TECHNICAL MEMO

TETRA TECH

TO: William Tigert, CAO, Town of Ingersoll
130 Oxford Street, Ingersoll, Ontario N5C 2V5

CC: Peter Klaassen, Vice President - Solid Waste Ontario, Tetra Tech Canada Inc.
Jack Coop and Joel Farber, Partners, Fogler, Rubinoff LLP

FROM: Dominique Grenier, P. Eng.
Leachate Treatment Lead

DATE: May 25th, 2017

PROJECT #: 21169TT

SUBJECT:
Review Comments on Leachate in respect of Walker Environmental Group Inc. – Southwestern Landfill Proposal

1.0 INTRODUCTION

The purpose of this memo is to provide a technical review on aspects specific to leachate management and treatment in connection with the Southwestern Landfill Proposal (the Walker Environmental Group (WEG) landfill or waste disposal site). In preparing this memo, the following documents were reviewed:

- Walker Environmental Group Inc., Alternative Methods – Interim Report, Southwestern Landfill Proposal, Draft January 3, 2017;
- Walker Environmental Group Inc., Facility Characteristic Assumption Report, March 28th, 2017, Rev. 02;

The following document was also reviewed in conjunction with the documents above:

- Technical Memorandum – Review of Alternative Methods (Draft January 3, 2017) – Southwestern Landfill Proposal EA, March 7th, 2017, Dave Lake, CH2M.

A copy of the reviewer's Curriculum Vitae is attached as Appendix A.

2.0 GENERAL OBSERVATION AND COMMENTS

2.1 Preferred leachate treatment alternative analysis

The preferred and only feasible leachate treatment alternative identified in the Alternative Methods Interim report is an on-site leachate treatment facility. This analysis seems reasonable considering the constraints involved with other alternatives, such as costs, permitting and technical feasibility.

On-site leachate treatment plants have been implemented in several municipal waste facilities in Canada with well-known technologies that can achieve a high level of treatment.

2.2 Leachate quantity

We have concerns that the preliminary leachate production is underestimated: The preliminary calculations shown in section 1.7 of the Facility Characteristic Assumption report indicate an average annual leachate generation of 124,000 m^3/d and an average daily treatment flow of 340 m^3/d at full build-out. As indicated in the report, these calculations need to be refined. Leachate generation calculations should be based on a statistical analysis of the monthly and yearly rainfall records in the Ingersoll region combined with the site development stages (open vs. closed cells). A security factor should also be taken into account. The calculations should be performed using different assumptions of yearly and monthly precipitations and then compared. Rainfall on open ponds that will be used prior to or after treatment should also be considered as the volume may not be negligible.

We would like to see the leachate generation calculations based on data that include a safe percentile which is higher than yearly rainfalls, rather than on average precipitations in the Ingersoll region based on historical data. These data should then be compared to the yearly rainfalls recorded for the last five years, bearing in mind that rain event patterns have changed during this period.

These calculations are critical for the design of the leachate collection system and the leachate treatment plant. Failing to properly evaluate the leachate quantity to be managed and treated could lead to problems such as accumulated leachate at the cell bottom resulting in a “stronger” leachate as well as possibly increasing pressure on the liner system. These calculations are also necessary to assess the impact on the receiving surface water course if direct off-site discharge is retained.

After reviewing the site development stages described in the Facility Characteristic Report, we believe that the volume of leachate at full build-out will be much higher than what is currently estimated. Due to the proposed waste height, it may become difficult to quickly add progressive capping, which would leave large areas exposed to rainfall. We would like to see a detailed landfill progress plan, given that leachate generation can only be minimized by limiting the surface area of exposed waste.

2.3 Leachate quality

We have concerns that the leachate concentration for TKN is too low: As indicated in the Facility Characteristic Assumption Report, section 1.7, the leachate quality will vary depending on the age of the waste in the landfill, among other factors. A preliminary analysis of the proposed leachate quality which could be used in the design of an on-site leachate treatment facility is provided in this report. The leachate quality is based on the quality of the leachate at Walker’s other facilities after the pre-treatment ponds but prior to treatment at a leachate treatment plant.

The concentration range for Total Kjeldahl Nitrogen (TKN) seems low based on leachate quality data from other landfills in the provinces of Ontario and Quebec. Typically, the concentration range for NTK in raw leachate falls between 200 and 1,000 mg/L. Nitrification utilizes slow-growing and temperature sensitive organisms. Thus, to enable adequate treatment during colder temperatures, the leachate must be heated in order to maintain a temperature between 15°C and 20°C, which cannot be achieved in open pre-treatment ponds.

We would like to see more conservative concentration levels for nitrogen in the design of the on-site treatment plant, taking into account the lack of nitrification during colder temperatures.

2.4 Contingency plan

As indicated in the Regulatory Requirements, *Ontario Regulation 232/98* requires the preparation of a contingency plan that can be implemented to control and dispose of leachate produced in a quantity greater than expected or with a quality worse than expected.

Given that all other treatment alternatives have been ruled out, we would like to see what the contingency plan would be in the event of leachate quantities in exceedance of the on-site leachate treatment plant design.

3.0 CONCLUSION

The preferred leachate treatment alternative identified in the Alternatives Methods Interim report is an on-site treatment plant. This alternative has been implemented successfully at several landfill sites in Canada with technologies that can meet stringent effluent limits.

The leachate quantity seems to have been underestimated at the full build-out. We recommend that the calculations be refined with more appropriate rainfall data. The leachate quality proposed after pre-treatment seems reasonable with the exception of the Total Kjeldahl Nitrogen (TKN) concentration. These data should be refined in the design of the treatment plant.

We trust this memorandum meets your present requirements. Should you have any questions or comments, please contact the undersigned at your convenience.

Respectfully submitted,

Tetra Tech

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DG/dl

TETRA TECH

Dominique Grenier, P. Eng.
Project Manager

EXPERIENCE SUMMARY

Ms. Grenier has 24 years of experience as a civil engineer in the environmental field, specifically treatment and process engineering. She began her career by taking part in the design of various treatment works in the province of Quebec. She also coordinated numerous environmental impact studies and worked on greenhouse gas reduction programs for the Canadian Federal Government. Ms. Grenier currently works as a project manager on a team that specializes in waste management and leachate treatment. She has led environmental impact studies for the expansion of landfill sites and carried out studies, design and start-up assistance of leachate collection and treatment works for many sites.

RELEVANT EXPERIENCE

LEACHATE MANAGEMENT AND TREATMENT

CVRD (Comox Valley Regional District), BC

- Technical Lead for the Design-Build request for proposal for the proposed Leachate Treatment Facility.
- Technical assistance and support for the Design-Build contract
- Detailed engineering for leachate management in landfill cell no. 1

Roland Thibault inc. (GFL)

- Review of leachate management plan (modelling)
- Preparation of plans and specifications for upgrade of the leachate management facilities

RMWB (Regional Municipality of Wood Buffalo), Fort McMurray, AB

City of Thunder Bay, ON

CVRD (Comox Valley Regional District), Comox, BC

- Lead project manager for study on leachate management and treatment strategy (study of various in- and ex-situ options using biological and physico-chemical processes)

Lafleche Environmental Inc. (GFL), Moose Creek, ON

- Project manager for the upgrade of the existing leachate treatment facility (study of options, design plans and specifications, cost estimates, ECA amendment, etc.)

Régie intermunicipale de traitement des matières résiduelles de la Gaspésie, QC

- Design, project management and start-up for the upgrade of the leachate treatment system (completely mixed pond and physico-chemical treatment)

RIEDSBM (Cowansville) RRGMRP (Neuville) and Roland Thibault (Matrec), QC

- Design and project management for a leachate treatment plant (MBBR biological reactors), including authorization request to the MoE, 100% design, supervision and follow-up for commissioning of entire treatment system

Services Écotria inc., QC

- Design of a treatment system for PAHs in leachate with pilot tests

City of Rivière-du-Loup, QC

- Design of the upgrade of the leachate treatment system (completely mixed pond and peat filters) at the city's landfill site (plans and specifications and project management)
- Environmental permitting

EDUCATION

Bachelor's Degree in Civil Engineering with an orientation in Environment, École Polytechnique de Montréal (1993)

REGISTRATIONS/ AFFILIATIONS

Ordre des ingénieurs du Québec (113956) (1993)

Professional Engineers Ontario (100198527) (2013)

Association of Professional Engineers & Geoscientists of BC (39264) (2013)

TRAINING/ CERTIFICATIONS

Biological purification of wastewater (Civil Engineering master's course)

Impact studies (Environmental Hydrogeology master's course)

HRAI – Building Heat Gain and Loss Calculations

WHMIS

OFFICE

Boucherville, QC

YEARS OF EXPERIENCE

24

YEARS WITHIN FIRM

17

CONTACT

dominique.grenier@tetratech.com

LEACHATE MANAGEMENT AND TREATMENT (CONTINUED)

Sable des Forges, Trois-Rivières, QC

- Preparation of a certificate of authorization request for upgrading the treatment system for water generated by the recycled glass grinding platform

WASTE MANAGEMENT

Municipality of St-Alphonse, QC

- Design and project management for construction of final cover on engineered landfill cell no. 1

GFL Environmental (GFL), ON

- Project management for construction of final cover on Phases 3 and 4 of Stage 2
- Project management for construction of Cells 1 and 2 of Stage 3A

City of Rivière-du-Loup, QC

- Calculation of landfilling progression

Régie de Gestion des matières résiduelles de Manicouagan (RGMRM)

- Construction of a permanent road on the Cell 1 final cover including preparation of a permit request and monitoring of geotechnical analyses

Larouche (Matrec), QC

- Design of engineered landfill cells and leachate treatment system for future site
- Preparation of Certificate of Authorization request for planned site
- Preparation of quality assurance specifications

Régie intermunicipale de traitement des matières résiduelles de la Gaspésie (RITMRG)

- Design of plans and specifications for Cells 9 and 10 including leachate collection network
- Technical support during construction and quality assurance monitoring

Régie de la Lièvre (Mont-Laurier, QC)

- Design and project management for construction of engineered landfill cells and quality assurance monitoring (Cell 4)

Valoris

- Design and project management for construction of landfill cells at the engineered landfill in Bury (Cells 4a and 4b)

NewAlta

- Preparation of environmental monitoring programs for NewAlta facilities in Quebec

RIEDSBM

- Design and project management for construction of engineered landfill cells and final cover, authorization request and quality assurance monitoring

RRGMRP

- Environmental impact study for the expansion of the Neuville Landfill and design of an engineered landfill cell including quality assurance monitoring

Roland Thibault inc

- Execution and coordination of impact study for the expansion of the Roland Thibault Landfill in Granby

MUNICIPAL

Various clients

- HHW environmental monitoring and design of leachate treatment systems for compliance with the “Regulation respecting the landfilling and incineration of residual materials (REIMR)” and the CMM (Communauté métropolitaine de Montréal) regulation
- Environmental impact study for the reopening of the Soulanges Canal (Quebec); the project consisted of various development works (banks, dredging, bridges, locks, roads, public services) along the Soulanges Canal which stretches over 23 kilometres and the construction of three (3) main marinas including one with a hotel complex
- Preparation of plans and specifications (5 phases), estimation of costs, partial supervision and drafting of the operating manual for the Haut-Richelieu wastewater treatment project (wastewater treatment plant with an average capacity of 70,000 m^3/d including primary and tertiary treatments with an air treatment system)

MUNICIPAL (CONTINUED)

- Preparation of plans and specifications, estimation of costs and partial supervision for the Régie intermunicipale d'assainissement des eaux de Saint-Césaire et Rougemont Anaerobic Treatment Plant (two industrial wastewater treatment plants using anaerobic digestion with an average capacity of 900 m^3/d each)

Town of Farnham

- Carry out environmental impact study for the town's existing rail yard

Ministère des Transports du Québec and Ministère de l'Environnement

- Design of a marsh with a spillway and observation points as part of the Boulevard de la Vérendrye construction project in Gatineau

National Capital Commission

- Carry out environmental study for the Gatineau River bank stabilization project in Leamy Park in Hull and coordination of various technical staff such as biologists and geotechnical engineers

Village of Bouchette

- Preparation of plans and specifications for remediation - treatment plant with rotating biological process

Town of Wakefield (la Pêche and Notre-Dame-de-la-Salette sectors)

- Drafting of operation manual and environmental requirements handbook for wastewater treatment plants

École Sedberg, Montebello

- Preparation of permit request for construction and use of a water supply well

Municipality of Chelsea (Farnham and Centre sectors)

- Carry out feasibility study for municipal water treatment

Various municipalities in the Montérégie region

- Ensuring management of various paving, drainage, sewer and water projects

Towns of Saint-Mathias-sur-Richelieu and Sutton

- Carry out drinking water supply study including recommendations to improve management, reduce operating costs and comply with new drinking water regulations

City of Gatineau

- Carry out comparative study of different water system balancing software such as WaterCAD and Aquagéo

Aéroports de Montréal (Dorval)

- Carry out water system balancing study

City of Montreal

- Carry out drainage studies and checklists for construction of sidewalks, sewers and water system, lead a survey team and assist with computer development on AutoCAD; supervise works

MISCELLANEOUS

- Planning, development and management of the technical requirements of the EnerGuide Program of rating residential heating, ventilation and air conditioning equipment (HVAC)
- Development of strategic and operational plans for the EnerGuide Program of HVAC systems rating including recommendations to division management concerning development of activities in collaboration with outside organizations in order to ensure program participation and availability of program material to consumers
- Identification of needs and writing of work statements for projects and/or calls for proposals, checking service contract revenue necessary to the proper functioning of the program, management of the results of professional service contracts and contribution agreements
- Ensuring technical monitoring of energy efficiency programs for the residential sector of the Office of Energy Efficiency (EnerGuide for residential homes, R-2000, Réno$ense, etc.)