XCG
Environmental Engineers & Scientists

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July 20, 2011 **XCG File No.: 5-2957-01-01**

Ron Haley, M.Sc., MBA
Novus Environmental Inc.
Research Park Centre
150 Research Lane, Suite 105
Guelph, ON N1G 4T2

Re: XCG Peer Review of Surface Water and Groundwater Concerns for Proposed Ethanol Plant, City of Oshawa

Dear Mr. Haley:

XCG Consultants is pleased to provide comments on our review of the provided documentation in support of a planned ethanol plant in the City of Oshawa. The documents reviewed are listed below along with the reference identification used in this letter report.

- FarmTech Ethanol Facility, Screening Level Environmental Assessment Report, August 2008; J.L. Richards & Associates Limited, Volumes 1-3. *(JLR 2008).*
- Stormwater, Process Discharge Water and Domestic Wastewater Report – Farmtech Ethanol Facility; July 2008 (Revised October 2009); J.L. Richards & Associates Limited *(JLR 2009).*
- Screening Report, FarmTech Ethanol Facility, June 2011; AMEC Earth & Environmental. *(AMEC 2011).*

XCG has provided comments in regards to surface water considerations including stormwater management on site as well as groundwater considerations. All topics are included in this letter. Relevant reference documentation is also included as an attachment.

The stormwater / surface water review was lead by Ms. Renata Sadowska, M.Eng., P.Eng. and the groundwater review was lead by Mr. Chris Rancourt, M.Sc., P.Geo.

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Stormwater, Process Discharge Water and Domestic Wastewater Report (JLR 2009)

Note: Comments provided below are based on a review of the report section and associated primary design drawings and do not include detailed review of the calculations nor technical drawings. The intent is to identify the key environmental concerns with respect to the design, as proposed, and areas of concern with respect to technical design and analysis. A level of risk needs to be established /considered in conjunction with the environmental triggers determined for the aquatic and terrestrial habitat, surface and ground water quality and general use of the area. Thus, an overall conclusions and recommendations pertaining to environmental collusion of the proposed undertaking should result from integration of all relevant aspects of the multidisciplinary review comments.

General Discussion

As it is presented right now the following information require further clarification and or data and investigations:

1. Documentation of the use and selection of the treatment technology and land allocation.
2. Review of the design in conjunction with the ground water study recommendations, including Great Lake Basin management document to identify how all key management requirements will be met on the site.
3. Compliance with various local By-laws and regulations is required as the proposed land use is adjacent to a publicly owned land with conservation and recreational land uses.
4. Design Concept*:*

- The key aspects of the design rely mostly on the efficiency of the pond to treat/withhold pollutants. More information should be provided how the proposed facility will operate to prevent spill and or dilution of the wastewater, i.e. in case of the major flow events or in case of a back-to-back storm.
- The polishing basin of the main pond needs further considerations to sediment removal, how it will be addressed given provided recommendations vs runoff from paved and gravel surfaces, etc.

Design Concept Considerations

The proposed stormwater management for the site follows traditional design protocol for road/highway drainage design and provision of sedimentation/polishing basin.

Provided a character of the proposed and environmental sensitivity of the adjacent land uses, complexity of the water management on the site, including potential chemical make-up of the surface discharges, the calculation methods and water management concept should be revisited to provide higher level of considerations for the stormwater treatment, separation of the wastewater treatment and contingency measures.

The proposed wet pond facility has been designed using simplified methods for estimates of water quality/erosion control requirements and hydraulic designs which in principal follow the MTO Drainage Management Guidelines. In addition, in estimation of the stormwater runoff from the site the Rational Method was applied which is not consistent with the MTO recommendations while designing water quality facility (*e.g. Chapter 3, 4) or CLOCA guidelines (Section 3.2 Modeling / 3.2.1 Hydrology Modeling: The preferred runoff model is Visual Otthymo. For small sites, less than five (5) hectares, manual calculations will be accepted such as the Modified Rational Method.*)

No relevant sections of the Municipal Guidelines were available during this review. Accordingly, the peak and stormwater runoff estimates should be revisited to ensure that the proposed design accounts for validated runoff volumes and local stormwater guidelines.

In addition, the drainage catchments calculated in support of the local drainage system design were highly discretized and are not illustrating clearly general site characteristic with respect to impervious vs. pervious areas and are not supportive in estimating stormwater runoff during more significant rainfall events. Lumped catchments could be determined to identify potential separation of ‘clean’ stormwater (larger pervious areas) from the stormwater runoff from paved, polluted surfaces as well as wastewater

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	discharges and to facilitate simulation of the storm hydrographs (flow peaks and volumes). The use of gravel areas is also not clear based on this highly discretized drainage scenario and the proposed site uses *(* e.g. use of site equipment/local traffic, temporary storage/loading areas). *However, local* compaction of the gravel surface*s, thus lower permeability, is anticipated in those areas.*. *Accordingly*, a runoff coefficient similar to impervious surfaces *should be applied to reflect those changes.It* is a reasonable practice and *it* has been adopted by a number of local municipalities/practitioners. *Accordingly, for the purpose of the analysis,g*ravel areas with low potential for compaction can be separated from those integrated with an intended industrial use of the facility, in conjunction with considerations for surface type given to ground water protection . Furthermore, based on the level of risk associated with the plant operation (*e.g. spills, pollutants migration/deposits, etc.*) and characteristics of the area (*e.g. permeable soils, shallow groundwater, connectivity to significant natural features – 2nd Marsh, lake*) further considerations for surface management within the site should be given. Similar considerations should be applied to surface water conveyance/storage facilities to prevent migration of the pollutants (stormwater, wastewater, spills) to local groundwater thus posing larger environmental risks. (Refer also to groundwater *considerations* concerning Section 2.5.1.4). Also, the proposed mitigation measures seem to rely largely on nature to remove and polish the wastewater as well as provide a first line of defence. *Often, a* muliti-barrier approach is recommended *to address* industrial applications and environmental sensitivity*of the area (MOE SWM Planning & Design Manual - Page 4-2) Thus, f*urther considerations should be given to enhance the proposed water management plan consisting of drainage ditches, wet pond and use of two control gates to address the water quality requirements of various agencies/programs applicable for the area *while* respect*ing* the sustainability objectives of the community (MOE effluent control requirements; DFO/MNR, aquatic and terrestrial habitat protection; MOE, SWM Planning & Design Guidelines, Great Lake Basin Management Plan *objectives*, local municipality/environmental organizations *technical* guidelines and *vision* for the area) Further considerations to major flow management (e.g. by-pass, flow splitter) should be given to allow for a maximum use of the pond's volume in case of the emergency spills or contingency wastewater discharges and to prevent dilution and washout of pollutants to lake.
Section 3	**Storm Drainage**
Section 3.1	Table 1 – Proposed Runoff Coefficients: As presented above, further review of runoff values for gravel surfaces including designation of gravel surfaces should be conducted to ensure that the stormwater runoff calculations reflect as closely as possible the proposed land uses and runoff responses from the site.
Section 3.2	The design criteria should include water quality management targets for any wastewater coming in contact with surface water as a higher standard of care given the nature of the proposed industrial land use.
Section 4.2	**Storm Drainage Plan:** Drainage catchment discretization and associated runoff coefficients should be reviewed as per general comments to provide basis for stormwater runoff estimation in support of the water quality management facility, major flows management design. Composite runoff coefficients may be used to facilitate analysis of larger (lumped) drainage catchments. It would be recommended that the small drainage areas are grouped together to account for type of industrial application e.g. process related facilities, non-hazardous uses, open space to allow for a better understanding of stormwater runoff/potential chemical pathways. **Use of Rational Method:** More rigorous calculations are required where it comes to more complex in nature land requirements/applications. As per general comments and

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	notes above concerning Storm Drainage Plan, local guidelines as well as recommendations in MOE SWMPDM and MTO drainage guidelines should be considered as it relates to methodology/hydrologic model selection for design and assessment of the water quality control facility. (i.e. Chapter 3: Pg63 – applicable hydrologic methods for major system design; Pg 78 – designing of stormwater quality drainage system; Pg 80 applicable methods for Quality Control Facility Design; Chapter 4: Pg 81 – wet pond water quality design analysis, Pg. 117 Table 4A.1 Wet ponds design, etc.)
	Verification of the methodology to compute runoff hydrographs (Rational Method has been applied to compute runoff volumes and pond storage requirements). Municipal guidelines and MOE SPDM (2003) indicate that more rigorous calculations are required where it comes to more complex in nature land requirements/applications.
Section 4.2.1	As per earlier comments concerning use of runoff coefficient for compacted gravel areas, the site plan and peak flow estimates in support of the ditch system design should be revisited, clarified.
	Water quality considerations should be included in an open ditch system design as discussed earlier to prevent contamination of groundwater system from the surface water coming in contact with various pollutants resulting from the site operation, including potential spills.
	Use of control gate is a valuable control measure; however, since the conveyance system is being design for surface water discharges, further clarifications/calculations should be provided how the system will operate during emergency situations (capacity, backwater) in conjunction with estimated storm volumes and or back to back storm events.
	A minimum 0.3 m freeboard from 1:100 year estimated water levels to proposed building finished floor is indicated. Clarification is required based on municipal guidelines and building code.
Section 4.2.2	Estimated peak flows/hydraulic culvert sizing should be verified in conjunction with a review of the runoff coefficients/major flow catchments – hydrograph verification as per earlier comments.
Section 5.1.1	Refer to comments for Section 4.2.1 – prevention of groundwater contamination.
Section 5.1.2	It should be noted that the sediment removal rates from the stormwater within the wet ponds vary and could be much less than desired 80% TSS. Thus, design considerations should be such that they will maximize pollutant removal (i.e. pre-treatment measures and/or forebay pool/berm design to *further* enhance settling within the basin, deeper permanent pool, extended flow path, major flow management/by-pass system). The monitoring program (e.g. TSS, flow measurements) would further confirm performance of the facility.
	Also, the key aspects of the design rely mostly on the efficiency of the pond to treat/withhold pollutants. More information should be provided how the proposed facility will operate to prevent spill and or dilution of the wastewater, i.e. in case of the major flow events or a back-to-back storm *and or other upset conditions related to plant operation*.
Section 5.2.1	Verification of impervious areas (compacted gravel surfaces and or potential additional paved surfaces) should be further verified.
Section 5.2.2	Clarification of the site area used in SWM pond volume calculation should be provided and or marked clearly on the plan. Only 12.19 ha out of total 22.3 ha total site area is indicated to drain to SWM facility.
	As per earlier comments, further considerations should be given to discharging of utility non-contact process water to the SWM treatment facility. Separation of the wastewater treatment and stormwater treatment is preferred *to provide further controls for the water quality management This aspect should be addressed in consultation with the MOE*

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	satff. *It is also consistent with the municipal* By-law 9-90: Grading and disposal of storm and surface water Section 4(9) Design Requirements concerning discharges of cooling water, unpolluted industrial process water, etc. Thus, land allocation for the pond block and need for a use of stormwater (SWM) facility for treatment of the wastewater should be further investigated. *Given the site location and environmental sensitivity of the area (i.e. close proximity to the lake and significant marsh/wetland area, a high potential that the SWM facility will be inhabited by local wildlife as well as migratory specie),a* separate *wastewater* treatment is preferred while the SWM pond may be used as a polishing facility *and additional spill containment during the emergency events.* In addition, use of Rational Method in pond sizing should be revisited and pond sizing calculation verified based on relevant comments (e.g. hydrologic modelling methodology) including volume estimates for an extended detention (contributing drainage area, imperviousness) and use of SWM PDM Volumetric Sizing criteria (page 4-52 of the manual). Pond geometry design should also incorporate municipal guidelines *while*forebay design should be revisited as per relevant comments. Water Quality – use of a pipe restrictor (150 mm Dia. orifice) at the end of discharge pipe should be clarified*/revisited.* Given proximity to lake and *size of the orifice*, the orifice may *be prone to* freez*ing during pond's winter operation resulting in* overflow conditions *and discharge of pollutants to receiving waters. Use of an orifice device within more sheltered area of the outlet control structure would provide higher level of protection from the weather elements and potential vandalism.* Quantity storage is not required (as per CLOCA *guidelines*), yet any reference to extra storage/provision for spill control should be clarified since an overflow weir is set at *the level of an* extended detention. Accordingly, spill contingency measures clarified during major flow events and back to back storms*, including enforcement of the proposed measures, should be clarified.* Outlet channel – further considerations should be given to minimize number of outlets from the facility and to address water quality thermal requirements – measures to prevent/mitigate potential increase in water temperature within an open channel. Temperature mitigation measures should account for impact of the wastewater discharges into the pond. It should also be noted that wet ponds tend to further increase stormwater temperature *due to satnding water and relatively shallow water depths*. Further considerations should be given to this aspect of pond and conveyance system design.
Section 5.2.3	Statement concerning flexibility in available storage volume for potential increase in wastewater discharges is misleading as approximately 50% of identified 900 m3 is designated for water quality control functions. *S*ediment *loading and* removal *estimates should be further clarified* provided *use of* gravel surfaces *and potential washout of sediment laden with the by-products of the site operation (e.g. corn husk).*
Section 6.1.3	As per earlier comments and provided estimates of sediment contribution, the polishing basin of the main pond needs further considerations to sediment removal, how it will be addressed given provided recommendations vs runoff from paved and gravel surfaces..
Section 7.0	Refer to comments provided below regarding Section 5 and 6 of the Process Water Discharge Stream Characterization and Assessment document.
Section 7.3	The proposed monitoring program should be refined in consultation with MOE and as per relevant comments in this document.
Section 7.4	Contingency measures should be further investigated to address comments from all

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	commenting disciplines and incorporate comments from other agency.
Section 9.0	Refer to comments below 'Drawing ESC-1'
Appendix 'D'	Should the wastewater discharge be maintained to the SWM pond, the calculation should account for a continuous discharge of process water in addition to required 'first flush' event. Thus, sizing of the forebay facility needs to be reviewed to account for multiple inlets, mixing zone and potential short-circuiting at the outlet as well as potential updates to runoff coefficients *(e.g.* increase in an overall impervious area*)*. The contributing drainage area should also be verified.
Appendix 'H'	As per comments above, a frequency of sediment removal calculation should be revisited to account for potential adjustments in a value of catchment imperviousness and potential increase of sediment loading from process wastewater, adjacent gravel areas (e.g. gravel roads) and high vehicle traffic, including potential deposition of corn waste during normal operation practices (loading, transport, processing, temporary storage).
Drawing SD-1	Drainage catchment discretization and associated runoff coefficients should be reviewed as per general comments to provide basis for stormwater runoff estimation.
Drawing SWM-1	Design parameters should be reviewed to provide consistency with the facility design recommendations as per municipal guidelines (Section 7.2 Stormwater Management Facility Design Guidelines). This includes depth of permanent pool in a secondary basin, , sump basin off-sets, side slopes, transition zone, planting plan, forebay bottom reinforcement, forebay berm design considerations including use of earth and or other material to avoid use of corrosive materials present in gabion baskets *and larger sediment control within the forebay area.*
Drawing ESC-1	Erosion control during construction: Light duty silt fence is not recommended along the sensitive water bodies Current Ontario Guidelines. As per CLOCA guidelines: The Erosion and Sediment Control Guidelines for Urban Construction, 2006 (All products specified in this document may be an approved equivalent) (http://www.sustainabletechnologies.ca/).
Appendix 'J'	**Process Water Discharge Stream Characterization and Assessment**
Section 5	As recommended in the report, the MISA program should be consulted to define effluent discharge criteria and the monitoring requirements. Provided environmental and social aspect of the proposal, the consultation process and development of proper criteria as well as mitigation measures should be completed as part of this approval process. In addition, in the light of many industrial accidents and nature of the proposed operation it is surprising to conclude based on results in controlled environment that no toxic impacts is predicted from the process water discharge stream. Accordingly, the statement as presented in this section is misleading. The comments provided by the *a*quatic biologist should be consulted to reconcile the risks pertaining to potential risk and resulting toxicity in surface waters.
Section 6	*A report statement* "No predicted toxicological impacts"*is misleading* – refer to comments regarding Section 5 above. Conclusions concerning parameters predicted to exceed PWQO standards need to be further clarified as they are contradictive with data listed in Table 2, Section 7.2 of the SWM report. In addition, municipal By-laws should be consulted regarding allowable effluent discharges/concentrations and monitoring requirements (e.g. Oshawa By-law Storm Sewer Use 95-95 Part 2, 3, 4). Proposed monitoring program – parameters such as temperature, pH, flow and total suspended solids (TSS) should be monitored on a continuous basis for an agreed *with the agency/municipality* period of time (e.g. 6 months) to determine flow and chemical patterns. In addition, environmental triggers for each parameter should be established to allow for a proper response time to investigate and implement proper mitigation

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	measures. A list of the parameters should be reviewed with *the* MOE *staff* and considerations given to relevant comments from other disciplines provided as part of this review document.
	CEAA Screening Report, AMEC 2011
Section 2.5.1.4	The report states that groundwater (static?) was found at depths ranging from 3.2 to 4.3 metres below grade in four out of seven monitoring wells. Based on this, the permeable soil type, and the location of the site, we expect that (i) the shallow water table discharges to the Second Marsh, a provincially significant wetland, and (ii) the aquifer may be vulnerable to surface contaminants. Baseline groundwater quality and aquifer properties need to be evaluated in order to evaluate the potential for significant impacts to both surface water and sediment quality within Second Marsh. There is some information that dredged material from the harbour has been placed in the berms (7 to 10 m in height) located on the east side of the property. It is possible that the dredged sediment in the berm may be a source of contamination to groundwater. In addition to citing the "absence of reliance on potable groundwater within 100 metres of the site" the consultant implies that the MOE reasonable use policy would allow for some permissible impacts to groundwater quality. However, given the complete lack of detail regarding existing groundwater quality it is not feasible for the consultant to determine that any additional impacts may be permissible under the reasonable use policy. The proponent should provide data to confirm that the groundwater does not contain elevated concentrations of contaminants compared with federal and/or provincial environmental quality criteria. The report statement that there is no potable use of groundwater within 100 metres of the site may or may not be true but a proper review by the City of Oshawa must be conducted and documented. Please also refer to comments on groundwater quality under Section 4.1.5.
Section 4.1.5	The report states that based on regional trends, groundwater is expected to flow south with some south-westerly and south-easterly influence from drainage bodies. While this may be true, detailed site specific data are required to assess the potential for significant impacts due to groundwater quality. There is a wide range in potential aquifer characteristics reported by AMEC (June 2011) for the region including well yield ranging from 5 to 325 L/m, transmissivity range from 0.1m2/day to 3,062 m2/day and specific capacity value range from 0.1 to 1,044 L/min/m. The description of the underlying bedrock is very generalized and includes rock formations not found in the region (for example, the Blue Mountain Formation). The bedrock would actually consist of the Collingwood Member (potentially) and the Lower Member of the Lindsay Formation. This error underscores the issue of generalization and the overall lack of understanding of the hydrogeologic regime in the area. Due to the lack of detail regarding the existing groundwater regime and how it interacts with local surface water bodies, the proponent has not provided any data to indicate that the site will not causing a significant adverse effect.

Please note that this review is not a detailed technical review in that we have visited all the calculations in all the appendices and supporting documents. This is meant to be a general technical review identifying data gaps and reviewing the design approach.

If you have any questions or concerns or need clarification on our comments, please do not hesitate to contact me.

Yours very truly,

XCG CONSULTANTS LTD.

Janet Noyes, P.Eng.
Sr. Project Manager

Enclosure: References