



Verification Report

CAR588 Stones Throw Landfill

Reporting Period: January 1, 2016 – December 31, 2016

Prepared for:

Sustainable Energy Solutions, LLC

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1.0 Introduction

Sustainable Energy Solutions, LLC. (SES) contracted Ruby Canyon Engineering, Inc. (RCE) to perform the verification of the CAR588 Stones Throw Landfill project (Project) for the reporting period January 1, 2016 through December 31, 2016 to the Climate Action Reserve (Reserve) Landfill Project Protocol Version 3.0 (Protocol). The Project involves GHG emission reductions from the capture and destruction of landfill gas (LFG) via an open flare at Stones Throw Landfill (Landfill) located in Tallassee, Alabama.

1.1 Project Background & Site Description

The Project activity consists of the installation of an active landfill gas collection system and flare at the Landfill. The Project consists of wells with a collection system that convey LFG to an open utility flare. The landfill is not a bioreactor.

The Project Developer is Sustainable Energy Solutions, LLC and the Landfill owner is Stones Throw Landfill. The Project Developer owns the rights to all of the GHG credits that result from the Project.

1.2 Responsible Parties

Sustainable Energy Solutions, LLC
300 Colonial Center Parkway, Suite 230
Rosewell, GA 30076

1.3 Verification Team

The RCE verification team consisted of the following individuals who were selected based upon verification experience and knowledge of the landfill methane sector.

Lead Verifier: Samantha Phillips
Senior Internal Reviewer: Jessica Stavole-Carter

1.4 Objectives

The goal of the verification activities was to ensure that the claimed GHG emission reductions were complete, consistent, accurate, transparent, and permanent and that the Project was in compliance with the Reserve's project additionality, monitoring, and reporting requirements. Furthermore, the verification activities ensure that the data provided to RCE is well documented and free of any material errors or omissions.

1.5 Scope

The scope of the verification consists of the following independent and objective activities:

- Review the reporting period's Project Monitoring Plan;
- Conduct a site visit to the Project;
- Review the Project data acquisition and quality control procedures;
- Review the Project's baseline emissions and confirm the baseline and Project boundaries;
- Review the Project's evidence of environmental and regulatory requirements to ensure that the Project is additional;
- Review the Project's emission reduction calculations;
- Review the Project documents and data against the criteria listed in Table 1;
- Issue requests for additional documentation, clarifications, and corrective actions as necessary; and

- Issue a verification report, list of findings, and verification statement to the Project Developer and the Reserve.

1.6 Verification Criteria

Table 1 – Summary of Verification Criteria

Criteria	Details
Standard of Verification	• The Reserve Landfill Project Protocol Version 3.0 (December 2, 2009) • Errata and Clarifications to Landfill Project Protocol Version 3.0 (June 18, 2015) • The Reserve Program Manual (September 1, 2015) • The Reserve Verification Program Manual (February 8, 2017)
Verification Process	ISO 14064-3 Specification with guidance for the validation and verification of greenhouse gas assertions
Level of Assurance	Reasonable assurance
Materiality	97% accuracy level (less than 3% error) because total annual emission reductions are between 25,000tCO ₂ e and 100,000 tCO ₂ e.

2.0 Verification Activities Summary

As the first step in verification activities, RCE developed a verification plan to be followed throughout the verification. The verification plan consisted of the following activities:

- RCE completed the Notification of Verification Activities/Conflict of Interest (NOVA/COI) form to identify any potential conflict of interest with the Project or Project developer. RCE submitted the NOVA/COI form to the Reserve and the COI assessment revealed no conflicts of interest and was approved on January 31, 2017.
- RCE held a verification kickoff meeting with SES on February 7, 2017. During the kickoff meeting RCE reviewed the verification objectives and process, reviewed the verification schedule, and requested the verification background documents.
- RCE performed a strategic review and risk assessment of the received data and support documents in order to understand the scope and areas of potential risk in the GHG emissions reductions calculations.
- RCE developed a risk-based sampling plan based upon the strategic review and risk assessment. The verification plan and sampling plan were used throughout the verification and were revised as needed based upon additional risk assessments.
- RCE conducted a site visit on February 22, 2017. During the site visit RCE performed key personnel interviews; inspected the Project equipment; and observed the onsite GHG management systems and data gathering, monitoring, and handling practices.
- RCE performed a risk-based desktop review of the submitted verification documents including an assessment of the GHG calculation methods and inputs, source data completeness, GHG management and monitoring systems, evidence of regulatory compliance, and record retention practices.
- RCE submitted requests for clarifications, corrective actions, and additional documentation to SES throughout the verification.

- RCE's Senior Internal Reviewer conducted a review of the verification sampling, verification report, and verification statement.
- RCE issued a final verification report, verification statement, and list of findings.
- RCE held an exit meeting with SES on March 10, 2017.

3.0 Verification Findings

3.1 Assessment of the GHG Reduction Project Operations

The Project collects LFG and destroys it via an open flare mounted on a flare skid adjacent to the landfill. The collection system consists of a series of wells and pulls LFG using blowers located at the flare skid. Prior to combustion, the LFG passes through a continuous methane analyzer and flow meter that measure methane concentration and LFG flow to the destruction device.

3.2 GHG Project Boundary (sources, sinks and/or reservoirs)

According to the Protocol, carbon dioxide and methane are the only GHGs included in the Project boundary from both the baseline and Project activities. The emissions resulting from the Project activity must be deducted from the Project baseline emissions in order to calculate total emission reductions. These Project emissions include the carbon dioxide resulting from the consumption of electricity from the grid related to Project activities. The calculation of baseline emissions takes into account the total methane destroyed based on the destruction efficiency of the Project destruction devices and the oxidation of methane by soil bacteria. Table 2 lists the sources of GHG emissions reviewed during the verification of the Project.

Table 2. Project GHG Sources, Sinks, and Reservoirs

Activity	GHG Sources, Sinks & Reservoirs
Baseline	• CH₄ vented to the atmosphere. • Percent methane oxidized by soil bacteria. As the landfill is not covered with a synthetic liner, a 10% oxidation factor resulting from natural oxidation by soil bacteria was applied to the baseline emissions.
Project	• CH₄ from the incomplete combustion of LFG sent to the flare. • CO₂ from the combustion of fossil fuels used during operation and maintenance of the Project activity. • CO₂ resulting from the consumption of imported electricity.

3.3 Project Eligibility Criteria

The Protocol specifies four eligibility rules that a project must meet in order to register emission reductions with the Reserve: Location, Project Start Date, Additionality, and Regulatory Compliance. Below is a summary of the Reserve eligibility requirements and the Project's compliance to each requirement.

- **Eligibility Rule 1: Location**

The Project is a US-based landfill located in Tallassee, Alabama, USA and therefore meets this eligibility requirement.

- **Eligibility Rule 2: Project Start Date**

The start date is defined as the date of which a qualifying destruction device becomes operational. RCE reviewed the Flare Commissioning Report in which SES certified the completion of the customer installation checklist and that the site was ready for start-up on April 30, 2010, less than a week before the project start date of May 6, 2010.

- **Eligibility Rule 3: Additionality**

Performance Standard Test

Prior to the Project activity, the Landfill did not collect or destroy LFG. RCE confirmed this through the site visit; no evidence was observed that would indicate there was ever a pre-project destruction device. Thus, the Project passes the Performance Standard Test number 1 since it involves:

“Installation of a landfill gas collection system and a new qualifying destruction device at an eligible landfill where landfill gas has never been collected and destroyed prior to the project start date.”

Legal Requirement Test

Project proponents must ensure that emission reductions achieved by the Project would not have occurred in the baseline case due to federal, state, or local regulations. The Landfill personnel regularly reviews federal, state, and local regulations and permitting requirements to ensure the Landfill is in environmental compliance and not mandated to collect and combust LFG.

The Landfill has a design capacity above 2.5 million mega grams (Mg) and 2.5 million cubic meters of municipal solid waste. The facility is therefore required by the New Source Performance Standard (NSPS) regulation to conduct non-methane organic compound (NMOC) emission rate testing. RCE reviewed the October 14, 2014 Tier II testing report and confirmed that the estimated NMOC generation rate for 2016 is calculated at 124.6 Mg/year, above the 50 Mg/year threshold that would require the installation of a gas collection and combustion system. The landfill will be required to operate a gas collection and combustion system within 30 months from the date of the Tier II NMOC report, therefore the Project will be eligible until April 13, 2017. Because this reporting period is within the 30-month period, emission reduction credits are still eligible.

RCE examined the procedures outlined in the Project Monitoring Plan that the Project Developer will follow to ascertain and demonstrate that the Project at all times passes the Legal Requirement Test. There are no other laws or ordinances requiring the Landfill to collect and destroy the landfill gas. RCE also reviewed the Attestation of Voluntary Implementation form signed after the end of the reporting period and uploaded to the Reserve website which states that the project was implemented and established voluntarily.

Based upon the personnel interviews and the documentation reviewed, RCE did not find any indication that the Landfill was mandated to collect and combust LFG during this reporting period. Additionally, there are no local, state or federal requirements mandating the installation of a LFG collection system at the Landfill. Therefore, the results of the review indicate that the Project Developer is following the Monitoring Plan procedures to ensure that the Project passes the legal requirements test at all times.

- **Eligibility Rule 4: Regulatory Compliance**

RCE reviewed the procedures described in the Monitoring Plan to ensure that the Project remains in compliance with all applicable local, state, and federal requirements. RCE reviewed wastewater discharge, air, and solid waste permits for evidence that the project was in compliance with all environmental and regulatory requirements. RCE reviewed Alabama Department of Environmental Management (ADEM) inspection reports for Landfill to confirm regulatory compliance with the applicable state regulations. RCE also reviewed the EPA's Enforcement and Compliance History Online (ECHO) database and found that the facility was in violation of the Clean Water Act during the reporting period. The violation recorded on the ECHO database is the result of a self-reported noncompliance notification completed by the Landfill as part of their discharge monitoring report. The Landfill reported noncompliance with turbidity limits and oil & grease limits from two sediment ponds in the 3rd quarter of the Project reporting period. The root cause of the permit exceedances was maintenance activities in and around sediment ponds. The landfill implemented corrective actions in response to the discharge and ADEM has not requested additional information. RCE concluded that the violation was not project related and project is within regulatory compliance.

RCE confirmed that the procedures for ensuring regulatory compliance in the Monitoring Plan were being properly followed and signature of the Attestation of Regulatory Compliance which was completed after the reporting period and uploaded to the Reserve website.

3.4 Ownership of GHG reductions

RCE reviewed evidence that Stones Throw Landfill, LLC is the owner and operator of the Project and landfill facility based on a Landfill Gas Collection and Combustion Agreement dated September 1, 2009. RCE also verified that the contract grants ownership of the emission reductions to SES and entitles SES to sell the emission reduction credits if they so choose. Finally, RCE verified that the Attestation of Title was correctly completed and uploaded to the Reserve.

3.5 GHG Monitoring and Management Systems

RCE reviewed the data management systems during the site visit and desktop review. RCE completed the majority of the GHG management systems review during the site visit by observing the onsite procedures and interviewing personnel. The onsite review included an assessment of the Project data collection, processing, and handling procedures; recordkeeping and data storage; quality control and assurance procedures; record retention systems; and a field tour of the Project equipment. The desktop review included a detailed review of the Project monitoring plan and its conformance to Protocol requirements.

The primary project data include the LFG flow to the open flare, temperature of the open flare, and methane content of the LFG. A Yokogawa data acquisition device records LFG flow, methane concentration and the flare temperature every thirty seconds, with flow to the flare measured continuously by a Rosemont Mass ProBar flow meter. The temperature of the open flare is measured continuously by a thermocouple. During the site visit, RCE observed that the flow meter was installed correctly to allow for laminar flow of landfill gas is configured to standard conditions of 60°F and 1 atm.

A Siemens Ultramat gas analyzer continuously measures methane, carbon dioxide, and oxygen composition of landfill gas before sent to the flare. The analyzer was removed from 8/6/2016 – 10/11/2016 for calibration. During this time credits were only claimed for two weeks when two weekly readings were recorded using a handheld Envision methane analyzer.

During the site visit RCE reviewed the Project Developer's data storage and retention policies and verified they were in conformance with the Protocol requirements and followed the Monitoring Plan.

3.6 Instrument QA/QC

RCE confirmed that all continuous monitoring equipment was inspected and cleaned quarterly (2/19/16, 5/18/16, 7/27/16, 11/21/16) with the as found/as left condition documented per the requirements of the Protocol. In addition, the gas analyzer is calibrated monthly with a known calibration gas. Carlson Environmental Consultants (Carlson) verified that the flow meter and the gas analyzer were working correctly on November 22, 2016. The gas analyzer's as found percent drifts were not outside the +/- 5 percent threshold throughout the reporting period. During the November 22, 2016 accuracy check the flow meter was found over recording by 14.9%. Emerson Process Management, the company that installed the flowmeter and is a qualified Rosemount service provider, was on site January 11, 2017 to adjust and calibrate the flow meter. SES applied a 14.9% adjustment for drift to the calculations for the entire reporting period.

RCE confirmed that the flow meter and the gas analyzer were calibrated per the manufacturer specified frequency or every five years, whichever is more frequent. SES exceeds the manufacturer calibration guidance for the analyzer and flow meter. The Siemens Analyzer operating manual requirement is that the analyzer be calibrated with calibration gas at a minimum of once per year – the gas analyzer on-site is calibrated monthly with calibration gas. Additionally, the Siemens was calibrated by ApplyTech, Inc. on September 7, 2016 according to Siemens Industry's standard procedures. The Rosemount flow meter was last checked for accuracy and calibration by Emerson Process Management on December 10, 2015, exceeding the five year calibration frequency.

While the analyzer was away weekly methane concentrations were recorded by an Envirogen gas analyzer. RCE confirmed that the handheld instrument was calibrated annually by the manufacturer.

The portable instrument (GEM2000) used by Carlson to check the accuracy of the flow meter was calibrated by the manufacturer one month prior to use. RCE confirmed that the handheld GEM2000 was calibrated semi-annually as required by Landtec, the manufacturer.

3.7 Assessment of GHG Emissions Reductions Calculations

RCE reviewed the emission reduction calculations, Project assumptions, raw data inputs, and accuracy of calculations. RCE first assessed the completeness of the raw data and how the data is transferred to the calculation spreadsheet. Next, the formulas and raw data inputs were reviewed for accuracy and compliance with the Protocol. RCE sampled selections of data and recalculated the methane destroyed by the Project and compared these values to the Project Developer's values in the assertion spreadsheet.

RCE reviewed checks built into the spreadsheet that include flow only at times when the flare thermocouple reads a temperature greater than 500°F.

RCE confirmed that the default destruction efficiency of 96 percent efficiency was applied to the open flare. A 10 percent discount was applied for the oxidation of methane by soil bacteria because the landfill does not incorporate a synthetic liner as part of the final cap system throughout the entire landfill. While the analyzer was away for calibration, weekly methane concentrations were recorded for the weeks of 9/9/16-9/15/16 and 10/2/16-10/8/16. A 10 percent discount was applied to these two weeks of data and credits were not claimed for the remaining days that the Siemens was not on site. A 14.9% adjustment factor was applied to the entire reporting period for the flow meter drift between confirmed calibration events.

RCE reviewed source documentation for Project emissions from purchased electricity and propane, confirmed that appropriate emission and conversion factors were used, and reviewed the use of Protocol equations for Project emissions in the GHG assertion

RCE recalculated LFG total flow, confirmed correct application of percent methane, recalculated project fossil fuel and electricity use, and confirmed use of appropriate conversion factors. All calculations were checked against SES's calculations with percent differences noted. There were no instances of data substitution during this reporting period. The difference between RCE's and SES's emission reductions was non-material.

4.0 Verification Results

SES provided sufficient documentation of its emission reduction calculations, data collection procedures, and monitoring and quality control procedures. The verification process focused on verifying the emission reductions claimed and the source data used by SES to quantify the emission reductions in accordance with the Reserve Landfill Project Protocol Version 3.0. The following is a summary of the verification results.

The Project reported emission reductions of **90,646** metric tons CO₂e for the current reporting period. During the final review, RCE identified no material misstatements in the data or emission reduction calculations. The emission reductions verified are listed in Table 3. During the verification process, RCE made requests for corrective actions, clarifications, and additional documentation to complete the verification. SES sufficiently addressed all requests. The details of these requests are documented in RCE's List of Findings provided to the Reserve and SES.

5.0 Verification Statement

RCE conducted a risk-based analysis of the CAR588 Stones Throw Landfill project GHG assertion including a strategic review of the Project data and evidence. Based upon the processes and procedures and the evidence collected, RCE concludes that the GHG assertion is a fair representation of the Project emission reductions resulting from the capture and utilization of LFG during the reporting period January 1, 2016 through December 31, 2016 and can be considered:

- In conformance with the Reserve Landfill Project Protocol Version 3.0,
- Without material discrepancy, and
- Verified to a reasonable level of assurance.

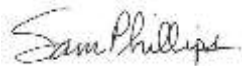
The verified emission reductions are listed in Table 3.

Table 3 - Emission Reductions Verified for January 1, 2016 through December 31, 2016

Year	BL Emissions CO ₂ e (tonnes)	Project Emissions CO ₂ e (tonnes)	Emission Reductions CO ₂ e (tonnes)
2016	90,772	126	90,646

Note: Due to rounding, individual values might not equal totals and values are not representative of raw data used in the emission reductions calculation.

Lead Verifier Signature



Samantha Phillips

Senior Internal Reviewer Signature



Jessica Stavole-Carter