The Corporation of the City of Kawartha Lakes

AGENDA

FENELON LANDFILL PUBLIC REVIEW COMMITTEE

#27

Friday, May 12, 2017

9:00 A.M.

Fenelon Falls Community Centre

27 Veterans Way, Fenelon Falls, Ontario

MEMBERS:

Councillor Stephen Strangway
Robert Coleman
Marlene Edwards
Julia Taylor
Mike Wilson
Robert Wright

Accessible formats and communication supports are available upon request.

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The Corporation of the City of Kawartha Lakes

MINUTES

FENELON LANDFILL PUBLIC REVIEW COMMITTEE

#26
Friday, March 17, 2017
9:00 A.M.

MEMBERS:

Councillor Stephen Strangway
Robert Coleman
Marlene Edwards
Julia Taylor
Mike Wilson
Robert Wright

Accessible formats and communication supports are available upon request.

1. CALL TO ORDER

2. ADOPTION OF AGENDA

MOVED BY: J. Taylor

SECONDED BY: M. Edwards

RESOLVED THAT the agenda be adopted with the addition 11.3 Adopt A Road Program and 11.4 Leaf and Yard Waste Fees.

CARRIED

3. DISCLOSURES OF PECUNIARY INTEREST

There were no declarations of pecuniary interest noted.

4. APPROVAL OF THE MINUTES OF THE PREVIOUS MEETING

MOVED BY: M. Edwards

SECONDED BY: J. Taylor

RESOLVED THAT the minutes from the Thursday January 20, 2017 meeting be approved as written.

CARRIED

5. LANDFILL COMPLAINTS

No complaints.

Note that one (1) load refusal was reported to MOECC on March 15, 2017 for soil brought to the site for disposal by Royel Paving. Attendants advised that the contaminated soil procedures needed to be followed, testing completed and the soil would have to be accepted at the Lindsay Ops landfill. Staff spoke with Royel after the occurrence and determined Royel was cleaning up their local yard. The soil in their load was inadvertently added. Material was brought back to their site and sorted for disposal.

6. LEACHATE OUTBREAKS

No leachate outbreaks.

7. MOECC CORRESPONDENCE

Staff completed a site inspection with MOECC for the Household Hazardous Waste program at the Fenelon landfill on October 24, 2016. The attached inspection report is a summary of this inspection and shows compliance with all

aspects of the HHW program. There is no outstanding action items associated with this inspection report.

8. OPERATING BUDGET UPDATE

8.1 Fenelon Final Cover

Four Brothers Contracting is scheduled to complete the final cover work in May/ June 2017, when the ground is dry and they can access the site. At this time a portion of the top of the landfill will also be seeded with the pollinator see mix.

8.2 Fenelon Reuse Centre

An internal SOP has been started to review the current operations of the Fenelon Reuse Centre. Until this is complete and staff training provided the Reuse Centre operations remains status quo.

9. CAPITAL PROJECT UPDATE

9.1 Fenelon Redesign

It has been confirmed with MOECC that an amendment to the current ECA is required to undertake the proposed site redesign. UEM is completing their review of the proposed redesign from Stantec. When UEM is complete and amendment application needs to be prepared and submitted. In the interim, a new traffic flow plan has been prepared to manage the new tipping fees that will be effective March 31, 2017.

10. WASTE STRATEGY PROGRAMS

10.1 Clear Bag Program

The results for the clear bags program throughout quarter 1 (Jan to March) consistently show 15% more recycling is being collected and 20% less garbage being landfilled. Will be undertaking additional advertising in April and May targeting cottagers. Committee suggested utilizing road signs and cottage associations as methods of communication.

10.2 Construction and Demolition Recycling Investigation

Work has been awarded to ReClay Stewardedge to complete this investigation by the end of June. Currently a background review has been completed, municipal & industry consultation and currently undertaking landfill waste audits. Next steps are to input data into a model, draft report and make recommendations. Draft recommendations will be reviewed by committee in May.

Also, Reclay is undertaking a second investigation for potential curbside collection changes, with public consultation and recommendations due in June. The draft recommendations will also be circulated to the committee for comment.

10.3 Backyard Composter and Digester Program

Staff have ordered new backyard digesters to sell at the 2017 recycling event days. Also, staff are working on information sheets that will be available to the public late spring.

MOVED BY: B. Coleman

SECONDED BY: J. Taylor

RESOLVED THAT the committee receive staff updates provided for items 10.1, 10.2 and 10.3.

CARRIED

11. OTHER ITEMS

11.1 Interactive Reuse Map

J. Taylor has completed a reuse map and has currently uploaded onto her personal blog to be accessible to the public. The City has also reviewed this map and will work with Corporate Communication to include it on the City website.

11.2 Recycling Social Media Campaign

This campaign is a project being taken on by J. Taylor. The intent is to post ‘does’ and ‘don'ts’ of recycling on social media that has been vetted by the committee and staff to ensure consistent messaging.

11.3 Adopt A Road Program

Committee requested clarification from staff if a new letter is required for every collection completed by the same individual. Could one letter be issued for a period of time? Staff to provide follow up at the next meeting.

11.4 Leaf & Yard Waste Fees

Committee has concerns of illegal dumping with new tipping fees for leaf and yard waste that are to be effective March 31, 2017. Staff noted that the $5.00 minimum fee would include the cost of bringing 10 full paper bags of material for composting. Committee asked if this issue has been discussed at the Lindsay Ops PRC, staff confirmed that it has.

12. PUBLIC COMMENT PERIOD

No comments.

13. NEXT MEETING

Friday May 12, 2017, Fenelon Falls Community Centre, commencing at 9:00 a.m.

14. ADJOURNMENT

MOVE BY: M. Edwards

SECONDED BY: J. Taylor

RESOLVED THAT the meeting be adjourned at 10:41 a.m.

CARRIED

Ministry of the Environment and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D U M

October 17, 2016

TO: D. Fisher
Senior Environmental Officer
Peterborough District Office, Eastern Region

FROM: B. Gilbert
Surface Water Specialist
Technical Support Section, Eastern Region

RE: Fenelon Landfill Site Annual Status Report January 1 to December 31, 2015, dated May 2016

Fenelon Landfill Site, 341 Mark Road
Lot 16, Concession 4
Former Township of Fenelon, City of Kawartha Lakes
Environmental Compliance Approval No. A321206

As requested, I have reviewed the 2015 annual status report prepared by Golder Associates Limited (GAL) for the City of Kawartha Lake (CKL), dated May 2016. The report was prepared by F.S. Barone, Ph.D., P.Eng.

I offer the following comments for your consideration with respect to surface water impact concerns.

Background

The Fenelon Landfill Site (WDS) has been in operation since 1972 and is operated by the City of Kawartha Lakes Environmental Compliance Approval (ECA) A321206, dated January 20, 2016. The ECA allows for the use and operation of a 21.3 hectare site and a 102.6 ha contaminant attenuation zone south and east of the site. The site is approved for the disposal of solid non-hazardous, domestic, commercial, and industrial wastes and is also licensed as a household hazardous waste (HHW) depot. The site also acts as: a collection and transfer facility for waste electronics, a reuse centre, and a leaf and yard waste composting facility.

Phase 1 of the site commenced in a former sand and gravel pit and extended to the west into the adjacent Martins Creek Provincially Significant Wetland (PSW) which surrounds the site, the exception being the northeast boundary. The majority of the Phase 1 (6.1 ha) operation is in the wetland. The site is operated as a natural attenuation facility. The amended ECA allows filling in Phase 2 (1.9 ha) of the site and requires final cover on Phase 1 up to the Phase 1-2 boundary by December 31, 2016. The remaining capacity in Phase 1 is reported to be 0.9 years as of December 2015.

The ECA includes an updated Design and Operations (D&O) Report which describes updates to the surface water and groundwater monitoring programs and trigger mechanisms.

- Samples were not collected at SW12, SW13, SW15, and SW16 in summer and fall due to dry conditions. The 30 m off set locations at WP 4, SW13 and SW15 were also dry.
- The conductivity survey was carried out in May. Surface water samples at 30 m distance from the toe at transect lines WP-4, SW-13, SW15 were collected in April.
- The Martin Creek Wetland between County Road 21 and Mark Road is a major contributor to the flow measured in Martin Creek at Mark Road in April 2015.
- It is not possible to establish a background station further downstream of SW2. It is recommended that both SW2 and SW16 be used as background stations for Martin Creek.
- For background stations SW2 and SW16 in Martin Creek, PWQO exceedances occurred for phosphorus and zinc, the latter of which was on an unfiltered sample. Phosphorous exceedances at background stations are likely due to biodegradation in the wetland.
- For background station SW14 in the PSW adjacent to the waste mound, PWQO were exceeded for iron, total phosphorous (TP), and zinc and may be related to dissolution of metals from soils and vegetation due to natural decomposition associated with acidic conditions in the wetland.
- Elevated concentrations of key leachate indicator parameters occur naturally within the creek and wetland area.
- SW12, SW13, SW15 located close to the toe showed concentrations greater than PWQO for indicator parameters iron, TP, aluminium, copper and zinc. Iron, TP and zinc were observed to exceed PWQO at SW14, although at lower concentrations indicative of natural sources. The PWQO exceedances at SW12, SW13, SW15 are indicative of landfill impact.
- Prior to final cover completion, impacts to the wetland along the periphery of Phase 1 are expected, since it was designed as a natural attenuation facility and most of Phase 1 was constructed in the wetland. Future Phase 2 area is situated on a sand esker and is not expected to have a significant effect on wetland water quality.
- The results of the conductivity transect monitoring indicate a decreasing trend in conductivity with increasing distance from the toe. With some extrapolation, surface water impacts extend about 30 m out from the toe into the wetland.
- Results of the key leachate indicator concentrations in Martin Creek for 2015 are summarized in Table 13 and Figures 15a-15 and indicate consistent slightly higher iron and DOC downstream at SW3 and SW4 in comparison to SW2 and SW16, even for filtered samples. This may be due to inputs from the natural wetland between County Road 21 and SW3. Data in Table 13 indicate no significant water quality impact on Martin Creek attributable to the landfill. This is supported by the absence of any significant impacts on groundwater at the new wetland monitoring well WP6-13 installed immediately adjacent to Martin Creek at the Mark Road culvert.
- Slightly elevated concentrations relative to PWQO at the Martin Creek downstream stations SW3 and SW4 were obtained for iron and TP. Elevated concentrations of iron and TP at the downstream surface water stations are likely related to inputs from the natural wetland between County Road 21 and Mark Road.
- Free cyanide was less than the detection limit at all Martin Creek stations.
- Concentrations of PCBs at SW3 were below the method detection limit.
- VOC were not detected at concentrations exceeding the method detection limits at the Martin Creek stations in 2015.
- The surface water trigger locations are at 30 m from the toe along the WP4, SW13, and SW15 transect lines. These transect lines indicated the greatest impact during the May 2014 survey. A 30 m distance to the trigger point takes into account the landfill was originally licensed as a natural attenuation facility with the wetland representing a key component of the natural attenuation system. The 30 m provides a reasonable buffer

zone for this purpose. With completion of the final cover construction on Phase 1, impacts to the wetland in close proximity to the landfill will be minimized.

- The trigger concentrations are based on PWQO for boron and un-ionized ammonia, and CWQG for chloride. GAL reports no exceedances of the Martin Creek Wetland trigger concentrations.
- The trigger is two consecutive surface water monitoring events exceeding any of the trigger concentrations for one or more of the trigger parameters, not necessarily the same parameter each time. This is followed by re-sampling within one month after the second exceedance result is received. If the exceedance is confirmed by re-sampling, an assessment will be carried out to determine the cause of impact within one year following receipt of the second consecutive exceedance. If the landfill is the cause, a contingency plan will be developed and implemented. Potential contingencies include low permeability membrane and/or discontinuation of landfilling.

GAL recommends the following with respect to surface water concerns:

- Monitoring in 2016 should continue to closely follow the ground and surface water monitoring program outlined in the Updated Design and Operations Report. In some cases, such as the surface water monitoring along the wetland transect line, more monitoring was carried out in 2015 than required by the ECA.
- Construct Phase 2 of the landfill in 2016 in accordance with the updated Design and Operations Plan.
- Going forward it is recommended that both SW2 and SW16 be used as the Martin Creek background stations.

Reviewer's Comments

Martin Creek

- I agree that there were no exceedances of the Martin Creek Wetland trigger concentrations in 2015. I also agree that there were no significant leachate impacts on Martin Creek in 2015. Concentrations of toluene in Martin's Creek were detected only in the filtered water samples from SW2 and SW3 and were at levels similar to PWQO (0.8 and 0.9 µg/L), respectively. Adverse impact is not anticipated at this time; however, explanation is needed as to why only the filtered samples detected toluene.
- Only four samples have been collected at SW16. Preliminary data shows higher chloride, total dissolved solids, iron, and alkalinity than reference station SW2. Since these are leachate indicators additional data is needed from SW16 to determine if these indicators are confounded by other factors. Flow contribution from SW16 should also be considered in terms of potential influence on water quality conditions at downstream locations.
- If available, I recommend that flow statistics (mean annual flow, average daily flow, mean monthly flows, etc.) are reported for Martin Creek at Mark Road and that these flow statistics are compared to spot flow measurements from SW2, SW3, SW4, and SW16 and to the leachate generation rate.
- Table 12 summarizes the range of background water quality at SW14, SW16 and SW12. I recommend that descriptive summary statistics (e.g. means, medians and 75th percentiles) are included.
- Confirmation is needed regarding the sampling conducted at stations SW14, SW12, SW13, and SW15, relative to the distance of the sampling point relative to the toe of Phase 1 waste. I recommend that the data provided in Appendix I indicate the distance that samples were collected from the toe of the waste for stations SW12, SW14, SW14,

SW15. This is indicated for some of the data, but not all. This is so the routine sampling data (fixed location/distance) can be readily distinguished from the sampling conducted as part of the conductivity monitoring (distance based and will vary from year to year).

Martin Creek Wetland east of Mark Road

- The groundwater trigger concentration of 0.8 µg/L for toluene was exceeded on one occasion at WP6-13 (3.9 µg/L) adjacent to Martin Creek and is not shown on Figure H.2.4.
- Trigger Mechanism - Page 17 of the report incorrectly refers to 0.8 µg/L as a CWQG for tolune; 0.8 µg/L is the PWQO. The CWQG is 2 µg/L.
- Appendix F compares groundwater chemistry to the Ontario Drinking Water Quality Standards. For the sentry groundwater monitoring wells included in the Martin Creek protection and Martin Creek Wetland protection groundwater trigger mechanisms, comparison should also be made to PWQO and CWQG, where PWQO do not exist (e.g. chloride).

Martin Creek Wetland adjacent to Phase 1

- In 2015, I agree that leachate impacts are evident around the toe of the site. Shallow groundwater at wetland point WP4 shows the highest concentrations of leachate indicators. Iron, aluminium, chromium, cobalt, vanadium, zinc, TP, and un-ionized ammonia exceed PWQO and were elevated above background (WP1). Potassium, DOC, alkalinity, total dissolved solids, and boron were elevated above background.
- Surface water in the wetland at 25 m and 30 m from the toe along transect WP4 showed elevated concentrations in terms of chloride, iron, potassium, total ammonia, total alkalinity, dissolved solids, and boron, relative to background wetland conditions at SW14. Concentrations of chloride and boron were less than the long-term CWQG values of 120 mg/L and 1.5 mgL, respectively. However, PWQO exceedances occurred for: aluminium (0.19, 3.7 mg/L, exceeding 0.075 mg/L), cadmium (0.00027, 0.00059 mg/L, exceeding 0.0009 mg/L), cobalt (0.006, 0.0025 mg/L, exceeding 0.0002 mg/L), copper (0.0087 mg/L, 0.0068 mg/L) lead (0.021, exceeding 0.005 mg/L), and Zn (0.412 and 0.03 mg/L, exceeding 0.02 µg/L). I recommend that the annual report characterize leachate well concentrations for these metals and compare this to background groundwater and surface water concentrations to determine if the PWQO exceedances in surface water around the toe of the waste are leachate related, landfill related, or naturally occurring.
- Based on data in Appendix I, I am not able to confirm un-ionized ammonia concentrations in surface water at WP2, WP3, WP4, and WP5 due to lack of field pH and temperature. Also, I am unable to confirm the distance at which some of the surface water samples at SW15, SW14, SW13, and SW12 occurred relative to the toe of the waste. Clarification should be provided.
- In 2015, iron concentrations were greater than background (<1 mg/L) and greater than PWQO at SW12 (15 m, 6.64 mg/L), SW13 (21.7 mg/L), and WP4 (25 m, 14.7 mg/L). I recommend future reports determine if high iron concentrations around the toe of the waste coincide with elevations in other leachate indicators.
- In 2015, un-ionized ammonia concentrations did not exceed the PWQO at SW12, SW13, SW14, or SW15. I recommend field pH and temperature are reported in Appendix I for surface water near WP2, WP3, WP4, and WP5.

- Zinc concentrations at well points WP1-WP5 are extremely high (< 1 mg/L to 193 mg/L) and show potential for impairment to surface water. Well point WP6 has very low zinc concentrations. Clarification is needed regarding whether there was a different pipe material used at WP6.
- Toluene is identified as a leachate indicator. I recommend toluene is analyzed at surface water stations in proximity to Phase 1 of the waste (SW12, SW13, SW14, and SW15).
- I am not aware of any additional monitoring that was completed in respect of the monitoring along the wetland transect lines than what is required by the ECA/D&O Report. With regard to the spring conductivity monitoring conducted along six transects, it is my understanding that locations with the highest conductivity readings along each radial transect and with the lowest conductivity readings along each transect would have samples collected and submitted for analysis for the same suite of surface water parameters that are currently monitored. Based on Figure 14 and Appendix I, it appears that samples were not collected at the highest conductivity reading along each transect. Clarification is needed.
- Figure 14 shows that conductivity measurements were not collected at 5 m increments from the toe of the waste along transect lines. Clarification is needed.
- I recommend extending WP4 and SW15 conductivity transects beyond 30 m up to a distance to where background conductivity is achieved in order to delineate the extent of the leachate plume in surface water within the PSW.
- In 2015, conductivity monitoring occurred 1 month after the surface and groundwater sampling programs. The spring-time conductivity monitoring survey could be better harmonized with the ground and surface water sampling.

<u>General</u>

- I recommend the following additions to future AMRs to improve the value of the reports:
  - A discussion of past transect conductivity monitoring events in the context of whether the leachate plume is consistent in location/extent within surface waters in the PSW.
  - Evaluation whether the surface water trigger locations around the toe of the waste continue to be appropriate based on the conductivity evaluations along the six transects.
  - For Martin's Creek: a table comparing upstream/reference site surface water quality data (SW2, SW16) to downstream/exposure stations (SW3, SW4, SW11, WP6-13) and comparison to PWQO, or CWQG where no PWQO exists.
  - For Martin Creek wetland around toe of waste: a table comparing shallow groundwater quality around the toe of the waste to surface water quality in the wetland, relevant PWQO or CWQG, and background surface water quality represented by SW14 for the monitoring year.

- I bring to your attention that there is a missing Appendix in the November 2015 D&O Plan. It is page 263 of page 265 in the pdf document. It is referred to as Appendix A (Martin Creek Wetland Conductivity Monitoring Program), found within Appendix H (Ground and Surface Water Monitoring Program and Trigger Mechanisms) of the D&O Plan. I believe the report exists and was authored by Heather Dzurko at the City of Kawartha Lakes.

- I bring to your attention that condition 8(10) of the ECA only speaks to the surface water trigger mechanism for the wetland adjacent to the toe of the WDS. The details (parameters, concentrations) of the remaining portions of ground and surface water trigger mechanism are contained in the annual report (sections 3.6 and 4.4) and in Appendix H of the Updated D&O Plan (Nov 2015).

- I note that the report indicates that the final cover over Phase 1 is anticipated to reduce the impact around the toe of the WDS. However, the report also indicates that final cover will not be in place until 2017. I bring to your attention that this may extend the time frame of potential for impact to surface waters in the wetland in the immediate vicinity of the Phase 1 waste mound. I note condition 7(12) (a) and (b) of the ECA which, states December 31, 2016 for final cover placement over Phase 1, up to the Phase 1-2 boundary.

- In correspondence dated January 22, 2015, GAL estimated that surface water stations under the influence of surface runoff would be expected to improve within 1 year of final cover placement over Phase 1, and stations more influenced by upwelling of leachate impacted groundwater are expected to show gradual improvement over several years. I recommend future annual monitoring reports identify stations under the influence of surface runoff vs. groundwater upwelling and evaluate whether improvement has occurred in water quality.

- The report implies that there is a 30 m distance surrounding the toe of Phase 1 of the site which allows for natural attenuation within the wetland. It should be clarified that the natural attenuation and contaminant attenuation zone (CAZ) concept applies to groundwater beneath the wetland only. Any surface water within the wetland is not part of a CAZ. PWQO apply to surface waters on-and off-site, regardless of CAZ.

- The detection limits for total PCB and cadmium need to be less than their respective PWQO of 0.001 µg/L, and 0.0002 mg/L.

- Vinyl chloride was not included in the VOC scan and should be included in future.

Please do not hesitate to contact me if you have any questions.

B. Gilbert, M.Sc.
BG/dv

ec: G. Faaren, Water Resources Unit Supervisor
P. Taylor, Technical Support Section Manager
C. Redmond, Peterborough District Supervisor

c: R. Holland, Groundwater Unit
File SW KL MA 03 06 Fenelon Landfill Site
File SW 11 02 07 02 MA, Martin Creek, Trent River Basin
BG/IDS # 3046-AAWKBL

April 07, 2017 Project No. 1545794

Angela Porteous, BESc.
Regulatory Compliance Officer
Waste Management Department
City of Kawartha Lakes
12 Peel Street
Lindsay, Ontario K9V 5R8

RESPONSE TO MOECC COMMENTS ON 2015 ANNUAL STATUS REPORT
ENVIRONMENTAL COMPLIANCE APPROVAL NO. A321206

Dear Angela;

As requested, this letter provides our responses to review comments received from the Ministry of Environment and Climate Change (MOECC) on surface water aspects of the 2015 Annual Status Report for the Fenelon Landfill Site. The MOECC comments were provided in a Technical Memorandum from Beth Gilbert (Surface Water Specialist) dated October 17, 2016.

MARTIN CREEK

Review Comment: *I agree that there were no exceedances of the Martin Creek Wetland trigger concentrations in 2015. I also agree that there were no significant leachate impacts on Martin Creek in 2015. Concentrations of toluene in Martin's Creek were detected only in the filtered water samples from SW2 and SW3 and were at levels similar to PWQO (0.8 and 0.9 µg/L), respectively. Adverse impact is not anticipated at this time; however, explanation is needed as to why only the filtered samples detected toluene.*

Response: As shown in Table 13, the only filtered sample that gave a toluene detection was that collected from Station SW-3 in July (0.0008 mg/L). All of the SW-2 filtered samples gave non-detectable toluene concentrations. The toluene detection at SW-2 was on the non-filtered sample collected in October (0.0009 mg/L). Therefore, it is not just filtered samples that gave detectable toluene concentrations. In any event, the toluene concentrations are close to the detection limit of 0.0005 mg/L and it is possible that slight losses during sampling may be the reason why toluene was detected in a filtered sample and not the unfiltered sample or vice versa. We do not have a definitive answer for this.

Review Comment: *Only four samples have been collected at SW16. Preliminary data shows higher chloride, total dissolved solids, iron, and alkalinity than reference station SW2. Since these are leachate indicators additional data is needed from SW16 to determine if these indicators are confounded by other factors. Flow contribution from SW16 should also be considered in terms of potential influence on water quality conditions at downstream locations.*

Response: Agreed. As of the end of 2015, only four samples have been collected from SW16 as this is a fairly new station. The station will continue to be monitored to better understand the variation in water quality and potential factors influencing concentrations. Regarding flow rates, we do provide flow data for SW-16 as well as other stations in Appendix I (first Table). In April 2015, the flow rate at SW16 was estimated at 0.06 m3/s versus 0.27 m3/s at SW2. Both stations had no flow during the July and October sampling events due to dry conditions. Based on this data, the flow at SW16 contributed about 20% of the April 16/15 flow in Martin Creek originating from west of County Road 21. This is considered enough contribution to have a significant influence on downstream water quality.

Review Comment: *If available, I recommend that flow statistics (mean annual flow, average daily flow, mean monthly flows, etc.) are reported for Martin Creek at Mark Road and that these flow statistics are compared to spot flow measurements from SW2, SW3, SW4, and SW16 and to the leachate generation rate.*

Response: The continuous flow monitoring by the Kawartha Region Conservation Authority (KRCA) in Martin Creek at the Mark Road crossing was not carried out for the purpose of the landfill monitoring and was discontinued by KRCA in 2014 at their own discretion. Therefore, only spot flow measurements are available post 2014. Flow rates are estimated by the City at each station in Martin Creek at the time of sampling, including at SW-3 (Mark Road culvert). These spot measurements are considered adequate for assessing the relative contributions to the creek flow from the landfill area versus upstream areas.

Review Comment: *Table 12 summarizes the range of background water quality at SW14, SW16 and SW12. I recommend that descriptive summary statistics (e.g. means, medians and 75lh percentiles) are included.*

Response: Agreed. These statistics will be included in Table 17 in the 2016 Annual Report.

Review Comment: *Confirmation is needed regarding the sampling conducted at stations SW14, SW12, SW13, and SW15, relative to the distance of the sampling point relative to the toe of Phase 1 waste. I recommend that the data provided in Appendix I indicate the distance that samples were collected from the toe of the waste for stations SW12, SW14, SW14, SW15. This is indicated for some of the data, but not all. This is so the routine sampling data (fixed location/distance) can be readily distinguished from the sampling conducted as part of the conductivity monitoring (distance based and will vary from year to year).*

Response: As shown in Figure 12, the routine/fixed surface water stations SW12, 13 and 15 are all at approximately 10 m out from the toe of the Phase 1 waste fill area. Station SW 14 (background) is not along the landfill periphery. The distances from the landfill toe are noted in Appendix I only if the sample was collected along the transect line rather than at the routine/fixed station. We will clarify this in Appendix I of the 2016 Report.

MARTIN CREEK WETLAND EAST OF MARK ROAD

Review Comment: *The groundwater trigger concentration of 0.8 µg/L for toluene was exceeded on one occasion at WP6-13 (3.9 µg/L) adjacent to Martin Creek and is not shown on Figure H.2.4.*

Response: Agreed. The vertical scale on Figure H.2-4 will be revised to show the 3.9 ug/L toluene concentration measured in October 2015. The subsequent (November 2015) event gave <0.5 ug/L at all the Martin Creek Protection Trigger Wells and therefore no action was required with respect to the groundwater trigger mechanism shown in Figure 11.

Review Comment: *Trigger Mechanism - Page 17 of the report incorrectly refers to 0.8 µg/L as a CWQG for tolune; 0.8 µg/L is the PWQO. The CWQG is 2 µg/L.*

Response: Agreed. This will be revised in the 2016 Annual Report.

Review Comment: *Appendix F compares groundwater chemistry to the Ontario Drinking Water Quality Standards. For the sentry groundwater monitoring wells included in the Martin Creek protection and Martin Creek Wetland protection groundwater trigger mechanisms, comparison should also be made to PWQO and CWQG, where PWQO do not exist (e.g. chloride).*

Response: This request is best addressed by including the sentry wells in Table 9. Table 9 shows the PWQO and/or CWQG exceedances for monitoring wells in proximity to the waste fill area and Martin Creek Wetland. We will revise the table to include the sentry wells in the vicinity of Martin Creek (i.e., MW 26, 27-3 and 28-3) and the sentry wells for the Martin Creek Wetland east of Mark Road (i.e., MW 12, 14, 15 and 16).

MARTIN CREEK WETLAND ADJACENT TO PHASE 1

Review Comment: *In 2015, I agree that leachate impacts are evident around the toe of the site. Shallow groundwater at wetland point WP4 shows the highest concentrations of leachate indicators. Iron, aluminium, chromium, cobalt, vanadium, zinc, TP, and un-ionized ammonia exceed PWQO and were elevated above background (WP1). Potassium, DOC, alkalinity, total dissolved solids, and boron were elevated above background.*

Response: Comment acknowledged.

Review Comment: *Surface water in the wetland at 25 m and 30 m from the toe along transect WP4 showed elevated concentrations in terms of chloride, iron, potassium, total ammonia, total alkalinity, dissolved solids, and boron, relative to background wetland conditions at SW14. Concentrations of chloride and boron were less than the long-term CWQG values of 120 mg/Land 1.5 mgL, respectively. However, PWQO exceedances occurred for: aluminium (0.19, 3.7 mg/L, exceeding 0.075 mg/L), cadmium (0.00027, 0.00059 mg/L, exceeding 0.0009 mg/L), cobalt (0.006, 0.0025 mg/L, exceeding 0.0002 mg/L), copper (0.0087 mg/L, 0.0068 mg/L) lead (0.021, exceeding 0.005 mg/L), and Zn (0.412 and 0.03 mg/L, exceeding 0.02 µg/L). I recommend that the annual report characterize leachate well concentrations for these metals and compare this to background groundwater and surface water concentrations to determine if the PWQO exceedances in surface water around the toe of the waste are leachate related, landfill related, or naturally occurring.*

Response: Leachate is sampled at the leachate well MW 7-13 only during the Spring monitoring event each year. In 2014 and 2015, this leachate well was dry during the Spring monitoring event. Data from the previous monitoring event (October/13) is shown in Appendix F. For the metals noted in the review comment, concentrations exceeding PWQO in the leachate sample were obtained for only aluminum (0.08 mg/L versus 0.075 mg/L) and cobalt (0.005 mg/L versus 0.00002 mg/L). Concentrations for cadmium, copper, lead and zinc in the leachate sample were below PWQO. Although leachate quality can vary at different locations in the landfill, the data from this single leachate well indicates that there is a naturally occurring component contributing to the PWQO exceedances at the wetland surface water stations along the periphery of the Phase I fill area. Note that in early 2017, this leachate well was re-constructed as MW7-17 to a greater depth within the waste.

Review Comment: *Based on data in Appendix I, I am not able to confirm un-ionized ammonia concentrations in surface water at WP2, WP3, WP4, and WPS due to lack of field pH and temperature. Also, I am unable to confirm the distance at which some of the surface water samples at SW15, SW14, SW13, and SW12 occurred relative to the toe of the waste. Clarification should be provided.*

Response: Clarification regarding the locations of the SW 12, SW14 and SW15 surface water stations relative to the toe of the waste is provided above. Where a distance from the toe is not given in Appendix I, the sample was collected from the routine/fixed station at 10 m out from the toe rather than along the transect line.

Field measurements for surface water pH and temperature along the transect lines at Wetland Probes WP 2, WP 3 and WP 4 were obtained but were inadvertently not presented in Appendix I. They will be included in the 2016 Report. In all cases, the unionized ammonia concentrations obtained using the field data were less than the PWQO value of 0.02 mg/L.

Review Comment: *In 2015, iron concentrations were greater than background (<1 mg/L) and greater than PWQO at SW12 (15 m, 6.64 mg/L), SW13 (21.7 mg/L), and WP4 (25 m, 14.7 mg/L). I recommend future reports determine if high iron concentrations around the toe of the waste coincide with elevations in other leachate indicators.*

Response: Yes, elevated iron concentrations around the toe of the waste do coincide with elevations in other leachate indicator parameters such as TDS, chloride, COD and conductivity. As noted in Section 4.3.2, the landfill was designed and approved as a natural attenuation facility and most of Phase I was constructed within the wetland. As such some impacts to the wetland along the immediate periphery of Phase I are expected, particularly during the operating period prior to completion of final cover construction. Overall, the landfill continues to operate satisfactory as a natural attenuation site.

Review Comment: *In 2015, un-ionized ammonia concentrations did not exceed the PWQO at SW12, SW13, SW14, or SW15. I recommend field pH and temperature are reported in Appendix I for surface water near WP2, WP3, WP4, and WPS.*

Response: Agreed. These data will be provided in Table I in the 2016 Annual Report. See response above.

Review Comment: *Zinc concentrations at well points WP1-WP5 are extremely high (< 1 mg/L to 193 mg/L) and show potential for impairment to surface water. Well point WP6 has very low zinc concentrations. Clarification is needed regarding whether there was a different pipe material used at WP6.*

Response: As noted in Section 3.5, the high zinc concentrations at the drive point wells WP 1 to WP 5 (all located within the wetland) are due to corrosion of the zinc coating on the metal pipe. The metal pipe used for these wetland wells was driven by hand to approximately 2.5 m depth. WP 6 is in a more accessible location that allowed the installation of a 51 mm diameter PVC screen/riser pipe using a Geo-probe rig. WP6 is therefore not susceptible to corrosion and leaching of zinc. In the 2016 Annual Report, we will include a recommendation that the City attempt to replace the metal wetland probes with approximately 2 m deep by 50 mm diameter PVC wells installed using a hand auger.

Review Comment: *Toluene is identified as a leachate indicator. I recommend toluene is analyzed at surface water stations in proximity to Phase 1 of the waste (SW12, SW13, SW14, and SW15).*

Response: Agreed. For the 2017 monitoring, toluene will be added to the list of parameters for the surface water stations SW 12, SW 13 and SW 15 located in close proximity to Phase I. Toluene will also be added to the list of parameters for the background surface water station SW 14.

Review Comment: *I am not aware of any additional monitoring that was completed in respect of the monitoring along the wetland transect lines than what is required by the ECA/D&O Report. With regard to the spring conductivity monitoring conducted along six transects, it is my understanding that locations with the highest conductivity readings along each radial transect and with the lowest conductivity readings along each transect would have samples collected and submitted for analysis for the same suite of surface water parameters that are currently monitored. Based on Figure 14 and Appendix I, it appears that samples were not collected at the highest conductivity reading along each transect. Clarification is needed.*

Response: Samples were collected at the transect lines at typically 15 m and either 25 m or 30 m out from the toe of the waste. In some cases, such as for the transect lines at SW 13 and SW 12, the 15 m offset location gave the highest conductivity and was where a sample was collected. In other cases, such as for the transect lines at WP 2 and WP 3, the 10 m offset gave the highest conductivity but sample collection was not possible due to insufficient surface water being present at the time. The sample was instead collected at the 15 m offset where sufficient water was present.

Review Comment: *Figure 14 shows that conductivity measurements were not collected at 5 m increments from the toe of the waste along transect lines. Clarification is needed.*

Response: Surface conditions were examined at each 5 m increment along the transect lines and conductivity readings were taken where surface water was present. For Figure 14, the absence of conductivity data at a 5 m increment means that surface water was not present at the location.

Review Comment: *I recommend extending WP4 and SW15 conductivity transects beyond 30 m up to a distance to where background conductivity is achieved in order to delineate the extent of the leachate plume in surface water within the PSW.*

Response: Agreed. This will be attempted for the 2017 conductivity monitoring. Note however that for the May 2015 conductivity monitoring event, the stations along the transect lines at WP4 and SW15 were dry except at 25 m out from the toe of landfill at WP4.

Review Comment: *In 2015, conductivity monitoring occurred 1 month after the surface and groundwater sampling programs. The spring-time conductivity monitoring survey could be better harmonized with the ground and surface water sampling.*

Response: Agreed. A recommendation will be made in the 2016 Annual Report that the conductivity monitoring be conducted closer to the time of the Spring groundwater / surface water monitoring event. This will commence with the 2017 annual conductivity monitoring.

GENERAL

We will incorporate the recommendations in the 2016 Annual Report.

Regarding the recommendation for a table comparing Martin Creek upstream and downstream water quality with PWQO and CWQG, it should be noted that Table 9 of the 2015 Annual Report provides this comparison. We will continue to include this table in future reports. Please note that the contracted laboratory cannot achieve a PCB detection limit of 0.001 µg/L using standard methods. A detection limit of 0.001 µg/L can be achieved using speciality labs at considerable expense. Considering that PCB's have not been an issue at this site, we request that the MOECC allow the use of the lowest possible detection level achievable by the contracted laboratory (Caduceon) which is 0.05 µg/L.

Vinyl chloride results for surface water sampling are shown in Appendix I (page 9 of 10).

Regarding final cover placement, the north slope of Phase I was capped in 2016. Capping of the remaining top surface area of Phase I was not possible in 2016 as final contours were not yet achieved. The remaining top surface area will be capped in the summer of 2017.

We trust that the above responses to the MOECC review comments meet your requirements. Please contact us should you have any questions or require further clarification.

GOLDER ASSOCIATES LTD.

Frank Barone

Frank Barone (Ph.D, P.Eng)
Principal

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