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Brian Hamilton, Chief Administrative Officer, and
Chief and Council
Mohawks of the Bay of Quinte
13 Old York Road, RR#1
Tyendinaga Mohawk Territory, ON K0K 1X0

**RE: REVIEW OF DRAFT AMENDMENT TO PROVISIONAL
CERTIFICATE OF APPROVAL, WASTE DISPOSAL SITE,
RICHMOND LANDFILL SITE, ONTARIO**

Dear Chief and Council:

XCG Consultants Ltd. (XCG) is pleased to provide this review of the draft Amendment to Provisional Certificate of Approval, Waste Disposal Site, for the Richmond Landfill Site. The draft amendment proposes to approve the closure plan for the site, which was released by Waste Management (WM) in a document dated June 2007. XCG completed a review of the June 2007 closure plan in September 2007, and the findings of the review were documented in a letter from XCG to the Citizens Against Richmond Expansion (CARE) and the Mohawks of the Bay of Quinte (MBQ) dated September 13, 2007. A copy of XCG's closure plan review letter is attached to this letter.

In preparing this letter, the documentation reviewed by XCG included the following:

- Letter from Greg Washuta of the Ministry of the Environment (MOE) to the Quinte Conservation Authority, entitled "Application for Approval of Closure Plan, Waste Management of Canada Corporation, Richmond Landfill, Town of Greater Napanee, County of Lennox and Addington, MOE Reference Number 7421-74DHGZ," April 30, 2009;
- Draft Amendment to Provisional Certificate of Approval, Waste Disposal Site, issued to Waste Management of Canada Corporation by the MOE for the Richmond Landfill Site, undated (the "Draft Amendment");
- Pollutech Enviroquatics Limited Certificates of Analyses providing Acute Lethality Bioassay Reports for samples collected from the northwest, northeast and southwest stormwater management ponds on November 18, 2008;
- Pollutech Enviroquatics Limited Certificate of Analyses providing an Acute Lethality Bioassay Report for a sample collected from the southwest stormwater management pond on March 9, 2009;
- RWDI Air Inc. report entitled "Richmond Landfill Odour Survey", dated February 4, 2009;

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- Henderson Paddon Drawing Number 8570G-1002, entitled “Storm Water Pond and Ditch Upgrades”, dated March 14, 2008;
- Letter from XCG Consultants Ltd. to CARE and MBQ, entitled “Peer Review, Waste Management of Canada Closure Plan, Richmond Landfill Site, Ontario,” dated September 13, 2007 (the “2007 XCG Closure Plan Review Letter”);
- Henderson Paddon report entitled “Richmond Sanitary Landfill Site Final Closure Plan”, June 2007 (the “2007 Closure Plan”).

XCG’s comments on the draft Amendment to Provisional Certificate of Approval are detailed below:

1. Condition 6a, Draft Amendment. XCG’s comments regarding the final cover design in the 2007 Closure Plan were provided in Item 13 of the 2007 XCG Closure Plan Review Letter. The MOE has in part addressed XCG’s comments by specifying that the silty clay soil used for final cover must have a hydraulic conductivity of 1×10^{-8} m/s or less. However, a number of XCG’s concerns have not been addressed, including:
 - Calculations of water balance and leachate generation have not been provided to justify the final cover design. This information should be made available for public review before the Draft Amendment is finalized.
 - No provision has been made for a drainage layer beneath the final cover layer to reduce the likelihood of leachate seeps and to improve the operation of gas collection wells.
 - There has been no incorporation of any synthetic cap material, which would be prudent given the concerns regarding the sensitive hydrogeology of the area.
 - The final maximum slope of 3.5 horizontal to 1 vertical has not been changed and does not meet the standard set in Ontario Regulation 232/98, Section 30(1).
2. Condition 6b, Draft Amendment. Before the Draft Amendment is finalized, the public should have an opportunity, given the environmental sensitivity of the area and the level of concern that has been expressed regarding the landfill site, to review and provide comments on the Quality Assurance/Quality Control Plan for placement of the final cover material.
3. Condition 8a, Draft Amendment. XCG’s comments regarding the proposed WM groundwater, surface water and landfill gas monitoring programs were provided in Items 12 and 19 of the 2007 XCG Closure Plan Review Letter. The majority of XCG’s concerns regarding the monitoring programs have not been addressed in the Draft amendment document or in the other supporting information provided for review. The following concerns should be addressed:
 - **The work that has been completed to establish Reasonable Use (RU) Criteria is inadequate, based on XCG’s review of the 2007 Closure Plan, and revised RU Criteria have not been provided or specified in the Draft Amendment. It is of concern that some of the RU Criteria listed in Table 4 of Appendix C of the 2007 Closure Plan are greater than the MOE Table 2 standards that apply to potable groundwater areas in Ontario. For example, the vinyl chloride RU Criterion is 0.005 mg/L, which is ten times the Table 2 standard of 0.0005 mg/L.**

- **In Schedule B of the Draft Amendment tritium has not been included as one of the parameters to be monitored in groundwater. As discussed in Item 19 of the 2007 XCG Closure Plan Review Letter, past studies have indicated that tritium is a valuable parameter for assessing leachate impacts at this site, particularly given the elevated naturally occurring concentrations in this area of a number of parameters that are commonly used to track leachate migration, such as chloride and iron. It is recommended that tritium be added in the Amendment as a required parameter for monitoring of all monitoring wells that are included in the monitoring program. It is noted that past studies by XCG, using tritium as one of the test parameters, including a recent study dated May 11, 2009, entitled “Surface and Groundwater Sampling, Richmond Landfill Vicinity,” have found evidence of probable off-site leachate impacts. More extensive analyses of tritium in the network of on-site wells would be very useful in providing a more comprehensive picture of leachate migration on the site.**
 - The monitoring program outlined in Schedule B of the Draft Amendment includes over 70 wells from which samples are to be collected and analyzed. There is no indication in the Draft Amendment regarding whether or not the number of wells to be monitored will be reduced after site closure. XCG had expressed concern in the 2007 XCG Closure Plan Review Letter regarding the small number of groundwater monitoring locations included for post-closure monitoring according to the 2007 Closure Plan. It is assumed that the details of the proposed post-closure monitoring will be defined in the Environmental Monitoring Program (EMP) that is to be submitted within 90 days of the issuance of the finalized Amendment. Given the environmentally sensitive nature of this site and the level of interest that has been expressed by the public and other stakeholders, the EMP document should be produced and made available for public review and comment before the Draft Amendment is finalized.
 - **The surface water monitoring program outlined in Schedule C of the Draft Amendment references three surface water monitoring locations, S4, S8 and S9, that are now obsolete because of the extensive changes that have been made to the southwest stormwater pond and surrounding area. The surface water monitoring program, including the revised sampling locations, needs to be updated and should be made available for public review and comment before the Draft Amendment is finalized. As discussed in Item 12 of the 2007 XCG Closure Plan Review Letter, sampling of the northeast and northwest ponds “up to two times per year” is inadequate. The minimum monitoring frequency (not the maximum) should be defined for these ponds. The water quality trends in the ponds will be key in determining the presence of impacts from the closed landfill, especially with respect to the performance of the final cover.**
4. Conditions 14 to 18 and 20, Draft Amendment. XCG’s comments regarding the proposed WM financial assurance are provided in Item 7 of the 2007 XCG Closure Plan Review Letter. The financial assurance calculation provided in Table 8.1 of the 2007 Closure Plan indicates a total of \$5,983,322, which does not match the figure \$11,495,773 listed in Condition 20 of the Draft Amendment. XCG has not been provided with details of the revised calculations that led to the revised financial

assurance figure. Ensuring the adequacy of the financial assurances to cover all aspects of closure, post-closure care, and contingency plans for dealing with emergency conditions is essential, and therefore an opportunity for public and third party review of the details of the revised financial assurance calculations should be provided.

5. Condition 19, Draft Amendment. **XCG's comments regarding the contaminating life span of the Richmond landfill Site are provided in Items 6 and 23 of the 2007 XCG Closure Plan Review Letter. XCG and the public have not been given an opportunity to review an updated estimate of the contaminating life span of the site. Rather than having WM submit this information within 90 days of issuance of the Amendment, the updated information should be released, and the public and stakeholders should have an opportunity to review and comment on it, prior to the finalization of the Amendment. As mentioned in Item 23 of the 2007 XCG Closure Plan Review Letter, the contaminating life span of the existing Richmond Landfill Site was previously calculated by WM's consultants to be approximately 300 years. On this basis, it would be prudent to continue with the post-closure maintenance and monitoring measures indefinitely.**
6. Conditions 60 and 61, Draft Amendment. XCG has the following concerns regarding the stormwater management pond sampling requirements as outlined in these conditions:
 - According to the Draft Amendment, the acute toxicity testing prior to discharge is only required for the southwest stormwater pond, and not for the northeast and northwest stormwater ponds. The other two ponds also have the potential to negatively impact a surface water body (Marysville Creek) and they should therefore be subject to the same requirements as the southwest pond.
 - In addition to parameters that are acutely toxic to rainbow trout and daphnia magna, there are many other parameters of concern that could potentially cause harm to the natural environment, including parameters such as heavy metals that can bioaccumulate in aquatic organisms. The list of parameters required to be sampled prior to discharge of the water in the southwest pond is a much longer list than just acute toxicity testing, as shown in Table 2 of the Certificate of Approval (C of A) Industrial Sewage Works Number 5268-7E8LJW, issued August 19, 2008. Conditions 60 and 61 of the Draft Amendment should be modified to refer to this longer list of parameters.
 - The Pollutech acute lethality bioassay reports provided to XCG by the MOE only cover two sampling dates (November 18, 2008, and March 9, 2009) for the southwest stormwater pond. It is expected that discharge events would have occurred more often than twice between the C of A being issued in August 2008 and the time when XCG received the results from the MOE for review (Friday, May 22, 2009). Based on the requirement of C of A 5268-7E8LJW to conduct acute toxicity testing prior to every discharge of water from the pond, there should be more analytical certificates documenting the testing that has been done. In addition to the acute lethality results, there should also be result for the analyses of the parameters listed in Table 2 referenced in the point above. The public should be given an opportunity to review and comment on these test results before the Draft Amendment is finalized.

- Based on a review of the Henderson Paddon Drawing entitled “Storm Water Pond and Ditch Upgrades,” the sampling inlet for the southwest pond is located at an elevation of 123.2 metres within the southwestern-most sedimentation pond. This is 0.9 metres deeper than the elevation of the cattail shelf that represents the bottom of the layer of pond water that is drained when the outlet valve for the pond is opened. This sampling depth may be appropriate for contaminants that may be associated with suspended solids that tend to settle towards the bottom of the pond, but it would not be appropriate for contaminants that may float at or near the surface of the pond, such as hydrocarbon-related contaminants. It is noted that the “Hydrocarbon Impact Soil Storage Pad,” which is shown on the above-referenced Henderson Paddon drawing, drains into the southwest stormwater pond. Provisions should be made in the pond sampling program to ensure that the potential for floating contaminants is taken into account.
 - Given the relatively large surface area of the different sections of the southwest stormwater pond, and the presence of various sedimentation ponds within these sections, there is a potential for accumulated sediment to become resuspended in the pond water during windy conditions. Thus, a pond sample collected on a calm day could potentially show a significantly lower level of contamination than that present in the pond water several days later, if conditions had become windy in the meantime. This possibility should be taken into account in the pond sampling program and a pond management plan detailing the method of managing accumulated sediment should be made available for public review and comment.
 - According to Certificate of Approval Industrial Sewage Works Number 5268-7E8LJW for the southwest stormwater pond, the pond has been designed to “provide quantity and quality control of stormwater runoff from storm events up to 1:100 return frequency.” Before the Draft Amendment is finalized, the public should be given an opportunity to review and comment on the supporting calculations used to size the pond to retain a 1:100 year storm event. The design should be based on a 1:100 year storm event combined with a major snowmelt event occurring at the same time. It is acknowledged that the Certificate of Approval for the southwest pond has already been finalized and issued, but because the pond forms an integral part of the environmental controls for the landfill, the pond design information requires further consideration in the context of the Draft Amendment.
 - As mentioned in Item 18 of the 2007 XCG Closure Plan Review Letter, a stormwater management plan for the landfill site should be prepared. It should be provided to the public for review and comment before the Draft Amendment is finalized.
7. Condition 66, Draft Amendment. The operations and procedures manual should be prepared in advance of the issuance of the Amendment, and provided to the public for review and comment prior to the finalization of the Draft Amendment.
8. Condition 75, Draft Amendment. XCG’s comments regarding the cleaning and inspection of the leachate system are provided in Item 14 of the 2007 XCG Closure Plan Review Letter. The “visual inspections” referred to in this condition should be clarified as including camera inspections no less frequently than twice per year.

9. Condition 81, Draft Amendment. XCG's comments regarding the leachate management are provided in Items 5 and 11 of the 2007 XCG Closure Plan Review Letter. Reliance on haulage to sewage treatment plants with a provision for development of an "action plan" in the future when a location for disposal is not available is an inadequate contingency plan. As noted in the 2007 XCG Closure Plan Review Letter, Item 11, the 2007 Closure Plan states that an existing approval is in place for spray irrigation of the leachate, and that this may be implemented in the future as a contingency measure (page 1-4 of the Closure Plan). Given the many concerns expressed during the EA review process regarding odour impacts and surface water impacts, spray irrigation of leachate should not be accepted as a contingency measure for leachate management following closure. A detailed leachate management contingency plan should be developed and made available for public review and comment prior to the finalization of the Draft Amendment.
10. Condition 84, Draft Amendment. A detailed leachate collection system contingency plan, which could form a part of the more general leachate management contingency plan referenced above, should be developed and made available for public review and comment prior to the finalization of the Draft Amendment.
11. Condition 88, Draft Amendment. A detailed contingency plan for the failure of the landfill gas collection system should be developed and made available for public review and comment prior to the finalization of the Draft Amendment.
12. Condition 115, Draft Amendment. The Groundwater and Surface Water Impact Contingency Plan should be developed and made available for public review and comment prior to the finalization of the Draft Amendment. A public review of this document prior to issuing the approval is particularly critical given the environmental sensitivity of the area and the potential for groundwater and surface water quality to be impacted by the landfill operation, as well as the degree of concern that has been expressed in the past regarding previously proposed contingency measures, such as the fracture trench approach mentioned in Section C, Item 2, of the attached 2007 XCG Closure Plan Review Letter.
13. Condition 123, Draft Amendment. A detailed Emergency Response Manual should be developed and made available for public review and comment prior to the finalization of the Draft Amendment.
14. Condition 126, Draft Amendment. XCG's comments regarding the timing of landfill closure are provided in Items 3 and 8 of the 2007 XCG Closure Plan Review Letter. The current Provisional Certificate of Approval A371203, Condition 34, indicates that "a schedule indicating the time period for implementing" the closure activities is to be provided. The 2007 Closure Plan does not provide this and the Draft Amendment does not require it. A specific schedule with required dates for completion of all closure activities should form part of the Amendment. As stated in Item 8 of the 2007 XCG Closure Plan Review Letter, it is XCG's opinion that the landfill closure should proceed immediately. This is based on the concerns about the current landfill operation that were raised by the MOE, other reviewing regulatory agencies, third party reviewers (including XCG), and the public during the review of the Richmond Landfill Expansion Environmental Assessment (EA) documents. There were many concerns expressed

during this process related to the sensitive nature of the hydrogeology of the site, the inadequacy of the existing liner beneath the landfill, the inadequacy of the existing environmental monitoring program, and the possibility of off-site groundwater quality impacts arising from the landfill operations. Based on these concerns, it would be prudent to proceed with immediate closure of the landfill, in order to reduce the risk of increasing the severity of ongoing environmental impacts and/or causing new negative environmental impacts in the future.

15. Schedule D, Draft Amendment. XCG's comments regarding the landfill gas monitoring program are provided in Items 5 and 19 of the 2007 XCG Closure Plan Review Letter. The landfill gas monitoring should include monitoring not only of methane, but also of carbon dioxide, oxygen, hydrogen sulphide and pressure. Furthermore, given numerous odour complaints that have been received from residents and odour modelling results as documented in XCG's report of March 31, 2009, entitled "Odour Modelling, Richmond Landfill Vicinity," a detailed odour monitoring program should be developed for the surrounding area and a copy of this should be made available for public review and comment prior to finalizing the Draft Amendment. Furthermore, there should be a landfill gas contingency plan developed to address potential explosive levels of methane and other potential problems with landfill gas, and this contingency plan should similarly be made available for public review and comment prior to finalizing the Draft Amendment.

If you have any questions, comments, or require further assistance, please do not hesitate to contact the undersigned.

Yours truly,

XCG CONSULTANTS LTD.



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Encl. Letter from XCG dated September 13, 2007, re "Peer Review, Waste Management of Canada Closure Plan, Richmond Landfill Site, Ontario"

cc: Todd Kring, Mohawks of the Bay of Quinte