

VERIFICATION REPORT

GREATER NEW BEDFORD LFG UTILIZATION PROJECT



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Summary:

CommonWealth Resource Management Corporation (CRMC) retained GHD Limited (GHD) to complete the verification of the Greater New Bedford LFG Utilization Project (Project Activity and Verified Carbon Standard ID: 138) for the January 1, 2018 through December 31, 2018 reporting period under the requirements of the Verified Carbon Standard (VCS). The Project Activity is located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States. The Project is operated by CRMC (Project Proponent).

The Project Activity consists of a landfill gas collection system and four combustion engines designed to capture and combust methane generated within the Crapo Hill solid waste landfill. A back-up flare is also connected to the landfill gas collection system to combust the landfill gas, as needed, when the engines are not operational. The baseline scenario of the Project Activity consisted of the voluntary installation of 21 vertical landfill gas extraction wells and a flare to combust the collected landfill gas. The project scenario consists of an expanded landfill gas collection system with additional vertical and horizontal extraction wells and the addition of the four landfill gas combustion engines. Blowers are used in the baseline and project scenarios to create a vacuum and draw in landfill gas to the landfill gas collection system. The Project Activity achieves emissions reductions through the collection and destruction of the methane within the landfill gas in either the four combustion engines or the flare that convert the methane to carbon dioxide, thereby preventing the release of methane to the atmosphere.

The Project Proponent utilized the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM) methodology ACM0001 entitled: "Large-scale Consolidated Methodology – Flaring or use of landfill gas", Version 16.0 dated 16 October 2015, as per the registered VCS Project Description (VCS PD), dated 17 December 2015.

The scope of this verification is such that GHD, recognized as an independent third-party Validation and Verification Body by the VCS (Registration Number 027) and as a Designated Operational Entity (DOE) by the UNFCCC CDM (Reference Number E-0020), is responsible for reviewing the Project Activity's monitoring plan, along with accompanying supporting materials and previous VCS Verification and Validation Reports. GHD utilized a risk-based analysis against the relevant requirements of both the interpretation from the CDM, the VCS Program Guide, Version 3.7, and VCS Standard Version 3.7, as applicable.

As part of the verification process, GHD reviewed the completeness, conservativeness, and accuracy of the underlying evidence for the assumptions and claims made, and data sources used. The results

of the investigation were then, together with the results of the review of other areas, combined to form the necessary input for the verification report and opinion.

The verification report and associated annexes document a total of fourteen (14) findings, which include:

- Four (4) Corrective Action Requests (CARs)
- Ten (10) Clarification Requests (LCs)
- Zero (0) Forward Action Requests (FAR)

Upon review of the documentation and explanations provided by the Project Proponent, all findings were closed in a clear and transparent manner. The verification was found to be performed in accordance with the VCS Program Guide, Version 3.7, and VCS Standard, Version 3.7, in addition to the UNFCCC CDM methodology and associated methodological tools. Based on the verification assessment performed, GHD is issuing a Positive Verification Opinion in regards to this Project Activity. GHD therefore recommends/certifies that the registered Project Activity has obtained the reported emission reductions of 76,930 tonnes of carbon dioxide equivalent.

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1 INTRODUCTION

1.1 Objective

CommonWealth Resource Management Corporation (CRMC/Project Proponent) retained GHD Limited (GHD) to complete the third-party verification of the 2018 monitoring period (1 January to 31 December 2018) for the following Verified Carbon Standard (VCS) Project Activity

- Greater New Bedford LFG Utilization Project (Project Activity) located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States, VCS Project ID: 138 (Project Activity)

GHD completed the verification pursuant to the relevant requirements of the VCS guidance (the Program Guide and Standard) as well as translational guidance from the UNFCCC CDM. As detailed in Section 5.1.1 of the Standard, *“Verification is the periodic ex-post independent assessment by a validation/verification body of the GHG emission reductions and removals that have occurred as a result of the project during the monitoring period, conducted in accordance with the VCS rules.”*

The objective of GHD, on behalf of the VCS, is to ensure that only Project Activities that meet the established criteria receive a positive and unconditional validation or verification statement. Specifically, the criteria states that the registered Project must result in emission reductions that are:

- Relevant
- Complete
- Consistent
- Accurate
- Transparent
- Conservative

In the verification of this VCS Project, GHD used a risk-based verification approach to focus and determine the detailed scope of the verification. The VCS and the CDM are rules-based mechanisms; GHD has ensured that the emission reductions for the monitoring period have been developed, in accordance with the VCS Program Guide Version 3.7 and the VCS Standard Version 3.7.

The key risks associated with the Project design, baseline, monitoring plan, emission reduction estimates, environmental impacts, and stakeholder comments are elements that are critical for meeting VCS criteria for achieving real, measurable, permanent, additional, independently audited, unique, transparent, and conservative greenhouse gas (GHG) reductions.

1.2 Scope and Criteria

The scope of the third-party verification services completed by GHD are as follows:

- Verification of the Greater New Bedford LFG Utilization Project (Project Activity) located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States for the monitoring period of 1 January 2018 through 31 December 2018 under the requirements of the VCS.

This Project Activity falls under Sectoral Scope 1 – Energy industries (renewable/non-renewable sources), which is one of the sectoral scopes for which GHD is accredited.

The Verification activities were completed pursuant to the most up-to-date related rules, requirements, regulations, modalities, criteria, guidelines, emission reductions yield, and principles in relation to the VCS Project Document (VCS PD) supplied by the Project Proponent. The Project Activity utilizes the UNFCCC CDM methodology ACM001: Large-scale Consolidated Methodology – Flaring or use of landfill gas, dated 16 October 2015, Version 16.0.

The scope of this verification is such that GHD, as an independent third party recognized as a Validation and Verification Body by the VCS (Registration Number 027) is responsible for reviewing the Monitoring Report including accompanying materials, the previous Validation Report, and the VCS PD including the monitoring plan, baseline assessment, and any supporting documentation.

GHD has prepared this verification report in accordance with ISO Standard ISO 14064 Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (ISO 14064-3) along with the criteria presented in the following documents:

- VCS Program Guide, dated 21 June 2017, Version 3.7 (VCS Program Guide)¹
- VCS Standard, dated 21 June 2017, Version 3.7 (VCS Standard)²
- VCS Validation and Verification Manual, dated 19 October 2016, Version 3.2 (VCS VVM)³
- UNFCCC CDM ACM001: Large-scale Consolidated Methodology – Flaring or use of landfill gas, dated 16 October 2015, Version 16.0

1.3 Level of Assurance

The verification was conducted to a reasonable level of assurance. Per the VCS Standard Section 5.3.1, *“The threshold for materiality with respect to the aggregate of errors, omissions and misrepresentations relative to the total reported GHG emission reductions and/or removals shall be five percent for projects and one percent for large projects.”*

Based on the reported emission reductions (i.e. less than 300,000 tonnes of carbon dioxide equivalent [tCO₂e]), the Project Activity is classified as a *project*, therefore the materiality was set at five (5) percent.

¹ https://verra.org/wp-content/uploads/2018/03/VCS_Program_Guide_v3.7.pdf

² https://verra.org/wp-content/uploads/2018/03/VCS_Standard_v3.7.pdf

³ https://verra.org/wp-content/uploads/2018/03/VCS_Validation_Verification_Manual_v3.2.pdf

1.4 Summary Description of the Project

The Project Activity (VCS ID: 138) is located at the Crapo Hill Landfill in Dartmouth, Massachusetts. The Project Activity consists of a landfill gas (LFG) collection system and four (4) combustion engines designed to capture and combust methane generated within the Crapo Hill solid waste landfill. A back-up flare is also connected to the landfill gas collection system to combust the landfill gas, as needed, when the engines are not operational. Blowers are connected to the network of piping along with vertical and horizontal extraction wells that are used to apply a vacuum to the system and collect the landfill gas.

The Project Activity achieves emissions reductions through the collection and destruction of the methane within the landfill gas in either the four combustion engines or the flare that convert the methane to carbon dioxide, thereby preventing the release of methane to the atmosphere. The baseline scenario consists of 21 vertical landfill gas extraction wells and the flare, whereas the project scenario includes an expanded landfill gas collection system containing additional vertical and horizontal extraction wells and the four electricity generation engines.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The Project Team has assessed and verified that the implementation of the Project Activity and the steps taken to report the emission reductions comply with the VCS criteria and relevant guidance provided by the VCS as well as relevant criteria of the UNFCCC CDM. The criteria used in the verification has been outlined in Section 1.2 above. The verification will include a review of relevant documentation, records, and completion of a Site Inspection.

GHD followed a risk-based verification approach. As such, GHD identified the key reporting risks related to the claimed emission reductions and assessed to what extent the Project Activity's control systems are adequate for mitigating any perceived reporting risks.

Key reporting risks that are not sufficiently addressed by the Project Activity's control system represents residual risks. GHD conducted a detailed verification and Site Inspection to investigate the residual risks. Key risks assessed during the verification included, but were not limited to, verification of correct use of emission factors, correct use of conversion factors, and consistency in aggregation of emissions data. Wherever practical, direct reading instruments were to be used to ensure that any reporting risks were kept within equipment and instrumentation performance limits. GHD included a Risk Assessment and Sampling Plan within the Verification Plan. The Verification Plan was updated throughout the verification as necessary. The final Verification Plan has been provided as Appendix A.

During the verification process, the GHD Project Team considered both quantitative and qualitative information on emission reductions. Quantitative data was comprised of the Monitoring Report and accompanying information submitted to the GHD Project Team by the Project Proponent. Qualitative data was comprised of information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, and review and internal audit of calculations/data transfers.

The main components of the GHD verification process conducted were as follows:

- Document review
- Preparation of Assessment List and Completion of a Site Inspection
- Findings Assessment and Issuance of Corrective Action Requests (CARs), Forward Action Requests (FARs) and/or Clarification Requests (CLs)
- Response to CARs, FARs, and CLs
- Draft Verification Report Issuance
- Technical Review
- Final Verification Report and Verification Statement Issuance

GHD's document review during the verification process was comprised of an evaluation of the following:

- The documentation, data and information is complete and comprehensive
- The monitoring methodologies are justified and appropriate for the specific Project Activity
- All aspects related to direct and indirect emissions, including leakage, are captured as applicable
- The calculation of GHG emission reductions is appropriate and uses conservative assumptions for estimating emission reductions
- The technical features of the Project Activity, as well as other information about the Project Activity have been sufficiently addressed
- The monitoring plan clearly identifies the frequency of, responsibility and authority for, monitoring, measurement, and data recording activities and sufficiently describes quality control/quality assurance/management control procedures

The outcome of the document review process and Site Inspection was the creation of a Findings Assessment. The Findings Assessment was issued to the Project Proponent for response to any corrective actions or clarification requests. Upon closing all findings identified by GHD, a Draft Verification Report was prepared. The Technical Reviewer completed a peer review of the Draft Verification Report, and there were no additional findings that required additional response from the Project Proponent. GHD issued a Draft Verification Report to the Project Proponent for review and comment. GHD then incorporated the Project Proponent's comments, as applicable and issued the Final Verification Report along with a completed Verification Representation.

The Verification Representation conclusion was based on the interaction of three key verification principles as follows:

1. Compliance with the monitoring plan
2. Accuracy
3. Quality of evidence

2.2 Document Review

The VCS verification process relies heavily upon document review. The primary document for review is the 2018 Monitoring Report. The Project Proponent provided GHD with the Monitoring Report and revised Monitoring Report as detailed below:

Document Date	Date Issued to GHD	Version Number	Methodology
15 February 2019	15 February 2019	1	ACM0001 Version 16.0
18 February 2019	18 February 2019	2	ACM0001 Version 16.0
14 March 2019	14 March 2019	3	ACM0001 Version 16.0
25 March 2019	25 March 2019	4	ACM0001 Version 16.0

The above submissions were reviewed by GHD. No issues were identified in the Monitoring Report Version No. 4 as a result of CARs #1 through #4, which are discussed in Section 4 below.

During the document review, GHD became familiar with the Project Activity in order to be able to compare the situation and status on site with the situation as described in the underlying documentation. GHD completed the following:

- Review of the data and information presented to verify completeness
- Review of the VCS PD and Monitoring Report, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures
- Evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions
- Review of the last revision of the previous verification and validation reports
- Review of operation licenses from local authorities
- Cross-check of available documentation with the registered VCS PD and Monitoring Report

GHD followed the audit trails and data sets on site for specific indicators, and cross-checked with the applicable records.

As part of the verification process, additional documentation supplemental to the Monitoring Report was requested and reviewed by GHD. This supplemental information included the following documents:

Date Issued to GHD	Document(s)	Description
19 February 2019	2016 Design Capacity Report.pdf	Design capacity report from Brown and Caldwell to US EPA, dated May 2, 2016
19 February 2019	Agreement 2017 and 2018.pdf	Agreement between NextEra Energy Power Marketing, LLC and Commonwealth New Bedford Energy, LLC regarding the purchase and sale of Massachusetts Class I Renewable Energy Credits
19 February 2019	CalAnalytical Inspection Service Calibration May2018.pdf	Calibration Certificates
19 February 2019	CNBE Final OP (SE-12-019).elecsig.073013.pdf	Massachusetts Department of Environmental Protection – Air Quality Operating Permit
19 February 2019	Daily Reports 2018.xlsx	Daily engine performance reports for the 2018 monitoring period
19 February 2019	FA Crapo Hill.031907.doc	Final Approval document for the Crapo Hill Landfill from MA Department of Environmental Protection
19 February 2019	MassDEP Status of Operating Permit Renewal.pdf	Operating Permit Renewal for the Crapo Hill Landfill
19 February 2019	Scannable Document on Feb 19, 2019 at 10_00_36 AM.pdf	Landtec Calibration Certificate for GEM2000 SN 12256
3 March 2019	CNBE VCS calc 2018.xlsx	GHG calculation tool and Exhibits 1 through 4
14 March 2019	CNBE VCS calc 2018 14Mar2018.xlsx	Updated GHG calculation tool addressing GHD's Findings
14 March 2019	Gas Constants.pdf	Gas constants from American Gas Association
14 March 2019	11111336-New Bedford-2018 Findings Assessment-Rev.0.xlsx	Project Proponent response to GHD's Findings
25 March 2019	Response to findings 25March2019.pdf	Project Proponent response to GHD's Findings
8 April 2019	CNBE VCS calc 2018 25Mar2018.xlsx	Updated GHG calculation tool addressing GHD's Findings

2.3 Interviews

GHD completed a Site Inspection for the verification on 19 February 2019. During this portion of the verification process, GHD was able to interview a series of Project stakeholders regarding various aspects of the Project Activity. Mr. Jason Clarke and Ms. Callie Churchill of GHD completed the Site Inspection. The following Project Stakeholders were interviewed by GHD:

Name of Interviewee	Position and Company	Details of Items Discussed
Mr. Thomas Yeransian	Principal, CRMC	- Overall management of VCS project and VCUs - Process flow for the Project - Components of the landfill gas collection system - Monitoring parameters for the landfill gas collection system and electricity generation plant - Locations of monitoring equipment and calibration frequencies - Reviewed permits and permitting requirements - Electricity consumption and back-up generator - Implication of digester biogas to the Project Activity - Project Activity inspection reports - Ownership of the landfill and the Project Activity - Ownership of the biogas and digester - Agreement for ownership of the landfill gas - FAR raised during validation
Mr. Shawn Peckham	Landfill Operations Manager, Greater New Bedford Regional Refuse Management District	- Monitoring of landfill gas collection system extraction wells - Monitoring and calibration of the equipment used to monitor the landfill gas collection system extraction wells

2.4 Site Inspections

The verification process is primarily a document review process. The completion of a Site Inspection provided the GHD Project Team with an added level of assurance that the information provided within documentation from the Project Proponent is complete and accurate as it relates to the Project Activity and emission reductions for the 2018 monitoring period. As stated above, GHD completed a Site Inspection for the verification on 19 February 2019. In addition to interviewing Project stakeholders as per Section 2.3 of this report, the GHD Project Team completed the following:

- A walkthrough of the Site and observation of the Project Activity's implementation/operation status
- Interview personnel with knowledge of the Project Activity and its implementation/operation to cross-check information provided; interviews may be conducted during the Site Inspection, but

may also be completed or continued by way of telephone or email. Details of the interviews are provided in Section 2.3 above

- Inspection of all monitoring equipment and a review of calibration and inspection data
- Request of information from personnel either not made previously available or deemed necessary following site walkthrough or following interviews
- Review of compliance related to the Project Activity and the registered VCS PD
- GHD reviewed each major component of the Project Activity including the engines, metering equipment, supervisory control and data acquisition (SCADA) system, landfill gas extraction wells and associated piping, and the flare

GHD focused on the key areas identified as follows:

- An assessment of the implementation and operation of the Project Activity as per the registered VCS PD
- A review of information flows for generating, aggregating, and reporting the monitoring parameters
- Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS PD
- A cross-check between information provided in the Monitoring Report and data from other sources such as plant log books, inventories, purchase records, or similar data sources
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the VCS PD
- A review of calculations and assumptions made in determining the GHG data and emission reductions
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters
- An inspection of physical and organizational aspects of the Project Activity

GHD verified the Project Activity is located at 300 Samuel Barnett Boulevard, New Bedford, Massachusetts at the following grid coordinates:

Latitude: 41.72oN

Longitude: -70.98oW

2.5 Resolution of Findings

The Verification findings are categorized as either a Corrective Action Request (CAR), Forward Action Request (FAR), or as a Clarification Request (CL).

The GHD Project Team raised CAR's in this Assessment if:

- The Project Proponent had made mistakes in assumptions or in the Project documentation that directly influenced the Project results
- The VCS requirements deemed relevant for verification of a Project Activity with certain characteristics were not met
- There is a risk that the Project would not be registered by the VCS or that emission reductions cannot be monitored, calculated, verified, and/or certified
- The Project Proponent has made mistakes that will influence the ability of the Project Activity to achieve relevant, complete, consistent, accurate, transparent, and conservative emission reductions
- The VCS requirements have not been met

When issued, FAR's will highlight issues related to Project implementation that require review during the subsequent verification of the Project Activity. FAR's do not relate to the VCS requirements for registration and thus do not require any formal response from the Project Proponent. No FAR's were issued during this verification. A FAR was raised during the validation of the Project Activity which is discussed further in Section 2.5.1.

CL's were issued to CRMC if the GHD Project Team determined that the information provided by CRMC was insufficient, unclear or not transparent enough to establish whether the applicable requirements are met.

Each CAR and CL raised by GHD was presented in individual rows of a large table that comprised the findings assessments. CRMC was required to complete the appropriate responses and to provide, where necessary, documentation as evidence of their assumptions and/or responses. The final version of the Findings Assessment is provided in Appendix B.

A summary of the final results of the findings assessments is presented as follows:

Finding Category	Number of Findings
CAR	4
FAR	0
CL	10
TOTAL	14

2.5.1 Forward Action Requests

A FAR was raised as a part of the validation process in order to address the future capacity of the Crapo Hill Landfill Site and the associated regulatory implications. The details of the FAR are presented below along with the verification activities that GHD performed to address it.

“GHD notes that at the time of Re-Validation the capacity of the Crapo Hill Landfill (landfill site) is below the threshold of approximately 2.5 million cubic meters of design disposal capacity and 50 Mg of NMOC emissions that are set out as per New Source Performance Standards (NSPS) and Existing Facility Guidelines (EGs) for Landfills (40 CFR 51, 52 and 60 March 12, 1996). However, as per the PDD the landfill site is due to be expanded in the future to a capacity greater than 2.5 million cubic meters and there may also be amendments or updates to the regulations as per the proposals issued by the U.S. Environmental Protection Agency (EPA) on August 14, 2015. As a result, GHD has raised this forward action request for future verifications during the crediting period to address any changes in the capacity of the landfill site and the applicable regulations.”

GHD discussed the FAR during the Site Inspection on 19 February 2019. The Project Proponent noted that the current capacity of the Crapo Hill Landfill does not exceed the 2.5 million cubic meters of design disposal capacity that relates to the New Source Performance Standards (NSPS). The Project Proponent provided a Design Capacity Report for the landfill from 2016 that applies to the current state of landfill operations and explicitly states that the current capacity of the landfill through the 2018 monitoring period is 2,132,283 cubic meters. The total NMOC emissions from the landfill were also detailed in the Operating Permit Renewal Application provided by the Project Proponent and were measured at 3.66 tons/year which is less than the 50 Mg/year (55 tons/year) specified in the NSPS Existing Facility Guidelines for Landfills. GHD notes that the NMOC threshold only applies once the landfill has exceeded the 2.5 million cubic meter capacity.

2.6 Eligibility for Validation Activities

Validation activities were not performed as part of this verification.

3 VALIDATION FINDINGS

There were no validation activities that took place during the verification of this reporting period.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The Project Activity received its Re-Validation Representation with the VCS dated 16 May 2016 as a Renewable Energy Industries type project under Sectoral Scope 1 defined by the UNFCCC and adopted by the VCS. The Project Activity was registered utilizing the approved consolidated large-scale methodology ACM0001 titled “Flaring or use of landfill gas”, dated 16 October 2015, Version 16.0 with a second crediting period of ten (10) years commencing on the 29 March 2016 immediately following the end of the Project Activity’s first crediting period and ending 28 March 2026.

Section 3.7.1 of the Standard states that *“The project start date is the date on which the project began generating GHG emission reductions or removals”*. The earliest credit start date established under the initial validation is 28 March 2006. The initial 10-year crediting period therefore began on 28 March 2006 and concluded on 28 March 2016. The Project Activity was then re-validated in 2016 and the second crediting period began on 29 March 2016 and will conclude on 28 March 2026. The stated crediting period is in accordance with the project crediting period Standard requirements. Monitoring data was provided for the 2018 monitoring period related to the destruction of landfill gas from the Crapo Hill Landfill in four (4) engines. The monitoring data indicates the Project was in consistent operation through 2018, with no significant unplanned downtime events. GHD verified that the data collected in 2018 was in accordance with the monitoring requirements of the registered VCS PD.

The four (4) engines actively destroyed landfill gas during this monitoring period. The back-up flare had limited use during the 2018 monitoring period and as a result, no emission reductions are claimed from flaring.

Based on a review of project information and observations from the Site Inspection, GHD determined that there are no material discrepancies between project implementation and the VCS PD.

GHD’s review of the monitoring plan and monitoring systems confirmed that the Project Activity is operating according to the monitoring plan, and the data collection methods and monitoring systems implemented at the Project Activity are robust.

The Project is currently registered at the American Carbon Registry (ACR), however, emission reductions for this monitoring period will not be claimed under ACR. GHD verified that the Project Proponent has not claimed GHG emission reductions in emissions trading programs or any other mechanism that includes GHG allowance trading. The Project is however, qualified under the Massachusetts, Connecticut, Maine and New Hampshire Renewable Energy Portfolio Programs to produce Class I Renewable Energy Credits in Massachusetts, Connecticut and Maine; and Class III Renewable Energy Credits in New Hampshire. The Renewable Energy Credits from these Programs do not result in any GHG emission reduction attributes associated with the destruction of methane.

The Project Activity supports sustainable development as it involves renewable energy generation.

The following table outlines the methodology deviations previous validated and approved for the Project Activity:

Number	Deviation	When approved?
1.	A separate LFG meter is not present on each of the four combustion engines. A single meter is used immediately before the piping splits to each engine. This meter is continuously recording data. Operating data is tracked for each engine so it is possible to calculate the flow destroyed by each engine and to ensure that LFG is destroyed. Flow controls are in place to ensure no LFG is sent to an engine that is not operating. This does not affect the conservativeness of the emissions reductions claimed.	Approved during the re-validation assessment in 2016
2.	Ex-ante emissions reductions calculations use historic Project specific data as the basis for projecting future emissions rather than the required CDM estimation tools. Using real data allows the estimations to be more accurate and reflect actual Project operating conditions. This does not affect the conservativeness of the emissions reductions claimed but increases the accuracy of the ex-ante projections ensuring the project is forecasting obtainable, appropriate emissions reductions.	Approved during the re-validation assessment in 2016.
3.	There is no flow meter installed on the collection pipe from the District Initial System to separately monitor the contribution of the original baseline system. Given the collection system design and meter requirements, installing a meter at this location would not produce reliable, meaningful results. Instead, well-head flow measurements are collected manually two times each month. These results are used to calculate the relative contribution of the District Initial System to the overall flow of LFG destroyed by the engines. This portion of the total	Approved during the re-validation assessment in 2016

Number	Deviation	When approved?
	flow represents $F_{CH_4,BL,y}$ and will be calculated on a monthly basis and subtracted from the total flow to account for the amount of methane destroyed in the baseline scenario. This approach represents an accurate measurement of the flow because (a) the portion of the landfill that includes the District Initial System (Phase 1) is capped so no landfill gas can be passively emitted to the atmosphere, and (b) the remaining active wells from the District Initial System are located in such a way as to enable capture of all LFG generated within the sphere of influence of the District Initial System. This deviation decreases the conservativeness of the emissions reductions claimed but significantly increases the accuracy of the calculations as is allowable under VCS Standard v3.5, Section 3.5.1.	
4.	The Project uses the eGrid electricity emissions factor rather than the default emissions factor provided in the CDM tool as explained in the project emissions section. This deviation decreases the conservativeness of the emissions reductions claimed but significantly increases the accuracy of the calculations as is allowable under VCS Standard v3.5, Section 3.5.1.	Approved during the re-validation assessment in 2016
5.	The SCADA system was programmed to calculate the methane gas flow in units of million British thermal units (MMBtu) using standardized gas flow (at 68°F and one atmosphere of pressure), methane concentration, the gross heat content (higher heating value) of methane, and the actual temperature and pressure. CNBE determines the volume of methane destroyed by converting the MMBtu values to total methane gas flow in standard cubic feet. This deviation from the monitoring methodology was previously approved by independent verifiers and had a conservative impact on the quantification of GHG emission reductions.	Approved during the validation of the initial crediting period.
6.	The Project reference conditions are 20 degrees Centigrade and 1 atmosphere rather than ACM0001 reference conditions of 0 degrees Centigrade and 1 atmosphere.	Approved during the validation of the initial crediting period.

Further to the deviations detailed above the Project Proponent had also applied an additional project deviation associated with the global warming potential for methane. This project deviation was removed as a result of CAR#1 as it is no longer applicable.

Based on the information provided to GHD from the Project Proponent, and the observations made during the Site Inspection, GHD concludes that the project has been implemented as described in the VCS PD.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

4.2.1 Monitoring Parameters

The following is a list of the monitoring parameters that the Technical Consultant and Project Proponent monitored during the crediting period and recorded in order to calculate the claimed emission reductions for the monitoring period:

Symbol	Description (Units)	Frequency
$EG_{\text{facility},y}$	Percent Methane content of landfill gas and biogas entering the engines (% v/v)	Continuous/real-time measurement, hourly, daily (SCADA)
$F_{\text{CH}_4,\text{EL},y}$ (symbol only represents landfill gas portion)	Volume of landfill gas and biogas entering the engines (acfm)	Continuous/real-time measurement, hourly, daily (SCADA)
-	Temperature of landfill gas and biogas entering the engines (°F)	Continuous (SCADA)
-	Pressure of landfill gas and biogas entering the engines (PSIG)	Continuous (SCADA)
-	Percent methane content of biogas from the anaerobic digester (% v/v)	Continuous and at totalization of biogas volume
-	Volume of biogas from the anaerobic digester (scfm)	Continuous and at totalization of biogas volume
-	Temperature of the biogas from the anaerobic digester (°F)	Continuous (SCADA)
-	Pressure of biogas from the anaerobic digester (PSIG)	Continuous (SCADA)
$F_{\text{CH}_4,\text{flared},y}$	Volume of landfill gas to the flare (scfm)	Continuous, hourly, daily

Symbol	Description (Units)	Frequency
%DistrictInitialSystem	Fraction of total LFG collected attributable to District Initial System represents the amount of landfill gas destroyed in the baseline scenario (%)	Twice per month (approximately every two weeks)
EF _{EL,Grid,y}	Emission factor for electricity generation in year y (tonnes CO ₂ /MWh)	Annual
TDL _{Grid,y}	Average technical transmission and distribution losses for grid in year y (no units)	Annual
EC _{Grid,y}	Amount of grid electricity consumed by the project (MWh)	Annual
FC _{Diesel,y}	Amount of diesel fuel consumed by the emergency generator (gallons)	Compiled annually
NCV _{diesel}	Energy content of diesel fuel (MMBtu/gallon)	Annual
EF _{CO₂,Diesel,y}	Emission factor for diesel fuel	Annual

The GHD Project Team reviewed the monitored parameters and their frequency, equipment used, and description. The GHD Project Team also verified that the monitoring of the above parameters coincides with the CDM Methodology and VCS guidance for the projected emission reductions and is consistent with the registered VCS PD.

The GHD Project Team also notes that the parameters available at validation detailed in the registered VCS PD have been applied appropriately and consistently with the parameters monitored during the 2018 monitoring period.

4.2.2 Methods for Recording Monitoring Parameters

SCADA System Monitoring

The Project Activity uses their internal SCADA system to record the monitoring parameters listed in Section 4.2.1 where the frequency of collection is continuous. The SCADA system measures and records methane content and gas (LFG and biogas) volume to the engines and flare once per minute, and then calculates methane quantities each minute. The results are then accumulated to provide hourly and daily totals in units of million British thermal units on a higher heating value basis [MMBtu (HHV)] and thousand standard cubic feet (KSCF) of LFG. This data is automatically saved from the SCADA system via a Microsoft Excel file that contains a summary of the hourly and daily total gas flows (landfill gas and biogas), methane content, heating value and then additional information pertaining to the operation and output of each of the four engines. This data is saved at the Project Activity but is also backed-up and can be accessed remotely.

The total gas flow provides data regarding the mixed landfill gas from the landfill and biogas from the anaerobic digester system. The same conversion of gas flow to heating value is made using data from the biogas feed pipe. The difference between the total Btus entering the engines and the total Btus received from the biogas facility is the quantity attributed to the landfill gas collected and is used in the calculations described previously in the VCS PD. The data collection method is consistent with the Project Activity deviation number 5 noted in Section 4.1 above and results in an accurate separation of the methane associated with the landfill gas and the methane associated with the biogas.

The SCADA system was reviewed by GHD during the Site Inspection on 19 February 2019 and is backed-up on-Site and externally. Upon review of the SCADA system by GHD during the Site Inspection, GHD verified that the above noted parameters are recorded via the SCADA system along with a significant number of other parameters related to the operation of the Project Activity but not specifically associated with the emission reductions (e.g. blower bearing temperature, engine temperature, and other maintenance related parameters). GHD determined that the using the SCADA system as the method to record the above noted parameters is appropriate and consistent with the VCS requirements.

The 2018 Monitoring Report Section 3.3.1 provides further details associated with how and where flow measurement and methane content data is collected. GHD was able to verify during the Site Inspection that the data collected associated with these parameters is accurate and consistent with the Monitoring Report and registered VCS PD. Through the review of the Project Proponents GHG calculation spreadsheet and daily reported data, GHD was able to verify that the data from these parameters is consistent with what is detailed in the Monitoring Report and VCS PD.

Volume of Landfill Gas to the Flare

In the 2018 Monitoring Report the Project Proponent has not attributed any landfill gas flow to the flare (refer to Exhibit 3). However, GHD identified that based on the data provided by the Project Proponent for the monitoring period there was a small amount of landfill gas flow to the flare in 2018. GHD requested clarification regarding this as detailed in CL#3 of the Findings Assessment. Ultimately the Project Proponent did not have sufficient data and/or information to support claiming the emission reductions from the destruction of landfill gas through the flare, therefore to be conservative the Project Proponent elected not to quantify the emission reductions from landfill flow to the flare. GHD verified that the Project Proponent has used a conservative approach by assigning the volume of landfill gas flow to the flare ($F_{CH_4, flared, y}$) during the 2018 monitoring period as 0 scfm. Therefore this parameter was not monitored in accordance with the VCS PD during the 2018 monitoring period however, the Project Proponent has applied a conservative value to this parameter as a result which GHD has determined is appropriate.

Methane Content of the Gas and Biogas

The methane content of the gas to the engines (landfill gas and biogas mixed) is measured continuously using a California Analytical non-dispersive infrared (NDIR) meter on a continuous basis. The metered results from this monitoring equipment is then aggregated by the SCADA system on an hourly and daily basis. During the 2018 monitoring period the NDIR monitoring equipment was sent out for factory calibration for the span of approximately one month between

May and June 2018. During this time the portable gas analyser (Landtec GEM 2000) was used to monitor the gas concentrations of the mixed landfill gas and biogas before it entered the engines. GHD raised CL#2 to request that the Project Proponent provide clarification on how the portable gas analyser monitoring equipment was used during the monitoring period. The Project Proponent updated the 2018 Monitoring Report to include the Landtec GEM 2000 as a monitored parameter.

The methane content of the biogas from the anaerobic digestion system is measured continuously using a Hitech Model NDIR meter on a continuous basis. The metered results from this monitoring equipment is then aggregated by the SCADA system on an hourly and daily basis. This information aids in subtracting the ineligible biogas fraction of the gas from the biogas/landfill gas mixture that is being fed into the engines.

District Initial System

The District Initial System consisted of the voluntary installation of 21 vertical landfill gas extraction wells and a flare to combust the collected landfill gas and represents the operations of the Project Activity in the baseline scenario. Typically on a bi-weekly basis (or twice per month) the Project Proponent uses a portable gas analyzer (Landtec GEM2000) to measure the landfill gas flow rate from each of the 21 vertical landfill gas extraction wells associated with the District Initial System. This flow information is used to establish the fraction of flow (%) of landfill gas to the engines that is attributed to the District Initial System during each monitoring event. The Project Proponent has retained an on-going summary of the flow from each of the 21 extraction wells since 2013 and has calculated the average fraction of flow that the District Initial System represents through that time period. The average fraction of landfill gas flow (5%) was used to calculate the baseline emissions associated with the District Initial System in 2018. GHD notes that during monitoring of the landfill gas flow at each of the 21 extraction wells the Project Proponent also monitors the methane, carbon dioxide, oxygen and balance gas concentrations to normalize the flow of methane to the total flow of landfill gas to the engines.

GHD notes that generally the above method was followed, however the Monitoring Report notes that for this parameter the data is collected on a bi-weekly/twice per month basis and in 2018 this data only appeared to be collected on a monthly basis. Given that the Project Proponent is using the average fraction of landfill gas flow for their calculations and this includes data points from 2013 through to 2018, this value is inherently conservative as the baseline extraction wells are anticipated to have reduced flow rates over time. GHD therefore verified that the monitoring method used for this parameter is accurate and generally consistent with the Monitoring Report and VCS PD.

4.2.3 Calculation of Emission Reductions

Baseline emissions

The procedure for quantification of the Baseline Emissions for the Project used the following applicable methodology:

- UNFCCC CDM *"Large-scale Consolidated Methodology – Flaring or use of landfill gas"*, ACM0001, Version 16.0 dated 16 October 2015.

The calculation methodology was applied to the calculation of emissions from methane contained within landfill gas which is generated from the decomposition of solid waste from within the landfill and combusted during electricity generation or in a flare.

For this Project Activity the baseline emissions consist of those associated with the volume of landfill gas that is destroyed in the flare and the engines to generate electricity. Further, the emissions associated with the fraction of landfill gas related to the District Initial System, need to be subtracted as this system was installed voluntarily as part of the baseline of the Project Activity. This subtraction of emissions is understood to occur in the baseline of the Project Activity.

The Baseline Emissions also include quantification of the fraction of methane in the landfill gas that would be oxidized in the top layer of the landfill in the baseline. This is a dimensionless value (0.1) that was available at validation and is therefore defined in the VCS PD. GHD verified that the Project Proponent has applied the Baseline Emissions calculations appropriately and they are consistent with the VCS PD.

Project Emissions

The procedure for quantification of the Project Emissions for the Project used the applicable methodology and tool:

- UNFCCC CDM *"Large-scale Consolidated Methodology – Flaring or use of landfill gas", ACM0001, Version 16.0 dated 16 October 2015.*
- UNFCCC CDM *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) 16 March 2008*

The calculation methodology for the project emissions was applied to the calculation of emissions from the following sources:

- Fossil Fuel Emissions – CO₂ – Generated from the combustion of fossil fuels in an emergency generator
- Electricity Consumption Emissions – CO₂ – Generated from the grid consumption of electricity within the Project Boundary

GHD verified that the Project Proponent has applied the Project Emissions calculations appropriately and they are consistent with the VCS PD.

Leakage

As per methodology ACM0001; "No leakage effects are accounted for under this methodology"

Net GHG Emission Reductions or Removals

The net GHG emission reductions are simply calculated by subtracting the project emissions from the baseline emissions. GHD verified that this calculation has been performed appropriately by the Project Proponent for the 2018 monitoring period.

Uncertainty Associated with the Calculation of Emissions

GHD identified the following minor uncertainties associated with the calculation of the Baseline and Project emissions which were addressed through the issuance of the following CAR's:

- Baseline Emissions – CAR#2 – The total MMBtu flow for the month of February 2018 in Exhibit 2 of the Monitoring Report was incorrect, however the total annual flow in MMBtu of landfill gas was still correct.
- Project Emissions – CAR#3 – The emissions associated with electricity consumption by the Project Activity ($EC_{Grid,y}$) were inconsistent with the third-party invoices provided and the discussion during the Site Inspection.
- Project Emissions – CAR#4 – The fraction of landfill gas flow from the District Initial System was applied to a total flow of landfill gas to the engines that was not representative of the full 2018 calendar year landfill gas flow. Therefore the emissions associated with the District Initial System were underestimated.

Each of the above noted CAR's were addressed by the Project Proponent to improve the certainty and accuracy associated with the Baseline and Project Emissions for the 2018 monitoring period.

Documentation

The Project Proponent provided a calculation spreadsheet to support applicable calculations. Additional documentation and information was provided by the Project Proponent to support the values used in the calculation spreadsheet.

Default Values

GHD reviewed the appropriateness of the default values applied by the Project Proponent which were mainly attributed to conversion from imperial to metric units along with default conversion factors for converting Btu's of methane to standard cubic feet. GHD requested clarification via CL#7 regarding the conversion factor of 1,012 Btu/scf applied to the calculations of total gas flow to the engines. The Project Proponent provide supporting evidence related to this conversion factor from a reliable source (American Gas Association).

Conclusion

- The referenced methodology has been applied correctly to calculate baseline emissions, project emissions and net GHG emission reductions.
- Relevant assumptions and data have been listed in the VCS PD and have been followed
- Data and parameter values used in the VCS PD are reasonable in the context of the Project and have been consistently been applied during the 2018 monitoring period, unless otherwise noted
- Estimates of the baseline and project emissions can be replicated using the provided data and parameters values listed in the VCS PD and 2018 Monitoring Report

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

GHD reviewed the quality of the evidence provided during the verification and requested additional evidence as required to further support the determination of emission reductions. Provided below is a summary of the CL's that were used through the verification process to address specific evidence requirements and clarify the quality of evidence:

- CL#1 – Covered the request for additional clarification regarding supporting evidence for a number of different aspects of the Project Activity related to; raw data from the SCADA system, calibration certificates for applicable metering, operating permit for the Project Activity, copy of a renewable energy credit sales agreement, permit for the existing flare and documentation related to the current capacity of the Crapo Hill Landfill.
- CL#4 – Request for the Project Proponent to provide supporting evidence related to the electricity consumption by the Project Activity
- CL#5 – Additional clarification was requested related to the amount of diesel fuel consumed by the diesel generator as further evidence to support the fossil fuel emissions from the Project Activity
- CL#6 – This request was related to clarification on the calibration events for the Monitoring Parameters in Section 4.2.1 to provide evidence related to the data associated with each of the parameters and therefore the quality of data provided.
- CL#8 – This request was as a result of the evidence provided not being entirely clear. It had appeared to GHD that in the evidence provided, a page appeared to be blank/missing related to the operating permit renewal and therefore GHD requested further evidence to support this document.

Each of the above noted CL's were closed out by GHD through explanation by the Project Proponent and the submission of additional supporting evidence to GHD, refer to Appendix B. External evidence was provided by the Project Proponent as detailed in Section 2.2. Internal evidence that GHD reviewed consisted of but was not limited to; factory calibration requirements for various meters, ECHO database review, historic verification reports, re-validation report, and VCS PD. Evidence was provided orally by the Project Proponent through the Site Inspection (refer to Section 2.3) and follow-up phone discussions. A significant portion of the evidence and the quality of the evidence was verified by GHD through the review of the documentation provided and then cross-checking with internal and external sources.

Through review of each of the different sources of evidence provided by the Project Proponent, GHD was able to verify that the evidence clearly and transparently conveys the data generation, aggregation, recording, calculation, and final transposition into the 2018 Monitoring Report. The conveyance from the metering through to the SCADA system, accompanying excel spreadsheets, and the calculation spreadsheet the information is clearly conveyed by the Project Proponent. The instrument calibration documentation, 2018 Monitoring Report, raw data, and permitting documentation support the transparency and quality of the information provided by the Project Proponent.

Monitoring Equipment Calibration Frequency

During the verification GHD performed a review of the monitoring frequency provided in the 2018 Monitoring Report for the monitored parameters and confirmed that it was consistent with the VCS PD. GHD did however, identify two instances where clarification was required related to the manufacturer calibration frequency requirements and the frequency specified in the 2018 Monitoring Report:

- CL#9 – GHD identified that the manufacturer recommendations for factory calibration for the portable gas analyzer (Landtec GEM2000) is bi-annually through discussions directly with the supplier and review of user manual for the monitoring equipment. The Monitoring Report and VCS PD both note calibration is conducted prior to each set of measurements and the Project Proponent provided sufficient evidence of these calibration events. The Project Proponent also performed factory calibration of the monitoring equipment annually in 2018. GHD concluded that although the Project Proponent may not meet the bi-annual factory calibrations set out by the manufacturer the Project Proponent is following the QA/QC procedures in their Monitoring Report and performed one annual factory calibration. GHD also obtained oral evidence from the manufacturer that when the Project Proponent completes the QA/QC procedures in their Monitoring Report they are insuring that the measuring equipment is reading correctly. Based on the above noted evidence GHD determined that the calibration frequency implemented for this monitoring equipment was appropriate.
- CL#10 – GHD identified that the California Analytical 602P measuring equipment used to measure the methane content of the gas (landfill gas and biogas) that goes into the engines was factory calibrated in 2018. The Project Proponent provided the factory calibration certificate to GHD for review. GHD identified that there are no specific factory calibration requirements for this meter and therefore requested clarification regarding the basis for the factory calibration and any applicable additions to the QA/QC procedures for this monitoring parameter. GHD verified that the Project Proponent performed the QA/QC procedures detailed in the Monitoring Report (refer to Exhibit 6). The Project Proponent identified that they will consult the manufacturer as required when an unacceptable degree of drift is observed between the weekly calibrations to ensure the measuring equipment is operating effectively. GHD determined that the Project Proponent is completing their QA/QC procedures for this monitoring parameter and is also being proactive at identifying when the measuring equipment requires factory service therefore, the calibration frequency implemented for this monitoring equipment was appropriate.

Conclusion

GHD concluded that the Project Proponent provided the required evidence with appropriate quality that allowed for accurate determination of the GHG emissions reductions from the Project Activity for the 2018 monitoring period.

4.4 Non-Permanence Risk Analysis

The Project Activity is not an Agriculture, Forestry, and Other Land Use (AFOLU) project, therefore a non-permanence risk analysis is not required.

5 SAFEGUARDS

5.1 No Net Harm

There are no negative environmental and socio-economic impacts identified by the Project Proponent. GHD also performed a review of the permits associated with the Project Activity and the EPA's Echo database and did not identify any outstanding violations that occurred during the 2018 monitoring period.

GHD verified that the Crapo Hill Landfill associated with the Project Activity is not yet subject to the NSPS based on the current capacity. As a result, emissions testing associated with non-methane organic compounds (NMOC) is not yet required. This standard is intended to identify and address landfill sites that may result in harm to the environment.

5.2 Local Stakeholder Consultation

The Project Proponent regularly engages with local stakeholders to gather input. Tours are provided of the facility to interested parties such as school groups, college students, environmental advocacy groups, and political leaders. The Project is often used as an example by the State of Massachusetts Clean Energy Council and Department of Environmental Protection as an important environmental project which helps Massachusetts achieve their environmental, renewable energy, greenhouse gas reduction and sustainability goals. In addition, the Project was awarded the Silver Metal for Excellence in 2010 for landfill gas and biogas projects by the Solid Waste Association of North America (SWANA).

6 VERIFICATION CONCLUSION

The verification of the Project Activity was performed in accordance with the following documents:

- ISO Standard ISO 14064 Greenhouse gases - Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions (ISO 14064-3) along with the criteria presented in the following documents:
- VCS Program Guide, dated 21 June 2017, 2013, Version 3.7
- VCS Standard, dated 21 June 2017, Version 3.7
- VCS Validation and Verification Manual, dated 16 October 2016, Version 3.2, and
- VCS Project Description, dated 12 May 2016
- UNFCCC CDM ACM001: Large-scale Consolidated Methodology – Flaring or use of landfill gas, dated 16 October 2015, Version 16.0 and associated tools

Through the collection of landfill gas from the landfill gas collection system in the Crapo Hill Landfill, including blowers, and subsequent destruction of the landfill gas in four electricity generation engines and/or a back-up flare, the Project Activity resulted in a reduction of GHG emissions that are relevant, complete, consistent, accurate, transparent and conservative.

Furthermore the emission reductions generated by the Project Activity served to contribute to sustainable development, and will result in long-term benefits to the mitigation of climate change.

Provided below is summary of the emissions reductions:

Verification period: From 1 January 2018 to 31 December 2018

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2018	76,943	13	0	76,930
Total	76,943	13	0	76,930

It is GHD's opinion that the emission reductions attributable to the Project Activity are free of material misstatements and concludes to a reasonable level of assurance that the emission reductions are additional to any emission reductions that would occur in the absence of the Project Activity. As a result, GHD is issuing a positive Verification Opinion in regards to this Project Activity and will therefore be approving the Project Activity for registration with the VCS with no limitations or qualifications. The Verification Deed of Representation is provided in Appendix C. GHD has not raised any qualifications or limitations.

APPENDIX A: FINAL VERIFICATION PLAN



Verification Plan

Greater New Bedford Landfill Gas Utilization Project

Project Proponent:
CommonWealth Resource
Management Corporation

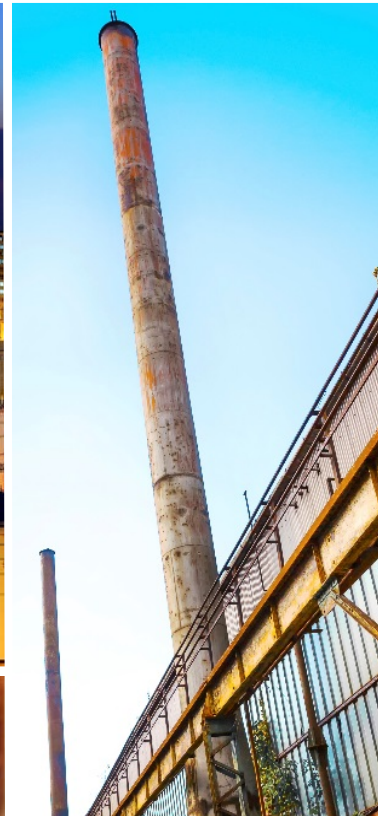




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1. Introduction

CommonWealth Resource Management Corporation (CRMC) retained GHD Limited (GHD), to complete an independent third-party verification of the Greater New Bedford Landfill Gas (LFG) Utilization Project (Project Activity), Verified Carbon Standard ID: 138. The project is located in Dartmouth, Massachusetts, United States of America, and meets the requirements of the Verified Carbon Standard (VCS). CRMC is the owner of the Project Activity and is the Project Proponent. The verification will be of the 2018 monitoring period (January 1 to December 31, 2018).

The VCS is established under Verra to provide a global standard for both validation and verification projects on a voluntary basis. The VCS takes the most stringent principles and standards available to the international GHG market, including and comprising of the United Nations Framework Convention on Climate Change (UNFCCC) and Climate Action Reserve, with reporting completed to the International Standards Organization (ISO) 14604 Part 3 standard.

GHD is a VCS-recognized GHG Validation/Verification Body (VVB) and is accredited by the American National Standard Institute (ANSI) ¹ under ISO 14065 to provide organizational and project level validation and verification services. Additionally, GHD is accredited as a Designated Operational Entity (DOE) by the UNFCCC to complete validations and verifications under the Clean Development Mechanism (CDM).

The VCS defines verification as "the periodic ex-post independent assessment by a validation/verification body of the [greenhouse gas (GHG)] emission reductions and removals that have occurred as a result of the project during the monitoring period, conducted in accordance with the VCS rules".² This Verification Plan has been prepared in accordance with the requirements presented in the following documents:

- VCS Program Guide, Version 3.7, dated June 21, 2017 (VCS Program Guide)
- VCS Standard, Version 3.7, dated June 21, 2017 (VCS Standard)
- VCS Validation and Verification Manual, Version 3.2, dated October 19, 2016 (VCS VVM)

In accordance with the VCS Program Guide, eligible GHG emissions reductions projects are to be evaluated by an accredited Validator/Verifier who has been approved under an accredited GHG program. GHD is a recognized Validator/Verifier under the VCS for projects within the following sectoral scopes:

- Sectoral Scope 1 - Energy industries (renewable/non-renewable sources)
- Sectoral Scope 4 - Manufacturing industries
- Sectoral Scope 5 - Chemical industry

¹ ANSI is a member of the International Accreditation Forum (IAF).

² http://verra.org/wp-content/uploads/2018/03/VCS_Standard_v3.7.pdf (Section 5.1.1)



- Sectoral Scope 10 - Fugitive emissions from fuels (solid, oil, and gas)
- Sectoral Scope 12 - Solvents use
- Sectoral Scope 13 - Waste handling and disposal

2. Verification Objective

GHD is to provide the Project Proponent and the VCS with assurance that the 2018 Monitoring Report contains no material discrepancy and is prepared in accordance with VCS Program Guide Version 3.7 and VCS Standard Version 3.7 as well as the translational guidance from the UNFCCC CDM.

GHD, as an independent third-party recognized as a VVB by the VCS (Registration Number 027), is responsible for reviewing the 2018 Monitoring Report including accompanying materials, previous VCS Verification and Validation Reports, and the VCS Project Description (PD) including the monitoring plan, baseline assessment, and any supporting documentation.

Per the VCS VVM, during verification VVBs must evaluate the Monitoring Report and assess the following:

- The extent to which methods and procedures, including monitoring procedures, have been implemented in accordance with the validated PD. This includes ensuring conformance with the monitoring plan.
- The extent to which GHG emission reductions and removals reported in the monitoring report are materially accurate.

3. Level of Assurance

The verification will be conducted to a reasonable level of assurance.

4. Materiality

Per the VCS Standard, "The threshold for materiality with respect to the aggregate of errors, omissions and misrepresentations relative to the total reported GHG emission reductions and/or removals shall be five percent for projects and one percent for large projects."

Based on historical reported emission reductions, the Project Activity is a project, therefore the materiality will be set at five (5) percent. GHD will revise the materiality for the Project Activity, as required, upon obtaining emission reduction estimates for the 2018 monitoring period.

5. Verification Standards

For the verification, GHD will apply the VCS Program Guide Version 3.7, the VCS Standard Version 3.7, and the VCS Validation and Verification Manual.



6. Verification Criteria

For this verification, GHD will apply the following criteria:

- VCS Program Guide, Version 3.7, dated June 21, 2017 (VCS Program Guide)
- VCS Standard, Version 3.7, dated June 21, 2017 (VCS Standard)
- VCS Validation and Verification Manual, Version 3.2, dated October 19, 2016 (VCS VVM)
- UNFCCC CDM ACM0001: Flaring or use of landfill gas, Version 16.0
- ISO 14064-3:2006 Specification with guidance for the validation and verification of greenhouse gas assertions

7. Scope of Services

The scope of services to be completed by GHD are as follows:

- Verification of the New Bedford LFG Utilization Project located in Dartmouth, Massachusetts, U.S.A for the monitoring period of January 1, 2018 through December 31, 2018 under the requirements of the VCS.

This Project Activity falls under Sectoral Scope 13 – Waste handling and disposal, which is one of the sectoral scopes for which GHD is accredited. GHD understands for the purposes of the works associated with the verification scope of work, all correspondence with respect to this Project Activity will be with CRMC unless otherwise noted.

The Verification activities will be completed pursuant to the most up-to-date related rules, requirements, regulations, modalities, criteria, guidelines, emission reductions yield, and principles in relation to the PD supplied by the Project Proponent. The Project Activity utilizes the UNFCCC CDM methodology ACM0001: Large-scale Consolidated Methodology – Flaring or use of landfill gas", Version 16.0, dated October 16, 2015. This methodology has been accepted for use by the VCS.

GHD will review the PD, Monitoring Plan, Monitoring Report, and related information along with preparing a Verification Report and Verification Deed of Representation (Verification Representation) for the crediting period. GHD will submit the Verification Report and Verification Representation to CRMC for submission to the VCS Registry, irrespective of the outcome of the Verification.

Verification Team

The proposed Verification Team for this Project Activity has been established to provide the Project Proponent with a fully capable and qualified project team with specific knowledge of the local area as well as the requirements of the applicable VCS project protocols. As for any assurance project, GHD pairs auditing expertise with technical expertise in order to provide all required aspects of an assurance process. For this verification assignment, the Verification Team is comprised of accredited engineers, including specialists in renewable energy and other related projects. The resources indicated will be focused on this verification activity to ensure that the assignment is completed in accordance with the indicated schedule.



The Verification Team consists of the following members:

Team Leader and Lead Verifier – Jason Clarke, B.Eng.

Jason is a Lead Verifier and has been with GHD since 2012. Jason has practical and facility-specific experience associated with a range of greenhouse gas (GHG) validation and verification activities. Jason is a Lead Verifier under the California Air and Resources Board (ARB) and an offset project specialist in Livestock and Ozone Depleting Substances (ODS). Jason is also Lead Verifier for the verification of a variety of Ontario based facilities under O. Reg. 452/09 and 390/18. Jason is also a Lead Verifier and Landfill Project Specialist under the Climate Action Reserve. Further, Jason has been a validation/verification team member for a variety of GHG Validation and Verification projects registered under ANSI and UNFCCC Clean Development Mechanism (CDM).

Jason has been involved in the preparation of GHG Validation and Verification plans, issues logs, draft and final validation/verification reports, and findings assessments for various GHG projects associated with the Ontario Ministry of the Environment and Parks (MECP), ANSI, TCR, Massachusetts Department of Environmental Protection (MassDEP), Verra (VCS), and the UNFCCC CDM. Jason also has experience with the internal and external auditing related to GHG Verification and Validation projects in Ontario, Quebec, Alberta, British Columbia, and Massachusetts.

Role of Team Leader: As Team Leader, Mr. Clarke will be the primary contact for CRMC unless otherwise delegated. The Team Leader will be responsible for establishing that no conflicts of interest are present prior to initialization of the work. During the verification Mr. Clarke will be responsible for preparing and/or reviewing and issuing the findings assessments as well as the transfer of material to the Independent Technical Reviewer when required. Specifically, Mr. Clarke will be present during any site visits such that a sufficient technical resources base is available.

Team Member and Verifier – Michelle Hirst

Ms. Hirst has over 8 years of experience preparing emission reports, as well as verifying offset projects and emission reports. Her capabilities have broadly involved verifying fugitive emissions, ozone depleting substances, forestry, mine methane capture, and livestock offset projects under the ARB, Climate Action Reserve (CAR), American Carbon Registry (ACR), and Verra (formerly Verified Carbon Standard), as well as verifying emission reports submitted under the British Columbia (BC) Reporting Regulation, Alberta Environment and Parks (AEP) Specified Gas Emitters Regulation (SGER), and Ontario Regulation (O. Reg.) 390/18 in Canada, and corporate emission reports submitted under the Global Reporting Initiative. Ms. Hirst is an ARB accredited Lead Offset Verifier, an Offset Project Specialist for livestock and ODS projects, and a CAR accredited Lead Verifier and a Landfill Project Specialist.

Role of Team Member: Ms. Hirst will be responsible for establishing that no conflicts of interest are present prior to initialization of the work. During the verification Ms. Hirst will be responsible for preparing and/or reviewing and issuing the findings assessments as well as the transfer of material to the Technical Reviewer when required.



Team Member and Verifier – Callie Churchill, B.Eng.

Ms. Churchill is a Junior Engineer at GHD and graduated from the University of Guelph with a Bachelor's Degree in Environmental Engineering. Ms. Churchill has been with GHD since 2016. Ms. Churchill has greenhouse gas (GHG) validation and verification experience under the Alberta Environment and Parks Specified Gas Reporting Regulation, Ontario Regulation 390/18, the British Columbia Reporting Regulation, the Alberta Emissions Offset Registry, the California Air Resources Board, and the UNFCCC Clean Development Mechanism. Ms. Churchill has been involved in the preparation of verification plans, sampling plans, calculation workbooks, verification reports, and findings assessments for the projects.

Role of Team Member: Ms. Churchill will be responsible for completing re-calculations of the emission reductions, reviewing calibration certificates for relevant electricity meters, and reviewing other supporting documents. During the verification Ms. Churchill will be responsible for preparing and/or reviewing and issuing the findings assessments as well as the transfer of material to the Technical Reviewer when required.

Technical Reviewer and Technical Expert – Gordon Reusing, M.A.Sc., P.E., P. Eng.

Mr. Reusing holds a Masters of Science Degree in Engineering from the University of Waterloo. He has over 20 years of extensive Canadian and US industrial sector experience, including the cement manufacturing sector, and has completed many GHG quantification studies for a wide variety of facilities. Mr. Reusing is very familiar with the GHG intensive processes and sources. Mr. Reusing is identified as an air emissions expert for quantification of emissions reductions in accordance with GHD's role as a DOE in the UNFCCC. Mr. Reusing's responsibilities include air emissions quantification, economic assessments, and project characterization for projects relating to municipal, solid and hazardous waste management, energy industries, manufacturing industries, and chemical industries. Mr. Reusing has acted as a Lead Verifier and Technical Expert for verifications of offsets and compliance reports under the Alberta Specified Gas Emitters Regulation, verifications and validations under British Columbia's GHG reporting and offsets regulations, validations under the Climate Registry (TCR) programme and validations under The Gold Standard programme.

Role of Technical Reviewer and Technical Expert: As the Technical Reviewer and Technical Expert, Mr. Reusing will be responsible for the third party review of the verification report prepared by the Team Members against the requirements of the VCS specifically providing technical expertise for the overall independent review process. Mr. Reusing will make known any further questions or comments to the Team Leader upon their review and will ensure through the Team Leader that these questions have been addressed accordingly.

8. Verification Process

The main components of the GHD verification process are as follows:

- Document Review
- Preparation of Assessment List and Completion of a Site Visit
- Verification Assessment and Issuance of Corrective Action Requests (CARs)/Clarification Requests (CLs)



- Response to CAR(s)/CL(s)
- Review and/or development of Forward Action Requests (FARs), as applicable
- Draft Verification Report Issuance
- Final Verification Report Issuance
- Technical Review and Verification Representation

The timelines associated with each of these items are discussed in the sections to follow.

8.1 Overview of Verification Process

The Verification Team will assess and verify that the implementation of the Project Activity and the steps taken to report emission reductions, comply with the VCS criteria and relevant guidance provided by the VCS. The verification will include a review of relevant documentation, records, and an on-site visit.

During the verification process, the Verification Team will consider both quantitative and qualitative information on emission reductions. Quantitative data is comprised of the monitoring reports submitted to the Verification Team by the Project Proponent. Qualitative data is comprised of information on internal management controls, calculation procedures, and procedures for transfer, frequency of emissions reports, and review and internal verification of calculations/data transfers.

The verification conclusion will be based on the interaction of three key verification principles as follows:

1. Compliance with the monitoring plan
2. Accuracy
3. Quality of evidence

8.2 Verification Findings

During the verification process, the Verification Team may identify issues related to the Project Activity's ability to meet VCS requirements and achieve credible emission reductions. Although there are different methods of reporting such results, it is imperative that these issues are transparently identified, discussed, and concluded in the Verification Report.

If during the verification of the Project Activity, the Verification Team identifies issues that need to be addressed to confirm that the Project Activity meets the VCS requirements, the Lead Verifier will issue a CAR CL, and/or a FAR, as appropriate, via a findings assessment to the Project Proponent.

Iterations of these requests will be continued until such a time as the Lead Verifier can adequately resolve or "close out" the identified CAR(s), CL(s), and/or FAR(s), as applicable.

Each of these procedures is discussed in further detail below.

Corrective Action Request (CAR)

A CAR is issued during a verification if the VVB has identified a material discrepancy or non-conformance that the Project Proponent must address. More specifically, the CDM provides a



standard that the VVB can use for the issuance of CARs, as detailed below, based on Section 9.1.3.2 of the CDM Validation and Verification Standard ³:

- Non-compliance with the registered monitoring plan, the applied methodologies, the applied standardized baselines or the other applied methodological regulatory documents is found in monitoring and reporting and has not been sufficiently documented by the Project Participant(s), or if the evidence provided to prove conformity is insufficient.
- Modifications to the implementation, operation and monitoring of the registered CDM project activity has not been sufficiently documented by the Project Participant(s).
- Mistakes have been made in applying assumptions, data or calculations of GHG emission reductions or net anthropogenic GHG removals that will impact the quantity of emission reductions or removals
- Issues identified in a FAR during the validation to be verified during the verification or the previous verification(s) have not been resolved by the Project Participant(s)

The above issues could result in the expected emission reductions not being realized.

The Lead Verifier will resolve or "close out" CARs only if the Project Proponent modifies the Monitoring Report, or provides adequate additional explanations or evidence that satisfies the Verification Team's concerns and the VCS requirements. GHD is unable to issue a Verification Representation prior to the resolution of all CARs. The Verification Team will report on all CARs in the findings assessment and Verification Report.

Clarification Request (CL)

In general, a CL is a request for additional clarification made by the Verification Team to the Project Proponent when the Project Activity reporting, lacks transparency, is unclear, and further information is needed to determine whether the applicable requirements are met.

The Lead Verifier will resolve or "close out" CLs only if the Project Proponent provides adequate additional explanations or evidence that satisfies the Verification Team's concerns and the VCS requirements. If this is not completed, GHD will not recommend the Monitoring Report for registration to the VCS. GHD is unable to issue a Verification Representation prior to the resolution of all CLs. The Verification Team will report on all CLs in the findings assessment and Verification Report.

Forward Action Request (FAR)

A FAR is request made during the validation to "identify issues related to project implementation that require review during the first verification of the proposed CDM project activity."³

The Lead Auditor will address any FAR(s) raised from the validation during the verification , as required. In addition, FAR(s) may also require review in subsequent verifications. The Project Auditing Team will report on all FARs in the findings assessment and Verification Report.

³ CDM validation and verification standard for project activities



8.3 Site Visit

Based on conversations between GHD and CRMC, GHD is anticipating to complete the Site Visit component of the verification on February 19, 2019. GHD will complete the following items during the Site Visit:

- A walkthrough of the site and observation of the Project Activity's implementation/operation status.
- Interview personnel with knowledge of the Project Activity and its implementation/operation to cross-check information provided; interviews may be conducted during the Site Visit, but may also be completed or continued by way of telephone or email.
- Inspection of all monitoring equipment and a review of calibration and inspection data.
- Request of information from personnel either not made previously available or deemed necessary following site walkthrough or following interviews.

8.4 Quality Control

GHD in its role as DOE/VVB has established, documented, and is maintaining a quality management system (CDM Quality System) for conducting CDM-related projects that is integrated with GHD's ISO 9001:2015 Quality System. The CDM-related aspects of the Quality System have been added based on CDM requirements. Appropriate portions of the Quality System are available to required parties, and will be periodically updated as changes to the DOE accreditation requirements occur.

8.5 Reporting

The Verification Report will describe the verification process, any findings raised, resolution of findings, and to conclusions reached by the VVB during the verification. GHD will use the most recent VCS Report Template.

The results of the verification will give the necessary input for the Verification Representation. The Verification Representation will be only be provided for a positive verification opinion. Irrespective of whether or not the Verification Representation can be provided, the Verification Report will be sent to the VCS Registry. The Verification Report will provide all required details identified in Section 5.3.9 of the VCS Standard, Version 3.7:

- Description of the level of assurance of the validation or verification.
- Description of the objectives, scope and criteria of the validation.
- Description as to whether the data and information supporting the GHG assertion were hypothetical, projected and/or historical in nature.
- Inclusion of the validation/verification body's conclusion on the GHG assertion, including any qualifications or limitations.

The Verification Report shall state the volume of verified GHG emission reductions or removals generated during the monitoring period.



9. Risk Assessment

GHD will follow a risk-based verification approach. As such, GHD will identify the key reporting risks related to the claimed emission reductions and assess to what extent the project operator's control systems are adequate for mitigating any perceived reporting risks.

Key reporting risks that are not sufficiently addressed by the project operator's control system represents residual risks. The Verification Team will conduct a detailed verification to investigate the residual risks. Key issues in verification include, but are not limited to, verification of correct use of emission factors, correct use of conversion factors, and consistency in aggregation of emissions data. Wherever practical, direct reading instruments are to be used to ensure that any reporting risks are kept with equipment and instrumentation performance limits.

GHD notes that the previous verification only covered from May 1, 2017 to December 31, 2017 and therefore percentage change presented in the table below is not necessarily an accurate representation of total annual changes in the emissions

Potential Risk Area	Percentage of total Site Emissions (%) and Percent Change of Source Specific Emissions Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
Baseline Emissions				
LFG Destruction	100% (26.4% increase from 2017 verification)	Inherent	Medium	An on-site SCADA system measures methane content and gas volume to the engines and flare each minute. Meters are calibrated regularly. It is expected this source will be a significant contributor to emissions. Therefore, the inherent risk has been set to medium.
		Control	Low	Meters are calibrated regularly. The SCADA system is automatically backed up daily. The file is backed up both at the Facility and off site. This leads to a low control risk related to data acquisition and control.
		Detection	Low	GHD will review SCADA data related to on-site methane content and gas volumes and meter calibrations for the entire monitoring period. There is a low risk that a material error would not be detected.



Potential Risk Area	Percentage of total Site Emissions (%) and Percent Change of Source Specific Emissions Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
Project Emissions				
Fossil Fuel Consumption	0.59% (92.3% increase from 2017 verification)	Inherent	Medium	Fossil fuel consumption is recorded internally, however it is expected this will be a relatively low contributing source of emissions. Therefore, the inherent risk has been set to medium.
		Control	Medium	Fossil fuel consumption is recorded internally, therefore the control risk is medium.
		Detection	Low	GHD will review the internal fossil fuel consumption records, and defaults and emission factors used in the calculations. There is a low risk that a material error will not be detected.
Electricity Consumption	0% (100% decrease from 2017 verification)	Inherent	Low	Electricity consumption is determined from third-party invoices, therefore the inherent risk is low.
		Control	Low	Electricity consumption is determined from third-party invoices, therefore the control risk is low.
		Detection	Low	GHD reviewed third-party invoices and all defaults and emission factors used in the calculations. There is a low risk that a material error was not detected.
District Initial System LFG Destruction	99.41% (26.4% increase from 2017 verification)	Inherent	Medium	LFG being destroyed in the baseline is determined with well head measurements of District Initial System collected twice a month. Data is collected with a portable gas analyzer that requires regular calibration. The inherent risk is medium .
		Control	Low	Calibration of the portable gas analyzer is completed prior to obtaining each set of measurements and documented. GHD reviewed all accompanying



Potential Risk Area	Percentage of total Site Emissions (%) and Percent Change of Source Specific Emissions Year Over Year	Risk Type (Inherent, Control, Detection)	Risk Level (High, Medium, Low)	Justification
				documentation, therefore the control risk is low.
		Detection	Low	GHD reviewed each measurement, the qualifications of the responsible party, and the associated calibration records for the monitoring period. There is a low risk that a material error was not detected.

The District Initial System LFG Destruction emissions are actually classified as baseline emissions, however because they are subtracted from the baseline emissions they are conveyed as project emissions in the above table and in Section 10.

10. Sampling Plan

GHD has prepared the below draft sampling plan for the verification.

Data/Information Description	Percentage of total Site Emissions (%)	Data/Information Source	Collection Frequency	Sample Size/Assessment Method
Baseline Emissions				
LFG Destruction	100%	SCADA system	Continuous and aggregated hourly and daily	- Reviewed full year of daily aggregated data - Reviewed calibrations and QA/QC procedures for relevant monitoring equipment - Reviewed calculation for conversion to Btu's
Project Emissions				
Project Fossil Fuel Consumption	0.59%	Fuel use by the Emergency Generator	Plant operator maintains a run time log, data compiled annually	Reviewed calculations for fossil fuel consumption by the Emergency Generator and defaults and emission factors used



Data/Information Description	Percentage of total Site Emissions (%)	Data/Information Source	Collection Frequency	Sample Size/Assessment Method
Project Electricity Consumption	0%	Electricity consumption	Bills are compiled annually	- Reviewed full year of electricity consumption data - Reviewed calculations for electricity consumption and defaults and emission factors used
District Initial System LFG Generation and Destruction	99.41%	Fraction of total LFG collected attributable to the District Initial System	Well head measurement of District Initial System collected twice a month	- Reviewed full year of measurements from each well-head - Reviewed calibrations and QA/QC procedures for the hand-held instrument(s) - Reviewed calculation for determination of the fraction
Detailed Process Overview	N/A	- Review of Process Details - Process flow diagram for the Facility	N/A	- Reviewed during Site Visit - Interviewed Project Participant personnel as applicable
Back up of data acquisition systems	N/A	- General Data Management System - Controls and QA/QC procedures - Document retention policy	N/A	- Reviewed frequency of data backup - Interviewed Project Proponent personnel as applicable
Data acquisition and flow from meters to data collection/process monitoring system software to data historian	N/A	Project Proponent	N/A	- Reviewed data systems - Interviewed Project Participant personnel as applicable
Compliance with PD	N/A	Project Description	N/A	- Site Visit - Monitoring Plan - Interviewed Project Proponent personnel as applicable



Data/Information Description	Percentage of total Site Emissions (%)	Data/Information Source	Collection Frequency	Sample Size/Assessment Method
Compliance of the Monitoring Plan	N/A	- Project Description - Monitoring Plan	Annual	- Ensure Monitoring Plan and supporting documents are complete, verifiable, and in accordance with VCS requirements - Reviewed any changes to the Project Activity, as applicable
Accuracy	N/A	Electricity Meters	Continuous records and calibration records	Reviewed calibration certificates and meter data

11. Verification Timelines

GHD is committed to providing efficient and effective services to all of its clients. In order for GHD to maintain a strict schedule, it is additionally the responsibility of CRMC to maintain adherence to the proposed schedule.

The following table presents the proposed timelines based on the general information provided by the Project Proponent with regard to the date on which the PD will be available to GHD. A key component to maintaining the proposed timelines is the timely and complete response of the Project Proponent to any/all CAR(s), CL(s), and FAR(s).

GHD reserves the right to revise or change the proposed timelines and the associated fees given the following occurrences:

- A CAR/CL is not adequately responded to in accordance with VCS standards within thirty (30) days of submittal of the request by GHD to the Project Proponent.
- The VCS guidance related to the verification is revised during the verification process.

Assuming that none of the previously mentioned events occur during GHD's verification assessment such that the verification process timelines would be altered, the following table presents the proposed timelines for completing the verification.

Table 12.1 Proposed Verification Timeline

Date/Timeline	Milestone	GHD Deliverable
Start Date (February 4, 2019)	Contract is Duly signed by CRMC and GHD	Duly signed contract
Start Date (February 14, 2019)	GHD submits Verification Plan and CRMC provides VCS Monitoring Report, Monitoring Plan, and PD	Verification Plan



Date/Timeline	Milestone	GHD Deliverable
Start Date + 2 Weeks	Verification Team reviews the documentation and formulates CARs/CLs and issues a Summary of Findings to CRMC	Summary of Findings consisting of CARs, CLs, and FARs
February 19, 2019	Verification Team will conduct a site visit for the Project Activity	Not applicable
Client Dependent (up to 30 days)	CRMC submits documentation addressing all CARs/CLs in a single submission package to GHD for the Project Activity	Not applicable
CAR/CL Closeout + 2 Weeks	Verification Team will review the additional supporting documentation and any changes to the PD or the Monitoring Report. If required, GHD provides CRMC with additional/revised CARs/CLs. Upon closure of all CARs/CLs GHD will issue the Draft Verification Report to Technical Reviewer.	Summary of Findings, if applicable
CAR/CL Closeout + 3 Weeks	Final review of the Monitoring Report and Draft Verification Report by the Technical Reviewer. Revisions to the Draft Verification Report to address Technical Review comments.	A request for any additional information required resulting from the Technical Review Draft Verification Report
CAR/CL Closeout + 4 Weeks	Revisions to the Draft Verification Report to address CRMC comments. Preparation of Final Verification Report and Statement.	Submit of the Final Verification Report and Statement to VCS



12. Closing

The Verification Plan is considered to be a dynamic document that may require modification and adaptation to conditions as encountered during the completion of the Verification process. GHD will communicate the changes to the Verification Plan with CRMC throughout the verification.

All of Which is Respectfully Submitted,

GHD

A handwritten signature in blue ink, appearing to read "Jason Clarke".

Jason Clarke, Team Leader and Lead Verifier

A handwritten signature in blue ink, appearing to read "Gordon Reusing".

Gordon Reusing, Technical Reviewer and Technical Expert



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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APPENDIX B: FINDINGS ASSESSMENT

TABLE 1
FINDINGS ASSESSMENT
NEW BEDFORD LFG UTILIZATION PROJECT
2018 MONITORING PERIOD VERIFICATION

Rev. No.	Date Issued
0	March 13, 2019
1	March 21, 2019
2	April 11, 2019

CL #	Clarification Request	Explanation/Response	Changes applied to Project Documents	Status
1	GHD requests that the Project Proponent provide clarification regarding the following items discussed during the Site Visit: - Raw data from the SCADA system related to LFG flow, methane concentration, etc. - Calibration certificate associated with the California analytical meter (used to measure the methane concentration of the LFG/biogas mixture) - CNBE Operating Permit and associated renewal correspondence - Copy of the agreement for the sale of RECs identifying that environmental attributes are not included in the sale of RECs related to the Project - Permit for the existing flare to confirm total LFG flow capacity - Documents associated with the total capacity of the landfill site in its current state and relation to the NSPS threshold	Requested documentation from the Site Visit provided by the Project Proponent on February 19, 2019 via e-mail. GHD reviewed the provided documentation and did not identify if any further clarification or correction is required. GHD discussed the applicability of the Capacity Report provided in relation to the total capacity of the landfill site and confirmed that although this report is dated in 2016 it still applies to the 2018 monitoring period as the conditions at the Site have not changed until 2019 when a new cell is being constructed. GHD also verified that the Crapo Hill Landfill Site is still well below (3.66 tons/year) the 50 Mg/year (55 tons/year) NMOC NSPS emission threshold as per the permit renewal documentation provided for the Site.	None	Closed
2	GHD is requesting that the Project Proponent provide clarification in Section 3.2 of the Monitoring Report regarding the unit used to measure the methane concentration in the LFG/biogas while the main non-dispersive infrared meter was being calibrated.	Project Proponent added use of Landtech GEM 2000 during servicing and calibration of main non-dispersive infrared meter. GHD reviewed the updated Monitoring Report and the addition of Landtec GEM 2000 for the Data Unit/Parameter "Methane content of gas (LFG and biogas)". GHD determined that the updates made to the monitoring report are appropriate and representative of the conditions.	Updated Section 3.2 of the Monitoring Report	Closed
3	GHD requests clarification regarding the reporting of the operation of the flare through the monitoring period of 2018. Based on the "Daily Reports 2018.xls" spreadsheet the flare was operated in September, October, and December 2018 however there is no data or calculations applied for the operation of the flare in Exhibit 3 of the Monitoring Report and associated emission reductions are not quantified.	GHD discussed with the Project Proponent and the Project Proponent does not have sufficient data associated with the operation of the flare to justify the quantification of emission reductions from this destruction device. Therefore to be conservative the Project Proponent has elected not to quantify emission reductions associated with the flare destruction device.	None	Closed
4	GHD requests that the Project Proponent provide the raw data file associated with the Eversource electricity billing for clarification on the project emissions associated with electricity consumption. GHD requests that the Project Proponent provide a photo of the electricity meter referenced in Exhibit 4 of the Monitoring Report (number: 5120378) and confirm that this is the only meter used to measure electricity consumption from the grid.	Project Proponent provided raw data file and electricity usage bill from Eversource as an attachment to Exhibit 4 in the revised Monitoring Report. GHD reviewed the Eversource data provided with Exhibit 4 of the Monitoring Report and confirmed that the Eversource data provides sufficient evidence for the calculation of the Electricity Consumption Project Emissions in Exhibit 4. The energy use (0 MWh) is also consistent with the discussions between the Project Proponent and GHD during the Site Visit on February 19, 2019 where it was identified that the energy produced on-Site is used to power the administration building and associated infrastructure. The Project Proponent provided a photo of the Eversource (formerly NStar) electricity meter at the Site which matches the serial number to the Eversource electricity data provided. The Project Proponent also confirmed that this is the only electricity meter used to measure electricity consumption from the grid.	Updated Exhibit 4 of the Monitoring Report	Closed
5	GHD requests that the Project Proponent provide the raw data file for the emergency generator run time for further clarification regarding the emissions associated with the emergency generator (diesel consumption). GHD requests that the Project Proponent clarify where this data is stored and what QA/QC is performed on the data to ensure it is accurate and no events are missed. Please provide a photo of the total run time hours from the emergency generator, as applicable.	Project Proponent provided raw data file for emergency generator run time as an attachment to Exhibit 4 in the revised Monitoring Report. GHD reviewed the "Emergency Generator Run Time Log Sheet" provided as an attachment to Exhibit 4 in the revised Monitoring Report. The Project Proponent provided a photo of the total emergency generator run-time up to the date the photo was taken (March 25, 2019) which identified 264.0 hrs. The Project Proponent also provided rationale for where the data is stored and the QA/QC procedures associated with it in the letter to GHD dated March 25, 2019.	Updated Exhibit 4 of the Monitoring Report	Closed

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CL #	Clarification Request	Explanation/Response	Changes applied to Project Documents	Status
6	GHD requests that the Project Proponent provide clarification regarding the calibration events for the following parameters and associated monitoring equipment during the 2018 monitoring period: - Temperature of gas (LFG and biogas) - Pressure of gas (LFG and biogas) - Methane content of biogas - Volume of biogas - Temperature of biogas - Pressure of biogas - Volume of LFG to flare GHD requests that the Project Proponent provide supporting documentation associated with the calibration events that occurred during the 2018 monitoring period.	Temperatures and pressures of LFG and biogas combined are each calibrated using thermometer and pressure gauge. Methane content of biogas is calibrated once per month using standard gas for methane. Volume of biogas is calibrated once per month using pitot tube and manometer. Temperature and pressure of biogas are each calibrated using thermometer and pressure gauge. Volume of LFG to flare is not routinely calibrated and Project Proponent is not quantifying carbon offsets associated with the LFG combusted in the flare. The Project Proponent included the supporting documentation associated with the calibration events in 2018 in Exhibit 6 of the Monitoring Report. GHD reviewed the provided documentation and determined it was in accordance with the details specified in Section 3.2 of the Monitoring Report.	Refer to Exhibit 6 of the Monitoring Report	Closed
7	GHD requests that the Project Proponent provide clarification regarding the conversion factor applied (1,012) to convert Btu's to scf when calculating the total gas flow (LFG and biogas) to the engines.	See attached Gas Constant table published by American Gas Association. Project Proponent uses Higher Heating Value that corresponds to Gross or High value. GHD reviewed the "Gas Constants.pdf" supplied by the Project Proponent and determined that the value applied for the conversion of Btu's to scf for calculating the total gas flow (LFG and biogas) in Exhibit 2 is appropriate.	None, additional supporting documents provided	Closed
8	GHD requests that the Project Proponent provide clarification regarding the permit renewal documentation provided "MassDEP Status of Operating Permit Renewal.pdf". It appears that the second page of this document may be missing.	The Project Proponent provided documentation of MassDEP Status of Operating Permit Renewal in the document dated February 14, 2018 and provided the corresponding e-mail that confirmed submission of the online application to the MassDEP. GHD reviewed the documentation provided and determined it was complete.	None, additional supporting documents provided	Closed
9	GHD identified that the manufacturer recommended calibration requirements associated with the Landtec GEM 2000 is a frequency of six (6) months. GHD has received evidence of one factory calibration that occurred in 2018 and is requesting clarification on whether or not the unit was calibrated a second time in 2018. GHD is reviewing the period where the Landtec GEM 2000 was used in absence of the California Analytical 602P unit (May 11, 2018 - June 28, 2018) and is also requesting clarification regarding the weekly field calibrations of the Landtec GEM 2000 that were performed during this time and associated documentation/evidence.	GHD concluded that although the Project Proponent may not meet the bi-annual factory calibrations set out by the manufacturer the Project Proponent is following the QA/QC procedures in their Monitoring Report and performed one annual factory calibration. GHD also obtained oral evidence from the manufacturer that when the Project Proponent completes the QA/QC procedures in their Monitoring Report they are insuring that the measuring equipment is reading correctly. Based on the above noted evidence GHD determined that the calibration frequency implemented for this device was appropriate.	None	Closed
10	GHD identified that the latest version of the VCS Standard - Section 3.16.5 does not specify calibration requirements for meters that do not have manufacturer recommended calibration frequencies and differs to national or international standards. GHD is requesting clarification regarding the factory calibration frequency that has been applied to the California Analytical 602P measuring device and if further calibration is completed regularly beyond the QA/QC procedures identified in the Monitoring Report. GHD identified that the unit was factory calibrated in 2018 based on the documentation and information provided by the Project Proponent.	the Project Proponent noted that California Analytical is typically consulted if problems with the instrument occur and California Analytical typically recommends to the Project Proponent when the instrument requires factory service. The Project Proponent typically sends the California Analytical 602P in for factory service when field calibration of methane, carbon dioxide, and oxygen cannot be reliably accomplished or that once calibrated unacceptable degree of drift in the parameters occurs between weekly calibrations. GHD determined that calibration of the California Analytical occurs based on the manufacturer recommendations and when drift occurs between weekly calibrations and that this is appropriate.	None	Closed

TABLE 1
FINDINGS ASSESSMENT
NEW BEDFORD LFG UTILIZATION PROJECT
2018 MONITORING PERIOD VERIFICATION

Rev. No.	Date Issued
0	March 13, 2019
1	March 21, 2019
2	April 11, 2019

CAR #	Corrective Action Request	Explanation/Response	Changes applied to Project Documents	Status
1	GHD requests that the Project Proponent correct Section 2.2.2 to remove the project deviation associated with the change in global warming potential (GWP) for methane. The GWP of 25 for methane is intended to apply to the full 2018 monitoring period for all VCS projects therefore the deviation in the Monitoring Report from 21 to 25 is no longer appropriate.	Project Proponent removed project deviation under 2.2.2. of Monitoring Report. GHD confirmed that the Project Description Deviation associated with the GWP for methane was removed from the Monitoring Report.	Updated Section 2.2.2 of the Monitoring Report	Closed
2	GHD identified a discrepancy associated with the total MMBtu and associated methane delivered to engines (scf) for the month of February 2018. The total monthly value conveyed in the "Daily Reports 2018.xls" spreadsheet is 15,047 MMBtu and the total value recorded in Exhibit 2 of the Monitoring Report is 15,084 MMBtu. GHD request that the Project Proponent correct these values to ensure consistency and provide associated justification for the correction, as required.	Project Proponent corrected discrepancy in Exhibit 2 of the Monitoring Report. GHD reviewed Exhibit 2 provided in the updated Monitoring Report and identified that the February 2018 MMBtu value has not yet been corrected. However the correct value was provided in the updated calculation spreadsheet "CNBE VCS calc 2018 14Mar2018.xls". The Project Proponent updated Exhibits 1 and 2 of the Monitoring Report to correct the discrepancy identified by GHD. GHD verified that the updates made to the Monitoring Report were appropriate.	Updated Exhibits 1 and 2 of the Monitoring Report	Closed
3	GHD identified a discrepancy associated with the emissions related to electricity consumption for the Project, detailed in Exhibit 4. The third-party Eversource information provided by the Project Proponents indicates that the Project did not use any electricity from the grid and the same was discussed during the Site Visit. However, GHD identified that a total of 2.1 MWh of electricity consumption and associated project emissions were calculated in Exhibit 4. GHD requests that the Project Proponent correct this discrepancy.	Project Proponent corrected discrepancy in Exhibit 4 of the Monitoring Report. GHD reviewed Exhibit 4 in the updated Monitoring Report and identified that the calculations related to the Electricity Consumption Project Emissions are now consistent with the third-party data provided by Eversource.	Updated Exhibit 4 of the Monitoring Report	Closed
4	GHD identified a discrepancy associated with the FCH ₄ ,EL _y value of 2,305 tCH ₄ /period in Exhibit 4 - Ex Ante Estimates of Annual Emissions Reductions as this value is not representative of the entire period (3,517 tCH ₄). GHD requests that the Project Proponent update these calculations to reflect the total tCH ₄ from the 2018 period.	The Project Proponent updated Exhibits 1, 2, and 4 of the Monitoring Report to correct the discrepancy identified by GHD. GHD verified that the updates made to the Monitoring Report were appropriate.	Updated Exhibits 1, 2, and 4 of the Monitoring Report	Closed

APPENDIX C: VERIFICATION DEED OF REPRESENTATION

VCS VERIFICATION DEED OF REPRESENTATION

BY

GHD LIMITED

THIS DEED OF REPRESENTATION is made on 17 April 2019

BY

GHD Limited (as **VVB**)

455 Phillip Street

Waterloo, ON, Canada

N2L3X2

THIS DEED WITNESSES as follows:

1. **INTERPRETATION**

1.1 In this Deed:

"Accountholder" means any person holding a VCU account with a VCS Registry;

"AFOLU" means agriculture, forestry and other land use;

"GHG" means greenhouse gas;

"GHG Program" means a formal or organized program, scheme or arrangement for the recognition of activities leading to Reductions, or the crediting or issuance of instruments representing, or acknowledging, Reductions;

"Project" means Greater New Bedford LFG Utilization Project;

"Project Crediting Period" means the time period for which GHG emission reductions or removals generated by the Project are eligible for issuance as VCUs (the rules with respect to the length of such time period and the renewal of the project crediting period are set out in the *VCS Standard*);

"Project Ownership" means the legal right to control and operate the project activities. Distinct from proof of right;

"Project Proponent" means an individual or organization that has overall control and responsibility for the Project, or an individual or organization that together with others, each of which is also a Project Proponent, has overall control or responsibility for the Project. The entity(s) that can demonstrate Project Ownership in respect of the Project;

"Reduction" means a reduction or removal of one tonne of CO₂e caused by the activities of a Project during the Project Crediting Period;

"VCSA" means the Verified Carbon Standard Association;

"Validation/Verification Body" or **"VVB"** means an organization approved by the VCSA to act as a validation/verification body in respect of providing validation and/or verification services in accordance with the VCS Rules;

"VCS Program" means the GHG Program operated by the VCSA which establishes the rules and requirements that operationalize the VCS to enable the validation of GHG projects and the verification of GHG emission reductions and removals;

"VCS Project Database" means the central project database that records all projects registered and VCUs issued under the VCS, and provides public access to all project and VCU information, including retirement and tracking of the AFOLU pooled buffer account;

"VCS Registry" means a registry operating within the VCS Registry System and holding a current, valid agreement with the VCSA to provide registry services on behalf of the VCSA. VCS Registries interact with the VCS Project Database to issue VCUs, and hold, transfer (to and from other VCS registries), retire, suspend, cancel and provide custodial services for VCUs on behalf of its Accountholders;

"VCS Registry System" means the system established by the VCS Program, comprised of the VCS Project Database and the VCS Registries, to provide project proponents with the ability to register projects, and issue, transfer, hold and retire VCUs;

"VCS Rules" means the rules and requirements set out in the *VCS Program Guide*, the *VCS Standard* and the other VCS Program documents, as such rules and requirements may be updated from time to time;

"Verification Report" means the written report of verification covering the Reductions generated by the Project from 1-January-2018 to 31-December-2018 and prepared by the VVB in accordance with the VCS Rules; and

"Verified Carbon Unit" (VCU) means a unit issued by, and held in a VCS Registry representing the right of an Accountholder in whose account the unit is recorded, to claim the achievement of a Reduction that has been verified by a validation/verification body in accordance with the VCS Rules. Recordation of a VCU in the account of the Accountholder at a VCS Registry is *prima facie* evidence of that Accountholder's entitlement to that VCU.

- 1.2 Documents referred to in this Deed but not defined shall be the VCS documents, as updated from time to time, to which the relevant term relates.

2. REPRESENTATIONS

- 2.1 I am the Validation/Verification Body in relation to the verification of the Project.

- 2.2 I hereby represent and warrant that:

2.2.1 I have independently verified the Reductions generated by the Project in accordance with the VCS Rules;

2.2.2 In relation to any validation findings and conclusions provided in the Verification Report, I have independently validated the Project's compliance with the VCS Program requirements as set out in the VCS Rules; and

2.2.3 All factual information that I provide in relation to this Deed or have provided in the Verification Report is to the best of my knowledge following due inquiry true, accurate and complete in all material respects and I have not made or provided, and will not make or provide, false, fraudulent or misleading statements or information in relation to this Deed or the Verification Report.

- 2.3 I hereby acknowledge and agree that:

2.3.1 The following persons may rely on and enforce the terms of this Deed:

- (a) the VCSA;
 - (b) each person who is an Accountholder holding VCUs relating to the Project at any given time;
 - (c) each person on whose behalf VCUs relating to the Project were retired by an Accountholder; and
 - (d) each of the successors and assigns of those persons listed in clauses 2.3.1(a), 2.3.1(b) or 2.3.1(c);
- 2.3.2 Neither the VCSA, the VCS Registries, nor any of their respective affiliates, directors, employees, agents, licensors and/or contractors, shall be liable with respect to any claims whatsoever arising out of this Deed or erroneous information within the Verification Report submitted to the VCS Registry System for indirect, consequential, special, punitive or exemplary damages, including, without limitation, claims brought against the VCSA or the VCS Registries by Accountholders, other VCS Registries, Project Proponents, other Validation/Verification Bodies or any other third party. This paragraph shall apply regardless of any actual knowledge or foreseeability of such damages;
- 2.3.3 I have read, understood and will abide by the VCS Rules; and
- 2.3.4 The VCSA has an absolute right to amend any of the VCS Rules at any time and shall not bear any liability for loss or damage or liability of any kind sustained by the Validation/Verification Body or any other party involved in the Project in any way under the VCS Program as a consequence of such amendment.

3. GOVERNING LAW AND JURISDICTION

This Deed is governed by and interpreted in accordance with English law, and the English courts shall have exclusive jurisdiction to settle any dispute arising from or connected with this Deed including a dispute regarding the existence, validity or termination of this Deed or the consequences of its nullity.

4. SOVEREIGN IMMUNITY

To the extent that the Validation/Verification Body enjoys any right of immunity from set-off, suit, execution, attachment or other legal process with respect to its assets or its obligations under this Deed, the Validation/Verification Body waives all such rights to the fullest extent permitted by law.

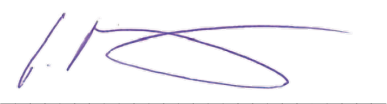
5. COUNTERPARTS

This Deed may be executed in any number of counterparts, each of which when executed and delivered is an original and all of which together evidence the same deed.

6. DELIVERY

This Deed is delivered on the date written at the start of the Deed.

EXECUTED by GHD Limited as a deed



Gordon Reusing, Principal

Signature of director

Name of director

Signature of director/secretary

Name of director/secretary