MEMO

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From:
Dr. Barbara Hard, P.Biol., R.P.Bio., QP_{RA}
Senior Terrestrial Biologist

Date:
May 26, 2017

Project No.:
351312

Subject:
Ecological Assessment Review of Walker Environmental Group Southwestern Landfill Environmental Assessment Submissions

1.0 Introduction

Arcadis has been retained by the Town of Ingersoll as experts on Ecology in connection with the Southwestern Landfill Proposal (the Walker Environmental Group (WEG) landfill or waste disposal site).[1] Specifically, I have been retained to provide comments on reports prepared by or for WEG under the ongoing *Environmental Assessment Act* approval process for the WEG landfill.

In preparation of this memorandum, I have reviewed the following WEG document:

- Ecological Assessment Work Plan- revised Draft for Discussion, dated February 2017, prepared by Beacon Environmental, submitted to Walker Industries.

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

- Walker Environmental Group Inc., Work Plan: Cumulative Effects Assessment In the Southwestern Landfill EA – Draft For Discussion, January 12, 2017.

[1] The Curriculum Vitae of the author of this report is attached as Appendix A.

- Walker Environmental Group Inc., Southwestern Landfill Proposal: Approved Amended Terms of Reference, May 10, 2016.

I have limited my review comments to aspects specific to the Ecological Assessment Work Plan.

2.0 Background

The purpose of this review was to determine whether the Work Plan for Ecological Assessment is adequate to consider the potential effects to ecology and the natural environment, and whether it is consistent with the requirements of the Environmental Assessment (EA) Terms of Reference (ToR) as approved by the Minister of the Environment and Climate Change on March 17, 2016 and amendments to the Work Plan arising from comments from various stakeholders and agencies such as Upper Thames River Conservation Authority and Ministry of Natural Resources and Forestry.

This review is primarily focused on the principles of Ecological Assessments. Other technical reviews of work plans specific to issues such as hydrogeology, air quality, noise, geotechnical engineering, landfill design, human health risks, etc. are being conducted under separate cover.

3.0 General Observations and Comments

The elements of the Ecological Assessment Work Plan are in line with general requirements of natural resources inventory and environmental impact assessments for EAs. However, review of the Work Plan noted a number of deficiencies with regards to details of the execution of the Work Plan. It appears to be written as a proposed Terms of Reference for the Ecological Assessment rather than a work plan that is ready to be implemented. For example, site reconnaissance and selection of sampling and reference locations should have been made at this stage and should be available for review by stakeholders and agencies. The selection of appropriate survey and reference locations is of great importance for natural environment surveys. Therefore, this is considered a significant deficiency that make it impossible to properly assess the work plan.

The Work Plan does not include provisions for the development of mitigation plans and implementation of mitigation measures, should they be deemed necessary.

4.0 Specific Observations and Comments

Section 4 Study Areas

Page 5: No overview of the study areas was provided. Therefore, an assessment of whether the proposed study areas are appropriate was not possible.

Section 6.2 Land Use Forecast

Page 1, 1st Paragraph: It is mentioned in this paragraph that cumulative effects will be assessed. However, there is no discussion under Section 8, Data Analysis that discusses cumulative effects and how they may be assessed, monitored and possibly mitigated, if needed. This is a deficiency in the report. Cumulative effects may originate from effects of the landfill on the natural environment, including potential failure of the

liner and the sudden release of contaminants, the effects of the operational quarry and truck traffic or a combination of both. Details of the methodology should be provided.

Section 7.2.1 Aquatic

Page 3: There is no indication of number of samples proposed, sampling locations and number and location of reference sites for both fish and benthic invertebrate studies. Although a figure is cited that shows proposed sampling location, it was not provided. This should be part of the proposed Work Plan as review of suitability of locations is necessary before sampling commences.

Page 4, 1st Paragraph: The Scope of Work states that fish sampling will occur twice annually, during the spring and fall, but no indication is given for how many years this will be implemented. It is also not clear if this sampling is meant to be part of the long term effects monitoring.

Benthic Invertebrate Study:

Page 4: OBBN Protocol Manual (Jones *et al.*, 2004)- an updated version is available (2007).

It is proposed to use the Hilsenhoff Biotic Index only. However, in order to ensure that differences in samples and sample locations in comparison to reference locations are captured, additional indices and criteria are suggested: Simpson's Evenness, Shannon-Wiener Diversity Index, % EPT (Ephemeroptera, Plecoptera, Trichoptera), % Worms, % Dominants, % Diptera, % Insects, total number of individuals.

Section 7.2.2 Terrestrial

Ecological Land Classification (ELC) and Floral Surveys

Page 5: The fall survey should be completed in September/October, rather than August/September, as an August survey would be too close to a July summer survey and would potentially not reflect a true fall survey.

Page 5, last line: The year should be added to the Lee et al. reference.

Page 6, 3rd Paragraph: The floral surveys should not be confined to the property and should include all study areas such as Vicinity Study Area and Haul Roads and should also be included in the description of benthic/fish sampling locations.

Qualitative Surveys for Species at Risk and Rare Species

Page 6: Species at Risk Ontario (SARO) lists 32 Species at Risk (SAR) in the Ingersoll area (Oxford County). Since this is a Work Plan and not a proposed Terms of Reference document, the screening for SAR should have already been completed and a work plan to address (include/exclude) each species with justification should have been developed. A location plan for species specific surveys should be shown. None of these tasks have been completed. This is a significant deficiency in the Work Plan.

Breeding Bird Surveys

Page 6: It is not indicated which protocol is proposed for the breeding bird surveys and how they will be carried out (timing, spacing between locations etc.). The standard breeding bird atlas protocol calls for surveys to be 15 days apart rather than 7 days as proposed in the work plan.

Survey locations for breeding bird surveys should be provided on a figure. This has not been done.

Amphibian Surveys

Page 7: It is stated that amphibian survey locations have been selected, but no figure, description or rationale for survey location selection is given. It is also not indicated how many survey locations have been selected.

Survey locations for amphibian surveys should be provided on a figure. The above deficiencies are significant.

Bird Hazards

Page 8: It is proposed to review background information before a field sampling plan is developed. However, as this is a Work Plan and not a proposed Terms of Reference document, the field program should have been developed and should be able for review and comments by stakeholders. This is a significant deficiency.

Section 8.1.1 Index of Biotic Integrity

Page 9, 1st Paragraph: It is stated that the Index of Biotic Integrity analyzes fish for 12 possible metrics which will be determined by professional judgement. Only five (5) metrics are listed. It is not clear what the remaining 7 metrics are and, given that this is the Scope of Work, these should have been already established at this point. The absence of this information does not allow for the review of adequacy and suitability of the unnamed metrics for the Index of Biotic Integrity.

Section 8.2 Terrestrial

Page 11, Paragraph 4: More information should be provided on the suitability of the benchmarks to assess impact of dust on plants as well as the methodology and implementation. It is unclear if the benchmarks referred to have been accepted by environmental agencies such as Ministry of Environment or US EPA. Further discussion is required.

Section 10 References

There are a number of references listed in the reference section that are not cited in the text. References should be cross referenced for ease of review.

B. Hard

Dr. Barbara Hard, P.Biol., R.P.Bio., QP$_{RA}$
Senior Terrestrial Biologist

APPENDIX A

Curricula Vitae

Barbara Hard

ARCADIS Design & Consultancy for natural and built assets

Education
Ph.D., Microbiology, University of Sheffield, 1992
B.Sc., Animal and Plant Biology, University of Sheffield, 1988

Years of Experience
Total - 26
With ARCADIS – 3.5

Professional Affiliations
Professional Biologist- (P.Biol.), Alberta Society of Professional Biologist, 2014.
Professional Biologist- (R.P.Bio), College of Applied Biology, BC, 2016.
Regional Director, Canadian Society of Environmental Biologists.
Qualified Person for Risk Assessment (QP_{RA}), Ontario Ministry of the Environment & Climate Change (MOECC), 2009

Certifications
Ministry of Natural Resources and Forestry (MNRF) Ontario Wetland Evaluation
MNRF Ecological Land Classification
Ontario Benthic Biomonitoring Network (OBBN) Certification for Benthic Invertebrate Sampling and Identification
WHMIS Training

Barbara Hard, Ph.D., P.Biol., R.P.Bio., QP_{RA}

Senior Risk Assessment Specialist and Discipline Lead, Natural Sciences

Dr. Hard has over 26 years of experience as an Environmental Biologist in Environmental Assessment, Permitting, Natural Resources and Risk Assessment.

Dr. Hard's experience in Risk Assessments (RA) includes the ability to design, cost, perform and manage risk assessments under the Ontario Ministry of Environment and Climate Change (MOECC) Guideline process and to carry out RAs under Ontario Regulation (O. Reg.)153/04 (as amended). She has been reviewing risk assessments for the MOECC for a number of years. She also has the ability to design, cost, perform and manage risk assessments under the CCME Guideline process and different Provinces across Canada. Dr. Hard provides project management and internal quality control for risk assessments on behalf of private and public sector clients. Her experience with contaminated sites includes contaminants in soil, groundwater, sediments, surface water and air as well as supervision of field sampling.

Dr. Hard's responsibilities related to Ecological Services and Permitting include costing and managing environmental impact assessments; species at risk studies; vegetation and wildlife surveys; benthic invertebrate surveys; fish habitat assessments; wetland evaluations; ecological land classification; and rare species research. She is a hands on biologist with extensive field work experience.

Project Experience

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

Ontario Ministry of the Environment and Climate Change (MOECC) Expert Multidisciplinary Scientific Reviews of Brownfield Risk Assessments. Dr. Hard is the Reviewer for Ecological Risk Assessments on the Vendor of Record Standing Offer Agreement with MOECC and regularly peer reviews Pre-submission Forms and risk assessments as well as responses to comments.

Human Health Risk Assessments and Species at Risk Surveys, Five sites between Wonowon and Buckinghorse River, Alaska Highway, BC. Completed for PWGSC - Senior Biologist for SAR surveys, vegetation and wildlife inventory for four former maintenance yards and a **landfill** along the Alaska Highway. Information was used to support the risk assessments. Dr. Hard was Senior Advisor for these risk assessments.

Preliminary Effects Determination (PED), Species at Risk Survey and Valued Ecosystem Identification, DFO Storage Yard, Fort Providence, NT. Completed for DFO and PWGSC - Senior Biologist for Species at Risk Study and vegetation and wildlife survey

at the DFP storage yard near Fort Providence on the Mackenzie River. The Site included a storage area, **landfill**, helicopter pad, residence and garage. A PEA is currently completed to assess potential effects from site use and potential remediation activities on the natural environment, including Species at Risk.

Preliminary Quantitative Risk Assessment, Station 17, SK. Completed for TransCanada Pipelines - Dr. Hard completed a Risk Assessment for a historic **landfill** site adjacent to Compressor Station 17, 16 km southeast of Regina. COCs were BTEX, PHCs, PCBs, and phenolics.

Preliminary Quantitative Risk Assessment, Benthic Invertebrate Survey and Constructed Treatment Wetland, Former Landfill, Ottawa, ON. Completed for National Capital Commission (NCC) - Senior Ecological Risk Assessor and Biologist for the former Ridge Road **Landfill**. Data for additional lines of evidence were collected such a benthic invertebrates, seep and surface water samples. In addition, Dr. Hard designed a full size constructed treatment wetland to treat landfill leachate and stormwater run-off from a former landfill in Ottawa. The constructed treatment wetland consisted of two trains with three cells each and was approximately 400 m long and 85 m wide. The re-vegetation plan included plantings of hybrid poplars in the flood plain of a creek in the vicinity of the wetland.

Preliminary Quantitative Risk Assessment, Benthic Invertebrate Survey and Constructed Treatment Wetland, Landfill, Almonte, ON. Completed for Municipality - Senior Ecological Risk Assessor and Biologist for the Almonte **Landfill**. Data for additional lines of evidence were collected such a benthic invertebrates, sediment and surface water samples. In addition, Dr. Hard designed a phytoremediation system which included hybrid poplars and willows to treat landfill leachate.

Human Health and Ecological Risk Assessment, Dundas Street, Toronto, ON. Completed for Development Company - QP_{RA} for a Human Health and Ecological Risk Assessment for a private development company of a former gas station in Toronto. Contaminants of concern are petroleum hydrocarbons (PHCs), polycyclic aromatic hydrocarbons (PAHs), BTEX and metals in soil and groundwater.

Human Health and Ecological Risk Assessment, Dufferin Street, Toronto, ON. Completed for an Engineering Company - QP_{RA} for a Tier 2 Human Health and Ecological Risk Assessment for a vacant lot in Toronto. Contaminants of concern were EC, SAR and PHCs in soil and groundwater.

Site Specific Human Health and Ecological Risk Assessment, Windy Bay, NT. Completed for Public Works and Government Services Canada (PWGSC) and Fisheries and Oceans Canada (DFO) (ongoing) - Senior Risk Assessor and Species at Risk Biologist for a DFO light beacon site on the Great Slave Lake. COCs are metals (primarily zinc, selenium and mercury) from batteries left at the Site. The risk assessment is being completed to evaluate the potential risk to human and ecological receptors including Species at Risk. Risk management measures will be provided to eliminate potential risks to these receptors,

as needed.

Site Specific Human Health and Ecological Risk Assessment, Gooseberry Island, NT. Completed for Public Works and Government Services Canada (PWGSC) and Fisheries and Oceans Canada (DFO) (ongoing) - Senior Risk Assessor and Species at Risk Biologist for Gooseberry Island, a small island in the Great Slave Lake. The island is covered with gooseberry bushes and is a major breeding site for gulls. COCs are metals (primarily zinc, selenium and mercury). The risk assessment is being completed to evaluate the potential risk to human and ecological receptors including Species at Risk. Risk management measures will be provided to eliminate potential risks to these receptors, as needed.

Preliminary Quantitative Human Health and Ecological Risk Assessment, Pine Point Mine, Fort Resolution, NT. Completed for PWGSC, Aboriginal Affairs and Northern Development Canada (AANDC) - Senior reviewer for a Screening Level Human Health and Ecological Risk Assessment for the Pine Point rail bed, which runs for 80 kilometer between the former Pine Point mine site and Sandy Creek. The primary contaminants of concern were metals associated with the transportation of lead and zinc concentrations along the rail line and polycyclic aromatic hydrocarbons (PAHs) associated with stream crossing supports and bridges. Concentrates in the form of airborne particulates would also likely have been deposited directly into streams and ponds, settling to sediments. Dr. Hard gave a presentation on this project at the RPIC Conference in Edmonton in June of 2015.

Preliminary Quantitative Human Health and Ecological Risk Assessment, Norman Wells Airport, NT. Completed for PWGSC - Senior Risk Assessor for a Preliminary Quantitative Human Health and Ecological Risk Assessment (PQHHERA). Contaminants of Potential Concern (COPCs) originating from historical activities included BTEX, petroleum hydrocarbon (PHC) Fraction F1 and metals in soil and groundwater. The risk assessment was completed to evaluate the potential risk to human and ecological receptors including Species at Risk. Risk management measures were provided to eliminate potential risks to these receptors.

Screening Level Human Health and Ecological Risk Assessments, Resolute Research Station, Lots 4 and 7, Resolute Bay, NU. Completed for PWGSC and Fisheries and Oceans Canada (DFO) - Senior Risk Assessor for two Screening Level Human Health and Ecological Risk Assessments (SLHHERA) of two lots at the former Resolute Research Station. COPCs included PHCs and metals. Tasks included: Problem Formulation Report and Conceptual Site Model, Senior Review and Development of Risk Management Measures.

Detailed Quantitative Human Health and Ecological Risk Assessment (DQHHERA), Benthic Invertebrate Survey, Elk Island National Park, AB. Completed for PWGSC and Parks Canada Agency (PCA) (ongoing) - Senior Biologist completing benthic invertebrate surveys, SAR assessment and natural environment inventory at four wetlands in the Elk Island National Park. Information is used to support a DQHHERA. Dr. Hard is Senior Risk Assessor and reviewer for this risk assessment.

Site Specific Human Health (SSHHRA) and Screening Level Ecological Risk Assessment (SLERA), Onefour Research Station, AB. Completed for PWGSC - Senior Risk Assessor for a risk assessment at the former Onefour agricultural research station on southern Alberta. The Site consisted of two areas, a residential and an agricultural area. COPCs included metals, nutrients, chloride, and total dissolved solids, PHC Fractions F1 to F4, BTEX, PAHs and/or metals in soil, groundwater and/or surface water. Tasks included: Problem Formulation Report and Conceptual Site Model, Senior Review, Development of Risk Management Measures and Supplemental Site Investigation.

Divestment Strategy and Due Diligence Human Health and Ecological Risk Assessment, Former Pole Dipping Site, Athabasca, AB (ongoing). Completed for CN - Dr. Hard is the Senior Technical Lead for a due diligence Human Health and Ecological Risk Assessment for a former pole dipping site in Athabasca. The Site is adjacent to the Athabasca River and Muskeg Creek and divestment of the Site as a nature park to an ENGO is proposed. Contaminants of concern include chlorophenols and PAHs as well as metals.

Preliminary Human Health Risk Evaluation, Round Lake/Long Lake Gold Mine, Near Sudbury, ON. Completed for Atikameksheng FN - Dr. Hard was project manager and senior risk assessor for a Preliminary Human Health Risk Evaluation, research and review of previous environmental studies, data gap analysis and development of a sampling plan for the evaluation of risk to human receptors from fish consumption and recreational use of Round Lake, downstream from the Long Lake gold mine as well as risk to ecological receptors, including fish, waterfowl and a wetland area adjacent to a creek which is impacted by acid mine drainage and arsenic. The Review included fish surveys, monitoring reports and remedial option analyses reports for Long Lake Gold Mine.

Human Health and Ecological Risk Assessment, 34 Street, Edmonton, AB. Completed for Development Company - Dr. Hard is the Senior Risk Assessor and Project Manager for a Human Health and Ecological Risk Assessment for a private development company of an industrial site in Edmonton which is located in the vicinity of a creek. COCs are PHCs, PAHs, BTEX and metals in soil and groundwater. Risk to aquatic receptors in the creek is also being assessed.

Human Health and Ecological Risk Assessment, Bloor Street, Toronto, ON, ongoing. Completed for an Engineering Company - Dr. Hard is QP_{RA} for a Human Health and Ecological Risk Assessment for a lot occupied with a commercial building in Toronto. Contaminants of concern are EC, SAR and solvents in soil and groundwater.

Human Health and Ecological Risk Assessments, Waterfront Toronto, Toronto, ON. Completed for Waterfront Toronto - Dr. Hard was the Ecological Risk Assessor for risk assessments under O. Reg. 153/04 for two sites near the Jarvis Slip at the waterfront in Toronto. Contaminants of concern were PHCs, BTEX, PAHs and metals in soil and groundwater. The risk assessment included evaluation of risk to offsite aquatic receptors in Lake Ontario.

Human Health and Ecological Risk Assessment, Winnipeg, MB. Completed for Development Company - Dr. Hard managed and completed a Preliminary Quantitative Human Health and Ecological Risk Assessment for a private development company at a mall and former wrecking yard in Winnipeg. Contaminants of concern were metals in soil.

Human Health and Ecological Risk Assessment, St. Laurent Square, Ottawa, ON. Completed for PWGSC - Dr. Hard completed a Preliminary Quantitative Human Health Risk Assessment and Ecological Risk Assessment for PWGSC at St. Laurent Square. Contaminants of concern were polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (PHCs) and metals in soil.

Human Health and Ecological Risk Assessment, CFB Borden, ON. Completed for Defence Construction Canada (DCC) - Dr. Hard managed and completed a Phase II Environmental Site Assessment and Preliminary Quantitative Human Health Risk Assessment and a Preliminary Quantitative Ecological Risk Assessment for DCC at the former soap plant at CFB Borden. Contaminants of concern were PAHs, PHCs and metals in soil. As part of the project a Vegetation Survey, Species at Risk study was carried out to identify sensitive ecological receptors.

Human Health and Ecological Risk Assessment, Kingston Road, Toronto, ON. Completed for Development Company - Dr. Hard managed and completed a Human Health and Ecological Risk Assessment for a private development company at a medical centre and former gas station in Toronto. COCs were chlorinated solvents and benzene in groundwater.

Preliminary Quantitative Risk Assessment, Hatchet Lake, SK. Completed for SaskTel - Dr. Hard completed a Preliminary Quantitative Ecological Risk Assessment and Management Limit Assessment for a remote SaskTel telecommunications tower site. Contaminants of concern were PHCs and toluene in soil.

Preliminary Quantitative Risk Assessment, Hawkrock River, SK. Completed for SaskTel - Dr. Hard completed a Preliminary Quantitative Ecological Risk Assessment and Management Limit Assessment for a remote SaskTel telecommunications tower site. Contaminants of concern were PHCs, PAHs and toluene in soil.

Preliminary Quantitative and Qualitative Risk Assessments, Former Gas Service Stations and Fuel Depots, Kipling, SK; Saltcoats, SK; La Ronge, SK; Winnipegosis, MB. Completed for Oil & Gas Company - Dr. Hard completed a number of Preliminary Quantitative and Qualitative Risk Assessments for former gas station sites. Contaminants of concern were PHCs in soil and groundwater.

Site Sensitivity Analyses, Former Service Stations, Hanley, SK; Swan Lake, MB; Swan River, MB. Completed for Oil & Gas Company - Dr. Hard completed Site Sensitivity Analyses to determine risk to human and ecological receptors at former gas station sites. Contaminants of concern were PHCs in soil and groundwater.