



**Verified Carbon
Standard**

HENRICO COUNTY LANDFILL GAS COMBUSTION PROJECT



Document Prepared by Blue Source LLC

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Project is a landfill gas (LFG) capture and combustion project located at the Springfield Road Landfill (the “Landfill”). Landfill gas is actively captured at the solid waste disposal site (SWDS) and combusted in either the on-site flare or the on-site electricity generation facility. Under this project condition, methane is converted to CO₂ through combustion which results in measurable emission reductions.

The Facility is a municipal solid waste landfill located in Henrico County, Virginia. The address is:

10600 Fords Country Land
Glen Allen, Henrico County, VA

The Landfill was opened in 1966 and received waste until 2014; it was permanently closed in 2016. The Landfill consists of three areas: The East Fill, the West Fill, and the Expansion. There are three distinct time periods relevant to the landfill gas collection and destruction system at this facility: Pre-Project, Stage 1 and Stage 2. The Project involves Stage 1 and Stage 2.

Pre-Project (2001 – 2004)

In 2001, 14 wells and a small flare were voluntarily installed by Henrico County (“Henrico”) at the Landfill to collect and destroy methane from the East Fill area. Based on anecdotal evidence, gas was first flared in March 2002. This phase constitutes the baseline scenario for the Project. Prior to this phase, gas from the Landfill was passively vented to atmosphere.

Stage 1 (2005 – 2010)

In December 2004, the small flare was decommissioned and on June 3, 2005, a larger flare was commissioned. This marks the official project start date. Along with the new flare, an additional 87 wells were installed across all three areas of the Landfill. The wellfield was further expanded in 2006 with the addition of five new wells in the Expansion area. This stage of the Project is owned and operated by Henrico.

Stage 2 (2010 – present)

This stage involves the installation of a 4 MW power generating facility on site that combusts the landfill gas to generate electricity. This is owned and operated by Ingenco Distributed Energy (“Ingenco”) and became operational in September 2010. In Fall 2010, an additional 18 wells were installed across the Landfill.

Since the implementation of the project activity, the estimated annual average emission reductions are 73,000 t CO₂e/year. For the 10-year renewal period, the estimated total emission reductions are 730,000 t CO₂e.

1.2 Sectoral Scope and Project Type

Project Category: Sectoral Scope 13 (Waste Handling and Disposal) and Sectoral Scope 1 (Energy)

Project Type: Individual project

1.3 Project Eligibility

The Project is being quantified using the approved CDM methodology: ACM0001 Flaring or Use of Landfill Gas (version 19.0) (the “Methodology”).

The Project is eligible under the VCS Program as it meets all requirements set out in Section 3.1 of the VCS Standard (version 4.0, September 2019) (the “Standard”). See Appendix A for a list of requirements and justifications as to how the Project meets each requirement.

1.4 Project Design

The Project has been designed to include a single installation of an activity.

Eligibility Criteria

This section is not applicable as this is not a grouped project.

1.5 Project Proponent

The gas collection system and flare are owned and operated by the County of Henrico.

Organization name	County of Henrico – Department of Public Utilities
Contact person	Jon Clary, P.E.
Title	Division Director – Solid waste and Recycling
Address	P.O. Box 27032 Richmond, VA 23273
Telephone	(804) 727-8217
Email	cla06@co.henrico.va.us

The power generation facility is owned and operated by Ingenco.

Organization name	Ingenco Distributed Energy
Contact person	Thomas Fabrie

Title	Chief Financial Officer
Address	2250 Dabney Road Richmond, VA 23230
Telephone	(804) 521-3578
Email	thomas.fabrie@riverviewpwr.com

1.6 Other Entities Involved in the Project

Bluesource has been contracted by Ingenco to develop and monetize the GHG emission reduction credits generated by the Project.

Organization name	Blue Source LLC
Role in the project	Project Developer
Contact person	Tooraj Moulai
Title	Director, Engineering & Technical Services
Address	1605 – 840 7 th Ave SW Calgary, AB Canada, T2P 3G2
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1.7 Ownerships

The Project consists of two stages, both implemented at the Landfill. Stage 1 is owned and operated by Henrico. Stage 2 is owned and operated by Ingenco.

1.8 Project Start Date

The project start date is June 3, 2005 when the Landfill began collecting and destructing landfill gas from the project collection system in Stage 1.

1.9 Project Crediting Period

January 1, 2019 – December 31, 2028

The Project's first crediting period was January 1, 2009 – December 31, 2018. This PDD is for the first 10-year renewal period of the Project.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Table 1: Project Scale

Project Scale	
Project	X
Large project	

Table 2: Estimated GHG Emission Reductions for Crediting Period

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2019	52,000
2020	52,000
2021	51,000
2022	51,000
2023	50,000
2024	50,000
2025	49,000
2026	49,000
2027	48,000
2028	48,000
Total estimated ERs	500,000
Total number of crediting years	10
Average annual ERs	50,000

1.11 Description of the Project Activity

Emissions reductions are achieved through the destruction of methane gas that otherwise would have been vented to atmosphere. This is accomplished by the expansion of previously existing landfill gas collection and control systems, and the installation of additional methane destruction capacity. Methane gas is combusted in a landfill gas flare and, as of stage 2 of the project, twelve combustion engines which are also capable of generating electricity. The production of electricity via landfill gas combustion additionally offsets emissions from grid electricity generation, however these emissions reductions are not considered under this project.

In Stage 1, installed in 2005, the Pre-Project existing landfill gas capture system was expanded, and a larger flare was installed along with additional wellheads. The system consists of the following infrastructure and equipment:

- Vertical wells to extract gas from all three areas of the Landfill
- Piping to collect and transport gas to the flare
- LFG Specialties candlestick flare to destruct landfill gas
- Two 2600 scfm blowers to create a pressure differential used to pull landfill gas from the wells
- Monitoring equipment including flow meters, thermocouples, gas analyzer, etc.

Stage 2 of the Project, installed from 2009-2010, involved the installation of a power generation unit along with additional wellheads. The system consists of the following infrastructure and equipment:

- Vertical wells to extract gas from the landfill
- Piping and controls required to transport landfill gas to the power generating facility
- Treatment systems required to dewater, filter and compress gas for electricity generation
- Twelve recycled Detroit Diesel dual-fuel compression ignition engines capable of producing a combined 4 MW of power
- Distribution lines and equipment required to transport electricity to the purchaser
- Retrofitting of existing landfill gas flare with controls and valves to function with Ingenco's infrastructure
- Monitoring equipment include flow meters, gas analyzers, etc.

The configuration of significant infrastructure and equipment in its current configuration following Phase 2 expansion can be seen in *Figure 1*.

Landfill gas collection is monitored by three main meters. Flow is measured in two places, both of which are located after condensate knockout pots and after the two blowers but before destruction devices or sophisticated dewatering/conditioning. These meters measure LFG flowrate to the candlestick flare and the Ingenco engines. Both flow meters are Rosemount Orifice Plates, Model 1595C with Rosemount 3095 Multi-Variable Pressure Transmitters. The manufacturer guarantees calibration stability for ten years, though the meter will be calibrated at least every 3 years to maintain increased accuracy. Gas content is also measured following condensate knockout pots and the two blowers using an FAU-TDL Gas Analyzer. The manufacturer recommends calibrating these meters every year or more frequently.

The average lifespan of the installed wellheads, piping, flares, blowers, engines, and other industrial equipment is longer than the crediting period of the Project. In particular, the landfill gas flare has an expected life of 30 years with regular maintenance and the Detroit Diesel engines have been overhauled to like new condition with an expected life of 20+ years. The monitoring equipment is calibrated regularly per the manufacturer's recommendation and will be repaired or replaced upon end of life.

Prior to 2001, the landfill gas was passively venting to atmosphere. Between 2001-2004, in the Pre-Project phase, an active gas collection system was installed in the East Fill area of the Landfill. At this time, 14 30-inch diameter gas wells, header and lateral lines, a vacuum blower, and LFG Specialties utility flare (maximum capacity of 793 scfm) were installed. All equipment installed as part of this project increase landfill gas capture and destruction efficiencies without impacting operational capacity of the Henrico landfill.

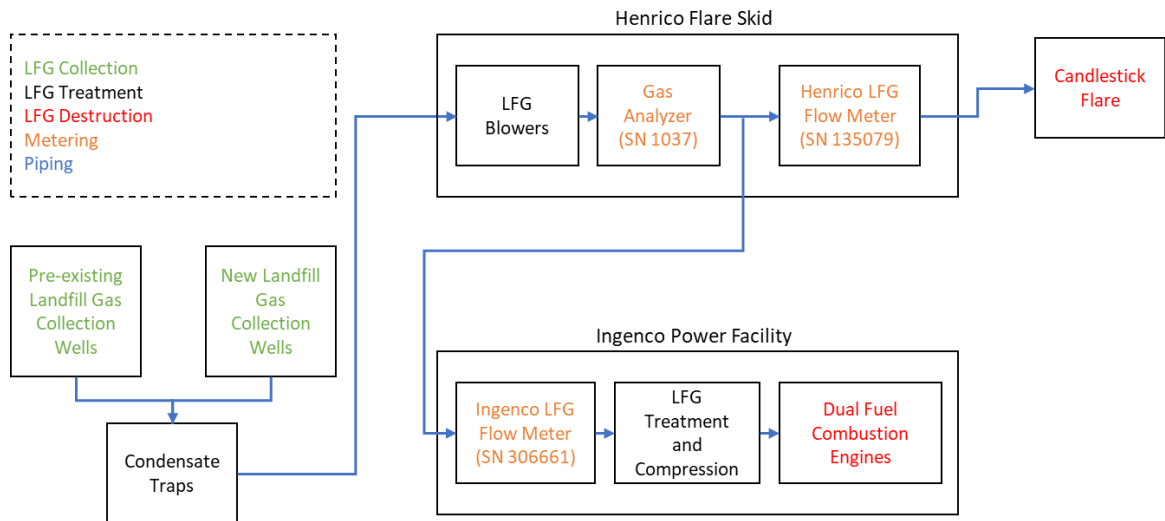


Figure 1: Configuration of Main Landfill Gas Collection and Control Technologies

1.12 Project Location

The Landfill is a municipal solid waste landfill located on a 192-acre site in Henrico County, Virginia. It is located immediately northeast of Nuckols Road and north of Interstate 295.

The address of the facility is:

10600 Fords Country Lane
Glen Allen, Henrico County, VA, 23060

The latitude and longitude of the facility are as follows:

Latitude: 37°40'45"
Longitude: 77°33'58"

1.13 Conditions Prior to Project Initiation

Prior to project initiation in Stage 1, the Landfill was in the Pre-Project phase with an existing LFG capture system as described in Sections 1.1 and 1.11.

The system in place in the Pre-Project phase was installed by Griffin Dewatering with the objective of reducing methane gas that was detected in subsurface methane gas detection wells located on the eastern perimeter of the landfill. While the Virginia Department of Environmental Quality (DEQ) required Henrico to control the subsurface migration of gas detected in these wells, the

installation of an active gas collection system is above and beyond that requirement. The alternative would have been passive gas venting. Installation of the Pre-Project landfill gas management system did not require DEQ approval.

Total gas collected from the Pre-Project system averaged approximately 88 scfm with a methane content of approximately 46.8% as evidenced from historical records. In the absence of the Project, the most likely baseline scenario would have been the continued operation of the Pre-Project landfill gas capture system.

The baseline scenario is the same as the conditions existing prior to the project initiation.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Under the 1990 Clean Air Act Amendments, landfills with a permitted capacity greater than 2.5 million megagrams and annual non-methane organic compound (NMOC) emissions greater than 50 tonnes are subject to the New Source Performance Standards (NSPS), as specified in 40 CFR Part 60 Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills. The objective of these federal landfill emissions regulations is to reduce fugitive emissions of hazardous air pollutants (HAPs), volatile organic compounds (VOCs), and greenhouse gases (GHGs) from landfills.

The Landfill had a design capacity of 2.901 million megagrams and while in operation was required to comply with 40 CFR Part 60 Subpart WWW and have a Title V Operating Permit (PRO-51286). In accordance with 40 CFR Part 60.754, Henrico was required to submit NMOC emission calculations to the US Environmental Protection Agency (USEPA) every five years.

According to the most recent Tier II report completed in December 2013, the Landfill's estimated NMOC emissions for the 2014 – 2018 years ranged from 16.05 – 19.01 Mg per year (well below the 50 Mg per year threshold). As the Landfill stopped accepting waste on November 8, 2014 and has since been closed, landfill annual emission rates are expected to decline and, therefore, will not exceed the 50 Mg per year threshold for 2019 and beyond.

After closure of the Landfill, the DEQ revoked the Title V permit at the request of Henrico. This means the Landfill is no longer required to submit NMOC emission calculations to the US EPA. Therefore, emission credits generated for this renewed crediting period are surplus to regulatory requirements.

Henrico was not required to expand the landfill gas collection system or install a flare (passive, candlestick or enclosed) to comply with NSPS requirements at any point before the Landfill's closure. There are no other applicable state or local regulations requiring Henrico to collect and destruct landfill gas at the site and the project activity complies with all local laws and regulations.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The Project has not been registered and is not seeking registration under any GHG programs other than the VCS.

1.15.2 Projects Rejected by Other GHG Programs

The Project has not been rejected by any GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The Project does not reduce GHG emissions that are included in any other emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The Project has not sought or received another form of GHG-related environmental credit. Emissions reductions associated with the production of electricity using renewable natural gas are not quantified under this project. Ingenco Distributed Energy owns the engines used to generate this electricity and retains all rights to other environmental attributes such as renewable energy certificates generated solely from electricity generation activities.

1.17 Additional Information Relevant to the Project

Leakage Management

The project activity is not known to create any leakage emissions; therefore, no leakage effects are accounted for under this methodology and no leakage management plan is required.

Commercially Sensitive Information

No commercially sensitive information has been excluded from this PDD.

Sustainable Development

The Project contributes to the sustainable development of the region by reducing methane venting and flaring, thereby improving regional air quality.

Further Information

In the calculation of the baseline emissions, the Methodology requires that the amount of methane that would have been destroyed/combusted in the absence of the Project be subtracted from the quantity of methane destroyed/combusted as a result of the project activity.

The baseline scenario is the Pre-Project phase. The amount of methane captured in this Pre-Project existing LFG capture system will be determined through estimation based on historical

records. This volume of gas will be considered the baseline scenario, or what would have been destroyed in the absence of the project condition and will be subtracted from the Project volumes.

2 SAFEGUARDS

2.1 No Net Harm

There are no potential negative environmental or socio-economic impacts as a result of the Project.

2.2 Local Stakeholder Consultation

Local stakeholders are encouraged to engage in the Project at any time.

The method used to engage local stakeholders is through the posting of project documents to the public VCS registry where any new changes to the Landfill or project operation are outlined.

Outcomes of local stakeholder consultation will be documented by the project proponent by way of retained email records.

Many channels are open to local stakeholders for on-going communication. Local stakeholder can refer to the project proponent contact information provided in Section 1.5 of this PDD, or the contact information on the public web pages of both Henrico County and Ingenco.

No comments or concerns from local stakeholders have been brought forward during this renewal, or during the original 10-year crediting period.

2.3 Environmental Impact

The installation of an LFG gas capture and combustion system is not known to have any negative environmental impacts. The Project reduces greenhouse gases entering the atmosphere and improves local air quality by reducing methane odours from the capture of LFG at the Landfill.

2.4 Public Comments

No comments or concerns from local stakeholders have been brought forward since the Project initiation.

2.5 AFOLU-Specific Safeguards

This is a non-AFOLU project, therefore this section is not applicable.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The Methodology used for the Project is ACM0001 Large-scale Consolidated Methodology: “Flaring or use of landfill gas” (version 19.0).

The tools applied by the Project are:

TOOL 11: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (version 3.0.1)

TOOL 5: “Baseline, project and/or leakage emission from electricity consumption and monitoring of electricity generation” (version 3.0)

TOOL 8: “Tool to determine the mass flow of a greenhouse gas in a gaseous stream” (version 3.0)

Tool 3: “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” (version 3.0).

Tool 6: “Project emissions from flaring” (version 3.0)

3.2 Applicability of Methodology

The applicability criteria for the Project is outlined in Section 2.2 of the Methodology. The Project meets all conditions as described and justified below.

- a) Install a new LFG capture system in an existing or new (Greenfield) SWDS where no LFG capture system was or would have been installed prior to the implementation of the project activity; or
- b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that:
 - i. The captured LFG was vented or flared and not used prior to the implementation of the project activity; and
 - ii. In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available;

Justification: Item (b) is applicable to the Project as the project activity required an investment to expand the existing Pre-Project existing LFG capture system to increase the recovery and destruction rate of landfill gas that was previously vented and flared. The landfill gas was not being used in the Pre-Project condition. Historical data on the amount of landfill gas being captured and flared in the Pre-Project condition is available.

- c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways:
 - i. Generating electricity;

- ii. Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or
- iii. Supplying the LFG to consumers through a natural gas distribution network;
- iv. Supplying compressed/liquified LFG to consumers using trucks;
- v. Supplying the LFG to consumers through a dedicated pipeline;

Justification: The Project flares the landfill gas as well as uses it to generate electricity.

- d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity

Justification: The Project has no influence on the amount of organic waste that would be recycled in the absence of the project activity. Until the Landfill's closure in 2016, the Landfill was operating under normal conditions with no restrictions on the amount of organic material accepted due to the flaring and electricity generation on-site.

As outlined in Section 3.4, the baseline scenario selection process shows that the most plausible baseline scenario is the continued capture of landfill gas and destruction through flaring as in the Pre-Project phase. This meets applicability criteria 4(a) as outlined in the Methodology.

This Methodology is not applied in conjunction with any other approved methodologies. Further, the Project has not been changed during crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity (i.e., the Landfill has not increased the amount of organic material accepted for disposal). This satisfies the applicability criteria 5(a) and 5(b) as outlined in the Methodology.

The justification for using each Tool is provided in this document where the function and use of the Tool is described. This satisfies the applicability criteria 6.

3.3 Project Boundary

The Project boundary includes the three areas of the Landfill where LFG is captured: East Fill, West Fill, and Expansion. The boundary also includes the site of the flare and the Ingenco power plant where the LFG is combusted to generate electricity. Further, since electricity is supplied to the Project, the grid-connected power generation source and associated infrastructure is included in the project boundary.

The relevant sources, sinks and reservoirs are outlined in Table 3, below. Sources that were listed in the Methodology but not relevant to the Project have been excluded from the table for clarity.

Table 3: Summary of Sources, Sinks and Reservoirs

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from decomposition of waste at the SWDS site	CO ₂	No	CO ₂ emissions from decomposition of organic waste are not accounted for since the CO ₂ is also released under the project activity.
		CH ₄	Yes	The major source of emissions in the baseline.
		N ₂ O	No	N ₂ O emissions are small compared to CH ₄ emissions from SWDS. This is conservative.

Project		Other	No	There are no other emissions released from this source.
	Emissions from baseline generation of electricity	CO ₂	No	As detailed in section 1.16.2, baseline emissions from grid electricity generation displaced by project activities are excluded from consideration to allow project proponents to seek alternate forms of environmental credit on these emission reductions.
		CH ₄	No	
		N ₂ O	No	
		Other	No	
	Emissions from fossil fuel consumption in the project activity	CO ₂	Yes	This is an important emission source.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	No	There are no other emissions released from this source
	Emissions from electricity consumption due to the project activity	CO ₂	Yes	This is an important emission source.
		CH ₄	No	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	No	Excluded for simplification. This emission source is assumed to be very small.
		Other	No	There are no other emissions released from this source
Project	Emissions from flaring of LFG	CO ₂	No	Emissions are considered negligible.
		CH ₄	Yes	This is an important emission source.
		N ₂ O	No	Emissions are considered negligible.
		Other	No	There are no other emissions released from this source
	Emissions from combustion of LFG in electricity generation engines	CO ₂	No	Emissions are considered negligible.
		CH ₄	No	Emissions are considered negligible so long as engine is well maintained and operated under lean burn conditions.
		N ₂ O	No	Emissions are considered negligible.
		Other	No	There are no other emissions released from this source

A map of the Project can be found in Appendix B. A diagram showing the flow of landfill gas and project emissions can be seen in Figure 2.

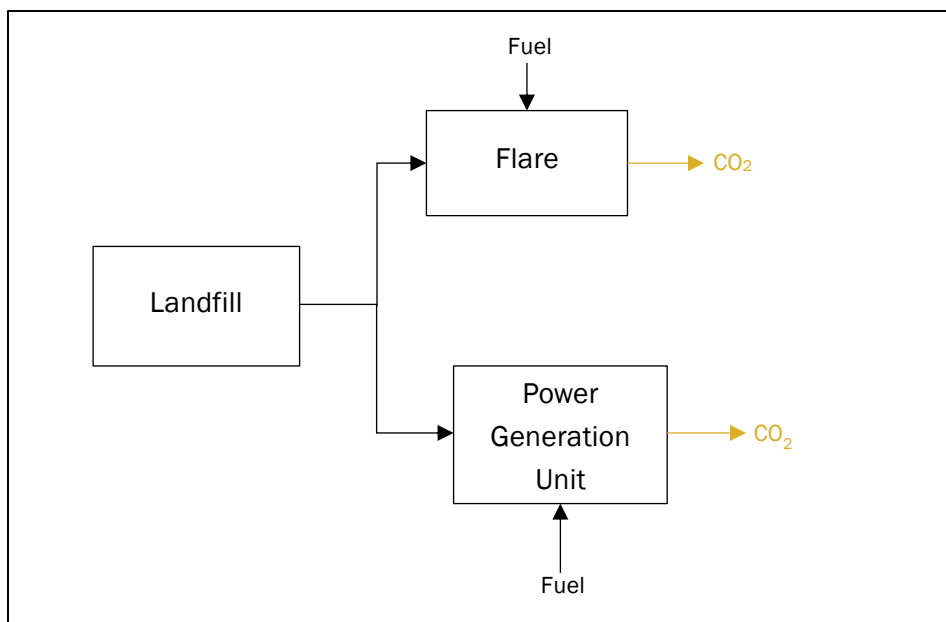


Figure 2: Process Flow Diagram

3.4 Baseline Scenario

This PDD is outlining the Project's 10-year project crediting period renewal. As such, the validity of the original baseline shall be demonstrated as per the Standard Section 3.8.9(2)(b). The CDM Tool 11: "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 3.0.1) is used.

The validity of the baseline is assessed using the following sub-steps:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The current baseline complies with all relevant mandatory national and sectoral policies which have come into effect since the original project initiation in 2009. Please refer to section 1.14 of this PDD for detailed information on the relevant regulations and information as to how the Landfill meets all stated requirements. It is important to note the Landfill was permanently closed in 2016 and anticipated emissions will subsequently be declining.

Step 1.2: Assess the impact of circumstances

The baseline scenario was selected in the original validation based on the most feasible option that involved continuation of existing conditions. When compared to the active capture and flaring of landfill gas, this scenario provided the same level of service, but avoids the following capital costs: purchase and installation of an expanded capture system, piping, blowers and a larger flare (to accommodate the increased flow of gas). It also avoids the continuing operating expenses of personnel, electricity and fossil fuel consumption related to the Project. The financial

additionality of the Project was established at the time of validation in 2009 with offset credits generated in the voluntary market making it feasible to proceed with the Project.

In comparison to the original validation year in 2009, the capital costs associated with the Project (i.e. equipment, labor, engineering, etc.) in 2019 have increased substantially due to inflation. While at the same time the voluntary offset market has not seen the same trend in pricing growth due to excess supply and relatively modest demand. The landfill's closure in 2014 also means offset credit generating potential will experience year over year decline. As such, the financial barriers used to determine the baseline scenario in the previous crediting period are still valid and are now actually much higher due to these three aforementioned factors.

Furthermore, the baseline scenario in the previous crediting period was and continues to comply with applicable laws and regulations (see section 1.14) and is not subject to any barriers to implementation and represents the least cost option available to Henrico. It is therefore identified as a plausible baseline.

Step 1.3: Assess whether the continuation of use of current baseline equipment or an investment is the most likely scenario for the crediting period for which renewal is requested.

The continuation of the original baseline scenario is the most likely scenario as compared to an investment for the reasons discussed in Step 1.2 above. Furthermore, the only technology installed in the original baseline scenario where an end of technical lifetime matters was the existing lower capacity flare. However, the technical lifetime of this flare is irrelevant to whether an alternate baseline would have been likely. This is because at end of life of the flare the scenario with the fewest barriers would be to decommission the flare and proceed with venting all quantities that were previously flared.

Regulations do not require the landfill to capture and destroy the gas, and any replacement of the flare would be costly and present increased economic risk (without VERs), particularly in the new crediting period, due to the declining methane generation after the landfill stopped receiving waste in 2014.

Additionally, with the Project system installed, Henrico could have taken other measures to address odors and / or surface emissions and provide the same level of service. Henrico could also have chosen not to take further action to prevent odor complaints. However, Henrico was not required to act, therefore it is also possible that no management activities to reduce odors and gas migration may have been taken. As a result, no incremental costs between the project and baseline are attributed to these activities.

Step 1.4: Assessment of the validity of the data and parameters

Data and parameters that are determined at the start of the crediting period and do not need to be monitored during the crediting period are listed in Section 5.1 of this PDD ("Data and Parameters Available at Validation").

These parameters were routinely updated throughout the original 10-year crediting period. For example, where IPCC values were used, such as methane GWP, the value was updated in line

with the recommendation from IPCC. Further, electricity grid factors are routinely updated to align with the most accurate information available.

These emission factors, values, and parameters will continue to be updated, as necessary and appropriate, in order to increase the accuracy of the Project. The only parameters that will not be updated regularly are those based on historical information from the Project (i.e. the historic methane content in the baseline scenario).

Conclusion

After evaluating Steps 1.1 – 1.4 from Tool 11, the original baseline scenario is determined to still be plausible and relevant for the 10-year project crediting renewal period. The current baseline remains valid and will not be updated.

Description of Baseline

The baseline scenario is described in Section 1.13.

3.5 Additionality

Per Section 3.8.9(1) of the Standard, a full reassessment of additionality is not required when renewing the project crediting period. An attestation of regulatory surplus has been provided by the County of Henrico and will be made available upon request.

3.6 Methodology Deviations

There are three methodology deviations that will be used when quantifying the Project:

1. Grid Electricity Emission Factor

Project emissions associated with electricity consumption are calculated in accordance with CDM Tool 5: “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”. Following the Tool, a default grid CO₂ emission factor of 1.3 t CO₂/MWh would be applied. However, given the generation mix and emission intensity of electricity generation from the applicable regional grid, this value is not representative of the emissions associated with electricity generation for the Landfill. A deviation from the methodology is used and the emission factor for electricity generation is determined by examining the electricity grid in the region.

The Landfill draws electricity from the SRVC (SERC Virginia/Carolina) region. According to the US EPA’s eGRID database, the emission rate of electricity generation from this grid for 2018 was 743.3 lbs CO₂/MWh. This emission intensity is representative of the actual emissions associated with the generation of electricity used at the site which increases the accuracy of the quantification. This value will be updated in subsequent reporting period to the most recent value available from the eGRID database.

2. Ex Ante Estimate of Emission Reductions

Following the Methodology, project proponents must provide an ex ante estimate of emission reductions by projecting the future GHG emissions of the Landfill.

Instead of estimating the baseline methane emissions using the CDM Tool: “Emissions from solid waste disposal sites”, historical data has been used as this reflects 10 years’ worth of 3rd party verified monitoring. This should provide a more accurate statement of emissions compared to an estimation model.

3. Efficiency of the Flare

A deviation from the CDM Tool 6: “Project emissions from flaring” (version 3.0) default value is used as this value is not an accurate representation of the flare efficiencies typically achieved in the United States for flares designed in accordance with 40 CFR 60.18. This deviation from the Tool is necessary to reflect the equipment used and destruction efficiencies commonly observed at the flares located in the United States and to increase the accuracy of the emission reduction claim. A flare efficiency value of 98% will be used in project calculations.

The Landfill operates an LFG Specialties candlestick flare to destruct landfill gas. The flare’s design limits specify that landfill gas must have a composition of at least 30% methane to maintain a stable flame and a 98% destruction efficiency. The flow range must be between 135 scfm and 1350 scfm. The average monthly methane content and average monthly flow of landfill gas to the flare will be monitored to ensure they are within design limits.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions are calculated with the following equations. No emission reductions are claimed for grid-connected electricity generation that is offset by electricity produced from LFG destructed at the Ingenco facility as these environmental attributes are not owned by Henrico. Further, no thermal energy is produced using the LFG, and the baseline scenario also does not include natural gas used from the natural gas network in the absence of the project activity. Therefore, the equation for baseline emissions is:

$$BE_y = BE_{CH_4,y}$$

Where,

BE_y = Baseline emissions in year y (t CO₂e/yr)

$BE_{CH_4,y}$ = Baseline emissions from the Landfill in year y (t CO₂e/yr)

Determination of BE_{CH_4}

Baseline emissions of methane from the Landfill are determined with the following equation, based on the amount of methane that is captured under the project activity and the amount that

would have been captured and destroyed in the baseline. In addition, the effect of methane oxidation that is present in the baseline and absent in the project is considered.

$$BE_{CH_4} = \left((1 - OX_{top\ layer}) * F_{CH_4,PJ,y} - F_{CH_4,BL,y} \right) * GWP_{CH_4}$$

Where,

$BE_{CH_4,y}$ = Baseline emissions from the Landfill in year y (t CO₂e/yr)

$OX_{top\ layer}$ = Fraction of methane in the LFG that would be oxidized in the top layer of the Landfill in the baseline (dimensionless)

$F_{CH_4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used to generate electricity in the project activity in year y (t CH₄/yr)

$F_{CH_4,BL,y}$ = Amount of methane in the LFG that would have been flared in the baseline year y (t CH₄/yr)

GWP_{CH_4} = Global warming potential of methane (t CO₂e / t CH₄)

Ex Post Determination of $F_{CH_4,PJ,y}$

$F_{CH_4,PJ,y}$ is the sum of quantities of methane flare and used to generate electricity during the reporting period, as follows:

$$F_{CH_4,PJ,y} = F_{CH_4,flared,y} + F_{CH_4,EL,y}$$

Where,

$F_{CH_4,PJ,y}$ = Amount of methane in the LFG which is flared and/or used to generate electricity in the project activity in year y (t CH₄/yr)

$F_{CH_4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring (t CH₄/yr)

$F_{CH_4,EL,y}$ = Amount of methane in the LFG which is destroyed by electricity generation (t CH₄/yr)

Determination of $F_{CH_4,flared,y}$

$F_{CH_4,flared,y}$ is determined as the difference between the amount of methane supplied to the flare and any methane emissions from the flare as follows:

$$F_{CH_4,flared,y} = F_{CH_4,sent\ to\ flare,y} - \frac{PE_{flare,y}}{GWP_{CH_4}}$$

Where,

$F_{CH_4,flared,y}$ = Amount of methane in the LFG which is destroyed by flaring (t CH₄/yr)

$F_{CH_4,sent\ to\ flare,y}$ = Amount of methane in the LFG which is sent to the flare in year y, (t CH₄/yr)

$PE_{flare,y}$ = Project emissions from flaring of the residual gas stream in year y (t CO₂e/yr)

GWP_{CH_4} = Global warming potential of CH₄ (t CO₂e / t CH₄)

Determination of $F_{CH_4, sent to flare,y}$

Henrico meters the volume of LFG sent to the flare and the composition of this gas on a wet basis. As such, $F_{CH_4, sent to flare,y}$ is determined using option C in the CDM Tool 8: “Tool to determine the mass flow of a greenhouse gas in a gaseous stream”. Option C includes instructions for determining the volume of greenhouse gas sent to the flare under standard temperature and pressure (STP) conditions (68F, 1atm). As the Henrico meters automatically record data under STP conditions, methane density can be considered a reference value and conversion of volumetric flow rate is not necessary. Equation 9 is therefore used to calculate the quantity of methane sent to the flare, while equations 10 and 11 are not used.

$$F_{CH_4, sent to flare} = LG_{flare} * w_{CH_4} * \rho_{CH_4}$$

Where,

$F_{CH_4, sent to flare,y}$ = Amount of methane in the LFG which is sent to the flare in year y, (t CH₄/yr)

LG_{flare} = Volume of landfill gas sent to flare (m³)

w_{CH_4} = Average methane fraction of the LFG (m³ CH₄ / m³ LFG)

ρ_{CH_4} = Density of methane at 68F and 1atm (t CH₄ / m³ CH₄)

Determination of $F_{CH_4, EL,y}$

Henrico meters the volume of LFG sent to the Ingenco’s power generation unit and the composition of this gas. As such, $F_{CH_4, sent to flare,y}$ is determined using option C in the CDM Tool 8. Option C includes instructions for determining the volume of greenhouse gas sent to the flare under STP conditions. As the Henrico meters automatically record data under STP conditions, methane density can be considered a reference value and conversion of volumetric flow rate is not necessary. Equation 9 is therefore used to calculate the quantity of methane sent to the flare, while equations 10 and 11 are not used.

$$F_{CH_4, EL,y} = LFG_{Electricity} * w_{CH_4} * \rho_{CH_4}$$

Where,

$F_{CH_4, EL,y}$ = Amount of methane in the LFG which is destroyed by electricity generation (t CH₄/yr)

$LFG_{Electricity}$ = Volume of landfill gas sent to power generation unit (m³)

w_{CH_4} = Average methane fraction of the LFG (m³ CH₄ / m³ LFG)

ρ_{CH_4} = Density of methane (t CH₄ / m³ CH₄)

Determination of $F_{CH_4,BL,y}$

In order to calculate the $BE_{CH_4,y}$ we must subtract the amount of methane that would have been flared in the absence of the project activity, $F_{CH_4,BL,y}$. Before the project activity, there was no requirement for the Landfill to destroy methane, and there was an existing LFG capture and destruction system in place. This means the baseline scenario falls into “Case 3” as outlined in Table 3 of the Methodology.

The calculation of methane that would have been flared in the absence of the project activity is done by using historical values for the flared landfill gas volumes and average methane fraction on a wet basis. It follows option C in CDM Tool 8. Option C includes instructions for determining the volume of greenhouse gas sent to the flare under STP conditions. Data collected by the historic Henrico meters was processed to equivalent values under STP conditions before data was saved, therefore equation 9 is used to calculate the quantity of methane sent to the flare while equations 10 and 11 are not used.

$$F_{CH_4,BL,y} = LFG_{BL} * w_{CH_4,BL} * \rho_{CH_4}$$

$F_{CH_4,BL,y}$ = Amount of methane in the LFG that would have been flared in the baseline year y (t CH₄/yr)

LFG_{BL} = Historic volume of landfill gas sent to the flare in the baseline (m³)

$w_{CH_4,BL}$ = Historic average methane fraction of the LFG in the baseline (m³ CH₄ / m³ LFG)

ρ_{CH_4} = Density of methane (t CH₄ / m³ CH₄)

Data Substitution Procedures

In cases where data is unavailable for a limited period of time, data substitution procedures will be used to quantify emission reductions for that time period. Data substitution will follow the principle of conservativeness, and the methodology outlined in the appendix of CDM tool 8. This methodology is outlined below:

Duration of Missing Data	Data Substitution Procedure
Less than six hours	Use the weighted average of the four-hour period immediately before and after the data outage
Six to 24 hours	Use the upper/lower bound of a 95% confidence interval of the data for a time period spanning the 24 hours prior to and 24 hours following the data

	outage, whichever is more conservative in estimating emission reductions.
One to seven days	Use the upper/lower bound of a 95% confidence interval of the data for a time period spanning the 72 hours prior to and 72 hours following the data outage, whichever is more conservative in estimating emission reductions.
Greater than seven days	No data may be substituted

4.2 Project Emissions

Project emissions come from electricity and fossil fuels consumed in the project activity. These emissions are calculated as follows:

$$PE_y = PE_{EC,y} + PE_{FC,y}$$

Where,

PE_y = Project emissions in year y (t CO₂e / yr)

$PE_{EC,y}$ = Emissions from consumption of electricity due to the project activity in year y (t CO₂e/yr)

$PE_{FC,y}$ = Emissions from consumption of fossil fuels due to the project activity in year y (t CO₂e/yr)

Determination of PE_{EC}

Project emissions from consumption of electricity by the project activity are calculated using equation 1 (the generic approach) from CDM Tool 5: “Baseline, project and/or leakage emission from electricity consumption and monitoring of electricity generation” (version 3.0).

$$PE_{EC} = EC_{PJ,y} * EF_{EF} * (1 + TDL)$$

Where,

$EC_{PJ,y}$ = Quantity of electricity consumed by the Project (MWh/yr)

EF_{EF} = Emission factor for the grid that supplies the electricity (t CO₂e/MWh)

TDL = Average transmission and distribution losses for providing electricity to the source (%)

The parameter EF_{EF} is quantified using the methodology described in Methodology Deviation 1, found in section 3.6. This emission factor will be regularly updated to reflect the most recent value for the region published in the US EPA's eGrid database.

The Methodology section 5.5(65)(b) states "If in the baseline a proportion of LFG is destroyed, then the electricity consumption in the tool should refer to the net quantity of electricity consumption (i.e. the increase due to the project activity)."

There was no historical data for electricity consumed in the baseline. Therefore, it will be assumed the net consumption is only what is consumed in the project activity. This will increase the project emissions which is a conservative approach.

Determination of PE_{FC}

Both propane and diesel are used in the project activity. Therefore, the equation for $PE_{FC,y}$ is:

$$PE_{FC,y} = PE_{propane} + PE_{diesel}$$

Project emissions from consumption of fossil fuel in the project activity are calculated using equation 1 in the CDM Tool 3: "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (version 3.0). The following equations are used:

$$PE_{propane} = FC_{propane} * COEF_{propane}$$

$$PE_{diesel} = FC_{diesel} * COEF_{diesel}$$

Where,

$PE_{propane}$ = CO₂ emissions from propane combustion in the flare in year y (t CO₂e/yr)

PE_{diesel} = CO₂ emissions from diesel combustion in the power generation facility in year y (t CO₂e/yr)

$FC_{propane}$ = Volume of propane combusted in the project activity in year y (gal)

FC_{diesel} = Volume of diesel combusted in the project activity in year y (gal)

$COEF_{propane}$ = CO₂ emission coefficient for propane (t CO₂e / gal)

$COEF_{diesel}$ = CO₂ emission coefficient for diesel (t CO₂e / gal)

The CO₂ emission coefficients are calculated based on net calorific value and CO₂ emission factor of the fuel type. This is Option B in Tool 3.

$$COEF_{propane} = NCV_{propane} * EF_{CO2,propane}$$

$$COEF_{diesel} = NCV_{diesel} * EF_{CO2,diesel}$$

The Methodology section 5.5(66)(b) states “If in the baseline a proportion of LFG is captured and flared ($F_{CH_4,BL,y} > 0$), then the fossil fuels consumption used in the calculation should refer to the net of that consumed in the baseline.”

There is no historical data for fuel consumed in the baseline. Therefore, it will be assumed the net consumption is only what is consumed in the project activity. This will increase the project emissions which is a conservative approach.

Determination of $PE_{flare,y}$

$PE_{flare,y}$ is determined directly by using the CDM Tool 6: “Project emissions from flaring” (version 3.0). The flare efficiency that will be applied is 98% as discussed in Section 3.6(3), except in cases when the flare thermocouples detect a flare flowrate outside of those specified in 40 CFR 60. In these cases, a flare efficiency of 0% will be used as per section 6.2 of CDM Tool 6. The landfill gas composition is continuously measured at the facility. Therefore, equation 15 from the Tool is used:

$$PE_{flare} = \sum (F_{CH_4,sent\ to\ flare} * (1 - \eta_{flare})) * GWP_{CH_4}$$

Where,

$F_{CH_4,sent\ to\ flare}$ = Mass flow of methane in the gas sent to flare (t CH₄)

η_{flare} = Efficiency of the flare (%)

Determination of $PE_{EL,y}$

$PE_{EL,y}$ is determined by the flow of methane gas sent to the electricity generation engines for destruction and the destruction efficiency of the engines. Electricity generation records are cross referenced, and if gas is sent to the engines during a period where electricity generation was not recorded a destruction efficiency of 0% will be applied.

$$PE_{EL} = \sum (F_{CH_4,EL,y} * (1 - \eta_{EL})) * GWP_{CH_4}$$

Where,

$F_{CH_4,EL,y}$ = Amount of methane in the LFG which is destroyed by electricity generation (t CH₄/yr)

η_{EL} = Destruction efficiency of the Ingenco engines

4.3 Leakage

The project activity is not known to create any leakage emissions.

4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

Sections 4.1 - 4.3 outline the calculations and equations necessary to quantify baseline, project and leakage emissions in more detail. The table below provides a summary of the estimated emission reductions generated by the project activity for the 10-year renewal period January 1, 2019 – December 31, 2028.

Table 4: Estimated baseline, project and leakage emissions for the Project

Year	Estimated GHG emission reductions or removals (tCO ₂ e)	Year	Estimated GHG emission reductions or removals (tCO ₂ e)	Year
2019	52,000	2019	52,000	2019
2020	52,000	2020	52,000	2020
2021	51,000	2021	51,000	2021
2022	51,000	2022	51,000	2022
2023	50,000	2023	50,000	2023
2024	50,000	2024	50,000	2024
2025	49,000	2025	49,000	2025
2026	49,000	2026	49,000	2026
2027	48,000	2027	48,000	2027
2028	48,000	2028	48,000	2028
Total estimated ERs	500,000	Total estimated ERs	500,000	Total estimated ERs

Ex Ante Estimate of Emission Reductions

Per the Methodology, it is necessary to provide an ex ante estimate of emission reductions by projecting the future GHG emissions of the landfill. These values are for information only and do not factor into the calculations of baseline or project emissions.

Instead of estimating baseline methane emissions using the CDM Tool: “Emissions from solid waste disposal site”, the US EPA LandGEM Landfill Gas Emissions model is used as described in Section 3.6(2). This is an accepted standard for developing landfill gas curves in the United States.

The LandGEM model requires the following inputs to determine the emissions associated with disposal of waste at the Landfill:

$$MD_{\text{project},y} = f(W, F, k, L_0)$$

Where,

$MD_{\text{project},y}$ = Modelled methane emissions generated during the year, y, from waste disposal at the Landfill during the time period from the start of the project activity to the end of the year, y (t CO₂e)

F = Fraction of methane in the landfill gas (45%)

W = Amount of waste disposed in the Landfill in each year from the year the Landfill began accepting waste to present; historic volumes (tonnes)

k = Decay constant (0.04)

L_0 = Methane potential generation capacity (100 m³/Mg)

The LandGEM model (version 3.02) was used to complete this modelling. The resulting estimated methane emissions that are modelled to occur in the Project’s 10-year crediting renewal period are shown in Table 5.

Table 5: Ex Ante Emissions

Year	Modelled Methane Emissions (m ³ /yr)
2019	5.350E+06
2020	5.140E+06
2021	4.938E+06
2022	4.745E+06
2023	4.559E+06
2024	4.380E+06
2025	4.208E+06

2026	4.043E+06
2027	3.885E+06
2028	3.732E+06

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	OX _{top_layer}
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the Landfill in the baseline
Source of data	Methodology
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	Value provided in the Methodology
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	F _{CH₄,BL,y}
Data unit	t CH ₄
Description	Amount of methane in the LFG that would have been flared in the baseline
Source of data	Calculated
Value applied	375.82 t CH ₄ /yr
Justification of choice of data or description of	Three years of historical flare data between 2002-2004 is used to determine this value as per equations 13 & 14 of ACM0001.

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	Calculated based on parameters LFG_{BL} , $WCH4_{BL}$, and $pCH4$.

Data / Parameter	LFG_{BL}
Data unit	m^3
Description	Historic volume of landfill gas sent to the flare in the baseline
Source of data	Measured
Value applied	43,704,080 m^3 / yr
Justification of choice of data or description of measurement methods and procedures applied	Three years of historical flare data between 2002-2004 is used to determine this value. This value was measured continuously using a Fluid Components International ST98 Thermal Gas Flow Meter and corrected to standard temperature and pressure conditions of 68 degrees F and 1 atm. Calibration was performed annually, but calibration records were not routinely kept until 2009.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$WCH4_{BL}$
Data unit	m^3 CH ₄ / m^3 LFG
Description	Historic average methane fraction of the LFG in the baseline
Source of data	Measured
Value applied	45.14%
Justification of choice of data or description of measurement methods and procedures applied	Three years of historical flare data between 2002-2004 is used to determine this value. This value was measured by Henrico County personal approximately monthly with a Landtec Gem 500 gas analyzer. Calibration was performed before every measurement, but calibration records were not routinely kept until 2009.
Purpose of Data	Calculation of baseline emissions

Comments	
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Data / Parameter	GWP_{CH_4}
Data unit	t CO ₂ e / t CH ₄
Description	Global warming potential of methane
Source of data	Reference
Value applied	25
Justification of choice of data or description of measurement methods and procedures applied	IPCC fourth assessment report
Purpose of Data	Calculation of baseline and project emissions
Comments	This value will be updated throughout the 10-year crediting renewal period to align with the latest published IPCC value

Data / Parameter	ρ_{CH_4}
Data unit	t CH ₄ / m ³ CH ₄
Description	Density of methane at 68F, 1 atm
Source of data	Reference
Value applied	0.000667
Justification of choice of data or description of measurement methods and procedures applied	This value is selected as flow meters on the Henrico site are calibrated to standard temperature and pressure conditions (68F, 1atm). Value is reference from the UNFCCC inputs received on consolidated methodologies.
Purpose of Data	Calculation of baseline emissions
Comments	https://cdm.unfccc.int/methodologies/inputsconsmeth/MGM_methane.pdf

Data / Parameter	η_{flare}
Data unit	%

Description	Efficiency of the flare
Source of data	Reference
Value applied	98%
Justification of choice of data or description of measurement methods and procedures applied	See deviation description in Section 3.6(3). Value is used based on guidance from the US EPA for flares operated within the requirements for 40 CFR 60.18.
Purpose of Data	Calculation of baseline emissions
Comments	https://cdm.unfccc.int/methodologies/inputsconsmeth/MGM_methane.pdf

Data / Parameter	η_{EL}
Data unit	%
Description	Efficiency of the electricity generation engines
Source of data	Reference
Value applied	100%
Justification of choice of data or description of measurement methods and procedures applied	Engines are continuously maintained and operated under lean burn conditions, therefore can reasonably be expected to destroy 100% of LFG methane. Destruction is cross referenced against electricity generation data to ensure operation.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	EF_{EF}
Data unit	lbs CO ₂ / MWh
Description	Emission factor for the grid that supplies electricity
Source of data	Reference
Value applied	743.3
Justification of choice of data or description of	Value is obtained using the US EPA eGRID summary tables 2018 Region SRVC. This is the most accurate source of this data.

measurement methods and procedures applied	
Purpose of Data	Calculation of project emissions
Comments	This value will be updated to align with the most recent published eGRID values https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

Data / Parameter	TDL
Data unit	%
Description	Average transmission and distribution losses in the grid
Source of data	Reference
Value applied	4.88%
Justification of choice of data or description of measurement methods and procedures applied	Value is obtained using the US EPA eGRID summary tables 2018 Region SRVC. This is the most accurate source of this data.
Purpose of Data	Calculation of project emissions
Comments	This value will be updated to align with the most recent published eGRID values. https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid

Data / Parameter	COEF _{propane}
Data unit	t CO ₂ e / gal
Description	CO ₂ emission coefficient for propane
Source of data	Calculated
Value applied	0.005297 t CO ₂ e/gal
Justification of choice of data or description of measurement methods and procedures applied	COEF = NCV * EF which are both reference values
Purpose of Data	Calculation of project emissions

Comments	
Data / Parameter	COEF _{diesel}
Data unit	t CO ₂ e / gal
Description	CO ₂ emission coefficient for diesel
Source of data	Calculated
Value applied	0.010210 t CO ₂ e/gal
Justification of choice of data or description of measurement methods and procedures applied	COEF = NCV * EF which are both reference values
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	NCV _{propane}
Data unit	MMBtu / gal
Description	Energy content of propane
Source of data	Reference
Value applied	0.084250
Justification of choice of data or description of measurement methods and procedures applied	U.S. EPA Guidelines https://afdc.energy.gov/fuels/fuel_comparison_chart.pdf
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	NCV _{diesel}
Data unit	MMBtu / gal
Description	Energy content of diesel

Source of data	Reference
Value applied	0.128488
Justification of choice of data or description of measurement methods and procedures applied	U.S. EPA Guidelines https://afdc.energy.gov/fuels/fuel_comparison_chart.pdf
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	EF _{CO₂,propane}
Data unit	t CO ₂ e / MMBtu
Description	CO ₂ emission factor for propane
Source of data	Reference
Value applied	0.06287
Justification of choice of data or description of measurement methods and procedures applied	US EPA Emission Factors for Greenhouse Gas Inventories https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	EF _{CO₂,diesel}
Data unit	t CO ₂ e / MMBtu
Description	CO ₂ emission factor for diesel
Source of data	Reference
Value applied	0.07946
Justification of choice of data or description of measurement methods and procedures applied	US EPA Emission Factors for Greenhouse Gas Inventories https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf Table 2 shows 10.21 kg CO ₂ /gal.

Purpose of Data	Calculation of project emissions
Comments	

5.2 Data and Parameters Monitored

Data / Parameter	$F_{CH_4,PJ,y}$
Data unit	t CH ₄ /yr
Description	Total amount of methane in the LFG collected and destroyed by the project system at standard temperature and pressure (68 F, 1 atm)
Source of data	Calculated value
Description of measurement methods and procedures to be applied	Flow rates of methane to the landfill gas flare and electricity generating engines are calculated based on continuous monitoring. $F_{CH_4,PJ,y}$ is calculated by summing $F_{CH_4,flared,y}$ and $F_{CH_4,EL,y}$.
Frequency of monitoring/recording	Continuously monitored
Value applied	2,800 tCH ₄ /yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of baseline emissions
Calculation method	Methane content sent to the flare and the Ingenco engines is calculated each month. $F_{CH_4,flared,y}$ and $F_{CH_4,EL,y}$ are summed to calculate the total methane captured and destroyed by the system. See sample calculations in Section 4 for exact methodologies.
Comments	

Data / Parameter	$F_{CH_4,flared,y}$
Data unit	t CH ₄ /yr

Description	Amount of methane in captured LFG which is destroyed by flaring.
Source of data	The amount of methane sent to the flare is calculated based on continuous monitoring. Project emissions from the flare are calculated using continuous monitoring and a flare efficiency factor. $F_{CH_4, flared, y}$ is calculated as the difference between $F_{CH_4, sent\ to\ flare, y}$, and $PE_{flare, y}$.
Description of measurement methods and procedures to be applied	Calculated value
Frequency of monitoring/recording	Annual
Value applied	110 t CH ₄ /yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of baseline emissions
Calculation method	$F_{CH_4, flared, y}$ is determined as the difference between the amount of methane supplied to the flare and any methane emissions from the flare. See sample calculations in Section 4 for exact methodologies.
Comments	Flare efficiency is not monitored, and a default value is used, as per the deviation in section 3.6.

Data / Parameter	$F_{CH_4, sent\ to\ flare, y}$
Data unit	t CH ₄ /yr
Description	Amount of methane in the LFG which is sent to the flare in year y
Source of data	Calculated based on LFG_{flare} , w_{CH_4} and p_{CH_4} as per CDM Tool 8: Tool to determine the mass flow of a greenhouse gas in a gaseous stream.
Description of measurement methods and procedures to be applied	Calculated value

Frequency of monitoring/recording	Continuous
Value applied	112 tCH ₄ /yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of baseline emissions
Calculation method	Measured flowrate of landfill gas is multiplied by the measured methane percentage and methane density at standard temperature and pressure. See sample calculations in Section 4 for exact methodologies.
Comments	

Data / Parameter	PE _{flare,y}
Data unit	t CO ₂ e /yr
Description	Project emissions from flaring of the residual gas stream in year y
Source of data	Calculated based on F _{CH₄,sent to flare} and η_{flare} as per CDM Tool 6: "Project emissions from flaring".
Description of measurement methods and procedures to be applied	Calculated value
Frequency of monitoring/recording	Annual
Value applied	55 t CO ₂ e /yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of project emissions
Calculation method	Methane sent to the flare is multiplied by the destruction efficiency of the flare and the global warming potential of methane to determine project emissions.

	See sample calculations in Section 4 for exact methodologies.
Comments	
Data / Parameter	LFG _{flare}
Data unit	m ³
Description	Volume of landfill gas sent to flare at standard temperature and pressure.
Source of data	Measured
Description of measurement methods and procedures to be applied	Volume of landfill gas to the flare is measured by an orifice plate flowmeter. Data is continuously monitored and recorded by Henrico data collection software.
Frequency of monitoring/recording	Continuous monitoring. Readings are recorded every five minutes.
Value applied	345,000 m ³
Monitoring equipment	Rosemount Orifice Plate Model 1595C flowmeter with a Rosemount 3095 Multi-Variable Pressure Transmitter SN: 135079
QA/QC procedures to be applied	The calibration schedule will follow manufacturer's recommendations. Rosemount guarantees meter stability for a 10 year period. For enhanced surety, the project developer has the meter inspected and calibrated at least every 3 years. If the meter is non-functioning for any reason, Ingenco personal will identify this during equipment inspections and repair or replace the malfunctioning meter.
Purpose of data	Calculation of baseline emissions
Calculation method	Measured value
Comments	Data is recorded at 68F and 1atm. Flow is measured on a wet basis and the flow meter is located at the blower / flare station. In particular, it is located after the condensate knockout pot and after the blowers.
Data / Parameter	WCH4

Data unit	m ³ CH ₄ /m ³ LFG
Description	Average methane fraction of the LFG
Source of data	Measured
Description of measurement methods and procedures to be applied	The methane fraction in the LFG is measured using a continuous gas analyzer. If the continuous gas analyzer is not available, a portable gas analyzer will be used to record measurements on a daily basis.
Frequency of monitoring/recording	Continuous monitoring. Readings are recorded every five minutes, but recorded values are provided in daily totals.
Value applied	50%
Monitoring equipment	Primary meter: FAU-TDL Gas Analyzer SN: 1037 Backup meter: Landtec GEM 2000 SN: GM12536
QA/QC procedures to be applied	The calibration schedule will follow manufacturer's recommendations. Ecotec's recommended maintenance practices are to have the meter inspected for proper operation once annually. If the meter is non-functioning for any reason, Henrico personal will identify this during equipment inspections and repair or replace the malfunctioning meter. Landtec's recommended maintenance practices are to have the meter inspected and calibrated bi-annually. In the case that the meter is not calibrated within the recommended range, the meter will display an error message on its screen warning that the meter is out of calibration.
Purpose of data	Calculation of baseline emissions
Calculation method	Measured value
Comments	If the regular field checks of the continuous gas analyzer identify a drift greater than 5% over- or under-reporting, a conservative drift factor will be applied in the calculations. If the continuous gas analyzer is not available for whatever reason, a portable gas analyzer will be used to record measurements on a daily basis. This is allowed as per CDM tool 8 so long as continuous monitoring of the biogas flow rate is maintained and is monitored for fluctuations greater than +/- 20%. Data substitution will be applied in accordance with the rules detailed in CDM tool 8.

Data / Parameter	$F_{CH_4,EL,y}$
Data unit	t CH ₄ /yr
Description	Amount of methane in the landfill gas which is destroyed by electricity generation.
Source of data	Calculated based on $LFG_{Electricity}$, w_{CH_4} and ρ_{CH_4} as per CDM Tool 8: Tool to determine the mass flow of a greenhouse gas in a gaseous stream.
Description of measurement methods and procedures to be applied	Calculated value
Frequency of monitoring/recording	Continuous
Value applied	2,700 t CH ₄ /yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of baseline emissions
Calculation method	Measured flowrate of landfill gas is multiplied by the measured methane percentage and methane density at standard temperature and pressure. See sample calculations in Section 4 for exact methodologies.
Comments	

Data / Parameter	$LFG_{Electricity}$
Data unit	m ³
Description	Volume of landfill gas sent to power generation unit at standard temperature and pressure.
Source of data	Measured
Description of measurement methods and procedures to be applied	Volume of landfill gas to the Ingenco power generation unit is measured by a flowmeter. Data is continuously monitored and recorded by Ingenco data collection software.

Frequency of monitoring/recording	Continuous monitoring. Readings are recorded every five minutes.
Value applied	8,500,000 m ³
Monitoring equipment	Rosemount Orifice Plate, Model 1595C with Rosemount 3095 Multi-Variable Pressure Transmitter SN: 306661
QA/QC procedures to be applied	The calibration schedule will follow manufacturer's recommendations. Rosemount guarantees meter stability for a 10 year period. For enhanced surety, the project developer has the meter inspected and calibrated at least every 3 years. If the meter is non-functioning for any reason, Ingenco personal will identify this during equipment inspections and repair or replace the malfunctioning meter.
Purpose of data	Calculation of baseline emissions
Calculation method	Measured value
Comments	Data is recorded at 68F and 1atm.

Data / Parameter	EC _{PJ,y}
Data unit	MWh/yr
Description	Quantity of electricity consumed by the Project in year y
Source of data	Calculated using supplier invoices from the Henrico and Ingenco facilities as per the "Tool to determine baseline, project and / or leakage emissions from electricity consumption".
Description of measurement methods and procedures to be applied	Review of supplier invoices for electricity consumed at both the Henrico Landfill facility and the Ingenco power generation facility. These invoices are based off direct measurement by commercial electricity meters.
Frequency of monitoring/recording	Monthly
Value applied	45 MWh/yr
Monitoring equipment	n/a
QA/QC procedures to be applied	n/a
Purpose of data	Calculation of project emissions

Calculation method	Electricity usage by the Henrico Landfill facility and the Ingenco power generation facility are summed to generate this value.
Comments	

Data / Parameter	PE _{propane}
Data unit	t CO ₂ e/yr
Description	CO ₂ emissions from propane combustion in the flare in year y
Source of data	Calculated based on FC _{propane} and COEF _{propane} as per the CDM “Tool to determine project or leakage CO ₂ emissions from fossil fuel combustion”.
Description of measurement methods and procedures to be applied	Calculated value
Frequency of monitoring/recording	Annually
Value applied	1 t CO ₂ e/yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of project emissions
Calculation method	Quantity of propane combusted is multiplied by an appropriate emission factor to determine total emissions. See sample calculations in Section 4 for exact methodologies.
Comments	

Data / Parameter	PE _{diesel}
Data unit	t CO ₂ e/yr
Description	CO ₂ emissions from diesel combustion at the Ingenco facility in year y
Source of data	Calculated based on FC _{diesel} and COEF _{diesel} as per the CDM “Tool to determine project or leakage CO ₂ emissions from fossil fuel combustion”.

Description of measurement methods and procedures to be applied	Calculated value
Frequency of monitoring/recording	Monthly
Value applied	450 t CO ₂ e/yr
Monitoring equipment	See applicable parameters
QA/QC procedures to be applied	See applicable parameters
Purpose of data	Calculation of project emissions
Calculation method	Quantity of diesel combusted is multiplied by an appropriate emission factor to determine total emissions. See sample calculations in Section 4 for exact methodologies.
Comments	

Data / Parameter	FC _{propane}
Data unit	Gallons/yr
Description	Volume of propane combusted by the flare in the project activity in year y
Source of data	Measured
Description of measurement methods and procedures to be applied	Review of supplier invoices for propane consumed at the facility. Invoices are based upon commercial fuel meters.
Frequency of monitoring/recording	Invoiced on an as-delivered basis
Value applied	35 gallons/yr
Monitoring equipment	Commercial fuel meters
QA/QC procedures to be applied	3rd party statements/invoices are used to ensure accuracy of data.
Purpose of data	Calculation of project emissions

Calculation method	Measured Value
Comments	

Data / Parameter	FC _{diesel}
Data unit	Gallons/yr
Description	Volume of diesel combusted by Ingenco engines in the project activity in year y
Source of data	Measured
Description of measurement methods and procedures to be applied	Volume of diesel consumed by the Ingenco engines is monitored by a Coriolis flowmeter. Data is continuously monitored and recorded by Ingenco data collection software.
Frequency of monitoring/recording	Continuous monitoring. Readings are recorded hourly.
Value applied	45,000 gallons/yr
Monitoring equipment	Micromotion Coriolis Flowmeter SN: 14354124
QA/QC procedures to be applied	Coriolis meter is equipped with Smart Meter Verification that continuously monitors performance indicators to ensure measurement accuracy. Ingenco technicians regularly cross reference diesel consumption against electricity generation data to ensure it behaves as expected.
Purpose of data	Calculation of project emissions
Calculation method	Measured Value
Comments	

Data / Parameter	T _{Flare}
Data unit	Degrees F
Description	Temperature of the landfill gas flare tip
Source of data	Measured

Description of measurement methods and procedures to be applied	Flame temperature is continuously monitored by thermocouple installed in the flare tip.
Frequency of monitoring/recording	Continuous
Value applied	1,400 F
Monitoring equipment	LFG Industries Type k thermocouple data logger
QA/QC procedures to be applied	The thermocouple meter will be calibrated annually to ensure proper function.
Purpose of data	Verification of landfill gas flare operation.
Calculation method	n/a
Comments	Landfill gas destruction is double checked against flare temperature to ensure that destruction is not claimed when the flare is not operational.

Data / Parameter	EGen ^{Ingenco}
Data unit	MWh/yr
Description	Electricity generated by the Ingenco engines during the project period. This is used to ensure operation of the energy plant.
Source of data	Measured
Description of measurement methods and procedures to be applied	Records from commercial electricity meters.
Frequency of monitoring/recording	Continuous
Value applied	95,000 MWh/yr
Monitoring equipment	Commercial wattmeter or similar.
QA/QC procedures to be applied	n/a
Purpose of data	Verification of operation of Ingenco engines
Calculation method	n/a

Comments

Landfill gas destruction is double checked against generation data from the Ingenco engines to ensure that destruction is not claimed when engines are not operational.

5.3 Monitoring Plan

The purpose of monitoring is to measure the quantity of methane captured by the Project Activity that would have been released to the atmosphere in the baseline condition. While Henrico County owns and operates the landfill, they have contracted with Draper Aden Associates to monitor the data and manage necessary compliance reporting and recordkeeping requirements. On a monthly basis, Draper Aden Associates performs a QC review and, if errors are detected, a design engineer analyzes the data to determine if adjustments need to be made. Bluesource receives both the adjusted data and the raw data from Draper Aden Associates and performs their own internal calculations to determine the carbon offset credits generated during the verification period.

If Draper Aden and Associates detect errors in the data stemming from potential equipment failure, Henrico county and Ingenco employees will be informed to arrange for calibration, repair, or replacement of meters or infrastructure. In the interim period where equipment is out of commission, handheld meters will be used to sample values regularly to ensure continued operation.

A summary of all monitored parameters and the relevant maintenance procedures are detailed below in Table 6 and Table 7.

Table 6: Summary of Monitored Data

Monitored Parameter	Data Source	Monitoring Frequency	Responsible Party
Gas Flow to Flare	Rosemount 3095 multi-variable pressure transmitter	Continuous, logged every 5 minutes	Henrico Technicians and Draper Aden Associates
CH ₄ Concentration at Flare	FAU-TDL data logger	Continuous, logged every 5 minutes	Henrico Technicians and Draper Aden Associates
CH ₄ Concentration at Ingenco Facility	Landtec Gem 2000 data logger	Daily	Ingenco Technicians and Draper Aden Associates
Flare Temperature	LFG Industries Type k thermocouple data logger	Continuous, logged every 5 minutes	Henrico Technicians and Draper Aden Associates
Gas Flow to Engines	Rosemount 3095 multi-variable pressure transmitter	Continuous, logged every 5 minutes	Ingenco Technicians and Draper Aden Associates
CH ₄ Concentration at Engines	FAU-TDL data logger	Continuous, logged every 5 minutes	Henrico Technicians and Draper Aden Associates
Diesel Consumption by Generation Engines	Micromotion Coriolis Flowmeter	Continuous, logged hourly	Ingenco Technicians
Operation of Generation Engines	Logs of power sent to the grid	Hourly	Ingenco Technicians

	for purchase		
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Table 7: Summary of Monitoring Equipment Maintenance

Equipment	Maintenance Procedure	Maintenance Frequency	Responsible Party
Rosemount Orifice Plate Model 1495C to Flare	Professional calibration at least every 3 years; Inspection should Draper Aden Associates note irregular data	Calibrated every 3 years; Data summarized and inspected monthly	Henrico Technicians and Draper Aden Associates
Rosemount Orifice Plate Model 1495C to Engines	Professional calibration at least every 3 years; Inspection should Draper Aden Associates note irregular data	Calibrated every 3 years; Data summarized and inspected monthly	Henrico Technicians and Draper Aden Associates
FAU-TDL data logger	Professional calibration at least every year; Inspection should Draper Aden Associates note irregular data	Calibrated every year; Data summarized and inspected monthly	Henrico Technicians and Draper Aden Associates
Landtec Gem 2000 Continuous Gas Analyzer	Professional calibration every 6 months;	Calibrated every 6 months; Data summarized and inspected monthly	Ingenco Technicians and Draper Aden Associates
LFG Industries Type K Thermocouples	Professional calibration at least every year; Inspection should Draper Aden Associates note irregular data	Calibrated every year; Data summarized and inspected monthly	Ingenco Technicians and Draper Aden Associates
Micromotion Coriolis Flowmeter	Continuous Smart Meter Verification Inspection should Draper Aden Associates note irregular data	Continuously monitored for data drift. Data summarized and inspected monthly	Ingenco Technicians
Generator Operating Data	Calibration per manufacturer's	Calibrated every 6 months;	Ingenco Technicians

	specifications and regulations regarding commercial electricity meters		
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Baseline Emissions

Gas Flow

Baseline emissions are monitored using two Rosemount Orifice Plate Model 1495C continuous gas flow meters (both with Rosemount 3095 Multi-Variable Pressure Transmitter) that measures flow on a wet basis and normalizes flow to standard temperature and pressure conditions. Data is recorded at 68 F & 1 atm. Landfill gas flow is metered continuously at the blower / flare station and at the Ingenco plant, with readings being taken every five minutes. A Red Lion data logger is installed to record flow, methane concentration and flare temperature continuously.

The flow meter to the flare (SN 135079) was factory calibrated 11/23/2015, 11/22/2016, 11/8/2017, 11/14/2018 and 11/13/2019 and was found to be operating per manufacturer specifications. On a go forward basis, the flowmeter will continue to be calibrated by certified technicians at least every three years as per the project developer's policies.

The flow meter to the Ingenco plant (SN 306661) was factory calibrated on 9/1/2010 before it was installed and came online 9/8/2010. The flow meter was also calibrated 10/19/15, 10/4/16, 10/25/17, 10/7/18, and 11/14/19 and found to be operating per manufacturer specifications. On a go forward basis, the flowmeter will continue to be calibrated by certified technicians at least every three years as per the project developer's policies.

Flare Operation

Two LFG Industries Type k thermocouples are used to ensure the flare and pilot flame are burning. The data logger records flare temperature to show whether or not the flare was burning. Henrico has verified that when the station is running (i.e. showing a landfill gas flow rate), the flare is also burning. In the event that gas flow is recorded to the flare at a time when a flame is not detected, or the flare temperature falls outside of manufacturer's recommended values, destruction efficiency of the flare will be treated as 0% as per CDM Tool 06 (version 3.0).

During every monthly site visit, the temperature readout from the main flame thermocouple's (upper) is recorded. During these visits, if the temperature reading were to be inconsistent with the flame condition (i.e., temp reading indicating that the flame was burning while it was not or vice versa) this would have been apparent. Both thermocouples were successfully calibrated by the manufacturer 11/23/15, 11/22/16, 11/8/17, 11/14/18 and 11/13/19. On a go forward basis, the thermocouples will continue to be calibrated annually by certified technicians.

Engine Operation

Electricity generation records from the twelve dual-fuel combustion engines are collected to demonstrate methane destruction. These records are compared with monitored landfill gas flow data and, in the event that gas flow is measured to the engines during a time period when no electricity generation is recorded, the destruction efficiency of these engines will be considered 0% for that time period. All electricity generation data will be obtained from commercial electricity meters maintained by Ingenco.

Gas Composition

Gas composition (CH₄, CO₂, O₂ and balance gases) is measured by a FAU-TDL continuous gas analyzer. The gas analyzer (SN 1037) is designed by Ecotec to monitor the methane, carbon

dioxide, and oxygen content of landfill gas. Landfill gas is sampled every five minutes to allow for continuous monitoring of composition.

The FAU-TDL meter was calibrated 10/21/19. On a go forward basis, the flowmeter will continue to be inspected annually by certified technicians as per manufacturer's recommendations. If malfunction is noted with the FAU-TDL meter, a handheld Landtec Gem 2000 gas meter (SN GM10769) is kept on site and calibrated every 6 months to serve as a backup.

Pre-project Gas Flow

The quantity of landfill gas collected from the pre-existing landfill gas to energy system is determined based on historical records of the flow and methane concentration of gas from 2002 through 2004. The flow of gas from the pre-existing system was measured continuously using a Fluid Components International ST98 thermal mass flowmeter and recorded on a strip chart located at the blower / flare station. This flowmeter was factory calibrated. Data was aggregated on a daily and monthly basis and entered into spreadsheets by the Landfill Operator.

The quantity of methane generated in the baseline condition is determined based on the quantity of landfill gas combusted in the project activity.

Project Emissions

Project emissions associated with flaring landfill gas, electricity consumption and fuel usage are estimated using both measured and default values.

Flaring Emissions

Emissions associated with methane destruction by flaring are determined based on the flare's destruction efficiency and the mass flow rate of methane in the gas stream (determined from the volumetric flow rate of landfill gas and the volumetric fraction of methane in the landfill gas being flared). The composition and flow rate of landfill gas flared are determined as outlined above.

Following the Methodology, the flare's operating parameters are to be continuously monitored to ensure compliance with manufacturer specifications. Accordingly, the temperature of the flare is monitored using a thermocouple and temperatures are recorded on the Red Lion data logger located at the blower / flare station.

Electricity and Fossil Fuel Combustion Emissions

Project emissions related to electricity consumption are estimated based on the quantity of electricity supplied to the facility according to supplier invoices. Emissions from propane consumptions are similarly estimated based on the quantity of propane supplied to the facility according to supplier invoices. Diesel consumption by the electricity generation engines is measured continuously using the Micromotion Coriolis Flow meter. This flow meter is equipped with Smart Meter Verification, which continuously monitors the meter for reading drift and will display an error if it is found out of calibration. Should this error occur, certified maintenance and calibration will be conducted.

Monitoring Roles and Responsibilities

The County of Henrico's Public Works Department has partnered with engineering consultant Draper Aden Associates (DAA) to oversee monitoring activities. In particular, DAA handles all the operations and management of gas collection system and has field technicians that balance the well field and downloads the data from the Red Lion data logger for off-site storage. DAA also assists the County in areas of permitting. DAA staff download the facility data from the data logger and submits data to Bluesource for integration into emission reductions calculations. Bluesource

saves the raw data files and then after applying the appropriate emission reduction parameters creates the emission reduction calculator that undergoes an internal QA/QC procedure.

Note that all relevant documents and records have been retained since 2002 and will be retained for a period of at least two years following the end of the Project's crediting period. All records will be available for review by a verification body.

A listing of the variables that will be monitored, including the source of data and a description of measurement methods and QA/QC calibration procedures are provided in Sections 5.1 & 5.2 above. It will be the responsibility of Henrico County staff to measure all variables and retain records for verification.

Non-Conformance with the Monitoring Plan

Should the above described meters fail or prove insufficient to monitor all parameters described in Table 6, DAA staff in collaboration with Bluesource will pursue one of the following solutions, listed in order of preference:

- Repair of the insufficient meter, with use of a portable rental meter for data capture during the time period required to complete necessary repairs.
- Replacement of the insufficient meter, with use of a portable rental meter for data capture during the time period required to arrange for a replacement.
- Repair or replacement of the insufficient meter, with data substitution used where allowed by the methodology and applicable CDM tools.

Any changes made to monitoring equipment used will be fully detailed in applicable monitoring reports.

APPENDIX A: SUPPORTING INFORMATION

	Requirements in VCS Standard	Justification
3.1.1	<i>Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.1 [of the Standard].</i>	The Project meets all rules and requirements of the VCS Program as outlined in this PDD.
3.1.2	<i>Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.13.1. The list of methodologies and their validity periods is available on the Verra website.</i>	The Project applies the eligible CDM Methodology: ACM0001, and subsequent tools described in the Methodology.
3.1.3	<i>Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.</i>	The Project does not violate any laws.
3.1.4	<i>Where projects apply methodologies that permit the project proponent its own choice of model (see the VCS Program document Program Definitions for definition of model), such model shall meet with the requirements set out in the VCS Program document VCS Methodology Requirements and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or removals).</i>	This is not applicable as the Project does not apply its own choice of model.
3.1.5	<i>Where projects apply methodologies that permit the project proponent its own choice of third party default factor or standard to ascertain GHG emission data and any supporting data for</i>	All default factors used in the Project are detailed and justified in Section 5.1 of this PDD. All meet the

	<i>establishing baseline scenarios and demonstrating additionality, such default factor or standard shall meet with the requirements set out in the VCS Program document VCS Methodology Requirements.</i>	requirements set out in VCS <i>Methodology Requirements</i> .
3.1.6	<i>Projects shall preferentially apply methodologies that use performance methods (see the VCS Program document VCS Methodology Requirements for further information on performance methods) where a methodology is applicable to the project that uses a performance method for determining both additionality and the crediting baseline (i.e., a project shall not apply a methodology that uses a project method where such a performance method is applicable to the project). Methodologies approved under the VCS Program that use performance methods provide a list of similar methodologies that use project methods (that were approved under the VCS Program or an approved GHG program at the time the performance method was developed). Such lists are not necessarily exhaustive but can serve as the starting point for determining whether a performance method is applicable to the project. Following the approval of a methodology that uses a performance method, projects may use any applicable pre-existing methodology that uses a project method for a six-month grace period.</i>	The Project applies the eligible CDM Methodology: ACM0001. There are no other LFG methodologies approved by the VCS Program.
3.1.7	<i>Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.</i>	The Project follows all rules and requirements of the VCS Program.
3.1.8	<i>Where projects apply methodologies from approved GHG programs, they shall comply with any specified capacity limits (see the VCS Program document Program Definitions for definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools</i>	The methodology used in the Project does not have any capacity limits. The Project meets all relevant requirements set out in the

	<i>referenced by the methodology under those programs.</i>	methodology and corresponding tools.
3.1.9	<i>Where Verra issues new requirements relating to projects, registered projects do not need to adhere to the new requirements for the remainder of their project crediting periods (i.e., such projects remain eligible to issue VCUs through to the end of their project crediting period without revalidation against the new requirements). The new requirements shall be adhered to at project crediting period renewal, as set out in Section 3.8.9.</i>	The Project meets all requirements set out by Verra.

APPENDIX B: MAP OF LANDFILL