

RE-VALIDATION REPORT

GREATER NEW BEDFORD LFG UTILIZATION PROJECT



GHD Limited

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Summary:

CommonWealth Resource Management Corporation (CRMC) retained GHD Limited (GHD) to complete a re-validation of the Greater New Bedford LFG Utilization Project (Project Activity and Verified Carbon Standard ID: 138) located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States under the requirements of the Verified Carbon Standard (VCS). The Project is operated by CRMC (Project Proponent) and the re-validation is required in support of CRMC's application for continued registration and renewal of the Project Activity's crediting period with the VCS.

The Greater New Bedford LFG Utilization Project 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 re-validation 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 VCS PD including the monitoring plan and baseline assessment, along with accompanying 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 3.5, and VCS Standard Version 3.5, as applicable.

As part of the re-validation 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 re-validation report and opinion.

The re-validation report and associated annexes document a total of eleven (11) findings, which include:

- Two (2) Corrective Action Requests (CARs)

- Eight (8) Clarification Requests (CLs)
- One (1) Forward Action Requests (FARs)

Upon review of the documentation and explanations provided by the Project Proponent, all findings were closed in a clear and transparent manner. The re-validation was found to be performed in accordance with the VCS Program Guide, Version 3.5, and VCS Standard, Version 3.5, in addition to the UNFCCC CDM methodology and associated methodological tools. Based on the re-validation assessment performed, GHD is issuing a Positive Re-Validation Opinion in regards to this Project Activity and will therefore recommend/certify that the registered Project Activity has successfully renewed their crediting period.

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1 INTRODUCTION

1.1 Objective

CommonWealth Resource Management Corporation (CRMC/Project Proponent) retained GHD Limited (GHD) to complete a re-validation of the Greater New Bedford LFG Utilization Project (Project Activity) located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States under the requirements of the Verified Carbon Standard (VCS). The re-validation is required in support of CRMC's application for continued registration and renewal of the Project Activity's crediting period with the VCS.

GHD has prepared this re-validation report and accompanying re-validation work plan 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) with the requirements presented in the following documents:

- VCS Program Guide, dated October 8, 2013, Version 3.5 (VCS Program Guide)¹
- VCS Standard, dated March 25, 2015, Version 3.5 (VCS Standard)²
- VCS Validation and Verification Manual, dated October 8, 2013, Version 3.1 (VCS VVM)³

In accordance with the VCS Program Guide, eligible GHG emission reduction 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
- Sectoral Scope 10 - Fugitive emissions from fuels (solid, oil, and gas)
- Sectoral Scope 12 - Solvents use
- Sectoral Scope 13 - Waste handling and disposal.

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

¹ <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Program%20Guide,%20v3.5.pdf>

² <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Standard%2C%20v3.5%280%29.pdf>

³ http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Validation%20Verification%20Manual,%20v3.1_1.pdf

- Consistent
- Accurate
- Transparent
- Conservative

In the re-validation of this VCS Project, GHD used a risk-based re-validation approach to focus and determine the detailed scope of the re-validation. The VCS and the CDM are rules-based mechanisms; GHD has ensured that the rules for requesting registration as a proposed VCS Project are complied with, in accordance with the VCS Program Guide Version 3.5 and the VCS Standard Version 3.5.

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

CRMC commissioned GHD to perform an independent third-party re-validation for the renewal of the crediting period starting immediately following the current crediting period on 29 March 2016 and extending for a 10-year period. The re-validation is being performed for the registered Project located at the Crapo Hill Landfill west of Samuel Barnett Boulevard in the Northeast portion of Dartmouth, Massachusetts, United States (longitude 70° 59' 04.82" and latitude 41° 43' 28.12"). The project consists of the landfill gas collection system piping network and electricity generation plant which consists of all piping valves and controls for conditioning the landfill gas and removing moisture as well as conveying it to the electricity generation engines (four Caterpillar model 3516 engine-generator sets) or the back-up flare. The electricity generation engines are all housed within a building that is connected to the electric power equipment required to convey electricity to the local distribution utility including; transformers, switchgear, relays and related equipment and controls.

The main GHG source considered for emission reductions is methane (CH₄) emissions from the landfill gas. The Project collects the landfill gas using a vacuum that is applied to a series of vertical and horizontal landfill gas extraction wells installed in the Crapo Hill Landfill. The baseline scenario consisted of a total of 21 vertical landfill gas extraction wells and a flare to combust the landfill gas. The project scenario consists of a much larger and expanded landfill gas extraction system including vertical and horizontal wells as well as the electricity generation engines. Project emissions consist of electricity consumption of the electricity generation plant during shutdown and maintenance periods along with fossil fuel (diesel) consumption from the 150kW back-up generator used for power outages. The following United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM) methodology was applied: "Large-scale Consolidated Methodology – Flaring or use of landfill gas", ACM0001, Version 16.0 dated 16 October 2015.

Utilizing a risk-based approach as part of the re-validation 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 this investigation then, together with the results of the review of other areas, gave the necessary input for the re-validation opinion which is completed pursuant to guidance provided within the VCS Program Guide Version 3.5 and the VCS Standard Version 3.5. Specifically, it was validated that the Project and associated emission reductions for the second 10-year crediting period (29 March 2016 through 28 March 2026) met the following principles, as identified in the VCS Program Guide Version 3.5:

- Real
- Measurable
- Permanent
- Additional
- Independently Audited

In addition to the principles identified above, it was validated that the Project fully complied with the approved methodology and that accompanying guidance documents suitable for the Project scope were referenced, as required under the VCS Program Guide Version 3.5 and VCS Standard Version 3.5. The applied methodology, UNFCCC CDM ACM0001, is eligible under the VCS program and is appropriate.

1.3 Level of Assurance

GHD has conducted the re-validation activities and has prepared this report to a reasonable level of assurance with a maximum allowable materiality threshold of 5 percent, as outlined in Section 5.3.1 of the VCS Standard Version 3.5 for large projects.

1.4 Summary Description of the Project

The Greater New Bedford LFG Utilization Project 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. 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 VALIDATION PROCESS

2.1 Method and Criteria

The GHD Project Team has assessed and re-validated that the implementation of the Project and the steps taken to estimate emission reductions comply with the VCS criteria and relevant

guidance provided by the VCS and the UNFCCC. The re-validation included a review of relevant documentation, records, and an on-site visit. The re-validation of baseline studies and monitoring plans for the Project Activity included a risk based assessment of the following, as applicable to the Project Activity:

- Accuracy of baseline emissions
- Uncertainty of external data sources used
- Coverage of leakage in the baseline scenario
- Baseline emission assumptions
- Accuracy of emission calculations in the monitoring plan

The VCS Project Document (PD) supplied by CRMC was used as the primary basis for the re-validation. Based on the VCS PD, GHD generated a preliminary Re-Validation Plan and supplied this to CRMC prior to the Site Visit component of the re-validation process. The Re-Validation Plan was updated, as required, throughout the auditing process. The final Re-Validation Plan is provided in Appendix A.

The VCS PD was assessed for completeness by GHD and it was, at the conclusion of the re-validation process, deemed comprehensive enough to give an accurate picture of the Project and its baseline. Documentation was approved by the Project Proponent for its completeness before it was presented to GHD for re-validation.

The VCS PD also provided GHD with sufficient information regarding the technical features of the Project Activity, and other relevant information about the Project Activity that was required to complete the re-validation activity.

The document review established to what degree the presented VCS PD, including the baseline study and the monitoring plan, met the established re-validation criteria.

GHD's document review during the re-validation process was comprised of an evaluation of the following:

- The documentation, data and information is complete and comprehensive and follows the structure and criteria specified in the VCS PD template
- The baseline and monitoring methodologies are justified and appropriate for the specific Project
- The assumptions for the baseline are conservative and appropriate
- The description of the baseline development has considered technological, political, socio demographic, environmental, and legal trends of relevance to the Project
- Additionality of the Project is sufficiently demonstrated in the PD
- 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, as well as other information about the Project 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 main components of the GHD re-validation process conducted were as follows:

- Document Review
- Preparation of Assessment List and Completion of a Site Visit
- Re-Validation Assessment and Issuance of Correction Action Requests (CARs), Forward Action Requests (FARs), and/or Clarification Requests (CLs)
- Response to CARs, FARs, and CLs
- Draft Re-Validation Report Issuance
- Technical Review
- Final Re-Validation Report and Re-Validation Statement Issuance

The re-validation protocol checklist completed by GHD is provided in Appendix B of this Re-Validation Report.

2.2 Document Review

The VCS re-validation process relies heavily upon documentation review. The primary document for review is the VCS PD. The Project Proponent provided GHD with the original VCS PD and revised VCS PDs as follows, all of which were reviewed in detail by GHD:

<i>Document Date</i>	<i>Date Issued to GHD</i>	<i>Version Number</i>	<i>Methodology</i>
5-October-15	5-October-15	1	ACM0001 Version 15.0
17-December-15	17-December-15	2	ACM0001 Version 16.0
20-April-2016	14-April-2016	3	ACM0001 Version 16.0
22-April-2016	22-April-2016	4	ACM0001 Version 16.0
5-May-2016	12-May-2016	5	ACM0001 Version 16.0
12-May-2016	12-May-2016	6	ACM0001 Version 16.0

As part of the re-validation process, additional documentation supplemental to the VCS PD was requested and reviewed by GHD. This supplemental information included the following documents:

Date Issued to GHD	Document(s)	Description	Language
5-October-15	CNBEPDDv1Oct052015.pdf	VCS Project Description, Version 1	English
5-October-15	ExAnteProjectionsforSecondCreditPeriod10012015v1.xlsx	Ex Ante and Emission Reduction Calculation Spreadsheet, Version 1	English
5-October-15	GNB LFG Utilization Project declaration.pdf	Letter of declaration regarding participation and rejection of the Project in other GHG programs	English
5-October-15	Oct022015 VCSCConfirmation.pdf	Copy of e-mail correspondence between the CRMC and the VCS regarding the change of Sector Scope for the Project to Sector Scope 13	English
5-October-15	Summary of ChangesOct052015.pdf	Summary of updates to the Project from the initial crediting period to this Re-Validation	English
17-December-15	CAR1 Elect eGRID2012.oxps	Grid emission factor used for the Project	English
17-December-15	CAR1 Elect EIA Annual Energy Review	2011 Annual Energy Review for the United States	English
17-December-15	CAR1 Elect NStar2014elecbill.pdf	2014 N Star Electricity Bill for the Project	English
17-December-15	CAR1 Emergency Gen Certification.pdf	Massachusetts Department of Environmental Protection (MassDEP) Installation Compliance Certification for the Emergency Generator	English
17-December-15	CAR1 Emergency Gen Fuel Use Estimate.oxps	Estimate for the fuel use of the emergency generator	English
17-December-15	CL7 Omega M3244.pdf	Differential Pressure Transmitter User Guide	English
17-December-15	CL7 oripac orifice specif sheet.pdf	Specification Sheet for the Orifice Plate Flow Meter	English
17-December-15	Annual compliance report.pdf	MassDEP Annual and Semi-Annual Compliance Monitoring Summary and Certification	English

Date Issued to GHD	Document(s)	Description	Language
17-December-15	EPAwebsitesummary.pdf	U.S. EPA search results for environmental violations for the Project	English
17-December-15	MassDEPinpection.pdf	MassDEP Inspection report dated 8-November-2011	English
17-December-15	Semiannualcomplcert.pdf	MassDEP Semi-Annual Compliance Monitoring Summary and Certification dated 13-July-2015	English
17-December-15	Designcapreport.pdf	Design Report indicating the total designed capacity for the Crapo Hill Landfill	English
17-December-15	LFEngineerDesignEmail.pdf	E-mail from the Design Engineer for the Crapo Hill Landfill Site	English
17-December-15	CNBE 04739 NMOC H2S Methane Composition.pdf	Certificate of Analysis for Hydrogen Sulfide, Methane and NMOC for the landfill gas	English
17-December-15	landgem-v302.xls	Landtec LandGEM – Landfill Gas Emissions Model Version 3.02 for the Crapo Hill Landfill	English
17-December-15	Emergency generator run time log.pdf	Log sheet to track the runtime in hours for the emergency generator	English
17-December-15	LFG flow calculation.pdf	Detailed calculation for the calculation of the flow of landfill gas at different temperatures and pressure	English
17-December-15	CNBEPDDv2Dec172015changetracked.docx	VCS PD Version 2, Word file with changes tracked from Version 1	English
17-December-15	CNBEPDDv2Dec172015clean.pdf	VCS PD Version 2, Adobe Acrobat file	English
17-December-15	ExAnteProjectionsforSecondCreditPeriodDecember172015v2.xlsx	Ex Ante and Emission Reduction Calculation Spreadsheet, Version 2	English
17-December-15	Findings Assessment-(20151120)-Rev1Dec172015.xlsx	Project Proponent responses to the Findings Assessment	English
20-April-2016	CNBEPDDv3April142016changetracked.docx	VCS PD Version 3, Word file with changes tracked from Version 2	English
20-April-2016	CNBEPDDv3April142016clean.pdf	VCS PD Version 3, Adobe Acrobat file	English
20-April-2016	ExAnteProjectionsforSecondCreditPeriodApril142016v3.xlsx	Ex Ante and Emission Reduction Calculation Spreadsheet, Version 3	English
22-April-2016	CNBEPDDv4April222016changetracked.docx	VCS PD Version 4, Word file with changes tracked from Version 3	English
22-April-2016	CNBEPDDv4April222016clean.pdf	VCS PD Version 4, Adobe Acrobat file	English

Date Issued to GHD	Document(s)	Description	Language
22-April-2016	ExAnteProjectionsforSecondCreditPeriodApril222016v4.xlsx	Ex Ante and Emission Reduction Calculation Spreadsheet, Version 4	English
12-May-2016	CNBEPDDv5May52016changes tracked.docx	VCS PD Version 5, Word file with changes tracked from Version 5	English
12-May-2016	CNBEPDDv5May52016clean.pdf	VCS PD Version 5, Adobe Acrobat file	English
12-May-2016	ExAnteProjectionsforSecondCreditPeriodMay52016v5.xlsx	Ex Ante and Emission Reduction Calculation Spreadsheet, Version 5	English
12-May-2016	CNBEPDDv6May122016changes tracked.docx	VCS PD Version 6, Word file with changes tracked from Version 4	English
12-May-2016	CNBEPDDv6May122016clean.pdf	VCS PD Version 6, Adobe Acrobat file	English

2.3 Interviews

The following presents the members of the GHD Project Team assembled for the re-validation of the registered VCS Project Activity:

GHD Project Team Position

Team Leader and Technical Expert
Team Leader Under Training
Independent Technical Reviewer

GHD Project Team Member

Brent Boss, P. Eng.
Jason Clarke, B.Eng., EIT
Gordon Reusing, M.A.Sc., P.E., P.Eng.

Curricula vitae for each of the GHD Project Team Members have been provided as Appendix C of this report.

GHD completed a Site Inspection for the re-validation on 17-November-2015. During this portion of the re-validation process, GHD was able to interview a series of Project stakeholders regarding various aspects of the Project Activity. Mr. Brent Boss and Mr. Jason Clarke of GHD completed the Site Inspection. The following Project Stakeholders were interviewed by GHD:

<i>Name of Interviewee</i>	<i>Position and Company</i>	<i>Details of Items Discussed</i>
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
Mr. Anton Finelli	Principal, CRMC	- Ownership of the landfill and the Project Activity - Ownership of the biogas and digester - Agreement for ownership of the landfill gas
Ms. Christina Magerkurth	GHG Consultant for the Project Activity, Magerkurth Associates, Inc.	- VCS PD and related ex ante calculations - Monitoring plan - Calculations and monitoring related to the subtraction of the digester biogas
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 re-validation 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. As stated above, GHD completed a Site Inspection for the re-validation on 17-November-2015. In addition to interviewing Project stakeholders as per Section 2.3 of this report, the GHD Project Team reviewed the implementation status of the Project Activity. During the Site Inspection, the GHD Project Team confirmed that the system was constructed and

operating, and what is described in the VCS PD is a clear representation of what is actually being completed on Site.

2.5 Resolution of Findings

The re-validation 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 validation 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. One FAR was issued during this re-validation.

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.

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

Finding Category	Number of Findings
CAR	2
FAR	1
CL	8
TOTAL	11

2.6 Forward Action Requests

One FAR was raised as a part of the re-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 for the benefit of subsequent project audits.

ID#	Forward Action Request	Explanation/Response	Status
FAR#1	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.	Not required.	On-going

3 VALIDATION FINDINGS

3.1 Project Details

The Project Activity utilizes one UNFCCC CDM methodology to establish eligibility/applicability as follows:

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

GHD has completed a full assessment on the applicability criteria and how they apply to the above noted methodology in Section 3.2.2 below. GHD also assessed the technologies/measures applied by the Project Activity in relation to the referenced methodologies.

GHD is of the opinion that the Project Activity meets the applicability requirements of the referenced methodology.

GHD raised CL#5 to address the recent update to methodology ACM0001 from Version 15.0 to Version 16.0 as noted below.

ID#	Clarification Request	Explanation/Response	Status
CL#5	GHD notes that there is a more recent version of ACM0001 (Ver. 16) than what is being applied to the Project (Ver. 15). Please provide clarification regarding the use of the updated methodology or continued use of the existing (Ver. 15). GHD notes that Ver. 15 of ACM0001 currently being applied to the Project is acceptable until June 11, 2016. Please also clarify if any newer versions of the methodology tools will be applied to the Project.	The Project will apply ACM0001 Version 16. This has been reflected in the PDD. No changes to the methodology tools being used will be made. GHD confirmed that updates to the VCS PD were consistent with ACM0001 Version 16.	Closed

3.1.1 *Project Type, Technologies and Measures Implemented and Eligibility of the Project*

Project Type – Landfill Gas Utilization

Technologies and Measures Implemented – Landfill gas collection system with active vacuum applied, landfill gas conditioning system to remove moisture and contaminants, four landfill gas and biogas utilization engines (Caterpillar model 3516 engine-generator sets), electricity distribution system, and supervisory control and data acquisition (SCADA) system used to monitor the functionality of the Project Activity.

Eligibility of Project – Voluntary installation and expansion of the landfill gas collection system, no current regulations that currently apply to this type of Project Activity at this location. Eligibility is discussed further in the Section 3.2 below.

3.1.2 *Project Proponent*

CommonWealth Resource Management Corporation
 Contact Name: Thomas Yeransian
 Role: Principal
 199 Corey Street
 Boston, MA 02132

3.1.3 Other Entities Involved in Project

Magerkurth Associates, Inc.
 Contact Name: Christina Magerkurth
 Role: GHG Consultant
 521 Finley Court,
 Batavia, IL 60510

3.1.4 Project Start Date

The VCS Standard defines the Project Start Date as:

"The project start date is the date on which the project began generating GHG emission reductions or removals"

The Project Start Date for this Project is 01 January 2002.

This start date is consistently applied throughout the VCS PD and associated calculations. The start date was confirmed through review of the previous crediting period as the renewal of the crediting period is slated to begin immediately following the original crediting period.

3.1.5 Project Crediting Period

The Project Crediting Period is 10 years, commencing on 29 March 2016 immediately following the end of the Project's first crediting period and ending 28 March 2026.

This crediting period timeframe was confirmed by GHD through review of the estimation of emission reduction calculations and the VCS PD.

3.1.6 Project Scale and Estimated GHG Emission Reductions or Removals

This is considered a "Project" based on the VCS Standard as the Project Activity generates less than or equal to 300,000 tonnes of CO₂e per year.

3.1.7 Project Location

Crapo Hill Landfill Site
 300 Samuel Barnet Boulevard
 New Bedford, MA, 02745
 Longitude 70° 59' 04.82" and Latitude 41° 43' 28.12"

3.1.8 Conditions Prior to Project Initiation

Since 1995 the Crapo Hill Landfill site has been used for disposal of solid waste. The initial landfill gas collection system and flare were installed by the Greater New Bedford Regional Refuse Management District (District) voluntarily in June of 2000. The purpose of the initial collection system was to mitigate landfill odours and landfill gas migration. The initial landfill gas collection

system consisted of 21 vertical extraction wells along with associated piping network and flare for the combustion of the landfill gas.

Methane generated from the landfill and contained in the landfill gas, would be generated regardless of whether or not the Project existed or not. Therefore, the Project was evidently not executed to produce GHG emissions for the sole purpose of their reduction.

3.1.9 Project Compliance with Applicable Laws, Statutes and Other Regulatory Frameworks

Based on GHD's review of the documentation provided by the Project Proponent, the Project is currently in compliance with all applicable local, state and federal regulations. The Crapo Hill Landfill is not currently obligated to collect and destroy landfill gas as a part of any regulations (local, state or federal). The Crapo Hill Landfill does not currently fall under the United States Environmental Protection Agency's (EPAs) New Source Performance Standards (NSPS) and Existing Facility Guidelines for Landfills (40 CFR 51, 52, and 60 dated 12 March 1996), or the National Emissions Standards for Hazardous Air Pollutants.

Based on the current NSPS rules, landfills that have an approved design capacity to handle greater than 3.27 million cubic yards or 2.75 million tons of solid waste, commenced construction post May 30, 1991 and began accepting solid waste on or after the date, and are projected to release greater than 50 tonnes per year of Non-Methane Organic Compounds (NMOCs) without controls, are required to install and commission a passive or active landfill gas collection system. The collection system must then meet the EPAs performance criteria and include an appliance to combust and destroy a minimum of 98 percent of the NMOCs.

Based on the documentation provided by the Project Proponent, the Crapo Hill Landfill currently has an approved design capacity of 1,886,904 cubic meters which equates to 2,467,832 cubic yards which is below the 3.27 million cubic yards NSPS threshold for the installation of a passive or active landfill gas collection system. As per the VCS PD, a 6-acre expansion of the landfill is anticipated following the renewal of the crediting period which will bring the capacity of the landfill to 3.5 million tons, thereby exceeding the 2.75 million ton NSPS threshold. As a result of the landfill expansion, GHD raised FAR#1 as noted in Section 2.7 above to address changes in capacity of the landfill that may impact the implications of regulatory influence on the Project. Upon completion and approval of the expansion of the landfill the Project Activity may not exceed the 50 tonnes per year of NMOCs and therefore not be required to install a landfill gas collection system. However, CRMC will be required to provide evidence to support that they do not exceed the 50 tonnes per year threshold of NMOCs.

GHD also raised CL#4 below to seek further clarification and evidence of the current capacity of the Crapo Hill Landfill.

ID#	Clarification Request	Explanation/Response	Status
CL#4	GHD requests that the Project Proponent provide clarification and evidence to support the current total capacity of the Crapo Hill Landfill Site.	During the Site Visit on 17-November-2015 GHD reviewed documentation for the Site noting a total capacity of the Site that is less than 2 million cubic meters, which is less than the approximate 2.5 million cubic meter threshold for the installation of the landfill gas collection system as per the New Source Performance Standards (NSPS) and Existing Facility Guidelines (EGs) for Landfills (40 CFR 51, 52 and 60 March 12, 1996).	Closed

3.1.10 Ownership and Other Programs

Right of Use – Based on the documents provided by CRMC and the agreement reviewed during the Site Inspection, it was made clear to GHD that the landfill gas generated from the landfill and all associated environmental attributes are owned by CNBE which is a wholly-owned subsidiary of CRMC. The District owns the landfill and originally owned the associated landfill gas however, through a landfill gas purchase and sale agreement CNBE now has exclusive rights and ownership of the landfill gas. An excerpt of this agreement has been provided by CRMC in the VCS PD.

Emissions Trading Programs and Other Binding Limits – The Project is not currently required to be implemented under any local, State, or Federal emission trading program or for any other regulatory environment.

Other forms of environmental credit sought or received and eligible to be sought or received - The Project neither has nor intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

Participation Under Other GHG Programs – The Project is currently registered under the American Carbon Registry (ACR), Project ID of ACR 113; however, the Project has not been issued any credits nor had emissions reductions verified since 2008 and does not plan to do so during the second crediting period. GHD confirmed the registration of the Project under ACR and also confirmed that the Project has not been registered or is seeking registration under any other GHG program. CRMC provided a letter to GHD on 7 October 2015 to further support the information presented above.

Rejection by Other GHG Programs – The only active GHG related programs that the Project has been submitted to are the ACR and VCS and the Project has not been rejected under any GHG related program, as noted by the letter submitted to GHD on 7 October 2015.

GHD raised CL#1 below to address the details of the ownership agreement.

ID#	Clarification Request	Explanation/Response	Status
CL#1	GHD is requesting that the Project Proponent provide clarification and evidence of ownership (i.e. agreement) for the exclusive rights to the landfill gas generated at the Crapo Hill Landfill including the environmental attributes associated with the collection, destruction and use.	GHD reviewed the a copy of the ownership agreement for the landfill gas between the Greater New Bedford Regional Refuse District and the Project Proponent during the Site Visit on 17-November-2015.	Closed

3.1.11 Additional Information Relevant to the Project

Eligibility Criteria for Grouped Projects - The Project is not a grouped project based on the statement provided by CRMC in the VCS PD. GHD reviewed the documentation provided by CRMC and confirmed that this Project represents a singular project instance.

Leakage Management – Based on review of UNFCCC CDM methodology ACM0001, this Project does not require a leakage management plan.

Commercially Sensitive Information - Commercially sensitive information has been excluded from the public version of the Project Description.

GHD concludes that the Project description provided in the VCS PD and applicable sections above is accurate, complete, and provides an understanding of the nature of the Project.

3.2 Application of Methodology

3.2.1 Title and Reference

The Project Activity was assessed by GHD's Project Team versus the following UNFCCC CDM methodology to establish eligibility/applicability:

- UNFCCC CDM "Large-scale Consolidated Methodology – Flaring or use of landfill gas", ACM0001, Version 16.0 dated 16 October 2015.
 - Methodological tool – Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, Version 3.0.1 dated 2 March 2012

3.2.2 Applicability

The following table provides all of the applicability criteria from the above noted methodology and references how the Project Activity meets the requirements as necessary. This assessment performed by GHD also assesses the technologies/measures applied by the Project Activity in relation to the referenced methodology:

UNFCCC Methodology	Applicability Criteria	Reference to Project
ACM0001	3. This methodology is applicable under the following conditions: (a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the project activity; or (b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG provided that: (i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and (ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after implementation of the project activity and its efficiency is not impacted on the project system: historical data on the amount of LFG capture and flared is available. (c) Flare the LFG and/or use the captured LFG in any combination of the following ways: (i) Generating electricity (ii) Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace; and/or (iii) Supplying the LFG to consumers through a natural gas distribution network (iv) Supplying compressed/liquefied LFG to consumers using trucks; (d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	3. a) Not applicable as the Project Activity is not a new SWDS or new LFG capture system b) Applicable, as the recovery rate has been increased and the use of the captured LFG has changed from a flare to electricity generation engines. (i) Captured LFG was flared prior to implementation of the Project Activity (ii) This data is available and was reviewed during the Site Inspection, the existing system and the Project system could not be separated c) Applicable, use of LFG (i) Project Activity uses four electricity generation engines (ii), (iii), and (iv) Not applicable. d) The only organics currently collected in the New Bedford area are from yard waste, there is currently no additional diversion for other organics such as food waste.

UNFCCC Methodology	Applicability Criteria	Reference to Project
ACM0001	4. The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is: (a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and (b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln; (i) For electricity generation: that electricity would be generated in the grid or captive fossil fuel fired power plants; and/or (ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary.	4. (a) Applicable, the LFG was captured and flared to address safety and odour concerns as detailed in the VCS PD. (b) Applicable, LFG is used to generate electricity and heat. (i) Electricity would have been generated by the grid. (ii) Heat would have been generated from fossil fuels in equipment within the project boundary.
	5. This methodology is not applicable: (a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace. (b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity	5. (a) Not applicable, this methodology is not used in combination with any others. (b) Not applicable, there has been no change to the management of the SWDS.
	6. The applicability conditions included in the tools...also apply	6. The Methodological tool – "Combined tool to identify the baseline scenario and demonstrate additionality" applicability is noted below

After assessing the applicability of the methodology selected by the Project Proponent, GHD determined that the Project and Project Activity sufficiently satisfy the applicability criteria. GHD also determined that the Methodological tool – *Assessment of the validity of the original/current*

baseline and update of the baseline at the renewal of the crediting period was also applicable to the Project.

3.2.3 *Project Boundary*

Under ACM0001 – Version 16.0, the Project Boundary is defined as follows:

The project boundary of the project activity shall include the site where the LFG is captured and, as applicable:

(a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network or biogas processing facility).

(b) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity to the project activity.

(c) Captive power plant(s) (including emergency diesel generators) or power generation sources connected to the grid, which are supplying electricity in the baseline that is displaced by electricity generated by captured LFG in the project activity.

(d) Heat generation equipment or sources which are supplying heat in the baseline that is displaced by heat generated by captured LFG in the project activity.

(e) The transportation of the compressed/liquefied LFG from the biogas processing facility to consumers.

The Project Boundary as defined in the VCS PD includes the; landfill gas collection system, the flare, and the landfill gas to energy plant. The following emissions are assessed within the boundary:

- Baseline
 - Landfill Gas – CH₄ – Generated from the decomposition of solid waste from within the landfill that is combusted during electricity production or in a flare
- Project
 - 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
 - Flaring Emissions – CO₂ – Generated from the combustion of landfill gas in the back-up flare

As noted in the VCS PD the following emissions are not included within the Project Boundary; baseline electricity emissions and emissions from incomplete combustion at the flare. GHD has confirmed that the removal of these emissions sources is conservative as inclusion of these sources would serve to increase the total estimated emission reductions.

GHD raised CL#6 below to request clarification regarding the omission of electricity emission reductions from the Project emissions.

ID#	Clarification Request	Explanation/Response	Status
CL#6	GHD requests clarification regarding the omission of the credits associated with electricity generation from the destruction of the landfill gas in the CAT model 3516 engine-generator sets.	Upon discussion with the Project Proponent prior to and during the Site Visit on November 17, 2015 it was determined that the Project Proponent decided to seek Renewable Energy Credits (RECs) instead of Carbon Credits and therefore decided not to include electricity generation.	Closed

GHD notes that based on review of the methodology and operation of the Project Activity during the Site Inspection, the emission sources identified in the VCS PD are appropriate and justified.

GHD reviewed the Project Boundary during the Site Inspection on 17-November-2015 and raised CAR#1 below. The Project Activity was already operating so the equipment included on-Site and connected to the Project Activity could be inspected and reviewed against the Project Boundary described in the VCS PD.

ID#	Corrective Action Request	Explanation/Response	Status
CAR#1	GHD requests that the Project Proponent include the emissions associated with the 150kW Emergency Generator located at the Facility and the use of grid supplied electricity.	The Project has addressed both sources of project emissions in the revised PDD. A deviation request has been made to exclude the emergency generator as a project emission source. Calculations supporting this request have been included in the Ex Ante Calculation Spreadsheet. The use of grid supplied electricity has been added to all relevant portions of the PDD. 2014 usage has been included as an estimate for future project emissions in the Ex Ante Calculation Spreadsheet. As part of the VCS audit, the exclusion of the emissions from the emergency generator was removed as a deviation request and included in the emission calculations. Supporting documentation and applicable parameters were added in to the VCS PDD as necessary. GHD reviewed the calculations and supporting documentation and determined the data and calculations performed were consistent with the Project and are conservative.	Closed

3.2.4 Baseline Scenario

Under ACM0001 – Version 16.0, the Baseline Scenario is defined as:

The baseline scenario for LFG is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons.

GHD notes that the emissions from electricity and heat generation are not considered in the baseline scenario as the project emissions reductions for electricity and heat generation have also been excluded.

The Project Proponent has used the Methodological tool – *Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period*, as noted in the VCS PD in order to assess the validity of the original baseline scenario. The Project Proponent has provided a step-by-step justification for the validity of the original baseline scenario, in the VCS PD. The original baseline scenario for the Project consists of the operation of 21 vertical wells, associated piping, blowers, and a flare. The original baseline scenario was present initially to address odour and safety concerns and would have continued to be operated by the District but would not have been expanded or improved over time.

Data to support the current operation of the original baseline system has been provided by the Project Proponent to GHD and factored in to the estimated emissions reductions. GHD also reviewed original drawings and data from the original baseline scenario during the Site Inspection. There have been no updates to policies or circumstances that would have any impact on the baseline scenario.

GHD concludes that the procedures for identifying and validating the applicability of the original baseline scenario have been correctly followed by the Project Proponent and have been detailed in the VCS PD. GHD also reviewed supporting information and documentation during the Site Inspection to cross-check the provided information, including system data and drawings.

Conclusion

- The identified baseline scenario is justified and represents what would have occurred in the absence of the project.
- Data used in the identification of the baseline scenario are justified.
- Relevant sectoral circumstances have been considered in the VCS PD.

3.2.5 Additionality

GHD reviewed the VCS Standard Version 3.5 and determined that, based on Section 3.8.5.1, a full reassessment of additionality is not required for the renewal of the crediting period.

GHD notes that only *regulatory surplus* shall be demonstrated, which has been discussed in the Section 3.1.9 above. Therefore, GHD concludes that additionality has been justified for this Project.

3.2.6 Quantification of GHG Emission Reductions and Removals

Quantification of GHG emissions and GHG emissions reductions and removals was performed by the Project Proponent for Baseline and Project activities, respectively.

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.

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
- Flaring Emissions – CO₂ – Generated from the combustion of landfill gas in the back-up flare

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 or removals are simply calculated by subtracting the project emissions from the baseline emissions.

Uncertainty Associated with the Calculation of Emissions

GHD identified minor uncertainties associated with the calculation of the Project emissions which was addressed through the issuance of CAR#2 as noted below. The Baseline emissions were based on values generated from the previous crediting period and therefore carried no uncertainties.

ID#	Corrective Action Request	Explanation/Response	Status
CAR#2	GHD requests that the Project Proponent include the parameters in the PDD associated with the biogas flow meter including temperature and pressure to account for the quantities of biogas that are subtracted from the total flow of gas to the engines.	These parameters have been added to the PDD and calculations. The monitoring plan has been updated to include this equipment and the calculation. GHD confirmed the updates to the VCS PD.	Closed

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.

Conclusion

- The referenced methodology has been applied correctly to calculate baseline emissions, project emissions and net GHG emission reductions and removals.
- Relevant assumptions and data have been listed in the VCS PD
- Data and parameter values used in the VCS PD are reasonable in the context of the Project.
- Estimates of the baseline emissions can be replicated using the provided data and parameter values.

GHD raised CL#2 below to seek clarification for the calculated annual emission reductions for the 10-year crediting period. The renewal of the crediting period does not begin at the beginning of the year which led to a variation in annual values for the first and last year.

ID#	Clarification Request	Explanation/Response	Status
CL#2	GHD is requesting the Project Proponent provide clarification regarding the calculation of the average annual ERs in Section 2.7 of the PDD. It is unclear as to why the average annual ERs is not equivalent to the total ERs over the crediting period divided by the total number of years in the crediting period.	Upon review of external documentation related to other Projects registered under the VCS, the calculation of the average annual ERs is acceptable for this crediting period.	Closed

3.2.7 Methodology Deviations

As noted in Section 3.6 of the VCS PD, the Project Proponent has proposed five methodology deviations as detailed in the table below:

Number	Deviation	GHD Comment
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Number	Deviation	GHD Comment
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.	GHD reviewed the flow meter data and the SCADA system that monitors the operation of each engine. GHD confirmed that this deviation does not impact the conservativeness of the emission reductions claimed.
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.	GHD confirms that this deviation does in fact increase the accuracy of the estimated emission reductions.
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 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	GHD confirms that this deviation does in fact increase the accuracy of the estimated emission reductions. GHD also reviewed the equipment and procedures followed to monitor and calculate the contribution of landfill gas from the District Initial System during the Site Inspection. GHD confirmed that the methods used provide real and accurate data.

Number	Deviation	GHD Comment
	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.	GHD confirms that this deviation does in fact increase the accuracy of the estimated emission reductions.

GHD notes that there were also two additional methodology deviations that were approved during the validation of the initial crediting period.

1. 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.
2. The Project reference conditions are 20 degrees Centigrade and 1 atmosphere rather than ACM0001 reference conditions of 0 degrees Centigrade and 1 atmosphere.

GHD reviewed supporting documentation and calculations to confirm the first previous deviation and determined that the calculations programmed in the SCADA are appropriate and conservative. Additionally GHD reviewed the second previous deviation request and determined that it was appropriate and consistent with all equipment and calculations. GHD notes that the

two previous deviation requests from the initial crediting period shall be carried forward to the new crediting period.

Conclusion

GHD determined that each of the methodology deviations noted above for the Project are valid.

3.2.8 Monitoring Plan

Monitoring Parameters

The Project Proponent included a series of data parameters that were available during the re-validation stage. These parameters included the parameters available at Re-Validation and information relating to the Baseline and Project emissions.

Below is the list of parameters that the Project Proponent has identified as parameters that are available at re-validation:

Data / Parameter	OX _{top_layer}
Data unit	Dimensionless
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	Consistent with how oxidation is accounted for in the methodological tool "Emissions from solid waste disposal"
Value applied:	0.1
Justification of choice of data or description of measurement methods and procedures applied	In accordance with requirements of ACM0001
Purpose of Data	Calculation of baseline emissions
Comments	No comments

Data / Parameter	GWP _{CH4}
Data unit	T CO ₂ e / t CH ₄
Description	Global warming potential of methane
Source of data	IPCC – Second Assessment Report
Value applied:	21
Justification of choice of data or description of measurement methods and procedures applied	Value required by VCS. Shall be updated to 25 or the latest UNFCCC approved value as required by ACM0001 when permitted by VCS.
Purpose of Data	Calculation of baseline emissions

Comments	No comments
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Data / Parameter	Regulatory requirements
Data unit	Not applicable
Description	Regulatory requirements applicable to the Landfill and Project
Source of data	Publicly available information on local, regional and national regulations
Value applied:	Not applicable
Justification of choice of data or description of measurement methods and procedures applied	Not applicable
Purpose of Data	To ensure continued compliance and regulatory additionality
Comments	This information is summarized in the PDD and will be monitored during the crediting period for any applicable changes.

Data / Parameter	Methane oxidation efficiency for electricity generation
Data unit	Percent
Description	Quantity of methane oxidized during combustion for electricity generation
Source of data	CDM Methodologies and Tools
Value applied:	100
Justification of choice of data or description of measurement methods and procedures applied	Appropriate for this type of destruction
Purpose of the data	Calculation of baseline emissions
Comments	None

Data / Parameter	Fuel Use by the Emergency Generator
Data unit	Gallons/hour
Description	Average consumption of a 150kW generator operating at $\frac{3}{4}$ load to be used to calculate fuel consumed annually
Source of data	Diesel Service and Supply Company
Value applied:	8.4 gallons/hour
Justification of choice of data or description of	Conservative for this piece of equipment given output needed vs total capacity

measurement methods and procedures applied	
Purpose of the data	Calculation of project emissions
Comments	None

Below is the list of parameters that the Project Proponent has identified as parameters that are monitored for the Project.

Data Unit / Parameter:	Methane content of gas (LFG and biogas)
Data unit:	Percent methane content of gas (LFG and biogas)
Description:	Methane content of gas (LFG and biogas)
Source of data:	SCADA System at Facility
Description of measurement methods and procedures to be applied:	Non-dispersive infrared
Frequency of monitoring/recording:	Continuous, hourly, daily
Value monitored:	Methane concentration, %
Monitoring equipment:	California Analytical 602P, Serial # S07002
QA/QC procedures to be applied:	Field calibrated once per week. A zero check and value check is performed by comparison with standard certified gas.
Purpose of the data	Calculate baseline and emissions reductions.
Calculation method:	Used in calculation to obtain heat value of gas (LFG and biogas) in Btu per scf of gas (LFG and biogas)
Any comment:	CO2 and O2 are also continuously monitored using the same instrument.

Data Unit / Parameter:	Volume of gas (LFG and biogas) to engines
Data unit:	Actual cubic feet per minute
Description:	Quantity of gas (LFG and biogas) used to fuel engines
Source of data:	SCADA System at Facility
Description of measurement methods and procedures to be applied:	Differential pressure measured across orifice plate
Frequency of monitoring/recording:	Continuous, hourly, daily
Value monitored:	Differential pressure
Monitoring equipment:	Oripac Model 4150, Serial #30154

QA/QC procedures to be applied:	Field calibrated once per month.
Purpose of the data	Calculate baseline and emissions reductions.
Calculation method:	Fluid flow equation (Bernoulli) calculates actual cubic feet per minute of gas (LFG and biogas).
Any comment:	None

Data Unit / Parameter:	Temperature of gas (LFG and biogas) to engines
Data unit:	Degrees Fahrenheit
Description:	Temperature of gas (LFG and biogas)
Source of data:	SCADA System at Facility
Description of measurement methods and procedures to be applied:	Thermocouple
Frequency of monitoring/recording:	Continuous
Value monitored:	Temperature
Monitoring equipment:	Thermocouple, Omega or equivalent
QA/QC procedures to be applied:	Field calibrated using thermometer.
Purpose of the data	Calculate baseline and emissions reductions.
Calculation method:	Used in fluid flow equation (Bernoulli) to calculate standard cubic feet per minute from actual cubic feet per minute of gas (LFG and biogas).
Any comment:	None

Data Unit / Parameter:	Pressure of gas (LFG and biogas) to engines
Data unit:	PSIG
Description:	Pressure of gas (LFG and biogas)
Source of data:	SCADA System at Facility
Description of measurement methods and procedures to be applied:	Pressure transducer
Frequency of monitoring/recording:	Continuous
Value monitored:	Static pressure
Monitoring equipment:	Pressure transducer, Omega or equivalent
QA/QC procedures to be applied:	Field calibrated using pressure gauge.
Purpose of the data	Calculate baseline and emissions reductions.

Calculation method:	Used in fluid flow equation (Bernoulli) to calculate standard cubic feet per minute from actual cubic feet per minute of gas (LFG and biogas).
Any comment:	None

Data Unit / Parameter:	Methane content of biogas
Data unit:	Percent methane content of biogas
Description:	Methane content of biogas
Source of data:	CRMC Bioenergy Facility (anaerobic digester system) tied to SCADA System at Facility
Description of measurement methods and procedures to be applied:	Infra-Red Gas Analyzer
Frequency of monitoring/recording:	Continuous and at totalization of biogas volume
Value monitored:	Methane concentration, %
Monitoring equipment:	Hitech Model: IR600 Infra-Red Gas Analyzer
QA/QC procedures to be applied:	Field calibrated periodically. A value check is performed by comparison with standard certified gas.
Purpose of the data	Calculate emissions reductions.
Calculation method:	Used in calculation to obtain heat value of biogas in Btu per scf of biogas
Any comment:	None

Data Unit / Parameter:	Volume of biogas
Data unit:	Standard cubic feet per minute
Description:	Quantity of biogas added to LFG, both used to fuel engines
Source of data:	CRMC Bioenergy Facility (anaerobic digester system) tied to SCADA System at Facility
Description of measurement methods and procedures to be applied:	Differential pressure measured across a pitot tube
Frequency of monitoring/recording:	Continuous and at totalization of biogas volume
Value monitored:	Differential pressure
Monitoring equipment:	Dwyer Series DS-300 Flow Sensor, which is an averaging pitot tube

QA/QC procedures to be applied:	Field calibrated once per month.
Purpose of the data	Calculate emissions reductions.
Calculation method:	Fluid flow equation (Bernoulli) calculates actual cubic feet per minute of gas.
Any comment:	None

Data Unit / Parameter:	Temperature of biogas
Data unit:	Degrees Fahrenheit
Description:	Temperature of gas
Source of data:	CRMC Bioenergy Facility (anaerobic digester system) tied to SCADA System at Facility
Description of measurement methods and procedures to be applied:	Thermocouple
Frequency of monitoring/recording:	Continuous monitoring
Value monitored:	Temperature
Monitoring equipment:	Thermocouple, Omega or equivalent
QA/QC procedures to be applied:	Field calibrated using thermometer.
Purpose of the data	Calculate emissions reductions.
Calculation method:	Used in fluid flow equation (Bernoulli) to calculate standard cubic feet per minute from actual cubic feet per minute of gas.
Any comment:	None

Data Unit / Parameter:	Pressure of biogas
Data unit:	PSIG
Description:	Pressure of gas
Source of data:	SCADA System at Facility
Description of measurement methods and procedures to be applied:	Pressure transducer
Frequency of monitoring/recording:	Continuous
Value monitored:	Static pressure
Monitoring equipment:	Pressure transducer, Omega or equivalent
QA/QC procedures to be applied:	Field calibrated using pressure gauge.

Purpose of the data	Calculate baseline and emissions reductions.
Calculation method:	Used in fluid flow equation (Bernoulli) to calculate standard cubic feet per minute from actual cubic feet per minute of gas.
Any comment:	None

Data Unit / Parameter:	Volume of LFG to the flare
Data unit:	Standard cubic feet per minute
Description:	Quantity of landfill gas combusted in flare
Source of data:	Flare station
Description of measurement methods and procedures to be applied:	Differential pressure measured across orifice plate
Frequency of monitoring/recording:	Continuous, hourly, daily
Value monitored:	Standard cubic feet per minute
Monitoring equipment:	Omega PDF65 sqrt, Serial #57493
QA/QC procedures to be applied:	Field calibrated as required when operating.
Purpose of the data	Calculate baseline and emissions reductions.
Calculation method:	Fluid flow equation (Bernoulli) calculates standard cubic feet per minute of LFG.
Any comment:	None

Data / Parameter	Fraction of total LFG collected attributable to District Initial System
Data unit	Percentage
Description	Amount of LFG collected from the District Initial System that would have been destroyed in the baseline scenario
Source of data	Well-head measurements
Description of measurement methods and procedures to be applied	Measurements at each well-head using a hand-held instrument
Frequency of monitoring/recording	Twice a month (approximately every two weeks)
Value applied:	6% was used in the ex-ante calculation based on two years of data (June 2013 – June 2015)
Monitoring equipment	Landtec GEM 2000 and GEM 5000

QA/QC procedures to be applied	Calibrations will be conducted prior to each set of measurements and documented.
Purpose of data	Calculation of the baseline emissions
Calculation method	LFG flows from District Initial System/Total LFG flow from all wells
Comments	None

Data Unit / Parameter	EF _{EL,Grid,y}
Data unit	tonnes CO2/MWh
Description	Emission factor for electricity generation in year y
Source of data	US EPA eGRID data
Description of measurement methods and procedures to be applied	This value converted from the pounds CO2/MWh provided by the US EPA.
Frequency of monitoring/recording	The eGRID data will be reviewed each year to ensure that the most current value is used.
Value applied	0.289955 tonnes CO2/MWh
Monitoring equipment	None
QA/QC procedures to be applied	None
Purpose of data	Calculation of project emissions
Calculation method	637.90 lbs CO2/MWh*0.454545455 kg/lbs*0.001 tonnes/kg = 0.289955 tonnes CO2/MWh
Any comment:	None

Data Unit / Parameter	TDL Grid,y
Data unit	--
Description	Average technical transmission and distribution losses for grid in year y
Source of data	Energy Information Administration (EIA) Department of Energy (DOE) Annual Energy Review 2011: Chapter 2 Energy Consumption by Sector. P. 66
Description of measurement methods and procedures to be applied	None
Frequency of monitoring/recording	This data will be reviewed each year to ensure that the most current value is used.

Value applied	0.07
Monitoring equipment	None
QA/QC procedures to be applied	None
Purpose of data	Calculation of project emissions
Calculation method	None
Any comment	None

Data Unit / Parameter	EC Grid,y
Data unit	MWh
Description	Amount of grid electricity consumed by the project
Source of data	Bills
Description of measurement methods and procedures to be applied	CNBE staff will compile the data.
Frequency of monitoring/recording	Data will be compiled annually.
Value applied	Ex Ante Calculation: 6.3 MWh/year based on 2014 usage
Monitoring equipment	None
QA/QC procedures to be applied	None
Purpose of data	Calculation of project emissions
Calculation method	None
Any comment	None.

Data Unit / Parameter:	FC _{Diesel,y}
Data unit:	Gallons/year
Description:	Amount of diesel consumed by the emergency generator
Source of data:	Run time log
Description of measurement methods and procedures to be applied:	Plant operator will log the run time of the engine each time it is used
Frequency of monitoring/recording:	Data will be compiled annually.
Value applied:	Ex Ante Calculation: Based on 2014-2015 usage, the engine ran for 19 hours. Using a conservative assumption that the engine operated at $\frac{3}{4}$ load, it was assumed that the engine uses 8.4 gallons of diesel per hour run. (Technical specifications provided to validator.

	See Parameter in Section 5.1 of PD)
Monitoring equipment:	None
QA/QC procedures to be applied:	None
Purpose of data:	Calculation of project emissions
Calculation method:	The total run time will be multiplied by 8.4 gallons/hour to determine the total amount of diesel consumed in the year.
Any comment:	None.

Data Unit / Parameter:	NCV _{diesel}
Data unit:	MMBtu/ gallon
Description:	Energy content of the diesel
Source of data:	Draft 2011 US Greenhouse Gas Inventory Report
Description of measurement methods and procedures to be applied:	This was converted from the MMBtu/barrel data provided by the USEPA. 5.809 MMBtu/barrel
Frequency of monitoring/recording:	Annual
Value applied:	0.13831 MMBtu/ gallon See ExAnteEstimate or Annual Calculation Workbooks for conversion
Monitoring equipment:	None
QA/QC procedures to be applied:	None
Calculation method:	None
Any comment:	Values provided by the EPA will be reviewed annually to ensure this value is the most up to date value available. This value is higher than the range provided by the IPCC in its 2006 Guidelines for National Greenhouse Gas Inventories and is therefore conservative.

Data Unit / Parameter:	EF CO ₂ , Diesel, y
Data unit:	t CO ₂ /MMBtu
Description:	CO ₂ emissions factor for diesel
Source of data:	Draft 2011 US Greenhouse Gas Inventory Report
Description of measurement methods and procedures to be applied:	This was converted from the Tg C/Qbtu data provided by the US EPA. See ExAnteEstimate or Annual Calculation Workbooks for conversion
Frequency of monitoring/recording:	Annual

Value applied:	0.073957 t CO ₂ /MMBtu
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Calculation method:	N/A
Any comment:	Values provided by the EPA will be reviewed annually to ensure this value is the most up to date value available.

The GHD Project Team reviewed all parameters and their frequency, equipment used, and description. The GHD Project Team also validated that the monitoring of the above parameters coincides with the CDM Methodology and VCS guidance for the projected emission reductions. The GHD Project Team notes that while there may be default and published values applied for the re-validation of the Project Activity, each of the parameters above will be monitored and recorded as per VCS guidelines.

GHD raised CL#7 below to request further clarification regarding the tolerance range for the pressure transducer.

ID#	Clarification Request	Explanation/Response	Status
CL#7	GHD requests that the Project Proponent provide the tolerance range for the pressure transducer(s) used to measure the landfill gas flow.	The pressure transducer is an Omega Model PX2300-1DI, serial # 5119832 with a range of 0.0 to 1.0 psig and a stated accuracy of 0.25%. The orifice plate is an Oripac Orifice Model 5300, serial #30154 with a range of 0 to 1800 cfm and a stated accuracy of 0.6%. Specification sheets for both instruments were provided to the GHD Validation team for review.	Closed

Additionally, GHD raised CL#8 to address the parameter "Methane oxidation efficiency for electricity generation" and the value applied of 100 percent.

ID#	Clarification Request	Explanation/Response	Status
CL#8	Please provide clarification and supporting evidence (as necessary) to support the value of 100 percent used for the Data/Parameter "Methane oxidation efficiency for electricity generation". In	The value of 100% for the parameter "Methane oxidation efficiency for electricity generation" was derived based on the formulas presented in the approved methodology, ACM0001 Version 16.0 used by the project. On pages 14-16 of the methodology, the approach for determining the quantity of methane destroyed by project activity is presented for methane used in electrical production and flaring, among other options. Equation 3 does not include any parameters related to destruction efficiency. In point 32, projects are referred to the Tool to	Closed

ID#	Clarification Request	Explanation/Response	Status
	addition, please provide any source testing data that may have been completed to support this value.	Determine Mass Flow of GHG in a Gaseous Stream to find the quantity of methane destroyed in electrical production. This tool also does not require any parameter related to destruction efficiency to be monitored. As a contrast, points 34-36, which relate to flaring, very explicitly examine emissions from incomplete combustion. These equations and the referenced tool all ensure that incomplete combustion is accounted for in the calculations. Based on this, the project understood there to be an implied destruction efficiency of 100% for electrical generation and included it in the PDD to be as transparent as possible. However, because it is not a parameter actually used in the equations required by ACM0001, we are happy to remove it if you feel it causes unnecessary confusion. GHD reviewed ACM0001 and all applicable tools and determined that the "Methane oxidation efficiency for electricity generation" parameter is not defined nor is it used in any of the methodology of VCS PD calculations. However, this value is still included in the VCS PD and Re-Validation Report as it is implied through the calculations that are included.	

GHD also notes that the parameters used to calculate emissions from flaring are also included in the list above however, given the flare has not operated in several years these parameters are not currently being used as part of the emission reduction calculations. These parameters have been listed for completeness and are defined should the flare be used in the new crediting period.

Monitoring Plan

The Monitoring Plan identifies the following items:

- The SCADA system monitors and records the methane content and total gas volume (landfill gas and biogas) and then calculates the total amount of methane once every minute. The results are then calculated in MMBtu's. The same readings and calculations are then performed for the biogas stream and the biogas MMBtu's are then subtracted from the total to determine the total MMBtu's attributable to the landfill gas.
- One flow meter is placed immediately before the four electricity generation engines and one is placed on the biogas feed line.

- Each meter and measuring device will be calibrated in accordance with the manufacturer recommendations or more frequently as necessary.
- Data monitored in the landfill gas collection system well field is stored on a portable monitoring device and then downloaded thereby eliminating potential human error.
- For data continuously recorded and stored in electronic format, the data will be stored in an electronic storage medium as a backup.

Conclusion

The monitoring plan is consistent with the applied methodology and Project deviation requests.

3.3 Non-Permanence Risk Analysis

Not relevant for this Project.

3.4 Environmental Impact

The Project Proponent submitted an Environmental Notification Form to the Massachusetts Secretary of Environmental Affairs to identify whether or not a detailed environmental impact assessment for the Project was required. The form was submitted based on the requirements of the Massachusetts Environmental Policy Act and was submitted prior to construction of the Project. In February 2004 it was determined and certified by the Secretary that an Environmental Impact Report for the Project would not be required.

GHD also performed a search under the United States Environmental Protection Agency's website to determine if there were any outstanding environmental issues associated with the Project.

GHD confirmed that the VCS PD and the construction of the Project along with the continued operation of the Project in the initial crediting period is in compliance with all applicable laws, statutes and regulatory frameworks.

GHD raised CL#3 below to request clarification from the Project Proponent regarding any environmental violations.

ID#	Clarification Request	Explanation/Response	Status
CL#3	GHD is requesting that the Project Proponent provide clarification regarding any environmental violations related to the Project (if applicable).	During the Site Visit on 17-November-2015, Mr. Tom Yeransian provided documentation noting that the Site is in compliance and has not received any violations. Mr. Yeransian also provided inspection reports issued by the Massachusetts Environmental Protection Agency related to random inspections that had previously occurred. Additionally, GHD performed an EPA search on the Site and determined that the results of the search were consistent with the documentation provided.	Closed

3.5 Comments by Stakeholders

The Project Proponent noted in Section 7.0 of the VCS PD that no formal stakeholder consultations were required as the District and CNBE are the only Project stakeholders. Based on the agreement between the District and the Project Proponent, the Project Proponent is the sole owner of the landfill gas and all associated environmental attributes. Therefore, the GHD Project Team considers that no stakeholder consultations were necessary for this Project and has confirmed that it meets the requirements of the VCS.

4 VALIDATION CONCLUSION

The validation was performed in accordance with the following documents:

- VCS Program Guide, dated October 8, 2013, Version 3.5 (VCS Program Guide)⁴
- VCS Standard, dated March 25, 2015, Version 3.5 (VCS Standard)⁵
- VCS Validation and Verification Manual, dated October 8, 2013, Version 3.1 (VCS VVM)⁶ and
- UNFCCC CDM methodological tools.

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

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

Upon completion of the re-validation process, it is GHD's opinion that all relevant VCS validation criteria have been satisfied. The Project Activity properly applies the following methodology and methodological tool:

- UNFCCC CDM "Large-scale Consolidated Methodology – Flaring or use of landfill gas", ACM0001, Version 16.0 dated 16 October 2015.
- Methodological tool – Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, Version 3.0.1 dated 2 March 2012

It is GHD's opinion that the emission reductions attributable to the Project Activity are additional to any emission reductions that would occur in the absence of the Project Activity.

Ten (10) findings (CARs, and CLs) raised by GHD were satisfactorily resolved by the Project Proponent. One (1) FAR was raised that is addressed in Section 2.6 above. In total, the emission reductions from the Project Activity are estimated to be 1,052,834 tonnes of CO₂e over a renewed 10-year crediting period between 29-March-2016 and 28-March-2026, resulting in an

⁴ <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Program%20Guide,%20v3.5.pdf>

⁵ <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Standard%2C%20v3.5%280%29.pdf>

⁶ http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Validation%20Verification%20Manual,%20v3.1_1.pdf

average of 80,398 tonnes of CO₂e annually throughout the crediting period. The estimated emission reductions have been reviewed by GHD for completeness, accuracy, and consistency. At the conclusion of this review GHD deemed it likely that the stated quantity of emission reductions may be achieved should the related assumptions and operational conditions remain unchanged.

Based on the re-validation assessment performed, GHD is issuing a positive Re-Validation 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.

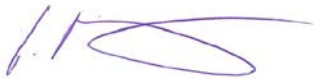
The Validation Representation is provided in Appendix D.

Respectfully Submitted,

GHD Limited

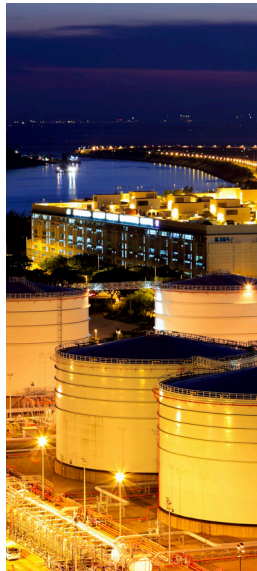
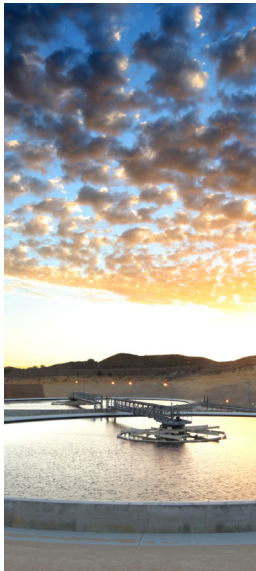


Brent Boss, P.Eng.



Gordon Reusing, M.A.Sc., P.E., P.Eng.

APPENDIX A: RE-VALIDATION PLAN



Re-Validation Plan

Re-Validation of Greater New Bedford LFG Utilization Project

Project Participants:

CommonWealth Resource Management Corporation

Magerkurth Associates Inc.

651 Colby Drive Waterloo Ontario N2V 1C2

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1. Introduction

CommonWealth Resource Management Corporation (CRMC/Project Proponent) retained GHD Limited (GHD) to complete a re-validation of the Greater New Bedford LFG Utilization Project (Project Activity) located at the Crapo Hill Landfill in Dartmouth, Massachusetts, United States under the requirements of the Verified Carbon Standard (VCS). The re-validation is required in support of CRMC's application for continued registration and renewal of the Project Activity's crediting period with the VCS. The following Re-Validation Plan has been prepared in accordance with the requirements presented in the following documents.

- VCS Program Guide, dated October 8, 2013, Version 3.5 (VCS Program Guide)¹
- VCS Standard, dated March 25, 2015, Version 3.5 (VCS Standard)²
- VCS Validation and Verification Manual, dated October 8, 2013, Version 3.1 (VCS VVM)³

In accordance with the VCS Program Guide, eligible GHG emission reduction 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 (renewable/non-renewable sources)
- Sectoral Scope 4 - Manufacturing industries
- Sectoral Scope 5 - Chemical industry
- Sectoral Scope 8 - Mining/mineral production
- Sectoral Scope 9 - Metal production
- Sectoral Scope 10 - Fugitive emissions from fuels (solid, oil, and gas)
- Sectoral Scope 12 - Solvents use
- Sectoral Scope 13 - Waste handling and disposal

2. Scope of Services

The scope of services completed by GHD for this Project Activity was as follows:

- Re-Validation of the Greater New Bedford LFG Utilization Project located at Crapo Hill Landfill in Dartmouth, Massachusetts, United States, under the VCS.

The Project Activity falls within Sectoral Scope 13 – Waste handling and disposal, for which GHD is accredited.

GHD was contacted regarding re-validation services by CRMC and Magerkurth Associates Inc. (MAI), which are the greenhouse gas consultants for the Project Activity. GHD understands that MAI assists CRMC by providing technical support for the project documentation.

¹ <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Program%20Guide,%20v3.5.pdf>

² <http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Standard%2C%20v3.5%280%29.pdf>

³ http://www.v-c-s.org/sites/v-c-s.org/files/VCS%20Validation%20Verification%20Manual,%20v3.1_1.pdf

GHD has entered into a contract with CRMC to complete the re-validation activities and GHD will be communicating directly with CRMC and MAI for the duration of the re-validation contract, unless otherwise noted/directed by CRMC or MAI.

The re-validation activities was 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 (PD) that was supplied by CRMC. GHD understands that the PD was prepared in accordance with the most up-to-date version of the following United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM) consolidated methodology and the associated methodological tools:

- UNFCCC CDM ACM0001 – Flaring or use of landfill gas, Version 16.0⁴
- UNFCCC CDM “*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*” (Version 01) 16 March 2008

GHD reviewed the VCS PD, Monitoring Plan, and all related information and prepared a Re-Validation Report and Re-Validation Opinion. GHD has submitted the final Re-Validation Report and Re-Validation Opinion to the Project Proponent/CRMC and understands that the Project Proponent will submit the Re-Validation Report and Re-Validation Opinion, along with the final PD, to the VCS Registry irrespective of the outcome of the re-validation.

3. GHD Project Team

The Project Team for this Project Activity was established to provide the Project Proponent/CRMC with a fully capable and qualified Project Team with specific knowledge of the local area as well as the requirements under the applicable VCS project protocol. As for any assurance project, GHD teams auditing expertise with technical expertise in order to provide all required aspects of an assurance process. For this validation assignment, the Project Team was comprised of accredited engineers, including specialists in renewable energy and other related projects. The resources indicated were focused on this validation activity to ensure that the assignment was completed in accordance with the indicated schedule.

As with any assurance exercise, GHD made available its entire company-wide resources to address Project requirements as required. Additionally, a senior member of the GGAS Group was assigned to undertake an Independent Technical Review of this assignment.

The Project Team consists of the following primary Auditors/Team Members:

Team Leader and Technical Expert – Brent Boss, P.Eng. – Mr. Boss is a licensed Professional Engineer in Ontario and Alberta and has a Bachelor of Engineering in Environmental Engineering from the University of Guelph. Mr. Boss has experience in solid waste engineering and a range of greenhouse gas (GHG) validation and verification activities. As the Greenhouse Gas Assurance Services Manager for GHD, Mr. Boss works closely with the United Nations Framework Convention on Climate Change (UNFCCC) and the International Standards Organization (ISO) 14065 GHG accreditations. Mr. Boss assisted in leading the successful applications and approvals process in which GHD is now recognized as a Designated Operational Entity (DOE) with the UNFCCC and as

⁴ ACM-0001, CDM consolidated methodology Flaring or use of landfill gas, Version 16.0
<https://cdm.unfccc.int/methodologies/DB/LZK7FFF1UVA2IILFNAQ0I0CUCW3RJJ>

a Validation/Verification Body under the ISO: 14065 program. Mr. Boss has also led GHD to become registered to complete Validation and Verification Services with The Gold Standard, the Fair Recycling Foundation (formerly the Swiss Charter Foundation), and the Verified Carbon Standard (VCS). Mr. Boss has completed well over 100 GHG validation/verification projects as a lead auditor or peer reviewer/technical expert on over a wide range of sectoral scopes ranging from but not limited to renewable power generation (wind, geothermal, and hydroelectric), oil and gas, agricultural, and LFG/biogas combustion plants. Mr. Boss has also completed several methodology review processes under the VCS.

Team Leader Under Training – Jason Clarke, B.Eng., EIT – Mr. Clarke is a Junior Engineer and has been with GHD since 2012. Mr. Clarke graduated from the University of Guelph with a bachelor's degree in Environmental Engineering. Mr. Clarke is currently a member of Professional Engineers of Ontario as an Engineer-in-Training (EIT). Mr. Clarke has practical and field experience associated with solid waste management engineering, construction oversight/administration, and a range of GHG validation and verification activities. Mr. Clarke has been a validation/verification team member for a variety of GHG Validation and Verification projects registered under ANSI and UNFCCC CDM, including several VCS projects. Mr. Clarke 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 MOECC, ANSI, TCR, Massachusetts Department of Environmental Protection (MassDEP), VCS, and the UNFCCC CDM. Mr. Clarke also has experience with the internal and external auditing related to GHG Verification and Validation projects in Ontario, Quebec, Alberta, British Columbia, and Massachusetts.

Additionally, Mr. Clarke has been involved in various LFG collection and monitoring projects in Ontario at open and closed landfill sites. Mr. Clarke has construction oversight and field experience associated with the development of various solid waste management projects from new public drop-off facilities and the installation of LFG collection and flaring systems to the monitoring and reporting associated with active and closed landfill sites. Mr. Clarke also continues to perform annual research into alternative waste management technologies including the conversion of municipal solid waste (MSW) and organic waste to biofuels.

Independent Peer 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.

Other qualified staff in GHD's GHG Assurance Services Group assisted as required. The Validation Team was communicated to CRMC and CRMC had the opportunity to object to any Team Member.

4. Re-Validation Process

GHD ensured that the re-validation activities address the Validation Objectives defined in Section 2.1 of the VCS VVM, which includes re-validation of:

- *Project conformance to VCS rules*
- *Project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology*
- *Likelihood that methods and procedures set out in the project description will generate verifiable GHG data and information when implemented*

The main components of the GHD re-validation process are as follows:

- Document Review
- Preparation of Assessment List and Completion of a Site Visit
- Re-Validation Assessment and Issuance of Correction Action Requests (CARs), Forward Action Requests (FARs), and/or Clarification Requests (CLs)
- Response to CARs, FARs, and CLs
- Draft Re-Validation Report Issuance
- Technical Review
- Final Re-Validation Report and Re-Validation Statement Issuance

These items are discussed in the following sections.

4.1 Overview of the Re-Validation Process

VCS is a rules-based mechanism, and GHD ensured that, in accordance with the VCS Program Guidelines, the rules were complied with for the Project.

GHD followed a risk-based re-validation approach to focus and determine the detailed scope of the re-validation.

The key risks associated with the Project Activity design, baseline, monitoring plan, emission reduction estimates, and environmental impacts are elements that were critical for meeting VCS Program criteria for achieving real, measureable, permanent, and additional GHG reductions.

Using the Project Activity information provided in the PD and other Project Activity specific materials provided by the Project Proponent/CRMC, the GHD Project Team assessed the Project Activity's conformance with all VCS requirements and requirements of the applied methodology including, but not limited to, the following requirements:

- Whether the Project Proponent can claim right of use⁵ based on evidence provided.

⁵ Right of use is, in respect of a GHG emission reduction or removal, the unconditional, undisputed and unencumbered ability to claim that the relevant project, or jurisdictional program, will or did generate or cause such reductions or removals (i.e., the project proponent has claim to ownership or control of the technologies or measures that have brought about the reductions or removals). (Section 3.2.1., VCS VVM, Version 3.1)

- The Project Activity meets the applicability and eligibility conditions of the selected methodology.
- The baseline scenario selection procedure complies with the procedure set out in the selected methodology.
- The Project Activity meets additionality⁶ requirements.
- Whether the GHG emission reductions and removals estimated in the PD will be achieved by implementing the Project Activity.
- Assess the effects of leakage on all carbon sources, sinks, and reservoirs within the same country as the Project Activity, if such emissions are measureable.
- Confirm that the Project Activity's monitoring plan conforms to the selected methodology requirements, and relevant data quality management procedures for generating verifiable GHG data and avoiding material errors.

The re-validation of baseline studies and Monitoring Plan included an assessment of the following, as applicable to the Project Activity:

- Accuracy of baseline emissions.
- Uncertainty of external data sources used.
- Coverage of leakage in the baseline scenario.
- Baseline emission assumptions.
- Accuracy of emission calculations in the Monitoring Plan.

The Project Team reviewed the completeness, conservativeness, and accuracy of the underlying evidence for the assumptions and claims made, and data sources used. Assumptions, claims, and data sources that were identified and discussed in the PD that are substantiated with information from reliable references, and that were sufficiently controlled through the Monitoring Plan, were identified as a lower level of risk. Remaining areas of material uncertainty associated with assumptions made and/or data sources used, that could not be fully recognized and approved by the Project Team during the above review, were investigated and further tested. The results of this investigation, together with the results of the review of other areas, gave the necessary input for the Re-Validation Report.

The evidence used in this assessment was not limited to that provided by the Project Proponent/CRMC. In assessing the evidence, the Project Team did not omit evidence that was likely to alter the Re-Validation Opinion. The Project Team documented all evidence reviewed and provided justification for any evidence omitted during the preparation of the Re-Validation Report and Re-Validation Statement.

Risks were classified in risk categories (e.g., high, moderate, and low). A risk may have been high, moderate, or low depending on the issue's potential to cause misstatement of the baseline emissions. The risk of understating baseline emissions is higher than the risk of overstating.

⁶ Additionally is the concept that credited GHG emission reductions and removals must exceed (i.e., be additional to) what would have been achieved under the business-as-usual scenario, and credited reductions and removals must be attributable to the intervention of the carbon market.

Understating baseline emissions, without recognizing the problem, could lead to certification and transference of emission reductions that are not real.

The classification of risk as high, moderate, or low is largely subjective and required GHD's expert judgement. The designated Team Leader and one of the Project Team members had a thorough understanding of the risks and uncertainties applicable to the assignment.

4.2 Document Review

The document review established to what degree the presented PD, including the baseline study and the Monitoring Plan, met the established re-validation criteria.

The Project Team's document review during the re-validation process was comprised, but not limited to, an evaluation of the following:

- The documentation, data and information is complete and comprehensive and follows the structure and criteria specified in the PD template.
- The baseline and monitoring methodologies are justified and appropriate for the specific project.
- The assumptions for the baseline are conservative and appropriate.
- The description of the baseline development has considered technological, political, socio-demographic, environmental, and legal trends of relevance to the project.
- Additionality of the project is sufficiently demonstrated in the PD.
- All aspects related to direct and indirect emissions, including leakage, are captured.
- The calculation of GHG emission reductions is appropriate and uses conservative assumptions for estimating emission reductions.
- The technical features of the project, as well as other information about the Project Activity have been sufficiently addressed.
- The monitored parameters 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.

Documentation Requested for Review

The Project Team requested that the following documents be provided for GHD's review:

- Project Document (PD).
- Documents related to additionality of the Project Activity.
- Documents related to Compliance with Laws, Statutes and Other Regulatory Framework.
- Declaration regarding non-participation in any other GHG program or rejected by any other GHG program.
- Emission Reduction Calculation Sheet
- Calibration certificates of monitoring equipment (as applicable)

GHD notes that on the day of the Site Visit, additional documentation was requested and reviewed. The list provided above was intended to allow the Project Proponent(s) to be adequately prepared for the Site Visit.

4.3 Site Visit

GHD completed the Site Visit on November 17, 2015 and completed the following items during the Site Visit:

- A walkthrough of the site and observation of the Project Activity's implementation status.
- Interviews with personnel with knowledge of the Project Activity and its implementation to crosscheck information provided; interviews may be conducted during the Site Visit, but may also be completed or continued by way of telephone or email.
- Request of information from personnel either not made previously available or deemed necessary following site walkthrough or following interviews.

4.4 Project Developer Interactions

During the re-validation process, the Project Team identified issues related to the project's baseline, implementation and operations that needed to be further elaborated, researched, and/or added to meet VCS requirements and achieve credible emission reductions. Although there are different methods of reporting such results, it was imperative that these issues were transparently identified, discussed, and concluded in the Re-Validation Report.

If during the re-validation of the Project Activity, the Project Team identified issues that needed to be addressed to confirm that the Project Activity meets the VCS requirements, the Team Leader issued a Corrective Action Request (CAR), Clarification Request (CL), or a Forward Action Request (FAR), as appropriate, to CRMC.

Iterations of these requests were continued until such a time as the Team Leader could adequately resolve or "close out" the identified CARs, CLs, and FAR.

Each of these procedures are discussed in further detail below.

Corrective Action Request (CAR)

A CAR is "a request raised by the Validation/Verification Body (VVB) during validation when there has been a mistake, the VCS requirements have not been met or there is a risk the emissions cannot be monitored or calculated."⁷ A CAR was issued when the Project Team identified non-compliance with project requirements or a risk to successful fulfillment of the particular project's objectives.

The Team Leader issued a CAR to CRMC if:

- The Project Proponent has made mistakes that will influence the ability of the Project to achieve real, measurable, verifiable and additional emission reductions.
- The VCS requirements have not been met.
- There is a risk that emission reductions cannot be monitored or calculated.

⁷ CDM Rule Book, A-Z, <http://cdmrulebook.org/3921>, accessed on December 30, 2009.

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

It was the responsibility of CRMC to acknowledge and respond to the CARs identified by the Project Team in a timely manner. The CARs were addressed by the Project Proponent/CRMC through modifications to the project design, adjustments to the selected project baseline, and/or by rectifying and updating the PD. CARs may have also required further investigation of issues that had not been considered or appropriately addressed in the project documents.

Conversely, a re-validation with no (remaining) CARs could still have ended up not producing the expected emission reductions. Some issues are only possible to fully clarify during detailed design (e.g., after an investment decision has been made). Other issues may even be unclear until an ex post verification and certification (i.e., after the emission reductions have been achieved) has been established to determine the emissions reductions the project has actually generated.

The Project Proponent/CRMC approved all changes submitted to the Project Team for final review.

The Team Leader resolved or "closed out" CARs only if the Project Proponent/CRMC modified the project design, rectifies the Project Description, or provided adequate additional explanations or evidence that satisfies the Project Team's concerns and the VCS requirements. GHD would not have recommended the project for VCS registration unless all of the CARs were resolved prior to the final stages of the re-validation.

The Project Team reported on all CARs in the Re-Validation Report.

Clarification Request (CL)

A CL was a request for additional clarification "made by the VVB to the Project Proponent during validation or verification if the information provided is insufficient or unclear."⁸

The Team Leader issued a CL to the Project Proponent/CRMC if the Project Team determined that the information provided by the Project Proponent was insufficient, unclear, or not transparent enough to establish whether the applicable requirements are met.

It was the responsibility of the Project Proponent/CRMC to acknowledge and respond to the CLs identified by the Project Team in a timely manner. The CLs could have been addressed by the Project Proponent through modifications to the project design, adjustments to the selected project baseline, provision of further explanations or additional evidence, and/or by rectifying and updating the PD. CLs may have also required further investigation of issues that had not been considered or appropriately addressed in the project documents.

The Project Proponent/CRMC approved all changes submitted to the Project Team for final review.

The Team Leader resolved or "closed out" CLs only if the CRMC modified the project design, rectified the Project Description, or provided adequate additional explanations or evidence that satisfied the Project Team's concerns and the VCS requirements. If that was not done, GHD would not have recommended the Project Activity registration by VCS.

The Project Team reported on all CLs in the Re-Validation Report.

⁸ CDM Rule Book, A-Z, <http://cdmrulebook.org/3920>, accessed on December 30, 2009.

Forward Action Request (FAR)

A FAR is "a request made by the VVB during validation" to "highlight issues related to project implementation that require review during the first verification of the Project".⁹

The Team Leader raised a FAR during re-validation to highlight issues related to project implementation that required review during future verifications of the Project. FARs did not relate to the VCS requirements for registration.

The Project Team reported on all FARs in the Re-Validation Report.

4.5 Reporting

As previously noted, the results of this investigation, together with the results of the review of other areas, gave the necessary input for the Re-Validation Opinion. The Re-Validation Opinion can be positive, negative, or qualified. Irrespective of the Re-Validation Opinion, the Re-Validation Report has been sent to CRMC and is expected to be provided in full to the VCS Registry. The Re-Validation Opinion will provide all required details identified in Section 5.3.9 of the VCS Standard, Version 3.5:

- *Description of the level of assurance of the validation*
- *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 body's conclusion on the GHG assertion, including any qualifications or limitations*

4.6 Materiality

Materiality has both qualitative and quantitative aspects and GHD assessed both aspects during the re-validation. When assessing qualitative materiality, GHD determined whether the project conformed to VCS rules and methodology requirements. In accordance with the VCS VVM, and GHD could have noted certain qualitative discrepancies, such as a discrepancy with respect to ownership or applicability criteria, as material non-conformances.

The VCS Standard specifies materiality thresholds based on the following project scale:

- Projects: Less than or equal to 300,000 tonnes of CO₂e per year (5 percent materiality threshold)
- Large Projects: Greater than 300,000 tonnes of CO₂e per year (1 percent materiality threshold)

The threshold for quantitative materiality with respect to the aggregate of errors, omissions, and misrepresentation relative to the total reported GHG emission reductions and/or removals shall be 5 percent as the Project meets the VCS definition of a "Project" rather than a "Large Project", based on the information provided on the VCS Project Database for the previous crediting period for the Project Activity.

⁹ CDM Rule Book, A-Z, <http://cdmrulebook.org/3919>, accessed on December 30, 2009.

5. Validation Timeline

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

The following table presents the timelines, which were based on the date the CRMC provided notice to proceed. A key component to maintaining the proposed timelines was the timely and complete response of the Project Proponent/CRMC to any/all Corrective Action/Clarification Requests. GHD notes that the schedules presented below were applicable to each individual component of the requested scope of work.

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

- The selected methodology version expires or is no longer applicable or the Project Proponents change the methodology.
- An CAR or CL is not adequately responded to within 30 days of submittal of the Request by GHD to the Project Proponent(s).
- The VCS guidance on Validation or other relevant guidance, methodologies, or standards are revised by the VCS or CDM Executive Board during the validation process.
- Prompt payment of outstanding invoices is not received in accordance with the terms of the signed contract.

Assuming that none of the previously mentioned events occur during GHD's re-validation assessment such that the re-validation process timelines would be altered, the following table presents the proposed timelines for completing the requested re-validation services noting that should the Project Activities be completed together or separately, the schedule will not change:

Table 5.1 Proposed Validation Timeline

Date/Timeline	Milestone	GHD Deliverable
Start Date - September 14, 2015	Contract is Duly signed by CRMC and GHD	Duly signed contract.
September 29, 2015	GHD submits the Validation Plan	GHD submits the Validation Plan to CRMC
October 1, 2015	Kick-Off Conference Call with CRMC and MAI	Not Applicable
October 5, 2015	CRMC provided the most current version of the VCS PD and Monitoring Plan.	Not Applicable
October 26, 2015	GHD's Project Team reviewed the VCS PD and Monitoring Plan and formulated, as applicable, all CARs, FARs, and CLs and issues	GHD submitted a Summary of Findings to CRMC consisting of CARs, CLs, and FARs
November 17, 2015	GHD's Project Team conducted a Site Visit of the Project Activity	Not Applicable
December 17, 2015	CRMC submitted documentation addressing all CARs and CLs in a	Not Applicable

Table 5.1 Proposed Validation Timeline

Date/Timeline	Milestone	GHD Deliverable
	single submission package to GHD	
December 17, 2015 – January 20, 2016	GHD's Project Team reviewed the additional supporting documentation and any changes to the VCS PD or the Monitoring Plan	Upon closure of all CARs, and CLs, GHD issued a Draft Re-Validation Report to the Technical Reviewer
January 21, 2016 and January 26, 2016	Final review of the VCS PD and Monitoring Plan by Technical Reviewer and preparation of the Draft Validation Report and Opinion	GHD submitted a request for any additional information required as a result of the Technical Review. GHD submitted the Draft Re-Validation Report to CRMC
February 3, 2016	Revisions to the Draft Re-Validation Report to address Technical Review comments and submission to CRMC for review	Following receipt of CRMC comments and receipt, GHD prepared and submitted Final Re-Validation Report and associated VCS Re-Validation Deed of Representation to CRMC.

APPENDIX B: RE-VALIDATION CHECKLIST



Project no.: 11111336 **Project title:** Greater New Bedford LFG Utilization Project
Project team: Brent Boss and Jason Clarke **Date:** April 26, 2016

Participation requirements		Comments	Peer reviewer
The host Party participates in the project voluntarily (checking that the project has been approved by the host Party's Designated National Authority).	☒	No requirement for the capture of LFG voluntarily.	Yes ☒ No ☐
The Project meets the requirements set out in the latest version of the VCS Program Documents	☒	The latest version of the VCS Program Documents were reviewed against the Project	Yes ☒ No ☐
GHG emission reductions and removals validated under the VCS Program and issued as VCUs shall meet the following principles: real, measurable, permanent, additional, independently audited, unique, transparent, conservative	☒	Identified through the re-validation process	Yes ☒ No ☐
Project Design Document Review			
(1) Does the VCS PD include at a minimum:			
Project Summary	☒	Refer to Section 2.1 of the VCS PD	Yes ☒ No ☐
Sectoral Scope and Project Type	☒	Refer to Section 2.2 of the VCS PD	Yes ☒ No ☐
Project Proponent	☒	Refer to Section 2.3 of the VCS PD	Yes ☒ No ☐
Other Entities Involved in the Project	☒	Refer to Section 2.4 of the VCS PD	Yes ☒ No ☐
Project Start Date and Crediting Period	☒	Refer to Section 2.5 of the VCS PD	Yes ☒ No ☐
Compliance with Laws, Statutes, and Other Regulatory Frameworks	☒	Refer to Section 2.11 of the VCS PD	Yes ☒ No ☐
Project Ownership and participation in other Emission Trading Programs, GHG Programs, or other forms of environmental credit	☒	Refer to Section 2.12 of the VCS PD	Yes ☒ No ☐
Evidence of Right of Use, in accordance with the VCS specifications on Right of Use.	☒	Refer to Section 2.12.1 of the VCS PD	Yes ☒ No ☐
Methodology and Project Boundary	☒	Refer to Section 3.0 of the VCS PD	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Baseline Scenario	☒	Refer to Section 3.4 of the VCS PD	Yes ☒ No ☐
Additionality	☒	Refer to Section 3.5 of the VCS PD	Yes ☒ No ☐
Methodology Deviations	☒	Refer to Section 3.6 of the VCS PD	Yes ☒ No ☐
Quantification of GHG emission reductions and removals, using conservative assumptions for estimating emission reductions	☒	Refer to Section 4.0 of the VCS PD	Yes ☒ No ☐
Monitoring Methodology and Plan and Data and Parameters Monitored	☒	Refer to Section 5.0 of the VCS PD	Yes ☒ No ☐
Environmental Impacts	☒	Refer to Section 6.0 of the VCS PD	Yes ☒ No ☐
Stakeholder Comments	☒	Refer to Section 7.0 of the VCS PD	Yes ☒ No ☐
Project Summary	☒	Refer to Section 2.0 of the VCS PD	Yes ☒ No ☐
(2) Ensure the VCS PD meets the following criteria:			
The documentation is complete and comprehensive and follows the structure and criteria given in the valid VCS template.	☒	Confirmed that the VCS PD follows the VCS Validation Report Template Version 3.2	Yes ☒ No ☐
The baseline and monitoring methodologies are justified and appropriate for the specific project.	☒	Refer to Section 3.2 of the Re-Validation Report	Yes ☒ No ☐
The assumptions for the baseline are conservative and appropriate.	☒	Refer to Section 3.2.4 of the Re-Validation Report	Yes ☒ No ☐
The description of the baseline development has considered technological, political, socio-demographic, environmental, and legal trends of relevance to the project.	☒	Refer to Section 3.4 of the VCS PD	Yes ☒ No ☐
Additionality of the project is sufficiently demonstrated in the VCS PD.	☒	Refer to Section 3.5 of the VCS PD	Yes ☒ No ☐
All aspects related to direct and indirect emissions, including leakage, are captured in the VCS PD and potentially claimed emission reductions.	☒	Refer to Section 4.0 of the VCS PD	Yes ☒ No ☐
The calculation of GHG emission reductions is appropriate and uses conservative assumptions for estimating emission reductions.	☒	Refer to Section 3.2.6 of the Re-Validation Report	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Local stakeholder consultation has been carried out and comments are taken into account in the project design.	☒	Refer to Section 7.0 of the VCS PD	Yes ☒ No ☐
The technical features of the project, as well as other information about the project, have been sufficiently addressed.	☒	Refer to Section 2.8 of the VCS PD	Yes ☒ No ☐
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.	☒	Refer to Section 5.0 of the VCS PD	Yes ☒ No ☐
(3) Has the VCS PD been prepared using the most up-to-date template from the UNFCCC?	☒	Confirmed that the VCS PD follows the VCS Validation Report Template Version 3.2	Yes ☒ No ☐
Project Description and Site Visit			
Has the Project Proponent provided a clear definition of the project activity enabling understanding of the precise nature of the project activity and the technical aspects of implementation?	☒	Yes, refer to Section 2.8 of the VCS PD	Yes ☒ No ☐
Site Visit has been completed unless it can be justified that one is not required to provide a reasonable level of assurance. Has appropriate justification been provided to rationalize not undertaking a site visit within the Validation Report?	☒	Site Visit was completed on 17-November-2015	Yes ☒ No ☐
If the proposed VCS project activity involves the alteration of an existing installation or process, ensure that the project description clearly states the differences resulting from the project activity compared to the pre-project situation.	☒	Baseline and Project processes are clearly defined in the VCS PD and were reviewed during the Site Visit	Yes ☒ No ☐
Baseline and Monitoring Methodology Review			
(1) Are the selected baseline and monitoring methodologies the valid versions of those approved by the VCS?	☒	Yes, Version 16.0 of ACM0001 is the most recent version on the UNFCCC CDM website.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(2) Is the selected methodology applicable to the project activity and is the selected version valid at the time of submission of the proposed project activity for registration?	☒	Version 16.0 of ACM0001 is the latest version of the methodology and is applicable to the Project.	Yes ☒ No ☐
(3) If a deviation to the approved methodology has been requested by the Project Proponent, or a deviation has been found during the validation, has guidance been requested from the VCS Association (VCSA) prior to requesting registration?	☒	Deviations have been requested however, none of them required guidance from the VCSA as they are all in accordance with the VCS standard requirements.	Yes ☒ No ☐
(4) If a determination cannot be made regarding the applicability of a selected methodology has a request for clarification of the methodology been made to the VCSA? Has an assessment been conducted to ensure that the request is not submitted with the intention of revising an approved methodology to expand its applicability?	☒	Not applicable, applicability of the methodology to the Project is appropriate.	Yes ☒ No ☐
(5) Has the selected methodology been correctly applied by the following with respect to the Project Boundary :			
Have all main GHG emission sources, the physical delineation of the proposed project activity and other relevant and baseline emission sources covered in the methodology been included?	☒	Yes, refer to Section 3.3 of the VCS PD related to the Project Boundary.	Yes ☒ No ☐
Has the project boundary been confirmed by documented evidence and/or a site visit?	☒	Yes, Site Visit completed on 17-November-2015	Yes ☒ No ☐
If the methodology allows Project Proponents to choose whether a source or gas is to be included within the project boundary, determine whether the Project Proponents have justified that choice. Confirm that the justification provided is reasonable, based on assessment of supporting documented evidence provided by the Project Proponents and corroborated by observations if required.	☒	Justification for emissions sources has been provided. GHD raised CL#6 and CAR#1 to address justification of emissions sources within the Project Boundary.	Yes ☒ No ☐
(6) Has the selected methodology been correctly applied by the following with respect to the Baseline Identification :			
Is the baseline identified for the proposed project activity the scenario that reasonably represents the anthropogenic emissions by source of GHGs that would occur in the absence of the proposed project activity?	☒	Confirmed and reviewed during the Site Visit	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Confirm that any procedure contained in the methodology to identify the most reasonable baseline scenario, has been correctly applied. If the selected methodology requires use of tools to establish the baseline scenario, consult the methodology on the application of these tools. In such cases, the guidance in the methodology shall supersede the tool. The VVB shall check each step in the procedure described in the PD against the requirements of the methodology.	☒	Confirmed, refer to Section 3.4 of the VCS PD. A CDM Methodological tool was also used to establish the baseline scenario.	Yes ☒ No ☐
If the methodology requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario, based on financial expertise and local and sectoral knowledge, determine whether all scenarios that are considered by the Project Proponents and are supplementary to those required by the methodology, are reasonable in the context of the proposed VCS project activity and that no reasonable alternative scenario has been excluded.	☒	Not applicable as consideration of several alternative scenarios is not required.	Yes ☒ No ☐
Determine whether the most plausible baseline scenario identified is reasonable by validating the assumptions, calculations and rationales used, as described in the PD. Ensure that documents and sources referred to in the PD are correctly quoted and interpreted. Cross-check the information provided in the PD with other verifiable and credible sources, such as local expert opinion, if available.	☒	Confirmed that the Baseline scenario presented is the most plausible and was reviewed during the Site Visit and with supporting documentation.	Yes ☒ No ☐
Determine whether the PD provides a description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the proposed project activity.	☒	Refer to Section 3.4 of the VCS PD.	Yes ☒ No ☐
Drawing on knowledge of the sector and/or advice from local experts, confirm that all applicable VCS requirements have been taken into account in the identification of the baseline scenario for the proposed project activity, including relevant national and or sectoral policies and circumstances.	☒	Confirmed, reviewed during the validation of Section 2.10 of the VCS PD.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(4) Has the selected methodology been correctly applied by the following with respect to the Emission Reductions :			
The steps taken and equations applied to calculate project emissions, baseline emissions, leakage, and emission reductions shall comply with the requirements of the selected baseline and monitoring methodology.	☒	Confirmed the applicability of the equations and calculations to methodology ACM0001	Yes ☒ No ☐
Determine whether the equations and parameters in the PD have been correctly applied by comparing them to those in the selected approved methodology.	☒	Confirmed, GHD reviewed the equations in Section 4.0 of the VCS PD against the methodology	Yes ☒ No ☐
If the methodology provides for selection between different options for equations or parameters, confirm that adequate justification has been provided and that the correct equations and parameters have been used, in accordance with the methodology selected.	☒	Not applicable, selection between different options was not required.	Yes ☒ No ☐
Verify the justification given in the PD for the choice of data and parameters used in the equations. If data and parameters will not be monitored throughout the crediting period of the proposed project activity but have already been determined and will remain fixed throughout the crediting period, assess that all data sources and assumptions are appropriate and calculations are correct, applicable to the proposed project activity and will result in a conservative estimate of the emission reductions. If data and parameters will be monitored on implementation and hence become available only after validation of the project activity, the VVB shall confirm that the estimates provided in the PD for these data and parameters are reasonable.	☒	GHD confirmed that all data presented that will remain fixed throughout the crediting period is reasonable and conservative. GHD confirmed during the review of Section 5.1 of the VCS PD.	Yes ☒ No ☐
Additionality			
(1) Assess that the selected methodology been correctly applied by completing the following with respect to Prior Consideration of the VCS :			
Has it been determined that VCS benefits were considered necessary in the decision to undertake the project as a proposed project activity if the starting date of the activity is prior to the start of validation (which is the date of publication of the PD for global stakeholder consultation)?	☒	Starting date of the re-validation is the day immediately following the previous crediting period.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Determine whether the start date of the project activity, reported in the PD, is in accordance with the VCS Program Definitions.	☒	Confirmed, first day immediately following the previous crediting period.	Yes ☒ No ☐
For an existing project activity for which the start date is prior to the date of publication of the PD for global stakeholder consultation, assess the Project Proponents prior consideration of the VCS. Specifically, assess whether the Project Proponents: (a) Had an awareness of the VCS prior to the project activity start date, and that the benefits of the VCS were a decisive factor in the decision to proceed with the project. Evidence to support this would include, inter alia, minutes and/or notes related to the consideration of the decision by the Board of Directors, or equivalent, of the Project Proponents, to undertake the project as a proposed VCS project activity. (b) Demonstrated that continuing and real actions were taken to secure VCS status for the project in parallel with its implementation. Evidence to support this should include on or more of the following: contracts with consultants for VCS/PD/methodology services, draft versions of PDs and underlying documents such as letters of authorization, and if available, letter of intent, purchase agreements or other documentation related to the sale of the potential verified carbon units (VCUs) (including correspondence with multilateral financial institutions or carbon funds), evidence of agreements or negotiations with a VVB for validation services, submission of a new methodology or requests for clarification or revision of existing methodologies to the VCSA, publication in newspaper.	☒	This is a re-validation for the renewal of the crediting period and therefore this is not applicable.	Yes ☒ No ☐
(2) Assess that the selected methodology been correctly applied by completing the following with respect to Identification of Alternatives :			
The list of alternatives includes as one of the options that the project activity is undertaken without being registered as a proposed VCS project activity.	☒	GHD notes that the Project Activity was not required to complete a full additionality assessment for renewal of the crediting period based on the VCS Standard.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
The list contains all plausible alternatives that are considered to be a viable means of supplying the comparable outputs or services that are to be supplied by the proposed VCS project activity.	☒	Not applicable, see above.	Yes ☒ No ☐
The alternatives comply with all applicable and enforced legislation.	☒	Not applicable, see above.	Yes ☒ No ☐
(3) Assess that the selected methodology been correctly applied by completing the following with respect to Investment Analysis :			
If investment analysis has been used to demonstrate the additionality of the proposed VCS project activity, determine whether the proposed project activity would not be: (a) The most economically or financially attractive alternative. (b) Economically or financially feasible, without the revenue from the sale of VCUs.	☒	GHD notes that the Project Activity was not required to complete a full additionality assessment for renewal of the crediting period based on the VCS Standard.	Yes ☒ No ☐
The proposed VCS project activity would produce no financial or economic benefits other than VCS-related income. The VVB shall determine whether the documented costs associated with the proposed project activity and the alternatives identified and demonstrate that there is at least one alternative which is less costly than the proposed project activity.	☒	Not applicable, see above.	Yes ☒ No ☐
The proposed project activity is less economically or financially attractive than at least one other credible and realistic alternative.	☒	Not applicable, see above.	Yes ☒ No ☐
The financial returns of the proposed project activity would be insufficient to justify the required investment.	☒	Not applicable, see above.	Yes ☒ No ☐
Determine the sustainability of the financial indicator selected by the Project Proponents and conduct a thorough assessment of all parameters and assumptions used in calculating such financial indicators, and determine the accuracy and suitability of these parameters using the available evidence and applying its expertise in relevant accounting practices.	☒	Not applicable, see above.	Yes ☒ No ☐
Cross-check the parameters against third-party or publicly available sources, such as invoices or price indices.	☒	Not applicable, see above.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Review, as appropriate, feasibility reports, public announcements and annual financial reports related to the proposed VCS project activity and the Project Proponents.	☒	Not applicable, see above.	Yes ☒ No ☐
Assess the correctness of computations carried out and documented by the Project Proponents.	☒	Not applicable, see above.	Yes ☒ No ☐
Assess, where applicable, the sensitivity analysis by the Project Proponents to determine under what conditions variations in the result would occur, and the likelihood of these conditions.	☒	Not applicable, see above.	Yes ☒ No ☐
Determine whether the type of benchmark applied is suitable for the type of financial indicator presented.	☒	Not applicable, see above.	Yes ☒ No ☐
Ensure that any risk premiums applied in determining the benchmark reflect the risks associated with the project type or activity.	☒	Not applicable, see above.	Yes ☒ No ☐
Determine whether it is reasonable to assume that no investment would be made at a rate of return lower than the benchmark.	☒	Not applicable, see above.	Yes ☒ No ☐
If a Feasibility Study Report (FSR) is the basis of the decision to proceed with the investment in the project, i.e. that the period of time between the finalization of the FSR and the investment decision is sufficiently short that it is unlikely in the context of the underlying project activity that the input values would have materially change.	☒	Not applicable, see above.	Yes ☒ No ☐
The values used in the PD and associated annexes are fully consistent with the FSR, and where inconsistencies occur validate the appropriateness of the values.	☒	Not applicable, see above.	Yes ☒ No ☐
The input values from the FSR are valid and applicable at the time of investment decision. The VVB shall confirm this on the basis of its specific local and sectoral expertise, and by cross-checking or other appropriate means.	☒	Not applicable, see above.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(4) Assess that the selected methodology been correctly applied by completing the following with respect to Barrier Analysis :			
If barrier analysis has been used to demonstrate the additionality of the proposed project activity, the VVB shall determine whether the proposed project activity faces barriers that: (a) Prevent the implementation of this type of proposed project activity. (b) Do not prevent the implementation of at least one of the alternatives.	☒	GHD notes that the Project Activity was not required to complete a full additionality assessment for renewal of the crediting period based on the VCS Standard. Therefore a barrier analysis was not required.	Yes ☒ No ☐
Determine whether the barriers are real. Assess the available evidence and/or undertake interviews with relevant individuals (including members of industry associations, government officials or local experts if necessary) to determine whether the barriers listed in the PD exist. Ensure that existence of barriers is substantiated by independent sources of data such as relevant national legislation, surveys of local conditions and national or international statistics.	☒	Not applicable, see above.	Yes ☒ No ☐
Determine whether the barriers prevent the implementation of the project activity but not the implementation of at least one of the possible alternatives. Since not all barriers present an insurmountable hurdle to a project activity being implemented, judge whether a barrier or set of barriers would prevent the implementation of the proposed CDM project activity and would not equally prevent implementation of at least one of the possible alternatives, in particular the identified baseline scenario.	☒	Not applicable, see above.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(5) Assess that the selected methodology been correctly applied by completing the following with respect to Common Practice Analysis :			
Assess whether the geographical scope (e.g., the defined region) of the common practice analysis is appropriate for the assessment of common practice related to the project activity's technology or industry type. For certain technologies the relevant region for assessment will be local and for others it may be transnational/ global. If a region other than the entire host country is chosen, assess the explanation why this region is more appropriate.	☒	GHD notes that the Project Activity was not required to complete a full additionality assessment for renewal of the crediting period based on the VCS Standard. Therefore a common practice analysis was not required.	Yes ☒ No ☐
Determine to what extent similar and operational projects (e.g., using similar technology or practice), other than project activities, have been undertaken in the defined region.	☒	Not applicable, see above.	Yes ☒ No ☐
Assess if similar and operational projects, other than VCS project activities, are already "widely observed and commonly carried out" in the defined region, assess whether there are essential distinctions between the proposed project activity and the other similar activities.	☒	Not applicable, see above.	Yes ☒ No ☐
Monitoring Plan			
(1) Compliance of the monitoring plan with the approved methodology:			
Identify the list of parameters required by the selected methodology including applicable tool(s) and, where applicable, the selected standardized baseline by means of document review;	☒	Parameters under Sections 5.1 and 5.2 of the VCS PD were reviewed against the methodology and deemed to be consistent.	Yes ☒ No ☐
Confirm that the description of the monitoring plan contains all necessary parameters, that they are described and that the means of monitoring described in the plan complies with the requirements of the methodology including applicable tool(s) and, where applicable, the standardized baseline;	☒	Monitoring for each of parameters in Section 5.2 of the VCS PD are deemed to be consistent with the methodology and tool requirements.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(2) Assess the feasibility of the plan by means of review of the documented procedures, interviews with relevant personnel, project plans and any on-site inspection of the proposed VCS project activity, assess whether:			
The monitoring arrangements described in the monitoring plan are feasible within the project design.	☒	Monitoring arrangements were reviewed during the Site Visit.	Yes ☒ No ☐
The means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, are sufficient to ensure that the emission reductions achieved by/resulting from the proposed CDM project activity or PoA and CPA can be reported ex post and verified.	☒	Confirmed during the Site Visit.	Yes ☒ No ☐
Local Stakeholder Consultation			
(1) The VVB shall, by means of document review and interviews with local stakeholders as appropriate, determine:			
Comments have been invited by local stakeholders that are relevant for the proposed project activity.	☒	No formal stakeholder consultations were required.	Yes ☒ No ☐
The summary of the comments received as provided in the PD is complete.	☒	No formal stakeholder consultations were required.	Yes ☒ No ☐
The Project Proponents have taken due account of any comments received and have described this process in the PD.	☒	No formal stakeholder consultations were required.	Yes ☒ No ☐
Environmental Impacts			
(1) Confirm, by means of a document review and/or using local official sources and expertise, whether the Project Participants have undertaken an analysis of environmental impacts and, if required, an environmental impact assessment.	☒	Refer to Section 6.0 of the VCS PD.	Yes ☒ No ☐
Re-Validation Report			
(1) The Re-Validation Report shall include all of the following:			
Sectoral Scope and Validation Criteria	☒	Refer to Section 1.2 of the Re-Validation Report	Yes ☒ No ☐
Summary Description of the Project	☒	Refer to Section 1.4 of the Re-Validation Report	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Validation Process, including methodology and criteria, document reviews, site inspections, and findings and their resolution	☒	Refer to Section 2.0 of the Re-Validation Report	Yes ☒ No ☐
Validation Findings, including details and conclusions on the Project and PD and the application of methodology, as specified in the most recent version of the VCS Validation Report Template	☒	Refer to Section 3.0 of the Re-Validation Report	Yes ☒ No ☐
Validation Conclusion	☒	Refer to Section 4.0 of the Re-Validation Report	Yes ☒ No ☐
(2) Describe whether the identified boundary and the selected sources and gases are justified for the project activity. Should the VVB identify project activity instance(s) that exceeds one percent of the capacity limit, as defined in the VCS Program Definitions, they should be identified. These project activity instance(s) shall be divided into clusters within one kilometer of each other, and none of the clusters shall exceed the capacity limit, and no further project activity instances shall be added to the project that would cause any of the clusters to exceed the capacity limit, as per the VCS Standard.	☒	Refer to Section 3.2.3 of the Re-Validation Report	Yes ☒ No ☐
(3) Describe the steps taken to assess the requirements for the baseline identification and provide an opinion as to whether:			
All the assumptions and data used by the Project Proponents are listed in the PD, including their references and sources.	☒	Confirmed through validation of the VCS PD.	Yes ☒ No ☐
All documentation used is relevant for establishing the baseline scenario and correctly quoted and interpreted in the PD.	☒	All supplemental information provided by the Project Proponent was reviewed by GHD	Yes ☒ No ☐
Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable.	☒	Confirmed, refer to Section 3.2.4 of the Re-Validation Report.	Yes ☒ No ☐
Relevant national and/or sectoral policies and circumstances are considered and listed in the PD.	☒	GHD raised FAR#1 to address the applicability of current regulations.	Yes ☒ No ☐
The approved baseline methodology has been correctly applied to identify the most reasonable baseline scenario and the identified baseline scenario reasonably represents what would occur in the absence of the proposed project activity.	☒	Confirmed, refer to Section 3.2.4 of the Re-Validation Report.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(4) Clearly describe in the validation report the steps taken to assess the requirements for algorithms and/or formulae used and shall provide an opinion as to whether:			
All assumptions and data used by the Project Proponents are listed in the PD, including their references and sources.	☒	Throughout Section 3.0 of the Re-Validation Report and the Re-Validation Opinion in Section 4.0	Yes ☒ No ☐
All documentation used by Project Proponents as the basis for assumptions and source of data is correctly quoted and interpreted in the PD.	☒	Throughout Section 3.0 of the Re-Validation Report and the Re-Validation Opinion in Section 4.0	Yes ☒ No ☐
All values used in the PD are considered reasonable in the context of the proposed VCS project activity.	☒	Throughout Section 3.0 of the Re-Validation Report and the Re-Validation Opinion in Section 4.0	Yes ☒ No ☐
The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions.	☒	Confirmed, refer to Section 3.2.6 of the Re-Validation Report.	Yes ☒ No ☐
All estimates of the baseline emissions can be replicated using the data and parameter values provided in the PD.	☒	Confirmed that the calculations and estimates are repeatable.	Yes ☒ No ☐
(5) The validation report shall clearly describe all steps taken, and sources of information used to cross-check the information contained in the PD on additionality. The validation report shall contain information regarding how it was determined that the documentation assessed is authentic, where appropriate.	☒	Refer to Section 3.2.5 of the Re-Validation Report.	Yes ☒ No ☐
(6) The validation report shall describe the following with respect to Investment Analysis:		No investment analysis required.	
Describe in detail how the parameters used in any financial calculations have been validated.	☒	Not applicable.	Yes ☒ No ☐
Describe how the suitability of any benchmark applied has been assessed.	☒	Not applicable.	Yes ☒ No ☐
Confirm whether the underlying assumptions are appropriate and the financial calculations are correct.	☒	Not applicable.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(7) The validation report shall describe the following with respect to Barrier Analysis:		No barrier analysis required.	
Provide an assessment of each barrier listed in the PD, which describes how the VVB has undertaken validation of the barrier.	☒	Not applicable.	Yes ☒ No ☐
Provide an overall determination of the credibility of the barrier analysis performed.	☒	Not applicable.	Yes ☒ No ☐
(8) The validation report shall describe the following with respect to Common Practice Analysis:		No common practice analysis required.	
How the geographical scope of the common practice analysis has been validated.	☒	Not applicable.	Yes ☒ No ☐
How the VVB has undertaken an assessment of the existence of similar projects.	☒	Not applicable.	Yes ☒ No ☐
How the VVB has assessed the essential distinctions between the proposed VCS project activity and any similar projects that are widely observed and commonly carried out.	☒	Not applicable.	Yes ☒ No ☐
Confirmation by the VVB that the proposed VCS project activity is not common practice.	☒	Not applicable.	Yes ☒ No ☐
(9) The validation report shall describe the following with respect to the Monitoring Plan:			
State opinion of the compliance of the monitoring plan with the requirements of the methodology.	☒	Positive, monitoring plan is in compliance with ACM0001.	Yes ☒ No ☐
Describe the steps undertaken to assess whether the monitoring arrangements described in the monitoring plan are feasible within the project design.	☒	Reviewed during the Site Visit and against the methodology.	Yes ☒ No ☐
State opinion of the Project Participant's ability to implement the monitoring plan.	☒	Positive, was implemented for the first crediting period.	Yes ☒ No ☐
(10) The validation report shall describe whether it considers the listed alternatives (to the project activity) to be credible and complete.	☒	Baseline scenario was the only alternative.	Yes ☒ No ☐
(11) The validation report shall describe the following with respect to the local stakeholder consultation.			
Describe the steps taken to assess the adequacy of the local stakeholder consultation.	☒	Refer to Section 3.5 of the Re-Validation Report.	Yes ☒ No ☐
State the opinion on the adequacy of the local stakeholder consultation.	☒	Positive, limited number of parties involved.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
(12) The validation report shall describe whether the Project Participants have undertaken an analysis of environmental impacts and, if required by the host Party, an environmental impact assessment in accordance with procedures as required by the host Party.	☒	Refer to Section 3.4 of the Re-Validation Report.	Yes ☒ No ☐
(13) The validation report shall include the VVB's final validation opinion.	☒	Refer to Section 4.0 of the Re-Validation Report.	Yes ☒ No ☐
(14) The validation report shall include the following at a minimum:			Yes ☐ No ☐
State conclusions regarding the proposed project activity's conformity with applicable VCS requirements.	☒	Refer to Section 3.2 of the Re-Validation Report.	Yes ☒ No ☐
Give an overview of the validation activities carried out in order to arrive at the final validation conclusions and opinion.	☒	Refer to Section 2.0 of the Re-Validation Report.	Yes ☒ No ☐
Include the results of the dialogue between the VVB and the Project Proponents, as well as any adjustments made to the project design following stakeholder consultation. It shall reflect the responses to CARs and CLs, and discussions on and revisions to project documentation.	☒	Findings listed throughout the Re-Validation Report.	Yes ☒ No ☐
A summary of the validation process and its conclusions.	☒	Refer to Section 4.0 of the Re-Validation Report.	Yes ☒ No ☐
All the applied approaches, findings and conclusions, especially on: baseline selection, additionality, emission factors and monitoring.	☒	Refer to Section 3.0 of the Re-Validation Report.	Yes ☒ No ☐
Information on the stakeholders consultation carried out by the VVB prior to submitting the project for validation, including dates and how comments received have been taken into consideration by the VVB.	☒	Refer to Section 3.5 of the Re-Validation Report.	Yes ☒ No ☐
A list of interviewees and documents reviewed.	☒	Refer to Section 2.3 of the Re-Validation Report.	Yes ☒ No ☐
Details of the validation team, technical experts, internal technical reviewers involved, together with their roles in the validation activity and details of who conducted the on-site visit.	☒	Refer to Section 2.3 of the Re-Validation Report.	Yes ☒ No ☐
Information on quality control within the team/of the validation process.	☒	Refer to Section 2.3 of the Re-Validation Report.	Yes ☒ No ☐



Participation requirements		Comments	Peer reviewer
Appointment certificates or curricula vitae of the validation team members, technical experts and internal technical reviewers for the project activities.	☒	Refer to Appendix C of the Re-Validation Report.	Yes ☒ No ☐

Peer Review Final Checks		Comments	Peer Reviewer
Check that all necessary submission forms, checklists, etc. have been prepared and are ready for submission.	☐		Yes ☒ No ☐
Check that the claimed emission reductions and reporting period are consistent between the PD, VCS Program Documents and Forms, and all other relevant information.	☐		Yes ☒ No ☐
Confirm that the Monitoring Plan and Parameter tables have all necessary information, including monitoring frequency and calibration requirements, as applicable.	☐		Yes ☒ No ☐

APPENDIX C: CURRICULA VITAE



Brent Boss

Project/Greenhouse Gas Assurance Services Manager

Qualified (Education): Bachelor of Engineering (B.Eng.) in Environmental Engineering, University of Guelph, 2008

Connected (professional affiliations): Professional Engineers Ontario (PEO) - Practicing Member, and Association of Professional Engineers and Geoscientists of Alberta (APEGA) - Practicing Member

Professional Summary: Brent possesses skills that give clients confidence that their projects will be executed in a professional and efficient manner. Brent utilizes effective procedure development and reporting, targeted communication, good organization, and excellent people skills to bring projects to completion. His work history spans +7 years in construction, waste management, greenhouse gas assurance, and agricultural projects; specifically in the management, coordination, and administration in each of these areas. Brent's dedication to his clients in addition to the skills mentioned above has led to numerous repeat and new clients to GHD.

Greenhouse Gas Assurance Services

GGAS Manager

Internal GHD | UNFCCC CDM and ANSI

Accreditations | 2012 - Current

Brent operates as the Greenhouse Gas Assurance Services (GGAS) Manager for GHD's greenhouse gas (GHG) accreditations under the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM) and the American National Standards Institute (ANSI). Brent effectively manages competency evaluations for nearly 40 staff members, assigns project team in consultation with Program Managers, and also performs a large number of Lead Auditor and Peer Review roles for our client base. Effective management of the GGAS Group has led GHD to be recognized in the industry as a top tier service provider in this field with many clients noting that GHD routinely exceeds their expectations.

Lead Verifier and Peer Reviewer

O. Reg. 452/09 Verifications | Various Clients | ON | 2011 - Current

Brent performed Lead Verifier and Peer Review roles on several Ontario Regulation (O. Reg.) 452/09 GHG verifications since 2011. As a Lead Verifier, Brent ensured that client needs and specific reporting deadlines were met. Specifically, Brent worked with individual clients to ensure that their organizations were accurately reporting emission sources in line with the regulation. Brent was also responsible for conducting Site visits to each of the organizations, in which Brent completed his works with minimal disruptions to daily operations and ensured health and safety requirements and procedures were always followed. This high level of service has led GHD to be one of the most widely utilized Verification Bodies in the Province of Ontario. Selected list of clients includes Clean Harbors, Toyota, Honda, Atlantic Packaging, Whitby Cogeneration, Labatt's, O-I Canada, Interlake/Dunn Paper, IGPC Ethanol, Jungbunzlauer, Union Gas.

Lead Verifier and Peer Reviewer

TCR Projects | Various Clients | United States | 2011 - Current

Brent performed Lead Verifier and Peer Review roles on several The Climate Registry (TCR) verifications since 2011. As a Lead Verifier and/or Peer Reviewer, Brent has effectively managed client's needs with those of TCR. Brent has completed Site visits as required to ensure implementation, proper monitoring, and full project inclusion for the various projects. Brent has managed an internal team of Engineers and Scientists to develop issues logs/findings assessments, write complete verification reports, and provide issuance support as needed. Many of Brent's clients are repeat clients due to the professionalism, responsiveness, and accuracy of the works completed. List of clients includes Hershey's, PG&E, TCR Batch Verifier in 2011 (nearly 40 individual assignments), and San Diego Gas and Electric.

Lead Validator/Verifier and Peer Reviewer

CDM Validations/Verifications | Various Clients | South/Central America and India | 2010 - Current

Brent led the successful initiative to become the first North American based company to be an approved validation/verification body (also referred to as a Designated Operational Entity or DOE) with the United Nations Framework Convention on Climate Change (UNFCCC) - Clean Development Mechanism (CDM). Since its inception, Brent has successfully completed numerous Lead Validator/Verifier and Peer Review roles for a variety of clients across South and Central America. Brent has managed language barriers, international contract negotiations, and global stakeholder consultations to ensure the requirements of the clients and that of the UNFCCC are met. Brent also completed Site Visits as required. Selected list of clients includes Bionersis/Ably Carbon, Polaris Energy/Ram Power, Landfill Gas Canada, Gen Power Carbon Solutions, Petroleum Equipment International.



Brent Boss

Project/Greenhouse Gas Assurance Services Manager

Lead Validator/Verifier and Peer Reviewer
VCS and Gold Standard Projects | Various
Clients | United States, Brazil, Turkey, India |
2010 - Current

Brent performed Lead Validator/Verifier and Peer Review roles on several Verified Carbon Standard (VCS) and Gold Standard validations and verifications since 2010. As a Lead Validator/Verifier and/or Peer Reviewer, Brent has effectively managed client's needs with those of the individual programs. Brent has completed Site visits as required to ensure implementation but also public/local perception of the projects. Brent has managed an internal team of Engineers and Scientists to develop issues logs/findings assessments, write complete validation/verification reports, and provide issuance support as needed. Many of Brent's clients are repeat clients due to the professionalism, responsiveness, and accuracy of the works completed. List of clients includes Native Energy (US based project developer), Western Farmers Electric Cooperative, Acciona, Willow Creek Dairy, Borga Carbon (Turkish project developer).

Lead Verifier
AESRD Verifications | Various Clients | AB |
2009 - Current

Brent performed the Lead Verifier role on several Alberta GHG verifications under the requirements of Alberta Environment and Sustainable Resources Development (AESRD) branch (now referred to as Alberta Environment and Parks [AEP]). Brent managed client relationships working both on behalf of clients directly but also on behalf of AEP in the re-auditing process. Brent ensured constant communications with the clients and ensured that all reporting timelines and budgets were met. Brent has successfully managed several different scopes of projects ranging from municipal composting operations, to oil refineries, and energy efficiency programs. Many of the clients in which Brent has managed turn into repeat clients due to the high level of service and responsiveness provided. Selected list of clients includes: BP, Clean-it-Green-it, Suncor, ALPAC, City of Medicine Hat, ECI.

Waste Management

Project Manager
Regional Municipality of Waterloo |
Kitchener Landfill | 2014 - Current

Brent continues to manage several on-going initiatives at this Site; which is closed landfill. The Site has very unique characteristics including close proximity housing, and numerous infrastructure elements (natural gas lines, sewage drains, etc.) running through the Site. Brent has successfully worked with the Region to develop tender packages, scopes of work, etc. that meet or exceed the Regions expectations while remaining at or under budget.

Specific projects underway at the Site include replacement of the existing landfill cap, surface monitoring of LFG for special events (concerts, etc.), review of quarterly third party gas assessments, and a physical risk assessment for the development of monitoring practices.

Project Manager
Regional Municipality of Niagara | Landfill Gas
Collection and Control System Construction |
2012 - Current

Brent provided contract administration and overall project management for the installation of the various engineering disciplines including electrical, structural, mechanical, and civil. Through on-Site Engineers, Brent managed the day to day construction of the project and was the main point of contact between GHD (formerly CRA), the Contractor, and the City; providing efficient and mutually beneficial conflict resolution providing the City confidence that the integrity of the project is being maintained. Brent also facilitated bi-weekly meetings and regular interactions with the Region and Contractor. Brent continues to work on providing construction support to the City to ensure the successful completion and installation of the flaring system and its ancillary equipment.

Project Manager
Corporation of the City of Stratford | Landfill
Gas Collection and Control System Design,
Construction, and Operational Support |
2011 - Current

Brent effectively managed the assessment of landfill gas generation potential. Brent coordinated internal electrical, civil, mechanical, and structural engineering teams to provide the City with a design and tender package that met regulatory needs of the TSSA, ESA, and the MOECC. Brent managed the day to day construction of the project and was the main point of contact between GHD (formerly CRA), the Contractor, and the City; providing efficient and mutually beneficial conflict resolution providing the City with an overall project that finished on-time and under budget. Brent continues to work on providing operational support to the City to ensure maximized operations of the installed flaring system.

Project Manager
City of Peterborough | Peterborough Landfill |
2013

The City contacted GHD (formerly CRA) to conduct an assessment of varying pressure swings at the LFG utilization engines at their landfill site. Brent led a team of Engineers to complete several on-Site assessments in which it was diagnosed that the header pipe had been installed without proper slope considerations. Brent together with the City performed a CCTV inspection of the header to confirm the diagnosis and then managed a



Brent Boss

Project/Greenhouse Gas Assurance Services Manager

team of excavators and pipe fusers to repair the necessary sections of header. Following the completion of this work, Brent together with technicians from the City and GHD balanced the well field and had the engines running at or near maximum capacity.

Project Engineer

Orgaworld Canada Ltd. | Odour Control Engineering and Operations Support | 2008 - 2011

Brent worked as a Project Engineer to diagnose issues related to odour both within and without the aerobic composting facility. Brent worked with internal GHD project managers to perform draft testing (smoke testing) of doors, collection of bio-filter samples, and stack samples. Brent also assisted in several Public Liaison Committee presentations and other various public interactions, ensuring that professionalism was maintained throughout. The end result of the works performed was a significant decrease in odour related concerns and overall client satisfaction.

Work History

2006 - present	Associate, GHD (formerly Conestoga-Rovers & Associates), Waterloo, ON
	Named Associate 2015
2005	Ontario Ministry of the Environment, Toronto, ON

Other related areas of interest

Recognized (Certifications/Trainings)

- California Air Resources Board (ARB) - Lead Offset Verifier and Project Specialist for Ozone Depleting Substance and Agricultural Projects
- The Gold Standard Foundation - Fast Track Validator/Verifier
- Social Carbon - Approved Lead Verifier
- OSHA 40-hour HAZWOPER, 2008 to present

Presentations

- "Carbon Pricing & Potential Challenges and Opportunities", Ontario Waste Management Association (OWMA) Annual General Meeting, Mississauga, Ontario, March 4, 2015 (with T. Gidda)
- "Validation of GHG Project - ISO:14065 Required Training", Internal Corporate Presentation, Waterloo, Ontario, 2014
- "Meter Training for GHG Validation/Verification Projects", Internal corporate presentation, Waterloo, Ontario, 2013
- "Current and Future Odour Management", Public Liaison Committee Meeting, London, Ontario, 2012
- "Understanding the Clean Development Mechanism (CDM) Project Development Process", Internal Corporate Webinar, Waterloo, Ontario, 2011



Jason Clarke

Junior Environmental Engineer/ Field Technician/Validator/Verifier

Qualified (Education): Bachelor of Environmental Engineering (BEng), University of Guelph, 2012

Connected (professional affiliations): Professional Engineers of Ontario – Engineer-in-Training (EIT)

Professional Summary: Jason has been with GHD since 2012 and has gained valuable practical and field experience associated with solid waste management engineering, construction oversight/administration, and a range of greenhouse gas (GHG) validation and verification activities. Jason has been involved in various landfill gas (LFG) collection and monitoring projects in Ontario at open and closed landfill sites. Mr. Clarke has construction oversight and field experience associated with the development of various solid waste management projects from new public drop-off facilities and the installation of LFG collection and flaring systems to the monitoring and reporting associated with active and closed landfill sites. Jason demonstrates exceptional communication and documentation skills to ensure the best interests of the client are being represented and achieved.

Greenhouse Gas Assurance Services

Validator/Verifier

Various Programs | 2013 – Present

Through various projects across Canada and the United States, Jason has gained experience with numerous GHG programs including: Ontario, Alberta, British Columbia, and California mandatory reporting programs; The Climate Registry; the California Air Resources Board (CARB) Cap-and-Trade program; the Verified Carbon Standard (VCS); The Gold Standard; and UNFCCC Clean Development Mechanism (CDM).

Jason has experience generating a number of documents under each of the above noted GHG programs including:

- Conflict of Interest Documentation and Mitigation Plans
- Validation/Verification Plans
- Issues Logs/Findings Assessments
- Draft and Final Validation/Verification Reports

Verifier

GHG Verification | Various Clients | Ontario | 2013 – Present

Jason has been a GHG verifier for a variety of clients under O. Reg 452/09 in Ontario. Jason has assisted with the development of verification plans, issues logs, draft and final verification reports, and recalculation of GHG emissions for the following clients in Ontario:

- Dunn Paper Inc.
- Atlantic Packaging Products Ltd.
- O-I Canada Corp.
- Labatt Brewing Company Ltd.
- IGPC Ethanol Inc.
- Clean Harbors Canada Inc.

Auditor

Various Programs and Projects | 2013 – Present

Jason has experience with internal and external auditing to comply with UNFCCC and ANSI accreditations for GHG emissions reporting. Jason has performed auditing related to the validation and verification of a number of projects in Ontario, Quebec, Alberta, British Columbia, and Massachusetts. The auditing has aided GHD in reducing the number of non-conformances and issues from year to year as identified by the regulating bodies (UNFCCC and ANSI).

Team Leader Under Training

Red Hills and Dempsey Ridge Wind Power Projects | Oklahoma, US | April – June 2015

Jason completed the annual GHG verification of two wind power projects under the VCS for private clients. Jason completed the Site visits and performed recalculation of the emissions generated by each project. Jason also generated the Draft and Final reports for review by the Team Leader and Independent Peer Reviewer. The projects were completed in a timely manner and on budget.

Validator/Verifier

Dairy Digester Validation and Verification | Private Client | 2014

Jason assisted with the validation and verification of a dairy digester project for a private client. The validation and verification were performed under the VCS. Jason assisted with the recalculation of the expected emissions and corresponding assessments to determine; accuracy of baseline emissions, uncertainty of external data sources used, coverage of leakage in the baseline scenario, baseline emission assumptions, and accuracy of emission calculation in the monitoring plan.



Jason Clarke

Junior Environmental Engineer/ Field Technician/Validator/Verifier

Solid Waste Management

Project Engineer/Field Technician

Stratford Landfill | City of Stratford | Stratford, ON | June 2015 – Present

Jason performed monitoring and balancing of the LFG collection system at the Stratford Landfill. Jason also assisted with data analysis and reporting as well as providing a summary of the event. As a result of the monitoring and balancing activities, the City was able to operate the collection system for a longer duration than they were previously capable of. GHD will continue to assist the City with regards to the performance of the LFG collection system.

Project Engineer

Annual Reporting | Region of Waterloo | Kitchener, ON | 2012 – Present

Jason has performed annual review and analysis of the potential for off-site LFG migration at the Former Kitchener Landfill Site. The annual review consists of; addressing methane readings at the probes and wells around the Site, monitoring the functionality of pumps, identifying potential areas and data points of concern, monitoring maintenance events, and developing recommendations related to reduce potential migration of LFG off-Site and improve the functionality of the perimeter collection system. This annual review identifies historical trends and provides the Region with a detailed summary of the status of LFG migration on-Site.

Project Engineer/Field Technician

Miscellaneous Monitoring | Region of Waterloo | Kitchener, ON | May – July 2015

Jason was at the Former Kitchener Landfill Site on multiple occasions to perform LFG monitoring in manholes and surface monitoring. This monitoring was at the request of the Region and provided insight into potential LFG migration pathways. Jason assisted with the recommendations to address and rectify the LFG migration concerns in both occasions.

Project Engineer/Field Technician

Header Pipe Replacement | Region of Waterloo | Kitchener, ON | June 2015

Jason provided oversight support for the Region of Waterloo during the modifications made to the header pipe of the Region's perimeter LFG collection system at the Former Kitchener Landfill Site. Jason was on-Site with the contractor for the duration of the works to ensure successful completion of the project. Jason was in constant contact with the Region throughout the project. The header pipe modifications were completed on-time and on-budget.

Project Engineer

MH1A Investigation | Region of Waterloo | Kitchener, ON | 2014 – 2015

Jason provided administrative, design, and oversight support for the Region of Waterloo into a manhole located at the Former Kitchener Landfill Site. Jason aided in addressing LFG hazards and potential mitigation techniques as well as oversight of an investigation performed in the manhole. GHD was able to identify the LFG source points and develop designs to prevent the accumulation of LFG in the manhole.

Project Engineer/Field Technician

Public Drop-Off Facility – Earthworks | City of Guelph | Guelph, ON | September – November 2014

Jason performed construction oversight services on behalf of the City of Guelph for the earthworks phase of the new Public Drop-Off Facility. Jason completed daily logs of the construction progress on-Site and problem solving with the contractor. Jason also maintained constant communication with the City throughout the project and prepared payment certificates for City review. The project was completed on-time and on-budget.

Project Engineer

Landfill Gas Well Field Infrastructure Assessment and Monitoring Program Rationalization | Region of Waterloo | Kitchener, ON | 2014

Jason completed historic data review and analysis including a physical risk assessment for the Former Kitchener Landfill Site for the Region of Waterloo. The risk assessment developed for the project aided the Region in understanding high, medium, and low risk areas around the Site and developed an annual method to re-classify areas of the Site based on new data, modifications to the monitoring program, and the addition or subtraction of new/old infrastructure.

Project Engineer/Field Technician

Ridge Landfill | Private Client | Blenheim, ON | 2012 – Present

Jason has and continues to complete monthly monitoring and balancing of the LFG collection system at the Ridge Landfill. Jason is also responsible for completing the data analysis and reporting to the client on a monthly basis. The collection system consists of 85 vertical LFG wells, two blowers, and two flares. The number of wells on-Site is increased on an annual basis. Jason also provides recommendations for troubleshooting, identifies and completes well repairs, and provides technical assistance related to the collection system.



Jason Clarke

Junior Environmental Engineer/ Field Technician/Validator/Verifier

Project Engineer/Field Technician
Humberstone Landfill Gas Collection and
Control System | Regional Municipality of
Niagara | Welland, ON | 2013 – Present

Jason performed construction oversight for the installation of a landfill gas collection and control system and the Humberstone Landfill. The collection system consists of 15 horizontal collection trenches, 2 blowers and a flare. Jason maintained constant communication with the Region and provided weekly progress updates related to the status of construction. Jason continues to provide operational support and troubleshooting to the Region.

Field Technician

Monitoring of Closed Landfill Sites | Greater
Toronto Area, ON | 2012 – Present

Jason has performed monitoring and reporting of LFG probes and vents situated around closed landfill sites for pressure and gas composition. The monitoring and reporting of this information aids the client in identifying potential LFG migration concerns at each Site and potential impacts on surrounding sensitive receptors. Jason has performed monitoring and reporting for the following closed landfill sites:

- Aurora Landfill
- HWY 48 Landfill
- East Gwillimbury Landfill
- Morningside Landfill

Engineering Assistant

Guelph Organic Waste Processing Facility |
City of Guelph | Guelph, ON | 2012

Jason assisted with a variety of administrative tasks related to the commissioning of the City of Guelph's aerobic composting facility. Jason consolidated all related project information and documentation that was then supplied to the City.

Project Engineer/Field Technician

Mohawk Landfill | Brantford, ON | 2013

Jason performed monitoring and balancing of the landfill gas collection system at the Mohawk Landfill. Jason also provided data analysis for the monitoring data and provided a summary of the event to the Client.

Researcher

MSW to Biofuels Technologies | 2012 – Present

Jason has been performing annual research into the development of companies and their technologies to provide alternative waste processing techniques for municipal solid waste (MSW). More specifically Jason's investigation has been the conversion of MSW to biofuels. Jason has provided an annual summary to fellow

employees on the development of the companies and technologies such that GHD has the most up to date knowledge in the industry.

Miscellaneous Field Work

Field Technician

Condition Assessment Surveying | Private
Client | Kitchener/Waterloo, ON | January –
March 2015

Jason performed commercial and residential condition assessment surveys throughout Kitchener and Waterloo. The assessments were performed prior to the construction of the Region of Waterloo's Light Rail Transit System (LRT). The assessments provided the client with a reference report to substantiate damage claims made during or after the construction of the LRT.

Environmental Services

Engineering Assistant

Unaccounted Used Oil Study | British Columbia
Used Oil Management Association | British
Columbia | 2013

Jason assisted with data gathering and analysis for the Unaccounted Used Oil Study to assist BCUOMA in identifying different uses and disposal methods of used oil that bypasses the British Columbia used oil collection system. The study provided BCUOMA with the information necessary to aid in improving their used oil collection system such that more used oil can be recycled.

Work history

May 2012 – present	GHD (formerly Conestoga-Rovers & Associates), Waterloo, ON
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Other related areas of interest

Recognized (Certifications/Trainings)

- 40-Hour HAZWOPER OSHA Training (per 29 CFR 1910.120)
- 8-Hour HAZWOPER Refresher Training, May 2013, 2014, and 2015
- Greenhouse Gas Validation and Verification Training



Gordon Reusing

Greenhouse Gas Lead Verifier

Qualified (Education): Master of Applied Science in Engineering (M.Sc), Bachelor of Applied Science in Engineering (B.Sc.)

Connected (professional affiliations): Professional Engineer in Ontario, Professional Engineer in Michigan; Air and Waste Management Association, Institute of Noise Control Engineering, Canadian Acoustical Association

Professional Summary: Gordon is a Principal in charge of CRA's Air, Noise and Greenhouse Gas Services Groups. Gordon is an acoustic engineer with extensive experience in industrial, transportation, construction and land development noise and vibration assessments, measurements, modeling and design of attenuation measures. He is an expert in the air quality field including emissions inventories, compliance and permitting, dispersion modeling, stack testing, odour assessments, ambient air testing, and emissions abatement and control technologies. Gordon is an accredited Lead Verifier and Lead Validator for greenhouse gas reports and offset projects for numerous programmes including those under the United Nations and the American National Standards Institute.

Greenhouse Gas Validation and Verification

GHG Lead Validator and Verifier
Various Clients | North America

- Lead Verifier, Lead Validator and Peer Reviewer with extensive experience including GHG Programmes in Alberta, BC, Ontario, Quebec, Nova Scotia, California, Massachusetts, and Programmes operated by the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism (CDM), The Gold Standard, The Climate Registry (TCR), the Carbon Disclosure Project (CDP), and the Verified Carbon Standard (VCS)
- Extensive GHG verification experience in the oil and gas sector, including validations and verifications of upstream oil and gas (in situ, SAGD and mining oil sands) and downstream oil and gas (refineries) facilities in Alberta, Ontario, BC, and Quebec in Canada and California and Massachusetts in the United States. Strong knowledge of both associated GHG emission sources, in particular fuel combustion, hydrogen production, catalytic cracking, sulphur recovery and flaring, as well as saleable outputs
- Extensive GHG emissions inventory and verification experience in the chemical, cement, transportation, pulp and paper, general industrial, electronics, power generation and waste management sectors. Completed dozens of bottom-up GHG emissions inventories. Very familiar with stationary combustion, manufacturing and reaction processes which generate GHG emissions
- Expert for quantification of emissions reductions in accordance with CRA's role as a Designated Operational Entity (DOE) in the United Nations Framework Convention on Climate Change (UNFCCC)
- Numerous GHG verification projects for the government of Alberta for GHG Compliance Reports,

Baseline Reports and GHG offsets under the Alberta Specified Gas Emitters Regulation. Experience with upstream oil and gas (in situ, SAGD and mining oil sands), downstream oil and gas (refineries), chemical plants, pulp and paper, sawmills, coal-fired power plants, co-generation systems, hydrogen plants and biomass power plants.

Technical Expert

Coal-Fired Power Plant GHG Verifications
Nova Scotia Power Plants | Nova Scotia

Mr. Reusing is the technical expert for the verification of GHG emissions from four coal-fired power plants operated by Nova Scotia Power. As technical expert, Mr. Reusing is reviewing the GHG emissions calculations methodology used for the emissions calculations and is advising on material issues identified by the verification team.

Project Manager, Technical Expert
Coal-Fired Power Plant GHG Emissions Factors for Canadian Power Plants | Environment Canada

Mr. Reusing is the project manager for a national study to develop updated CO₂ emissions factors for coal-fired power plants across Canada. GHD was retained by Environment Canada to collect data from all Canadian coal-fired power plants in order to review emissions factors for GHG emissions. In particular the study is interested in the oxidation factors for various types of coal, determined based on a carbon balance of the combustion process.

Lead Verifier and Technical Expert
In-Situ SAGD Oil Sands Facilities | Multiple Oil and Gas Clients | Alberta

Mr. Reusing has been the lead verifier and technical expert for GHG verifications of multiple SAGD oil sands facilities in Alberta operated by various oil and gas companies including Imperial Oil, Shell, Canadian Natural Resources Limited (CNRL) and Suncor. Mr. Reusing has completed over 10 verifications of SAGD facilities under



Gordon Reusing

Greenhouse Gas Lead Verifier

the Alberta Specified Gas Emitters Regulation (SGER), including facilities with co-generation plants. Mr. Reusing is an expert in the methodologies used to estimate GHG emissions from SAGD facilities.

Lead Verifier and Technical Expert
Petroleum Refineries | Multiple Oil and Gas Clients | Alberta, Ontario, Quebec

Mr. Reusing has been the lead verifier and technical expert for numerous GHG verifications for refineries in Alberta, Ontario and Quebec operated by Imperial Oil, Suncor and Shell. Mr. Reusing has completed over ten verifications for five refineries, including those with hydrogen plants, co-generation plants and chemical plants. Mr. Reusing is an expert in the methodologies used to estimate GHG emissions from refineries.

Lead Verifier and Technical Expert
Pulp and Paper Mills | Multiple Clients | Alberta, Ontario and Quebec

Mr. Reusing has been the lead verifier, technical expert or peer reviewer for numerous GHG verifications for pulp mills and paper mills in Alberta, Ontario and Quebec operated by Alberta Forest Products (ALPAC), Weyerhaeuser, Tembec, Domtar, Atlantic Packaging, Interlake Paper and Dunn Paper. Mr. Reusing has completed over ten verifications for pulp and paper mills and is an expert in the methodologies used to estimate GHG emissions from pulp and paper manufacturing processes.

Lead Verifier and Technical Expert
Iron & Steel Mills | Multiple Clients | Ontario and Quebec

Mr. Reusing has been the lead verifier, technical expert or peer reviewer for numerous GHG verifications for iron and steel mills in Ontario and Quebec operated by Essar Algoma Steel, US Steel, Arcelor Mittal, and Gerdeau. These include primary steel plants with coke oven batteries and blast furnaces and secondary mills with electric arc furnaces. Reusing has completed over ten verifications for iron and steel plants and is an expert in the methodologies used to estimate GHG emissions from pulp and paper manufacturing processes.

Lead Verifier and Technical Expert
Co-Generation and Power Plants | Multiple Clients | Alberta, Ontario and Quebec

Mr. Reusing has been the lead verifier, technical expert or peer reviewer for numerous GHG verifications for facilities operating co-generation plants or primary prime power plants using natural gas as the fuel. The facilities include institutions such as the University of Toronto, York University, Brock University, Hamilton Health Sciences, the University of Windsor and Guelph University. The facilities also include prime power plants such as St. Clair

Power and Goreway Power. Mr. Reusing has also verified GHG emissions from co-generation plants in various industries including many oil and gas facilities and pulp and paper plants. Mr. Reusing has completed over 20 verifications for co-generation and prime power facilities.

Noise and Vibration Engineering

Acoustic Engineer, Project Manager
Various Clients | North America

- Noise impact assessments for wind farms including noise modeling and noise monitoring of various proposed and existing wind farm projects in Barrie, Ontario and New York State in accordance with applicable noise guidelines, bylaws, and regulations
- Noise and vibration impact assessments and attenuation for equipment and traffic sources at over 50 manufacturing facilities, residential developments, and landfill sites
- Noise impact assessments and abatement for a variety of clients involved in food processing including ice cream, cheese manufacturing, meat processing, and chemical preservatives
- Conducted noise impact assessment for Oklahoma Highway 64 expansion using Federal Highway Administration Traffic Noise Model (TNM)
- Prepared residential noise barrier design for highway noise impacts using Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) model
- Managed a railroad noise assessment for a proposed residential development using the Ontario Sound from Trains Environmental Analysis Method (STEAM) model
- Managed noise monitoring programs and impact studies for two lime mining and manufacturing facilities including large kiln operations and traffic assessments
- Prepared an Acoustic Audit report for a casting plant in accordance with permit requirements
- Managed noise study for landfill site including road traffic and on-site equipment and barrier design
- Managed acoustic audit for a dust collection system including sound frequency measurements for ductwork, fan, and collector
- Acoustic audit and residential impact evaluation for an oxidizer used in automotive industry



Gordon Reusing

Greenhouse Gas Lead Verifier

Air Quality Engineering

Air Quality Engineer, Project Manager - Various Clients | North America

- Air compliance audits, Title V permitting, State permitting, Federally Enforceable State Operating Permits (FESOPs)/Synthetic Minor permitting, and evaluation and implementation of applicable NSPS, NESHAP, and MACT standards for manufacturing facilities including chemical, automotive, cellophane, coating, distillery, energy, fiberglass, food, glass, locomotive, metal finishing, molding, petroleum, secondary metals, steel and wood furniture manufacturing sectors in the United States, Canada, and the UK
- Completed over 100 Ontario Emission Summary and Dispersion Modelling (ESDM) Reports for a variety of industries
- Environmental Impact Statements (EIS) and Environmental Assessments (EA) for over ten sites
- Air emissions modeling, air dispersion modeling, permitting, risk assessments, noise assessments and ambient air monitoring programs for quarries, mines, aggregate processing equipment, cement manufacturing, landfills and site remediation facilities
- Risk Management Plans (112R RMPs) including hazard assessments and off-site consequence analyses
- USEPA Community Right to Know Application for a Continuous Release
- USEPA Clean Air Act Emission Reduction Credit (ERC) Applications for emissions trading
- Project Manager and primary technical resource for the General Motors Corporation EPCRA Corporate Manual and the General Motors of Canada Limited NPRI and OnAir Corporate Manual inclusive of the development of the associated training programs. Key components include detailed OEM process knowledge, VOC emission quantification methods and regulation compliance
- Developed and manage numerous ambient air monitoring programs for particulate (PM, PM10, PM2.5), VOCs, TRS, and ozone
- Expert for quantification of emissions reductions as part of CRA's role as an Applicant Entity (AE) for Clean Development Mechanism (CDM) projects in the United Nations Framework Convention on Climate Change and for Alberta Environment offset project emissions
- Manage and conduct corporate training programs for US EPCRA and Canadian NPRI Reporting

- Managed and conducted EPCRA, NPRI, and OnAir Reporting for over 50 facilities
- Air emissions inventories, dispersion modeling and permitting for over 200 manufacturing facilities
- Air emissions assessments, permitting, and monitoring for over 30 hazardous waste site remedial actions including groundwater treatment systems, soil remediation systems and fugitive emissions
- Litigation support including expert testimony
- Odor emissions assessments and preparation of remedial action plans for numerous facilities in the food, chemical and automotive sectors
- Incinerator/oxidizer design, installation, permitting and trial burn stack testing including a RCRA hazardous waste incinerator
- Air emissions assessments for over ten landfill sites including estimation of landfill gas generation rates and particulate and evaluation of off-site impacts of odor and VOCs and NSPS requirements
- Managed and conducted stack testing programs for over 50 facilities

Environmental Assessments and Land Development

Air Quality and Noise Engineer

Various Clients | North America

- City of Toronto Projects:
 - Bridgepoint Hospital air impact assessment and Ontario Municipal Board expert report and testimony
 - Waste management sites odour, air and noise studies for compatibility assessments with nearby residential properties (Green Lane Landfill, biosolids facilities)
 - Dufferin Street Noise Impact Study and abatement alternatives for residential properties
 - W.R. Allen Road Noise and Vibration Impact Study and abatement alternatives for residential properties
 - Community drop in centre noise study and building features abatement design
- Regional Municipality of York - Large scale air, noise, odour, vibration data collection, and land use compatibility assessments for industrial and residential uses
- Huron County –Guideline D-6 dust, odour, noise impact studies for Official Plan amendments
- City of Burlington - Highway, road and rail traffic noise assessments for residential land uses



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- Grey County - Noise impact assessments and abatement for annual music festival
- City of Collingwood - Industrial/residential air compatibility study peer review.
- City of Ajax - Air and noise compatibility studies for biomass district energy plant
- Mondelez Canada Inc. - Industrial/residential noise compatibility reports, Ontario Municipal Board expert report, testimony and negotiations for multiple sites
- Stackpole Ltd. - Industrial/residential noise compatibility report, Ontario Municipal Board expert report, testimony and negotiations
- Imperial Oil - Gas station/residential air compatibility report, Ontario Municipal Board expert report and testimony
- Vinemount Quarry - Quarry/residential air compatibility report, Ontario Municipal Board expert report and testimony
- Drysdale Quarry - Quarry/residential noise compatibility report, Ontario Municipal Board expert report and testimony
- Clean Harbors - Odour, air and noise data collection, modelling and mapping for compatibility assessment with residential properties as part of Environmental Assessment
- Chemtura Chemicals and Sulco Chemicals - Industrial/residential odour, air and noise compatibility reports, Ontario Municipal Board expert reports, testimony and negotiations
- Oneida-Herkimer Landfill - Landfill/residential air compatibility report and New York Judicial Review expert report and testimony

Work history

1990 – present	Principal, GHD (formerly Conestoga-Rovers & Associates), Waterloo, Ontario
	Named Principal, 2003

Other related areas of interest

Recognized Certifications

- ISO 14064 Part 1 "Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals"
- ISO 14064 Part 2 "Specification with Guidance at the Project Level for Quantification, Monitoring and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements"

- ISO 14064 Part 3 "Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions"
- OSHA 40-hour and annual 8-hour refreshers Hazardous Waste Health and Safety Training (1990 to present)

Published

Published Reports

- "Locomotive Emissions Monitoring Program 2011 Report", Railway Association of Canada (with S. Williams, et al.)
- "Locomotive Emissions Monitoring Program 2010 Report", Railway Association of Canada (S. Williams, et al.)
- "Locomotive Emissions Monitoring Program 2009 Report", Railway Association of Canada and Transport Canada (with S. Williams, et al.)

Published Refereed Papers

- "A Multi-Chamber Ventilation Model with Random Parameters", in Building and Environment, Volume 25, No. 4, 1990. (with G.M. Bragg)
- "Transient Solutions to a Stochastic Ventilation Model", in Building and Environment, Volume 24, No. 3, 1989 (With L. Siurna, G.M. Bragg)

Conference Papers and Presentations

- "An Investigation of HVAC Directivity: Theory versus Reality 2.0", InterNoise 2015, San Francisco, August 2015
- "Environmental Regulation and Compliance 2015", presentations given at the CANECT '15 Conference, International Conference Center, Mississauga, April 27, 2015.
- "An Investigation of HVAC Directivity: Theory versus Reality" INCE, Noise-Con 2014, Fort Lauderdale, Florida, September 2014
- "Environmental Regulation and Compliance 2014", presentations given at the CANECT '14 Conference, International Conference Center, Mississauga, May 5, 2014
- "Community Noise and Optimal Industry Siting", ICA 2013, 21st International Congress on Acoustics, Montreal Quebec, June 2013
- "Environmental Regulation and Compliance 2013", presentations given at the CANECT '13 Conference, International Conference Center, Mississauga, April 29, 2013
- "Quantifying the Ambient Environment: Siting Within the Urban Din", Inter-Noise 2012 Conference, New York, NY, August 19-22, 2012 (with T. Wiens,



Gordon Reusing Greenhouse Gas Lead Verifier

G. Grozev, Z. Zehr)

- "Greenhouse Gas Verification Methodology", Lecture given to University of Waterloo School of Environment, Enterprise and Development, June 21, 2012
- "Environmental Regulation and Compliance 2012", presentations given at the CANECT '12 Conference, International Conference Center, Mississauga, April 30, 2012
- "Tire Recycling Pilot Plant Using Microwave Technology", Air and Waste Management Association, Ontario Section Annual Conference, Toronto, October 6, 2010 (with R. Maier)
- "Noise Modelling Versus Reality Under Worst-Case Meteorological Conditions", Canadian Acoustics Proceedings, Volume 38, Number 3, September 2010 (with T. Wiens)
- "Liberty Energy Study", Latest Developments in Air Modeling Conference, Air and Waste Management Association, Toronto, January 19-22, 2009
- "District Energy Plants and Ajax Case Study", Sustainable Energy Career Symposium, University of Waterloo, January 26, 2009
- "Biomass to Energy: Greenhouse Gas Reduction Quantification Protocols and Case Study", 2nd Climate Change Technology Conference, Hamilton, May 12-15, 2009 (with W. Nolan, G. Kerr, C. Taylor)
- "Greenhouse Gas Reduction Quantification Protocols for Biomass Projects", Annual Air and Waste Management Conference, Detroit, June 16-19, 2009 (with C. Taylor, S. Vel)
- Annual Environmental Compliance Training Seminars for General Motors, Masco Corporation, Tomkins Corporation, Magna International, Linamar Corporation and various industry associations 2003-2007
- Session Moderator, Environmental Nuisances: Noise, Light, Odor and Fugitive Dust, Air and Waste Management Conference, Vancouver, May 2007
- "New Ontario Dispersion Models and Air Standards, Odor Assessments and Noise Assessments", Environmental Law & Regulation Conferences, Canadian Institute, 2005 and 2006
- "Introduction to Environmental Issues for Occupational Health and Safety", Environmental Panel Discussion Expert, University of Western Ontario Course, November 2006
- "Fugitive Dust Assessment and Control", Environmental Nuisances: Noise, Odor and Fugitive Dust, Air and Waste Management Conference, Toronto, May 9-11, 2005

- "New Ontario Dispersion Models and Air Standards, Odor Assessments and Noise Assessments", Environmental Law & Regulation Conference, Canadian Institute, December 2, 2005
- "Preparing Applications for Certificates of Approval (Air)", Centre for Health-Environment-Safety (CHES), Training Seminar for Industry, March 10, 2005
- "Expediting Certificates of Approval Air", Environmental Law & Regulation Conference, Canadian Institute, December 8, 2004
- "Air Dispersion Modeling", Training for New Brunswick Department of Environment and Local Government Air and Risk Assessment Staff, Fredericton, New Brunswick, November 2002 (with D. Freeman)
- "Ambient Air Odor Regulations in Canada and the United States", Paper Presented to the 2002 Joint CSCE/EWRI of ASCE Environmental Engineering Conference, An International Perspective on Environmental Engineering, Niagara Falls, Ontario, July 2002 (with S. Law, A. Loney)
- "Odor Assessment Methodology for a Complex Industrial Facility", Paper Presented to the Odors and Toxic Air Emissions 2002 Specialty Conference, Water Environment Federation, Albuquerque, New Mexico, April 2002
- "Industrial Wood-Fired Boiler Optimization and Emissions Compliance", in Pollution Engineering, April 2002
- "Ontario Environmental Compliance Seminar - Air Regulations", Canadian Association of Metal Finishers, September 2001
- "Understanding the Clean Air Act", presented to the Environmental Regulation Course, Executive Enterprises, Cincinnati, October 1995
- "Waste Management Issues for the Forest Industry - Burning of Woodwaste", presented to the 1994 Environmental Law and Management Conference for the Canadian Forest Industry, Toronto, September 1994 (with A.J. Crutcher, M.A. Benson)

APPENDIX D: RE-VALIDATION REPRESENTATION

VCS VALIDATION DEED OF REPRESENTATION

BY

GHD LIMITED

THIS DEED OF REPRESENTATION is made on May 16, 2016

BY

GHD Limited (as **VVB**)

651 Colby Drive,

Waterloo, ON

N2V 1C2

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 Proponent" means an individual or organization that has overall control and responsibility for a VCS project, or an individual or organization that together with others, each of which is also a Project Proponent, has overall control or responsibility for a VCS project;

"Reduction" means a reduction or removal of one (1) metric tonne of CO₂ equivalent caused by the activities of the Project during the Project Crediting Period;

"Validation Report" means the written report of validation in relation to the Project prepared by the VVB in accordance with the VCS Rules;

"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;

"VCSA" means the Verified Carbon Standard Association; 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 validation of the Project.

- 2.2 I hereby represent and warrant that:

2.2.1 I have validated the Project's compliance with the VCS Program requirements as set out in the VCS Rules; and

2.2.2 All factual information that I provide in relation to this Deed or have provided in the Validation 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 Validation 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 Validation 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.

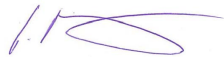
5. COUNTERPARTS

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