Environmental Screening Report

Twin Creeks Landfill
Proposed Fill Rate Increase

Waste Management of Canada Corporation

March 2017
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Executive Summary

Waste Management of Canada Corporation (WM) owns and operates the Twin Creeks Landfill (formerly known as the Warwick Landfill) in Watford, Ontario. WM is proposing to amend the Environmental Compliance Approval (ECA) for the landfill to increase the annual fill rate from an overall maximum of 750,000 tonnes per year up to an overall maximum of 1,400,000 tonnes per year. This increase will allow the Twin Creeks Landfill to receive wastes historically directed to the Petrolia Landfill, which is scheduled to close in early 2017, in addition to retaining and servicing a growing customer base. The project will not involve the construction of new facilities and will not alter the existing landfill infrastructure, footprint or profile.

This ECA amendment is subject to the Environmental Screening Process in accordance with the Waste Management Projects Regulation, Ontario Regulation (O.Reg.) 101/07 of the Environmental Assessment Act, R.S.O. 1990. This Environmental Screening Report has been completed to fulfill the requirements of the Environmental Screening Process, and includes:

- a description of the project, the Environmental Screening Process, the local environment and conditions, and other required approvals and permits;

- a completed Screening Criteria Checklist; a description of consultation methods, activities and comments received;

- a detailed effects assessment, including mitigation and management measures and the identification of net effects, as appropriate; and

- a description of monitoring commitments.

It has been determined, through the assessment of the potential environmental effects of the project, that minor environmental effects are anticipated; however, these effects may be mitigated through the implementation of existing mitigation measures. The project is not anticipated to result in negative net effects (disadvantages) on the environment.

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1 Net effects are defined as "Negative environmental effects of a project and related activities that will remain after mitigation and impact management measures have been applied." Ministry of Environment and Climate Change. March 2007. Guide to Environmental Assessment Requirements for Waste Management Projects. PIBS 6168e.
1 Project Description

1.1 Introduction

The Twin Creeks Landfill (formerly the Warwick Landfill) is a regional landfill facility located in the Township of Warwick at the corner of Nauvoo Road and Zion Line (8039 Zion Line, Watford, Ontario) (Figure 1-1). The landfill began operation in 1972 and provides safe and convenient disposal services for communities, businesses and industries within Ontario. This landfill is approved to receive municipal, industrial, commercial, and institutional solid non-hazardous wastes for disposal, including non-hazardous contaminated soil, from generators within the Province of Ontario.

Waste Management of Canada Corporation (WM) has owned and operated the Twin Creeks Landfill since 1996. The landfill was approved under the Environmental Assessment Act (EAA) for expansion in 2007 and the Environmental Compliance Approval was obtained in 2008. Waste was first deposited into the expansion landfill in November 2009. The pre-existing landfill site was originally approved for a waste capacity of 3,072,000 m³ within an area of 32.4 ha. The approval of the expansion in 2008 increased the total airspace capacity to 26,508,000 m³ within an area of 101.8 ha.

The Environmental Compliance Approval (ECA) A032203 for the Twin Creeks Landfill currently allows the landfill to receive up to a maximum of 750,000 tonnes per year of waste, including contaminated soil, for disposal at the site. The remaining capacity at the landfill is currently over 20 million m³.

The Twin Creeks Landfill is engineered with environmental protection systems that meet or exceed regulatory requirements and are subject to highly regulated monitoring and reporting requirements. Systems include an engineered liner and cover, leachate collection and removal, landfill gas collection and control, and surface water management.
1.2 Problem, Purpose and Opportunity

The Twin Creeks Landfill currently receives approximately 550,000 tonnes per year of waste. As previously noted, the ECA for the Twin Creeks Landfill currently allows the landfill to receive up to a maximum of 750,000 tonnes per year of waste.

In addition to the Twin Creeks Landfill, WM owns and operates the Petrolia Landfill, located on Oil Heritage Road in Petrolia, Ontario. The Petrolia Landfill, which is licensed to receive 365,000 tonnes per year of waste, is scheduled to reach capacity in 2017. WM has made the corporate decision to reduce the flow of waste to the Petrolia Landfill and redirect these wastes to other landfill sites in preparation for the closure of the Petrolia Landfill in 2017. Upon the closure of the Petrolia Landfill, it is anticipated that the flow of waste destined for the Petrolia Landfill will be redirected to the Twin Creeks Landfill.

Given that the current ECA for the Twin Creeks Landfill allows the landfill to receive up to a maximum of 750,000 tonnes per year of waste, the addition of the Petrolia Landfill waste flow to Twin Creeks’ current waste flow will place the Twin Creeks Landfill at its maximum annual fill rate limit under the ECA. This condition will not allow WM to accommodate increased waste flows from future population growth, or accept other waste contracts in Ontario.
WM is proposing to increase the landfill annual fill rate to an overall maximum of up to 1,400,000 tonnes per year. This increase will enable the Twin Creeks Landfill to accommodate wastes previously directed to the Petrolia Landfill, plus retain and service a growing customer base.

1.3 Description of Project Components and Activities

Increasing the maximum annual fill rate limit under the ECA will not require any changes to the landfill footprint, approved capacity, profile or site infrastructure. The Twin Creeks Landfill will continue to operate within currently approved operating hours and current construction activities and daily operations will continue as usual.

Increasing the maximum annual fill rate limit will result in increased truck traffic on the haul route from Highway 402 along Nauvoo Road (County Road 79) to the landfill entrance. There are approximately 11 landfill-related vehicles per hour on the haul route based on the current fill rate, and it is projected that the project will result in the addition of approximately eight vehicles per hour travelling along the haul route to the landfill site. Of these eight vehicles, it is anticipated that approximately three vehicles per hour will arrive from the West on Highway 402, and approximately five vehicles per hour will arrive from the East. The number of vehicles will increase slightly during the peak operating hours.

Additional on-site landfill equipment will be required to handle the additional incoming waste, specifically two bulldozers (CAT D6 and CAT D7). This equipment will operate within the currently-approved operating hours.

There is the potential for a decreased operating life for the Twin Creeks Landfill if the current maximum annual fill rate limit is increased, depending on the actual annual waste quantities received. Based on an increase in the annual fill rate to 1,400,000 tonnes per year, and a period of five years required to reach this annual limit, it is estimated that the Twin Creeks Landfill will reach the approved capacity by 2034 versus 2047. This means that the Twin Creeks operating site life may be reduced by approximately 13 years.

1.4 Approval Requirements

As mentioned in Section 1.1, the expansion of the Twin Creeks Landfill was approved by the Ministry of Environment and Climate Change (MOECC) in 2008 subject to the conditions of ECA A032203 regarding planning, construction, installation, operation, closure and monitoring. This approval was based on the “Warwick Landfill Expansion Environmental Assessment” (WM, September 2005). The ECA was amended in December 2011, and then periodically from February 2012 through July 2016.

A change to the annual fill rate limit requires a modification to Condition 6.6 (1) of the ECA, which specifies the maximum amount of waste that may be received at the landfill. This ECA amendment is subject to the Environmental Screening Process in accordance with Section 15 of the Waste Management Projects Regulation, Ontario Regulation.

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2 The Warwick Landfill Expansion Environmental Assessment is referred to throughout this Environmental Screening Report as “the original environmental assessment”.
(O.Reg.) 101/07 of the *Environmental Assessment Act, R.S.O. 1990*. The Environmental Screening Process is described in Section 2.

When the Environmental Screening Process has been completed, WM will initiate the ECA amendment process by preparing and submitting an application to the MOECC to amend ECA A032203.

### 2 Environmental Screening Process

Environmental assessment is a planning process used to support environmentally responsible decision-making. The *Environmental Assessment Act* establishes a process for evaluating the environmental effects of proposed activities in order to provide for the protection, conservation and management of the environment.

In 2007, the MOECC developed new environmental assessment requirements for waste management projects, the *Waste Management Projects Regulation* (O.Reg. 101/07), to ensure that the environmental effects of these projects are appropriately reviewed, given their potential significance. The MOECC published the “Guide to Environmental Assessment Requirements for Waste Management Projects” (the Guide), which outlines the Environmental Screening Process for waste management projects in detail.

Certain waste management projects are exempt from environmental assessments under Part II of the *Environmental Assessment Act* if they fulfill the requirements of the Environmental Screening Process in Part B of the Guide. The Environmental Screening Process contains a series of steps for completion and is illustrated in Figure 2-1.

The proposed project is exempt from Part II of the *Environmental Assessment Act* and is subject to the Environmental Screening Process under Section 15 of O.Reg. 101/07.

This Environmental Screening Report has been prepared as part of the Environmental Screening Process to document the potential adverse environmental effects of the project on the environment. Where adverse environmental effects are identified, mitigation, monitoring and other impact management measures are recommended to reduce or eliminate the effects.

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3 The environment under the *Environmental Assessment Act* is defined as including the natural, social, economic, cultural and built environments.
Consultation and Engagement

Consultation and engagement is an important part of environmental assessments and is a requirement of the Environmental Screening Process. Consultation and engagement allows proponents to obtain feedback from interested parties, government agencies, First Nation communities, Aboriginal groups and the public so issues and concerns can be identified and considered in the environmental assessment. The consultation and engagement program undertaken by WM for this project is described below.
3.1 Consultation and Engagement Methods

Consultation and engagement with the public, interested parties, government agencies, First Nation communities and Aboriginal groups was carried out during the Environmental Screening Process as follows:

- Pre-consultation with the Township of Warwick, the MOECC, County of Lambton and Walpole Island First Nation;
- Notice of Commencement of an Environmental Screening and Public Open House;
- Two Public Open Houses;
- Waste Management Twin Creeks Landfill website: http://twincreekslandfill.wm.com;
- Newspaper ads;
- Face to face meetings;
- Letters, telephone calls, and emails;
- Presentations; and
- Peer review of technical studies.

A listing of interested parties, government agencies, and First Nation communities and Aboriginal groups that were engaged during the Environmental Screening Process are provided in Sections 3.2, 3.3 and 3.4, respectively.

Copies of the consultation documentation provided to interested parties, government agencies, and First Nation communities and Aboriginal groups are included in Appendix A (Public Open House #1 Summary Report) and Appendix B (Public Open House #2 Summary Report). Consultation and engagement activities are described further in Sections 3.5 through 3.8.3.

Additional consultation and engagement was conducted through the distribution and review of draft assessment studies, as detailed in Section 7.

3.2 Interested Parties

The following interested parties were consulted during the Environmental Screening Process:

- the Warwick Public Liaison Committee (WPLC); and
- the general public, including residential property owners and businesses located in the vicinity of the landfill and haul route.

The ECA for the landfill includes the condition that WM “continue and maintain” the WPLC, whose purpose would be to provide community review of the development, operation (current and proposed), on-going monitoring, closure and post-closure care related to the landfill. Consequently, the WPLC was consulted during the Environmental Screening Process and there was no need to develop a public committee specifically for the purpose of this project.
3.3 Government Agencies

The following is a list of the Federal, Provincial and local government agencies that were consulted during the Environmental Screening Process.

**Federal Agencies:**
- Canadian Environmental Assessment Agency
- Environment and Climate Change Canada
- Transport Canada

**Provincial Agencies:**
- Ministry of Aboriginal Affairs
- Ministry of Agriculture, Food and Rural Affairs
- Ministry of Citizenship and Immigration
- Ministry of Community Safety and Correctional Services
- Ministry of the Environment and Climate Change
- Ministry of Health and Long-term Care
- Ministry of Municipal Affairs and Housing
- Ministry of Natural Resources and Forestry
- Ministry of Tourism, Culture and Sport
- Ministry of Transportation
- Ontario Provincial Police
- Lambton Public Health Unit

**Local Agencies:**
- County of Lambton
- Warwick Township
- Lambton Kent District School Board
- St. Clair Catholic District School Board
- Conseil Scolaire Catholique Providence
- St. Clair Region Conservation Authority

3.4 First Nation Communities and Aboriginal Groups

As recommended as part of the Environmental Screening Process, the MOECC was contacted during the initiation of the Environmental Screening Process. A list of First Nation communities and Aboriginal groups was provided to the MOECC and feedback was requested. The following is a list of First Nation communities and Aboriginal groups
that were identified as potentially having an interest in the project. This list was confirmed by the MOECC.

- Aamjiwnaang First Nation
- Bkejwanong (Walpole Island) First Nation
- Walpole Island Heritage Centre (Walpole Island First Nation)
- Caldwell First Nation
- Chippewas of Kettle and Stony Point First Nation
- Chippewas of the Thames First Nation
- Delaware Nation at Moraviantown
- Munsee Delaware Nation
- Oneida Nation of the Thames
- Metis Nation of the Ontario Windsor-Essex Metis Council
- Metis Nation of Ontario Grand River Metis Council

3.5 Pre-Consultation

Publishing the Notice of Commencement of a screening project is the first step of the Environmental Screening Process; however, prior to distribution of the Notice of Commencement, pre-consultation was undertaken with the Township of Warwick, the MOECC, County of Lambton and Walpole Island First Nation.

WM provided a presentation on the project to the Township of Warwick during a Council meeting on March 21st, 2016.

A meeting was held with the MOECC Regional Environmental Assessment Coordinator, London Region, and Sarnia District staff on April 13th, 2016 to provide a brief overview of the project and approach for the Environmental Screening Process and to solicit any feedback.

WM met with representatives of Walpole Island First Nation on April 13th, 2016 to discuss the proposed project and their interest in the project.

3.6 Notice of Commencement

Under the Guide, a proponent is required to issue a public Notice of Commencement of a Screening Project describing the project and announcing the commencement of the Environmental Screening Process (Step 1 on Figure 2-1). WM prepared the “Notice of Commencement of an Environmental Screening and Public Open House” (the Notice of Commencement) to fulfill the requirements of the Environmental Screening Process. The Notice included a brief description of the proposed undertaking and a map of the project location, details of the Environmental Screening Process, information regarding consultation and Public Open House #1, the project website address, contact information for project personnel, and an invitation to submit written comments and concerns.
On April 14th 2016, WM distributed the Notice of Commencement via regular mail to government agencies, organizations, and local residential property owners. The Notice of Commencement was also distributed via regular mail to the First Nation communities and Aboriginal groups listed in Section 3.4 and Appendix A, along with copies of the Project Description and the draft Screening Criteria Checklist.

The Notice of Commencement was published for two consecutive weeks in two local newspapers: the Sarnia Observer on April 16th and April 23rd, 2016; and the Standard Guide Advocate on April 14th and April 21st, 2016. WM also placed the Notice of Commencement on the project website (http://twincreekslandfill.wm.com).

A list of the government agencies, organizations, and local residents that received the Notice of Commencement is provided in Appendix A.

3.7 Public Open Houses

Two public open houses were held to fulfill the requirements of the Environmental Screening Process: the first on April 28th, 2016; and the second on August 17th, 2016. Details regarding the notice, attendance and materials are provided in Sections 3.7.1 and 3.7.2.

3.7.1 Public Open House #1

Public Open House #1 (Step 5 on Figure 2-1) was advertised to government agencies, First Nation communities and Aboriginal groups, organizations, local residents and the public through the distribution of the Notice of Commencement as described in Section 3.6. Public Open House #1 took place on Thursday, April 28th, 2016, from 4:00 p.m. to 8:00 p.m. at the Waste Management Twin Creeks Landfill Site Office located at 5768 Nauvoo Road, Watford, Ontario. A total of 15 people attended the open house. The purpose of the open house was to describe the project and the Environmental Screening Process, and provide an opportunity for attendees to raise issues and concerns and discuss them directly with project staff.

The format of Public Open House #1 was a drop-in style session, with an informal set-up. Information provided at the open house included:

- an overview of WM;
- background information on Twin Creeks Landfill;
- details of the ECA and the project problem and opportunity;
- a description of the project;
- an overview of the Environmental Screening Process;
- a draft Screening Criteria Checklist;
- a summary of the anticipated potential effects of the project; and
- next steps and Project Team contact information.

Materials from Public Open House #1 can be found in Appendix A.
A total of two (2) comment forms were received during Public Open House #1. No additional comments were received following Public Open House #1. Generally the comments were inquisitive in nature and requested additional information regarding project details. The main issues raised were as follows:

- Landfill lifespan concerns;
- Additional information on the history of the landfill;
- Request for additional staff (preferably from MOECC) to be present;
- Questions about safeguards;
- Concerns with increased traffic, dust, odour and noise;
- Concerns with increased wildlife;
- Concerns with blowing litter; and
- Additional information on landfill runoff.

A complete summary of Public Open House #1, including comments received, is included in Appendix A. This summary was made available on the project website following the open house.

3.7.2 Public Open House #2

On July 29th, 2016, WM distributed the Notice of Public Open House #2 via regular mail to government agencies, organizations, and local residential property owners. The Notice of Public Open House #2 was also distributed via regular mail to the First Nation communities and Aboriginal groups listed in Section 3.4 and Appendix B along with copies of the Project Description and the draft Screening Criteria Checklist.

The Notice of Public Open House #2 was published in two local newspapers: the Sarnia Observer on August 3rd and August 13th, 2016; and the Standard Guide Advocate on August 11th, 2016. WM also placed the Notice of Public Open House #2 on the project website (http://twincreekslandfill.wm.com).

Public Open House #2 (Step 8 on Figure 2-1) took place on Wednesday, August 17th, 2016, from 4:00 p.m. to 8:00 p.m. at the Waste Management Twin Creeks Landfill Site Office located at 5768 Nauvoo Road, Watford, Ontario. A total of 15 people attended the open house. The purpose of the open house was to describe the project and the Environmental Screening Process, review the potential effects of the project, answer questions from the attendees, and to solicit comments from the public.

The format of Public Open House #2 was a drop-in style session, with an informal set-up. Information provided at the open house included:

- an overview of WM;
- background information on Twin Creeks Landfill;
- details of the ECA and the project problem and opportunity;
- a description of the project;
3.8 Correspondence

Correspondence with interested parties, government agencies, and First Nation communities and Aboriginal groups is detailed in Sections 3.8.1, 3.8.2, and 3.8.3, respectively.

3.8.1 Correspondence with Interested Parties

Members of the WPLC attended Public Open House #1 and Public Open House #2. The project was discussed at the WPLC meeting on June 2\textsuperscript{nd}, 2016. Correspondence received from WPLC during the consultation period, including comments from the June 2\textsuperscript{nd}, 2016 meeting is provided in Appendix J. There was one request to be added to the project mailing list.

3.8.2 Correspondence with Government Agencies

Correspondence was received from seven (7) of the government agencies during the consultation period. Details of the correspondence are provided in Appendix H. Comments were received from the following agencies:
• MOECC;
• Ministry of Tourism, Culture and Sport;
• Ministry of Natural Resources and Forestry;
• Canadian Environmental Assessment Agency;
• Transport Canada;
• St. Clair Region Conservation Authority;
• Township of Warwick; and
• County of Lambton.

3.8.3 Correspondence with First Nation Communities and Aboriginal Groups

Members of the Walpole Island First Nation attended Public Open House #1 and also provided comments on the draft effects assessment studies. Walpole Island First Nation’s comments on the effects studies, and WM’s responses, are provided in Appendix G.

WM also received a letter from the Chippewas of the Thames First Nation requesting that they be informed of any project details such as completed studies associated with the project. WM’s response to this letter is provided in Appendix I.

4 Screening Criteria Checklist

One of the first steps in the Environmental Screening Process is to identify the potential environmental effects of the project. The MOECC has developed a Screening Criteria Checklist (Schedule I of the Guide), which comprises a series of screening criteria presented in the form of “yes” or “no” questions to be applied to the project for the following environmental components:

• Surface and Groundwater;
• Land Use;
• Air and Noise;
• Natural Environment;
• Resources;
• Socio-Economic;
• Heritage and Culture;
• Aboriginal; and
• Other.

Under the Environmental Screening Process, if no potentially adverse environmental effects are associated with the project for a given environmental component, that
component is no longer considered part of the impact assessment. If it is determined that there is potential for an adverse impact to occur, the assessment must evaluate the nature of the impact and provide the appropriate mitigation measures to minimize the impact.

Following preparation of the draft Screening Criteria Checklist, the list was sent to the First Nation communities and Aboriginal groups in Section 3.4 for review, presented at both public open houses, and published on the project website (http://twincreekslandfill.wm.com). The draft Screening Criteria Checklist was reviewed based on the comments received and was used as the basis for the identification and assessment of the potential environmental effects of the project.

The completed Screening Criteria Checklist is provided in Appendix C.

5 Potential Environmental Effects

Potential environmental effects (either positive or negative) anticipated to result from the project were identified using the screening criteria in the Screening Criteria Checklist (Appendix C). The following subsections provide a summary of the results of the application of the screening criteria.

5.1 Surface and Ground Water

The project will not result in changes to the landfill design, footprint or on-site landfill operations. The proposed increase of the annual fill rate is not anticipated to negatively affect surface water quality, quantity or flow, or groundwater quality, quantity or movement. The project is not anticipated to cause measurable changes to sedimentation or erosion on-site or off-site, or cause any negative effects on surface water or groundwater due to accidental spills or releases (e.g., leachate) to the environment.

No negative environmental effects are anticipated on surface water or groundwater as a result of the project.

5.2 Land Use

The project will not result in changes to the landfill design, footprint or on-site landfill operations. The landfill will continue to be consistent with the Provincial Policy Statement, provincial land use and resource management plans, and municipal land use policies, plans and zoning by-laws (including municipal setbacks). No new lands are required, and there will be no changes to existing zoning.

No negative environmental effects are anticipated on the lands or land uses surrounding the Twin Creeks Landfill including residential, commercial, institutional, or other sensitive land uses, or from the remediation of contaminated land.
5.3 Air and Noise

The project will result in an increase in the daily frequency and volume of truck traffic on local roads and at the Twin Creeks Landfill. Additional landfill equipment will also be required on-site during operating hours. The following potential environmental effects on air and noise are anticipated:

- Potential increase in emissions of greenhouse gases from additional truck movements to/from the site, increased on-site landfill equipment requirements, and a larger landfill working face;
- Potential increase in dust and odour emissions from additional truck movements to/from the site, increased on-site landfill equipment requirements, and a larger landfill working face; and
- Potential increase in noise emissions from additional truck movements and increase in on-site landfill equipment requirements.

5.4 Natural Environment

The project will not result in changes to the landfill design, footprint or on-site landfill operations, and the transporting of waste will continue along approved haul routes.

No negative environmental effects are anticipated on the natural environment including protected natural areas, and wildlife habitat, populations, corridors and movement. No effects are anticipated to rare (vulnerable), threatened or endangered species and habitats, fish and fish habitats, designated wetlands, locally important or valued ecosystems and vegetation, as none are present on site.

5.5 Resources

The project will not result in changes to the landfill design, footprint or on-site landfill operations, and the landfill will continue to be consistent with waste diversion targets.

The project will not involve energy recovery and is not anticipated to result in negative effects on locally significant agricultural lands or existing agricultural production.

5.6 Socio-Economic

The project will not result in changes to the landfill design, footprint or on-site landfill operations; consequently, no negative environmental effects to the following social or economic aspects of the surrounding community are anticipated: aesthetics (visual, litter); local businesses, institutions or public facilities; recreation, cottaging or tourism; community services and infrastructure; local economic base; local employment and labour supply; or public health and safety.

The project is anticipated to result in potential effects on traffic from additional truck traffic to and from the site.
5.7 Heritage and Culture

The Ministry of Tourism, Culture and Sport developed two checklists to aid in the determination of potential impacts to archaeological and built heritage resources: the *Criteria for Evaluating Archaeological Potential*; and the *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes*. Copies of the completed checklists are provided in Appendix L. A Stage 3 Archaeological Assessment conducted on the site in 2007 cleared the project area of any further archaeological concern, and a cultural heritage resources assessment carried out for the original environmental assessment determined that no built heritage resources exist on the site, while the two agricultural landscapes identified in the assessment have been removed as a result of landfill development. The project will not result in changes to the landfill design, footprint or on-site landfill operations; consequently, no negative environmental effects are anticipated on heritage and cultural features including heritage buildings, structures or sites, archaeological sites or cultural heritage landscapes. In addition, no negative environmental effects on scenic or aesthetically pleasing landscapes or views are anticipated.

5.8 Aboriginal

The project is not anticipated to have an effect on First Nation communities or Aboriginal groups, including their lands, resources, traditional activities or other interests; however, several First Nation communities and Aboriginal groups have been engaged throughout the environmental screening process to solicit feedback on the project and/or studies (Section 3.4).

Two First Nation communities, Walpole Island First Nation and the Chippewas of the Thames First Nation, indicated interest in the project and requested that they be kept informed throughout the environmental screening process. Communications received from the First Nation communities are provided in Appendix G and Appendix I.

5.9 Other

The project will not result in changes to the types of wastes the facility is permitted to receive and will not result in the creation of hazardous or non-hazardous waste materials requiring disposal. The Twin Creeks Landfill currently receives non-hazardous wastes as permitted by the existing ECA. The project is not anticipated to result in other negative environmental effects not covered by the Screening Criteria Checklist provided in Appendix C.

6 Environmental Effects Assessment

Three studies were completed to assess the potential environmental effects of the project identified in Section 5:

1. Air Quality, Odour, and Dust Evaluation (Appendix D);
2. Noise Evaluation (Appendix E); and
3. Traffic Impact Study (**Appendix F**).

The following sections provide an overview of the assessment of the potential environmental effects as identified in the Screening Criteria Checklist and describes the necessary mitigation and impact management measures. The environmental effects assessment describes how the baseline conditions in the study area will change as a result of the project.

### 6.1 Air Quality, Odour and Dust

The potential environmental effects of the project were identified as: a potential increase in emissions of greenhouse gases from additional truck movements to/from the site, increased on-site landfill equipment requirements and a larger landfill working face; and a potential increase in dust and odour emissions from additional truck movements to/from the site, increased on-site landfill equipment requirements, and a larger landfill working face.

#### 6.1.1 Air Quality and Odour

**Background**

WM is required to complete an annual air quality monitoring program at the Twin Creeks Landfill site in order to satisfy the requirements of the ECA (as amended in December 2011 through July 2016). The air quality monitoring program comprises the following:

- Landfill Gas Surface Monitoring – Total Hydrocarbons (THC); and
- Ambient Fenceline Volatile Organic Compound (VOC) Monitoring.

The air quality monitoring program is monitored and reviewed by the MOECC to ensure levels fall within accepted standards. Details of the air quality monitoring programs are provided in **Appendix D**.

For THC monitoring, data is collected at \( \leq 7.6 \) cm above the ground across the surface of the landfill. Locations where the THC concentrations are \( \geq 500 \) ppm are marked by recording the UTM coordinates from a GPS and physically marking the ground with a flag. Ground repair work is completed and the location is re-examined to confirm that all leaks found during the survey have been repaired.

VOC sampling has been conducted through the summer months (July, August and September) since 2009. No more than two (2) sets of concurrent upwind and downwind samples are collected in any calendar month. The samples are 30 minutes in duration and are compared to Provincial Point of Impingement standards.

In general, the VOC concentrations measured since the onset of the monitoring program have been generally quite low. All concentrations measured have consistently been less than their respective air quality standards (**Appendix D**).

A total of eleven (11) odour complaints have been received since late 2009 related to detectable odours off-site. The majority of the complaints were received in 2012 and follow-up by WM determined that the odours could not be directly related to landfill activities.
WM has provided a Best Management Practices Plan (BMPP) for odour to the MOECC. The plan includes the responsibilities for various aspects of the plan, overview of potential sources or emissions, training, inspection and maintenance procedures, control methods for identified sources, schedule for implementation of controls, record keeping, log of inspections and complaint forms. The BMPP is provided in Appendix D.

Assessment

The assessment of the environmental effects of the project on air quality considered changes to landfill gas emission rates and odour including THCs and VOCs. Air quality contaminants including vinyl chloride and hydrogen sulphide (H₂S) were used as indicator contaminants for landfill gas and as the basis of the evaluation. In addition, the remaining VOCs and odour were examined as part of the evaluation.

The assessment considered the following proposed changes:

- annual tonnage increase from 750,000 tonnes to 1,400,000 tonnes over six years, beginning in 2022 to accept 1,400,000; and
- increase in the size of the active working face.

Only the worst-case scenario, as identified from the original environmental assessment results, was considered for the environmental effects assessment. For landfill gas contaminants, the worst case scenario represented the landfill operations one year after the landfill closes (noted as Year 26 in the original environmental assessment).

Dispersion modelling details are provided in Appendix D.

Modelling results were compared to the applicable Ambient Air Quality Criteria (AAQC) for vinyl chloride, H₂S, and the other 30 contaminants of interest. AERMOD modelling results were produced for 10-minute, 24-hour, and annual averaging times to compare to the applicable AAQC at both the property line and the discrete receptors.

Modelled VOC concentrations from proposed landfill operations (at a maximum of 1,400,000 tonnes per year) were found to increase by between 0% and 23% at both the property line and at discrete receptors, relative to the approved maximum current operating conditions (at 750,000 tonnes per year). The maximum predicted concentrations using the dispersion model indicate that the concentrations are less than 60% of the criteria for both the current and proposed scenarios. VOC concentrations are predicted to continue to be compliant with applicable standards at nearby receptors and property lines.

VOC emissions are dominated by the planned leachate treatment plant, which will not be affected by an increase in the annual fill rate since the landfill capacity is not changing. The modelling results indicate that the landfill can demonstrate compliance with applicable standards for VOCs, and the proposed increase in the annual fill rate will not result in a substantial effect on VOC emissions.

H₂S emissions are directly related to the landfill gas generation. Modelled H₂S concentrations from the proposed landfill operations were found to increase by approximately 20% at the property line and 17% at discrete receptors relative to the approved maximum current operating conditions. The results of the dispersion modelling...
show that the predicted concentrations are within applicable limits at the property line and discrete receptors.

The transportation of wastes to the landfill site was identified as a potential source of greenhouse gas emissions. While the approved design capacity will not change, the operating life of the landfill will be shortened as a result of the project. Although an increased number of vehicles will access the site on an annual basis during the operating period, the total number of vehicle trips associated with the landfill is not expected to differ regardless of the change in operating period (i.e., a comparable number of vehicles will be required to transport the waste to the landfill under all operating periods) due to the project.

Odours within the existing environment are predominantly generated by the existing landfill including the active working face and the leachate collection system. The Twin Creeks Landfill is located within a predominantly rural setting and therefore agricultural operations are also a source of odours in the vicinity of the landfill. Increased traffic movements on site for the delivery of the additional waste material are not anticipated to be an odour source.

As noted above, the worst-case scenario, as identified from the original environmental assessment results, was considered for the environmental effects assessment. For odour, the worst-case scenario represented Year 21 (as noted in the original environmental assessment). Although the working face location will move throughout the life of the landfill, the modelled location in the northeast corner at this time represents the closest proximity to an off-site odour sensitive receptor (i.e., residence). All other working face locations are farther from the sensitive receptor locations and thus do not represent worst-case conditions in regards to the working face contribution to odour impacts. A worst-case landfill gas collection system operating scenario was also assumed, with the collection system having a minimum collection efficiency of 70%. Modelling details are provided in Appendix D.

Modelled odour concentrations from the proposed landfill operations were found to have remained relatively the same at receptors compared to the approved maximum current operating conditions, and an increase in the size of the working face will not substantially increase odour emissions. The dominant source of odours is related to the planned leachate treatment plant and the odours will not substantially change with the proposed increase to the annual fill rate.

Overall, it is anticipated that the Twin Creeks Landfill will continue to comply with the applicable air quality standards when the annual fill rate increases. The full Air, Odour, and Dust evaluation is provided in Appendix D.

6.1.2 Dust

Background

WM is required to complete an annual dust monitoring program at the Twin Creeks Landfill site in order to satisfy the requirements of the ECA (as amended in December 2011 through July 2016). The dust monitoring program comprises Ambient Particular Monitoring for Total Suspended Particulate Matter (TSP) and metals.
The air quality monitoring program is monitored and reviewed by the MOECC to ensure levels fall within accepted standards. Details of the air quality monitoring programs are provided in Appendix D.

TSP sampling is completed at three (3) fixed locations around the landfill footprint. The samples are collected on a six (6) or twelve (12) day interval, depending on time of year, in concurrence with the U.S. EPA National Air Pollutant Surveillance monitoring schedule. Sampling commenced in 2009 and has continued to date at the same locations approved by the MOECC.

Of the 906 valid samples collected at the site since 2009, only 20 samples have exceeded the AAQC of 120 µg/m³ for TSP. Approximately 2% of the valid samples collected had measured levels greater than the AAQC. One (1) dust complaint has been received at the site since the expansion of landfilling operations in November 2009.

WM has provided a BMPP for dust to the MOECC. The plan includes the responsibilities for various aspects of the plan, overview of potential sources or emissions, training, inspection and maintenance procedures, control methods for identified sources, schedule for implementation of controls, record keeping, log of inspections and complaint forms. The BMPP is included as Schedule A Item 24 of the ECA. A copy of the approved BMPP is provided in Appendix D.

Assessment

Potential dust emissions at the Twin Creeks Landfill include dust generated by material handling (e.g. bulldozing, excavating), travelling vehicles, and wind and dry weather.

For the dust evaluation, the assessment considered the following changes as a result of the project:

- An increase in the on-site truck traffic during the peak operating hours; and
- The addition of a CAT D7 and D6 dozer.

On-site and off-site traffic data was updated based on new traffic counts. On-site traffic data was based on the average of the AM, mid-day, and PM peak traffic volumes. This combined traffic volume was then applied to every hour that the landfill is receiving traffic (i.e., from 7 a.m. to 7 p.m.). The contribution from small vehicles (i.e., passenger cars and trucks using the public drop off area) and on-site heavy equipment was not updated from the original environmental assessment. The total traffic volume was applied to the site entrance route, and then the traffic was divided across the on-site roads based on vehicle type and route information from the original environmental assessment.

Only the applicable worst-case scenario was considered for the environmental effects assessment. For dust, the worst-case scenario represented Year 21 (as noted in the original environmental assessment). Modelling details are provided in Appendix D.

Dust sources considered in the assessment include paved and unpaved roads, material handling, vehicle emissions, flares, generators, passive landfill area sources, leachate treatment sources, and wind erosion. The modelling took into account additional factors including emission factors and variables, vehicle weights and capacities, vehicle fleet...
makeup, road watering rate and other dust control strategies, and size and location of on-site sources.

Besides local agricultural activity, the majority of particulate background is related to off-site traffic. Because of this, ambient monitoring data was not used for background dust concentrations; instead, the background concentrations were accounted for by including the contribution from off-site traffic as a source within the modelling.

Based on the modelling results, the 24-hour TSP concentrations at the site for all sources are predicted to increase by approximately 1% at discrete receptors, while annual TSP concentrations are predicted to increase by 2%. The predicted concentrations at the property line from an ECA perspective will not change as a result of the project. The project will not substantially affect dust concentrations at discrete receptors or at the property line, but there will be increases in the on-site TSP concentrations related to additional vehicular traffic movements and soil handling.

There is an on-going requirement to monitor particulate concentrations at the site boundary and WM will continue to utilize the BMPP for fugitive dust control and monitor for any changes to TSP concentrations. If concentrations begin to increase, site operations will be reviewed and additional dust controls will be implemented as soon as practicable. The BMPP will be updated to account for these changes, if required.

Overall no negative environmental effects (disadvantages) of the project are anticipated for air quality, odour and dust; therefore, no additional mitigation measures are required. The complete Air Quality, Odour, and Dust Evaluation is provided as Appendix D.

6.2 Noise

The potential environmental effects of the project were identified as a potential increase in noise emissions from additional truck movements and an increase in on-site landfill equipment requirements.

Background

Under the current ECA, WM is required to conduct a Noise Monitoring Program on an annual basis. The Noise Monitoring Plan is included in Appendix E.

Historically, some events at the landfill have resulted in excess noise levels including construction activities for new cell construction. Since 2009, elevated sound levels at the monitoring locations have been attributed to activity in close proximity to the sound level monitors, such as construction activities, rather than landfilling operations. Non-landfill noise sources have contributed to excess noise levels including residents using the adjacent snowmobile trail, construction of the nearby nature trail, and increased activities at adjacent commercial facilities.

Since 2009, a total of nine (9) noise complaints have been received. All nine complaints came from the same resident and were related to audible noise from back-up beepers associated with equipment operation at the site. Back-up beepers are a safety requirement and therefore are exempt from noise assessment per the MOECC guidance. No noise complaints have been received since 2013.
The landfilling activities are currently operating within the accepted noise criterion and the proposed increase in the annual fill rate will also be required to meet the same criterion.

Assessment

*Landfill Operations*

In order to consider future compliance of noise levels from the landfill, an evaluation was carried out on the predicted sound levels that will be associated with the proposed increase in the annual fill rate. The criteria for landfilling-related sound levels are established in the MOECC guideline for landfill sites, and are as follows:

- 55 dBA for daytime operations (7 a.m. to 7 p.m.); and
- 45 dBA for nighttime operations (7 p.m. to 7 a.m.).

As a conservative approach, no background sound levels were examined during this assessment. Therefore, the MOECC default guideline limits applied.

The assessment considered the following proposed changes:

- On-site truck traffic increase from 28 trucks per hour under current operations to a total of 67 trucks per hour (an addition of 28 heavy trucks and 11 medium trucks) during a peak hour for the proposed operation; and
- The addition of a CAT D7 and CAT D6 dozer to landfill operations where allowed by the mitigation measures outlined below.

The assessment also included the existing public waste drop-off area and a conceptual situation where the entire waiting area for the scales is occupied with idling trucks. The modelling took into account 48 trucks idling at the scale and approximately 6 automobiles arriving and departing from the public waste drop off area in a given worst-case hour. As a worst-case, the modelling of medium trucks assumed that all medium trucks proceed to the working face and have sound levels equivalent to the heavy trucks.

On-site modelling of truck sound levels was completed and took into account vehicle speed, source sound power level, distance attenuation, ground and air (atmospheric) attenuation, source-receptor geometry including heights, elevations, and barrier effects due to berms, and topography of the site.

Sound levels for the daytime operating equipment were taken from the original environmental assessment, with the addition of the sound levels for the CAT D6 and D7 dozers at 72 and 77 dBA at 30 m, respectively. It was assumed that the CAT D6 and D7 dozers will not operate at nighttime. The sources associated with wood chipping, tire shredding and crushing of concrete were not included in this assessment as these activities do not occur on the landfill site and are not in the permitted by the ECA for the site.

The predicted sound levels from proposed operations are predicted to generally increase by 1 to 2 dB, and will comply with the approved sound level limits provided that the following mitigation measures are followed:
• Existing noise control measures already in place at the facility are continued, including the nighttime operational restrictions on existing landfilling equipment from the original environmental assessment;

• The proposed CAT D6 and CAT D7 dozers meet a sound level of 72 dBA and 77 dBA at 30 m, respectively, where their operation is allowed under the mitigation measures identified below;

• The proposed CAT D6 and CAT D7 dozers will not be used during the nighttime period for all phases;

• During Phase 3 of the landfill development, three potential noise mitigation scenarios can be implemented. All three scenarios will allow the noise requirements to be met depending on the specific operational requirements of the landfill. As operational changes occur at the landfill (i.e., due to the increase or decrease in day to day volumes received), WM will require flexibility to adjust the specific mitigation scenario implemented periodically during this Phase. The mitigation scenarios are:

  • **Scenario 1:**
    - During the peak operating hour, up to 30 trucks per hour will travel on the new northern haul route to the landfill working face and up to 37 trucks per hour will travel on the existing southern haul route to the landfill working face; and
    - The use of the proposed CAT D6 and D7 dozers are not permitted during Phase 3.

  • **Scenario 2:**
    - During the peak operating hour, up to 22 trucks per hour will travel on the new northern haul route to the landfill working face and up to 45 trucks per hour will travel on the existing southern haul route to the landfill working face;
    - A 4 m-high, 320 m-long barrier will be installed on the south side of the east-west portion of the southern truck route near receptor R9; and
    - There is no restriction on the use of the proposed CAT D6 and D7 dozers.

  • **Scenario 3:**
    - During the peak operating hour, all 67 trucks per hour will travel on the new northern haul route to the landfill working face; and
    - There is no restriction on the use of the proposed CAT D6 and D7 dozers.

• During Phase 9 of the landfill development, the use of the proposed CAT D7 dozer is not permitted during the daytime hours.

*Haul Route*

A haul route noise assessment was completed to assess the effects of the increased project-related off-site vehicle traffic. Traffic data was obtained from the Traffic Impact Study (**Appendix F**).
Vehicles bound for the landfill exit off Highway 402 and travel southbound on Nauvoo Road (County Road 79) to the landfill entrance. Vehicles exiting the landfill travel northbound on Nauvoo Road to the entrance ramp to Highway 402. The haul route impact assessment took into account all receptors fronting on Nauvoo Road or within 250 m of Nauvoo Road that were located south of Highway 402 to 250 m south of the landfill entrance. Peak hourly traffic during the midday period was used as this period demonstrates the worst-case landfill impact.

The assessment determined that the receptors along Nauvoo Road (County Road 79) will experience a minor increase in sound levels (0 to 3 dB) from current conditions during the worst-case scenario for the project; therefore, no considerable change in noise levels along the haul route is anticipated with the proposed increase in annual fill rate.

Based on the noise modelling, the proposed annual fill rate change will not result in any significant noise affects, provided that noise mitigation measures outlined for Phase 3 and 9 of the landfill development are implemented. The full Noise Evaluation is provided as Appendix E.

6.3 Traffic

The potential environmental effects of the project on the socio-economic environment were identified as potential changes to traffic from additional truck traffic to and from the site.

Background

The Twin Creeks Landfill is located in a predominantly agricultural area at the southeast quadrant of Zion Line and Nauvoo Road (County Road 79) in the Township of Warwick. Vehicles access the site via the entrance/driveway on Nauvoo Road. The existing road network is illustrated in Figure 6-1 and described below.
Figure 6-1. Existing Road Network around Twin Creeks Landfill Site

**Highway 402:** Under the jurisdiction of the Ontario Ministry of Transportation, Highway 402 is an east-west divided highway with a posted speed of 100 km/h.

**Nauvoo Road (County Road 79):** Under the jurisdiction of the County of Lambton, Nauvoo Road is a north-south rural road with a posted speed of 80 km/h. It has a two-lane rural cross-section with no sidewalk on either side. Nauvoo Road is unsignalized in the study area at Highway 402 interchanges, Zion Line, and Confederation Line.

**Zion Line:** Zion Line is an east-west rural local road with an unposted speed limit (assumed to be 50 km/h). It has a two-lane rural cross-section with no sidewalk on either side.

**Confederation Line:** Also known as County Road 39 east of Nauvoo Road, Confederation Line is an east-west rural road under the jurisdiction of the County of Lambton that runs through the north side of the Village of Watford. It has a two-lane cross-section with a posted speed limit of 50 km/h.
Traffic data was collected on May 17th, 2016, to obtain existing weekday a.m., midday and p.m. peak period turning movement counts (2 hours in morning between 7 a.m. and 9 a.m., 3 hours in the midday between 11 a.m. and 2 p.m., and 2 hours in the afternoon/evening between 4 p.m. and 6 p.m.) for all intersections within the study area. A volumes comparison between these counts and historical annual site traffic data shows that these count volumes are higher; therefore, these counts were used as a basis for the traffic impact study.

The landfill fill rate increase is anticipated to occur in 2017. A global growth rate of 1.5% was applied on the turning movement counts to conservatively estimate existing conditions, based on historical traffic growth patterns (Appendix F). Based on existing traffic conditions, the individual turning movements for intersections in the study area are all operating at Level of Service\(^4\) ‘C’ or better, and with a volume to capacity ratio\(^5\) of 0.30 or better, which indicates that the existing road network is operating at acceptable levels of service and under capacity.

Two on-site weight scales (one inbound and one outbound) at the Twin Creeks Landfill are located approximately 330 m southeast of the site entrance/driveway. The roadway leading to the weight scales has two lanes in each direction, and has an available combined vehicle storage capacity of 660 m. All waste hauling trucks proceed across the weight scale before unloading. However, only 5% to 10% of trucks scale out of the landfill since the tare weight is known and recorded for the majority of vehicles.

Assessment

Traffic impact studies typically examine traffic conditions at 5 and 10 years after a project start date. The Twin Creeks Landfill annual waste fill rate increase is anticipated to start in 2017; consequently, the traffic impact study examined traffic conditions in the years 2022 and 2027. Background traffic conditions were estimated for these two time periods, and then project-related traffic was added to determine the traffic conditions resulting from the project.

Intersection operations were assessed for the site entrance and the study intersections considering two measures of performance:

- The capacity of the critical intersection movements which is based on a volume to capacity ratio; and
- The Level of Service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection.

As part of the analysis, adjacent background developments expected within the horizon year of the study were accounted for in the traffic forecasting process. Under 2022 background traffic conditions, the individual movements for intersections in the study area will operate at Level of Service ‘D’ or better, and with a volume to capacity ratio of 0.50 or better. All intersections in the study area will be operating with reserve capacity.

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\(^4\) Level of Service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between ‘A’ and ‘F’, with ‘F’ being the longest delay.

\(^5\) The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection.
Under 2027 background traffic conditions, there will be excess capacity at the Highway 402 off-ramps at Nauvoo Road with a Level of Service ‘B’ or better and volume to capacity ratio 0.13 or better.

Trip generation for the proposed fill rate increase was based on information for projected traffic entering/exiting the site. Historical truck counts for both the Twin Creeks Landfill and the Petrolia Landfill between 2013 and 2015 were used to determine projected truck traffic entering and exiting the site and estimate hourly traffic volumes.

The proposed increase in the annual fill rate is predicted to add 22, 39, and 6 trucks (two-way traffic) to the road network during the weekday a.m., midday and p.m. peak hours, respectively. Any new non-truck traffic is anticipated to be minimal as the nature of the site and the project should only attract trucks.

Under 2022 total traffic conditions, the individual movements for unsignalized intersections in the study area will all operate at Level of Service ‘D’ or better, and with a volume to capacity ratio of 0.50 or better. All intersections in the study area will be operating with reserve capacity.

Under 2027 total traffic conditions, there will be excess capacity at the Highway 402 off-ramps at Nauvoo Road with a Level of Service ‘B’ or better and volume to capacity ratio of 0.14 or better. The ramps will be operating with reserve capacity.

The intersections within the study area will continue to operate with residual capacity under 2022 and 2027 traffic conditions, with adequate queuing on-site.

Site queuing was assessed as part of the traffic impact study and used average processing/waiting times at the inbound and outbound weight scales to determine if the proposed fill rate increase will alter truck queuing on the site and vehicle storage capacity on-site. The average wait time at the weigh scales is 180 seconds and, as a result, the weigh scales can serve up to 40 trucks within a one hour period assuming both available weight scales are operating as inbound scales. It was estimated that 48 trucks will enter the site during midday peak hour in 2022; therefore in a worst case scenario, there will be a queue length of 175 m assuming each truck is approximately 25 m in length and there is a 15 m buffer between trucks. As there is approximately 660 m of available vehicle storage between the site entrance/driveway and the weight scale, the existing on-site roads will be able to accommodate the future queue scenario.

Road safety was assessed along the length of the landfill haul route from the site entrance to Highway 402. This assessment considered the operation of the existing northbound acceleration lane from the site entrance to Zion Line, collision history and rate along the haul route, and potential cyclist exposure to conflicts with landfill related traffic since Nauvoo Road is identified as a Linkage Trail Corridor (with on-road shared access) as part of the Lambton County Trails. The northbound acceleration lane was found to satisfy the design standards specified by the Ministry of Transportation. The acceleration lane was also found to operate satisfactorily and there is little opportunity for merge conflicts. Collision records were obtained from the Ontario Provincial Police and Ministry of Transportation for 2009 to 2013 along the length of the haul route. The data identified five collisions during this time period, of which one was relevant to the landfill site as a result of the driver’s inability to comply with signage and lane markings. The collision rate for the haul route of 0.61 collisions per million vehicle kilometers is well
below the provincial average of 1.43 (in 2013) and indicates the haul route is not a collision-prone location.

Nauvoo Road is identified as a Linkage Trail Corridor (with on-road shared access) as part of the Lambton County Trails. The road safety audit considered the potential for cyclist exposure to conflicts with landfill related traffic. Based on the assessment completed, the risk of collision with trucks or cyclists is considered to be minimal due to the low exposure and cyclist demands along the haul route. No issues or conflicts with cyclists can be observed from site observations or historical collision data. Proper signing of the linkage trail corridor on Nauvoo Road will help to improve drivers’ awareness of other vulnerable users on the roadway, including potential cyclists and pedestrians. WM will work with the County of Lambton, the responsible authority for the road, to have the appropriate signs installed along the haul route on Nauvoo Road. This includes signage alerting drivers of the potential presence of cyclists and a supplementary early warning sign for the northbound acceleration lane taper. The full Traffic Impact Study is provided as Appendix F.

6.4 Consideration of Climate Change

In support of the Province of Ontario’s Climate Change Action Plan the MOECC has developed a draft guide entitled “Consideration of Climate Change in Environmental Assessment in Ontario” (August 2016). The guide provides direction on ways to incorporate climate change considerations into environmental assessments, including the consideration of greenhouse gas emissions, and includes consideration of:

- the effects of a project on climate change;
- the effects of climate change on a project; and
- various means of identifying and minimizing negative effects during project design.

The Twin Creeks Landfill is an existing landfill site, the expansion of which was approved following completion of an individual environmental assessment. The landfill accepts municipal solid wastes which contain organic materials remaining after diversion activities and programs implemented at the generation source. The landfilled wastes will decompose over time and will generate landfill gas, including methane and carbon dioxide. Both are considered greenhouse gases and contributors to climate change.

6.4.1 Effect of the Project on Climate Change

The landfill has an approved design capacity which will not change as a result of the project. In addition, while the project is anticipated to shorten the operating life of the landfill by reaching capacity in fewer years (2034 vs. 2047), the overall volume of landfill gas generated will not be affected. Landfill gas generation typically peaks at the end of the active landfilling period and then begins to decrease in future years as the waste decomposes. The project, an annual fill rate increase, will result in landfill gas generation reaching a peak earlier than currently projected.

The Twin Creeks Landfill design includes a landfill gas collection system. The system is constructed in conjunction with the development of each new landfill cell. The gas collection system is currently operating in each completed cell under negative pressure.
or vacuum. The collected landfill gas is destroyed through flaring. The collection efficiency of the system is estimated to be greater than 70%.

Current mitigation practices at the landfill also include an annual air quality monitoring program as detailed in Section 6.1. As part of the ECA for the landfill, WM completes an Ambient Air Quality Monitoring Program (AAQMP) which includes Landfill Gas Surface Monitoring (THC), Ambient Fenceline VOCs Monitoring, and Ambient Particulate Monitoring (TSP and metals). The AAQMP is monitored and reviewed by the MOECC to ensure levels fall within accepted standards.

The assessment of the project on air quality considered changes to landfill gas emission rates including THCs and VOCs. The assessment identified that VOC concentrations have been less than their respective air quality standards. It was also determined that vinyl chloride and H2S emissions will continue to be within standards at nearby receptors and property lines. Overall it was determined that modelled air concentrations are anticipated to remain relatively the same despite the proposed changes and it is anticipated that the Twin Creeks Landfill will continue to comply with the applicable air quality standards. Section 6.1 of this report describes the assessment process and the results in more detail.

The current AAQMP will be continued at the landfill to identify and assess any changes in emissions in order to minimize greenhouse gas emissions and the potential effects of the project on climate change.

The transportation of wastes to the landfill site is also a source of greenhouse gas emissions. While the approved design capacity will not change, the operating life of the landfill will be shortened as a result of the project. Consequently, an increased number of vehicles will access the site on an annual basis during the operating period; however, the overall total number of vehicle trips associated with the landfill is not expected to differ regardless of the change in operating period (i.e., a comparable number of vehicles will be required to transport the waste to the landfill under all operating periods). The project is not anticipated to have an effect on climate change.

### 6.4.2 Effect of Climate Change on the Project

Currently, WM estimates that the Twin Creeks Landfill will reach approved capacity in approximately 2047 if the maximum annual fill rate remains at 750,000 tonnes per year. With an increase in the approved annual fill rate, gradually increasing over five years to a maximum of 1,400,000 tonnes per year, the landfill is anticipated to reach approved capacity by 2034. This means that the Twin Creeks Landfill site life will be reduced by approximately 13 years. Following closure of the landfill, monitoring will be conducted during the post-closure period for the site.

As outlined in the MOECC guide Consideration of Climate Change in Environmental Assessments in Ontario, climate variables that may affect the project can include temperature, precipitation and wind. If the frequency, severity or duration of any of these climate variables changes during the life of the project, there may be an effect on aspects of the project or the daily operations of the landfill.

Variations in temperature will not affect daily landfill operations. Landfilling is a waste management practice that is utilized around the world in locations with widely varying
temperatures from extreme cold to heat. A landfill can be successfully operated in all temperature conditions.

Precipitation may occur in the form of rainfall and snow. Changes in annual precipitation, including in frequency and severity such as severe weather events, are not anticipated to have an effect on landfill operations. The landfill has been designed and is operated in a manner to minimize precipitation infiltration into the waste in order to minimize landfill leachate generation. The site has also been designed and constructed to manage stormwater from a 100-year storm event. In the situation where more extreme storm events are observed, the site has additional area that could be used to manage stormwater. WM utilizes an on-site weather station to monitor and track precipitation events and is able to identify any changes that may require adjustments to the site operations.

Wind can be detrimental to daily landfill operations resulting in dust and blowing litter. WM has BMPPs in place for the landfill to address the management of dust and blowing litter. This includes halting landfill operations when certain wind conditions are encountered combined with covering of landfilled waste. To assist in dust control, the operating plans and BMPPs for the site outline practices for road sweeping, road watering, grassing of completed landfill areas and minimizing the landfill working area. WM has shown that it can manage varying wind conditions at the site and has the appropriate controls in place for the operating life of the landfill.

Given the relatively short operating period for the landfill, with the existing site infrastructure and approved operating plans, the Twin Creeks Landfill is not expected to be affected by changes in climate variables. The landfill will continue to be monitored during the post-closure period.

As a result, it is not anticipated that climate change will have an effect on the project.

7 Review of Assessment Studies

As detailed in Section 6, three technical studies were completed to assess the potential environmental effects of the project:

- Air Quality, Odour, and Dust Evaluation (Appendix D);
- Noise Evaluation (Appendix E); and
- Traffic Impact Study (Appendix F).

Drafts of these effects assessment studies were provided to the following recipients for their review and comments:

- Walpole Island First Nation;
- Township of Warwick;
- County of Lambton; and
- the MOECC.

The studies were circulated on July 8th, 2016 and it was requested that comments be provided to WM by August 31st, 2016. Detailed comments were provided to WM by
Walpole Island First Nation, the Township of Warwick and the MOECC. These comments were tabulated to facilitate the development of responses. Revisions were made to the corresponding draft effects assessment studies in order to address the comments, as appropriate. Detailed responses to the comments, including reference to where and how the studies were revised, are included in the comment/response tables provided as Appendix G.

The draft effects assessment studies were also posted on the project website on July 8th, 2016. No additional comments were provided on the draft reports by other interested parties or groups.

The comment/response tables and revised effects assessment reports were recirculated to the corresponding reviewers on October 26th, 2016. Additional correspondence between WM and the Walpole Island First Nation, Township of Warwick and MOECC reviewers was undertaken to further clarify responses and address the comments received. Appendix G includes the details of these follow-up discussions.

Walpole Island First Nation provided follow up comments on November 27th, 2016 with subsequent responses from WM on January 12th, 2017. A final set of comments were provided by Walpole Island First Nation on January 31st, 2017 along with confirmation that there were no further issues with the proposed project at this time. A copy of the comments/responses and correspondence are included in Appendix G.

A meeting was held with the Township of Warwick and members of its Technical Review Team on December 16th, 2016. The results of this meeting are recorded in the Township’s comment/response table in Appendix G.

On February 15th, 2017, the Township of Warwick Council considered the findings of its Technical Review Team and passed a resolution outlining that the Township has no objection to the proposed fill rate increase, subject to the Township confirming that the Environmental Screening Report fully and accurately reflects the technical responses provided by WM to the Technical Review Team’s comments, and that the Environmental Screening Report includes the commitments provided to the Township. A copy of the Council resolution and the Technical Review Team’s report to Council is included in Appendix G.

WM was requested to provide a final version of the Noise Evaluation to the Township’s Technical Review Team for sign-off. An updated Noise Evaluation was provided to the Technical Review Team on February 23rd, 2017.

Numerous discussions and correspondence were conducted with various representatives of the MOECC as part of finalizing the environmental effects studies. On January 12th, 2017, the MOECC confirmed that comments provided by the Ministry had been addressed. The Ministry’s Noise Unit is expected to complete its review of the Environmental Screening Report and supporting technical studies following the issuance of the Notice of Completion. A copy of the comments/responses and correspondence are included in Appendix G.

The County of Lambton, the responsible authority for Nauvoo Road, provided a response on February 22nd, 2017 confirming that they are satisfied with the final Traffic Impact Study and a willingness to work with WM regarding the proposed signage.
The final reports, incorporating the responses to the comments received, are those appended to this Environmental Screening Report.

8 Summary of Commitments to Mitigation and Monitoring

This section presents a summary of the commitments made during the Environmental Screening Process to mitigation and monitoring. Commitments made through the Environmental Screening Process are presented in Table 8-1. Existing mitigation, monitoring and operational requirements for the landfill, as outlined in the ECA and Design and Operations Plans, will continue in accordance with the current approvals. Commitments to incorporate information into the Environmental Screening Report or revised effects assessment study reports have not been included in Table 8-1 as they have been addressed within the respective reports.

Table 8-1. Summary of Commitments

<table>
<thead>
<tr>
<th>Commitment</th>
<th>Location of Commitment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Best Management Practices will continue to be followed as it relates to size of active workface, odour control, litter management, vermin and bird control activities.</td>
<td>Appendix B, Table 1</td>
</tr>
<tr>
<td>WM will be reviewing the Nuisance Compensation packages as they relate to the predicted changes to the potential impacts off-site. If deemed necessary, WM will adjust the compensation packages accordingly.</td>
<td>Appendix G, MOECC Comments/Responses on draft Air Quality, Odour, and Dust Evaluation</td>
</tr>
<tr>
<td><strong>Air Quality and Odour</strong></td>
<td></td>
</tr>
<tr>
<td>As noted in the Odour BMPP (Version 6) from 2011, WM will continue to screen incoming loads to identify highly odorous loads. In the case of highly odorous loads, cover material (consisting of soil or low odour waster material) should be immediately applied. The use of alternative daily cover techniques should only be used for loads or areas where waste is not identified as being highly odorous or can be applied to areas with higher odour loads provided that the cover material is first applied to prevent odours from the site.</td>
<td>Appendix G, MOECC Comments/Responses on draft Air Quality, Odour, and Dust Evaluation</td>
</tr>
<tr>
<td>WM will update the Air Quality Monitoring Plan to change the sample duration of the VOC samples from 30-minute samples to 24-hour samples.</td>
<td>Appendix G, MOECC Comments/Responses on draft Air Quality, Odour, and Dust Evaluation</td>
</tr>
<tr>
<td><strong>Dust</strong></td>
<td></td>
</tr>
<tr>
<td>WM will continue to utilize the BMPP for fugitive dust control and monitor for any changes to TSP concentrations. If concentrations begin to increase, site operations will be reviewed and additional dust controls will be implemented as soon as practicable. The BMPP will be updated to account for these changes.</td>
<td>Environmental Screening Report, Section 6.1.2</td>
</tr>
<tr>
<td>WM will increase the frequency of sampling at the current dust monitoring stations to a 6-day cycle from October 1 to May 31 and to a 3-day cycle from June 1 to September 30.</td>
<td>Appendix G, Attachment 4</td>
</tr>
<tr>
<td>Commitment</td>
<td>Location of Commitment</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>In the event that two measured dust exceedances occur (trigger) that can be attributed to WM operations, in any quarter (excluding periods when on-site cell construction is occurring), WM will review the data with the Township of Warwick Technical Review Team.</td>
<td>Appendix G, Attachment 4</td>
</tr>
<tr>
<td>Upon confirmation that the exceedances can be attributed to WM operations and are not related to cell construction WM will complete the installation of continuous dust monitors.</td>
<td>Appendix G, Attachment 4</td>
</tr>
<tr>
<td>In order to enhance the current notification of elevated TSP Levels, WM will copy the Township of Warwick Technical Review Team (Air Quality Consultant) on any future elevated TSP level reporting.</td>
<td>Appendix G, Attachment 4</td>
</tr>
<tr>
<td>In order to revise the frequency of dust measurements, an update will be required to the Air Quality Monitoring Plan. The sampling frequency and the trigger mechanism will be noted in the Plan update.</td>
<td>Appendix G, Attachment 4</td>
</tr>
</tbody>
</table>
| If continuous dust monitors are to be installed, WM will work with the Township of Warwick Technical Review Team to update the following documents:  
  - Air Quality Monitoring Plan – updated for equipment change as well as trigger for shorter duration alerts to be issued to the site as warnings for higher dust levels.  
  - BMPP (Dust) – to be updated to link dust alerts to dust control initiatives.                                                                                                                                                                                                                           | Appendix G, Attachment 4 |
| **Noise**                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Environmental Screening Report, Section 6.2  
**Appendix E**, Section 3.5  
**Appendix E**, Section 3.5.3 |
| • The proposed CAT D6 and CAT D7 dozers meet a sound level of 72 dBA and 77 dBA at 30 m, respectively, where their operation is allowed.                                                                                                                                                                                                                                                                                                                                                           | Environmental Screening Report, Section 6.2  
**Appendix E**, Section 3.5.3 |
| • The proposed CAT D6 and CAT D7 dozers will not be used during the nighttime period for all phases                                                                                                                                                                                                                                                                                                                                                                               | Environmental Screening Report, Section 6.2  
**Appendix E**, Section 3.5.3 |
| • During Phase 3 of the landfill development, three potential noise mitigation scenarios can be implemented. All three scenarios will allow the noise requirements to be met depending on the specific operational requirements of the landfill. As operational changes occur at the landfill (i.e., due to the increase or decrease in day to day volumes received), WM will require flexibility to adjust the specific mitigation scenario implemented periodically during this Phase. The mitigation scenarios are:  
  **Scenario 1:**  
  • 30 trucks per hour will travel on the new northern route to the landfill operations and 37 truck per hour will travel the existing southern route; and  
  • The use of the proposed CAT D6 and D7 dozers are not permitted during Phase 3.  
  **Scenario 2:**  
  • 22 trucks per hour will travel on the new northern route to the landfill operations and 45 truck per hour will travel the existing southern route;  
  • A 4 m-high, 320 m-long barrier will be installed on the south side of the east-west portion of the southern truck route near receptor R9; and  
  • There is no restriction on the use of the proposed CAT D6 and D7 dozers.  
  **Scenario 3:**  
  • All 67 trucks per hour will travel on the new northern route to the landfill operations; and                                                                                                                                                                                                                                           | Environmental Screening Report, Section 6.2  
**Appendix E**, Section 3.5.3 |
Commitment | Location of Commitment
--- | ---
- There is no restriction on the use of the proposed CAT D6 and D7 dozers. |  
- During Phase 9 of the landfill development the use of the proposed CAT D7 dozer is not permitted during the daytime hours. | Environmental Screening Report, Section 6.2 Appendix E, Section 3.5.2
- Sound levels of the proposed CAT D6 and D7 will be verified and confirmed to meet the limits outlined in the Noise Evaluation (Appendix E) prior to operation. | Appendix E, Section 6

**Traffic**

Both weigh scales (one inbound and one outbound) will be used as inbound scales during peak periods of inbound truck traffic to the landfill to minimize the requirement for on-site queuing of vehicles. | Appendix F, Section 5.3

WM will work with the County of Lambton, the responsible authority for Nauvoo Road, to have the appropriate signs installed on the road to improve drivers’ awareness of other vulnerable users on the roadway. Provision of warning signs will notify drivers of potential cyclists and pedestrians along the linkage trail corridor on Nauvoo Road and the acceleration lane taper. | Appendix F, Section 5.4.1

During consultation on the Environmental Screening Process, the Township of Warwick also raised the issues of a long term leachate management plan for the landfill and the frequency of environmental inspections. Leachate management and environmental inspections are operational issues included under the landfill’s ECA approval and are not expected to change as a result of the project; consequently, no potential environmental effects associated with leachate management or environmental inspections were identified as part of the environmental screening. WM made a series of commitments to the Township regarding these issues during the Environmental Screening Process, which are documented in a letter dated February 13th, 2017. A copy of this commitments letter is included in Appendix G.

**9 Next Steps**

Adhering to the Environmental Screening Process shown on Figure 2-1, this Environmental Screening Report will be submitted to the MOECC, and WM will publish a Notice of Completion to inform the public, interested parties, government agencies, First Nation communities and Aboriginal groups that the Environmental Screening Report has been completed under the Environmental Screening Process and that a 60-day review period is commencing.

The Notice of Completion will indicate where copies of the Environmental Screening Report can be viewed (i.e., local public library, project website). The contents of the Notice will correspond with the requirements of the Environmental Screening Process. The Notice will be published in local newspapers and will be distributed to the contacts on the project mailing list. A copy of the Notice of Completion is included in Appendix K.

If outstanding environmental concerns are identified by anyone reviewing the Environmental Screening Report, concerned individuals can submit a request to the Director of the MOECC (with a copy to WM) to have the project elevated to an individual
environmental assessment. Elevation requests must be received within the 60-day review period. The MOECC will review any elevation requests to determine if they have merit and warrant elevation. WM will attempt to resolve any issues or concerns raised during the review period.

If no elevation requests are received within the 60-day review period, or if an elevation request is resolved or withdrawn, WM will complete a Statement of Completion form, per Schedule II of the Guide to Environmental Assessment Requirements for Waste Management Projects, and will submit it to the MOECC. Upon acknowledgement of the Statement of Completion by the MOECC, WM will prepare and submit an application to amend ECA A032203.

10 Summary and Conclusions

WM is proposing to increase the annual fill rate at the Twin Creeks Landfill in Watford, Ontario. The project will not require any changes to the landfill infrastructure, volume, footprint or profile. The project will result in increased truck traffic on the haul route from Highway 402 along Nauvoo Road (County Road 79) to the landfill entrance, increased truck traffic on-site, additional on-site landfill equipment to handle the additional incoming waste, a larger landfill working face, and a decreased landfill operating life.

Through the Environmental Screening Process, the potential for the project to result in adverse environmental effects (disadvantages) was assessed. As the landfill infrastructure, profile and footprint will remain unchanged, it was concluded that the project could have potential environmental effects on the following environmental components:

- Air Quality, Odour, and Dust;
- Noise; and
- Traffic.

Comments, concerns and questions from the public, government agencies, First Nation communities and Aboriginal groups were considered during consultation and engagement activities, which included meetings, telephone calls, emails, two public open houses, and a review of the draft environmental effects assessment studies by Walpole Island First Nation, Township of Warwick, County of Lambton, and the MOECC.

It was concluded, through the assessment of the potential environmental effects of the project, that minor environmental effects are anticipated; however, these effects may be mitigated through the implementation of existing mitigation measures. The project is not anticipated to result in net effects on the environment.