Supporting Document 3-2

Noise Effects Assessment Report

Eastern Ontario Waste Handling Facility Future Development Environmental Assessment

GFL Environmental Inc.

Moose Creek, Ontario

August 19, 2022

Prepared by:

HGC Engineering
2000 Argentia Rd, Plaza 1, Suite 203
Mississauga, Ontario L5N 1P7

Acknowledgements

This Report has been Prepared by:

HGC Engineering
2000 Argentia Rd, Plaza 1, Suite 203
Mississauga, Ontario L5N 1P7

This page is intentionally left blank.

Executive Summary

The purpose of this Noise Effects Assessment Report is to present the potential environmental effects on noise of alternative methods for the future development of the Eastern Ontario Waste Handling Facility, which includes a comparison of the net effects of each alternative method, the identification of a preferred alternative, an assessment of the environmental effects of the preferred alternative, commitments, monitoring, and approvals.

Two alternative methods for carrying out the undertaking were identified in the approved Terms of Reference. This evaluation compared the predicted maximum cumulative noise impacts from the landfilling operations, associated stationary noise sources, and impulse noise sources for both alternative methods. The potential noise effects and net noise effects of Alternative Methods 1 and 2 were assessed and Alternative Method 2 was found to have slightly lesser offsite sound levels, although both alternatives were found to have sound levels well within the applicable noise limits. As a result, no net effects were identified. Additional mitigation measures were not recommended beyond the best practices for noise already in place at the site.

Continued monitoring is proposed for the operational phase of the future development of the facility.

As there are no changes proposed to the stationary sources of noise on site, the existing Environmental Approvals for those operations and equipment will not require amendments as a result of the future development.

This page is intentionally left blank.

Acronyms, Units and Glossary

Acronyms

Acronym	Definition
CDR	Conceptual Design Report (HDR, 2022)
EAA	Environmental Assessment Act
EOWHF	Eastern Ontario Waste Handling Facility
GFL	GFL Environmental Inc.
GHG	Greenhouse Gas
HDR	HDR Corporation
L_{EQ}	Energy-equivalent sound level, over a given period of time
L_{LM}	Logarithmic-mean impulse sound level
MECP	Ministry of Environment, Conservation and Parks
OES	Ontario Electronic Stewardship
RPRA	Resource Productivity and Recovery Authority
ToR	Terms of Reference

Units

Unit	Definition
dB	Decibel
dBA	A-weighted Decibel
dBAI	A-weighted, Impulse-weighted Decibels
km	kilometre
m	metre

Glossary

Term	Definition
Approval	Permission granted by an authorized individual or organization for an undertaking to proceed. This may be in the form of program approval, certificate of approval or provisional certificate of approval
Bulking Material	Material such as woodchips added to high nitrogen materials like food scraps to provide a carbon source and increase the porosity of the compost.
Capacity (Disposal Volume)	The total volume of air space available for disposal of waste at a landfill site for a particular design (typically in m^3); includes both waste and daily cover materials, but excludes the final cover.
Composting	The controlled microbial decomposition of organic matter, such as food and yard wastes, in the presence of oxygen, into finished compost (humus), a soil-like material. Humus can be used in vegetable and flower gardens, hedges, etc.

Glossary

Term	Definition
Composting facility	A facility designed to compost organic matter either in the presence of oxygen (aerobic) or absence of oxygen (anaerobic).
Environment	As defined by the Environmental Assessment Act, environment means: • air, land or water; • plant and animal life, including human life; • the social, economic and cultural conditions that influence the life of humans or a community; • any building, structure, machine or other device or thing made by humans; • any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities; or • any part or combination of the foregoing and the interrelationships between any two or more of them (ecosystem approach).
Environmental Assessment	A systematic planning process that is conducted in accordance with applicable laws or regulations aimed at assessing the effects of a proposed undertaking on the environment
Evaluation criteria	Evaluation criteria are considerations or factors taken into account in assessing the advantages and disadvantages of various alternatives being considered
Greenhouse gas	Any of the gases whose absorption of solar radiation is responsible for the greenhouse effect, including carbon dioxide, methane, ozone, and the fluorocarbons.
Indicators	Indicators are specific characteristics of the evaluation criteria that can be measured or determined in some way, as opposed to the actual criteria, which are fairly general
Landfill gas	The gases produced from the wastes disposed in a landfill; the main constituents are typically carbon dioxide and methane, with small amounts of other organic and odour-causing compounds
Landfill site	An approved engineered site/facility used for the final disposal of waste. Landfills are waste disposal sites where waste is spread in layers, compacted to the smallest practical volume, and typically covered by soil.
Leachate	Liquid that drains from solid waste in a landfill and which contains dissolved, suspended and/or microbial contaminants from the breakdown of this waste.
Methane gas	A colourless, odourless highly combustible gas often produced by the decomposition of decomposable waste at a landfill site. Methane is explosive in concentrations between 5% and 15% volume in air.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Proponent	A person who: • carries out or proposes to carry out an undertaking; or • is the owner or person having charge, management or control of an undertaking.
Receptor	The person, plant or wildlife species that may be affected due to exposure to a contaminant.
Terms of Reference	A terms of reference is a document that sets out detailed requirements for the preparation of an Environmental Assessment.

Glossary

Term	Definition
Undertaking	Is defined in the Environmental Assessment Act as follows: • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity by or on behalf of Her Majesty in right of Ontario, by a public body or public bodies or by a municipality or municipalities; • A major commercial or business enterprise or activity or a proposal, plan or program in respect of a major commercial or business enterprise or activity of a person or persons other than a person or persons referred to in clause (1) that is designated by the regulations; or • An enterprise or activity or a proposal, plan or program in respect of an enterprise or activity of a person or persons, other than a person or persons referred to in clause (a), if an agreement is entered into under section 3.0.1 in respect of the enterprise, activity, proposal, plan or program ("enterprise").
Waste	Refuse from places of human or animal habitation; unwanted materials left over from a manufacturing process.

Contents

Executive Summary i

Acronyms, Units and Glossary iii

1 Introduction 1

2 Effects Assessment Methods 5

2.1 Predict Potential Environmental Effects for Alternative Methods 5

2.1.1 Study Areas 5
2.1.2 Evaluation Criteria, Indicators and Data Sources 6
2.1.3 Key Design Considerations and Assumptions 9

2.2 Comparative Evaluation and Identification of the Preferred Alternative 14

2.3 Effects Assessment of the Preferred Alternative 14

3 Net Effects Assessment 14

3.1 Alternative Method 1 14

3.2 Alternative Method 2 14

4 Comparative Evaluation of Net Effects and Identification of the Preferred Alternative 17

4.1 Comparative Evaluation Results 17

4.2 Climate Change Considerations 19

4.3 Advantages and Disadvantages of the Preferred Alternative 19

5 Commitments and Monitoring 19

5.1 Noise Commitments 19

5.2 Environmental Effects Monitoring for Noise 19

5.3 Noise Compliance Monitoring 20

6 Noise Approvals 20

7 References 21

Tables

Table 1. Environmental Aspects, Components and Evaluation Criteria 1
Table 2. Evaluation Criteria, Indicators and Data Sources for Noise 6
Table 3. Exclusion Limits for Non-impulsive Sound, L_{EQ} [dBA] 8
Table 4. Exclusion Limits for Impulsive Sound, L_{LM} [dBA] 8
Table 5. Applicable Limits for Non-Impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night) 12
Table 6. Applicable Limits for Impulsive Sound, L_{LM} [dBAI] 12
Table 7. Net Effects Assessment – Alternative Method 1 15
Table 8. Net Effects Assessment – Alternative Method 2 16
Table 9. Comparative Evaluation of Net Effects for Noise 18
Table 10. Environmental Effects and Compliance Monitoring for the Preferred Alternative 20

Figures

Figure 1-1. Alternative Method 1 3
Figure 1-2. Alternative Method 2 4
Figure 2-1. Study Areas for Noise 6
Figure 2-2. Residences within Offsite Study Area for Noise 11

Appendices

Appendix A. Sound Source Inventory A-1
Appendix B. Acoustical Modelling Results B-1

1 Introduction

HGC Engineering was contracted by GFL Environmental Inc. (GFL) to conduct an assessment of the effects of the future development of the Eastern Ontario Waste Handling Facility (EOWHF) on environmental noise as part of the EOWHF Future Development Environmental Assessment (EA).

The EA is being carried out in accordance with the requirements of the *Environmental Assessment Act* (EAA) and Terms of Reference (ToR), which was approved by the Ministry of Environment, Conservation and Parks (MECP) on January 14, 2021.

The environment was divided into environmental aspects, components and evaluation criteria as listed in **Table 1-1**. Existing conditions reports and effects assessment reports have been prepared to address the environmental components.

Table 1-1. Environmental Aspects, Components and Evaluation Criteria

Environmental Aspect	Environmental Component	Evaluation Criteria
Natural Environment	Atmospheric Environment	• Air Quality • Noise • Odour
	Geology and Hydrogeology	• Groundwater Quality • Groundwater Quantity
	Surface Water Environment	• Surface Water Quality • Surface Water Quantity
	Ecological Environment	• Terrestrial Ecosystems • Aquatic Ecosystems
Socio-Economic Environment	Economic	• Economic Effects on / Benefits to Local Community
	Social	• Effects on Local Community • Visual Impact of Facility
Cultural Environment	Cultural Environment	• Cultural Heritage Resources • Archaeological Resources
Built Environment	Transportation	• Effects from Truck Transportation along Access Roads
	Current and Planned Future Land Use	• Effects on Current and Planned Future Land Uses
	Aggregate Extraction and Agricultural	• Aggregate Resources • Effects on Agricultural Land

The purpose of the proposed undertaking is to provide approximately 15.1 million cubic metres (m^3) of additional landfill disposal capacity at the existing EOWHF over a 20-year planning period, with operations anticipated to begin in 2025 and closure anticipated in 2045. The undertaking will enable GFL to continue to provide essential disposal services for residual non-hazardous solid waste to their customers once the landfill reaches its currently approved disposal capacity and continue to provide economic support to the

local community over the long term. No changes to the approved fill rates or site access routes are proposed.

Two alternative methods for carrying out the undertaking were identified in the approved ToR and are developed to a preliminary conceptual design level in the Conceptual Design Report (CDR). Both alternative methods provide a landfill volume of approximately 15.1 million m^3 based on the approved fill rate of 755,000 tonnes per year over a 20-year planning period. Studies completed for the EOWHF have indicated that, based on the underlying soils, the design alternatives are limited to varying lateral configurations with a consistent height. Both alternative methods will continue to use established operating procedures currently in place at the EOWHF and would maximize the use of existing site infrastructure.

Alternative Method 1 (**Figure 1-1**) consists of implementing the future development through five stages: one stage adjacent to and north of the existing landfill (Stage 5); and four stages oriented east-west within the future development lands (Stages 6 through 9). Stages 6 through 8 will be identical in size, while Stages 5 and 9 will be smaller. A stormwater management system will be constructed consisting of conveyance ditches around the perimeter of each stage and a retention pond located northwest of Stage 8. The existing pond located northeast of Stage 5 will be modified to attenuate peak flows if required.

Alternative Method 2 (**Figure 1-2**) consists of implementing the future development through four stages: one stage adjacent to and north of the existing landfill (Stage 5); and three stages oriented north-south within the future development lands (Stages 6 through 8). Stages 6 and 7 will be identical in size, while Stages 5 and 8 will be smaller. A stormwater management system will be constructed consisting of conveyance ditches around the perimeter of each stage and a retention pond located north of Stages 6 and 7. The existing pond located northeast of Stage 5 will be modified to attenuate peak flows if required.

For both alternative methods, the design of the stages will be consistent with the existing landfill design. Visual screening will be constructed along the north and east perimeters and a portion of the south perimeter consisting of earthen berms and/or vegetation plantings. A new road entrance will be constructed from Laflèche Road, which will include a new scale facility.

The purpose of this Effects Assessment Report is to present the potential environmental effects of the alternative methods on environmental noise, a comparison of the net effects of each alternative method, the selection of a preferred alternative, an assessment of the environmental effects of the preferred alternative, commitments and monitoring, and approvals. The results from this study will be documented in an EA Study Report in accordance with the approved ToR, which will be submitted to the MECP for review.

Figure 1-1. Alternative Method 1

Figure 1-2. Alternative Method 2

2 Effects Assessment Methods

Using the evaluation criteria, indicators, rationale and data sources from the approved ToR and the existing conditions from the Noise Existing Conditions Report (HGC Engineering, 2022), the effects assessment is carried out as follows:

- predict the potential environmental effects for each alternative method (Section 3);
- identify the preferred alternative based on a comparative evaluation of the potential environmental effects of each alternative method (Section 4); and
- conduct an effects assessment on the preferred alternative, including the identification of mitigation measures and monitoring programs (Sections 4 and 5).

2.1 Predict Potential Environmental Effects for Alternative Methods

The potential environmental effects for each alternative method are identified based on the application of the evaluation criteria, indicators and data sources in the approved ToR and based on the maximum allowable waste receipt level for the EOWHF landfill. The potential effects can be positive or negative, direct or indirect, and short- or long-term. Mitigation measures are identified to minimize or mitigate the potential effects and then the net effects are evaluated taking into consideration the application of mitigation measures.

2.1.1 Study Areas

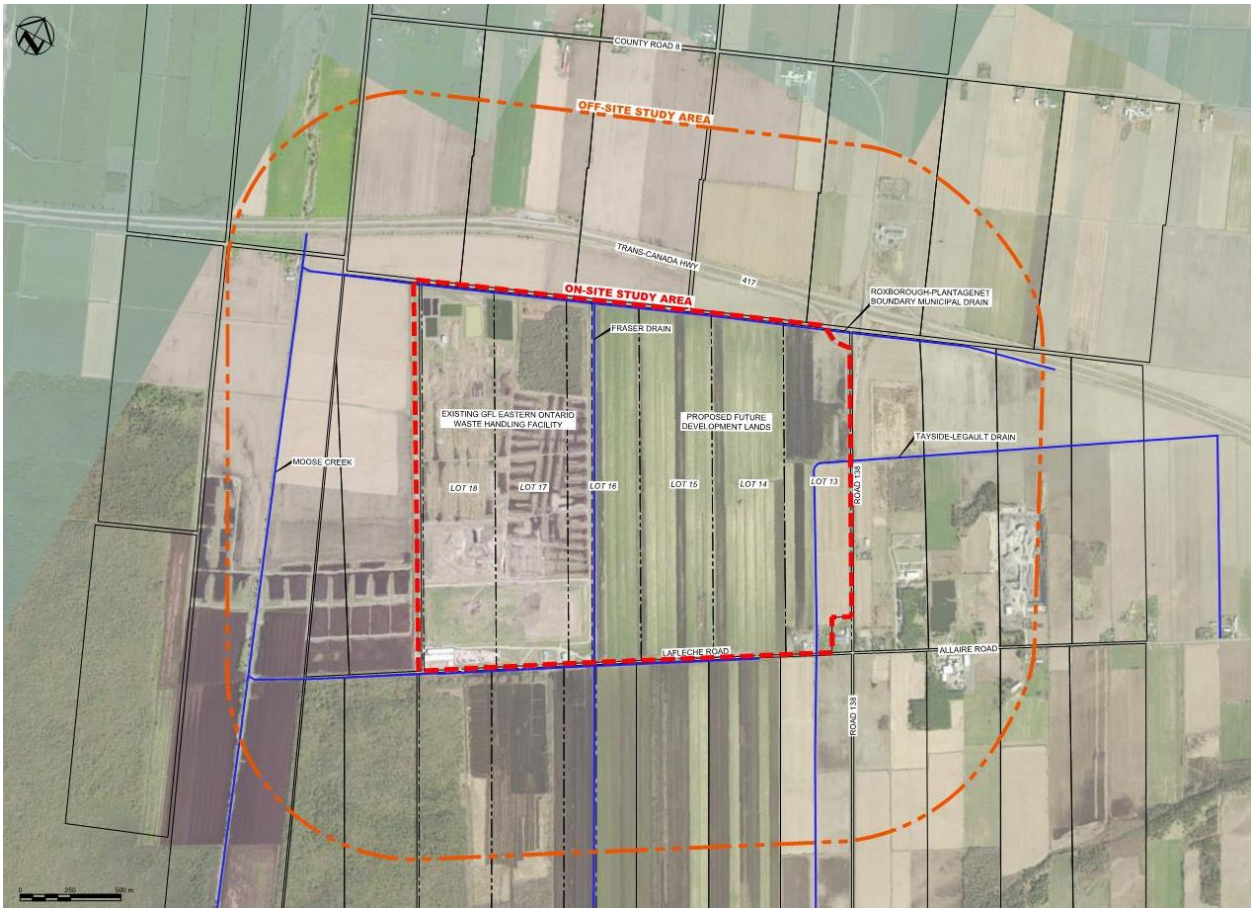
The existing EOWHF is located within the Township of North Stormont, approximately 5 km north-northwest of the village of Moose Creek, Ontario, and 5 km east of the village of Casselman, Ontario, on the western half of Lot 16 and Lots 17 and 18, Concession 10, Township of North Stormont, United Counties of Stormont, Dundas and Glengarry, near the intersection of Highway 417 and Highway 138. The municipal street address for the facility is 17125 Laflèche Road, Moose Creek, Ontario. The lands to the east of the existing EOWHF being considered for the future development include the eastern half of Lot 16, Lots 14 and 15, and the majority of Lot 13 of Concession 10. The existing EOWHF encompasses a site area of 189 hectares, while the lands to the east of the existing EOWHF being considered for future development include approximately 240 hectares.

The Study Areas include the existing site as well as potentially affected surrounding areas. The On-site and Off-site Study Areas identified for the EA in the approved ToR are as follows (**Figure 2-1**):

- On-site Study Area – the existing EOWHF, and the future development area comprising the eastern half of Lot 16, Lots 14 and 15, and the majority of Lot 13 of Concession 10 east of the EOWHF; and
- Off-site Study Area – the lands in the vicinity of the future development extending approximately 1 kilometre from the On-site Study Area.

These Study Areas were used for the purposes of the noise effects assessment.

Figure 2-1. Study Areas for Noise



2.1.2 Evaluation Criteria, Indicators and Data Sources

The evaluation criteria, rationale, indicators, and data sources used for the noise effects assessment as per the approved ToR are provided in **Table 2-1**.

Table 2-1. Evaluation Criteria, Indicators and Data Sources for Noise

Evaluation Criteria	Rationale	Indicators	Data Sources
Noise	Activities related to operation of the landfill can result in an increase in noise levels associated with the waste disposal facility.	• Predicted site-related noise levels (measured in dBA or dBAI). • Number of off-site receptors potentially affected (residential properties, public facilities, businesses/ farms, institutions)	• Annual site specific noise monitoring data • Manufacturer provided noise specifications • Applicable MECP guidelines, technical standards and models • Aerial mapping and field reconnaissance to confirm off-site receptors • Land use zoning plans • Proposed facility characteristics • Landfill design and operations data

The MECP has set out separate noise guidelines for landfill sites versus "stationary" noise sources of sound [MECP 1998, 2013]. The activities at a landfill site are defined to comprise "construction and rehabilitation" and "landfilling operations."

Construction and rehabilitation include "grading, construction of internal and external roads, construction of earth berms and tree removal, as well as those due to rehabilitation activities such as removal of berms, demolition of buildings and landscaping." Landfilling operations include vehicles bringing waste to the facility , and mobile equipment for moving and handling landfill waste and soil. Stationary sources include mechanical equipment, fixed sound sources, and vehicles operating on or visiting the site, other than those bringing landfill waste or taking away finished compost.

The majority of operations at the EOWHF produce sound that is steady or slowly varying in nature, which is defined in the MECP guidelines as "non-impulsive" sound. However, the monthly pick-up of waste bins by a roll-off truck at the RPRA, tire drop-off area, and tail-gate impacts during occasional tipping of waste by a dump-truck in the active landfill area, produce *impulse sound*, which is defined as a single pressure pulse or a single burst of pressure pulses. Under MECP noise assessment guidelines, non-impulsive sounds and impulse sounds are assessed separately, using two distinct measurement/evaluation methods.

Non-impulsive sounds are measured and assessed using the one-hour, energy-equivalent ("L_{EQ}") sound level. Impulse sounds are quantified in terms of the Logarithmic-Mean Impulse Sound Level ("L_{LM}"), in units of dBAI. (The "I" suffix denotes an impulse sound level.)

Noise Criteria for Construction and Rehabilitation Operations

The MECP noise criteria for construction and rehabilitation activities are set out in their Publication NPC-115 [MECP 1978] and are point-of-emission limits (as against the noise limits applicable to landfill noise sources and stationary noise sources [MECP 1998, 2013], which apply at the offsite points-of-reception). In the case of the EOWHF, the items of equipment that will be used for construction and rehabilitation – i.e., excavators, dozers, articulated dump trucks and front-end loaders – are the same as those which will be used for on-going daily operations, such as landfilling waste and applying daily cover, which would be categorized as landfilling operations. Moreover, since the sound level limits for landfilling operations [MEPC 1998] are on the order of 30 dBA more restrictive than those in NPC-115, the assessment of excavators, dozers, articulated dump trucks and front-end loaders according to the criteria for landfilling operations (as per Section 2.1.3, below) yields a conservative analysis.

Noise Criteria for Landfilling Operations and Stationary Sources

The MECP sound level limits for both landfill activities [MECP 1998] and stationary sources [MECP 2013] apply at any neighbouring noise-sensitive points of reception, and are location-specific, varying depending on the characteristic background sound at that location. Specifically, the applicable limit is the greater of the minimum one-hour L_{EQ} background sound level occurring during the hours that the facility is operational, or the applicable "exclusion limit." For stationary sources, the exclusion limits depend on the categorization of the existing acoustical environment at the point of reception – Class 1

(urban) area, Class 2 (semi-urban) area, or Class 3 (rural) area. These classifications are based on the degree to which the background sound is dominated by man-made activities versus natural sounds, and do not have direct relation to the zoning of the lands at that point of reception. The different exclusion limits that apply to landfill operations versus stationary sources are discussed respectively in **Table 2-2**, below.

The MECP noise guideline for landfill sites provides impulse sound limits only for pest control devices (such as “bird bangers”), but not other activities. The future development of the EOWHF will use birds of prey for pest control, so there will be no impulse sounds associated with pest control. For the other impulsive sources at the EOWHF, the MECP impulse limits for stationary noise sources apply, and the relevant exclusion limits are listed in **Table 2-3**, below.

Table 2-2. Exclusion Limits for Non-impulsive Sound, L_{EQ} [dBA]

Category of Activity	Daytime Hours [07:00 to 23:00]	Evening Hours [19:00 to 23:00]	Nighttime Hours [23:00 to 07:00]
Landfilling Operations	55	45	45
Stationary Sources			
Class 1 Area	50	50	45
Class 2 Area	50	50 / 45*	45
Class 3 Area	45	45	40

* The evening exclusion limit in a Class 2 area is 50 dBA in outdoor areas and 45 dBA in the plane of a window

Table 2-3. Exclusion Limits for Impulsive Sound, L_{LM} [dBA]

Number of Impulses in a One-Hour Period	Class 1 & 2 Areas Day / Evening & Night	Class 3 Area Day & Evening / Night
9 or more	50 / 45	45 / 40
7 to 8	55 / 50	50 / 45
5 to 6	60 / 55	55 / 50
4	65 / 60	60 / 55
3	70 / 65	65 / 60
2	75 / 70	70 / 65
1	80 / 85	75 / 70

Background sound is defined to include natural sounds, road traffic, and other man-made sounds but to exclude the sound of the facility under assessment. The characteristic background sound level can be determined through automated long-term measurement for a period of at least 48 hours, or by computational modelling based on road traffic volume counts, in cases where the background sound is dominated by road traffic.

The sound level limits applicable at each point of reception neighbouring the EOWHF were established as part of the Noise Existing Conditions Report [HGC Engineering, 2022] by comparing the background sound to the exclusion limits listed above, as discussed in Section 2.1.3, below.

The MECP noise assessment guidelines require that the sound levels of the facility be assessed assuming a "predictable worst case" operating scenario, which is defined as an hour when typically busy operation of the facility could coincide with an hour of low background sound.

2.1.3 Key Design Considerations and Assumptions

The alternative methods of carrying out the undertaking are described in detail in the CDR. Regarding the alternative methods, the key design considerations and assumptions as they relate to noise are described below.

Operations with the existing configuration of the EOWHF were assessed in detail in the Noise Existing Conditions Study [HGC Engineering, 2022], based on acoustical measurements of the existing equipment and monitoring of the background sound near the closest neighbouring noise-sensitive receptors (residential points of reception). Based on the CDR, the equipment and operations comprising the future development of the EOWHF are the same as those of the existing configuration. There are two key differences between the existing conditions and future development: the location of the operations is further north and east than the existing conditions, and the fact that one of the neighbouring residential points of reception (the lot identified as "R4" in the Noise Existing Conditions report) was purchased by GFL and vacated in Summer 2022. This location will be demolished prior to the implementation of the future development landfill. Consequently, location R4 will not be a point of reception with regard to noise from the future development and is not discussed further in this Noise Effects Assessment Report.

The MECP noise guideline for landfill sites makes a general recommendation that sound from off-site haul routes be considered for proposed new landfill sites, although it provides no quantitative limits for such operations. However, the off-site haul routes for the EOWHF are long established and will not change relative to existing conditions. Accordingly, sound from off-site haul routes is not relevant to this Noise Effects Assessment Report.

As with the existing conditions, the operations at the future development were assumed to be as follows. Waste and compostable materials will be received at the future development between the hours of 07:00 and 17:00 on weekdays and 08:00 to 14:00 on Saturday, with occasional extended hours to 18:00 on weekdays. On-site landfilling equipment can operate from 06:30 to 18:30 on weekdays and 07:30 to 14:30 on Saturdays[1]. Some of the ancillary operations on site, including the energy from the landfill gas generating facility, the biofilter system associated with the composting facility, and the leachate wastewater treatment plant can operate continuously, day and night. The following equipment and operations were assumed to be active during a predictable worst case daytime hour:

- A maximum of 33 visits by landfill trucks;
- Three rock trucks;

[1] The ECA allows on-site equipment to operate for a half-hour before and after waste-receipt hours to carry out regular site activities such as site preparation and placement and removal of daily/interim cover. The hours provided are based on current operations.

- Two landfill compactors;
- Two bulldozers;
- Two loaders;
- Two excavators;
- One water truck (occasional and acoustically insignificant, not modelled);
- Two landfill gas flares and associated equipment;
- Four landfill gas electrical generators and associated equipment;
- Leachate wastewater treatment facility;
- A maximum of 12 visits by trucks to the compost facility;
- Composting operations;
- RPRA bin drop-off/pickup, non-impulsive sound;
- Impulse sounds from RPRA bin pickup (maximum 1 per hour);
- Impulse sounds from dump truck tail gates (maximum 4 per hour).

The future development will accept landfill trucks during daytime hours only, although the on-site mobile landfill equipment can begin operations at 06:30 on weekdays. In that respect, the only night-time operation of the landfill will be the on-site mobile equipment in the half hour between 06:30 and 07:00. The impulse sounds are associated with trucking activities, and therefore will occur daytime hours only.

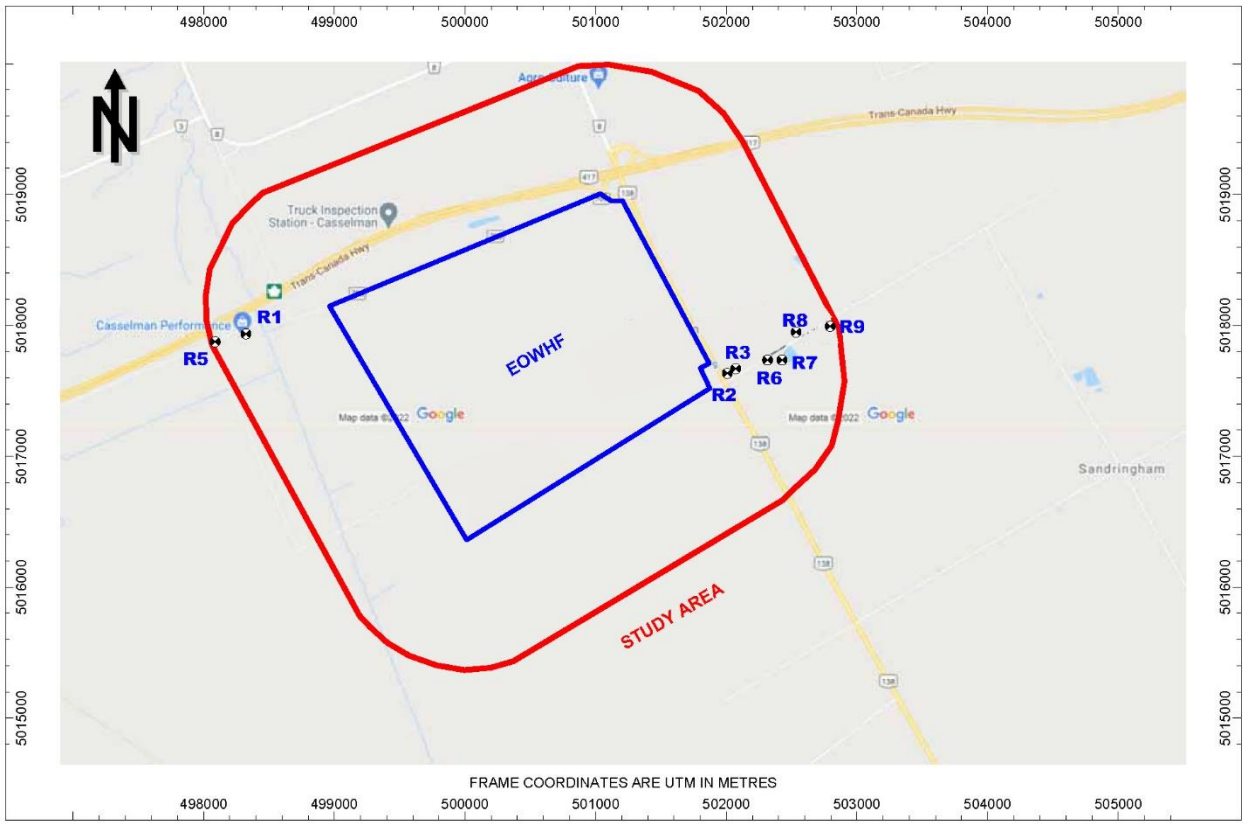
Similarly, the compost trucks (NS-46) travelling between the front gate and the compost area, will visit the site during daytime hours only, at a maximum of 12 trucks in a busy hour.

Summary of Existing Conditions

Zoning information from the Township of North Stormont and the Municipality of Nation shows that the lands within the Off-site Study Area to the south of the EOWHF are zoned Area of Natural or Scientific Interest (“ANSI”), and to the east, west and north of the EOWHF are zoned for Agriculture (“A”) use. The zoning bylaws for lands designated for Agriculture allow residential dwellings, which comprise noise-sensitive points of reception, under the MECP noise guidelines.

Within the Off-site Study Area, there are nine existing residences, eight of which will remain in future, shown as R1 through R3 and R5 through R9 in Figure 2-2. Three of these residences comprise the closest and most-potentially impacted points of reception, with respect to noise – R1 through R3. Assessment locations have been considered at those three residences. The other residences are further and less exposed to the sound of the EOWHF, including the future development. Because of the observable preponderance of traffic sound at the residences, from the adjacent Highways 417 and 138, the vicinity is best categorized as a Class 1 area.

Figure 2-2. Residences within Offsite Study Area for Noise



The sound level limits applicable under MECP noise guidelines were established as part of the Noise Existing Conditions Report, based on monitoring of the background sound at the points of reception. Those limits will remain applicable for the future development of the EOWHF, and are summarized in **Table 2-4** and **Table 2-5**, below.

Table 2-4. Applicable Limits for Non-Impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night)

Point of Reception	Minimum Monitored Background Sound Level	Applicable Limits for Landfilling Operations [MECP 1998]	Applicable Limits for Stationary Sources [MECP 2013]
R1	51 / 49 / 44	55 / 49 / 45	51 / 50 / 45
R2	63 / 59 / 54	63 / 59 / 54	63 / 59 / 54
R3	56 / 51 / 47	56 / 51 / 47	56 / 51 / 47

Table 2-5. Applicable Limits for Impulsive Sound, L_{LM} [dBAI]

Point of Reception	Minimum Monitored Daytime Background Sound Level	Impulses from Roll-off Trucks (max 1/hr) [MECP 2013]	Impulses from Tailgates (max 4/hr) [MECP 2013]
R1	51	80	65
R2	63		
R3	56		

A review of the past annual off-site noise monitoring data conducted as part of the Noise Existing Conditions study, along with field reconnaissance determined that the sound of the EOWHF was not audible off-site over the background traffic sound. Therefore, computational acoustical modelling was used to determine the off-site sound levels of the existing facility. The sound levels from the EOWHF were found to be within the limits in **Tables 2-4** and **2-5** above, under all existing operating conditions.

Design Considerations and Assumptions

The sources of environmental noise associated with the future development – i.e., operations, equipment and activities – will be the same as those for the existing conditions, but will be located further north or east, depending on the stage of operation. Therefore, the sound emission levels measured as part of the Noise Existing Conditions study were used, along with computational acoustical modelling, to predict the offsite sound levels of the future development. In general, acoustical analysis of a future development may need to rely on manufacturer's published noise data – e.g., for proposed new equipment. However, in the case of the EOWHF the future development will comprise the same equipment and operations as the existing conditions, and the previous sound emission levels were measured, so there was no need to rely on manufacturer's sound data. An inventory of the measured sound levels used as input to the acoustical modelling is included as Appendix A. The locations of the various sound sources at the EOWHF are shown in Figures A-1 through A-4 of Appendix A.

The computational acoustical model was developed using Cadna/A software (version 2022, build 189.5221), which is a digital implementation of ISO Standard 9613-2 [ISO 1996] and which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable) and is accepted by the MECP for modelling outdoor sound propagation.

Grading information for the future development was available in the CDR. Contours of existing topography at the EOWHF were obtained from GFL, with a vertical resolution of 0.3 metres. For the topography external to the site, Ontario Base Maps were purchased in digital format, with a vertical resolution of 5 metres.

Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 1.0, globally, representative of primarily grass covered areas and soft soil, 0.25 for paved areas at the facility and 0.7 for unpaved gravel areas. The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The modelling considered first order acoustical reflections, the sufficiency of which was verified via an iterative convergence analysis. Absorptive characteristics were applied to the onsite buildings, typically with values representative of corrugated steel or brick/concrete block, as applicable.

In order to assess the effects of the proposed development, the acoustical model was used to determine which operating locations and configurations of the landfilling operations will represent the "predictable worst case" noise impact scenarios at the closest off-site points of reception (residences). Because one of the closest residences is situated to the northwest of the EOWHF and two to the southeast, the configurations with the greatest off-site sound levels were found to be:

- Alternative Methods 1 & 2, End of Stage 5 (with respect to R1 to the northwest);
- Alternative Method 1, End of Stage 7 (with respect to R2/R3 to the southeast); and
- Alternative Method 2, Start of Stage 8 (with respect to R2/R3 to the southeast).

Also, while the change in grade between the beginning and completion of each Stage/Cell was found to make little difference to the predicted offsite sound levels, the higher grades representing the completed state were assumed in the modelling, as they produced slightly greater exposure of the residences to the landfilling equipment and operations. The proposed visual berming and screening around the perimeter of the site was found to have negligible effect on offsite sound levels and was therefore conservatively omitted from the modelling.

The location and configuration of the stationary noise sources will be the same for all stages of the landfilling operations for both Alternative Methods, so separate assessment cases were not necessary.

The results of the modelling are included as Tables B-1 through B-8 In Appendix B. The predicted sound levels for landfilling operations, stationary sources, and impulse sounds were found to be within the MECP noise criteria.

2.2 Comparative Evaluation and Identification of the Preferred Alternative

The two alternative methods are comparatively assessed and evaluated using the criteria and indicators to determine the preferred alternative. The differences in the potential environmental effects remaining following the implementation of potential mitigation/management measures (i.e., net effects) are used to identify and compare the advantages and disadvantages of each alternative method.

The net environmental effects are utilized in a comparison of the two alternatives to one another at the criteria and indicator level for each discipline. The following two-step methodology was applied in order to carry out the comparative evaluation for noise:

1. Identify the predicted net effect(s) associated with each alternative for each indicator and assign a preference rating (i.e., Preferred, Not Preferred, No Substantial Difference); and
2. Rate each alternative at the criteria level (i.e., Preferred, Not Preferred, No Substantial Difference) based on the identified preference rating for each indicator and provide a rationale.

2.3 Effects Assessment of the Preferred Alternative

An assessment of the environmental effects of the preferred alternative is carried out considering the same criteria, indicators, and data sources, taking into account potential mitigation/management measures and cumulative effects. The effects assessment of the preferred alternative will be presented in the EA Study Report.

3 Net Effects Assessment

The results of the net effects assessment for each alternative method are provided in Sections 3.1 and 3.2.

The potential noise effects were assessed and were found to be compliant with the sound level limits set out in the applicable noise guidelines [MECP 1998, 2013]. Additional mitigation measures were not found to be warranted and were not recommended beyond the operating parameters itemized in Section 2.1.3. Therefore, the potential noise effects and net effects are equal.

3.1 Alternative Method 1

The net effects assessment for Alternative Method 1 is presented in **Table 3-1**.

3.2 Alternative Method 2

The net effects assessment for Alternative Method 2 is presented in **Table 3-2**..

Table 3-1. Net Effects Assessment – Alternative Method 1

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Noise	Predicted site-related noise levels (dBA/dBAI)	• Other than relocation of landfilling operations to the future development area, the existing equipment and operations comprising the sources of noise emissions will remain unchanged • Study Area is influenced by the following noise sources: ○ 33 visits/hr by landfill trucks ○ Three rock trucks ○ Two landfill compactors ○ Two bulldozers ○ Two loaders ○ Two excavators ○ Two landfill gas flares and associated equipment ○ Four landfill gas electrical generators and associated equipment ○ Leachate wastewater treatment facility ○ 12 visits/hr by trucks to the compost facility ○ Composting operations ○ RPRA bin drop-off/pickup, non-impulsive & impulsive sound (max 1/hr) ○ Impulse sounds from tail gates (max 4/hr) • Measured sound emission levels of actual equipment at EOWHF were used for the predictive analysis • The worst-case locations for landfilling activities were assessed • Final (near closure) landfill topography as the worst-case elevations was assessed. • Equipment is maintained to prevent atypical noise emissions.	• Predicted maximum cumulative noise impact from all landfilling operations is 55 dBA at R3, within the limit of 56 dBA at that location • Predicted maximum cumulative noise impact from all stationary sources is 30 dBA at R1, within the limit of 51 dBA at that location • Predicted maximum impulse noise impact is 59 dBAI at R2 and R3, within the limit of 65 dBAI at those locations	• The potential effects are below the allowable limit; therefore, no mitigation measures are required.	• The neighbouring noise-sensitive (residential) points of reception will experience a minor increase in noise levels, relative to existing conditions, resulting from landfilling activities, below the MECP noise limits. Landfilling activity may be audible at times, during lulls in background sound levels.
	Number of off-site noise-sensitive points of reception potentially affected (residences in this case)	• Eight noise sensitive (residential) points of reception located within the Off-site Study Area	• All points of reception within the Off-site Study Area will experience sound levels within the MECP limits	• No additional mitigation required. Continue annual noise monitoring program.	• Noise levels at all points of reception within Off-site Study Area will be within the MECP regulatory sound level limits.

Table 3-2. Net Effects Assessment – Alternative Method 2

Evaluation Criteria	Indicator	Key Design Considerations and Assumptions	Potential Effects	Mitigation Measures	Net Effects
Noise	Predicted site-related noise levels (dBA/dBAI)	• Other than relocation of landfilling operations to the future development area, the existing equipment and operations comprising the sources of noise emissions will remain unchanged • Study Area is influenced by the following noise sources: ○ 33 visits/hr by landfill trucks ○ Three rock trucks ○ Two landfill compactors ○ Two bulldozers ○ Two loaders ○ Two excavators ○ Two landfill gas flares and associated equipment ○ Four landfill gas electrical generators and associated equipment ○ Leachate wastewater treatment facility ○ 12 visits/hr by trucks to the compost facility ○ Composting operations ○ RPRA bin drop-off/pickup, non-impulsive & impulsive sound (max 1/hr) ○ Impulse sounds from tail gates (max 4/hr) • Measured sound emission levels of actual equipment at EOWHF were used for the predictive analysis • The worst-case locations for landfilling activities were assessed • Final (near closure) landfill topography as the worst-case elevations was assessed. • Equipment is maintained to prevent atypical noise emissions.	• Predicted maximum cumulative noise impact from all landfilling operations is 49 dBA at R3, within the limit of 56 dBA at that location • Predicted maximum cumulative noise impact from all stationary sources is 30 dBA at R1, within the limit of 51 dBA at that location • Predicted maximum impulse noise impact is 56 dBAI at R2 and R3, within the limit of 65 dBAI at those locations	• The potential effects are below the allowable limit; therefore, no mitigation measures are required.	• The neighbouring noise-sensitive (residential) points of reception will experience a minor increase in noise levels, relative to existing conditions, resulting from landfilling activities, below the MECP noise limits. Landfilling activity may be audible at times, during lulls in background sound levels.
	Number of off-site noise-sensitive points of reception potentially affected (residences in this case)	• Eight noise sensitive (residential) points of reception located within the Off-site Study Area	• All points of reception within the Off-site Study Area will experience sound levels within the MECP limits	• No additional mitigation required. Continue annual noise monitoring program.	• Noise levels at all points of reception within Off-site Study Area will be within the MECP regulatory sound level limits.

4 Comparative Evaluation of Net Effects and Identification of the Preferred Alternative

A comparative evaluation of the net effects of each alternative method and the identification of a preferred alternative are carried out in accordance with the methods described in Section 2.2. The results of the comparative evaluation are provided below.

4.1 Comparative Evaluation Results

The results of the comparative evaluation for noise are provided in **Table 4-1**.

Table 4-1. Comparative Evaluation of Net Effects for Noise

Evaluation Criteria	Indicators	Net Effects of Alternative Methods	
		Alternative Method 1	Alternative Method 2
Noise	Predicted site-related noise levels (dBA/dBAI)	• Predicted maximum cumulative noise impact from all landfilling operations is 55 dBA at R3, within the limit of 56 dBA at that location • Predicted maximum cumulative noise impact from all stationary sources is 30 dBA at R1, within the limit of 51 dBA at that location • Predicted maximum impulse noise impact is 59 dBAI at R2 and R3, within the limit of 65 dBAI at those locations **Not Preferred Alternative**	• Predicted maximum cumulative noise impact from all landfilling operations is 49 dBA at R3, within the limit of 56 dBA at that location • Predicted maximum cumulative noise impact from all stationary sources is 30 dBA at R1, within the limit of 51 dBA at that location • Predicted maximum impulse noise impact is 56 dBAI at R2 and R3, within the limit of 65 dBAI at those locations **Preferred Alternative**
	Number of off-site noise-sensitive points of reception potentially affected (residences in this case)	• All points of reception within the Study Area will experience sound levels within the MECP limits **No Substantial Difference**	• All points of reception within the Study Area will experience sound levels within the MECP limits **No Substantial Difference**
	Criteria Rating & Rationale	***Alternative Method 2 is preferred because the maximum off-site sound levels at the points of reception are less than those predicted for Alternative Method 1, in the case of landfilling operations and impulse sounds. This occurs because the closest approach of the landfilling activities to the closest neighbouring residences (R2 and R3) is less in the case of Alternative Method 1. There is no significant difference in off-site sound levels from stationary sources or number of potentially affected points of reception, between Alternative Method 1 and Alternative Method 2.***	

4.2 Climate Change Considerations

There are no climate change considerations related to noise.

4.3 Advantages and Disadvantages of the Preferred Alternative

The differences in net effects are used to identify and compare the advantages and disadvantages of each alternative method.

Alternative 2 has the advantage of slightly lower offsite sound levels from landfilling operations and impulse sounds. There are no noise-related disadvantages to either Alternative. The sound levels from all aspects of both Alternatives are predicted to be within the applicable MECP noise limits.

5 Commitments and Monitoring

To confirm that the commitments related to noise are carried out, and that the proposed mitigation measures address the predicted effects for noise, monitoring is proposed for operations of the EOWHF landfill. Monitoring for compliance will be undertaken to confirm that the project complies with the commitments and mitigation measures identified in the effects assessment.

The commitments associated with noise are listed in Section 5.1. The proposed environmental effects monitoring is provided in Section 5.2. Compliance monitoring for noise is described in Section 5.3.

5.1 Noise Commitments

No noise effects are anticipated as a result of the project. GFL will continue with the existing noise monitoring program conducted annually at the landfill, and will record any noise complaints and follow up as appropriate.

5.2 Environmental Effects Monitoring for Noise

Monitoring plans are developed as part of the detailed effects assessments carried out for the Preferred Alternative to confirm:

- the net effects are as predicted;
- unanticipated negative effects are addressed; and
- the effectiveness of the proposed mitigation measures.

Table 5-1 summarizes the environmental effects monitoring for the Preferred Alternative.

5.3 Noise Compliance Monitoring

Compliance monitoring will be undertaken to confirm that the construction, operation and maintenance of the project are carried out in accordance with the mitigation measures and commitments identified in the effects assessment. Compliance monitoring is summarized in **Table 5-1**. The results of compliance monitoring, including details of the effectiveness of mitigation measures and fulfillment of commitments, will be provided to the MECP.

Table 5-1. Environmental Effects and Compliance Monitoring for the Preferred Alternative

Evaluation Criteria	Potential Effect	Commitment for Mitigation	Commitment for Monitoring	Compliance Monitoring
Noise	The neighbouring noise-sensitive (residential) points of reception will experience a minor increase in noise levels, relative to existing conditions, resulting from landfilling activities, below the MECP noise limits. Landfilling activity may be audible at times, during lulls in background sound levels.	• No additional mitigation required. Continue current noise control practices and annual noise monitoring program.	• Continue with existing annual noise monitoring program. • Track all noise complaints and follow up as appropriate.	• Annually during construction and operation as part of the current monitoring program.

6 Noise Approvals

Beyond EA approval, no updates to noise approvals are anticipated to be necessary for the site.

The proposed future development does not entail changes to the stationary equipment and operations. The Environmental Compliance Approvals covering the operation of the stationary sources – numbers 8583-B9ZRZ8, 5665-8STRV7, 9112-9DMTGX, and 7899-CBQP6L will not require amendments as a result of the future development.

7 References

HGC Engineering

2022 "GFL – Eastern Ontario Waste Handling Facility – Landfill Expansion Environmental Assessment – Noise Existing Conditions Study", February 18, 2022.

HDR Corporation

2022 "Conceptual Design Report – Eastern Ontario Waste Handling Facility – Future Development Environmental Assessment", April 5, 2022.

ISO (International Organization for Standardization)

1996 ISO Standard 9614-2, "Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning", 1996.

Ministry of the Environment, Conservation and Parks

1978 *Model Municipal Noise Control Bylaw,* Publication NPC-115, "Construction Equipment", August, 1978.

1998 "Noise Guidelines for Landfill Sites," October, 1998.

2013 "Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning Publication NPC-300," August, 2013

Appendix A. Sound Source Inventory

Table A-1. Sound Source Inventory

Source ID	Source Description	Sound Power Level [dBA re 10^{-12} Watt]
EF2	Enclosed Flare 2 -- 4500 CFM	92
G1	LFG Generator 1 Combustion Exhaust	93
G2	LFG Generator 2 Combustion Exhaust	93
G3	LFG Generator 3 Combustion Exhaust	93
G4	LFG Generator 4 Combustion Exhaust	93
SF	Siloxane Flare	77
NL-01	Landfill Trucks to Primary Tipping Location (each)	101
NL-02	Landfill Trucks to Secondary Tipping Location (each)	101
NL-03	Rock Trucks (Sum of 3)	112
NL-04	Compactors (Sum of 2)	117
NL-05	Dozer at Primary Tipping Area	106
NL-06	Dozer at Secondary Tipping Area	116
NL-07	Loader	103
NL-08	Loader	110
NL-09	Excavator	105
NL-10	Excavator	104
NS-02	LFG Flare #2 Blower & Motor	97
NS-05	LFG Flare #2 NW Induction Air Intake	79
NS-06	LFG Flare #2 SW Induction Air Intake	79
NS-09	LFG Flare #2 NE Induction Air Intake	79
NS-10	LFG Flare #2 SW Induction Air Intake	79
NS-11	LFG Blower Skid	101
NS-12	LFG Chiller	92
NS-13	Dry Cooler	87
NS-14	Siloxane Flare Blower & Motor	82
NS-15	LFG Generator 1 Exhaust Duct Expansion Joint	93
NS-16	LFG Generator 2 Exhaust Duct Expansion Joint	93
NS-17	LFG Generator 3 Exhaust Duct Expansion Joint	93
NS-18	LFG Generator 4 Exhaust Duct Expansion Joint	93
NS-19	LFG Generator 1 Remote Radiator	81
NS-20	LFG Generator 2 Remote Radiator	81
NS-21	LFG Generator 3 Remote Radiator	81
NS-22	LFG Generator 4 Remote Radiator	81
NS-23	LFG Generator 1 Ventilation Outlet	73
NS-24	LFG Generator 2 Ventilation Outlet	73
NS-25	LFG Generator 3 Ventilation Outlet	73

Table A-1. Sound Source Inventory

Source ID	Source Description	Sound Power Level [dBA re 10^{-12} Watt]
NS-26	LFG Generator 4 Ventilation Outlet	73
NS-39	WTP -- Wall Exhauster EF-1a	54
NS-40	WTP -- Wall Exhauster EF-1b	54
NS-41	WTP -- Wall Exhauster EF-1c	54
NS-42	WTP -- Wall Exhauster EF-1d	54
NS-43	WTP -- Wall Exhauster EF-1e	54
NS-44	WTP -- Wall Rooftop Exhaust Fan EF-2	78
NS-45	WTP -- Blower Intake	89
NS-46	Compost Trucks in/out (each)	103
NS-47	Compost -- Trucks Unloading	102
NS-48	Compost -- Two FELs at Intake	100
NS-49	Compost -- FEL at East End of Bldgs	100
NS-50	O/H Door Screener Building	87
NS-51	Compost -- Truck Idling at Screener	99
NS-52	Compost -- West Bio-Blower (Housing & Motor)	102
NS-53	Compost -- Mid Bio-Blower (Housing & Motor)	94
NS-54	Compost -- East Bio-Blower (Housing & Motor)	97
NS-55	Compost -- Indoor Blower Sound thru Walls	111
NS-56	Vermeer Grinder	117
NS-57	Wildcat Trommel/Screener	109
NS-59	Compost Windrow Turner	118
NS-14	RPRA Bin Drop-off/Pickup	101
IS-01	Impulse During OTS Pickup	108
IS-02	Impulse From Dump Truck Tail Gate (Occasional)	125

Figure A-1. Source Location Diagram – Landfilling Operations and Insets

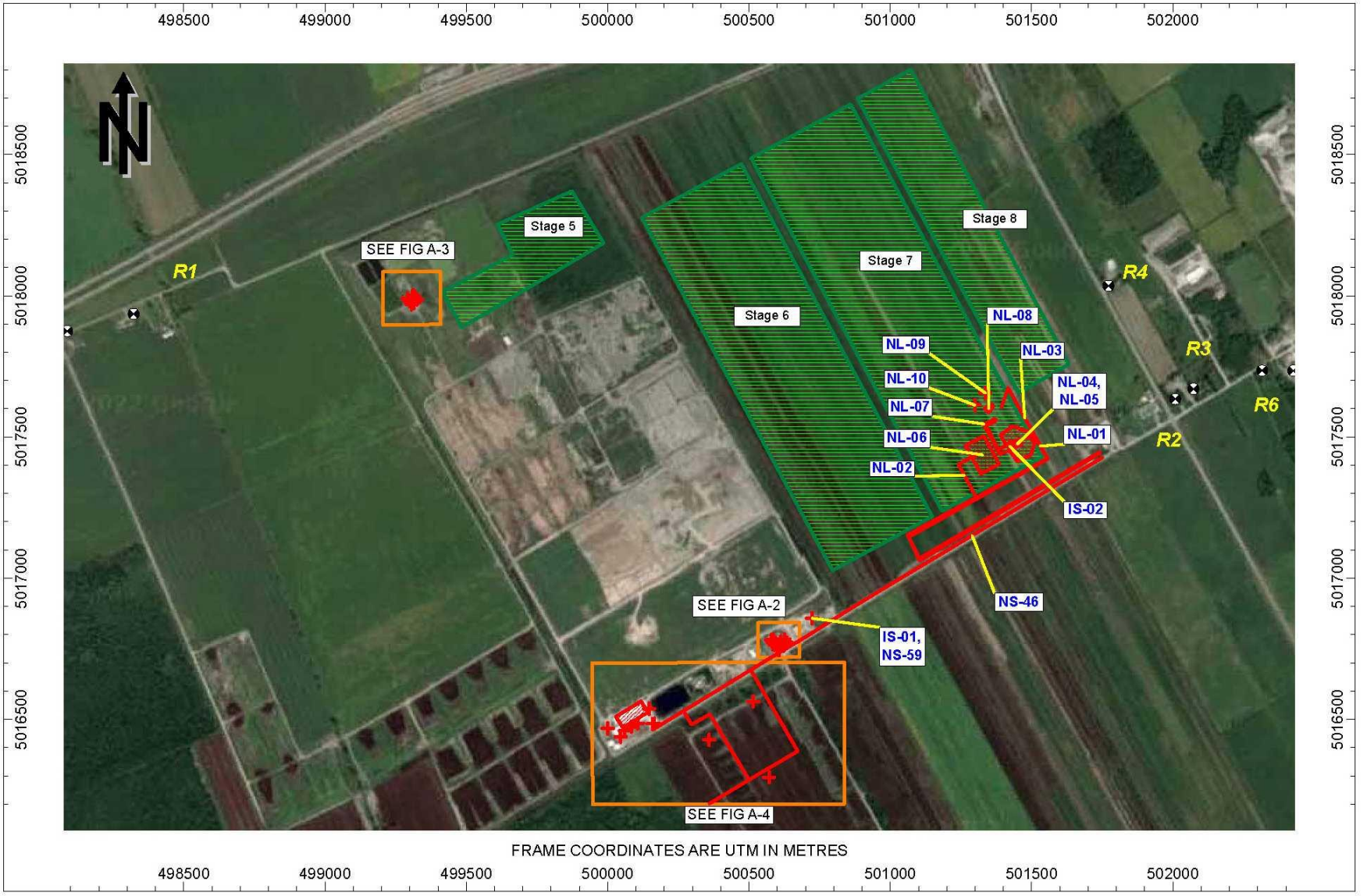


Figure A-2. Source Location Diagram – Landfill Gas Flares & Generating Plant

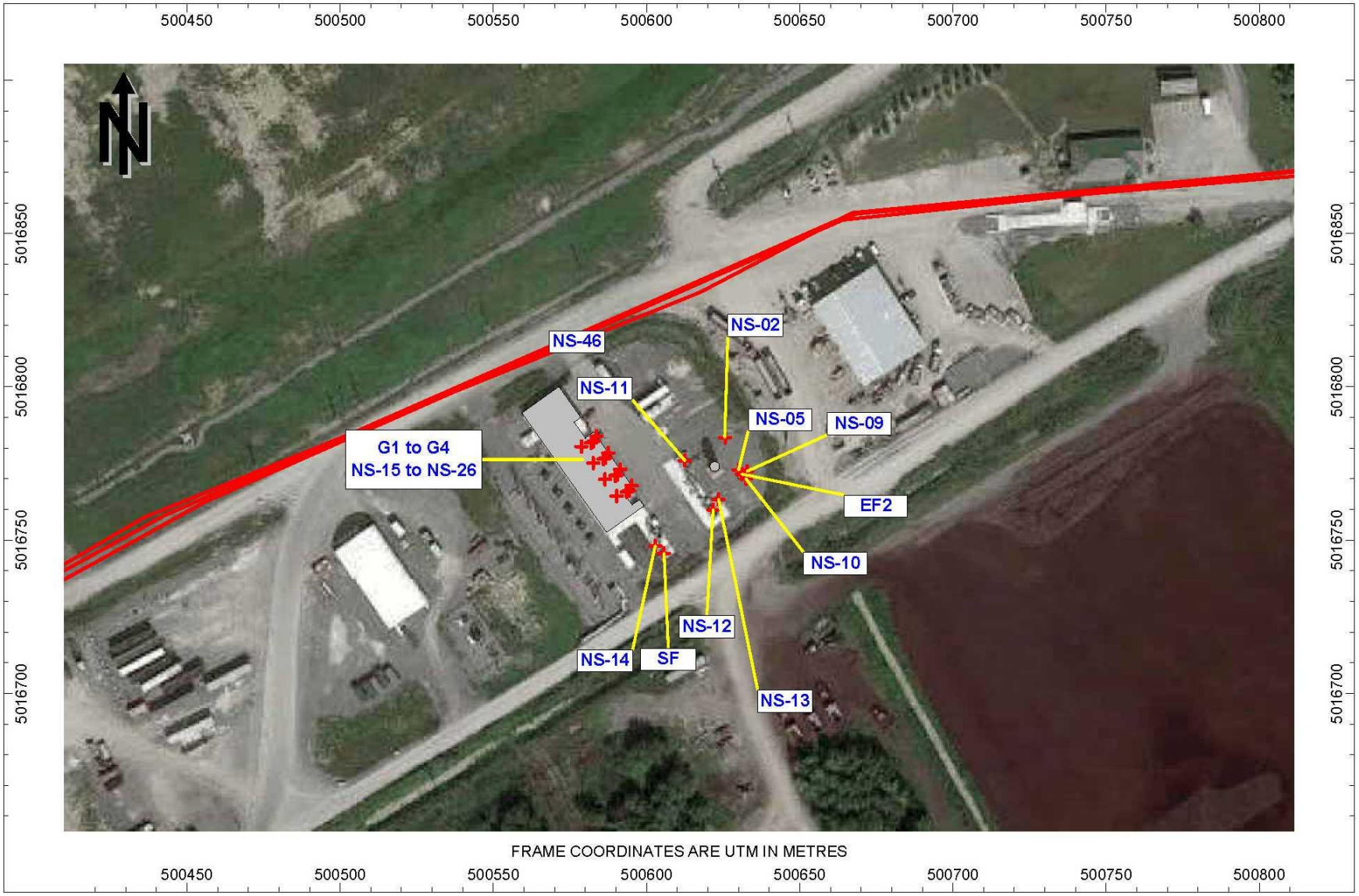
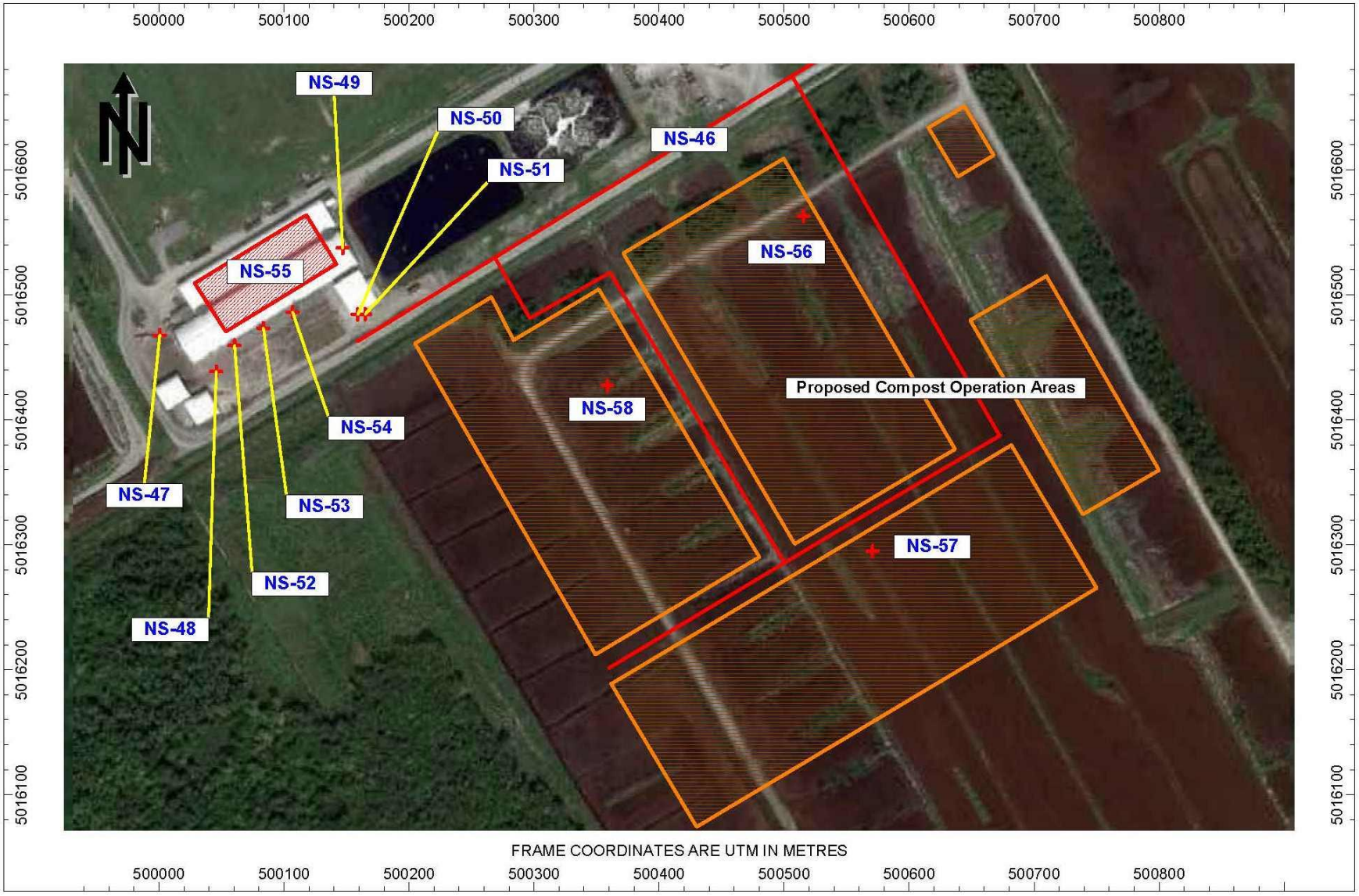


Figure A-3. Source Location Diagram – Leachate Treatment Plant

Figure A-4. Source Location Diagram – Composting Operations



Appendix B. Acoustical Modelling Results

Table B-1. Alternatives 1 & 2, End of Stage 5, Landfilling Operations
Assessment of Non-impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night)

	Sound Levels	Applicable Limits for Landfilling Operations [MECP 1998]	Within Limits?
R1	40 / -- / 37	55 / 49 / 45	Y / Y / Y
R2	34 / -- / 24	63 / 59 / 54	Y / Y / Y
R3	34 / -- / 26	56 / 51 / 47	Y / Y / Y

Table B-2. Alternative 1, End of Stage 7, Landfilling Operations
Assessment of Non-impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night)

Point of Reception	Sound Levels	Applicable Limits for Landfilling Operations [MECP 1998]	Within Limits?
R1	28 / -- / 24	55 / 49 / 45	Y / Y / Y
R2	55 / -- / 52	63 / 59 / 54	Y / Y / Y
R3	55 / -- / 52	56 / 51 / 47	Y / Y / Y

Table B-3. Alternative 2, Start of Stage 8, Landfilling Operations
Assessment of Non-impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night)

Point of Reception	Sound Levels	Applicable Limits for Landfilling Operations [MECP 1998]	Within Limits?
R1	27 / -- / 24	55 / 49 / 45	Y / Y / Y
R2	49 / -- / 46	63 / 59 / 54	Y / Y / Y
R3	49 / -- / 46	56 / 51 / 47	Y / Y / Y

Table B-4. Stationary Sources, Both Alternatives, All Stages
Assessment of Non-impulsive Sound, L_{EQ} [dBA] (Day/Evening/Night)

Point of Reception	Sound Levels	Applicable Limits for Stationary Sources [MECP 2013]	Within Limits?
R1	30 / 25 / 24	51 / 50 / 45	Y / Y / Y
R2	32 / 26 / 23	63 / 59 / 54	Y / Y / Y
R3	33 / 27 / 25	56 / 51 / 47	Y / Y / Y

Table B-5. Impulse Sounds from Roll-off Bin Pickup at RPRA Area Both Alternatives, All Stages, L_{LM} [dBAI] (Daytime Only)

Point of Reception	Sound Levels	Applicable Limits for Stationary Sources [MECP 2013]	Within Limits?
R1	18	80	Y
R2	22	80	Y
R3	23	80	Y

Table B-6. Impulse Sounds from Dump Truck Tailgate, Alternatives 1 & 2, Stage 5 L_{LM} [dBAI] (Daytime Only)

Point of Reception	Sound Levels	Applicable Limits for Stationary Sources [MECP 2013]	Within Limits?
R1	47	65	Y
R2	31	65	Y
R3	32	65	Y

Table B-7. Impulse Sounds from Dump Truck Tailgate, Alternative 1, End of Stage 7 L_{LM} [dBAI] (Daytime Only)

Point of Reception	Sound Levels	Applicable Limits for Stationary Sources [MECP 2013]	Within Limits?
R1	28	65	Y
R2	59	65	Y
R3	59	65	Y

Table B-8. Impulse Sounds from Dump Truck Tailgate, Alternative 2, Start of Stage 8 L_{LM} [dBAI] (Daytime Only)

Point of Reception	Sound Levels	Applicable Limits for Stationary Sources [MECP 2013]	Within Limits?
R1	28	65	Y
R2	56	65	Y
R3	56	65	Y