MEMORANDUM

Date:	January 27, 2023
To:	Noah Wayt (WM)
Cc:	Chris Prucha and Chad Moose (WM)
From:	François Richard and Madeleine Corriveau
Project Number:	230130-05
Re:	Responses to MECP Comments on ECA Amendment Applications (ERO numbers 019-4955 and 019-4864), WM Richmond Landfill Town of Greater Napanee, Ontario

As requested, we are providing this memorandum in response to the comments received by the Ministry of the Environment, Conservation and Parks (MECP) in relation to the applications to amend ECAs No. A371203 (waste) and No. 1688-8HZNJG (industrial sewage works) recently submitted by Waste Management of Canada Corporation (WM) and discussed during a meeting with the MECP on December 2, 2022. This memorandum is designed to document agreement between WM and MECP made during the meeting, and to provide clarification of additional points that were not resolved during the meeting.

In accordance with Condition 8.5(e) of ECA No. A371203, WM submitted an application, dated 23 November 2021 (MECP ref. no. 3258-C93K73), seeking approval to amend the ECA to address non-compliance with Condition 8.8 and Guideline B-7, including incorporation of a contaminant attenuation zone (CAZ) into the approval and a proposed updated Environmental Monitoring Plan (EMP). An addendum to this ECA amendment application was submitted on January 7, 2022 (MECP ref. no. 4205-CAFSYS) along with an application to amend ECA 1688-8HZNJG, to seek approval for a proposed hydraulic control system (HCS).

ENIVRONMENTAL MONITORING PLAN (EMP)

Monitoring Frequency

WM proposed reducing the sampling frequency of background locations and wells within known impacted areas to once every 3 years and reducing the monitoring frequency for groundwater elevations and groundwater quality at all other locations to once each year alternating between spring and fall.

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MECP would like WM to continue to monitor groundwater elevations and quality twice per year (including at known impacted areas) because the site does not comply with Guideline B-7 and a new active remediation system (HCS) is being proposed for the site. Although WM does not believe semi-annual monitoring is necessary based on historical data being consistent year over year, WM will include semi-annual monitoring for the first 2 years, consistent with increased monitoring associated with the HCS. After 2 years, monitoring of groundwater elevations and quality will be assessed and if no significant deviations are identified, the monitoring will be reduced to once per year. During the December 2, 2022 meeting, it was agreed that a reduction in sampling frequency at background locations to once every two years was acceptable to the MECP.

Monitoring Locations – Groundwater

MECP recommended a number of additions to the semi-annual groundwater level and sampling program, as discussed by area below.

Shallow Bedrock Flow Zone – Central CAZ

- M199-DP and M201-DP – these are drive-point piezometers installed for monitoring of shallow groundwater elevations and as such are inappropriate for monitoring groundwater quality. They will not be added to the EMP.
- M201 – this monitoring well is south of the shallow groundwater divide. This location will be maintained as a water level monitoring well to monitor the presence of the flow divide but will not be sampled for chemistry.
- M199 – this monitoring well will be added to the EMP.

Intermediate Bedrock Flow Zone – CAZ

- M168 – this monitoring well will be added to the EMP.

Karst Feature Area

- M173, M194-1 and M194-2 – MECP would like one of these wells added to the EMP. WM recommends using M194-2 to monitor groundwater conditions in the intermediate bedrock in this area of the site as it is the shallower of the M194 well nest, and closest to the karst feature. This location will be monitored for 1,4-dioxane and alkalinity.

Lagoon Area

- M217, M218 and M60-4 – WM will prepare a separate letter with a commitment to monitor these wells until the Lagoon is empty. These wells will not be included in the EMP.

MECP also requested that M70-2, M170 and M192 be included as compliance wells in the EMP. After discussion, it was agreed that M70-2 should not be included as it is a poor monitor; M170 is better suited as it is located very close to this location, is screened in the same flow zone as other Intermediate Bedrock wells and has shown good hydraulic connection with other monitoring wells. WM agrees to add M170 as a compliance well in the EMP. Monitoring well M192 is located off-property and is included as part of the HCS performance monitoring program, it will not be included as a compliance well in the EMP.

Monitoring Parameters

MECP requires that the following wells are sampled for per- and polyfluoroalkyl substances (PFAS) on an annual basis:

- Near lagoon (M60-4, M217 and M218) – WM will prepare a separate letter with a commitment to monitor these wells until the Lagoon is empty and no longer in use. These wells will not be included in the EMP.
- North of landfill (M6-3) – This well will be included. WM notes that this is a poor producing well, however, low flow sampling methods will be used for PFAS sampling.
- Central CAZ (M178R-3) – This monitoring well is not included in the proposed EMP. MECP agreed during the December 2, 2022 meeting that it could be replaced with another well at this location, either M178R-2 or M178R-4. WM recommends M178R-2 as it is easier to sample due to the artesian conditions at this location.
- HCS extraction wells – It was agreed during the December 2, 2022 meeting that the combined discharge would be sampled, as opposed to individual extraction wells which would be considered should anomalies or issues be identified from performance monitoring.
- Surface water locations (S3, S8R, S23 and Ministry location "SW5") – MECP agreed that S23 can be removed from this list.

WM will prepare a separate letter with a commitment to sample these locations for PFAS on an annual basis; however, this sampling will be separate from the EMP at this time since there are currently no applicable criteria for PFAS.

Reporting

During the December 2, 2022 meeting, MECP indicated they are in agreement with the proposed annual EMP reporting. MECP also agreed that a summary of leachate seeps, springs, spills, overflows or other upset events is not required in the EMP as it is already included in the annual operations report for the site.

HYDRAULIC CONTROL SYSTEM (HCS)

2-Year Increased Monitoring Period

WM agrees to increased monitoring for a two-year period to confirm that the system is working as intended but will avoid using "pilot study" terminology. Operational changes deemed necessary as a result of the increased monitoring will be addressed with MECP at the end of the 2-year period.

Enhanced Monitoring Program

MECP agrees with combined discharge sampling, as opposed to individual purge well sampling. Individual well sampling will be conducted only as a contingency measure; however, WM will add "snapshots" of individual extraction well chemistry before system commissioning and annually afterward.

Saline Upwelling

Operations will be optimized to minimize potential upwelling. No changes are required to the HCS monitoring program. Data collected through the EMP (i.e., trends of sodium, chloride, TDS concentrations) will be evaluated.

Pond System Effluent Sampling

WM will increase weekly effluent sampling from the pond system outlet (1,4-dioxane only) for the initial two months of operation instead of one month as requested by MECP. WM will not add the complete leachate indicator parameter list to effluent sampling. It should be noted that the full parameter list for surface water is included in the EMP sampling program.

HCS Operation

During the December 2, 2022 meeting, MECP raised a concern that the calculations of effluent discharge (0.46 ug/L) were based on assumptions that were not sufficiently conservative, specifically that there was not consideration of the fact that precipitation is variable (i.e., consideration of drier months), and that it was assumed that the background concentration of 1,4-dioxane in the ponds was zero.

The ponds have a permanent pool of 2 m (between 122.4 m and 124.4 m) and the volume of this permanent pool based on the as-built drawings is 9,543 m^3. If there were no precipitation during an extended drought period and the only inflow to the SWM pond was from the HCS, the

retention time in the permanent pool of the SWM pond is calculated to be 875 days. If there is little precipitation for even 3 months (91 days), the inflow from the HCS over that period would not result in only the water from the HCS discharging from the SWM pond. The discharge from the SWM pond would continue to be a mixture of runoff and HCS water. On an annual basis, the total expected flow from the HCS is 5.2% of the total volume of water discharge from the SWM ponds in 2011[1].

Table 1 summarizes the predicted concentrations of 1,4-Dioxane at the effluent from the pond outlet as a function of assumed background concentration (see **Attachment 1** for calculation details). With respect to the assumption that the concentration of 1,4-dioxane in the ponds is zero, the predicted concentration of 1,4-dioxane in the effluent from Stormwater Pond No. 3 based on a mass balance approach is estimated at 0.46 µg/L, which is over 25 times less than the PWQO of 20 µg/L and less than the current site-specific groundwater reasonable use limit of 1 µg/L. If the runoff into the SWM pond is assumed to equal the maximum concentration of 1,4 dioxane at surface water sampling location S8R, which was 0.023 ug/L, the effluent concentration is estimated to be 0.49 ug/L. The highest concentration of 1,4 dioxane measured in surface water was at MECP sampling location SW4. Even assuming that the runoff into the SWM pond could have this elevated 1,4-dioxane concentration, the effluent concentration is estimated to be 0.79 ug/L, which would still be less than the current site-specific groundwater reasonable use limit of 1 µg/L.

Table 1: Predicted Pond Effluent 1,4-Dioxane Concentrations Relative to Pond Background

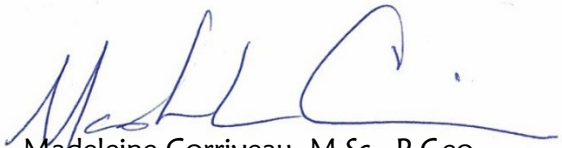
	Background 1,4 Dioxane in SWM Pond (ug/L)	Mass Balance Pond Effluent Concentration (ug/L)
Assume no 1,4 Dioxane in SWM pond inflow from runoff	0	0.46
Maximum concentration at S8R	0.023	0.49
Maximum concentration at MECP sampling location SW4	0.34	0.79

[1] GENIVAR Inc., 2012. Richmond Sanitary Landfill Site – Monitoring Report No. 25. March 12, 2012.

CLOSING

If you have any questions regarding the above information, please contact the undersigned anytime.

Respectfully submitted,
BluMetric Environmental Inc.



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Encl.

Ref: WM Response to Comments on ECA Amendment Applications-FINAL.docx

ATTACHMENT 1

HCS Target Flow Rates and Predicted 1,4-Dioxane Effluent Concentrations

	Target Flow Rate (gpm)	Target Flow Rate (L/m)	Target Flow Rate (gpm)	Target Flow Rate (L/m)	Target Flow Rate (gpm)	Target Flow Rate (L/m)
M212-PW	1	3.8	1	3.8	1	3.8
M214-PW	0.5	1.9	0.5	1.9	0.5	1.9
M215-PW	0.5	1.9	0.5	1.9	0.5	1.9
Total (gpm):	2.0		2.0		2.0	
Total (L/min):	7.6		7.6		7.6	
Total (m^3/day):	10.9		10.9		10.9	
Total volume pumped from Stormwater Pond 3 in 2011 (m^3/yr)	76,528		76,528		76,528	
Background 1,4 dioxane concentration (µg/L)	***0***		***0.023***		***0.34***	
Annual volume of groundwater	3979		3979		3979	
HCS discharge relative to 2011 Pond no. 3 volume	5%		5%		5%	
HCS 1,4 dioxane concentration (µg/L)	9.4		9.4		9.4	
Mass Balance for 1,4 dioxane (µg/L)	***0.46***		***0.49***		***0.79***	

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