



September 10, 2025

BY EMAIL

Client Services and Permissions Branch
Ministry of the Environment, Conservation and Parks
135 St Clair Ave West, 1st Floor
Toronto, ON M4V 1P5

Dear Sir/Madam:

**RE: RICHMOND LANDFILL (TOWN OF GREATER NAPANEE)
ERO NUMBER 019-4955 – PROPOSED HYDRAULIC CONTROL SYSTEM**

Please be advised that I am counsel for the Concerned Citizens' Committee of Tyendinaga & Environs ("CCCTE") in relation to the above-noted matter.

Pursuant to my letter dated August 22, 2025, I am writing to provide CCCTE's supplementary comments on the proposed Hydraulic Control System ("HCS") at the Richmond Landfill, and to clarify or correct some minor items addressed in my previous letter (see Appendix 1 below).

This submission has been filed in accordance with Ministry's commitment to consider any additional comments filed by the CCCTE by September 12, 2025.

Please note, however, that I am still awaiting disclosure of additional documents from the MECP regarding the proposed HCS as per a freedom-of-information request that I filed several months ago. Accordingly, the CCCTE reserves the right to file additional comments upon receipt and review of the requested records once they are provided by the Ministry.

(a) Technical Report by Wilf Ruland, P.Geo dated September 9, 2025

The CCCTE has requested Wilf Ruland, P.Geo, to independently review the current HCS proposal and the proponent's supporting document dated August 13, 2025.

Mr. Ruland's findings, conclusions, and recommendations are set out in his report dated September 9, 2025. This report (and its Attachment A) is appended below.

In summary, Mr. Ruland's report contains the following conclusions about the proposed HCS:

- 1) The 2025 HCS Report which presents WMCC's proposed Hydraulic Control System (HCS) is a problematic document, which is marred by a variety of omissions and deficiencies.**

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- 2) The chief concern associated with the HCS proposal is that in essence it involves pumping leachate-impacted groundwater, providing some pre-treatment, and then discharging it to an aerated stormwater pond (SP3) from where it will be allowed to flow off-site unimpeded. There is no provision in the HCS proposal to respond in any way to PWQO exceedences at the downstream site boundary monitoring station (S8R) for any parameter except 1,4-dioxane.
- 3) The proposed granulated activated carbon (GAC) pre-treatment technology is unproven and unlikely to be effective.
- 4) No testing has been done to confirm that GAC pre-treatment would be effective.
- 5) The estimates of SP3 discharge water quality presented in the 2025 HCS Report are based upon flawed calculations.
- 6) The hydraulic testing done to date has not confirmed that pumping of the HCS extraction wells can provide hydraulic containment and cut off the flow of leachate-impacted groundwater to the neighbouring private property to the east.
- 7) While water quality sampling of the leachate-impacted groundwater being pumped from the extraction wells is proposed in the 2025 HCS Report, the proposal is missing provisions that describe what WMCC would do if the extraction well water quality dramatically worsens.
- 8) WMCC has several other viable options available for dealing with the off-site contamination to the east of the landfill property which the HCS proposal is intended to address (page 9, original emphasis).

Accordingly, it remains Mr. Ruland's professional opinion that the Ministry should not approve the current HCS proposal:

- 1) There are numerous problems with the 2025 HCS Report and these problems are so significant that the report and the proposal it supports should under no circumstances be approved by the MECP Approvals Branch. Any such approval should be vigorously challenged by the CCCTE and its allies (page 10, original emphasis).

(b) CCCTE Conclusions about the Proposed HCS

For the various technical reasons outlined by Mr. Ruland's attached report, the CCCTE continues to recommend that the modified HCS proposal should not be approved by the Ministry on the basis of the unpersuasive and incomplete supporting documentation submitted by the proponent to date.

We trust that the CCCTE's comments and Mr. Ruland's technical concerns about the modified HCS proposal will be considered and acted upon by the Ministry by refusing to approve it via ECA

amendments. Please contact the undersigned if you have any questions arising from this submission.

Yours truly,

CANADIAN ENVIRONMENTAL LAW ASSOCIATION



Richard D. Lindgren
Counsel

cc. Ian Munro, CCCTE Chair
Chief R. Don Maracle, Mohawks of the Bay of Quinte

APPENDIX 1

The following clarifications and corrections are provided in relation to page 6 of CELA's previous letter to the Ministry dated August 22, 2025 regarding the proposed HCS:

- The reference to Appendix A of the proponent's 2025 HCS report should be Appendix B of the proponent's 2022 HCS report
- The reference to the PWQO for 1,4-dioxane should read 0.02 mg/L, as per Appendix B of the proponent's 2022 HCS report
- The reference to predicted 1,4-dioxane levels in the pond are found in main body of the proponent's 2025 HCS report

Mr. Richard Lindgren
Canadian Environmental Law Association
1500-55 University Avenue
Toronto, Ontario
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September 9, 2025

Dear Mr. Lindgren,

I am writing today regarding the Richmond Landfill, and about a report which was recently circulated by Waste Management of Canada Corporation (“WMCC”).

The report in question was issued for WMCC by BluMetric Environmental inc. on August 13, 2025 and is entitled “Design for Southeast Hydraulic Control System, Waste Management Richmond Landfill” (hereafter referred to by me as the “**2025 HCS Report**”). I have been retained by my clients the Concerned Citizens’ Committee of Tyendinaga & Environs (“CCCTE”) to review the 2025 HCS Report, and to provide my comments and recommendations.

In the course of my review I have come to realize that the 2025 HCS Report is a problematic document, which is incomplete and marred by a variety of omissions and deficiencies. I would prefer not to be wasting my time or the funds of our clients on reviewing this very problematic report, but it is being seriously considered by the Ministry of the Environment, Conservation and Parks (“MECP”) for approval.

There are numerous problems with the 2025 HCS Report and these problems are so significant that the report and the proposal it supports should under no circumstances be approved by the MECP. I will provide my reasons for making this statement in the course of this report.

1) Background

WMCC is the owner/operator of the now closed Richmond Landfill, which is situated near Napanee Ontario. For many years WMCC and its consultants claimed that the Richmond Landfill was not impacting off-site groundwater quality. These claims were incorrect.

The Richmond Landfill has been leaking since it was established in the 1950s, due mainly to the fact that Phase 1 of the landfill (which makes up about 40% of the landfill footprint) is unlined.

The lack of a liner means that even now in 2025, leachate continues leaking freely through the base of the landfill into the underlying groundwater flow system.

A landfill at this location was always going to pose a significant threat to the environment and its neighbours, but this threat was exacerbated by WMCC which initiated the practice of recirculating the landfill's leachate soon after it took ownership of the Richmond Landfill in 1997. The company's recirculation of the landfill's leachate drove up leachate heads inside the landfill and increased the strength of the leachate - both of these developments increased the threat that the landfill posed to the environment and its neighbours.

It was clearly a very poor idea for the company to carry out leachate recirculation at this landfill, and it was clearly a major mistake for the Ministry of the Environment, Conservation and Parks (MECP) to allow this practice.

Significant groundwater contamination caused by downward and outward leakage of the landfill's leachate progressed in the years after leachate recirculation began, and this leachate contamination crossed the landfill property boundaries and began contaminating off-site properties downgradient of the landfill.

WMCC and its consultants were unaware of the off-site contamination, due to significant deficiencies in the hydrogeological landfill investigations and monitoring programs.

As recently as 2010, WMCC's consultants made the following incorrect claim, namely that:
"There is no documented evidence of off-site groundwater impacts arising from the WM Richmond Landfill throughout its operational life".

Following a 2015 Hearing that I participated in as an expert witness, the Environmental Review Tribunal (ERT) concluded that the landfill has in fact contaminated groundwater on a vast off-site area of adjacent properties - including at least 6 domestic wells. In at least one case neighbours of the landfill were drinking leachate-contaminated groundwater from their well, because they believed the company's claims that there were no off-site impacts.

As currently mapped the leachate contamination plume extends southward and southeastward from the landfill, and crosses the landfill property boundaries across a broad front measuring at least 600 meters in width. At its furthest currently known extent the plume extends at least 800 meters from the landfill, and at least 350 meters onto adjacent properties.

To deal with the off-site contaminant plume, the ERT required WMCC to bring the landfill to compliance with the MECP's Guideline B-7 (the Reasonable Use Policy) - this could be done either by cutting off the flow of contamination onto the affected properties, by acquiring the affected properties, or by acquiring the "groundwater rights" for them. Acquiring groundwater rights for a property involves getting a "Contaminant Attenuation Zone" ("CAZ") legally registered on title, in return for providing the property owner(s) with adequate compensation.

WMCC has not been able to negotiate an agreement with the owners of one adjacent property (situated immediately east of the landfill) to either get a CAZ registered or to buy the property outright - and WMCC is thus out of compliance with the Reasonable Use Policy, and with the ERT's ruling. The company has come up with the HCS proposal to remediate the contamination on the neighbouring property, by cutting off the flow of leachate contamination from the landfill in the bedrock flow system.

The “Hydraulic Control System” (“HCS”) which is being put forward by WMCC in the 2025 HCS Report represents the company’s revised proposal, to remediate the contamination on the neighbouring property by cutting off the flow of leachate contamination from the landfill.

WMCC’s earlier HCS proposal (put forward in 2022) was not approved by the MECP after receiving highly critical submissions from my clients and other parties. My comments on WMCC’s original 2022 HCS proposal are contained in Section 5 of a Memorandum dated February 23, 2022 - and that Memorandum from myself can be found in **Attachment A** of this report.

2) Brief Description of Hydraulic Control System

The HCS (as described in the HCS Report) will consist of the following main features:

Extraction Wells

Three extraction wells have already been installed just inside the WMCC property boundary, in a rough line extending northward from the southeast corner of the landfill property. They are screened in the fractured bedrock formation which has been contaminated by the landfill leachate plume. The idea behind the HCS is that if the extraction wells are pumped continuously, then it should be possible to cut off the flow of leachate contamination which is currently flowing off-site onto the neighbouring private property.

Forcemain

The extraction wells are to be connected to a forcemain, which is to be used to convey the leachate-impacted groundwater to a pre-treatment facility which is to be situated at the location of the existing leachate Pumping Station PS3.

Pre-treatment Facility

The pre-treatment facility at PS3 is a modest operation that involves running the leachate-impacted groundwater through two 205 L barrels containing granulated activated carbon (GAC), with the goal of reducing concentrations of 1,4-dioxane.

Stormwater Pond No. 3

The effluent from the GAC pre-treatment facility is to be discharged into Stormwater Pond 3 (“SP3”), which is actually 3 interconnected ponds. An aerator is to be installed in the upstream pond, and it is hoped that various reactions will reduce the concentrations of contaminants in the effluent. The downstream pond has an overflow/outlet structure, and from there the SP3 discharge runs down a ditch to a culvert under Beechwood Road. The upstream end of the culvert is a sampling location (8SR) and represents the downstream site boundary monitoring point.

3) Chief Concern - the Dumping of Partly Treated Leachate into the Surface Water System

My chief concern associated with the HCS proposal is that WMCC is proposing to dump the pre-treated but still contaminated HCS effluent into Stormwater Pond No. 3 (SP3), from where it will (after the first 2 months of HCS operation) discharge unimpeded into the off-site downstream natural environment. As will be discussed in more detail below, the extraction wells will be pumping contaminated groundwater which is roughly equivalent in quality to the raw landfill leachate.

The only active treatment that this leachate-equivalent groundwater will be getting is that it will be run through two 205 L barrels containing granulated activated carbon (GAC). After that it is to flow through SP3 where it is hoped that aeration of the pond's water will facilitate reactions that will reduce contaminant concentrations.

This proposal is unique in my experience - normally leachate-contaminated groundwater being pumped for containment purposes would be taken off-site for proper treatment and disposal.

I have prepared a table (**Table 1**) which is presented at the end of this report, that provides a comparison of leachate strength from the landfill leachate collection system's North Chamber and South Chamber to the HCS effluent sampling results. The leachate quality data presented in **Table 1** were taken from the Spring 2024 Semi-Annual Monitoring Report (Table 6), and the HCS effluent quality data presented in **Table 1** were taken from Appendix B of the 2025 HCS Report (Table 5).

Table 1 indicates that the leachate-impacted groundwater pumped from the HCS extraction wells is roughly equivalent in strength to the raw landfill leachate. While WMCC is proposing GAC pre-treatment of the HCS effluent, the pre-treatment would be ineffective for any of the parameters shown in **Table 1**.

In effect the WMCC proposal to dump 10,900 Litres/day of pre-treated HCS effluent into the surface water system is the rough equivalent (in terms of mass loading) of dumping a similar amount of Richmond landfill leachate (365 days per year) into the surface water system via SP3. The latter would never be approved, and the former shouldn't be either.

It is extremely disappointing that WMCC is bringing this objectionable proposal (to dump HCS effluent into the surface water system) forward yet again. There are indications that the proposal has the tacit support of local MECP staff - who should really know better.

Under no circumstances should the MECP Approvals Branch approve the proposed dumping of GAC pre-treated HCS effluent into Stormwater Pond No. 3. Any such approval should be vigorously challenged by the CCCTE and its allies.

4) Overview of Other Major Problems with 2025 HCS Report

In the course of my review of the 2025 HCS Report I have found other major problems with the current HCS proposal:

- the GAC pre-treatment technology is unproven and unlikely to be effective;
- no testing has been done to confirm that GAC pre-treatment would be effective;
- the estimates of SP3 discharge water quality are based upon flawed calculations;
- hydraulic testing has not confirmed that the extraction wells can provide hydraulic containment;
- the possibility of deteriorating groundwater quality is not considered;
- no plan to respond if any parameter beside 1,4-Dioxane exceeds PWQO at the site boundary.

These problems are described and discussed in more detail below.

a) GAC Pre-treatment Technology is Unproven and Unlikely to be Effective

A key feature of the proposed HCS is the pre-treatment of the leachate-impacted groundwater using granulated activated carbon (GAC) to remove 1,4-dioxane. However a literature review indicates that GAC treatment is not effective at removing 1,4-dioxane. An example is provided by Section 7.1.2 of the Canadian government's Guideline Technical Document for 1,4-dioxane, which includes the following statements:

Given the low organic partitioning coefficient of 1,4-dioxane and its hydrophilicity, it is not expected to be efficiently removed using powdered or granulated activated carbon (Summers et al., 2014). Although bench-scale studies have shown moderate removals (50-67% removal) of 1,4-dioxane in columns (McGuire et al., 1978; Zenker et al., 2003) full-scale data have demonstrated that 1,4-dioxane is poorly removed by GAC (Roccaro et al., 2012)..

Overall, it is likely that under most conditions it is impractical to use activated carbon processes to achieve low levels of 1,4-dioxane in treated water (DiGuseppi et al., 2016).

The Guideline Technical Document for 1,4-dioxane can be found here:

<https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-1-4-dioxane.html#a9.1.2>

b) No Testing was Done to Confirm that GAC Pre-treatment Would be Effective

Given the uncertainty regarding the pre-treatment of the leachate-impacted groundwater using granulated activated carbon (GAC) to remove 1,4-dioxane, it would be prudent to conduct bench scale testing to confirm that the proposed GAC pre-treatment will actually work. However there is no indication in the 2025 HCS Report that testing of any kind has been conducted to see if the proposed GAC pre-treatment system will be effective.

c) Estimates of SP3 Discharge Water Quality are Based Upon Flawed Calculations

Section 3.5.2 of the 2025 HCS Report provides estimates of 1,4-dioxane concentrations in discharges from Stormwater Pond No. 3 (SP3). Unfortunately there are flaws in the estimates and their presentation, which are provided on pages 9 and 10 of the 2025 HCS Report.

The main problem appears to be confusion regarding the concentration units, which are at times expressed in mg/L (milligrams per Litre) and at times expressed in ug/L (micrograms per Litre). There is a factor of 1000 difference between mg/L and ug/L, with 1000 ug/L equalling 1 mg/L.

So for example, the first paragraph of page 9 indicates that the PWQO for 1,4-dioxane is 20 ug/L, while the second paragraph states that it is 20 mg/L. Similarly, page 9 par. 2 indicates that the highest concentration of 1,4-dioxane measured at station S8R was 0.023 mg/L while the first paragraph on page 10 and also Table 4 on that page (which present calculations using that figure) indicate that the concentration was 0.023 ug/L. Likewise page 9, par. 2 indicates that the highest concentration of 1,4-dioxane measured at station S4 was 0.34 mg/L while Table 4 on page 10 (which presents calculations using that figure) indicate that the concentration was 0.34 ug/L.

The confusion regarding concentration units make it impossible to check the proponent's estimates of SP3 discharge water quality.

d) Hydraulic Testing has Not Confirmed that Extraction Wells can Provide Hydraulic Containment

The third paragraph on page 2 of the 2025 HCS Report states that:

“Analysis of the data confirmed that effective hydraulic control can be achieved in the southeastern portion of the landfill property through continuous pumping at the 3 extraction wells.”

Although hydraulic testing including a 57 hour pumping test was carried out, it has not yet been demonstrated that pumping of the 3 extraction wells will create a sustainable hydraulic barrier that will stop the flow of leachate contamination onto the neighbouring property.

Appendix B of the 2025 HCS Report is a Jan. 6, 2022 Memorandum that provides the results of hydraulic testing done on the HCS extraction wells. The centrepiece of the hydraulic testing was a 57 hour pumping test done using the 3 extraction wells which are to be part of the HCS. The wells were pumped at a combined rate of 15 Litres per minute (L/min) for 49 hours but water levels were steadily dropping with no sign of equilibrium conditions. Pumping rates were then cut in half (to 7.6 L/s) and this pumping rate appeared to be more sustainable.

The only evidence regarding hydraulic control that is provided in the Jan. 6, 2022 Memorandum is Figure 2, which has the title *“Interpolated Groundwater Drawdown Sept. 2, 2021”*. Figure 2 appears to be map showing contoured water level drawdowns for the extraction wells used in the pumping test and for observation wells nearby. Not unexpectedly, Figure 2 shows that drawdowns were greatest in the extraction wells and less in the observation wells. This does not however demonstrate hydraulic containment.

In order to demonstrate hydraulic containment at the property boundary, the following are required:

- There should be an adequate number of observation wells along the property boundary, with a spacing of no more than about 40 meters between the wells. (At present there is only 1 observation well at the property boundary - but a total of 5 are needed.)
- There should be observation wells situated right beside the extraction wells (or else between them), to allow objective groundwater elevations to be measured. This is because water levels measured in a well that is being pumped are artificially low due to well losses. (At present there are no observation wells situated beside or between the extraction wells - but a total of 2 or 3 are needed.)
- At least 3 observation wells should be situated on the neighbouring property in reasonable proximity (within 75 meters) to the extraction wells. (At present there is one well).
- All wells should be surveyed in to a common datum (sea level is normally used), and all water level measurements should be expressed as elevations (normally meters above sea level, or masl).
- Water level elevations should be measured for each observation well on the same date, and as close as possible to the same time.
- A water level map can then be used to assess whether hydraulic containment has been achieved, with the groundwater level elevation for each observation well being entered on the map and contours being drawn based on interpolation of elevations between the wells.

To demonstrate hydraulic containment on a given date, the groundwater level contours should show that there is inward flow to the extraction wells from both the landfill property and the neighbouring property (ie. that the extraction wells are the “low points” in the flow system).

The contoured map shown in Figure 2 of Appendix B of the 2025 HCS Report suffers from the following deficiencies:

- Instead of showing groundwater elevations (in masl), the map shows water level drawdowns during the pumping test - this would only be a valid approach if all of the wells were situated on a perfectly flat, horizontal plain such that they were all at identical elevations.
- The map does not show the water level data which are being contoured at the well locations where the data have been measured. This makes it impossible to check to make sure that appropriate data have been used, and that they have been contoured properly.
- Data from the extraction wells have been used in preparing the map. This will lead to misleading interpolations, because the groundwater levels measured in the extraction wells are artificially low (due to well losses) - this may lead to maps which seem to show that hydraulic control has been achieved, even though that is not the case in the real world.

My above comments regarding interpolated water level contour maps are based on personal experience. At the start of my career I was responsible for operating and overseeing a hydraulic control system in Germany for almost 2 years. It was a much bigger system and the stakes were higher, as that system was being operated to protect the main production wells supplying a city of over 100,000 inhabitants. But that having been said, the basic principles are the same regardless of the size of the system.

At any rate, significant improvements to the monitoring well network and the water level contour mapping will be required in order to be able to determine with confidence whether hydraulic control is being achieved at the landfill property boundary or not. At present and on the basis of the evidence provided in the 2025 HCS Report and its Appendix B, it is not clear if hydraulic containment was achieved during the 2021 pumping test.

e) The Possibility of Deteriorating Groundwater Quality is not Considered

The pumping of the proposed HCS would result in a contaminated effluent which needs to be disposed of, with the current HCS proposal being to pre-treat the effluent and discharge it to the surface water system.

The 2025 HCS Report (and its Appendix B) provide and discuss the water quality sampling results obtained during the 57-hour pumping test carried out in 2021, and use these results as the basis for various calculations in support of the HCS proposal.

I see no sign in the 2025 HCS Report (or its Appendix B) that any consideration has been given to the possibility that conditions might significantly worsen from those observed during the pumping test (in 2021).

Instead, the authors appear to be implicitly assuming that the groundwater chemistry conditions which prevailed at the time of the pumping test can be extrapolated into the long term. I anticipate that this assumption will prove to be incorrect. In my professional opinion, a 57-hour pumping test is not long enough for sampling to ascertain what long-term groundwater quality in the HCS effluent will be.

The proposed continuous pumping of the 3 HCS wells will establish a new low point in the local groundwater flow system, and inward hydraulic gradients will induce inward flow to the system.

Increasing leachate parameter concentrations in the HCS effluent may result from continuous long-term pumping, as increasing amounts of the leachate leaking from the unlined 40% of the landfill footprint are drawn into the HCS wells.

There is also a very real possibility that the ongoing pumping of the HCS wells will create upward hydraulic gradients, that would induce the upwelling of briny water from depth. The Richmond Landfill is underlain by very saline groundwater at depth, and past history has shown that ongoing pumping of groundwater can induce upwelling of that very saline (briny) deep groundwater. The briny deep groundwater is in many respects a worse liquid than landfill leachate, but the possibility of upwelling brine is not meaningfully discussed in the HCS Report.

While water quality sampling of the leachate-impacted groundwater being pumped from the extraction wells is proposed in the 2025 HCS Report, the proposal is not sufficiently detailed - in particular it is missing provisions that describe what WMCC would do if the extraction well water quality dramatically worsens.

f) No Plan to Respond if Any Parameter Beside 1,4-Dioxane Exceeds PWQO at S8R

Water quality testing during the 2021 pumping test showed that the water being pumped from the HCS extraction wells did not meet the Provincial Water Quality Objectives (PWQO) for boron or zinc (please see **Table 1** at the end of this report). Moreover, levels of un-ionized ammonia were rising throughout the test.

In addition and as discussed above, it is possible that the leachate-impacted groundwater being pumped from the HCS extraction wells will significantly worsen - either due to more leachate being drawn to the wells, or due to upwelling of briny groundwater from deeper bedrock formations.

The GAC pre-treatment will not reduce levels of boron, zinc, ammonia, or the various salts in the briny deeper groundwater - and no other treatment is proposed in the 2025 HCS Report. That report only includes provisions for responding to increased concentrations of 1,4-dioxane in the SP3 effluent flowing off-site at site boundary surface water monitoring station S8R, but does not include any provisions to respond in any way to PWQO exceedences for any other parameter.

5) Discussion

The numerous problems with the current HCS proposal have been described in some detail in the previous sections of this report. As discussed previously, I am strongly recommending against MECP approval of the HCS proposal in its current form.

The only option for disposal of the HCS effluent that is presented in the 2025 HCS Report is to dump the GAC pre-treated contaminated effluent into the surface water system. But WMCC has other available options for dealing with the issue of off-site contamination to the east of the landfill property which the HCS is intended to address.

Firstly and most obviously, WMCC could purchase the property to the east of the landfill which is being contaminated. Alternatively WMCC could purchase the water rights for that property. Once WMCC owns the property (or the water rights for the property) it can expand the Contaminant Attenuation Zone (CAZ) to include the property and the issue is resolved.

Secondly, WMCC could make arrangements to have the HCS effluent taken to the same sewage treatment plants that treat the landfill's leachate. This is what would normally be done at any other landfill that I am familiar with. The annual volume of effluent from the proposed HCS is projected to be about 4 million Litres per year. By comparison, the volume of leachate hauled from the landfill for treatment in 2024 was about 22 million Litres. The 22 million Litres hauled from the landfill in 2024 went to sewage treatment plants for proper treatment/disposal - there is no reason that the 4 million Litres/year of HCS effluent can't be managed in the same way.

I consider the current proposal to dump the GAC pre-treated contaminated effluent into the surface water system to be an unacceptable approach for WMCC to be taking. The options outlined above demonstrate that WMCC has other viable options.

These other options may be more expensive than the proposed HCS effluent dumping - however I would argue that for a company of WMCC's size, properly dealing with contaminated liquids should simply be seen as a cost of doing business.

6) Conclusions

- 1) The 2025 HCS Report which presents WMCC's proposed Hydraulic Control System (HCS) is a problematic document, which is marred by a variety of omissions and deficiencies.**
- 2) The chief concern associated with the HCS proposal is that in essence it involves pumping leachate-impacted groundwater, providing some pre-treatment, and then discharging it to an aerated stormwater pond (SP3) from where it will be allowed to flow off-site unimpeded. There is no provision in the HCS proposal to respond in any way to PWQO exceedences at the downstream site boundary monitoring station (S8R) for any parameter except 1,4-dioxane.**
- 3) The proposed granulated activated carbon (GAC) pre-treatment technology is unproven and unlikely to be effective.**
- 4) No testing has been done to confirm that GAC pre-treatment would be effective.**
- 5) The estimates of SP3 discharge water quality presented in the 2025 HCS Report are based upon flawed calculations.**
- 6) The hydraulic testing done to date has not confirmed that pumping of the HCS extraction wells can provide hydraulic containment and cut off the flow of leachate-impacted groundwater to the neighbouring private property to the east.**
- 7) While water quality sampling of the leachate-impacted groundwater being pumped from the extraction wells is proposed in the 2025 HCS Report, the proposal is missing provisions that describe what WMCC would do if the extraction well water quality dramatically worsens.**
- 8) WMCC has several other viable options available for dealing with the off-site contamination to the east of the landfill property which the HCS proposal is intended to address.**

Recommendations

1) There are numerous problems with the 2025 HCS Report and these problems are so significant that the report and the proposal it supports should under no circumstances be approved by the MECP Approvals Branch. Any such approval should be vigorously challenged by the CCCTE and its allies.

2) WMCC has several other available and viable options for dealing with the issue of off-site contamination to the east of the landfill property which the HCS proposal is intended to address. These options include:

- WMCC could purchase the private property to the east of the landfill which is being contaminated by the landfill.
- WMCC could purchase the water rights for the private property to the east of the landfill which is being contaminated by the landfill.
- WMCC could make arrangements to have the HCS effluent taken to the same sewage treatment plants which are receiving the landfill's leachate.

WMCC should make use of one of these options in order to deal with the issue of off-site contamination on the private property to the east of the landfill.

Please feel free to contact me if there are any questions about any of the issues raised or recommendations made in this report.

Yours sincerely,



W Ruland

Wilf Ruland (P.Geo.)

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Table 1 - Comparison of Strength of Leachate vs. HCS Effluent

<u>Parameter</u>	PWQO	<u>North Chamber Leachate</u>	<u>South Chamber Leachate</u>	<u>HCS Effluent</u>
conductivity	NL	1400	1500	1750
alkalinity	NL	570	590	540
sodium	NL	100	110	250
chloride	NL	100	110	252
TDS	NL	675	690	879
phosphorous	0.03	<i>0.2</i>	<i>0.19</i>	0.03
boron	0.2	<i>0.49</i>	<i>0.53</i>	<i>1.0</i>
nickel	0.025	0.008	0.009	0.003
zinc	0.02	<i>0.048</i>	<i>0.032</i>	<i>0.03</i>
1,4-dioxane	0.02	0.013	0.014	0.008

Notes:

- all concentrations are in mg/L
 - data taken from HCS Report and Spring 2024 Semi-Annual Monitoring Report
 - concentration in bold italics (eg. ***0.038***) means PWQO exceeded
 - HCS means Hydraulic Control System
 - North Chamber means North Chamber of landfill leachate collection system
 - PWQO means Provincial Water Quality Objective
 - NL means no PWQO for this parameter
-

To: Mr. Richard Lindgren
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From: Wilf Ruland (P.Geo.)
766 Sulphur Springs Road
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Date: February 23, 2022

Re: Various Reports Pertaining to Contamination Issues at the Richmond Landfill

1) Introduction

This memorandum has been prepared in order to respond to a request from my clients (the Concerned Citizens Committee of Tyendinaga and Environs, or CCCTE). The CCCTE asked me to review various recently issued documents circulated by Waste Management of Canada Corporation (WM) or the Ministry of Environment, Conservation and Parks (MECP) pertaining to the Richmond Landfill, including the following:

- a memorandum dated May 19, 2021 from Mr. Kyle Stephenson of the MECP regarding the leaky North (Leachate) Lagoon on the Richmond Landfill property;
- a second memorandum (dated August 11, 2021 from Mr. Stephenson (MECP) regarding the purported delineation of the off-site groundwater contamination plume emanating from the Richmond Landfill property;
- the November 23, 2021 Application by WM to amend its Certificate of Approval for the Richmond Landfill;
- the January 7, 2022 Addendum to the above Application, to allow for operation of a Hydraulic Control System (HCS) near the southeast corner of the landfill property.
- a second January 7, 2022 document which is an application to allow for discharge of leachate-impacted effluent from the HCS into the landfill's stormwater management system.

In reviewing these documents and preparing my comments I am taking a somewhat different approach to previous reviews that I have done for the CCCTE. In the past the CCCTE have of necessity been very heavily involved in the review of proposals coming from WM - because so many of the landfill-related proposals coming from the Company have been ill-advised and potentially harmful to the local environment and to neighbours of the site.

It would normally be the job of the MECP to oversee and regulate site operations and make sure that the local environment and site neighbours are protected from harmful impacts, but historically the MECP has often not been up to the task.

For example the MECP permitted the expansion of the landfill and the recirculation of leachate which led to many of the current off-site contamination problems, including the contamination of several neighbouring properties and domestic wells.

It is high time for the MECP to rise to the task of properly regulating the Richmond Landfill. In preparing my comments and recommendations I have at times deliberately chosen brevity over the level of detail provided in previous reviews, because I have come to the conclusion that the CCCTE and I need to stop “doing the MECP’s job for them”.

In my review comments in this memorandum I will occasionally be referencing my last report for the CCCTE (dated October 31, 2019) - and the full text of that prior report is attached for convenience.

My review comments on the documents listed on page 1 of this memo follow below.

2) May 19, 2021 Memo from Mr. Stephenson regarding the leaky North (Leachate) Lagoon

Starting in 2017 WM was engaged in the years-long practice of dumping surplus leachate into a leaky storage lagoon (the North Lagoon). I expressed my grave concerns about this practice in Section 6 of my Oct. 31, 2019 report, and I stand by everything said in that report.

The North Lagoon was only to be used for temporary leachate storage during high-flow periods and to be emptied thereafter - instead WM misused the North Lagoon by dumping leachate into the lagoon and leaving it there until it “evaporated” (ie. leaked out).

The following volumes of leachate were dumped into the lagoon:

- 2.9 million Litres were dumped in 2017, and were said to have “evaporated”;
- 3.5 million Litres were dumped in 2018, and were said to have “evaporated”;
- a net total of 4.4 million Litres were dumped in 2019;
- at least 0.3 million Litres were dumped in January 2020, after which the MECP ordered a stop to the dumping.

Starting in May 2020 liquid (a mix of leachate plus precipitation) was removed from the North Lagoon - by year-end a total of 8.8 million Litres. The MECP’s hydrogeologist also required water balance modelling to be done to assess whether the pond was leaking. This modelling showed that there was a 40% discrepancy between the amount of liquid left in the lagoon vs. the amount that the model predicted should be in the lagoon. I have not seen the modelling results, but it is my professional opinion based on the available evidence that the missing 40% liquid leaked into the groundwater flow system.

Mr. Stephenson commented on two wells (M217 and M218) which were installed near the lagoon to check for leachate impacts, and in which leachate indicators were not detected. It is my position that millions of Litres of leachate leaked from the North Lagoon between 2017 and 2020, and the fact that it was not detected in two wells only means that the two wells were situated in the wrong locations.

The leachate from the North Lagoon is somewhere in the groundwater flow system - location unknown. But it will be contributing to the contaminant load of the groundwater flow system, which is already burdened by ongoing and uncontrolled leakage from the unlined 40% of the Richmond Landfill.

Further contributions to the contaminant load of the groundwater system came from 3 leachate spills in 2020 - one of which was intentional. In the intentional spill (on Jan 14, 2020), a truck driver was directed to dump his entire load of 13,000 Litres of leachate on the ground when there were challenges in finding a location to dispose of the leachate. In the second spill a couple of days earlier there was an overflow of the South Chamber of the leachate collection system, with an undetermined amount of leachate having spilled into a ditch near Stormwater Pond 3.

There was also a third leachate overflow of the South Chamber of the leachate collection system, starting on January 2, 2020. The amount of leachate which overflowed from the South Chamber in the two overflow spill events is unknown.

The MECP was not notified by WM of the spills until 2 days after the intentional leachate spill, and this delay was in contravention of the requirements of the Environmental Protection Act. The public were not notified by WM until over two weeks later, in contravention of the requirements of the landfill's Public Notification Plan.

These unacceptable leachate management practices appear to have finally gotten the attention of the MECP, which took some long overdue action. A Provincial Officer's Report and a related Provincial Officer's Order (dated Jan. 23, 2020) were prepared by MECP Officer David Arnott, which detailed these leachate spills and required that:

- a leachate management Action Plan (with both short-term and long-term components) be prepared;
- further dumping of leachate into the North Lagoon was to be discontinued;
- surface water and groundwater samples be taken to investigate the leachate spills, and a report be submitted to the MECP outlining the results of that investigation.

Since that time new leachate storage tanks have been and/or are being constructed at the site, WM has indicated that it is not using the North Lagoon, and the lagoon is being emptied of liquid. WM's consultants were unable to detect any impacts on groundwater or surface water quality from the various spills - but that does not mean that impacts were not occurring.

The MECP's hydrogeologist (Mr. Stephenson) is concerned that these various leachate management issues may have resulted in increasing 1,4-dioxane levels in several wells at and beyond the eastern property boundary of the landfill site. In this he is echoing my concerns brought to him 1 1/2 years earlier in Section 6 of my Oct. 31, 2019 report for the CCCTE.

3) August 11, 2021 Memo from Mr. Stephenson regarding Contaminant Plume Delineation

At this point, Mr. Stephenson considers the Richmond Landfill's offsite groundwater contamination plumes to have been reasonably delineated.

I disagree, for reasons set out in my Oct. 31, 2019 report for the CCCTE. **Therefore I recommend that the CCCTE should formally register its disagreement that the off-site plumes have been delineated.** This leaves the long-term responsibility for protection of off-site groundwater resources where it should be - with the MECP.

In years past there was good reason for the CCCTE to be actively involved on this issue as there were impacts and threats to private domestic well water supplies, however the area around the landfill has been effectively depopulated due to a variety of landfill impacts and there are no domestic wells in use south of Beechwood Road. North of Beechwood Road and east of the landfill is a private property with 2 shallow dug wells. These wells are completed in the overburden and as such are not vulnerable to impacts from the leachate plume on that property.

The proposed Contaminant Attenuation Zone (CAZ) encompasses all off-site lands on which contaminant plumes emanating from the Richmond Landfill have been detected. It remains the responsibility of the MECP to ensure that the reasonable use of groundwater on lands outside of the CAZ boundaries is secured. In order for the MECP to do so, a comprehensive and proactive long-term groundwater monitoring program is needed. This issue is discussed further in the next section below.

4) Nov. 23, 2021 Application to amend Landfill's Environmental Compliance Approval

a) Introduction

The only substantive technical document in this Application is in Attachment F, which contains the Nov. 23, 2021 proposed **Post-Closure Environmental Monitoring Plan** for the landfill (hereafter referred to as the "Proposed EMP").

I have briefly compared the current site monitoring programs (as set out in the Spring 2021 Semi-Annual Monitoring Report) with the Proposed EMP. Following that comparison, **I recommend that the Proposed EMP should be rejected by the MECP and CCCTE**, for the reasons set out below:

- The Proposed EMP fails to disclose which changes are actually being proposed to the landfill's various monitoring programs.
- The Proposed EMP if approved would reduce key aspects of the site monitoring programs with no justification or rationale.
- The Proposed EMP does not make provision for PFAS sampling or for sampling of several off-site wells near a karst feature, even though such sampling was recommended by the MECP.
- The Proposed EMP does not make provision for reporting of leachate seeps, springs, spills, overflows or other upset events at the landfill.

I will deal with each of these issues in turn below.

b) Proposed EMP Fails to Disclose Changes being Made

The proposed EMP is a lengthy document with 12 tables outlining various aspects of the proposed landfill monitoring programs. The proposed new monitoring program is presented in the document as a "fait accompli" - there is no disclosure of which parts of the proposed monitoring programs are the same, and which parts have been changed. This is unreasonable.

In effect the MECP, First Nations, local municipalities, the CCCTE, and members of the public have been left with the onerous task of trying to discern what is staying the same and what is being changed. This is inappropriate - it should be up to WM and its consultants to carefully and transparently document which changes are proposed.

It is not a good use of my time or the CCCTE's funds to be combing through the Proposed EMP trying to find changes which have been surreptitiously introduced. **A revised draft of the EMP is required which transparently documents the proposed changes.**

c) Proposed EMP Reduces Key Aspects of Site Monitoring Programs with no Justification

As indicated above it is not a good use of my time or the CCCTE's funds for me to be combing through the Proposed EMP trying to find changes introduced by WM and/or its consultants. However a simple count of monitoring wells in the program reveals that WM is proposing to sample 47 wells going forward, down from 63 currently - a 25% reduction.

As outlined above, there is no disclosure of which wells are proposed to be dropped from the sampling program. There is also no justification or rationale provided regarding the dropping of wells - the Proposed EMP simply presents a new (25% shorter) list of wells to be sampled in Table 2.

Focussing in on one key area (north of the landfill, between the landfill and Marysville Creek) the number of shallow wells to be sampled as per the Proposed EMP is one (1), down from 8 currently. No rationale is provided - the reviewer is left to guess at what might be behind such a severe reduction in sampling locations.

Maybe WM is planning to do more frequent surface water quality sampling (in lieu of shallow well sampling)? However my review of Table 7 of the Proposed EMP indicates that surface water sampling is proposed to be reduced to twice yearly from 3 times yearly at present - again with no justification or rationale provided for the reduction in surface water quality sampling.

A revised draft of the EMP is required which provides the justification/rationale for all proposed reductions in site monitoring.

d) MECP's Recommended PFAS and Well Sampling is not Included in Proposed EMP.

Mr. Stephenson (MECP hydrogeologist) has recommended several lines of monitoring which have not been included in the Proposed EMP.

i) On page 5, paragraph 3 of his Aug. 11, 2021 Memorandum, the MECP's Mr. Stephenson stated that:

".. ongoing PFAS sampling should be incorporated into the updated EMP for the site".

I support this recommendation. PFAS parameters have emerged as a very useful potential addition to the site monitoring programs, and can be used together with 1,4-dioxane and alkalinity to help determine the presence of landfill leachate.

For example, in **Section 2** of this report I discussed WM's dumping of leachate into the North Lagoon. During an investigation of the lagoon, 1,4-dioxane was not found to be present in the lagoon. Mr. Stephenson attributed this to dilution from rainfall - I believe it was more likely volatilization that led to 1,4-dioxane not being detected. In any event, PFAS were found to be present at high levels in the lagoon and were then useful in assessing whether leachate had impacted nearby monitoring wells.

A revised draft of the EMP is required which makes provision for PFAS sampling in critical areas of the site including selected monitoring wells as well as Marysville Creek, Stormwater Pond 3, the Beechwood Road ditch, and the off-site karst feature.

ii) On page 4, paragraph 3 of his Aug. 11, 2021 Memorandum, the Mr. Stephenson also stated the following in regard to his recommendation for monitoring of a complex pathway for leachate migration to a karst feature:

“Monitoring well locations that are interpreted to be influenced by the karst system such as wells at locations M194, M195, M187, and M173 should also be considered for inclusion in the updated EMP.”

Only one of the 4 wells recommended by Mr. Stephenson is included in Table 2 of the Proposed EMP. I support Mr. Stephenson’s recommendation.

WM’s prior consultants had long denied that there could be karst features in the landfill area in response to my raising that possibility. The karst feature in question receives leachate-impacted surface water under certain flow conditions, and it is not known where the water disappearing down the karst feature goes from there.

A revised draft of the EMP is required which makes provision for sampling of wells M173, M194, and M195 near the off-site karst feature.

e) No Reporting of Leachate Seeps, Spills, Overflows or Other Upset Events at the Landfill

The most recent (2020) Annual Operations Report for the site provides numerous details regarding the various leachate spills, seeps, overflows and other upset events at the Richmond Landfill in 2020. Information can be found in Sections 3.1.5, 3.11, 3.15, 3.23 of the 2020 Annual Report as well as in Appendices E, H, I, J, and K.

Such information provides important contextual background information for interpretation of environmental monitoring program results, and a summary of such events needs to also be provided in the Annual Monitoring Reports for the landfill.

A revised draft of the EMP is required which makes provision for summary reporting of leachate seeps, springs, spills, overflows or other upset events at the landfill (in Section 8 of the Annual Monitoring Reports for the site).

5) January 7, 2022 ECA Application Addendum for Hydraulic Control System (HCS)

a) Introduction

This document is an Addendum to the ECA Amendment Application discussed previously. The only substantive technical document in this Addendum is in Attachment C, which contains the January 6, 2022 report entitled **Conceptual Design for Southeast Hydraulic Control System** (hereafter referred to as the “HCS Report”).

The Hydraulic Control System (HCS) is being proposed in order to try to hydraulically contain the southeastern corner of the Richmond Landfill property. At present one of the landfill’s groundwater contamination plumes crosses the southeast property boundary and contaminates groundwater on a neighbouring property. The off-site area which is being contaminated by the landfill is not precisely defined, which is one of the reasons I don’t consider the plumes to be fully delineated.

In any event, the HCS has been developed in order to contain the plume to the landfill property in this area. Work done to date includes the following:

- 4 prospective pumping wells (M212-PW through M215-PW) were installed;
- well yields were established through testing;
- several pumping tests were run (the longest for 57 hours) in order to assess hydraulic parameters and to establish whether there was a hydraulic connection to nearby site monitoring wells;
- groundwater modelling was done to establish which constellation of pumping wells and pumping rates might work best;
- groundwater quality testing was done on samples taken from the wells.

Based on this work it is proposed that three of the wells together be used as a hydraulic control system (HCS), with a combined pumping rate of 7.6 Litres/minute. It is assumed that the HCS will be able to permanently cut off the flow of contaminants to the neighbouring property - but this is by no means a sure thing.

The contaminated HCS effluent is proposed to be fed into a forcemain which would discharge the effluent to Stormwater Pond 3 on the south side of the landfill. In turn, Stormwater Pond 3 discharges into the off-site environment via the Beechwood Road ditch. This is a very questionable proposal.

My comments on a prior 2018 report regarding the HCS were provided in Section 5c) of my (attached) Memorandum dated October 31, 2019. The chief concerns which I raised at that time have not been addressed, and are reprinted here:

“It can be anticipated that any purge well system would see progressively evolving and deteriorating groundwater quality conditions, as the pumping of a purge well system would establish a new low point in the local groundwater flow system. Increasing leachate impacts, the upwelling of briny water from depth, and safe disposal of the leachate/brine impacted groundwater all need to be accounted for.”

I will deal with these issues in turn below.

b) Deteriorating Groundwater Quality in HCS Effluent

The pumping of the proposed HCS will result in a contaminated effluent which needs to be disposed of. The HCS Report reported on the sampling results obtained during one of the pumping tests, and projected that this effluent water quality was suitable for discharge to Stormwater Pond 3, and from there into the off-site environment via the Beechwood Road ditch.

I see no sign in the HCS Report (or the attached HCS Evaluation Memorandum) that any consideration has been given to the possibility that conditions might change from those observed during the pumping tests (in late August and early September 2021).

Instead, the authors appear to be assuming that one particular pumping rate for the HCS (10,900 Litres/day) and the groundwater chemistry conditions which prevailed at the time of the pumping test can be extrapolated into the long term. I anticipate that these assumptions will prove to be incorrect.

In my opinion, a 57-hour pumping test is not long enough to ascertain what long term groundwater quality in the HCS effluent will be. The proposed continuous pumping of the 3 HCS wells will establish a new low point in the local groundwater flow system, and inward hydraulic gradients will induce inward flow to the system.

Increasing leachate parameter concentrations in the HCS effluent may result from continuous long-term pumping, as increasing amounts of the leachate leaking from the unlined 40% of the landfill footprint are drawn into the HCS wells.

There is also a very real possibility that the ongoing pumping of the HCS wells will create upward hydraulic gradients, that would induce the upwelling of briny water from depth. The Richmond Landfill is underlain by very saline groundwater at depth, and past history has shown that ongoing pumping of groundwater can induce upwelling of that very saline (briny) deep groundwater. The briny deep groundwater is in many respects a worse liquid than landfill leachate, but the possibility of upwelling brine is not discussed in the HCS Report.

c) Is it Appropriate to Dump Contaminated HCS Effluent into the Surface Water System?

From my perspective the main concern associated with the HCS proposal is the fact that WM is proposing to dump the contaminated HCS effluent into the landfill stormwater system (Stormwater Pond No. 3), from where it will flow unimpeded into the off-site downstream natural environment.

This proposal is unique in my experience - normally leachate-contaminated groundwater being pumped for containment purposes would be diverted to a landfill's leachate collection system, from where it would be taken off-site for proper treatment and disposal.

The HCS report does not present a selection of options for dealing with the HCS effluent - it simply presents the dumping of effluent into Stormwater Pond No. 3 as the only option. As discussed below in **Section 5d** of this report, WM has other options. The HCS does not explain why this option (which brings with it the greatest potential for negative effects on the natural environment) was selected.

I have prepared a table (**Table 1**) on the following page, which provides a comparison of leachate strength from the North Chamber to the HCS effluent sampling results from the HCS Report.

The data presented in **Table 1** were taken from the HCS Report (Table 5) and the Spring 2021 Semi-Annual Monitoring Report (Table 6).

Table 1 shows that the raw landfill leachate is certainly stronger, perhaps by an average overall factor of about 3 for the parameters listed. But the HCS effluent did not meet the Provincial Water Quality Objectives for 3 parameters (boron, zinc and toluene) - with toluene detected in the HCS effluent but not the raw leachate!

In effect the WM proposal to dump 10,900 Litres/day of HCS effluent into the surface water system is the rough equivalent (in terms of mass loading) of dumping 1000s of Litres/day (365 days per year) of North Chamber leachate into the surface water system. The latter would never be approved, and the former shouldn't be either.

It is extremely disappointing that WM is bringing this objectionable proposal (to dump HCS effluent into the surface water system) forward at this time. There are indications that the proposal has the tacit support of local MECP staff - who should really know better.

Under no circumstances should the MECP Approvals Branch approve the proposed dumping of HCS effluent into Stormwater Pond No. 3. Any such approval should be vigorously challenged by the CCCTE and its allies.

Table 1 - Comparison of Strength of Leachate vs. HCS Effluent

<u>Parameter</u>	<u>PWQO</u>	<u>North Chamber (NC) Leachate</u>	<u>HCS Effluent</u>	<u>Difference in Strength (NC vs HCS)</u>
alkalinity	NL	1200	540	2.2 times stronger
sodium	NL	290	250	1.2 times stronger
chloride	NL	320	252	1.3 times stronger
TDS	NL	1580	879	1.8 times stronger
phosphorous	0.03	<i>0.42</i>	0.03	14 times stronger
boron	0.2	<i>1.3</i>	<i>1.0</i>	1.3 times stronger
nickel	0.025	<i>0.027</i>	0.003	9 times stronger
zinc	0.02	<i>0.06</i>	<i>0.03</i>	2 times stronger
1,4-dioxane	0.02	<i>0.038</i>	0.008	4.5 times stronger
toluene	0.0008	<i><0.004</i>	<i>0.0013</i>	HCS is stronger!

Notes:

- all concentrations are in mg/L
 - data taken from HCS Report and Spring 2021 Semi-Annual Monitoring Report
 - concentration in bold italics (eg. ***0.038***) means PWQO exceeded
 - HCS means Hydraulic Control System
 - NC means North Chamber of landfill leachate collection system
 - PWQO means Provincial Water Quality Objective
 - NL means no PWQO for this parameter
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d) Other Considerations

i) Other Options

The only option for disposal of the HCS effluent that is presented in the HCS Report is to dump the contaminated effluent into the surface water system. But WM has other options for dealing with the issue of off-site contamination to the east of the landfill property which the HCS is intended to address.

Firstly and most obviously, WM could purchase the property to the east of the landfill which is being contaminated. Alternatively WM could purchase the water rights for that property. Once WM owns the property (or the water rights for the property) it can expand the Contaminant Attenuation Zone (CAZ) to include the property and the issue is resolved.

Secondly, WM could make arrangements to have the HCS effluent taken to the same sewage treatment plants which are receiving the landfill's leachate. This is what would normally be done at any other landfill that I am familiar with.

As I have stated previously, I consider the dumping of HCS effluent into the surface water system to be an unacceptable approach for WM to be taking. The two options presented above demonstrate that WM has other options.

These other options may be more expensive than the proposed HCS effluent dumping - however I would argue that for a company of WM's size, properly dealing with contaminated liquids should simply be seen as a cost of doing business.

ii) Annual Volume of HCS Effluent which is Recommended to be Properly Treated.

The annual volume of effluent from the proposed HCS is projected to be about 4 million Litres per year. By comparison, the volume of leachate generated at the landfill in 2020 was about 21 million Litres.

The 21 million Litres of leachate generated by the landfill in 2020 went to sewage treatment plants for proper treatment and disposal - there is no reason that the projected 4 million Litres/year of HCS effluent can't be treated in the same way.

iii) No Assurance the Hydraulic Control System Will Work as Intended

The field investigations, calculations and modelling carried out in support of the HCS have demonstrated the following:

- the pumping wells are drawing leachate-contaminated groundwater from one of the landfill's contaminant plumes;
- taking water from the pumping wells leads to observable water level drops in some nearby monitoring wells.

What has not yet been demonstrated is that the operation of the HCS will accomplish the goal of cutting off the flow of contaminated groundwater to the neighbouring property.

Interestingly, the HCS “Performance Monitoring” proposed in Section 5 of the HCS Report does not include any proposal to test groundwater quality in the critical impacted wells on the east property boundary and on the adjacent private property.

As discussed previously, I am strongly recommending against MECP approval of the HCS proposal in its current form. **If WM intends to pursue this proposal, then any revised application should address this issue as well as the other issues and recommendations made in this report.**

6) Jan. 7, 2022 Sewage ECA Amendment Application to Allow Dumping of HCS Effluent

This document is an ECA Amendment Application, which if approved would allow WM to dump about 10,900 Litres/day of contaminated HCS effluent into Stormwater Pond No. 3 at the Richmond Landfill.

The only substantive technical document in this Application is in Attachment C, which contains the January 6, 2022 HCS Report which I have discussed previously in **Section 5** of this memorandum.

Attachment D of this ECA Amendment Application includes correspondence between WM and the MECP which suggests that local MECP staff are at least tacitly supporting WM’s proposal - as stated previously, I am disappointed in the MECP staff for not insisting on a proper treatment proposal.

7) Discussion

The Richmond Landfill has a long and checkered history. Unnecessary environmental impacts caused by poor leachate management practices are a recurring theme at this site, as are ill-advised new proposals for leachate management.

It is with a certain sense of déjà vu that I have undertaken the current review of documents pertaining to this site - which again document incidents of unacceptable leachate management in the form of spills and overflows, and which feature a new, objectionable proposal to dump contaminated groundwater pumped from the HCS into the surface water system.

The CCCTE have been in existence for a long time, and over their history have done the public and the environment a very good service by shining a spotlight on what is happening at the landfill and by vigorously challenging unpalatable new proposals.

I regret to have to inform the group that another ill-advised proposal has been put forward and needs to be challenged. The proposal to dump contaminated groundwater pumped from the HCS into the surface water system should never have made it past the initial reviews by local MECP staff. Instead of telling WM to come back with a more reasonable option, local MECP staff seem to be tacitly supporting the ECA Amendment applications which I have reviewed.

8) Conclusions

1) The reports I reviewed indicate that there were unacceptable leachate management practices at the Richmond Landfill in January 2020, which culminated in the issuance of a MECP Provincial Officer's Order against WM. Detailed discussion of this matter is provided in **Section 2** of this report.

2) The MECP have indicated that they consider the off-site groundwater contamination plumes from the Richmond Landfill to be delineated. I disagree with the MECP on this issue. My discussion of this matter is provided in **Section 3** of this report.

3) **Section 4** of my report discusses the proposed Post-Closure Environmental Monitoring Plan, which is inadequate and requires further work because:

- it fails to disclose which changes are actually being proposed to the landfill's various monitoring programs;
- if approved it would reduce key aspects of the site monitoring programs with no justification or rationale;
- it does not make provision for PFAS sampling or the sampling of wells near a karst feature, even though such sampling has been recommended by the MECP;
- it does not make provision for reporting (in the Annual Monitoring Reports) of leachate seeps, springs, spills, overflows or other upset events at the landfill
- it does not make provision for the monitoring of the proposed Hydraulic Control System (HCS).

4) My concerns about the WM proposal to dump contaminated groundwater pumped from the HCS into the surface water system (via Stormwater Pond No. 3) are outlined in **Sections 5 and 6** of this report.

In its current form I consider the HCS proposal to be ill-advised and objectionable.

9) Recommendations

Recommendation 1

The CCCTE should formally inform the MECP of its disagreement that the Richmond Landfill's off-site groundwater contamination plumes have been delineated.

Recommendation 2

a) The Proposed Environmental Monitoring Plan (EMP) should be rejected by the MECP and CCCTE.

b) A revised draft of the EMP is required, which:

- transparently documents the proposed changes to the site monitoring plans;**
- provides the justification/rationale for all proposed reductions in site monitoring;**
- makes provision for PFAS sampling in critical areas of the site including selected monitoring wells as well as Marysville Creek, Stormwater Pond No. 3, the Beechwood Road ditch, and the off-site karst feature;**
- makes provision for sampling of wells M173, M194, and M195 near the off-site karst feature;**
- makes provision for summary reporting of leachate seeps, springs, spills, overflows or other upset events at the landfill (in Section 8 of the Annual Monitoring Reports);**
- makes provision for the monitoring of the proposed Hydraulic Control System (HCS), in the event that WM chooses to pursue that proposal.**

Recommendation 3

a) Under no circumstances should the MECP Approvals Branch approve the proposed dumping of contaminated HCS effluent into Stormwater Pond No. 3 at the Richmond Landfill Site.

b) Any such approval should be vigorously challenged by the CCCTE and its allies.

c) Any revised HCS application should address the issues raised in this report.

Please feel free to contact me if there are any questions about any of the issues raised or recommendations made in this memorandum.

Yours sincerely,



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