Report to Waste Management Working Group

To: **Chair and Members**
Waste Management Working Group
From: **Jay Stanford, MA, MPA,**
Director of Environment, Fleet and Solid Waste
Subject: **Proposed Draft Environmental Assessment Study Report for the Expansion of the W12A Landfill**
Date: **March 16, 2021**

Recommendation

That, on the recommendation of the Director of Environment, Fleet and Solid Waste, the:

a) The report *Draft Environmental Assessment of the Proposed W12A Landfill Expansion, City of London* **BE RECEIVED** for information.

b) The release of the report for review and comment by the Government Review Team, Indigenous Communities and the general public **BE SUPPORTED** noting that minor changes/revisions to the report may be made prior to release.

Executive Summary

The Environmental Assessment (EA) for the proposed expansion of the W12A Landfill was completed in accordance with the Terms of Reference (ToR) and recommends that the W12A Landfill be expanded vertically over the existing waste footprint. The vertical expansion will increase the maximum height of the landfill by 26 metres and the disposal volume of the landfill by 13,800,000 m^3. It is expected the landfill expansion will accommodate 9,900,000 tonnes of waste and take 25 years to fill.

All aspects of the EA process need to be documented in an Environmental Assessment Study Report (EASR) and submitted to the Ministry of the Environment, Conservation and Parks (MECP) for approval. A draft EASR (titled *Environmental Assessment of the Proposed W12A Landfill Expansion, City of London*) has been prepared to receive feedback from stakeholders prior to submission to the MECP.

It is recommended the WMWG support the release of the draft EASR to obtain feedback from the Government Review Team (GRT), Indigenous Communities, general public and other stakeholders noting that minor changes/revisions (e.g., grammar corrections, simpler wording, etc.) to the version of the EASR report being reviewed may be made prior to release of the Draft EASR.

Linkage to the Corporate Strategic Plan

Municipal Council continues to recognize the importance of solid waste management and the need for a more sustainable and resilient city in the development of its 2019-2023 - Strategic Plan for the City of London. Specifically, London's efforts in solid waste management address three Areas of Focus, at one level or another:

- Building a Sustainable City
- Growing our Economy
- Leading in Public Service

On April 23, 2019, the following was approved by Municipal Council with respect to climate change:

Therefore, a climate emergency be declared by the City of London for the purposes of naming, framing, and deepening our commitment to protecting our economy, our eco systems, and our community from climate change.

Both the Resource Recovery Strategy and Residual Waste Disposal Strategy (including the EA) address various aspects of climate change mitigation and climate change adaptation. These elements are also a requirement that must be addressed as part of EA documentation.

Analysis

1.0 Background Information

1.1 Previous Reports Related to this Matter

Some relevant reports that can be found at www.london.ca under City Hall (Meetings) include:

- Environmental Assessment Process – Updates and Preferred Method to Expand the W12A Landfill (September 22, 2020 meeting of the Civic Works Committee (CWC), Item 2.11)
- Proposed Terms of Reference - Environmental Assessment of the Proposed W12A Landfill Expansion (September 25, 2018 meeting of the CWC, Item #3.1)
- Draft Proposed Terms of Reference – Environmental Assessment of the Proposed W12A Landfill Expansion (April 17, 2018 meeting of the CWC, Item #3.3)

Some relevant reports that can be found at www.london.ca under City Hall (Meetings – Advisory and other Committee Meetings) include:

- Environmental Assessment Process (August 13, 2020 meeting of the Waste Management Working Group (WMWG)), Item #4.21
- Environmental Assessment Process (December 18, 2019 meeting of the WMWG, Item #4.2)
- Proposed Amended Terms of Reference (April 18, 2019 meeting of the WMWG, Item #3.2)
- Proposed Terms of Reference (August 15, 2018 meeting of the WMWG, Item #2.1)

2.0 Discussion and Considerations

2.1 Background

An EA under the *EA Act* is a planning study that assesses environmental effects and advantages and disadvantages of a proposed project. The environment is considered in broad terms to include the natural, social/cultural and economic aspects of the environment.

There are different classes (types) of EAs depending on the type and complexity of the undertaking (project). The most rigorous EA is an Individual EA. An Individual EA is less prescribed than the more common class EAs and is used for large-scale projects like landfill sites.

The first phase of the Individual EA process is the development and approval of a ToR by the Minister of the Environment, Conservation and Parks. The ToR becomes the framework or work plan for the preparation and review of the Individual EA. The ToR allows the proponent to produce an EA that is more direct and easier to be reviewed by interested persons. The Amended ToR for the proposed expansion of the W12A Landfill was approved on July 30, 2019.

The second phase of the Individual EA process is completion and approval of an EA. The proponent completes the EA in accordance with the approved ToR. All aspects of the EA process are documented in the EASR. The EASR is submitted to the MECP for approval by the Minister of Environment, Conservation and Parks.

2.2 EA Terminology

The EASR has a different title depending how far along it is in the approval process. For clarity these various titles are listed below in Table 1.

Table 1 - EA Terminology

Title	Definition
Preliminary Draft EASR (completed)	An early draft of the Draft EASR. The MECP does a preliminary screening of the Preliminary Draft EASR to ensure all documentation requirements have been met.
Draft EASR (underway)	Comments from the MECP on the Preliminary Draft EASR have been addressed. Council approves release of the Draft EASR for feedback. The Draft EASR is submitted to GRT, public and other stakeholders for review and comment.
EASR	Comments from the GRT, public and other stakeholders on the Draft EASR have been addressed. Council approves submission of the EASR to the MECP for approval.
Amended EASR	The MECP often ask for revisions to the EASR to address comments and/or concerns prior to MECP staff submitting the EASR to the Minister for approval. These comments/concerns may come from the MECP or be received by the MECP from other stakeholders during their consultation period.
Approved EASR (or Approved Amended EASR)	EASR as approved by the Minister of Environment, Conservation and Parks.

2.3 Development of the EA

Development of the EA began on September 19, 2019 with the release of the Notice of Commencement and the start of the Community Engagement Program. The Community Engagement Program included:

- Series of Open Houses in February 2020 and November 2020. Each series of open houses was followed by a virtual open house on the project website;
- Project Website (Getinvolved.London.ca/WhyWasteDisposal) which had over 2,000 visitors during the EA phase including 565 visitors during the comment period following the November 2020 Open Houses and 437 visitors during the comment period following the February 2020 Open Houses:
- Indigenous Community engagement including two workshops;
- Updates provided to various stakeholder groups (residents within 2 kilometres of the landfill, landfill customers, community groups, key government agencies (referred to as the government review team), City advisory committees (ACE, AAC, and EEPAC), Indigenous Communities, W12A Landfill Public Liaison Committee and the Waste Management Community Liaison Committee, other interested persons who signed up to receive updates, etc.); and,
- Traditional media and social media advertising.

The EA was completed in accordance with the ToR which involved:

- completing numerous technical studies examining all aspects of the environment (natural environment, socio-economic and technical);

- comparing three expansion alternatives and determining the preferred expansion alternative;

- an impact assessment of the preferred expansion alternative on the environment;

- considering and incorporating feedback from various stakeholder groups (e.g., nearby residents, community groups, Indigenous Communities, governments agencies, etc.); and,

- documenting all aspects of the EA process in the EASR.

2.4 Summary of Draft EASR

The full draft EASR (titled *Environmental Assessment of the Proposed W12A Landfill Expansion, City of London*) is provided under separate cover. The Executive Summary of the report is provided in Appendix A.

It is worth noting key parts of the Draft EASR have previously been before the WMWG, Civic Works Committee, Council, and community stakeholders as it was being developed. The current report pulls all these details together in a prescribed format.

<u>Overview of EASR</u>
The key features of the EA that are documented in the EASR are:

- the results of numerous technical studies completed to understand existing conditions and allow for the comparison of potential expansion alternatives;

- comparison of three expansion alternatives which were 1) vertical expansion over the existing waste footprint, 2) horizontal expansion to the north with vertical expansion over part of existing footprint; and 3) horizontal expansion to the east with vertical expansion over part of the existing footprint;

- recommendation of vertical expansion over the existing waste footprint as the preferred expansion alternative;

- summary of the findings and mitigation recommendations of the various impact assessments completed for the preferred expansion alternative:

- the vertical expansion will increase the maximum height of the landfill by 26 metres and the disposal volume of the landfill by 13,800,000 m^3. It is expected the landfill expansion will accommodate approximately 9,900,000 tonnes of waste and take 25 years to fill; and,

- over 30 commitments made to facilitate the expansion. Many of these commitments came from the impact assessment studies which recommended various mitigation measures be incorporated into the design and operations to prevent adverse impacts to the environment. The complete list of commitments is provided in Appendix B and key commitments are summarized in Table 2.

Table 2 Summary of Key Commitments

Impact Assessment Report and Finding	Commitment
Atmosphere Report (Air Quality/Noise) • Potential for noise impacts at 3691 Manning Drive. • Additional measures for dust and odour management.	• Design and implement a follow-up noise monitoring program when landfill operations are within 330 metres of 3691 Manning Drive. • Prepare a fugitive dust management plan and complaints response protocol. • Review and update the odour management plan and complaints response protocol.
Groundwater Report • Potential minor exceedance of aesthetic water quality parameter (chlorides) in several hundred years.	• Incorporate additional leachate collection measures into the landfill design (estimated cost of approximately $5 million). It should be noted the proposed additional measures will also result in improved landfill gas capture.
Biology Report • Confirmed Significant Wildlife Habitat for Monarch Butterfly and Species at Risk Habitat (SAR) for grassland birds (i.e., Eastern Meadowlark and Bobolink) on the landfill.	• Develop an Environmental Mitigation and Monitoring Plan. • Prepare and implement a SAR and Wildlife Observation Protocol to outline the steps to take in the event of an encounter with wildlife, including SAR, during the construction stage. • Consult MECP to determine appropriate compensation for habitat loss of SAR grassland birds. • Progressively re-vegetate the landfill with native plant species.
Archaeology Report • One site with cultural heritage value or interest (First Nations) located in the northern buffer area.	• Commitments to ensure no construction or other activities will take place within 10 metres of site.
Visual Report • Report identifies properties with increased visual impacts.	• Screening berms will be placed on south side of disposal area to screen disposal operations from residences to the south. • Screening berms will be constructed along White Oak Road and Scotland Drive to screen landfill operations from the road. • Seek feedback on appropriate roadside view-mitigation measures from area residents when the Community Enhancement and Mitigation Measures Program (CEMMP) is updated. • Seek feedback from the public on appropriate visual screening measures for affected individual residential properties when the CEMMP is updated.

Table 2 Summary of Key Commitments

Impact Assessment Report and Finding	Commitment
Climate Change	• Include the possibility of increased leachate generation from climate change into the design of the proposed replacement perimeter leachate collection system. • Include the possibility of increased leachate generation from climate change in the design of the replacement for the main leachate pump station on the W12A Landfill site.

2.5 Next Steps

The next steps and tentative timetable for approval of the EASR is presented below.

Table 1 - Tentative Timetable for EASR Approval

Date	Step
March 30, 2021	• CWC to receive Draft EASR and approve for stakeholder circulation.
April 13, 2021	• Council approval of CWC recommendation.
April 20 to May 19, 2021	• Circulate Draft EASR to GRT and other stakeholders. • Notify interested stakeholders; place Draft EASR on-line and at City Hall for review. • The 30 day review period may be extended if stakeholders need additional time.
Late June/Early July, 2021	• Review of EASR by WMWG.
July 27, 2021	• CWC to hold public participation meeting for EASR. • CWC to consider recommending approval for submission to MECP.
August 10, 2021	• Council approval of CWC recommendation.
August 19, 2021	• Formal submission of Proposed EASR to MECP (includes notice to all stakeholders).
August 19, 2021 to Mid-March 2022 or later	• MECP provides a seven week review period for stakeholders to provide comments to the MECP. • MECP evaluates EASR submission and makes recommendation to the Minister. • Minister makes Decision to Approve or Reject. • Prescribed Deadlines (Ontario Regulation 616/98) requires MECP process to be completed in 30 weeks but the process often takes longer.

3.0 Financial Impact/Considerations

3.1 Future Capital Costs

The estimated capital cost of the landfill expansion is $65,000,000 (present 2021 costs). The cost rises to approximately $80,000,000 over the 25-year site life of the landfill assuming 2% inflation for future costs. These costs are less than previously estimated for the landfill expansion however the costs to be incurred for initial development over the next 10 years may be higher than the funding currently included in the 10-year capital budget.

The required changes to the capital budget to accommodate the construction portion of this project will be addressed as part of the budget update process and brought forward as a budget amendment for Committee and Council approval.

3.1 Future Operating Costs

It is expected that operating costs of the expanded landfill site will increase by approximately 10% ($500,000 per year) to accommodate additional and enhanced site operations including additional gas collection measures, additional environmental monitoring requirements, enhanced nuisance control measures (noise, litter, etc.), improved small vehicle depot operations, visual screening measures, etc.

Conclusion

All aspects of the EA process to expand the W12A Landfill need to be documented in an EASR and submitted to the MECP for approval. A draft EASR has been prepared to receive feedback on the EASR from stakeholders prior to formal submission to the MECP.

It is recommended the WMWG support the release of the draft EASR for feedback from the GRT, general public and other stakeholders noting that minor changes/revisions to the version of the EASR report being reviewed may be made prior to release.

Prepared by:	**Mike Losee, B.SC** **Division Manager, Solid Waste Management**
Submitted by:	**Jay Stanford, MA, MPA** **Director, Environment, Fleet & Solid Waste**
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c. Wesley Abbot, Project Manager, Oakridge Environmental

Appendix A – Executive Summary of Draft Environmental Assessment Study Report

Appendix B – List of Commitments in the Draft Environmental Assessment Study Report

Appendix A
Executive Summary of Draft Environmental Assessment Study Report

Introduction

This document is the environmental assessment study report (EASR) for the environmental assessment (EA) of the proposed expansion of the W12A Landfill site (the Project) being undertaken by the City of London (the City). This is an individual EA completed under the provincial *Environmental Assessment Act* (EAA).

The W12A Landfill is located at 3502 Manning Drive in the south end of the City of London, Ontario. The landfill has been in operation since 1977 and operates under Environmental Compliance Approval (ECA) #A042102. The residual waste disposed at the landfill is generated from an existing service area consisting of the City, the Municipality of Thames Centre, the two water treatment plants that serve the City located outside the City and a privately owned recycling facility. The site also receives Municipal Hazardous or Special Waste (MHSW) from residents and small quantity generators (businesses with limited amounts of MHSW) from within the City and from the Counties of Middlesex and Elgin; this waste is sent off-site for recycling, reuse or disposal. The landfill is expected to reach its approved capacity by 2024.

The existing W12A Landfill site has a 107 hectare (ha) fill area and is located on a 142 ha property. The average height of the landfill above ground surface is about 9 to 12 metres (m). The peak elevation is approximately 17 m above the ground surface. In summary, the currently approved W12A Landfill can be described as having a large footprint area and a low height above grade. The total approved site capacity is 12,500,000 cubic metres (m^3). The site is approved to receive up to 650,000 tonnes per year of solid non-hazardous waste, noting that over the past 10 years the site typically receives between 230,000 and 320,000 tonnes of waste per year. The landfill site is located in a favourable geologic setting, underlain by a deposit of low permeability clay till that provides a natural barrier to downward groundwater (and landfill leachate) movement. The landfill has been developed in two phases. Phase 1 comprises the eastern portion of the waste footprint; the waste rests directly on the clay soil and is surrounded by a perimeter leachate collection system (LCS). Phase 2, comprising the western portion, is underlain by a continuous granular leachate collection layer/system. The collected leachate is conveyed off-site via a forcemain and municipal sanitary sewer system for treatment at the Greenway Wastewater Treatment Plant (WWTP). Completed areas of the landfill have a landfill gas (LFG) collection system; the collected LFG is sent to an on-site enclosed flare for combustion.

The W12A Landfill has had groundwater, surface water, leachate, water well and LFG monitoring programs since 1976. A summary of the results of the 2019 monitoring programs indicates that the landfill is performing acceptably and in accordance with provincial requirements in terms of potential effects of leachate on groundwater and surface water, as well as in terms of LFG migration in the subsurface.

Additional detail on the site history, design, operations and performance is provided in Sections 1.3 and 5.13 of the EASR.

Description of the Project

To plan for the future, the City has commenced the development of two long-term waste management strategies: the Resource Recovery Strategy, and the Residual Waste Disposal Strategy. The Resource Recovery Strategy involves the development of a plan to maximize waste reduction, reuse, recycling, resource recovery, energy recovery and/or waste conversion in an economically viable and environmentally responsible manner. The current residential diversion rate is 45%. The Resource Recovery Strategy is scheduled to be completed in 2022. As an interim step, in 2018 the City completed the 60% Waste Diversion Action Plan that includes the development of programs and an implementation schedule for specific activities to increase the City's diversion rate to 60% for residential waste.

The Residual Waste Disposal Strategy involves the development of a long-term plan to manage residual waste, which will require obtaining additional residual disposal

capacity. Several ways of satisfying this need have been assessed (referred to as ‘Alternatives To’ the undertaking). The assessment of these ‘Alternatives To’ has been completed by the City using a previously completed long term waste management planning study, as described in Section 4 of the approved Amended ToR and summarized in Section 2.5 of this EASR. The preferred ‘Alternative To’ included the expansion of the W12A Landfill, which is the subject of this EA.

The purpose of the EA study is to seek approval for additional waste disposal capacity because the existing W12A landfill is reaching its approved total disposal capacity by 2024. The planning period for this EA is 25 years, so from the beginning of 2024 through to the end 2048.

To estimate the quantity of residual waste from the existing service area requiring disposal over this planning period, the City proposes to implement the Resource Recovery Strategy such that 60% residential diversion will be achieved by the end of 2022. It is projected that the expanded W12A landfill will require disposal capacity for 9,400,000 tonnes of residual waste over the 25 year planning period.

In addition, the City is proposing to assist neighbouring municipalities with their future residual waste management needs by having a larger service area for the expanded landfill. Based on interest expressed, the regional service area is proposed to consist of the City of London plus Elgin County, Middlesex County, Huron County, Lambton County and Perth County. In 2017, these municipalities annually disposed of approximately 86,000 tonnes of residual waste and had an overall residential diversion rate of 38%. Based on information about the life remaining in their existing landfills, proposed expansions of their landfills and various diversion scenarios, it is projected that an additional 500,000 tonnes of residual waste from the neighbouring municipalities could require disposal over the 25 year planning period.

Having available residual waste disposal capacity for municipalities outside of London from the proposed regional service area municipalities does not mean that London is obligated to accept waste from these municipalities in the future. City Council will have the authority to determine which, if any, municipalities or businesses outside of London can use any City facilities and under what conditions they are allowed to do so. For example, the City may require municipalities and businesses to demonstrate that their diversion rate matches or exceeds the City’s diversion rate to be allowed to dispose of residual waste at the W12A Landfill.

As such, it is proposed that the W12A Landfill expansion should be designed to dispose of 9,900,000 tonnes of waste between 2024 and 2048, which corresponds to 13,800,000 cubic metres (m^3) of additional airspace. It is also proposed for the expansion that the annual maximum waste receipt be reduced from 650,000 to 500,000 tonnes per year.

Methodology

The EA was carried out in accordance with the approach described in the approved Amended ToR, which was approved on July 30, 2019. The EA was undertaken in a series of nine steps as described below. Additional details about each step are further described in Section 3.0 of this EASR.

- Step 1 – Outline the aspects of the environment considered and characterize the existing environmental conditions;
- Step 2 – Identify the ‘Alternative Methods’ of landfill expansion (and incorporate conceptual design mitigation measures);
- Step 3 – Qualitative and quantitative, where possible, evaluation of ‘Alternative Methods’;
- Step 4 – Compare the ‘Alternative Methods’ for landfill expansion and identify the preferred alternative;
- Step 5 – Describe the preferred ‘Alternative Method’ for landfill expansion;
- Step 6 – Refine the mitigation measures and determine the net effects of the preferred alternative;

- Step 7 – Consideration of climate change;
- Step 8 – Cumulative impact assessment; and
- Step 9 – Preparation of the EASR.

The environmental, socio-economic and technical components were identified in the approved Amended ToR and reviewed by the public at Open House #2 during the ToR phase of the EA. At commencement of the EA no changes to the components used to evaluate the Undertaking were identified. Likewise, the indicators and criteria to assess the effects of the proposed Undertaking were identified during the ToR phase of the project, reviewed during the EA and no changes were proposed.

Consultation

Consultation with the public, agencies, Indigenous Communities and other stakeholders was ongoing throughout the EA process. A variety of consultation events and activities were used during the EA process. The consultation program for the EA was presented in the approved Amended ToR.

The consultation activities carried out during the EA consisted of:

- Letter and email correspondence distributed to the public, interested stakeholders (e.g. businesses using the landfill, environmental groups, etc.), Government Review Team (GRT), and Indigenous communities;
- Meetings, presentations and tours with Indigenous Communities;
- Notices published in local newspapers;
- Notices on the EA project website (https://getinvolved.london.ca/WhyWasteDisposal);
- Two open houses in the local community;
- Presentations and discussions to the existing W12A Landfill Public Liaison Committee (PLC);
- Media releases;
- Meetings and telephone calls between the City, the EA consultants, and the Ministry of the Environment, Conservation and Parks (MECP); and
- Informal meetings, telephone calls and discussions with Indigenous Communities, local politicians, business owners, community organizations and neighbours to the existing W12A Landfill on an as needed basis throughout the EA.

A complete list of issues and concerns raised and responses was compiled and is included in Volume V – Consultation Record; a summary of these issues, responses and how each was addressed in the EA is provided in Section 4.7 of the EASR. The input received during various consultation events was carefully considered and incorporated into the EA, where applicable. The following are some of the questions and concerns raised during the EA process:

- Proposed regional service area and conditions under which the neighbouring municipalities should be allowed to use the W12A Landfill;
- Landfill and other traffic;
- Height of expanded landfill – visual impacts and effects on wind;
- Beneficial use of collected LFG;
- Importance of noise and odour control;
- The importance of expanding waste diversion and resource recovery programs in addition to additional landfill capacity;
- Visual screening of landfill operations; and

- Potential groundwater impacts – impacts to groundwater quality and influence of fractures in upper portion of clay soil underlying the landfill.

In addition, the City held two workshops that were attended by interested Indigenous Communities. The first workshop focused on the groundwater assessment work plan and resulted in modifications being made to the work program. The second workshop described the proposed expansion and the results of impact assessment for specific environmental and socio-economic components of interest. These consultation activities are described in Section 4.7.3 of the EASR.

Description of the Environment Potentially Affected

Section 5.0 of the EASR provides a description of the environmental, socio-economic, and technical components, which together are defined as the existing environment that may be affected by the undertaking. The environmental component includes atmosphere, hydrogeology, surface water and biology. The socio-economic component includes socio-economic, land use and cultural heritage. The technical component includes design and operations and transportation aspects of the environment.

Section 5.1 provides an overview of the study areas (Site, Site-vicinity and Wider study areas) to provide context for the assessment. Appropriate study areas for each component were determined based on the potential extent of the effects from the proposed expansion and along the main haul route to the landfill site.

The existing conditions for the environmental, socio-economic and technical components are detailed for each component in Volume IV, Appendices D.01 through D.12 and summarized in Sections 5.2 to 5.13 of the EASR.

The Site Study Area (or Site Area when referring to the preferred approach to expansion) is the existing landfill property and adjacent lands to the north and east where expansion could occur. This Site Study Area is occupied by the existing landfill, stormwater management (SWM) ponds and ancillary landfill operations and diversion facilities and the potential expansion areas. The general area surrounding the landfill are currently characterized by a mix of agricultural uses, with some rural residential uses. The City owns a majority of the parcels within a 500 m Site-vicinity Study Area to the east of the Site Area, as well as a number of parcels to the west and north of the Site Area.

The Haul Route Study Area consist of the haul routes associated with the landfill, specifically Manning Drive between Wellington Road South and Highway 401 and Wellington Road South between Dingman Drive and Manning Drive; also, Wonderland Road South between Decker Drive and Manning Drive.

Description of the ‘Alternative Methods’ of Landfill Expansion

‘Alternative Methods’ are different ways that the proposed expansion of the W12A Landfill could be implemented to provide an additional 13,800,000 m^3 of disposal capacity over the 25 year planning period. As described in the approved Amended ToR, because of the physical constraints associated with the configuration of the existing waste footprint and geometry on the existing landfill site property, the ‘Alternative Methods’ are limited to vertical expansion above the existing waste footprint and/or lateral expansion to the north and/or east within the Site Study Area.

In the development of the landfill expansion alternatives, site-specific factors were considered, consisting of 1) site design requirements as set out in O. Reg. 232/98 (MECP, 1998); 2) existing leachate and LFG control and management systems, and SWM system; 3) conceptual mitigation measures for the landfill expansion; and 4) engineered system requirements.

Based on the above factors, three ‘Alternative Methods’ for expansion of the W12A Landfill were developed. These alternatives are referred to as:

- Alternative 1 – Vertical Expansion Over Existing Footprint
- Alternative 2 – Horizontal Expansion to the North and Vertical Expansion Over Part of the Existing Footprint

- Alternative 3 – Horizontal Expansion to the East and Vertical Expansion Over Part of the Existing Footprint

Alternative 1 consists of vertical expansion over the whole of the existing 107 ha landfill footprint, with a peak waste elevation of 317.65 metres above sea level (masl) along a west to east ridge in the south-central part of the footprint. Allowing 0.75 m for the final cover, this maximum elevation corresponds to a peak elevation that is approximately 25 m higher than the current landfill peak and 43 m higher than the average ground surface elevation. The design provides 4H:1V sideslopes upward from the existing sideslopes and a 5 % top slope; it is noted a majority of the waste footprint area (about 60 %) will be at the gradual 5 % top slope. With this alternative, it is proposed to move the northern property line of the landfill site to Scotland Drive, creating a north buffer width of approximately 300 m (noting that this land is all currently owned by the City).

Alternative 2 consists of a 200 m wide horizontal expansion to the north, increasing the waste footprint area from 107 to 134 ha. This will involve 2,040,000 m^3 of excavation to form the cell and management of the excavated soil. To provide the required airspace, this alternative has a peak waste elevation of 309.8 masl along a west to east ridge in the central part of the footprint. Allowing 0.75 m for the final cover, the maximum peak elevation is approximately 18 m higher than the current landfill peak and corresponds to a height above average ground surface elevation of about 35 m, some 8 m lower than Alternative 1. The design provides 4H:1V sideslopes on the north side and upward from the existing sideslopes on much of the east and west sides, and a 5 % top slope on the area of vertical expansion above the existing footprint area.

Alternative 3 consists of a 300 to 550 m wide horizontal expansion to the east, increasing the waste footprint area from 107 to 135 ha. This will involve about 821,400 m^3 of excavation to form the cell and management of the excavated soil. To provide the required airspace, this alternative has a peak waste elevation of 311.80 masl along a west to east ridge in the north end of the footprint, with the majority of the fill area having a 5 % top slope. Allowing 0.75 m for the final cover, this maximum elevation is approximately 20 m higher than the current landfill peak and corresponds to a height above average ground surface elevation of about 37 m, between Alternative 1 (higher) and Alternative 2 (lower). The design provides 4H:1V sideslopes on the horizontal expansion area and upward from the existing sideslopes on the north side and much of the east and west sides, and a 5 % top slope on the area of vertical expansion above the existing footprint. With this alternative, as with Alternative 1, it is proposed to move the northern property line of the landfill site to Scotland Drive, creating a north buffer width of approximately 300 m (nothing that this land is all currently owned by the City).

Evaluation and Comparison of Landfill Expansion Alternatives

For each of the three proposed expansion alternatives, the potential for environmental effects was assessed based on the broad definition of the environment within the Act, using a set of evaluation criteria. The evaluation criteria consist of components, sub-components and indicators; the components represent a high level aspect of the environment, each of the sub-components represents a specific aspect of the environment, and the indicators represent a potential effect of the Project.

For each sub-component, the potential effects associated with each expansion alternative were identified and comparatively evaluated using either qualitative, quantitative or a combination of each method; as well, an assessment of advantages and disadvantages of each alternative was completed. Based on the results, for each indicator the alternative methods were ranked as one of ‘preferred’, ‘less preferred’, ‘least preferred’, and ‘equally preferred’. The next step was to compile the individual component comparative evaluations of the ‘Alternative Methods’ and select the overall preferred method of landfill expansion.

The detailed comparative assessment for each indicator is provided in Sections 7.2.1 to 7.2.12 of the EASR; the rationale for the selection of the overall preferred method of landfill expansion is provided in Section 7.4 of the EASR.

The comparative evaluation of ‘Alternative Methods’ of expanding the London W12A Landfill clearly identified Alternative 1 - vertical expansion over the existing footprint - as the preferred method of expanding the landfill. Alternative 1 was ranked as most

preferred for 12 of the sub-components and least preferred for three. Some key advantages of this expansion alternative are that the same landfill footprint is utilized meaning that proximity to sensitive off-site receptors stays the same and most potential nuisance impacts are indicated to be less than associated with the other expansion alternatives, no aquatic features are destroyed as a result of construction, the thickest clay till aquitard is present offering the most protection to downgradient groundwater quality, the least modifications to the stormwater management system are required, limited loss of agricultural land and least capital cost for construction.

Description of the Preferred Undertaking

Following the identification of Alternative 1 as the proposed expansion, the expansion design concept was further refined to carry out a detailed impact assessment. Details of the refined concept design are provided in Section 8 of the EASR and summarized as follows and shown on Figure ES-1:

- To accommodate the final design in the northwest corner of the currently approved landfill, it was necessary to reduce the footprint in the northwest corner by 0.7 ha to 106.3 ha, comprised of the eastern approximately 59.1 ha of Phase 1 footprint and 47.2 ha of Phase 2 footprint. A design adjustment was also made regarding the currently approved limit of waste. To accommodate these changes while continuing to provide 13.8 million m^3 of airspace, the landfill contours were adjusted, resulting in an increase in the highest ridge elevation of waste of approximately 0.8 m, from elevation 317.65 masl to 318.43 masl.

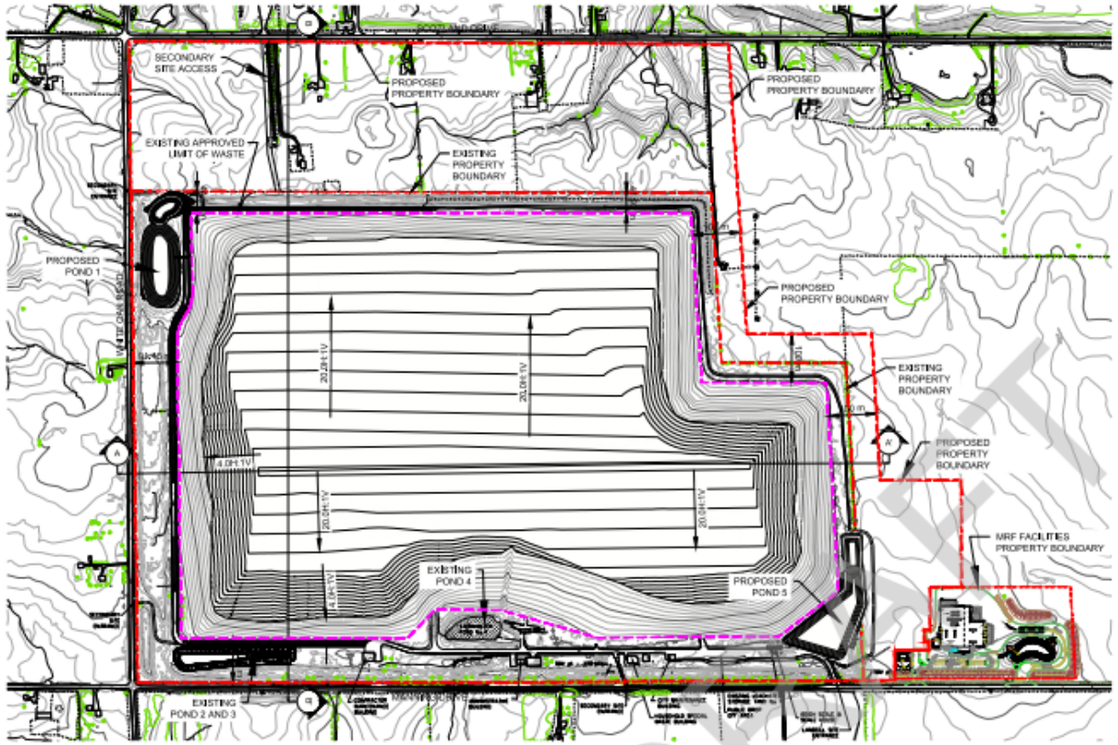
- To accommodate future ancillary features and provide additional on-site buffer width compared to the existing landfill, the northern boundary of the landfill property will be adjacent to Scotland Drive and a 100 m buffer width will be provided on the east side of the landfill footprint and some additional area in the southeast corner to tie into the adjacent Material Recycling Facility (MRF) property line. This results in a 106.3 ha landfill footprint within a 192.4 ha landfill property.

- The landfill expansion will be developed sequentially in eight Phases, 1E through 8E, with four Phases in the southern part of the landfill and 4 Phases in northern part of the landfill. Filling will start in the Phase in the southwest corner of the landfill and proceed to the adjacent northern Phase. Filling will then move eastward starting at the next southern Phase followed by the adjacent northern Phase. This process will continue until all Phases have been filled. The estimated duration of landfilling in each Phase corresponds to an average annual waste receipt of 370,000 tonnes per year over the 25 year planning period. It is estimated that each Phase will provide about 1.2 to 1.9 million m^3 of airspace and typically operate for a period of about 2.5 to 3.5 years.

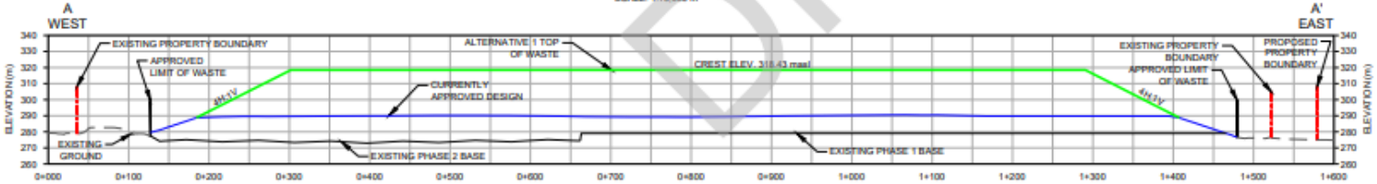
- A separate cell dedicated for disposal of the non-decomposable portion of the waste stream (street sweepings, water treatment plant process residuals, sewage sludge ash and contaminated soil) will be provided in the southeastern area of the landfill expansion and utilized throughout the expansion operating period.

- To commence filling in each Phase, the existing cover material would be progressively stripped from an area large enough to accommodate the year's disposal, which is estimated to average approximately 4 ha. The area of exposed waste would be limited to that needed to spread, compact and cover the waste received on a daily basis. The active area would range from about 40 m by 25 m typically (1,000 square metres) to 50 by 30 m (1,500 square metres). The waste will be spread and compacted in lifts of about 0.6 m to a height of approximately 3 m. All waste will be covered daily.

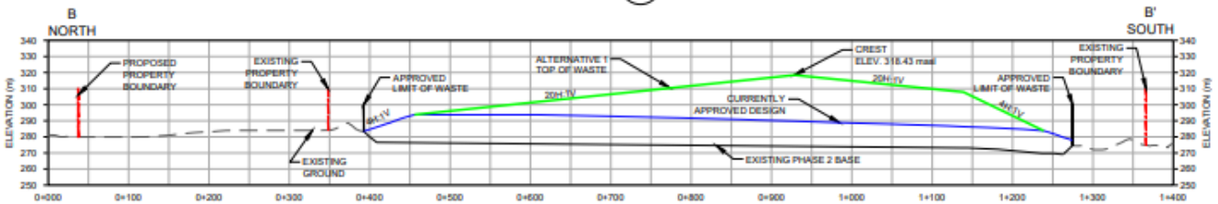
- To reduce air emissions (for odour control purposes during landfilling operations and to increase the overall collection of landfill gases), horizontal LFG collection pipes will be installed progressively as waste is placed.



SITE PLAN
SCALE: 1:10,000 m



HORIZ. SCALE: 1:6,000 m
VERT. SCALE: 1:3,000 m
A-A' CROSS-SECTION



HORIZ. SCALE: 1:6,000 m
VERT. SCALE: 1:3,000 m
B-B' CROSS-SECTION

KEY MAP

NOTE(S)
1. ELEVATION CONTOURS SHOWN ARE TOP OF WASTE, masl.

REFERENCE(S)
BASE INFORMATION AND EXISTING CONTOURS AS PER CITY OF LONDON SURVEY DATED NOVEMBER 22, 2016.

Figure reduced for inclusion in WMWG Report

NOT FOR CONSTRUCTION

DRAFT

1:6,000 METRES (0, 100, 200)

1:10,000 METRES (0, 250, 500)

CLIENT
CORPORATION OF THE CITY OF LONDON
LONDON, ONTARIO
CANADA

PROJECT
INDIVIDUAL EA OF THE PROPOSED W12A LANDFILL EXPANSION

TITLE
LANDFILL EXPANSION FINAL CONTOUR PLAN AND CROSS-SECTIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-10-22
DESIGNED	MLF
PREPARED	MLF
REVIEWED	PAS
APPROVED	PAS

PROJECT NO.	CONTROL	REV.	FIGURE
1648176	0017	B	ES-1

DRAFT

Figure ES-1: Landfill Expansion Final Contour Plan and Cross-Sections

- For the southern Phases 1E, 3E, 5E and 7E the waste would be placed initially to build a berm along the south side of the Phase and will be covered with final cover soil and seeded to establish vegetation; the berm will screen the view of subsequent filling operations north of the berm from off-site vantage points to the south. The south side perimeter waste berm would be raised sequentially and filled in behind until the peak elevation is reached.

- For the portion of the proposed vertical expansion that will involve placement of additional waste above the Phase 2 area, the existing LCS will continue to be used to collect and remove leachate from the area. For the vertical expansion above the Phase 1 area, it is proposed to replace the existing perimeter LCS with a new perimeter LCS that will serve the same functions as the existing system. To control the potential for leachate seeps along the perimeter sideslopes that could occur as a result of leachate mounding in Phase 1, it is proposed to construct granular finger drains around the north, east and south sides of the exterior perimeter of the Phase 1 area.

- It is proposed to consider options to provide temporary leachate storage on the W12A Landfill site during storm events of significant magnitude that could result in discharge of the mixed leachate/sewage to Dingman Creek or the Thames River if the WWTP is in a by-pass situation. Although the W12A leachate represents only a small percentage of the total flow within the sewer system, the objective is to minimize the discharge of untreated leachate to these water courses. The temporarily stored leachate would be pumped off-site for treatment after the by-pass event is over.

- The leachate collected from the Phase 1 and Phase 2 LCS is currently routed through the main leachate pumping station and pumped off-site through a leachate forcemain to the Dingman Drive pump station, where it combines with municipal sewage and enters the municipal sanitary sewer system to the Greenway WWTP. Following treatment at the WWTP, the effluent is discharged to the Thames River. An assessment of the ability of this City owned, operated and maintained infrastructure to continue to manage leachate from the W12A landfill expansion was completed and the results show that this can be continued for the W12A Landfill expansion and be expected to perform acceptably during expanded site operations and post-closure. All components of this system are part of City owned, operated and maintained infrastructure, and are accessible for repair, upgrade or replacement if and as needed in the future.

- For LFG management, vertical LFG extraction wells will be installed to collect gas from within the expanded waste mass as part of the progressive construction of the final cover system following completion of filling within each Phase. The collected LFG will ultimately be combusted via blowers and flares. To reduce air emissions (for odour control purposes during landfilling operations and to increase the overall collection of landfill gases), it is proposed that a number of horizontal LFG collection pipes will be installed progressively as waste is placed and connected to the flare.

- Stormwater management will utilize the existing four stormwater management ponds, which will be upgraded and modified to manage and control the release of surface water runoff from the expanded landfill.

- It is proposed that many of the existing ancillary facilities at the site will be progressively upgraded or replaced during the expansion. In addition, it is proposed that in the vacant southeast corner area between the landfill and the MRF there will be a new scale and scalehouse, a grade-separated small vehicle drop-off for waste materials, a grade-separated small vehicle drop-off for recyclable materials (such as tires, scrap metal, ceramics, Blue Box materials, clean wood, electronics), an area for drop-off of brush, a large item drop-off area, and a new HSW depot.

- The landfill Phases will be progressively closed after the final waste contours have been reached and landfill operations have proceeded into the next Phase(s). The final cover on the landfill will consist of 600 mm of soil, topped with 150 mm of soil capable of sustaining vegetation.

Impact Assessment and Net Effects

Section 9.0 of the EASR presents an overview of the predicted effects of the proposed expansion on each of the components. These assessments were conducted in accordance with the requirements set out in the approved Amended ToR (Volume II) and detailed in Work Plans (Volume III Appendix B). Additional details on the impact assessments are provided in Volume IV Appendix D.

Atmosphere

The Atmosphere environment component comprises two sub-components: air quality (including dust, odour, greenhouse gas (GHG)) and noise. The details of the impact assessment for the Atmosphere Environment (air and noise) are provided in Volume IV Appendix D.01 and Appendix D.02, respectively.

Air Quality

The effects of the Project on air quality were identified for different phases of the expansion and involved the following three steps:

- Calculating representative emissions rates for each of the significant sources;
- Carrying out atmospheric dispersion modelling to predict off-site concentrations of the indicator compounds; and
- Comparison of predicted concentrations to existing conditions and the Applicable Guidelines.

The emission estimation methods followed accepted MECP practices including, where applicable, guidance in the Ontario MECP document *Procedure for Preparing an Emission Summary and Dispersion Modelling Report Version 4.1* (MECP, 2018b).

To determine potential effects of the proposed project on air quality and odour, the predicted concentrations of indicator contaminants were compared to Ontario's Ambient Air Quality Criteria (AAQC) (MECP 2018) and the Canadian Ambient Air Quality Standards (CAAQSs) (CCME 2014).

The maximum cumulative concentrations of all indicator compounds are below the relevant guidelines for all indicator compounds, with the exception of NO_2 on a 1-hour basis related to the CAAQS but NO_2 meets the AAQC standard. Although the AAQC is less conservative for NO_2, it is technically more appropriate for the situation being considered.

The predicted compound concentrations associated with the expansion are predicted to meet the relevant air quality criteria.

In addition to the assessment of the effects of the Project on ambient air quality and odour, consideration was given to an evaluation of compliance by determining whether an Environmental Compliance Approval (ECA) for air and noise under Section 9 of the *Environmental Protection Act* (EPA) could be obtained based on whether the facility is in compliance for those sources regulated under O. Reg. 419/05. At the landfill, this would include landfill gases and materials handling emissions. All mobile equipment is exempt from compliance requirements under O. Reg. 419/05. The assessment indicates that the proposed facility will be in compliance with Schedule 3 of O. Reg. 419/05.

Noise

The methodology used for the noise assessment was based on the MECP publications *"Noise Guidelines for Landfill Sites"* (Landfill Guidelines) (MECP 1998) and NPC-300 (MECP 2013). These guidelines outline the sound level limit criteria for evaluating landfilling operations and ancillary facilities (i.e., stationary noise sources).

The noise assessment was carried out at the representative points of reception (PORs) identified within the Site-vicinity Study Area. All representative PORs identified in this noise assessment are conservatively described as being located in a Class 3 area, as defined in NPC-300 as a rural area with an acoustical environment that is dominated by natural sounds.

Noise predictions of landfilling operations, ancillary equipment, and off-site haul routes were each assessed independently against the MECP guidelines (where applicable), and then combined to assess change relative to existing noise levels.

The results of the assessment indicate that mitigation measures are required when landfilling within an area of the south portion of the landfill so that the Project does not result in an adverse effect on noise (i.e., a moderate or high magnitude rating) at a specific existing receptor.

Geology and Hydrogeology

The details of the impact assessment for long-term groundwater quality and quantity are provided in Volume IV Appendix D.03.

The groundwater quality assessment was carried out using the contaminant transport model POLLUTE (Rowe et. al., 1994) and results were compared to the MECP Reasonable Use Guideline (RUG) B-7 (MECP, 1994), noting that this guideline establishes a quantitative benchmark for protecting off-site groundwater quality for drinking water purposes.

The soil stratigraphy at the landfill was simplified for the model which consisted of the Surficial Aquitard (silty clay), Upper Aquifer (sand), Lower Aquitard (silty clay) and White Oak Aquifer (lower sand aquifer). The fractures that were studied in the upper portion of the Surficial Aquitard were accounted for in the modelling. As required in O.Reg. 232/98 (MECP, 1998) the model assessed the impact of groundwater contaminants benzene, cadmium, chloride, lead,
1,4-dichlorobenzene, dichloromethane, toluene and vinyl chloride from the expanded landfill on the receiving groundwater.

The direction of groundwater flow on and in the area of the W12A Landfill can be generally described as north to south. Water supply wells in the area obtain their water supply from both the Upper Aquifer and White Oak Aquifer. The modelling demonstrated no groundwater quality impacts on the White Oak Aquifer for the groundwater contaminants of interest. In the Upper Aquifer, all RUG were met over the 1,000 year modelling time frame except for chloride that is predicted to have a peak impact of 129 mg/L, which is slightly above the allowable RUG of 128 mg/L in the Upper Aquifer. As a result, additional design mitigation measures were evaluated for off-site groundwater quality protection. The addition of incorporating leachate collection into the design of a first tier of horizontal landfill gas collector trenches required over the top surface of the Phase 1 area prior to vertical expansion was considered. With this additional mitigation design, the modelling demonstrated all groundwater quality impacts were below the RUG for the groundwater contaminants of interest in the Upper Aquifer.

Because of the existing landfill's location overlying the Surficial Aquitard, its presence does not affect the recharge of the groundwater system and has no effect on groundwater levels or groundwater quantity in the Upper and White Oak Aquifers beneath the landfill or off-site further to the south of the landfill site. With the proposed landfill expansion consisting of a vertical expansion above the existing landfill footprint, the expansion will not have an effect on downgradient groundwater levels or groundwater quantity off-site to the south of the landfill site.

Surface Water

The details of the impact assessment for surface water quality and quantity are provided in Volume IV Appendix D.04.

The existing drainage network in the vicinity of the landfill is currently divided into four general areas with a system of berms, slopes and perimeter drainage ditches directing runoff generated within the W12A Landfill Operations Area to four separate stormwater management (SWM) ponds. During landfill expansion, surface drainage from potentially contaminated areas, i.e., originating from active landfilling areas, will be contained locally within berms and will discharge into the waste and eventually into the leachate management system. Hence there is no anticipated change to surface water quality as a result of contact with landfill expansion waste. Surface drainage from non-contaminated areas such as road areas and areas with interim or final landfill cover will be conveyed to the SWM ponds via the internal drainage ditches.

To update the design of the existing SWM ponds under changed conditions from the landfill expansion (peak of the landfill shifting, sideslopes of the landfill that are longer and steeper in some locations, and movement of some of the ancillary features on the site), the model Visual Otthymo was used to evaluate changes to water quantity. As a requirement of the MECP SWM Planning and Design Manual (MECP, 2003) the updated designs to the SWM ponds required Enhanced Level Protection (80% total suspended solids (TSS removal)) and matching post-expansion outlet flows from the ponds to corresponding pre-expansion flows for selected storm events.

Because of the required quality and discharge quantity controls for the SWM ponds (e.g., larger ponds, new control structures, etc.), there is not expected to be an adverse impact on off-site surface water quantity or quality. A summary of SWM pond modifications is provided as follows:

- SWM Pond 1: the pond will be expanded to the north, increasing the size of the main pond and forebay. The outlet structure will be modified such that flows will match or be less than pre-development flows. The new outlet pipe for the pond is designed as a submerged reverse sloped pipe to promote separation/floating of oils, providing potential for spilled material to be recovered prior to off-site release occurring. The existing outlet structure for the pond will be fitted with a valve to allow emergency closure to assist in spill / leachate containment activities, if needed. A 600 mm diameter pipe with a ditch inlet grate will be provided at two elevations to provide discharge control for larger storm events. The updated permanent pool volume of SWM Pond 1 exceeds the required permanent pool volume to achieve the Enhanced Level Protection (80% TSS removal).
- SWM Pond 2/3: the landfill expansion will result in a decreased drainage area to this pond; however, to meet the Enhanced Level Protection (80% TSS removal) as defined by the MECP Stormwater Management Planning and Design Manual (MECP, 2003) the permanent pool depth will be increased and some modifications will be made to the existing outlet structure. A minimum sized orifice of 75 mm will be used to control the pond outflow for the baseflow storage and 25 mm storm. The outlet pipe for the pond is designed as a submerged reverse sloped pipe to promote separation/floating of oils, providing potential for spilled material to be recovered prior to off-site release occurring. The existing outlet structure for the pond will be modified and used and fitted with a valve to allow emergency closure to assist in spill / leachate containment activities, if needed. An overflow weir with 1.0 m bottom width, 3H:1V sideslopes with rip-rap covering is proposed to provide discharge control for larger storm events. The updated permanent pool volume provided in the proposed wet pond of SWM Pond 2/3 exceeds the required permanent pool volume to achieve the Enhanced Level Protection (80% TSS removal).
- SWM Pond 4: under proposed expansion conditions Pond 4 would receive stormwater runoff from a smaller total drainage area. The existing permanent pool and active storage is sufficiently sized to meet the Enhanced Level Protection (80% TSS removal) as defined by the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The existing outlet structure will be modified with an appropriately sized orifice to control discharge and the existing double inlet catchbasin would be maintained for larger storm events. An overflow weir would be added for storm events larger than the 1:100 year return period design storm. The existing outlet structure for the pond will be modified and used and fitted with a valve to allow emergency closure to assist in spill / leachate containment activities, if needed. A 600 mm outlet pipe with a ditch inlet grate will be provided at one elevation for the controlled discharge of large storm events.
- SWM Pond 5: under proposed expansion conditions, Pond 5 would receive stormwater runoff from a larger total drainage area. The Pond would be expanded to the east and north to increase both the permanent pool and active storage capacities. The existing outlet structure orifice and weir will be modified to match pre-development peak flows. The existing outlet structure for the pond will be fitted with a valve to allow emergency closure to assist in spill / leachate containment activities, if needed. The provided permanent pool volume in the proposed wet pond

exceeds the required permanent pool volume to meet the Enhanced Level Protection (80% TSS removal) requirement.

The proposed works are predicted to result in surface water quality conditions that are comparable or better to existing conditions and meet MECP PWQO (MOEE, 1994) requirements. Post-closure, the pond operations will continue such that surface water quality downstream of the site remains protected.

Biology

The Biology environment component comprises two sub-components: aquatic ecosystems and terrestrial ecosystems. The details of the impact assessment on the Biology component (aquatic and terrestrial ecosystems) are provided in Volume IV Appendix D.05.

The impact assessment considers the potential direct and indirect impacts of the W12A Landfill preferred expansion alternative on the aquatic and terrestrial ecosystems within the Site and Site-vicinity Study Areas for the construction, operations and closure stages of the landfill expansion.

The proposed expansion of the W12A Landfill avoids many potential impacts by situating the future expansion on the existing landfill fill area.

<u>Aquatic Ecosystems</u>

Direct Impacts:

- Because the proposed modification to SWM pond weirs and outlets will all occur within the landfill area, and there are no physical alterations to the downstream SWM infrastructure, including the ditches, culverts, or other downstream watercourses, no direct impacts to aquatic species or habitat are anticipated from the proposed modifications to SWM system. Similarly, there are no anticipated direct impacts to aquatic ecosystems during the Operations Stage and during closure and post-closure activities related to the expansion of the W12A Landfill.

Indirect Impacts:

- No indirect impacts to aquatic species or habitat are anticipated during the Construction Stage, since there are no proposed modifications to the SWM pond weirs and outlets for existing structures that convey discharged pond water to downstream watercourses;
- Although the proposed works associated with the Operations Stage for the proposed expansion are not expected to result in direct impacts to aquatic ecosystems, there will be changes to drainage areas and the resulting water balance (i.e., reduced water drainage to Dodd Creek; increased surface water drainage to Dingman Creek). The changes in drainage area are expected to have a negligible effect on runoff and drainage downstream of the site in both the Dingman and Dodd Creek subwatersheds. Further, modifications to the existing SWM infrastructure, along with mitigation measures (i.e., erosion and sediment control), are expected to result in surface water quality conditions that are comparable to existing conditions and meet the MECP PWQOs; and
- Potential indirect impacts associated with closure and post-closure activities are limited to the management of leachate and stormwater management within the landfill. With the continued operation of the leachate control system and the proposed SWM ponds, indirect impacts as a result of landfill closure are not anticipated.

<u>Terrestrial Ecosystems</u>

Direct Impacts:

- Direct impacts are anticipated for Confirmed Significant Wildlife Habitat for Monarch and Species at Risk Habitat for grassland birds (i.e., Eastern Meadowlark and Bobolink) during construction and operational stages on the existing landfill. Impacts related to the removal of habitat will be temporary in nature as they will be revegetated when vertical capacity is reached to mimic habitat conditions currently

present (e.g., grassland species, common milkweed). The direct impacts to these areas during the construction stage are not considered to be significant and may be avoided.

- Should stripping of existing vegetation for the new diversion and drop-off facilities in the southeastern corner occur during the breeding bird window (April 1st to August 31st), there is potential for impacts to nesting birds and may contravene the *Migratory Birds Convention Act*.
- Other potential direct impacts during construction may include common wildlife species that may occupy areas of the existing landfill site; these may include groundhogs, Killdeer, common snake species, etc.
- Accidental destruction of nests, stockpiling of stripped material creating nesting opportunities for birds, or wildlife mortality may occur as part of the operations stage. These occurrences can be avoided through the implementation of standard operational measures, the continuation of measures implemented during the construction stage, and potential compensation for SAR Habitat.
- Activities associated with landfill closure include the addition of topsoil and plantings of native vegetation; as such, the project closure will result in an overall compensation for natural communities lost during construction and operations.

Indirect Impacts:

During the construction and operations stages of the expansion of the W12A Landfill, potential indirect impacts to terrestrial ecosystems are likely to be limited to the following types of impacts:

- Dust deposition on vegetation in adjacent vegetation communities during construction;
- Dust and airborne waste deposition in natural habitat during operations;
- Noise related impacts to wildlife in adjacent habitat;
- Introduction of invasive plant species via construction equipment; and
- Accidental injury or mortality of wildlife or vegetation (i.e., adjacent trees) from construction equipment and/or vehicles.

The indirect impacts during construction and operations are not considered significant and are mitigatable with standard measures. Indirect impacts as a result of landfill closure are not anticipated.

To avoid or minimize impacts to SAR and wildlife related to the construction stage, a detailed Environmental Mitigation and Monitoring Plan (EMMP) will be developed. Vegetation removal associated with the construction stage and with the operations stage will have to avoid direct impacts to the SAR Birds, including Bobolink and Eastern Meadowlark; all habitat removal should occur outside of the bird nesting season (April 1 to August 31) unless first assessed by an ecologist. The preparation and implementation of a SAR and Wildlife Observation Protocol will also be required.

Compensation for habitat loss will be required as regulated under the ESA (O. Reg. 242/08), to determine appropriate compensation measures for Bobolink and Eastern Meadowlark. Compensation for Significant Wildlife Habitat for Monarch will be achieved at project closure with the implementation of native plantings which are recommended to include common milkweed, a host plant for the species.

Land Use

The details of the impact assessment on land use are provided in Volume IV Appendix D.06.

The W12A Landfill is zoned “Waste and Resource Management (WRM) Zone 1”. This zoning permits the waste management facility that currently operates on the site, as well as the MRF adjacent to the east side of the landfill.

A variety of studies were completed to assess impacts to surrounding uses. Of particular relevance to the assessment of impacts to sensitive land uses in the Site Area and Site-vicinity Study Area is the noise, odour and air assessments. Generally, it is concluded in these associated studies that the proposed landfill expansion is expected to meet all Provincial criteria with respect to noise, odour and air quality and is not expected to result in impacts in excess of these criteria to the public. These studies recommended various mitigation and monitoring programs to help minimize potential impacts associated with landfill operations following implementation of the Project.

The proposed landfill expansion does not result in the limits of waste being extended towards any of the sensitive land uses as defined by Guideline D-4 (Land Use on or Near Landfills and Dumps). Provided the recommended impact mitigation for noise and air quality (i.e., odour) are implemented, the proposed expansion is not expected to have significant adverse impacts on these uses. Further, in light of the intended use of the Site Area, it is determined that the landfill expansion would be compatible with the existing land uses within the Site-Vicinity Study Area.

It is not anticipated that sensitive land uses would be constructed in the vicinity of the W12A Landfill site within the 2035 planning horizon defined for the City's new Official Plan. Accordingly, it is determined that the Project should not adversely impact on future land uses within the Site-vicinity Study Area.

No significant impacts or adverse effects are expected with respect to the surrounding land uses, no mitigation or monitoring is required at this time from a land use perspective. Notwithstanding, the measures recommended in conjunction with this EA should be implemented to mitigate any potential impacts (noise, odour, dust) to land uses proximate to the existing landfill facility and to protect natural heritage features and functions.

Agriculture

The details of the impact assessment on agriculture are provided in Volume IV Appendix D.07.

Agricultural uses within this defined area are characterized by conventional agricultural production that is in keeping with regional and provincial trends (e.g., cash crop production, livestock operations).

The assessment of impacts on agricultural land and operations within the Site-vicinity Study Area was based on the Province's draft Agricultural Impact Assessment Guidelines (released March 2018) (OMAFRA 2018).

As an outcome of the agricultural impact assessment, the Project is expected to generate minimal land use impacts on agricultural land and/or operations in the Site-vicinity Study Area. Notwithstanding, mitigation and monitoring programs associated with the expanded landfill operations recommended in conjunction with this EA should be implemented to minimize any potential impacts on local agricultural activities and the larger agricultural system.

Archaeology

The details of the impact assessment on potential archaeological resources are provided in Volume IV Appendix D.08.

An archaeological assessment was completed to identify known archaeological resources within the Site Study Area.

The Stage 1 background study determined that portions of the Site Study Area had archaeological potential and, as such, would require Stage 2 Archaeological Assessment to identify archaeological sites that may be present. The Stage 2 assessment involved a combination of pedestrian survey at 5 m intervals and shovel test pit survey at 5 m intervals, and resulted in the identification of seven archaeological locations. One location was considered to have cultural heritage value or interest and recommended to be subject to a Stage 3 Archaeological Assessment.

The results of the Stage 3 Archaeological Assessments identified the presence of one site with archaeological potential in the Site Area (White Oak 1 site), located on the north side of the western portion of the existing landfill footprint. The presence of high

artifact-yielding test units (e.g., ≥10 artifacts) indicates that the White Oak 1 site has further cultural heritage value or interest and will require Stage 4 mitigation prior to development. This conclusion is consistent with Section 3.4.1, Standard 1a of the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)'s *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). There are no further concerns for impacts to archaeological sites in the remainder of the Site Study Area. This White Oak 1 site plus a 10 m buffer requires avoidance during construction, operation and closure of the Project and this can be accomplished without disruption to the Project.

The MHSTCI reviewed the results and recommendations presented in the Stage 3 Archaeological Assessment Report and accepted this report into the Provincial Register of archaeological reports, and issued a standard letter of compliance with the Ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licensing.

Cultural Heritage

The details of the impact assessment on potential built heritage resources are provided in Volume IV Appendix D.09.

Seven properties in the Site-vicinity Study Area were identified as requiring cultural heritage assessment to determine if any of the properties had cultural heritage value or interest (CHVI) in accordance with *Ontario Heritage Act Regulation 9/06* (Ontario, 1990b). They were identified for study because they are properties with buildings or structures 40 or more years old and evaluated as having potential cultural heritage value or interest (CHVI) if they met one or more of the criteria prescribed in *Ontario Heritage Act Regulation 9/06* or was a part of a potential cultural heritage landscape. One additional property with buildings or structures 40 or more years old was also identified but evaluated to not meet at least one criterion for CHVI prescribed in O. Reg 9/06 (Ontario 1990b).

No cultural heritage resources of value or interest were identified within the Site-vicinity Study Area that could potentially be impacted by the proposed W12A Landfill expansion and no further cultural heritage studies or monitoring of any properties is recommended.

Socio-economic

The Socio-economic component comprises two sub-components: local economy; and residents and community. The details of the socio-economic impact assessment are provided in Volume IV Appendix D.10.

Local economy

The Project is not expected to create any new jobs in the community during operation, the existing landfill workforce is deemed sufficient. New jobs during construction activities are expected. It is estimated that with the additional infrastructure operations associated with the expansion, the annual operating cost could increase approximately 10% to $5 million. Several stop-controlled approaches along the haul routes are forecast to operate at a poor level of traffic control in the future (2048) conditions. However, traffic signals, if warranted, would be due to the projected increase of background traffic volume and/or movement of this background traffic and not the traffic associated with the landfill expansion. Other businesses (excluding farms as these were assessed within the agriculture component) in the Site-vicinity Study Area are not anticipated to be affected negatively or positively as a result of the landfill expansion. In terms of the local economy, no changes to employment or use of local vendors is anticipated and over time the landfill is expected to have increased costs and generate additional revenue for the City.

- In terms of capital costs, the proposed expansion design has an estimated budget of $55 to $90 million, with a midpoint estimate of approximately $72 million (in 2020 dollars).

Residents and Community

The W12A Landfill site is located in a largely agricultural area with few socio-economic features of note. The most likely potential impact to the socio-economic environment is from nuisance effects such as litter, noise, odour or dust, which can affect use and

enjoyment of private properties or outdoor spaces. The presence of the landfill and proposed changes to it associated with the expansion are not expected to result in any out-migration of existing residents who are accustomed to living in an area where agricultural and industrial noise is commonplace. Adherence to applicable municipal and provincial guidelines and use of best management practices at the W12A Landfill site related to control and mitigation of effects such as litter, noise, dust or odour will assist in reducing potential effects to local residents. Continued use of a complaints protocol will be key tools in monitoring socio-economic effects and ensuring good community relations during construction and operations.

Visual

The details of the impact assessment for visual are provided in Volume IV Appendix D.11.

The visual impact of the proposed landfill expansion on existing residential properties within 3,500 m of Site-vicinity Study Area was assessed. This was done by calculating a visual effect rating using relevant factors that affect the visual impact from different viewpoints in private outdoor areas and from public rights of way within the Site-vicinity Study Area.

For the majority of the viewpoints, the visual effect is moderate to very low. However, the landfill expansion will have a very high visual impact on four properties and have a high visual impact on two properties. Three of the six properties with high to very high visual impacts are owned by the City and three properties are privately owned.

The most obvious views of the proposed landfill expansion are from the south. To reduce the visual impact of daily operations, the site development plan proposes that waste would be placed initially to build a berm along the south side of the landfill's waste disposal area and will be covered with final cover soil and seeded to establish vegetation. This berm will screen the view of subsequent filling operations north of the berm from off-site vantage points to the south.

The existing perimeter berms with trees on the south, west, north and a portion of the east sides of the landfill are effective at visually screening the existing landfill from traffic beside the landfill on Manning Drive and White Oak Drive and are expected to continue to screen the view of the expanded landfill, but not from Scotland Drive or Wellington Road South. With the proposed expansion, the landfill property boundary will be moved northward to Scotland Drive and new berms with tree plantings will be constructed along the new property boundary (White Oak Road northward to Scotland Drive, Scotland Drive) to visually screen the landfill expansion from traffic beside the landfill on Scotland Drive.

The City will seek feedback on appropriate roadside view-mitigation measures from area residents when it updates its Community Enhancement and Mitigative Measure (CEMMP) Program. The first step in updating the CEMMP is seeking stakeholder feedback on how the program can be improved, including what are appropriate visual screening measures for individual residential properties. The project to update the CEMMP started in November 2020.

Transportation

The details of the impact assessment on transportation are provided in Volume IV Appendix D.12.

Taking into account the additional vehicles generated by the W12A Landfill, as well as applying the projected 1.0% annual growth rate for background traffic across the Site-vicinity Study Area, operational analyses along the haul routes were completed.

The two signalized intersections, found along Wellington Road at both Dingman Drive and Manning Drive, continue to operate with minor increases reported to the volume to capacity (v/c) ratio, delays, and 95th percentile queues. All movements at these two intersections, as well as the overall intersection performance, are forecast to remain at a good to reasonable level of service (LOS). Critical movements are not expected to occur by the 2048 horizon year at either of these intersections.

The remaining intersections and site accesses within the Site-vicinity Study Area operate under a stop-control condition. Compared to the existing conditions analyses,

most stop-controlled intersections are not anticipated to see any significant changes to operations with a few notable exceptions: Wonderland Road (Highway 4) at both ramp terminals from Highway 401; Wellington Road at Scotland Drive; Wellington Road at Westminster Drive. These stop-controlled approach exceptions along the haul routes are forecast to operate at a poor level of traffic control in the future (2048) conditions. However, traffic signals, if warranted, would be due to the projected increase of background traffic volume and/or movement of this background traffic and not the traffic associated with the landfill expansion.

An assessment carried out on the effects of temporary major road closures and resultant use of Emergency Detour Routes (EDR) as related to the W12A Landfill traffic indicates that, depending on the road that is closed and the closure location along either Highway 401 or 402, the rerouted traffic could potentially combine with landfill traffic. If Manning Drive is closed in front of the W12A Landfill, alternate site access to and from both White Oak Road and Scotland Drive would be readily available.

Design and Operations

The details of the assessment of impacts associated with the design and operations of the proposed expansion are provided in Volume IV Appendix D.13.

The Description of the Preferred Landfill Expansion (see Section 8 of the EASR) covered off the proposed expanded landfill phasing and development; estimated leachate generation and on-site leachate management; estimated LFG generation and on-site management; and geotechnical assessment. In addition, a soil balance for the proposed expansion was completed as well as an estimate of probable capital and operational costs.

A soil balance estimates the volume of soil materials available on site for potential use in constructing various components of the expansion compared to the types and volumes of soil materials required for their construction. With the continued use of alternative daily cover materials and stripping of the existing final cover prior to placing waste for the vertical expansion, it is estimated that following construction of the final cover using on-site soils there will a surplus of 162,000 m^3, which can readily be accommodated within the expanded landfill site property limits.

It is estimated that the capital costs of implementing the expansion (including engineering and contingencies) are in the range of $55 to $90 million, with a midpoint estimate of approximately $72 million (in 2020 dollars). The current annual operating cost, including both staff and the operations, is approximately $4.5 million (in 2020 dollars). It is estimated that with the additional infrastructure operations associated with the expansion, the annual operating cost could increase to $5 million.

In terms of potential impacts associated with site design and operations:

- Phasing and Development: The design of the expansion phasing and the approach to development of each phase will reduce potential visual impacts (i.e., view of ongoing site landfilling operations) from off-site vantage points to the south, from where the site operations are most visible for the greatest number of existing residences. For landfilling, the area from which the existing final cover will be stripped prior to placement of waste and the active area used for waste disposal will be kept as small as practical to minimize the potential for odours and litter.

- Management of Leachate: The management of leachate will continue to rely on the same LCS approaches that have proven effective in preventing impacts on off-site groundwater resources and surface water quality. In addition, the design will provide sufficient temporary leachate storage to minimize the potential for untreated leachate release due to storm events that are sufficiently large to cause overflows from the off-site pumping station and WWTP.

- Management of LFG: The expansion will continue to utilize an active LFG collection system (installed both during landfill operations and progressively with the final cover as expansion phases are completed) to capture and flare LFG and thereby control odour and greenhouse gas releases.

- Geotechnical Considerations: Geotechnical analysis demonstrates that the proposed expansion will be stable in terms of overall stability of the waste, and that settlement of the underlying clay till deposit due to the weight of the vertical expansion of waste will not adversely affect the operation and performance of the underdrain LCS below the Phase 2 area.
- Soil Balance: The expansion is expected to use a combination of available on-site stockpiled soil and alternative daily cover consisting of off-site waste materials. It is anticipated that there will be an overall soil surplus at the end of the expansion period. The expansion will require aggregates and asphalt for infrastructure construction and maintenance; otherwise, the expansion is not expected to consume off-site soil resources from licensed pits or other borrow sources.
- Capital and Operational Costs: The capital costs associated with the expansion can be planned within the municipality's annual capital expenditures budgeting process. The operating costs are comparable to but somewhat higher than the current operating costs. These cost components are not expected to impact municipal finances.

Climate Change Considerations

The document entitled "Considering Climate Change in the Environmental Assessment Process" (MECP, 2019) was used as a guide for incorporating measures in the landfill expansion design that reduce both the potential impact of climate change on the landfill (i.e., climate change adaptation) and its potential impact on climate change (i.e., climate change mitigation).

In terms of potential impacts from climate change on the landfill expansion, it is expected that the planned 25 year operational period of the landfill expansion, i.e., through 2048, will be too short to be significantly affected by impacts from climate change. However, during the post-closure period, longer term changes in precipitation and temperature could possibly affect the vegetative cover growth on the closed landfill and/or runoff of surface water from the landfill final cover and the performance of the components that comprise the SWM system. The proposed stormwater pond designs were assessed to predict conditions during the 1:250 year return period storm event to evaluate potential climate change effects. It is expected that the ponds will perform acceptably under such storm conditions. The potential impacts from climate change related to precipitation will also be taken into account in the final design of site infrastructure components related to leachate collection and temporary storage on-site. Adjustments to landfill operations can be made, as required, in future to mitigate potential effects from temperature extremes and winds associated with climate change.

In terms of potential impacts from the landfill expansion on climate change, the two main ways that a landfill expansion could affect climate change are the generation of GHG that enters the atmosphere, and reduction of GHG sequestration by removal of forested areas. For the proposed vertical expansion of the W12A Landfill above the existing footprint, there will not be any clearing of forested areas, and therefore no associated adverse effects related to GHG sequestration. The annual GHG emission rates in tonnes per year for each activity for the existing landfill and the proposed expanded landfill were estimated. GHG generated from the landfill expansion, which will peak in 2049 and then decline over time, will be controlled by an active LFG collection and flaring system. The system will have a LFG collection efficiency that is expected to significantly improve by 2049 in comparison to 2020 and this will result in decrease GHG emissions annually.

Cumulative Impact Assessment

A cumulative impact assessment of the potential effects of the proposed landfill expansion in combination with past, present and reasonably foreseeable future activities, where possible, was carried out following a framework often used in federal EA processes and is described in Section 11 of the EASR.

The cumulative effects analysis involved a scoping phase and an analysis of effects phase. For the scoping phase, the components that had residual negative effects (after

mitigation) from the proposed landfill expansion were identified. After this, other projects or activities in the area that may affect the same components were identified.

During the analysis of effects phase, the other projects or activities were evaluated to assess if their effects would overlap in timing or spatial extent with the effects of the Project, accounting for and including the proposed landfill expansion mitigation. The nature and extent of the possible cumulative effects were then identified along with any possible mitigation and/or monitoring strategies.

The identified environmental, socio-economic and technical components from the proposed landfill expansion with identified residual, negative effects are: atmosphere (air/odour and noise); hydrogeology; surface water (quantity); biology; land use; agriculture; socio-economic, transportation and visual. The existing zoning and land use in the vicinity of the site was considered in determining the other projects and activities to include in this cumulative assessment. It was determined that the effects from the landfill expansion would not overlap with those from other projects or activities for the hydrogeology, surface water, agriculture or visual components. For the remaining components, the landfill expansion will utilize operating procedures, monitoring programs and mitigation measures such that the landfill complies with provincial requirements. Potential remaining cumulative effects are described. In light of the existing zoning and the associated Official Plan policy framework, it is considered unlikely that new sensitive land uses would be introduced in close proximity to the landfill.

Monitoring and Contingency

The proposed expansion of the W12A Landfill has been designed to incorporate mitigation measures to minimize the potential for unacceptable environmental effects. Following the identification of mitigation measures, the environmental effects of the proposed expansion were evaluated. Although, efforts have been made to conservatively estimate potential impacts associated with the proposed W12A Landfill expansion, there is always some potential for variability between predicted and actual conditions. Effective monitoring and contingency measures are intended to address this potential variability and confirm the assumptions used in this assessment.

An effective monitoring program provides results to: indicate whether the facility is working as expected and that the assumptions used in the assessment were correct; assess on an ongoing basis whether mitigation measures as designed and operated are effective; and identify unforeseen problems so they can be addressed in a timely manner. The proposed monitoring program for the proposed W12A Landfill expansion is summarized in Section 12.0 of the EASR and details are provided in the D&O Report (Volume IV, Appendix D.13) and includes requirements for air quality, noise, groundwater quality, surface water quality and quantity, LFG and biology.

The final details will be determined in consultation with the MECP and incorporated in the ECA amendments for the proposed expansion.

In the event that the ongoing groundwater or surface water monitoring programs detect unexpected problems, it may be necessary to implement contingency measures to further reduce the potential for any adverse environmental effects associated with the proposed expansion of W12A Landfill. The current ECA for the W12A Landfill has a trigger mechanism that requires prescribed actions to be taken should the monitoring results indicate that certain thresholds are reached, whereby additional investigations and assessments are undertaken to confirm the monitoring results and determine if it is necessary to implement contingency measures to prevent non-compliance with the RUG for groundwater, or to prevent leachate-impacted waters from accessing the stormwater management ponds. As part of the ECA amendment application process for the expanded landfill, the trigger mechanisms and contingency measures will be reviewed and modified, if required.

An overview of the proposed contingency measures that could be put into effect are described in Section 12.2 of the EASR.

Summary of Commitments and Other Approvals

Section 13.0 of the EASR lists the commitments made by the City during the ToR process, how they have been considered in the preparation of the EASR and their current status. Generally, these commitments relate to a committed target of 60% residential residual waste diversion by the end of 2022, the preparation of work plans for technical studies as identified in the ToR, assessment of 'Alternative Methods' of expansion and detailed description of the preferred alternative, completing a cumulative effects assessment, preparing a draft EA for public review and ensuring public consultation events and availability of the draft and final main body of the EASR to the public, holding workshops based on interest indicated by stakeholders, engaging with Indigenous Communities, and refining the purpose statement (if required).

Commitments made by the City during the EA study process are also listed in Section 13.0. The City will report on the status of these commitments via compliance monitoring to the MECP annually until such time as all commitments are completed or addressed/superseded in EPA/*Ontario Water Resources Act* (OWRA) conditions of approval. Generally, these commitments relate to effects monitoring requirements, design of site components, operating procedures, mitigation measures and best management practices.

Following approval of the W12A Landfill expansion EA by the Minister of the Environment, Conservation and Parks, approval under the EPA and the OWRA will then be required; these approvals will take the form of amendments to the existing landfill ECAs. Approvals will also be required under the *Ontario Heritage Act* to implement the expansion and under several pieces of legislation for specific matters related to the natural environment. Approval under the *Planning Act* related to rezoning of a portion of the expanded landfill property may also be required.

Appendix B
List of Commitments in the Draft Environmental Assessment Study Report

ID	Component (*if applicable*)	Commitment (*Location of Where Commitment was Made in the EA Document Package*)	Project Phase
A	-	Implementation of all required Site effects monitoring and reporting programs. (EASR – Section 12)	Construction, operations and post-closure
B	-	The City has committed to implementing its 60% Waste Diversion Action Plan. (EASR – Section 2.3)	Operations
C	Atmosphere	Application of dust suppressant on unpaved roads on a routine basis. (EASR –Volume IV – Appendix D.01)	Construction and operations
D		Sweep/clean the roads as required to prevent mud track out on vehicles. (EASR –Volume IV – Appendix D.01)	Construction and operations
E		On-site vehicles and equipment engines will meet Tier 3 emission standards and be maintained in good working order. (EASR –Volume IV – Appendix D.01)	Construction and operations
F		Minimize idling of vehicles on-site. (EASR – Volume IV – Appendix D.01)	Construction and operations
G		Site will operate with approx.1,500 m^2 maximum working face. (EASR – Volume IV – Appendix D.01)	Operations
H		Landfill will be capped and LFG collection system installed and put into operations progressively as Phases of landfilling are completed. (EASR – Volume IV – Appendix D.01)	Operations and post-closure
I		Prepare a fugitive dust management plan and complaints response protocol. (EASR – Section 12.1.1.1 and Volume IV – Appendix D.01)	Pre-construction
J		Review and update the odour management plan and complaints response protocol. (EASR – Section 12.1.1.1 and Volume IV – Appendix D.01)	Pre-construction
K		Design and implement a follow-up noise monitoring program for the expanded landfill when landfill operations are within 330 m of POR R15 on Figure 5.2-4 in Section 5.2. Requirements for nearby vacant lots will be developed if a noise-sensitive building is constructed. (EASR – Section 9.1.2.3 and Volume IV – Appendix D.02)	Operations
L	Groundwater	Design horizontal landfill gas collectors for dual purpose as gas and leachate collectors, in the north-south direction at 30 m spacing and to a depth of 3 m into the existing waste fill over the top surface of the Phase 1 area. (EASR – Section 9.2 and Volume IV – Appendix D.03)	Pre-construction

ID	Component (*if applicable*)	Commitment (*Location of Where Commitment was Made in the EA Document Package*)	Project Phase
M	Surface Water	Design post-expansion outlet of surface water flows to corresponding pre-expansion flows to convey design storm flows. (EASR – Section 8.5.5 and Volume IV – Appendix D.04)	Pre-construction
N		Provide Enhanced Level Protection (80% TSS removal) as defined by the MECP SWM Planning and Design Manual (MECP, 2003). (EASR – Section 8.5.5 and Volume IV – Appendix D.04)	Pre-construction
O		Engineer surface drainage from potentially contaminated areas to be contained locally within berms and discharge into the waste and eventually into the leachate management system, and separate from surface drainage from non-contaminated areas. (EASR – Section 8.5.5 and Volume IV – Appendix D.04)	Pre-construction
P		Design ditch sizes to convey the 1:100 year return period design storm and culverts sized to convey a 1:25 year return period design storm as per *O. Reg. 232/98*. (EASR – Section 8.5.5 and Volume IV – Appendix D.04)	Pre-construction
Q		Inspect ESC measures during construction on a weekly basis, and after significant rainfall events (e.g. greater than approximately 10 mm). Inspection reporting, highlighting any ESC deficiencies, will be prepared for each inspection, and kept on-Site for reference and reported to MECP, if needed. (EASR – Volume IV – Appendix D.04)	Construction
R	Biology	A detailed EMMP will be developed, including a construction monitoring program. (EASR Section 9.4 and Volume IV Appendix D.05)	Pre-construction
S		Conduct all vegetation clearing activities outside the breeding bird season. (EASR Section 9.4 and Volume IV Appendix D.05)	Construction and operations
T		No vegetation clearing between April 1 to August 31 unless a nest search is completed by a qualified ecologist. (EASR Section 9.4 and Volume IV Appendix D.05)	Construction and operations
U		Prepare and implement a Species at Risk and Wildlife Observation Protocol to outline the steps to take in the event of an encounter with wildlife, including SAR, during the construction stage. (EASR Section 9.4 and Volume IV Appendix D.05)	Pre-construction, construction, and operations
V		Consult MECP to determine appropriate compensation for habitat loss of SAR grassland birds, specifically for Bobolink and Eastern Meadowlark, as regulated under the ESA (*O. Reg. 242/08*). (EASR Section 9.4 and Volume IV Appendix D.05)	Pre-construction

ID	Component (*if applicable*)	Commitment (*Location of Where Commitment was Made in the EA Document Package*)	Project Phase
W		Progressively re-vegetate as landfilling is completed in the expansion phases. Plantings should include native species that are known to occur within the region and may include compensation plantings as determined through consultation with the MECP for Bobolink and Eastern Meadowlark habitat compensation. (EASR Section 9.4 and Volume IV Appendix D.05)	Operations
X	Archaeology	EMMP (EASR Section 9.7 and Volume IV Appendix D.08)	Construction and operations
Y		Install a temporary fencing barrier to clearly delineate a 10-metre protective buffer around White Oak 1 site (AfHh-926). The protected area and the location of the temporary barrier will be shown on all contract drawings and be labeled as a “no-go” zone where construction activities will not be permitted. (EASR Section 9.7 and Volume IV Appendix D.08)	Construction and operations
Z		Provide instructions to all construction staff to stay outside of the 10 m protected area and ensure appropriate monitoring by a licensed archaeologist during any construction which takes place within. (EASR Section 9.7 and Volume IV Appendix D.08)	Construction and operations
AA		Implement a construction monitoring program whereby a licensed archaeologist would be present to monitor any construction activities (excavation or stockpile placement) that extend to the edge of the protected area, if these activities occur. (EASR Section 9.7 and Volume IV Appendix D.08)	Construction and operations
AB		Implement a post-construction monitoring program on the effectiveness of the monitoring and avoidance strategy for reporting to MHSTCI by the licensed consultant archaeologist, if construction monitoring occurs. (EASR Section 9.7 and Volume IV Appendix D.08)	Operations
AC	Land Use	Confirm if the intended uses of the Site Area comply with existing Zoning By-law permissions.	Pre-construction
AD	Visual	Waste will be placed initially to build a berm along the south side of the landfill’s waste disposal area and will be covered with final cover soil and seeded to establish vegetation. This berm will screen the view of subsequent filling operations north of the berm from off-site vantage points to the south. The south side perimeter waste berm would be raised sequentially and filled in behind until the peak elevation is reached.	Operations
AE		Construct new berms with tree plantings along the new property boundary (White Oak Road northward to Scotland Drive, Scotland Drive).	Operations

ID	Component (*if applicable*)	Commitment (*Location of Where Commitment was Made in the EA Document Package*)	Project Phase
		(EASR Section 9.9 and Volume IV Appendix D.10)	
AF		The City will seek feedback on appropriate roadside view-mitigation measures from area residents when it updates its CEMMP.	Pre-construction
AG		City will seek feedback from the public on possible improvements to the CEMMP and on appropriate visual screening measures for affected individual residential properties	Pre-construction
AH	Climate Change	Include the possibility of increased leachate generation from climate change into the design of the proposed replacement perimeter LCS for the Phase 1 area of the landfill, as well as the design of the proposed system of temporary leachate storage on the W12A Landfill site during storm events of significant magnitude that could result in discharge of the mixed leachate/sewage to Dingman Creek or the Thames River if the WWTP is in a by-pass situation temporarily.	Pre-construction
AI		Include the possibility of increased leachate generation from climate change in the design of the replacement for the main leachate pump station on the W12A Landfill site.	Pre-construction