

# LANDFILL GAS PROJECT VERIFICATION REPORT

*Verification under the Climate Action Reserve (CAR)*

*Maple Hill Landfill  
CAR#521*

**Reporting Periods:**

**January 1, 2017 to December 31, 2017**

**and**

**January 1, 2018 to December 31, 2018**



CLIMATE ACTION RESERVE

**Prepared for:**

**Advanced Disposal Services Maple Hill Landfill, Inc.**

**03 January 2020**

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## Summary

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This report presents the findings of the verification assessment of the Maple Hill Landfill (“the Project”) developed by Advanced Disposal Services Maple Hill Landfill, Inc. (“the Project Proponent” or “Advance Disposal Services”). This assessment covers the Maple Hill Landfill’s greenhouse gas emission reductions reported to the Climate Action Reserve (the Reserve or CAR) for the verification period January 1, 2017 to December 31, 2018.

The evaluation was undertaken using the Climate Action Reserve Landfill Project Protocol, version 5.0 as well as the verification methodology developed by SCS for carbon offset projects submitted to the Reserve.

In the course of the verification assessment, the SCS verification team developed findings, which may include New Information Requests (NIRs), Non-Conformity Reports (NCRs) and/or Observations. The findings have been adequately responded to, resulting in their closure.

On the basis of the information provided and the analyses completed, SCS was able to reach a decision on the emissions reduction reported by the Project Proponent to the Climate Action Reserve. SCS verified the adequacy of the information provided in the Project Monitoring Plan, confirming that this document meets the requirements of the Climate Action Reserve standards. Further, SCS was able to reach a positive opinion on the Project claimed emission reductions presented in the Project Documentation and on the Reserve website by Advanced Disposal Services . Thus, SCS has verified 47,235 for 2017 and 42,545 for 2018 metric tonnes of CO<sub>2</sub>e reductions and removals from the Maple Hill Landfill for the reporting period of January 1, 2017 to December 31, 2017 and January 1, 2018 to December 31, 2018.

## Introduction

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SCS Global Services (SCS) is a global leader in third-party certification, auditing, testing services, and standards. Established as an independent third-party certification firm in 1984, our goal is to recognize the highest levels of performance in environmental protection and social responsibility in the private and public sectors, and to stimulate continuous improvement in sustainable development. In 2012, Scientific Certification Systems, Inc. began doing business as SCS Global Services, communicating its global position with offices and representatives in over 20 countries. SCS is currently accredited to ISO 14065 for GHG Validation and Verification by the American National Standards Institute (ANSI) and offers carbon offset validation and verification under the Verified Carbon Standard (VCS) and the American Carbon Registry (ACR). SCS offers carbon offset verification under the Climate Action Reserve (CAR). And lastly, SCS also offers verification services for the Climate, Community and Biodiversity (CCB) standards.

SCS was commissioned by Element Markets to undertake the project verification of the Maple Hill Landfill. The project consists of the collection of landfill gas (LFG) from the Maple Hill Landfill, located in Macon, Missouri and subsequent destruction in an open flare. This report covers the verification period of January 1, 2017 to December 31, 2017 and January 1, 2018 to December 31, 2018 as a project deliverable into the Climate Action Reserve.

## Verification Details

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### Verification Objectives

The objective of the verification is to:

- Evaluate conformance of the Project with the criteria stated below.
- Determine with a reasonable level of assurance whether the Project has resulted in the GHG emissions reductions and/or removals as stated in the project documents.
- Evaluate the project planning information and documentation including the determination of project eligibility, project design, baseline and project emissions determination, management systems supporting the project, and methodologies employed for the calculation of GHG emission reductions.

### Verification Scope and Criteria

The scope of the verification is defined as an independent and objective review of the project description document, the project's baseline study, monitoring plan and emissions reductions calculations. The information in these documents is reviewed against the following criteria:

- CAR Landfill Project Protocol, Version 5.0, April 24, 2019
- CAR Verification Program Manual, February 8, 2017
- Reserve Offset Program Manual, November 12, 2019

- All Verification activities carried out by SCS followed the requirements of ISO 14064-3 (Specification with guidance for the validation and verification of GHG assertions)

## Level of Assurance

The level of assurance applied to this verification assessment is Reasonable Assurance as required by the Climate Action Reserve.

## Treatment of Materiality

In consideration of the required level of assurance, the needs of the intended user and the requirements of the Climate Action Reserve Program, SCS applied a materiality threshold of 3% because total annual emission reductions are greater than 25,000 tCO<sub>2</sub>e but less than 100,000 tCO<sub>2</sub>e. The data reviewed was considered to meet the principles of accuracy, completeness, and transparency and is free of material error or omission.

## Verification Process

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### Verification Summary

The verification process consisted of the following:

**1. Project listed with the Climate Action Reserve:**

The Maple Hill Landfill was listed on the Climate Action Reserve (CAR) website. Advanced Disposal Services Maple Hill Landfill Inc. selected SCS as their verification body.

**2. Conflict of Interest Review.**

A Notification of Verification Activities/ Conflict of Interest (NOVA/COI) form was submitted to CAR. The COI assessment was conducted to identify any potential conflicts interests with the verification/project. No conflicts were identified and a determination of low potential for conflict of interest was received from the Climate Action Reserve prior to the commencement of verification activities in a determination letter dated June 11, 2019.

**3. Introductory Meeting:**

A kick-off meeting was conducted between the verification team, Advance Disposal Services and Element Markets on July 1, 2019. The purpose of the kick-off meeting was to review the timeline of audit; confirm verification criteria; determine any changes in the site, sources, GHG management systems or personnel, and to begin gathering information.

**4. Desk Review**

SCS received and reviewed the Project Design Document (also known as the Project monitoring plan), CAR submittals, and supporting documentation to assess initial conformance with the data requirements of the CAR Landfill Project Protocol, version 5.0, (April 24, 2019). A risk assessment was conducted to identify key factors that impact the reported emission reductions

and removals. A Verification Plan was created to focus on the critical elements presenting potential risk for errors with the project.

**5. Site Visit**

A site visit was conducted by the lead verifier on August 22, 2019. The purpose of the site visit is to verify the project equipment, location and eligibility, to review and evaluate the project GHG management systems, data collection and handling, and emission reduction calculations and procedures in place, and to finalize the risk assessment and sampling plan. During the kick off call, the Project changes to the GHG Management system, data collection and handling or procedures since the previous site visit were reviewed.

**6. Quantitative Review**

An assessment of the emission reduction calculation inputs and procedures was performed to review the quantitative analyses undertaken by the Project Proponent to convert the raw inventory data into emission reduction estimates.

**7. Findings**

Throughout the verification, there is an iterative exchange between SCS and the Project Proponent to gather additional information for review and examination. This exchange includes Findings—New Information Requests (NIR), Non-Conformity Reports (NCR) and Observations that are issued by SCS to the Project Proponent. The Project Proponent must respond to NIRs and NCRs in order for SCS to render a verification opinion. At this time all Findings have been appropriately addressed by Advanced Disposal Services and subsequently closed by SCS.

**8. Draft Report and Statement**

This step in the verification process includes a final review of the submitted data, completion of the Verification Report, and drafting of the Verification Statement. A draft Verification Report and Statement are completed based on the results of the verification assessment.

**9. Technical Review**

The draft report was presented to an SCS lead verifier, independent of the verification, who determined the Verification Statement to be justified given the evidence presented. The Verification Report and Verification Statement were then presented to Advanced Disposal Services for review and comment.

**10. Final Report and Statement**

Once Advanced Disposal Services approved these documents, SCS uploaded them to the Reserve website for administrative review by CAR. Given a positive review, CAR will register the emissions reductions for the landfill gas project and issue carbon tonnes for a reporting period of January 1, 2017 to December 31, 2017 and January 1, 2018 to December 31, 2018.

**11. Exit meeting with Advanced Disposal Services:**

The exit meeting entails a review of the verification process, summary of the verification findings and to initiate scheduling for the next verification period if applicable.

## Verification Team

The verification was undertaken by Tina Sentner, Lead Verifier. The Technical Review was performed by Scott Eaton, Lead Verifier for SCS.

## CAR Landfill Project Requirements

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SCS verified the Maple Hill Landfill against the requirements of the Climate Action Reserve Landfill Project Protocol, version 5.0. The following sections detail the most essential aspects of the verification of the Maple Hill Landfill.

### Project Description

The Maple Hill Landfill collects landfill gas (LFG) from the Maple Hill Landfill and destroys it via combustion through an open candlestick flare. The Project is located at the Maple Hill Landfill approximately 5 miles west of the city of Macon, Missouri. The landfill is an active solid waste sanitary landfill owned and operated by Advanced Disposal Services, Maple Hill Landfill, LLC. The landfill began accepting waste in 1976 and consists of approximately 130 acres. Final closure of the landfill is estimated to take place in 2080.

The gas collection and conveyance system consisted of wellheads that pull gas from approximately (27) vertical wells, three (3) horizontal wells and five (5) leachate extraction points. The gas from the wellheads is routed via a main header line into the flare skid. The landfill gas is pulled by a blower and passes through various knockout vessels to remove moisture prior to passing through the flow meter en route to the candlestick flare.

The Maple Hill Landfill does not recirculate leachate, and it was confirmed during the site visit that the landfill is not considered a Bioreactor as defined by U.S. EPA. During this verification period, it was noted the landfill collection system operated normally.

This reporting period includes verification of the zero credit reporting period, the first reporting period, and the second reporting period.. As such, the Project was originally developed under Landfill Project Protocol, Version 2.1. With this second credit period, the landfill has updated to the Landfill Project Protocol, Version 5.0. In addition, the Project metering equipment at the flare skid was upgraded. A higher capacity flare (1,822scfm) replaced the previous flare (673scfm) and a new header pipe (12") was installed along with an additional 40HP blower. In addition, a new Sierra Instruments flow meter was installed to replace the previous Thermal instruments meter on the 1<sup>st</sup> of August 2018. See project monitoring review further in the report.

### Project Eligibility

There are eligibility rules the Project must meet in order to register reductions with the Climate Action Reserve.

## **Location**

The Project is a U.S. based landfill located five miles west of the town of Macon, Missouri, USA. SCS conducted a site visit on August 22, 2019 and concluded the project meets this eligibility requirement.

## **Project Start Date**

The project proponent originally listed the Project on the Climate Action Reserve website on October 23, 2009. The project listing indicated the project proponent began installation of the landfill gas collection and conveyance system (GCCS) in mid 2002 and began flaring gas on September 16, 2002. Advance Disposal Services, Maple Hill Landfill Inc. provided various documents to support the evidence of construction of the landfill gas project such as the Solid Waste Permit with the gas collection and conveyance system installation application to Missouri Department of Natural Resources, the revised Title V Permit for the flare addition, the GCCS design drawings for the well construction, well field drilling logs for the first phase of well installation, initial chart recorder logs and a start up confirmation letter from Environmental Sampling Corporation for the installation of the flare skid. SCS concluded from these documents a project start date of September 16, 2002 and the Project was considered eligible at the time of the initial start. Lastly, the project submitted a new listing form for the second credit period. SCS concluded that the project remains eligible.

## **Crediting Period**

The crediting period for landfill projects is 10 years from the project start date. This is the second ten-year crediting period for the Project. The second credit period started September 16, 2012 and extends to September 15, 2022. SCS has concluded that the reporting period verified in this report is within the second crediting period for this Project.

## **Zero Crediting Periods**

There were several zero credit periods during the reporting period. The zero credit periods were from September 16, 2012 to December 31, 2016. SCS confirmed the project developer signed a Zero-Credit Reporting Period Acknowledgment and Election form (Acknowledgment and Election form) acknowledging that CRTs will not be issued for any GHG emission reductions or removals achieved by the project during the zero-credit reporting period. The project developer also submitted a monitoring report to the Reserve that covers data for the zero-credit reporting period. Lastly, the Project developer provided project documentation and calculations for zero-credit reporting period emissions to the verifiers. SCS was able to confirm with reasonable assurance that project emissions were less than baseline emissions during the zero-credit reporting period.

## **Additionality**

Project Proponents must indicate that reductions are above and beyond business as usual. In order to do so, the Project must pass a Performance Standard test and the Legal Requirement test.

## **Performance Standard**

For the Performance Standard test at the time of project commencement, a project developer may meet eligibility under three possible performance threshold scenarios. SCS verified the Project was not previously collecting and destroying any landfill gas in a qualifying destruction device prior to the project start date. Through observation during the site visit and interviews with the landfill site manager, there was no evidence of a solar flare or pre-existing destruction devices, nor were pre-existing destruction devices on historical project drawings identified. In addition, SCS reviewed the MSW Permit and subsequent modifications for the landfill gas conveyance and collection systems along with the Title V Permit for Maple Hill Landfill and no evidence of a pre-existing destruction device was observed or required of the site. Therefore, SCS concluded the project proponent meets the performance standard threshold under option 1: “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”.

### ***Limits On Credit Stacking***

Credit stacking is defined as receiving both offset credits and other types of mitigation credits for the same activity on spatially overlapping areas (i.e., in the same landfill). Per interviews with the landfill staff and regulatory compliance personnel, the Project has not received offset credits and other types of mitigation credits for the same activity.

### ***Legal Requirements***

For the Legal Requirements 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 Maple Hill Landfill is greater than 2.5 million megagrams or 2.5 million cubic meters of waste and therefore is subject to NSPS regulation requiring the facility to conduct Non-Methane Organic Compound (NMOC) emission rate testing. Maple Hill Landfill conducted an NMOC Threshold review. The most recent Tier II NMOC Emission Rate Report for Maple Hill Landfill was conducted on September 21-25, 2015 with a result of 30.9 Mg/yr NMOC for 2017 and 32.08 Mg/r for 2018. The test results indicate that the Maple Hill Landfill is not expected to reach an NMOC level of 50 MG/year until 2030. SCS confirmed that landfill had not undergone or permitted for any landfill expansions, modification or reconstruction, which would subject the landfill to a lower NMOC of 34 mg/yr.

SCS confirmed that Maple Hill Landfill implemented the procedure in the monitoring plan to ascertain and demonstrate that the project passes the legal requirements test at all times. In addition, a legal review of the Maple Hill Landfill was conducted by the project proponent. The results of the review indicated there are no laws, statutes, regulations, court orders, environmental mitigation agreements, permitting conditions, or other legally binding mandates requiring the destruction of landfill gas. SCS confirmed this status by reviewing the latest Title V permit and annual compliance reporting for the Title V permit, the latest Municipal Solid Waste (MSW) permit and the Storm Water Permit and report for the Maple Hill Landfill. There was no evidence observed requiring a mandatory installation of a gas collection and conveyance system.

Lastly, SCS reviewed the Attestation of Voluntary Implementation, signed on November 19, 2019 by an eligible signatory to attest for the Project. Advanced Disposal Services, Maple Hill Landfill, LLC has affirmed that the Project was established and implemented voluntarily and continues to operate as such. Based on this evidence, SCS concludes the Project passes the legal requirements test.

### **Regulatory Compliance**

SCS reviewed the Attestation of Regulatory Compliance submitted by Advanced Disposal Services, Maple Hill Landfill, LLC dated November 19, 2019 affirming the Project's compliance status throughout the project reporting period. During the site reconnaissance and desk review activities, SCS reviewed a sample of the monthly solid waste inspection reports from the Missouri Department of Natural Resources, and the semi-annual Title V Compliance Certification Forms for 2017 and 2018. There were no violations noted throughout the reporting period and the certifications indicated that the landfills had been in continuous compliance with all applicable requirements of the permit. The EPA's Enforcement and Compliance History Online (ECHO) report was also reviewed and did note Title V Annual compliance deviations and a Clean Water Act issue noted. These issues were reviewed with the landfill and determined either to be administrative in nature or not a result of the Project activities. Further information regarding compliance can be found in the list of findings. Lastly, SCS confirmed the project had implemented a procedure within the project monitoring plan to monitor compliance at all times. From this evidence, SCS concluded that during the reporting period, the project met the regulatory compliance requirements of the protocol.

### **Ownership**

The Maple Hill landfill was originally identified as ES Veolia Maple Hill Landfill, Inc. In late 2012, Advanced Disposal Services purchased ES Veolia, Maple Hill Landfill, Inc and changed the name to Advanced Disposal Services, Maple Hill Landfill, LLC. The name change and ownership was confirmed by SCS through review of various regulatory permits issued from Missouri Department of Natural Resources as well as review of the legal documents to change of name for the corporation. As the landfill owner and project developer, Advanced Disposal Services, Maple Hill Landfill, Inc. signed the Climate Action Reserve's Attestation of Title form affirming that Advanced Disposal Services, Maple Hill Landfill, Inc. has an exclusive ownership claim to the GHG reductions and removals achieved by the Maple Hill Landfill project. The Attestation was signed on November 19, 2019 by the Vice President of Advanced Disposal Services, Maple Hill Landfill, LLC.

Advanced Disposal Services, Maple Hill Landfill, LLC retains an agreement with Element Markets, LLC to act as the sole agent for the registration, verification and administrative processing of the project's emission reductions. From this evidence, SCS has concluded that the project developer, Advanced Disposal Services, Maple Hill Landfill Inc., is entitled to receive the emission reduction credits that may be issued by the Climate Action Reserve for methane destroyed during the project period.

## The GHG Assessment Boundary

The Project includes all emission sources from the operation of the landfill gas collection system to the ultimate destruction of the landfill gas. The sources of GHG emissions reviewed include:

The GHG sources, sinks, and reservoirs associated with the baseline scenario are:

- CH<sub>4</sub> vented to the atmosphere
- CO<sub>2</sub> from the oxidation of CH<sub>4</sub> by soil bacteria. As the landfill is not covered with a synthetic liner, the CAR Landfill Project Protocol, Version 5.0 assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.

The GHG sources, sinks, and reservoirs associated with the project are:

- Un-combusted CH<sub>4</sub> from Landfill gas in an open flare.
- CO<sub>2</sub> from the combustion of fossil fuels used during operation and maintenance activities for the project activity.
- CO<sub>2</sub> resulting from the consumption of imported electricity.

The gases reviewed include CO<sub>2</sub> and CH<sub>4</sub>. All gases are converted to CO<sub>2</sub> equivalents.

## Review of Project GHG Management Systems

During the site visit, the Project's greenhouse gas management systems were reviewed with the Project Proponent. This review included a detailed look at the Project's data handling and processing procedures, recordkeeping and data storage, and the quality control and assurance procedures. The following is the result of this review:

### Project Monitoring

The primary data gathered for the Project is landfill gas flow, pressure, temperature and methane content of the landfill gas. A TIC Model 62-9/9500 thermal mass Flow Meter continuously monitored flow after the blower and a knockout prior to combustion in to the open flare. The position of the flow meter was adequate to ensure laminar flow. The TIC flow meter was removed for calibration annually and met the recommended 18 month factory calibration frequency. A calibrated TIC flow meter of like kind was swapped in during the calibration events. The meter was calibrated to standard condition of 60 degrees Fahrenheit and 1 ATM. In August 2018, the TIC flow meter was replaced with a Sierra Mass Flow meter. The meter was calibrated by the factory prior to installation and has a calibration requirement of every two years. The Sierra mass flow meter was observed to be calibrated to a standard condition of 70 degrees and 1 ATM.

SCS also confirmed the flow meters were inspected, cleaned and field checked for calibration accuracy on a quarterly basis within the reporting period with the as found/as left conditions of the flow meter documented. All records show that the flow meters read within a +/- 5% margin of error during the

reporting period and the last check was within 2 months of the end of the reporting period by a certified third party. SCS confirmed the flow meter was calibrated to a range of flow rates corresponding to the flow rates expected at the landfill. The calibration results for the flow meter were as follows.

**Table 1. Flow Meter Field Monitoring Results**

| Quarter | Instrument             | Cleaning/Inspection | Cal/field check Dates | Service Provider    |
|---------|------------------------|---------------------|-----------------------|---------------------|
| Q1 2017 | TIC 2008450            | 03/01/2017          | 01/31/2017            | Thermal Instruments |
| Q2 2017 | TIC 2008450            | 06/8/2017           |                       | MHL                 |
| Q3 2017 | TIC 2008450            | 09/20/2017          |                       | MHL                 |
| Q4 2017 | TIC 2008450            | 12/11/2017          |                       | MHL                 |
| Q1 2018 | TIC 2008450            | 03/15/2018          | 02/13/2018            | Thermal Instruments |
| Q2 2018 | TIC 2008450            | 06/05/2018          |                       | MHL                 |
| Q3 2018 | Sierra Mass Flow meter | 08/01/2018          | 07/02/2018            | Sierra              |
| Q4 2018 | Sierra Mass Flow Meter | 12/3/2018           | 12/19/2018            | RMC Environmental   |

Methane concentration measurements were recorded weekly throughout the reporting period using two portable methane analyzers. A portable GEM 2000 Gas Analyzer measured methane content during the verification period until July 2018 when it was replaced (see more below). The GEM was required to be factory calibrated every 6 months. The GEM was factory calibrated on 12/13/2016, 06/16/17, 12/18/17 and 06/22/18. In addition, the GEM was factory calibrated on August 24, 2011, March 24, 2012 and October 12, 2012. The GEM was observed to be operating within calibration tolerances.

A new Envision Portable Gas analyzer was purchased and replaced the GEM. The Envision was required to be calibrated annually according to the manufacturer guidance. The Envision was factory calibrated 7/2/2018 and field checked for calibration accuracy on 12/19/2018, within 2 months of the end of the reporting period. The Envision was observed to be operating within calibration tolerances.

Field Calibration was conducted weekly by the Project using a known set of calibration gases. The calibration gas was visually verified to be current. Weekly calibration data from the portable gas analyzer device were reviewed onsite.

SCS concluded based on the review of calibration procedures, calibration report logs and calibration certificates that the various methane analyzers were within the deviation tolerances of the Protocol and the manufacturer specifications.

Temperature and hours of operation were continuously monitored via a thermocouple positioned within flare. On rare occasions during the reporting period, the flare skid system would trigger either manual or automatic restarts. SCS confirmed that all data points were deleted where landfill gas flow was recorded at less than 500 degrees Fahrenheit in the emission reduction calculations. This ensures that all landfill gas destruction data used in the emission reduction calculations accounts for landfill gas flow that is properly destroyed by the flare.

During periods of scheduled and unscheduled flare shutdowns, a valve is automatically closed that prevents the flow of landfill gas to the flare until flare startup. The system is designed to prevent landfill gas from flowing through the flare under low temperature conditions, and any gas flow that has been recorded by the flare flow meter is destroyed by the flare.

Data from the flow meter, gas analyzer, and flare thermocouple device was measured and recorded by a Yokogawa digital data recorder every 15 minutes. Data was acquired remotely from the site and compiled daily. Element Markets monitors for accuracy, completion and periods of unusual temperature and/or flow.

A Project Design Document and monitoring plan has been created for the Project. The contents of the PDD were thoroughly reviewed and observed to meet the requirements of a monitoring plan as described in the Landfill Gas Project Protocol. Also as this verification covers two reporting periods, the Project submitted an interim monitoring report for the 1/1/2017-12/31/2017 reporting period. SCS confirmed the monitoring report met the requirements of section 7.3.2 of the Landfill Project Protocol Version 5.0. Lastly, SCS confirmed the Project records will be kept for a minimum of ten years when the information is first generated or seven years after the last verification, per the PDD.

## Quantitative Review of Carbon Reductions and Removals

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SCS devoted a portion of the verification assessment to the review of the manner and propriety by which Advanced Disposal Services quantified their net GHG reductions and removals. This assessment included a review of the baseline determination, review of project assumptions, raw data inputs and accuracy of calculations. The formulas and raw data inputs used to determine emission reduction calculations as described in the Project Design Document and the calculation spread sheets were first reviewed for compliance with the Landfill Project Protocol, version 5.0. The main parameters of Equation #5.4 were verified as follows:

### Total Annual Methane Emissions Destroyed By the Project Landfill Gas Collection and Destruction System (CH<sub>4</sub> Dest<sub>PR</sub>)

The amount of methane destroyed is calculated from the continuously metered landfill gas flow data. For the verification period, data was electronically aggregated on a 15 minute interval for the flare. The main monitored parameters needed to calculate the amount of methane destroyed are:

$LFG_{i,t}$  = total quantity of landfill gas fed to the destruction device and  
 $PR_{CH_4\ i,t}$  = the average methane fraction of the landfill gas in time interval t as measured

Flare flow is first adjusted for low temperature by voiding the flow for any period when the flare temperature is below the threshold of 500 degrees F. Daily flow is then calculated by summing the flare flow for each interval period to produce a daily total. The incremental methane destroyed flow is calculated based on average methane concentration by the daily total of landfill gas with temperature and pressure taken into consideration. Total daily destroyed methane is carried forward into further calculations for the flare to determine emission reductions for the project.

#### Adjustment For Landfill Gas Flow Metering Equipment For Temperature And Pressure

The project TIC flow meter automatically corrected for the temperature and pressure of the landfill gas, however the newly installed Sierra Mass flow meter adjusted flow to 70 deg and 1 atm. Therefore, during the period the Sierra flow meter was installed, emission reductions were adjusted to 60 deg and 1 atm.

#### Default Methane Destruction Efficiency For Device (Dei)

The value applied was 0.960 for an open flare as prescribed by the Protocol. The Project Developer has taken an approach of applying a 500 degrees F temperature minimum to emission reduction calculations to ensure 96% destruction efficiency of the flare.

#### Factor For The Oxidation Of Methane By Soil Bacteria (OX)

The Project does not incorporate a synthetic liner in its cover system; therefore a 10% methane soil oxidation factor was applied to the baseline including the Project and Pre-Project scenarios.

#### Discount Factor To Account For Uncertainties Associated With The Project Monitoring Equipment (DF)

As per the methodology, 10% discount factor was employed in the emission reductions to account for the weekly methane concentration readings.

#### Adjustment To Account For Pre-Project LFG Destruction Device ( $PRE_{discount}$ )

Not applicable as there was no pre-project activity prior to the Project.

#### Total Annual Indirect Carbon Dioxide Emissions From The Consumption Of Electricity From The Grid ( $EL_{CO_2}$ ) and Total Annual Carbon Dioxide Emissions From The Destruction Of Fossil Fuel ( $FF_{CO_2}$ )

CO<sub>2</sub> emissions result from consumption of electricity to power project equipment and activity data for this source was tracked by reviewing utility invoices from the power supplier. Direct CO<sub>2</sub> emissions result from propane used to assist the ignition of the flare. This activity data is taken from purchase invoices. The emission factors for electricity and propane were verified and no material errors were found.

Project emissions consisting of indirect emissions from electricity and direct emissions from propane use are subtracted from the total amount of methane destroyed. The values are presented in the final Calculation Spreadsheets for the verification period.

#### Missing Data Procedures

Missing data calculation procedures were reviewed for consistency with the Landfill Gas Protocol requirements as part of this verification. There was no missing data substitution applied to the Project for this reporting period.

#### Variances or Deviations

For this reporting period, there were no variances reviewed.

## Verification Results,

The verification of CAR521 Maple Hill Landfill focused on the accurate collection of data and quantification of emission reductions as implemented by Advanced Disposal Services Maple Hill Landfill, LLC in accordance with the Landfill Project Protocol. A sample set of raw flow data (consisting of landfill gas flow, and temperature) and methane concentration was selected and reviewed in order to identify material misstatements due to transcription mistakes, mathematical errors or malfunction of instruments. The emission reduction calculations were recalculated by the audit team and found to be conformance with the Landfill Project Protocol.

The following provides a summary of the verification results (all emissions listed are in metric tonnes CO<sub>2</sub>e):

| Emissions Verified                | January 1, 2017 to<br>December 31, 2017 | January 1, 2018 to<br>December 31, 2018 | Total         |
|-----------------------------------|-----------------------------------------|-----------------------------------------|---------------|
| Baseline Emissions                | 47,291                                  | 42,600                                  | 89,891        |
| Project Emissions                 | 56                                      | 55                                      | 111           |
| Pre-Discount                      | 0                                       | 0                                       | 0             |
| <b>Total Emissions Reductions</b> | <b>47,235</b>                           | <b>42,545</b>                           | <b>89,780</b> |

*Note: final numbers are rounded for simplicity.*

Throughout the verification process, SCS made several supplemental documentation requests in the form of New Information requests. These requests provided clarification regarding the project. The Findings from the verification of the Advanced Disposal Services are compiled in a separate “List of Findings” and are available under separate cover. The List of Findings is only shared between the Project Proponent and verifier and is not publicly available.

## Recommendation

The Lead Verifier recommends that SCS Global Services issue a positive verification opinion for the following:

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name & Address of Project Developer    | Advanced Disposal Services Maple Hill Landfill, LLC                                                                                                                                                                                                                                                                                                                                                                            |
| Scope of Verification                  | Emission reductions arising from the capture and destruction of Landfill Gas Methane from:<br>Maple Hill Landfill                                                                                                                                                                                                                                                                                                              |
| Reporting Period                       | January 1, 2017 to December 31, 2017 and January 1, 2018 to December 31, 2018                                                                                                                                                                                                                                                                                                                                                  |
| Total GHG Emission Reductions Verified | 47,235 for 2017 and<br>42,545 for 2018 metric tonnes CO <sub>2</sub> e                                                                                                                                                                                                                                                                                                                                                         |
| GHG Protocol(s) Used for Verification  | <ul style="list-style-type: none"> <li>■ CAR Landfill Project Protocol, Version 5.0, April 24, 2019</li> <li>■ CAR Verification Program Manual, February 8, 2017</li> <li>■ Reserve Offset Program Manual, November 12, 2019</li> <li>■ All Verification activities carried out by SCS followed the requirements of ISO 14064-3 (Specification with guidance for the validation and verification of GHG assertions)</li> </ul> |
| Lead Verifier's Approval               | <br>Tina Sentner, 03 January 2020                                                                                                                                                                                                                                                                                                           |
| Technical Reviewer's Approval          | <br>Scott Eaton, 3 January 2020                                                                                                                                                                                                                                                                                                             |
| Date of Verification                   | The Verification Statement is to be dated when the technical reviewer accepts the recommendation to issue the statement.                                                                                                                                                                                                                                                                                                       |

## Appendix A: SCS Certification Mark

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Congratulations on receiving a positive verification for Maple Hill Landfill. Your project is now eligible to use the SCS Kingfisher Certification Mark B for Carbon Offset Project Verification, as represented on the cover page of this verification report. The SCS Kingfisher Certification Mark increases the recognition of your achievements with your verification carbon offset project.

Please refer to the *SCS Kingfisher Certification Mark Labeling and Language Guide: Mark B* provided to you by the GHG Verification Program staff for more information about your Mark and usage. Should you have any additional questions regarding your Mark, use, messaging, or other marketing opportunities, please contact the GHG Verification Team or SCS Marketing Staff at [NRmarcom@scsglobalservices.com](mailto:NRmarcom@scsglobalservices.com).