



Work Plan:  
**Cumulative Effects  
Assessment in the  
Southwestern  
Landfill EA**

**Walker Environmental Group Inc.  
Southwestern Landfill Proposal**

**September 2017**

## Executive Summary

The Minister's approval of the Southwestern Landfill (SWL) Terms of Reference required the development of this work plan describing how cumulative effects would be addressed in the Environmental Assessment (EA).

Cumulative effects assessment is not currently an explicit legal requirement of Ontario's EA process, but guidance provided by the federal government regarding cumulative effects assessment under the former *Canadian Environmental Assessment Act* (CEAA) and CEAA 2012 is available and was consulted. This EA methodology does contain and incorporate all of the constituent steps and elements recommended under the CEAA methodology.

This EA was designed from the outset as a cumulative effects assessment; it is embedded in the approved EA methodology rather than a separate study or additional step in the EA process. The key elements of the cumulative effects assessment are:

- A *multi-source assessment* wherein the effects of the proposed landfill are assessed in combination with those from other *sources*, over corresponding periods of the landfill lifespan (i.e., using the "do nothing" alternative as the environmental baseline); and
- A *multi-stressor assessment* examining how different *types* of effects may act together on a single receptor, using criteria that span across two or more study disciplines. In particular, the criteria developed for the social, economic and health studies are largely cross-disciplinary.

Each of the work plans for the individual technical studies supporting this EA reflect these cumulative effects elements and describe how they will be developed for their particular study discipline.

All of the above will be subject to consultation, and documented in the draft EA Report for review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.

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## 1. Introduction

Walker Environmental Group Inc. (“WEG” or “Walker”) is preparing an Environmental Assessment (EA) under the *Environmental Assessment Act* for the “*provision of future landfill capacity at the Carmeuse Lime (Canada) site in Oxford County for solid, non-hazardous waste generated in the Province of Ontario*”.

On March 17, 2016 the Minister of the Environment issued the *Notice of Approval* to Walker for its Southwestern Landfill Terms of Reference, subject to fifteen further Amendments. Walker published a consolidated version, including these further amendments, under the title “*Approved Amended Terms of Reference*” (May 10, 2016).

The Minister’s amendments include the following:

12. Walker shall also prepare a cumulative effects assessment work plan and implement the following activities:
- a. Prior to finalizing the cumulative effects assessment work plan, Walker shall be required to consult with the Ministry of the Environment and Climate Change in the development of a draft cumulative effects assessment work plan on the method and how the assessment of cumulative effects should be presented in the environmental assessment. Walker shall also consider the guidance document *Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act (CEAA, 2007)* when drafting its cumulative effects assessment work plan. In addition, Walker shall use cumulative effects assessment guidance documents issued by the Ministry of the Environment and Climate Change in the environmental assessment, if and when available.
  - b. Walker shall be required to post the draft cumulative effects assessment work plan on the project website, communicate the availability of the draft cumulative effects assessment work plan for review and comment by government agencies, Aboriginal Communities and interested members of the public in conjunction with the proposed public Open Houses or a Drop-In Exhibit (Terms of Reference, Section 10.2, pages 68), circulate copies of the work plan ministry's Technical Review Team, the Ministry of Natural Resources and Forestry, the Conservation Authority, Aboriginal communities and the Committee Peer Review Team for review and comment.
  - c. Arrange meetings/workshops, where requested to discuss the draft cumulative effects assessment work plan.
  - d. Consult with the Ministry of the Environment and Climate change on the finalization of the cumulative effects assessment work plan.
  - e. Post the final cumulative effects assessment work plan on the project website.

This document presents the draft work plan required under Minister’s Amendment #12 (a) to the *Approved Amended Terms of Reference*. It has been prepared by Walker for review and discussion among various stakeholders to the EA. Walker will carefully consider the input received in finalizing the work plan and carrying out the impact assessment studies during the EA.

Comments on this work plan may be provided to Walker; contact information is supplied at the end of this document.

## 2. Purpose

The purpose of this work plan is to describe how cumulative environmental effects are to be analysed and documented in the Southwestern Landfill EA, with particular reference to the federal guidelines regarding cumulative effects assessment.

## 3. Regulatory Requirements & Guidance

Cumulative effects assessment is neither explicitly required nor defined under the Ontario *Environmental Assessment Act*, nor is there any specific procedural guidance provided in the associated *Code of Practice*<sup>1</sup>. However, the Code of Practice does note that, under its *Statement of Environmental Values*, the Ministry will consider cumulative effects on the environment in making decisions (p. 15) and, therefore, proponents are encouraged to provide such information to the Ministry when preparing an EA (p. 16).

Cumulative effects assessment is, however, a requirement under the *Canadian Environmental Assessment Act* (CEAA, 2012) and guidance is provided by the Canadian Environmental Assessment Agency (the Agency) in the document *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (March, 2015<sup>2</sup>). Appreciating that there are some significant differences in scope, approach and methodology between the provincial and federal EA processes, the CEAA guidance was nonetheless carefully reviewed to ensure that its fundamental concepts were incorporated into this EA to the extent possible. Appendix C to this work plan provides a detailed comparison between the federal requirements, and the cumulative effects assessment for the proposed Southwestern Landfill.

## 4. Cumulative Effects Assessment in the Southwestern Landfill EA

The methodology established for the Southwestern Landfill EA, set out in Section 8.2 of the *Approved Amended Terms of Reference* (and reproduced here as Appendix A for the reader's convenience) incorporates an assessment of cumulative effects. It was designed from the outset as a fully integrated methodology, as opposed to a separate study or an additional step in the EA process. In that way, the net environmental effects of the proposed undertaking are characterized in the context of their cumulative effects, not in isolation from other types of effects, or other concurrent activities.

There are two key aspects of the Southwestern Landfill (SWL) evaluation methodology that are fundamental to the assessment of cumulative effects:

- Examining the effects of the proposed landfill in combination with those from other sources (*multi-source assessment*); and
- Examining how different types of effects may act together on a single receptor (*multi-stressor assessment*).

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<sup>1</sup> Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario; Ontario Ministry of the Environment, January 2014. At the time of writing, no specific guidance documents on addressing cumulative effects in the Ontario EA process have been issued.

<sup>2</sup> Updating and replacing the 2007 version.

Each of these is described further, below.

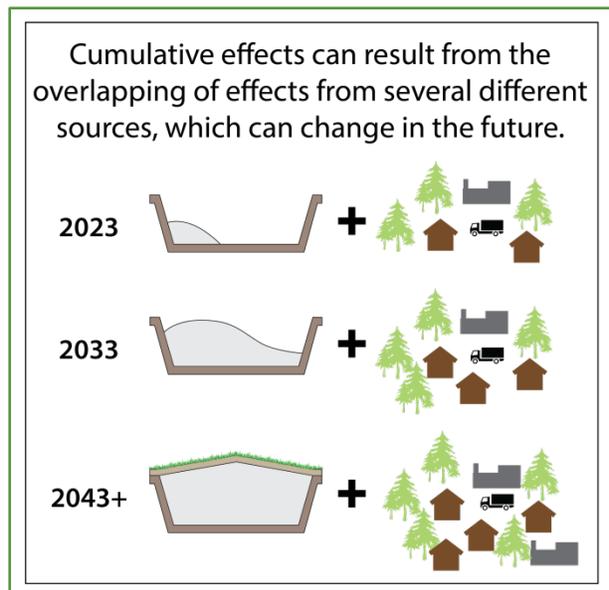
## 4.1. Multi-Source Assessment

In the SWL EA process, the potential effects of the landfill will be overlain on, and examined in combination with, those of the *environmental baseline conditions*. The baseline includes other activities within the same area that could contribute similar effects. In this case, for example, noise generated at the proposed landfill will be compared to, and combined with, other baseline sources of noise in the same area such as the ongoing quarrying and lime processing plants, other industries, road traffic, rail traffic, etc.



In addition, the SWL EA will go a step further and undertake a careful forecast of the *future baseline conditions*. The reason for this is that as the landfill develops and changes over the years, other activities in the same area are likely to be changing too. For instance, when the landfill is half full, perhaps ten years into its lifespan, the location where Carmeuse is mining in its adjacent quarry will have moved as well. New houses and industries may have been built in the nearby community. Traffic along the haul routes may have increased as the population grows.

In order to establish the baseline conditions, the experts leading each of the technical studies in the EA will first carry out an inventory of the existing conditions on and around the site using both published information and field investigations. Then, using some common assumptions regarding land use changes that can be expected in the area (from the County Official Plan and other sources), they will project their baseline conditions into the future as best they can. Collectively, this forecast of the baseline conditions represents the “*do nothing*” alternative that is required to be considered in an EA – that is, what would the environmental conditions be without the proposed landfill?



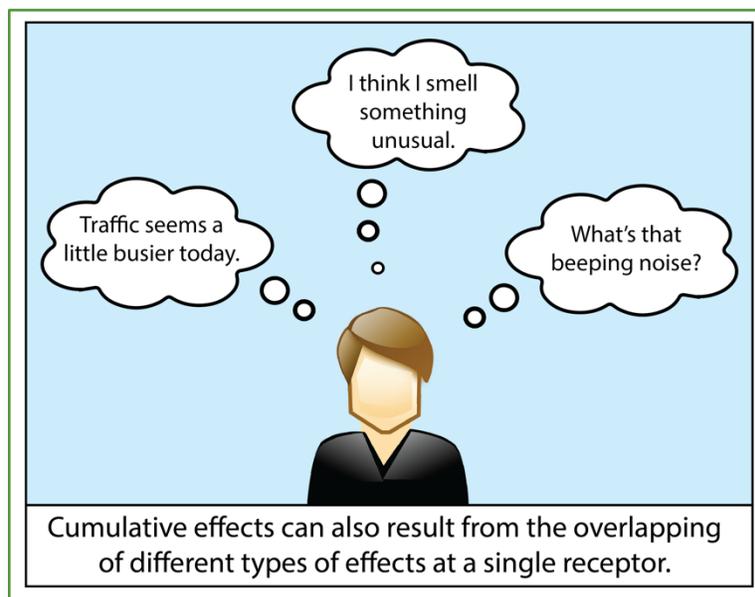
Next, each expert will overlay the potential effects of the proposed landfill on the baseline, to determine how significant the landfill effects would be over time, in combination with the ongoing effects from other sources. To continue the noise example above – what would the combined noise effects be from the landfill and other sources in ten years, when the

landfill is half full? In twenty years when the landfill is almost full? Beyond that when the landfill is closed?

Each of the work plans for the individual technical studies supporting this EA reflect this same basic approach to the multi-source assessment and describe how the future baseline conditions will be developed for their particular study discipline.

## 4.2. Multi-Stressor Assessment

The second key aspect to the cumulative effects assessment in this EA is to examine the situation where different *types* of effects act together on a single receptor. For instance, could the combined effects of some noise, dust, litter, odour, and traffic at a certain location result in a significant effect, even though these effects might individually meet acceptable standards?



The multi-stressor analysis in this EA consists of two main aspects.

First, the EA Criteria (Appendix B) were designed from the outset to describe multi-stressor effects. Unlike some EAs where the criteria are split according to individual study disciplines or subjects (i.e., each technical study has its own exclusive set of largely independent criteria), here the EA criteria describe the range of effects that could be experienced at the receptors, notwithstanding the fact that they may cross over two or more study disciplines. As just one example:

Criteria		Definition/Rationale
41	Loss/disruption of recreational resources.	Waste disposal facility operations and traffic may displace/disrupt existing recreational resources in the area, which could adversely affect the community at large. Disturbances could result from noise, dust, odour, visibility, birds and traffic congestion. Recreational resources include naturalist and interpretive opportunities.

Second, these sorts of inter-disciplinary criteria mean that the various technical studies must be carefully integrated and coordinated. For this reason, the following correspondence table was included in Walker’s Terms of Reference:

**Table A-2 – EA Technical Studies Interconnectivity Matrix**

Because effectively evaluating the EA criteria provided in Table A-1<sup>3</sup> may require input from experts in many disciplines, WEG adopted a methodology that facilitates a cross-functional approach among the experts. Each EA criterion has been assigned a ‘lead’ expert for reporting purposes (see Table A-1). The lead expert is responsible for coordinating efforts with any other expert they determine necessary to effectively report on that criterion as well as providing information to other experts who need input from them to report on any other criteria. Table A-2 provides possible relationships required between experts to effectively report on their respective EA criteria. The actual relationships will be developed during the EA process in consultation with interested parties.

		Reference Studies												
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic / Financial	Groundwater / Surface	Human Health	Land Use	Noise / Vibration	Social	Traffic	Visual / Landscape
Agriculture		✓							✓	✓		✓		
Air Quality												✓		
Archaeology														
Cultural Heritage									✓		✓		✓	
Ecology		✓					✓			✓		✓		
Economic / Financial	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Groundwater / Surface	✓										✓			
Human Health		✓					✓			✓				
Land Use														
Noise / Vibration														
Social	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Traffic	✓								✓		✓			
Visual Landscape											✓			

Note in this table that the social, economic and health studies are broad integrators of the other studies, since the criteria assigned to them tend to be many of the multi-stressor variety. In particular, the social criteria for this EA are structured to address such cumulative effect factors as *enjoyment*, *community cohesion* and *community character*.

Each of the individual technical work plans that support this EA includes details regarding the input required from other studies, as well as the information to be provided to other studies, in order to permit the characterization of multi-stressor cumulative effects.

<sup>3</sup> See Appendix B.

## 5. Contact Information

Comments or questions regarding this draft work plan, or the Environmental Assessment, may be addressed through any of the following:

- Sending written comments by mail or fax to:  
Darren Fry  
Walker Environmental Group Inc.  
160 Carnegie Street  
Ingersoll, ON N5C 4A8
- Sending an email with your comments to [info@walkerea.com](mailto:info@walkerea.com)

Additional information about the EA may be obtained at:

- The project web site: [www.walkerea.com](http://www.walkerea.com).
- Calling the toll-free project number: 1-855-392-5537
- Registering to receive the Southwestern Landfill Proposal Newsletter and electronic updates by sending an email with your contact details to: [info@walkerea.com](mailto:info@walkerea.com). You may also subscribe to the Newsletter by phone or mail.

## Appendix A

### Methodology - Evaluation of the Proposed Undertaking

(Reproduced from Section 8.2, Approved Amended Terms of Reference, May 10, 2016)

The Environmental Assessment will include an evaluation of the proposed undertaking in accordance with the requirements of Section 6.1 (2)(c) and (d) of the *Environmental Assessment Act*. The evaluation method will describe the following in relation to the proposed undertaking:

- The environment potentially affected;
- The effects that will be caused on the environment;
- The actions necessary to prevent, change, mitigate or remedy the effects on the environment;
- An evaluation of the advantages and disadvantages to the environment.

The evaluation of the proposed undertaking, incorporating the preferred alternatives resulting from the evaluation described in Section 8.1 above, will be carried out using a comprehensive impact assessment methodology. The assessment will be complete in accordance with the environmental assessment criteria and studies described in Appendix B to these Terms of Reference. The steps in the evaluation will be conducted in consultation with government agencies, Aboriginal Communities, the general public and any other interested parties and will consist of the following:

1. Develop a set of **facility characteristics** describing, in conceptual terms, the design and operating assumptions for the proposed undertaking, and incorporating a range of basic mitigation measures that will prevent and/or limit environmental impacts.
  - *Combine the preferred alternative methods for the proposed landfill into a design and operating concept, in sufficient detail to provide working assumptions for the impact assessment evaluation.*
  - *Include the typical or normal mitigation measures that would be incorporated into a landfill of this size and type.*
  - *Prepare a facility characteristics report including figures and plans, where appropriate. Include assumptions regarding all of the basic elements of landfill design and operations set out in O. Reg. 232/98 (the Landfill Standards).*
2. Describe the **environment potentially affected** by the proposed undertaking, including both the existing environment as well as the environment that would otherwise be likely to exist in the future without the proposed undertaking (i.e., the environmental baseline conditions, or the “do nothing” alternative).

- *Select common reference periods or milestone dates for the environmental baseline conditions assessment (e.g., existing, start of construction, 10-year mark, closure, etc.).*
  - *Prepare a forecast of future land uses in the Site & Site Vicinity, and Along the Haul Routes, using data from municipal official plan documents, and in consultation with municipal planning staff, with specific assumptions regarding the reference periods.*
  - *Select common receptor points for the assessment of overlapping effects between study disciplines.*
  - *Within each study discipline, collect secondary source and field data to characterize the existing environmental baseline conditions.*
  - *Within each study discipline, forecast the future environmental baseline conditions at the reference periods, taking into considerations all of the forecast land uses except for the proposed landfill (i.e., the 'do nothing' alternative).*
  - *Consolidate and document the existing and future baseline conditions in order to characterize the environment potentially affected by the proposed landfill.*
3. Carry out an evaluation of the potential **environmental effects** of the proposed undertaking, using the environmental assessment criteria and studies described in Appendix B to these Terms of Reference.
- *Prepare appropriate indicators for each of the EA criteria listed in Appendix B to these Terms of Reference.*
  - *Within each study discipline, carry out analyses to evaluate the potential effects of the proposed landfill facility on the environmental baseline conditions. Evaluate these against the criteria, indicators, study areas and study durations assigned to each respective study, incorporating input from other studies in order to assess any cumulative effects.*
  - *Prepare an overall matrix (tables) summarizing and characterizing (describing) the potential environmental effects of the proposed landfill for each of the criteria, indicators study areas and study durations.*
4. Carry out an evaluation of any additional actions that may be necessary to **prevent, change or mitigate environmental effects**, in order to identify the net effects, and incorporate those that are reasonable and feasible into the design and operations plan for the proposed undertaking.
- *For any negative environmental effects that are identified in the analysis, carry out an assessment to determine if there are any further actions that could be reasonably be taken to reduce or eliminate the effect.*

- *Incorporate any further feasible and reasonable mitigation measures into the design and operating concept for the landfill facility. Update the facility characteristics report accordingly.*
  - *Update the evaluation of environmental effects (i.e., Step 3 above), as necessary, to incorporate the additional mitigation measures.*
  - *Update the overall matrix (tables) to characterize the positive and negative net effects of the proposed landfill versus the environmental baseline conditions (i.e., the “do nothing” alternative) for each of the criteria, indicators study areas and study durations.*
5. Prepare a description and evaluation of the **environmental advantages and disadvantages** of the proposed undertaking, based on the net environmental effects that will result following mitigation.
- *Prepare a descriptive analysis summarizing and weighing the relative positive and negative net effects (advantages and disadvantages to the environment) for the proposed undertaking.*
  - *Document the rationale for the proposed undertaking based on the balance of advantages and disadvantages to the environment.*
  - *Prepare a final description of the undertaking based on the revised design and operating concept referenced in Step 4, above.*
  - *Prepare appropriate monitoring and contingency plans.*
  - *Prepare appropriate impact management plans.*
  - *Document all of the above (including the evaluation of Alternative Methods) in an Environmental Assessment report suitable for submission to the Minister of the Environment for approval under the Environmental Assessment Act.*

The proposed criteria, study areas, durations and technical studies to be employed during the Environmental Assessment are presented in Appendix B to these Terms of Reference. The scope of work for each of the necessary technical studies to support the evaluation of the proposed undertaking is also included in Appendix B.

WEG, and its technical experts, have also created draft work plans for each of the technical studies. WEG carried out consultation with government agencies, Aboriginal Communities and interested members of the public on these preliminary study plans during the preparation of these Terms of Reference. WEG intends to refine then finalize these draft work plans during the EA, once the preferred alternatives have been selected, in further consultation with government agencies, Aboriginal Communities and interested members of the public. These will include detailed descriptions of the specific study area(s), study durations, criteria, indicators and data sources associated with each study.

## **Appendix B**

### **EA Criteria Table**

(Reproduced from Appendix B, *Approved Amended Terms of Reference*, May 10, 2016)

Criteria	Definition/ Rationale	Studies Addressing the Criteria											Study Areas			Duration			
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landscape	On-Site & Site Vicinity	Along the Haul Route	Wider Area	Operational Period	Post-Closure Period
<b>Public Health &amp; Safety</b>																			
1	Explosive hazard due to combustible gas accumulation in confined spaces.						<input checked="" type="checkbox"/>											<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Effects due to exposure to air emissions.		<input checked="" type="checkbox"/>															<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Effects due to fine particulate exposure.		<input checked="" type="checkbox"/>															<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Effects due to contact with contaminated groundwater or surface water.						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Flood hazard.						<input checked="" type="checkbox"/>											<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Disease transmission <i>via</i> insects or vermin.				<input checked="" type="checkbox"/>													<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Criteria	Definition/ Rationale	Studies Addressing the Criteria											Study Areas			Duration			
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landscape	On-Site & Site Vicinity	Along the Haul Route	Wider Area	Operational Period	Post-Closure Period
7	Potential for traffic collisions.											<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
8	Aviation impacts due to bird interference.					<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
<b>Social and Cultural</b>																			
9	Displacement of residents from houses.											<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Disruption to use and enjoyment of residential properties.											<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	Disruption to use and enjoyment of public facilities and institutions.											<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
12	Disruption to local traffic networks.														<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13	Visual impact of the waste disposal facility.												<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Criteria	Definition/ Rationale	Studies Addressing the Criteria												Study Areas			Duration		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landscape	On-Site & Site Vicinity	Along the Haul Route	Wider Area	Operational Period	Post-Closure Period
14	Nuisance associated with vermin.										<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
15	Displacement/disturbance of cultural/heritage resources.				<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	Effects on land resources, traditional activities or other interests of Aboriginal Communities.										<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	Displacement/destruction of archaeological resources.			<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	
18	Level of public service provided by the waste disposal facility.										<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	Effects on other public services.										<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Criteria	Definition/ Rationale	Studies Addressing the Criteria											Study Areas			Duration		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landmarks	On-Site & Site Vicinity	Along the Haul Routes	Wider Area	Operational Period
20	Changes to community character/cohesion.										<input checked="" type="checkbox"/>			✓	✓	✓	✓	✓
21	Compatibility with municipal land use designations and official plans.								<input checked="" type="checkbox"/>					✓		✓	✓	✓
<b>Economics</b>																		
22	Displacement/disruption of businesses or farms.										<input checked="" type="checkbox"/>			✓	✓		✓	
23	Property value impacts.										<input checked="" type="checkbox"/>			✓	✓		✓	✓
24	Direct employment in waste disposal facility construction and operation.										<input checked="" type="checkbox"/>					✓	✓	
25	Indirect employment in related industries and services.										<input checked="" type="checkbox"/>					✓	✓	

Criteria	Definition/ Rationale	Studies Addressing the Criteria											Study Areas			Duration			
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landscape	On-Site & Site Vicinity	Along the Haul Route	Wider Area	Operational Period	Post-Closure Period
26	New business opportunities related directly to waste disposal facility construction and operation.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
27	New business opportunities in related industries and services.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
28	Public costs for indirect liabilities.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
29	Effects on the municipal tax base.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
30	Effect on the cost of service to customers.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
31	Effects on the provincial/ federal tax base.						<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Natural Environment &amp; Resources</b>																			
32	Loss/displacement of surface water resources.							<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
33	Impact on the availability of groundwater supply to wells.							<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
34	Effects on stream baseflow quantity/quality.							<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Criteria	Definition/ Rationale	Studies Addressing the Criteria											Study Areas			Duration		
		Agriculture	Air Quality	Archaeology	Cultural Heritage	Ecology	Economic/ Financial	Groundwater/ Surface Water	Human Health	Land Use	Noise/Vibration	Social	Traffic	Visual/ Landscape	On-Site & Site Vicinity	Along the Haul Route	Wider Area	Operational Period
35	Loss/disturbance of terrestrial ecosystems.					<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
36	Loss/disturbance of aquatic ecosystems.					<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
37	Displacement of agricultural land.	<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
38	Disruption of farm operations.	<input checked="" type="checkbox"/>												<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
39	Sterilization of industrial mineral resources.								<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
40	Displacement of forestry resources.								<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
41	Loss/disruption of recreational resources.													<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

## Appendix C

### Comparison to the Canadian Environmental Assessment Act Requirements

Cumulative effects assessment is a requirement under the *Canadian Environmental Assessment Act* (CEAA, 2012) and guidance is provided by the Canadian Environmental Assessment Agency (the Agency) in the document *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (March, 2015<sup>4</sup>). Appreciating that there are some significant differences in scope, approach and methodology between the provincial and federal EA processes, the CEAA guidance was nonetheless carefully reviewed to ensure that its fundamental concepts were incorporated into this EA to the extent possible. This appendix provides a detailed comparison between the federal requirements, and the cumulative effects assessment for the proposed Southwestern Landfill.

The guidance document specifies that the overall requirement or purpose under CEAA, 2012 (p. 2) is to “take into account any cumulative environmental effects that are likely to result from the designated project in combination with the environmental effects of other physical activities that have been or will be carried out”. It goes on to detail the recommended methodology in five steps<sup>5</sup>:

**Table 1: Steps in the CEAA Cumulative Effects Assessment**

<b>Steps</b>	<b>Objectives</b>
<b>Step 1: Scoping</b>	<i>Defining the scope of the assessment is the first step in the assessment of cumulative effects. Scoping helps determine which VCs<sup>6</sup> should be carried forward into the Step 2 analysis. This helps orient and focus the cumulative effects assessment.</i>
<b>Step 2: Analysis</b>	<i>Step 2 considers how the physical activities examined during Step 1 may affect the VCs identified for further analysis in Step 1. Step 2 addresses such VCs within spatial and temporal boundaries set for the assessment of cumulative effects during Step 1.</i>
<b>Step 3: Mitigation</b>	<i>Step 3 aims to identify technically and economically feasible measures that would mitigate adverse cumulative effects. Mitigation may include elimination, reduction or control or, where this is not possible, restitution measures such as replacement, restoration or compensation should be considered.</i>
<b>Step 4: Significance</b>	<i>Step 4 is concerned with determining the significance of any adverse environmental effects that are likely to result from a designated project in combination with other physical activities, taking into account the implementation of mitigation measures.</i>
<b>Step 5: Follow-up</b>	<i>With Step 5, a follow-up program is developed that addresses both project-specific environmental effects and cumulative effects. A follow-up program verifies the accuracy of the EA and determines the effectiveness of any mitigation measures that have been implemented.</i>

<sup>4</sup> Updating and replacing the 2007 version.

<sup>5</sup> Taken from the companion document Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012; CEAA, December 2014 (Draft).

<sup>6</sup> Valued [Ecosystem] Components.

The following describes how the Southwestern Landfill (SWL) EA methodology mirrors the five steps in the federal CEA methodology.

## Step 1: Scoping

*“Defining the scope of the assessment is the first step in the assessment of cumulative effects. Scoping helps determine which VCs should be carried forward into the Step 2 analysis. This helps orient and focus the cumulative effects assessment.”*

### Identifying Valued Components (VCs)

The federal CEA methodology refers to the term “*Valued Components*” (VCs)<sup>7</sup> which is not used commonly in the context of a provincial EA, where the term “*Receptor*” is more commonplace. Effectively, VCs are equivalent to the *receptors* to be identified in Step #2 of the SWL EA (see Appendix A). Each relevant technical study supporting the EA includes in its work plan an identification of receptors (which may be properties, areas, neighbourhoods, ecological features, etc.) where the respective environmental effects are analyzed.

In addition, Step #2 in the SWL EA includes the collaborative selection of a number of common receptor points “*for the assessment of overlapping [cumulative] effects between study disciplines*”. For example, these could include a residence, a public location or an ecological feature where the direct, indirect and cumulative effects will be analyzed.

### Determining Spatial Boundaries

Spatial boundaries are equivalent to the *study areas* set out in the SWL EA. The preliminary EA study areas are defined and justified in Section 6.2 and illustrated in Figure 5 of the *Approved Amended Terms of Reference*. Three generalized or common types of study areas are defined in the ToR: *On-Site and in the Site Vicinity*; *Along the Haul Routes*; and *Wider Area*. Furthermore, each of the 41 EA Criteria (Appendix B) has been correlated to these corresponding study area(s). Lastly, the draft technical work plans contained in the Supporting Documents to the *Approved Amended Terms of Reference* provide a more detailed rationale for specific study areas related to each of the respective studies and criteria. However, it is noted that these study areas are subject to refinement as the EA proceeds based on the outcome of the alternative methods assessment (i.e., once the preferred methods have been selected and developed), and iteratively once the preliminary environmental effects are assessed (e.g., if significant effects are determined to potentially extend beyond the study area, then the study area will be expanded and the effects re-assessed). This concept of iteration is also recommended in the federal CEA guidance (p. 3).

### Determining Temporal Boundaries

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<sup>7</sup> VCs refer to environmental features that may be affected by a project and that have been identified to be of concern by the proponent, government agencies, Aboriginal peoples, or the public. The value of a component not only relates to its role in the ecosystem, but also to the value people place on it. For example, it may have been identified as having scientific, social, cultural, economic, historical, archaeological, or aesthetic importance.

Temporal boundaries correspond to the *study durations* for the SWL EA, which are also defined and justified in Section 6.2 of the Approved Terms of Reference, and correlated to each of the 41 EA Criteria (Appendix B). Two general and common study durations are defined: *Operational Period*; and *Post-Closure Period*. Each of the 41 EA criteria has been correlated to its appropriate study duration (see Appendix B). The operational period is bounded by the time in which the landfill will be progressively constructed, filled and capped (estimated at about 20 years), but the post-closure period is flexible and, depending on the criterion, can extend for as long as the related effect(s) would be significant. For example, Criterion #2: *Effects due to exposure to air emissions* is associated with both the operational period and the post-closure period, since the landfill will produce and emit gas during its operating life and also for a certain period of time after the site is closed.

Step #2 of the SWL EA also includes “*Select common reference periods or milestone dates for the environmental baseline conditions assessment (e.g., existing, start of construction, 10-year mark, closure, etc.)*”. These common temporal reference points across the EA and all of its supporting technical studies will ensure that the cumulative effects can be characterized relative to the corresponding future baseline conditions (i.e., other activities occurring at the same points in time).

### Examining Physical Activities That Have Been Carried Out

In the SWL EA, Step #2: “*Within each study discipline, collect secondary source and field data to characterize the existing environmental baseline conditions.*” In the federal CEA guidance it is noted that past environmental conditions may be useful to inform the assessment of existing (or future) effects. (There is no purpose in using past conditions as a baseline since obviously the potential effects of the undertaking can only occur in the future.) In that respect, the SWL EA studies will, where appropriate, use historical environmental data where they are relevant to the existing or future baseline conditions (for example, air quality monitoring trends, water quality monitoring trends, population growth/decline trends).

### Examining Physical Activities That Will Be Carried Out

The federal CEA guidance recommends the evaluation of future physical activities (in addition to the proposed undertaking itself) that are *certain* and/or *reasonably foreseeable* (p. 4). This is the key aspect to the federal CEA methodology. Correspondingly, Step #2 in the SWL EA process includes the “*forecast of future land uses in the Site & Site Vicinity, and Along the Haul Routes, using data from municipal official plan documents, and in consultation with municipal planning staff, with specific assumptions regarding the reference periods*”. This will characterize the other physical activities that will be, or are likely to be, occurring in the same time frames as the various stages of the proposed landfill. This forecast of future land uses will consider both certain and/or reasonably foreseeable developments in a manner that is consistent with current federal CEA guidance<sup>8</sup>.

Next, the related environmental conditions and effects for each reference period will be forecast within each of the supporting technical studies, based on the forecast of the expected future land uses

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<sup>8</sup> Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012, Updated: March 2015. Catalogue No.: En106-116/2013E-PDF. ISBN: 978-1-100-22263-9.

mentioned above. This will establish the future environmental baseline conditions<sup>9</sup> in the absence of the proposed undertaking (i.e., in the provincial EA process, the “do nothing” alternative). Put in the CEA context, this will establish the environmental effects on the receptors (VCs) from all of the other certain and reasonably foreseeable future physical activities.

As noted above, the scoping of the receptors, study areas and study durations has been subject to consultation with government agencies, Aboriginal groups and the public during the course of the Terms of Reference development. The draft EA Report and associated technical work plans and studies will document further refinements to the scoping, and additional consultation with these stakeholders will occur during the EA in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.

## Step 2: Analysis

*“Step 2 considers how the physical activities examined during Step 1 may affect the VCs identified for further analysis in Step 1. Step 2 addresses such VCs within spatial and temporal boundaries set for the assessment of cumulative effects during Step 1.”*

Step 2 in the CEAA cumulative effects methodology correlates closely with Step #3 of the SWL EA (Appendix A). In that step, the potential environmental effects will be analysed for each of the 41 EA Criteria (Appendix B) based on the compilation and integration of the supporting technical studies. The supporting technical studies will respectively overlay the effects of the proposed undertaking on those of the baseline (which includes all other certain and reasonably foreseeable activities) at each corresponding time horizon in order to assess and characterize cumulative effects at the receptors. The methodology will vary from study to study (i.e., either quantitative or qualitative), depending on the nature of the effect. Furthermore, given the integrated, inter-disciplinary nature of the EA criteria, the cumulative effects of different types of impacts will also be characterized<sup>10</sup>, to the extent possible.

All of these analyses will be documented, criterion-by-criterion, in summary charts contained in the draft EA Report, while the detailed methodology, data, analyses and results will be contained in the respective draft technical supporting reports. These reports will be subject to review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.

## Step 3: Mitigation

*“Step 3 aims to identify technically and economically feasible measures that would mitigate adverse cumulative effects. Mitigation may include elimination, reduction or control or, where this is not possible, restitution measures such as replacement, restoration or compensation should be considered.”*

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<sup>9</sup> Note a difference in terminology. The SWL EA refers to “existing conditions”, and to “future baseline conditions” to represent future states of the environment in the absence of the proposed undertaking. CEAA limits the term “baseline conditions” only to describe the existing conditions, and refers to future conditions as “scenarios”.

<sup>10</sup> The characterization of these different types of effects will necessarily be largely qualitative or descriptive (for example, the effects of noise, odour and visibility cannot easily be added quantitatively).

Step 3 in the federal CEA methodology aligns closely with Step #4 of the SWL EA process (Appendix A). Here, Walker, in conjunction with its technical experts, will carry out a review of the potential effects (which in this case are the cumulative effects, as discussed above) to see if any adverse effects can be further mitigated. It is recognized that the best way to minimize cumulative effects is to minimize the direct and indirect effects of the SWL project through good design, facility operations and mitigation. Therefore, any reasonable mitigation will then be incorporated back into the design and operating concept for the facility.

Where the two processes differ slightly (in timing only) is that the federal definition of “mitigation” includes the development of “restitution measures” in this step, whereas the SWL EA process separates this as part of an overall impact management plan in Step #5 of the EA, after the net cumulative effects have been established (i.e., reconsidering the effects with the application and incorporation of the mitigation measures into the design and operations).

As an example (only), Walker’s impact management plan for its South Landfill in Niagara Region includes a commitment to community road cleaning. This addresses cumulative effects since it monitors and mitigates the effects of excess mud and dirt on neighbourhood roads that arise from Walker’s landfill operations combined with other sources in the local area such as farming, new construction and local traffic.

All of the mitigation measures will be documented, criterion-by-criterion, in summary charts contained in the draft EA Report, along with the updated facility characteristics, while the detailed methodology, data, analyses and results for the mitigation recommendations will be contained in the respective draft technical supporting reports. These reports will be subject to review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.

## Step 4: Significance

*“Step 4 is concerned with determining the significance of any adverse environmental effects that are likely to result from a designated project in combination with other physical activities, taking into account the implementation of mitigation measures.”*

The determination of the significance of an adverse environmental effect is a fundamental component of the overall federal EA process. Determining significance as undertaken in the federal EA process is neither explicitly required nor defined under the Ontario Environmental Assessment Act, nor is there any specific procedural guidance provided in the associated Code of Practice.

Nevertheless, the SWL EA process embeds the concept of *significance* through the development of *indicators* for each of the EA Criteria, as noted under Step #3. As recommended in the Ministry’s EA Code of Practice (p. 26), *“each criterion will then be followed by indicators that will be measured for each criterion”*. Thus, in the Ontario EA process, the indicators are the measure of significance, and because these indicators are being applied to an analyses of the cumulative effects wherein the baseline includes other certain and reasonably foreseeable activities (see above), then it is a characterization of the significance of the cumulative effects.

The use of indicators in the EA aligns with the concept of *thresholds* in the federal process. Note that many of the indicators were already developed and proposed, and subject to review and comment by government agencies, Aboriginal groups and the public, as part of the preliminary draft work plans for each of the technical studies. As an example (only), one of the indicators proposed for EA Criterion #35 *Loss or disturbance to terrestrial ecosystems* is the loss of the (lesser of) 10 ha or 5% of habitat for area-sensitive species as defined by the Ecological Land Classification System for Southern Ontario<sup>11</sup>. These work plans, including the indicators, will be subject to further review during the EA process, as set out in the *Approved Amended Terms of Reference*. The detailed methodology, data, analyses and results for the assessment of the indicators (significance) will be contained in the respective draft technical supporting reports. These reports will also be subject to review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.

## Step 5: Follow-up

*“With Step 5, a follow-up program is developed that addresses both project-specific environmental effects and cumulative effects. A follow-up program verifies the accuracy of the EA and determines the effectiveness of any mitigation measures that have been implemented.”*

The SWL EA methodology includes in Step #5 a commitment to develop monitoring plans, contingency plans and impact management plans, all of which will be documented in the draft EA Report for review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*. Because the net environmental effects in this EA will be assessed on a cumulative effects basis (as discussed above), then the monitoring programs and impact management plans will also consider cumulative effects, where relevant and appropriate.

As an example, monitoring programs will be developed for surface water and groundwater that will include both upstream (upgradient) and downstream (downgradient) testing in order to characterize any landfill emissions in relation to the baseline, which will include contributions from other sources, and to confirm that the mitigation measures are performing as planned. As a result, the effects of the landfill itself, as well as the overall cumulative effects, will both be determined.

## Summary

The Minister’s approval of the Southwestern Landfill (SWL) Terms of Reference required the development of this work plan describing how cumulative effects would be addressed in the Environmental Assessment (EA).

Cumulative effects assessment is not currently an explicit legal requirement of Ontario’s EA process, but guidance provided by the federal government regarding cumulative effects assessment under the former *Canadian Environmental Assessment Act* (CEAA) and CEAA 2012 is available and was consulted.

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<sup>11</sup> *Approved Amended Terms of Reference*, Supporting Documents; *Ecological (Terrestrial/Aquatic) Work Plan*; Beacon Environmental, May 2013, p.8.

The SWL EA was designed from the outset as a cumulative effects assessment; it is embedded in the EA methodology rather than a separate study or additional step in the EA process. However, the SWL EA methodology does contain and incorporate all of the constituent steps and elements recommended under the CEAA methodology, summarized as follows.

#### Scoping:

- A set of forty-one *EA Criteria* have been developed, many of which constitute a cross-disciplinary and multi-stressor assessment of cumulative effects.
- *Receptors* will be selected where the cumulative effects from different sources will be analyzed.
- *Common receptors* will also be selected for some of the technical studies so that the cumulative effects arising from different types of impacts can also be characterized.
- *Study Areas* have been developed (and will be further refined during the EA) that reflect the spatial boundaries of the potential cumulative effects.
- *Study Durations* have been developed that reflect the temporal boundaries of the potential cumulative effects. Common future reference periods (or milestone dates) will also be developed during the EA for forecasting cumulative effects.
- Historical and new data will be used to establish the *Existing Environmental Conditions*, reflecting physical activities that have been, or are being, carried out within the study areas.
- Land use plans and other information will be used to forecast *Future Baseline Conditions* (i.e., the state of the environment at various milestone dates in the future in the absence of the proposed undertaking, also known as the “do nothing” alternative), reflecting certain or reasonably foreseeable physical activities that will be carried out in the future.

#### Analysis:

- Experts in each technical discipline will analyze the potential effects of the proposed landfill relative to the corresponding future environmental baseline (which incorporates the effects of other physical activities), and thereby characterize any cumulative effects.
- The cumulative effects will be integrated and characterized in the EA report for all 41 EA Criteria.

#### Mitigation:

- A review will be conducted by Walker and its technical experts to determine whether any of the adverse cumulative effects can be further mitigated through reasonable changes in the proposed design or operation of the landfill.
- Mitigation measures will be incorporated into the facility characteristics, and the net cumulative effects assessed and documented for each of the 41 EA Criteria.

#### Significance:

- *Indicators* have been developed for each of the 41 EA Criteria (and will be further refined during the EA) that will serve as a measure or gauge of the significance of the cumulative effects.
- The effects of the proposed landfill will be assessed and characterized relative to these indicators.
- The indicators align with the use of *thresholds* in the federal methodology.

#### Follow-Up:

- *Monitoring Plans, Contingency Plans and Impact Management Plans* will be established based

on the net cumulative effects.

All of the above will be subject to consultation, and documented in the draft EA Report for review by government agencies, Aboriginal groups and the public in accordance with the consultation plan set out in the *Approved Amended Terms of Reference*.