Associates prepared technical responses to each of the comments and provided these responses to the MOECC. The government review indicates that the MOECC is satisfied with the responses. In his May 2015 submission, Mr. Ken Torrance, a former university professor with expertise in marine clay deposits, submitted comments on behalf of the CRCCPE that included the potential for weakening of the clay structure due to permeation by landfill leachate. Golder Associates are aware that there have been studies (Quigley et. al., 1989) completed to determine the potential effects of landfill leachate on clay soils (including eastern Ontario marine clays), with the primary concern being the potential alteration of their minerology and higher hydraulic conductivity that could facilitate leachate migration through the clay. The results of those studies concluded that this is not a concern, since any effects on the minerology is more than compensated by the consolidation of the silty clay under the weight of the waste. The June 2016 review by Professor Locat discussed below also reaches the same conclusion. It should also be noted that in the CRRRC leachate assessment, the worst case combination of the Reg. 232/98 default landfill leachate parameters and those from an existing IC&I landfill were utilized. It is reasonably expected that the proposed diversion of organic waste at the CRRRC will result in a leachate that is weaker than what has been used in the assessment.

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	(ii) The expected settlements over time of the clay deposit under the weight of the waste has been fully described in the EA documents. The leachate collection system underlying the landfill has been designed to accommodate these settlements to ensure that the system will continue to be operationally effective to remove leachate for treatment. The government review of the EA and Taggart Miller's responses to similar questions indicated satisfaction with Taggart Miller's analysis of this question. Professor Ken Howard, submitted comments on behalf of the CRCCPE on the hydrogeological aspects and predictive modelling in the EA in letters dated February 10, 2015 and May 18, 2016. Golder Associates prepared technical responses to each of the comments from February 2015 and provided these responses to the MOECC hydrogeologist, who confirmed satisfaction with the hydrogeological assessments and the responses. The May 2016 letter did not present any new comments that had not been previously addressed. In addition, Dr. R. Kerry Rowe of Queen's University, a recognized world expert in the prediction of potential effects from landfills on groundwater resources, was retained by Taggart Miller. Dr. Rowe independently reviewed Golder Associates' assessment of hydrogeological conditions and predictive modelling as presented in the EA and concluded that he had "a high degree of confidence that the [landfill] site can be operated in the safe manner predicted." Both the MOECC reviewers and Dr. Rowe were supportive of the design approach that relies on the thick natural low permeability clay deposit and a constructed perimeter liner to provide both short term and long term leachate containment. There is no mention of "layers of sand running through the Leda clay" in Professor Howard's comments. Some members of the CRCCPE, as well as the recent submission by Ken Torrance have stated that this condition exists. However based on the extensive subsurface investigation program undertaken at the CRRRC Boundary Road site, as reported in detail in Volume III of the EASR document, there is no evidence to support this assertion. An independent review of

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	Torrance's submission was prepared by Professor Jacques Locat of Laval University in June 2016, and has been provided to the MOECC and posted on the project website. Professor Locat's review in part comments on the characteristics of the clay deposit that underlies the CRRRC Site, and concludes that the potential for the presence of sandy layers within the silty clay deposit and the importance of determining their presence or absence as it relates to potential leachate effects on groundwater was recognized by Golder Associates, and the subsurface investigation program was designed and carried out accordingly. The investigation program did identify the presence of a silty layer within the upper portion of the silty clay deposit, which was characterized and described in the EA documents and fully recognized and considered in the assessment of potential leachate migration from the landfill in the groundwater flow system. (iii) As described in the EA, the preferred leachate treatment approach is to pre-treat the collected leachate on the CRRRC site, and then convey it to the City of Ottawa sewage treatment plant (ROPEC) for final treatment. ROPEC has ample unused hydraulic capacity; however, due to the current limited truck receiving hours and other users of the truck delivery facility at ROPEC, the City has stated that ROPEC can currently accept up to 6 trucks per day from the CRRRC, or approximately 180,000 litres per day, which is estimated will accommodate the leachate generation from the CRRRC up to about year 10 of operations (sometime in the 2028 – 2030 timeframe approximately). City staff were directed by Council to consult with Taggart Miller on optimum method(s) by which leachate over this amount could be conveyed to ROPEC. It is noted that ROPEC currently accepts leachate from three other landfills within the City by either forcemain or truck.
Clay Soils Underlying the Boundary Road Site	
(i) The proponent refers to the clay on the site as a natural low permeability, silty clay deposit. CRCCPE's experts define it as weak, highly compressible (given the 100 feet depth) and	Approximate Number of Times Comment Received Individuals: 487 Groups: 3

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sensitive Leda clay which can be prone to liquefaction. This liquefaction could occur during phased loading of the landfill causing bearing capacity failure of the clay. There appears to be a difference of opinion between experts. It would appear that there are major constraints imposed by the soil conditions to the planning of any sort of viable development beyond typical low rise houses and commercial buildings and heavier structures will require special, and hence expensive, foundation treatment. For the same reason, extensive re-grading of the site, which would be desirable for landscaping and to improve drainage, presents many problems. The EA minimizes the major constraints posed by the soil conditions and supports experimental design concepts. (ii) The 1987 Geocon report says "excavation in this material may trigger slope failures due to disturbances caused by construction and operational equipment". Improper loading of the landfill and the operation of mechanical equipment has to be considered. A detailed study with more analysis than typical landfills is required.	(i) The reference to the silty clay as a "natural low permeability deposit" relates to its hydraulic properties and its ability to transmit groundwater (and/or leachate); essentially its hydrogeological characteristics. The reference to the silty clay being described by CRCCPE's experts as "weak, highly compressible and sensitive…..and prone to liquefaction" relates to its strength and other engineering properties as it relates to its ability to support loads and the associated engineering analyses of stability and settlement under those loads; essentially its geotechnical characteristics. These are two completely different aspects of the silty clay deposit, and the two descriptions provided are not a difference of opinion. Leda clay, or Champlain Sea clay, is one name given to the clay deposits that underlie large areas of the St. Lawrence lowlands in eastern Ontario and parts of Quebec. The result of being deposited in a salt water environment about 10,000 years ago (following retreat of the last ice age) is a clay soil with a particular structure and characteristics. This in turn results in the soil having certain engineering properties when it comes to designing structures and/or infrastructure on or within this clay soil. The behavior of these marine clays has been the subject of much scientific and engineering research, and there is a considerable body of knowledge regarding the design and performance of a broad range of development on these soil conditions. Depending on location, there is variation in the thickness of the clay soil and in its strength that can vary from soft to stiff, and consequently also in the engineering approach required to design a proposed development so it will perform acceptably. In view of the widespread occurrence of this soil deposit, there has been a large amount of development that has been designed and constructed and performed acceptably for many decades in areas underlain by Leda clay. For example, in the Ottawa area this includes housing, high rise buildings, commercial/industrial facilities, highways, servicing and large landforms such as earth embankments and landfills (both the nearby PWS Navan Landfill and the Lafleche landfill near

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	Moose Creek are constructed on Leda clay). The design of the CRRRC site is based on site-specific investigations of the properties of the clay soil. Using this information, the landfill component of the CRRRC has been designed so that it will be stable in both the short term and long term, and also under seismic loading conditions. The silty clay deposit's ability to naturally contain landfill leachate is well understood (and has been demonstrated at other eastern Ontario landfill sites underlain by these soils as noted above); and its expected performance can be predicted with confidence. The design and performance of infrastructure, including landfills, on marine silty clay deposits is not at all "experimental." As noted above, the subsurface investigations at the Boundary Road Site have characterized both the hydrogeologic and geotechnical properties of the silty clay deposit. As clearly documented in the EA, from a hydrogeological perspective the silty clay deposit has hydraulic conductivity values that correspond to a description as a low permeability deposit. From a geotechnical perspective and also clearly documented in the EA, the upper portion of the silty clay deposit is soft, and increases in strength with depth below that. The strength and compressibility characteristics of the silty clay deposit were fully considered in the geotechnical analysis of the overall CRRRC site development, including the proposed landfill. The results of the analysis of the proposed CRRRC landfill component showed that the landfill side slopes (both interim and permanent slopes) should be flatter than the maximum side slopes allowed by O.Reg. 232/98 to ensure stability, and that under the landfill's waste loading there will be long term settlement due to consolidation (or compression) of the clay. The expected performance of the proposed CRRRC landfill component under these conditions was fully assessed as described in the EA, and in responses provided to questions posed by LRL Associates, the geotechnical experts hired by CRCCPE. (These complete responses are available in hard copies of the Ministry Review or by request from the Ministry directly.) The MOECC have indicated in the government

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	review satisfaction with the analysis and information presented in the EA, and with the responses provided to the comments submitted on the EA. In addition, the independent review by Professor Jacques Locat of Laval University in June 2016, in response to the submission by Mr. Torrance on behalf of CRCCPE, provides Professor Locat's opinion on the characteristics of the clay deposit that underlies the CRRRC Site, including its liquefaction potential. Professor Locat states potential liquefaction was very well and conservatively assessed and taken appropriately into account by Golder in the design and proposed monitoring of the landfill component of the proposed CRRRC. The concern regarding the potential liquefaction of marine clay soils under seismic loading conditions has been previously raised by members of the public. This has been responded to by Golder (response of December 15, 2015 to comments from Ms. C. Vetter and of March 17, 2016 to similar comments from Mr. H. Baker and are included in the complete responses available in hard copies of the Ministry Review or by request from the Ministry directly) during the MOECC review of the final EA. The previous response is copied below: *"Ms. Vetter [and Mr. Baker] provides a number of links to articles on landslides of sensitive clay slopes adjacent to water courses, where after the landslide was initiated the clay soil behind and adjacent to the failure area is left in an over-steepened unstable condition and continues to fail through what is termed a 'flow slide' and can result in a relatively large total landslide area. This is due to the well-known 'sensitivity' of the marine clay soil, which is different than 'liquefaction'. Sensitivity refers to the ratio of the undisturbed strength of the silty clay soil to its 'remoulded' strength after it has been disturbed/sheared. In marine silty clay soils, the sensitivity is typically fairly high, meaning that these soils retain only a small portion of their original undisturbed strength after they have been disturbed/sheared. The 'flow slides' described in the articles provided by Ms. Vetter [and Mr. Baker] are the movement of disturbed, weakened clay soils after they have undergone movement associated with an initial slope instability.*

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	The Canadian Foundation Engineering Manual (CFEM) is a good reference to explain the topic of liquefaction (which is a distinctly different phenomenon). Section 6 of the manual is on Earthquake-Resistant Design. Subsection 6.6 is on liquefaction associated with seismic loading conditions and key relevant points are as follows: • *Seismic liquefaction refers to a sudden loss in soil strength and stiffness due to the cyclic loading effects of an earthquake;* • *The response of the soil to an earthquake depends on the mechanical properties of the soil layers, the depth to the water table and the duration and intensity of the earthquake;* • *Liquefaction is restricted primarily to more recently deposited sands and silts with a high water table;* • *Two of the factors that influence the liquefaction potential of a site are the soil type (saturated granular soils, especially fine loose sands with poor drainage conditions are susceptible to liquefaction) and the relative density of the soil (loose soils are more susceptible to liquefaction that more dense soils, noting that the terms loose and dense refer to granular soils and not more fine grained silty clay soils); and,* • *The susceptibility of cohesive (clayey) soils to liquefaction is variable and depends largely on their plasticity, with cohesive soils having a plasticity index of greater than 20% being classified as 'not susceptible' (Figure 6.15 in the CFEM).* *Based on the laboratory testing carried out on the unweathered silty clay soils obtained from investigations at the Boundary Road site, the plasticity index values generally range from about 27% to 58%, indicating a relatively high plasticity soil (and therefore, based on Table 6.15 of the CFEM, not susceptible to liquefaction).* *What is key to understand is that, as described above, liquefaction-susceptible soils are loose granular soils or cohesive soils of low plasticity. In contrast, the Boundary Road site and surrounding area are underlain by relatively high plasticity cohesive marine silty clay soils."*

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	(ii) Golder has carried out far more geotechnical and related investigations at the CRRRC Boundary Road Site than the preliminary work reported in Geocon 1987. That said, the findings of the two investigations are generally similar. Geocon conclude that the landfill sideslopes for a landfill previously proposed by the RMOC on this site would need to be flatter than typical landfills for the landfill to be stable, and that excavation into the silty clay deposit can be problematic in terms of both stability and in working within the soft clay during construction of the site. Golder is in agreement with these observations, and they are incorporated into the planning for and design of the proposed CRRRC landfill component.