REDUCING GAS LEAKAGES WITHIN THE BAKHRABAD GAS DISTRIBUTION NETWORK IN BANGLADESH

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Carbon Check (India) Private Ltd.

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Summary:

- **A brief description of the verification and the project**

  Verification: Carbon Check (India) Private Ltd. (CCIPL) has been contracted by EcoGas Asia Limited, the project proponent, to carry out the verification of voluntary greenhouse gas emission reductions generated by the Project, "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh". The verification is based on the desk review of the Monitoring report /01/, VCS PD /06/, registered CDM PDD /B03/, previous CDM verifications /B03/, supporting emission reduction calculation spreadsheets /02/, and other relevant supporting documents made available to the verification team by the project proponent accompanied by on-site interviews. This verification involves the period of 28/01/2019 to 30/07/2020 (including both days).

  Project: The project's transmission and distribution of natural gas are located in the districts of Comilla, Brahmanbaria, Chandpur, Lakshmipur, Noakhali, and Feni. The project will lead to reductions in methane, a potent greenhouse gas (GHG). The project reduces gas leakages from components in the natural gas transmission and distribution system operated by Bakhrabad Gas Distribution Company Limited (BGDCL) in Bangladesh. During the present monitoring period, the project has reported a total of 15,220 leaks within the project boundary.

- **The purpose and scope of verification**

  Purpose: The purpose of the verification is to review the monitoring results and verify that the monitoring methodology was implemented according to the monitoring plan and monitoring data, used to confirm the reductions in anthropogenic emissions by sources is sufficient, definitive, and

presented in a concise and transparent manner. In particular, the monitoring plan, monitoring report, and the project's compliance with relevant VCS, UNFCCC, and host party criteria are verified to confirm that the project has been implemented in accordance with the previously registered design and conservative assumptions, as documented.

Scope: The scope of the verification is:

- To verify the project implementation and operation with respect to the registered PDD and VCS PD.
- To verify the implemented monitoring plan with the registered PDD and applied baseline and monitoring methodology.
- To verify that the actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.

The verification shall ensure that the reported emission reductions are complete and accurate to be certified.

- **The method and criteria used for verification**

(a) Desk review, involving:

(i) Review of the data and information presented to verify their completeness.

(ii) Review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.

(iii) Evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

(b) On-site assessment involving:

(i) Assessment of the implementation and operation of the proposed VCS project as per the registered PDD and VCS PD.

(ii) Review of information flows for generating, aggregating, and reporting the monitoring parameters.

(iii) Interview with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan in the registered PDD.

(iv) A cross-check between information provided in the monitoring report and data from other sources such as inventories, purchase records, or similar data sources.

(v) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the registered PDD and the selected methodology.

(vi) Review of calculations and assumptions made in determining the GHG data and emission reductions.

(vii) Identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

- **The number of findings raised during verification**

  A risk-based approach has been followed to perform this verification. During the course of verification, a total of 11 findings were raised, which include:

  03 Corrective Action Request (CAR); 08 Clarification Requests (CLs);

  All the raised findings have been resolved by the PP.

- **Any uncertainties associated with the verification**

  The VCS MR /01/, emissions reduction calculations /02/ along with the supporting documents provided are in line with all the VCS requirements /B01/. The verification team has detected no further uncertainties or quality restrictions.

- **Summary of the verification conclusion**

  In CCIPL's opinion, the emission reductions reported for the project "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh" in the monitoring report are fairly and correctly stated. CCIPL is, therefore, able to certify that the emission reductions from the project during the period from 28/01/2019 to 30/07/2020, are 1,291,591 tCO_2 equivalents.

CCIPL does not assume any responsibility for the issuance and utilization of VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration. The verification of reported emission reductions is based on the information made available to CCIPL and the engagement conditions detailed in this report. Hence, CCIPL cannot be held liable by any party for decisions made or not made based on this report.

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1 INTRODUCTION

1.1 Objective

Carbon Check (India) Private Ltd. (CCIPL) has been contracted by EcoGas Asia Limited, the Project Proponent (PP), to undertake the verification of the project titled "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh" for the monitoring period 28/01/2019 to 30/07/2020 (including both days). Through the verification activities, it is to be confirmed that:

- The project is implemented as described in the registered PDD/B03/ and VCS Project Description document /06/.
- The monitoring system is implemented and fully functional to generate emission reductions without any double-counting, and
- The data reported are accurate, complete, consistent, transparent, and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

The verification followed the requirements of the current version of the VCS Standard, Version 4.3, and the VCS program guide, Version 4.2 /B01/ to ensure the quality and consistency of the verification work and the report.

1.2 Scope and Criteria

The verification of this project is based on the Monitoring Report of this monitoring period /01/, registered PDD /B03/ and VCS PD /06/, emission reduction calculation spreadsheets /02/, supporting documents /03/-/24/ made available to the verifier, and information collected through performing on-site visit interviews. Furthermore, publicly available information was considered as far as available and required.

CCIPL has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The verification is carried out on basis of the following requirements, applicable for this project activity:

- VCS Standard, Version 04.3 /B01/
- VCS Program Guide, Version 04.2 /B01/
- CDM Methodology: AM0023, Version 04 /B02/.
- Other relevant rules, including the host country legislation

The scope of this verification, by independent checking of objective evidence, is as follows:

- To verify that the project is implemented as described in the registered CDM PDD and the VCS PD.
- To assess the project's compliance with other relevant rules including the host country legislation.
- To confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions without any double counting.
- To establish that the data reported are accurate, complete, consistent, transparent, and free of material error or omission by checking the monitoring records and the emissions reduction calculation.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.
- The verification shall ensure that the reported emission reductions are complete and accurate to be certified.

The method and criteria used for verification consisted of the following phases:

1. Completeness check and desk review.
2. On-site visit interviews with stakeholders.
3. Resolution of outstanding issues and issuance of final verification report and applicable VCS Validation and Verification Deeds of Representation.

CCIPL conducts all its work under strict rules to safeguard impartiality and ensure the independence of the verification team. The verification team does not provide any consulting or recommendations for the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

1.3 Level of Assurance

The verification report is based on the Monitoring report /01/, registered PDD/B03/ and VCS PD /06/, supporting documents /03/-/24/ made available to the verifier, and information collected through performing interviews.

The verification has been planned and organized to achieve a:

☒ Reasonable level of assurance as per VCS Standard, version 4.3

☐ Limited level of assurance

1.4 Summary Description of the Project

This is the first monitoring report under VCS for the project which employs the CDM methodology; AM0023, Version 04 /B02/. The project aims to reduce gas leakages from components in the natural gas transmission and distribution system operated by Bakhrabad Gas Distribution Company Limited (BGDCL) in Bangladesh. The length of the BGDCL natural gas transmission/distribution system is about 4,000 km. The Company carries out transmission and distribution of natural gas in the districts of Comilla, Brahmanbaria, Chandpur, Lakshmipur, Noakhali, and Feni. The project reduces the leaks in the transmission/distribution system caused by normal component wear, thermal and vibrational stresses, and seasonal expansion/contraction cycling from ambient air temperature changes. The project implements advanced leak detection and repairs (LDAR) procedures to identify and implement various interventions to arrest leakage and thus reduce methane emissions at valves, insulating joints, pressure regulators, and other above-ground gas transmissions/distribution infrastructure. The project proponent for the project activity is EcoGas Asia Limited, which owns the rights to VCUs /04/.

The total estimated GHG emission reductions achieved from Project activity instances are 1,291,591 tCO_2e for this monitoring period.

The project activity has been implemented as described in the registered PDD /B03/ and VCS PD /06/ and the emission reductions are calculated conservatively as per the applied methodology /B02/.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The method and criteria used for verification:

The verification consists of the following three phases:

1. Completeness check and desk review of the validation report, monitoring plan, monitoring report, monitoring methodology, registered PDD, VCS PD, and applicable tools in particular attention to the frequency of measurements, quality of metering equipment including calibration requirements, QA/QC procedures and other relevant documents.

2. On-site visit interviews (including follow-up interviews with project stakeholders, when deemed necessary). The on-site interviews include the following:

    - An assignment of implementation and operation of project activity with respect to registered PDD and validated VCS PD

    - Review of information flows for generating, aggregating, and reporting the monitoring parameters.

    - Interview with relevant personnel to determine whether the operational and data collection procedures are implemented and in accordance with the monitoring plan of the registered PDD and validated VCS PD,

- Cross-check information and data provided in the monitoring report with purchase records or similar data sources.
- Review of assumptions made in calculating the emission reductions (if any).
- Implementation of QA/QC procedure in-line with the registered PDD, VCS PD, and methodology requirements.

3. Resolution of outstanding issues and the issuance of the final Verification report and as applicable the VCS Verification Deed of Representation.

2.2 Document Review

During the document review, CCIPL applied standard auditing techniques to assess the quality of the information provided. The verification was performed primarily based on the review of the monitoring report and the supporting documentation. This process included:

- A review of data and information presented by the PP to verify their completeness
- A review of the MP and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, the QA/QC procedures, and
- An evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of ERs.

The monitoring report (version 1 dated 29/04/2022) /01/ was initially reviewed and CCIPL requested the PP to present the supporting information and documents /03/-/24/. The documents were reviewed by CCIPL. Through the process of the verification, the revised monitoring report and the supporting documents were evaluated to confirm the actions taken by the PP to the CARs and CLs issued by the verification team.

The list of documents referred to during the course of this verification has been provided in Appendix-1.1.

2.3 Interviews

A site visit to the project activity was undertaken on 14/06/2022 to confirm the information as outlined in the table below and to resolve issues identified in the document review. The site visit was conducted to assess the implementation and operation of the project activity and review evidence, and interview key personnel to confirm evidence associated with the project design, implementation, plant operations, environmental impacts, stakeholders, etc.

The table below describes the on-site interview process and further identifies personnel, including their roles, who were interviewed, and/or provided information additional to that provided in the project description, Monitoring report /01/, and any supporting documents.

Sr. No.	Date	Name	Organization	Topic	Persons Interviewed
/1/	14/06/2022	Richard Cobbs	EcoGas Asia Ltd.	Project implementation and operation (Remotely)	Sanjay Kumar Agarwalla (Team Leader) Manas Halder (Trainee Assessor), and R. V. Nesari (Technical Expert)
/2/	14/06/2022	Kevin James	Climate Compass LLC	Project implementation and operation, monitoring procedure, data and information flow, CER calculation and MR preparation, QA/QC Procedures, Management, and operating system (Remotely)	
/3/	14/06/2022	Daragh Glynn	Brawa Consulting	Project implementation and operation	
/4/	14/06/2022	Oleksandr Potapenko	MBS	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance and calibration, training of the PSL staff (Remotely)	
/5/	14/06/2022	Abul Bashar	BGDCL	Leak maintenance under safety and emergency situations	
/6/	14/06/2022	Mortuza Rahman Khan	BGDCL	Leak maintenance under safety and emergency situations	
/7/	14/06/2022	Mir Fazle Rabbi	BGDCL	Leak maintenance under safety and emergency situations	
/8/	14/06/2022	Asma Haque	PSL	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance, and calibration	
/9/	14/06/2022	Tanvir Ahmed	PSL	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance, and calibration	
/10/	14/06/2022	Mahabubur	PSL	Project implementation and operation, monitoring procedure,	

Sr. No.	Date	Name	Organization	Topic	Persons Interviewed
		Rahaman			
/11/	14/06/2022	Kausar Ali	PSL	Project implementation and operation, monitoring procedure,	
/12/	14/06/2022	Abdul Barek	PSL	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance, and calibration	
/13/	14/06/2022	Badsha Halader	PSL	Project implementation and operation, monitoring procedure,	
/14/	14/06/2022	Saifur Rahaman	PSL	Project implementation and operation, monitoring procedure, data and information flow, data management, monitoring instrument maintenance and calibration	

The verification team has carried out on-site interviews to assess the information included in the monitoring report and monitoring measurement procedures adopted during the monitoring period. During the desk review, the relevant monitoring records were checked.

Through the review of validation reports, comparing the relevant evidence, and interviewing with the PP's representatives through on-site visit interviews, CCIPL has confirmed that the project is implemented in line with the registered PDD /B03/ and VCS PD /06/ during the monitoring period. There is no change in the project design, operation, and monitoring plan.

2.4 Site Inspections

Carbon Check has conducted an on-site inspection to confirm all physical features of the project activity proposed in the registered PD are in place and that the project proponent has operated and correctly monitored all parameters of the project activity as per the registered CDM PDD and VCS PD during this monitoring period. A reasonable level of assurance has been maintained for verification as follows:

1) An assessment of the implementation and operation of the project activity as per the registered PDD, and VCS PD

2) A review of information aggregating and reporting of the monitoring parameters

3) Interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the MP

4) A cross-check between product sales information provided in the MR and data from other sources.

5) A check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the registered PDD and the applied monitoring methodology

6) A review of calculations and assumptions made in determining the GHG data and ERs, and

7) An identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters

The total number of leaks identified, repaired, and then re-surveyed within the monitoring period was cross-checked by the verification team with the ER calculation spreadsheets /02/ and is confirmed to be correct.

The verification team took note of paragraphs 26 and 27 of the Sampling Standard, version 09 which states the following:

Paragraph 26: The VVB may apply a sampling approach for on-site visits and/or remote surveys as part of validation/verification, applying the "Guideline: Sampling and surveys for CDM project activities and programme of activities", irrespective of whether the above-mentioned sampling plan exists or the project participants or the coordinating/managing entity have undertaken sampling surveys.

Paragraph 27: When the project participants or the coordinating/managing entity have not applied a sampling approach, the VVB may apply a sampling approach, choosing a different confidence/precision than the ones indicated in paragraph 11 above, provided that samples are randomly selected and are representative of the population.

As it is not possible to individually verify all the reported leaks, the verification team applied a sampling approach for the on-site assessment/inspection. The verification team then randomly selected 25 sample points for the on-site inspection. The detailed method/steps applied to randomly select the sample points out of the total leaks are provided below:

The verification team used the online Raosoft calculator to derive an appropriate initial number of samples for an on-site visit. The verification team has applied a 90/10 confidence/precision (assuming response distribution as 90%) and the sample size calculated is 25 and the same is conveyed to the PP in the verification audit plan. The verification team had also indicated in the verification audit plan, that during the on-site inspection if the discrepancy is identified in the selected samples, the verification team shall increase its sample size (applying the materiality concept in line with VVS for project activities, version 03.0).

During the assessment of sample points, as applicable, the verification team has conducted an on-site inspection and also a plausibility check of information provided in:

i. hard copy protocols
ii. data tags fixed on-site at every surveyed leak,
iii. leak report files,
iv. ER calculation spreadsheets and HFS Data Log Files /15/.

All information of the selected sample points verified was consistent and plausible and thus no further samples were conducted by the verification team and the records of all the repaired leaks were acceptable to the verification team. The verification team carried out on-site interviews with representatives of PP to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable to the VCS.

2.5 Resolution of Findings

CCIPL, during this verification, identified issues related to the monitoring, implementation, or operation of the VCS project that could impair the capacity of the proposed VCS project to achieve project emission reductions or influence the reporting of emission reductions. CCIPL has identified and discussed these issues within the Verification report in Appendix 4.

- Clarification requests (CLs): Project reporting lacks transparency and further information is needed to determine if a material discrepancy is present.

Corrective action requests (CARs): The VVB has identified a material discrepancy or non-conformance that the project proponent must address.

The verification team identified 03 CAR and 08 CLs. All CAR and CLs raised by Carbon Check during this verification have been resolved by the PP. If this was not completed, the ERs cannot be certified and recommended for issuance to the VCS Registry.

2.5.1 Forward Action Requests

Forward Action Request (FAR) is to be raised when the monitoring and reporting require attention and/or adjustment for the next verification period. FARs do not relate to VCS requirements for issuance of ERs achieved during subject monitoring.

No FAR was raised either during CDM validation or previous verifications. CCIPL has not raised any FAR during this verification.

2.6 Eligibility for Validation Activities

The project activity falls under sectoral scope 10 and the CCIPL is accredited for validation /verification of project activities under this scope.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

This is a registered CDM project activity by UNFCCC (Reference number 10559). UNFCCC Clean Development Mechanism is approved by VCS Program and meets VCS criteria. VCS gap validation has been carried out by the VVB “KBS Certification Services Pvt. Ltd” issued on 01/11/2022 /06/.

3.2 Methodology Deviations

There is no methodology deviation identified during the current monitoring period.

3.3 Project Description Deviations

There is no project description deviation identified during the current monitoring period.

3.4 Grouped Project

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

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The VCS project, "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh" (VCS Project ID 2736) applies the CDM methodology AM0023 version 04 /B02/. This is the first monitoring report for the project under VCS.

CCIPL, through on-site interviews and document review, assessed that all the features (technology, project equipment, and monitoring) of the registered PDD are in place and that the project participants have operated the project as per the registered PDD /B03/.

The project aims to reduce gas leakages from components in the natural gas transmission and distribution system operated by Bakhrabad Gas Distribution Company Limited (BGDCL) in Bangladesh. The length of the BGDCL natural gas transmission/distribution system is about 4,000 km. The Company carries out transmission and distribution of natural gas in the districts of Comilla, Brahmanbaria, Chandpur, Lakshmipur, Noakhali, and Feni. The project reduces the leaks in the transmission/distribution system caused by normal component wear, thermal and vibrational stresses, and seasonal expansion/contraction cycling from ambient air temperature changes. The project implements advanced leak detection and repairs (LDAR) procedures to identify and implement various interventions to arrest leakage and thus reduce methane emissions at valves, insulating joints, pressure regulators, and other above-ground gas transmissions/distribution infrastructure.

As stated in the MR, the project is funded by Ecoeye Co., Ltd and the Korea Midland Power Co. Ltd. (KOMIPO), which provide survey equipment, repair materials, and project transportation. The PP (EcoGas Asia Ltd.) has hired Climate Compass LLC as a technical partner to help manage the project implementation and compliance with the PDD. Climate Compass has hired M.B.S as a 3rd party technical consultant to help confirm through regular inspections that the project is compliant with the methodology and PDD. Climate Compass has hired Brawa Consulting to assist in the local project management and Prokaushali Sangsad Limited (PSL) to do the project implementation work on a day-to-day basis.

The PSL team includes project managers to direct the daily workflow, database managers to ensure the data gathered from the project is recorded correctly, and operators in the field who take the appropriate measurements and log the data. The roles and responsibilities of each of the above parties are discussed and the respective documentation has been verified by the verification team. The training certificates of the monitoring personnel and calibration team are checked and verified by the verification team /23/ which could also be confirmed by the verification team during the on-site visit interviews.

A total of 15,220 gas leaks are included in the database of the current monitoring period. As per the registered PDD "The project boundary will be defined in detail in a database, of all the leaking components identified and repaired during the baseline study completed on the above-ground equipment in the BGDCL gas system". The PP had done the baseline survey from 28/01/2019 to 02/01/2020 and the components covered during the baseline survey form the project boundary. This is in line with the registered PDD and also the applied methodology. The verification team also noted that in some components, second or third leaks were identified during the monitoring and PP is claiming emission reductions only for the period after the monitoring date when the new leaks were repaired or after the date of re-repair for any re-emerged leaks till the end of the monitoring period. This is deemed acceptable to the verification team as these newly found leaks are within the project boundary.

The assessment of gas leak repairs made with advanced material was done by visual inspection of the quality of the repair of all leaks assessed during on-site inspection and interviews by the verification team. The check of the quality of the repairs was made through the leak flow identification made by the verification team by on-site inspection with the application of GS/HFS device and soap spray solution, monitoring records check for selected leaks via cross-checking of references /15/ as well as desk review and check of Emission Reduction calculation spreadsheet /02/.

The main monitoring equipment (four HFS) /17/was available on-site and this can be confirmed by the verification team via visual observation of the equipment in the HFS storeroom during the on-site visit interviews.

The start date of operation of the project activity was 28/01/2019 when the initial baseline study was undertaken. The initial baseline study and resulting repairs started before the project was registered as a CDM project and were completed by 02/01/2020 /12/. This timeline can be confirmed as correct via interviews held with Mr. Tanvir Ahmed (PSL) and Mr. Oleksandr Potapenko (MBS), as well as through the analyses of data on the date of baseline measurements in ER calculation spreadsheet /02/.

The project activity is processed using multiple steps for every individual leak surveyed, starting with the leak identification by an LDMT, the subsequent repair of these detected leaks by repair teams, and finally, the LDMT undertakes additional measurements to monitor the effectiveness of the repairs undertaken. If required, re-repair steps are included in this process chain. The major measurement devices applied are a set of up to four identical Hi-Flow Samplers obtained from the US-based distributor Heath Consulting, where the proper operation and maintenance of these Hi-Flow Sampler devices, including staff training, is supervised and controlled by MBS. The HFS, a product of Bacharach Inc., is a machine designed to detect and measure leaks in gas infrastructure.

The Hi-Flow Sampler, a high-volume sampler, represents a technology directly referenced in the applied monitoring methodology AM0023, version 04 /B02/ and the registered CDM PDD /B03/ for use in quantifying emissions. The device operates by capturing all emissions from a leaking component to accurately quantify leak flow rates. Leak emissions, plus a large volume sample of the air around the leaking component, are pulled into the instrument through a vacuum sampling hose. Hi-Flow Samplers are equipped with dual hydrocarbon detectors that measure the concentration of hydrocarbon gas in the captured samples, as well as the ambient hydrocarbon gas concentration. Sample measurements are corrected for the ambient hydrocarbon concentration, and the leak rate is calculated by multiplying the flow rate of the measured sample by the difference between the ambient gas concentration and the gas concentration in the measured sample.

Methane emissions are obtained by calibrating the hydrocarbon detectors to a range of concentrations of methane in the air. Hi-Flow Samplers are equipped with special attachments designed to ensure complete emissions capture and to prevent interference from other nearby emissions sources. The hydrocarbon sensors are used to measure the exit concentration in the air stream of the system. The Hi-Flow Sampler automatically accounts for standard temperature and pressure (i.e., 0 degrees Celsius and 101.3 kPa) in its leak flow rate measurements /19/. The normalized results of the measured leaks are ±10% accurate /17/.

The data management team coordinates the process of detecting, repairing, and monitoring leaks involving thorough management of data through different media (weather-proof data tags, hard copy protocols, leak report files, data log files, and ER calculation spreadsheet) /15//02/. In this respect for every individual leak, the ER calculation basically starts with the first monitoring after this individual leak repair has been successfully undertaken (or with the start date of the monitoring period, whichever is later), and ends with the end date of the monitoring period. For this monitoring period (from 28/01/2019 to 30/07/2020) a total number of 15,220 leaks have been included in the data system of the project activity.

During the desk review process and on-site visit, it could be confirmed that the implementation and the operation of the project activity are consistent with the approved baseline and monitoring methodology AM0023, version 04 /B02/ and the registered CDM PDD /B03/. Also, the project operated continuously during the monitoring period with a steady supply of natural gas without any outages as confirmed by BGDCL /22/.

Technical specifications of the Gas Surveyor and High Flow sampler were checked with the websites https://www.manualslib.com/manual/537303/Bacharach-Hi-Flow-Sampler.html and http://www.manualsdir.com/manuals/737801/heath-consultants-gasurveyor-500-series.html. The age and average lifetime of the material used in the repair were checked with the letter from MBS Ltd, which confirms that the repair materials used in the project are designed to and capable of ensuring that the leaks mostly do not reappear within the 10 years of the project crediting period/13/.

A complete set of monitoring data as specified in the registered CDM PDD /B03/ have been provided to the verification team relevant for the monitoring period from 28/01/2019 to 30/07/2020 (including both days) and all necessary evidence, data files, and underlying documents have been transparently provided to the verification team, such as ER calculation spreadsheet /02/, Leak Report Files, Hard Copy Protocols and Data Log Files of the Hi-Flow Sampler /15/.

Furthermore, the verification team noted that there were a few risers for which the gas supply was stopped for some period during the monitoring period or during the monitoring, and PP was not able to reach a few of them. In all such cases of outages, PP has not considered these risers for emission reductions for the full monitoring period which is a conservative approach and hence deemed acceptable to the verification team.

The verification team has cross-checked whether the leak tags correspond to the photos of leak tags made and provided in the excel sheets - leak report files /15/, and also whether the hand-written information entered by the operator provided in the leak tags such as:

- leak ID number on leak tags
- Date of baseline leak flow measurement (before the repair), the date of leak flow measurement after leak repair (or also re-repair, if any), and the date of leak flow monitoring measurement(s)
- The values of leak flow on the date of baseline leak measurement, on the date of leak flow measurement after leak repair (or also re-repair, if any), and on the date of monitoring measurement(s)
- The HFS number applied on the date of baseline leak flow measurement, the date of measurement after leak repair (or also re-repair, if any) and the date of leak monitoring measurement(s), and the records numbers in HFS memory corresponding to each leak flow measurements
- The name of the operator who has performed each corresponding leak flow measurement corresponds to the information contained in (i) hard copy protocols (ii) leak report files, (iii) ER calculation spreadsheet, and (iv) Data Log Files, as appropriate, for each physically surveyed leak.

The total amount of GHG reductions calculated for this monitoring period from 28/01/2019 to 30/07/2020 including both days is 1,291,591 tCO_2e.

The verification team confirms that an appropriate approach has been chosen by the PP to ensure that within the monitoring period, the claim for emission reductions for any new leaks that have been identified during monitoring is restricted to the period after the monitoring date when the new leaks were repaired or after the date of re-repair for any re-emerged leaks till the end of the monitoring period (i.e. 30/07/2020).

Following the decision tree of leaks inclusion in the project activity (page 27 of the CDM PDD /B03/) when equipment ceases to function and leaks in emergency situations, these leaks will be repaired by an emergency repair team that works completely independent of the operation of the project activity. The corresponding procedures are described in the MR /2/. No emergency leaks and cases with replacement of equipment were included in the emission reduction calculation spreadsheet which could be confirmed through interviews with the representatives of BGDCL and PSL and also a declaration provided by BGDCL /16/ and a sample log of emergency repairs maintained by BGDCL /11/. During each monitoring visit, the operator checks the current configuration of the equipment against the photographs and technical schematics completed during the baseline study. Database entries representing leaks that have been shut off are no longer used to calculate emission reductions. Thus, it can be confirmed that emission reductions resulting from the leaks repaired before the list of scheduled equipment to be replaced in the baseline scenario are not claimed in the ER calculation spreadsheet.

Following the decision tree of leaks inclusion in the project activity, the leak which can be identified and repaired with materials and know-how available before the CDM Project (like a simple tightening of a loose-fitting or connection) has not been included in the CDM Project Database which could be confirmed by the interviews made with the members of LDMT and representative of MBS and PSL. Based on the visual observation of the sample leaks during the on-site assessment of the project performed, the verification team has confirmed the usage of only advanced repair materials for all leaks repaired as part of the project activity.

The project activity complies with all the national statutory requirements /21/. CCIPL's verification team considers the project description to be complete and accurate.

CCIPL's verification team confirms that the project activity is implemented within the boundary of the project activity as described in the registered PDD /B03/ and the implementation and operation of the project activity have been conducted in accordance with the description contained in the registered PDD.

During the on-site interviews verification, QA/QC procedures were identified which demonstrate that: the operational and management system of the project is in place; data were centralized; monitoring data were crosschecked, records were stored and confirmation that all operational staff was trained before taking up positions. The verification team thus confirmed that the monitoring of the project activity has been implemented in accordance with the monitoring plan in the registered PDD/B03/.

The registered PDD/B03/ clearly describes the monitoring and responsibility of monitoring done by PP. During the on-site interviews, monitoring, data collection, and reporting procedures were confirmed with the relevant staff and through document review of samples of all relevant records.

All the ex-ante parameters which are used in the calculation of emission reductions are consistent with the CDM PDD / VCS PD. It is confirmed that the ex-ante parameters mentioned in section 4.1 of the MR /01/ are in line with the parameters mentioned in section B.6.2 of the registered PDD. All the ex-post parameters have been monitored as per the monitoring plan and presented in section 4.2 of the MR /01/.

In summary, the monitoring period is reasonable, and the operation of the project activity is in accordance with the registered PDD /B03/. There were no changes observed from the technology stated during the validation. CCIPL's verification team considers the project description to be complete and accurate.

4.2 Safeguards

4.2.1 No Net Harm

Not applicable as the project does not pose any potential negative environmental and socio-economic impact.

4.2.2 Local Stakeholder Consultation

The local stakeholder consultation meetings were held during the CDM validation. Also, ongoing communication with local stakeholders has been stated in section 2.2 of the MR /01/. To undertake the monitoring activity, the monitoring teams visit every riser included in the database during each monitoring period. In the process of conducting the monitoring, they regularly meet the customer and explain that they are repairing and maintaining leaks and receive regular feedback from the customers. In addition, the gas company maintains a customer service line and any issues that arise are passed to the teams as needed. This was cross-checked during OSV interview and customer complaint log book. Hence, the verification team deemed the ongoing communication with local stakeholders appropriate.

4.3 AFOLU-Specific Safeguards

This is a non-AFOLU project and hence this section is not applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The equations and choices provided in the methodology and all other methodological tools are correctly quoted in the MR /01/. The emission reductions of the project are calculated using the formulae mentioned in the applied methodology AM0023 version 04 /B02/. The verification team has reviewed the emission reduction spreadsheets (ER sheets) and checked all the formulae and found they are correct and are in accordance with the monitoring plan of the registered PDD and the applied monitoring methodology.

The verification team checked the Emission Reduction calculation sheet /02/ and confirms that the

equations used have been correctly applied and as per the selected methodologies AM0023 "Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities", version 04 /B02/ and the registered CDM PDD /B03/.

Baseline emissions:

Baseline emissions are determined based on the quantity of CH_4 emitted through physical leaks that are detected and repaired as part of the project activity (i.e., by the advanced LDAR program).

Option 2 of the methodology AM0023 /B02/ has been chosen to measure the flow rate of the physical leaks through the use of a Hi-Flow Sampler. In addition, the baseline emissions are capped to the baseline emission level of the first crediting year, which is again as per the methodology.

The baseline emissions are calculated as follows:

$$BE_y = \min\left\{ BE_1, ConvFactor \times \sum_j \left[F_{CH4,j} \times T_{j,y} \times \left(1 - UR_j\right)\right] \times GWP_{CH4} \right\}$$

With,

$$BE_1 = ConvFactor \times \sum_j \left[F_{CH4,j} \times T_{j,y=1} \times \left(1 - UR_j\right)\right] \times GWP_{CH4}$$

Where:

BE_1	=	Baseline emissions for the first crediting year of the crediting period (tCO_2e).
BE_y	=	Baseline emissions for crediting year *y* (tCO_2e)
ConvFactor	=	Conversion factor to convert Nm^3 CH_4 into tCH_4. The Hi-Flow sampler automatically accounts for standard temperature and pressure in data readings; as such this factor amounts to 0.0007168 tCH_4/Nm^3 CH_4 (i.e., 0 degree Celsius and 101.3 kPa).
j	=	All physical leaks that are included in the project activity for which physical leaks were detected and repaired and which would leak in the baseline scenario during the crediting year *y*.
$F_{CH4,j}$	=	Measured flow rate of methane for the physical leak *j* from the leaking component (Nm^3 CH_4/h)
UR_j	=	Uncertainty range for the flow rate measurement method applied to physical leak *j*. The uncertainty of the measurement is taken into account by using the flow rate at

the lower end of the uncertainty range for the measurement at a 95% confidence interval for baseline emissions from leaks

$T_{j,y}$ = The time the relevant component, in which physical leak *j* occurred, would leak in the baseline scenario and would be eligible for crediting during the crediting year *y* (hours)

GWP_{CH4} = The global warming potential for methane valid for the commitment period (tCO_2e/tCH_4). After the commitment period, this value may be revised based on any decision by the CMP.

Uncertainty is calculated using the following formula:

$$UR_j = \frac{\sqrt{(UR_1 * x_1)^2 + (UR_2 * x_2)^2 + \ldots + (UR_n * x_n)^2}}{x_1 + x_2 + \ldots + x_n}$$

Where

UR_j = the percentage uncertainty in the sum of the quantities (half the 95% confidence interval divided by the total (i.e. mean) and expressed as a percentage);

x_n and UR_n = the uncertain quantities and the percentage uncertainties associated with them, respectively.

(Note: "n" in this case refers to each recorded leak rate of each component surveyed)

For all physical leaks detected, the following assumptions are applied in calculating the baseline emissions:

- For components where no physical leaks were detected at the initial baseline survey and where the physical leak(s) were detected during a subsequent survey, baseline emissions shall be accounted from the moment when the leak was detected;
- Baseline emissions from a specific leak j or a specific component r are included in the calculations until whichever of the following occurs first:
  - The component concerned is replaced for a non-leak-related reason (i.e. it breaks down); or
  - The end of the last crediting period of the overall project activity; or
- The maximum period for which a specific leak can be accounted for emission reductions is over. This maximum period is the end of the crediting period (i.e., 10 years).

Further, the information provided in the monitoring report has been cross-checked with other sources such as detailed log sheets of all leaks /15/, to confirm the correctness and for plausibility check. The calculation of baseline GHG emissions has been carried out in accordance with the formulae and methods described in the registered monitoring plan and the applied methodology. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs, and other reference values have been correctly applied. The verification team also confirms that there is no material misstatement in the calculation of reported baseline emissions.

Project emissions:

For project emissions, it is required to include physical leaks that take place on components included in the project boundaries in the following cases:

- If a repair of a physical leak ceases to function, for as long as it is not repaired again; or
- If a new physical leak is detected in a component that was part of the initial baseline survey and for which no physical leak was detected during that survey, as long as that physical leak is not repaired.

Project emissions are calculated using the following formula (Option 2):

$$PE_y = ConvFactor \times \sum \left[F_{CH4,z} \times T_z \times (1 - UR_z) \right] \times GWP_{CH4}$$

Where:

PEy = Project emissions in crediting year y ((tCO$_2$e)

ConvFactor = Conversion factor to convert m^3 CH4 into Tch4. The Hi-Flow sampler automatically accounts for standard temperature and pressure in data readings; as such this factor amounts to 0.0007168 tCH$_4$/Nm^3 CH4 (i.e., 0 degree Celsius and 101.3 kPa).

z = All leaks that are accounted for as project emissions during the crediting year y

F_{CH4} = Measured leak flow rate of methane for the physical leak z from the leaking component (m^3 CH4/h)

URz = Uncertainty range for the flow rate measurement method applied to physical leak z. The uncertainty of the measurement is taken into account by using the flow rate at the upper end of the uncertainty range for the measurement at a 95% confidence interval for project emissions from leaks.

Tz = The time the relevant component has been leaking during the crediting year y

GWPCH$_4$ = Global warming potential of methane valid for the commitment period ((tCO$_2$e /tCH$_4$).

The following assumptions are made in the calculation of project emissions:

If a repair of a physical leak ceases to function, it is conservatively assumed that the leak resumed either:

- At the same flow rate that was measured before its repair when using only leak detection equipment;
- At the newly measured leak rate if the leak is re-measured using leak measurement equipment at the time of monitoring (in case of Option 2);

It is further assumed that the leak resumed on the day when the leak was last checked and confirmed not to leak and that it continued to leak for the entire time since that date. Any new leaks or leaks that reappear are immediately repaired. For this reason and the fact that finding and repairing gas leaks does not create emissions, PP assumed that there are no project emissions and has not calculated it.

For components where no physical leak was detected at the initial baseline survey and where the physical leak(s) were detected during subsequent surveys, project emissions from these components shall be accounted since the moment when the leak was detected.

Project emissions from a specific physical leak are included in the calculations until whichever of the following are earlier:

The date of any repair of the physical leak as long as the repair does not cease to function; or the equipment concerned is replaced (i.e. it breaks down).

During the current monitoring period, there are no project emissions for the project activity.

As per the applied methodology AM0023, version 04 /B02/ no leakage effects are accounted for. Thus, there will no leakage emissions from the project activity.

According to the applied methodology, the emission reductions are calculated as:

$$\mathbf{ER_y = BE_y - PE_y}$$

From the above-calculated value of BE_y and PE_y, the total emission reductions are:

$$\mathbf{ER_y = 1{,}291{,}591\ tCO_2e}$$

The verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence, and calculations are done in accordance with the pre-defined formulae from registered PDD /B03/. As the measuring instruments directly read out the amount of methane leakage rate per unit time, the "sample gas methane concentration" and "ambient air methane concentration" parameters are rendered redundant in the calculation of ER. The total number of emission reductions achieved during the monitoring period is 1,291,591 tCO_2e.

Emission reductions have been calculated in accordance with the applied methodology AM0023, version 04 /B02/, registered PDD, and VCS PD /06/. The PP has used monitored data and ex-ante fixed data including default values as mandated/permitted by the applied methodology. The values used for the calculation of GHG emission reductions have been thoroughly checked by the verification team and were found appropriate and correct.

Table 2:- Parameters Determined ex-ante

The following parameters are determined ex-ante and mentioned in the CDM PDD / VCS PD:

Parameter	Unit	Value	Assessment
GWP_{CH4}	tCO_2e/tCH_4	28	Fixed ex-ante in the PDD from the 5th Assessment Report of the IPCC
ConvFactor	$tCH_4/ m^3 CH_4$	0.0007168	The value of the parameter is fixed ex-ante in the PDD. As per the methodology, the leak flow rate (FCH4,j) and conversion factor (ConvFactor) should be reduced to the same reference conditions. The verification team has checked that the Hi-Flow Samplers automatically account for standard temperature and pressure (i.e., 0 degree Celsius and 101.3 kPa) in its leak flow rate measurements.

The spreadsheet submitted by the PP clearly and transparently mentions the values of the data parameters used for the calculation of emission reductions. The input values have been verified from reliable and authentic sources including monitoring records, MR /01/, and applied methodology /B02/. The emission reductions calculated were compared with the emission reduction spread sheet /02/ and found to be correct. No significant reporting risks have been identified for the data reported.

The details of monitoring parameters used for the calculation of emission reductions are provided below:

Table 3:- Parameters monitored ex-post

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	The time the relevant component, in which physical leak j, occurred, would leak in the baseline scenario and

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	would be eligible for crediting during the crediting year y (hours) ($T_{j,y}$)
Measuring frequency/Time Interval:	Ongoing throughout the monitoring period and the final value calculated at the end of the monitoring period
Reported value:	Multiple Values for each leak 'j' (Please refer to the ER spread sheet for each leak /02/)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	This is a calculated parameter. Not applicable
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Not applicable
Calibration frequency /interval: Is it as per monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	Not applicable
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Not applicable
Company performing the calibration (internal or external calibration):	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is (are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	The reported data on the hours of operation, during which each leak is venting gas was verified by examination of the formula for the calculation of hours between each corresponding date of leak flow measurement in ER calculation spreadsheet /02/. It

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	can be confirmed that the final calculation of hours of operation, during which each leak is venting gas was done in the correct manner in line with procedures defined in registered PDD /B03/, and the hours of shut-offs where the leaks ceased to operate were appropriately subtracted from the total amount of hours of operation. During the desk review of the leak reports /15/ and on-site surveys for the sampled leaks, the verification team has come to the conclusion that all the leak repairs were made with advanced repair material, as specified in PDD. It can be confirmed that there have been no hours of operation calculated for the equipment replaced for a non-leak related reason (i.e., when it breaks down), or when replacement of the equipment is made.
How were the values in the monitoring report verified?	The values were verified with the ER spreadsheets. The recording of hours has been verified from the complete data for each leak j, in the baseline scenario and also from the shutdown records
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures the correct transfer of data and reporting of emission reductions, and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	The temperature and pressure at the point at the time of measurement Temperature and pressure of natural gas (°C and bar)
Measuring frequency/Time Interval:	As and when a leak is measured using HFS

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Reported value:	The Hi-Flow™ Sampler automatically adjusts readings to standard temperature and pressure (0°C and 101.3 kPa) and is integrated into the results from the Hi-Flow sampler device /19/. The verification team confirms that the values are automatically corrected in accordance with the HFS manual. This is in line with the monitoring plan in registered PDD /B03/ and monitoring methodology /B02/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	**Instrument Name**: Hi Flow Sampler **Manufacturer**: Heath Consultants **Serial Numbers**: LP1002, LU1001, LX1011, MN1018, MN1032, MP1006, MP1032, NQ1000, NQ1002, NQ1003, NQ1005, NQ1007, NQ1008, NQ1009, NQ1011 **Accuracy Class**: +/-10%
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes
Calibration frequency /interval: Is it as per monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	Every 30 days while in use
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration (internal or external calibration):	Calibration of the HFS was done internally by the trained personnel of PSL by MBS /18/ /23/. The competence

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	of the calibrating persons could be confirmed during the on-site interviews by the verification team including a live demonstration of the same.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	-
How were the values in the monitoring report verified?	-
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	-
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not applicable

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	The uncertainty range for the measurement method applied to leak j (UR_j)
Measuring frequency/Time Interval:	As and when a leak is measured using HFS
Reported value:	Multiple Values for each leak “j” (Pl refer to the ER spread sheet for each leak)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Details of monitoring equipment:	The URj is calculated using leakage flow rates and the respective UR of the Hi-Flow sampler used for the leak. Leaks are measured using the Hi-Flow samplers. The readings as per the operator's manual are ±10% accurate /17/. Having applied uncertainty values of 10% for each individual HFC measurement undertaken (as given as "accuracy of calculated leak rate" in the HFS manual /17/), a total uncertainty of 0.001061392 had been calculated correctly by the PP based on 2000 IPCC Good Practice Guidance (Chapter 6 and the registered PDD). The calculation procedure is given as separate sheets attached to the CER calculation spreadsheets /02/ which have been checked and found to be correct by the verification team.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes
Calibration frequency /interval: Is it as per monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	Every 30 days while in use
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration (internal or external calibration):	Calibration of the HFS was done internally by the trained personnel of PSL by MBS /18/ /23/. The competence of the calibrating persons could be confirmed during the on-site interviews by the verification team including a live demonstration of the same.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	Yes

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
If applicable, has the reported data been cross-checked with other available data?	The reported data was verified by examination of the formula for the calculation in ER calculation spreadsheet /02/.
How were the values in the monitoring report verified?	The uncertainty data is calculated using leakage flow rates and the respective UR of the Hi-Flow sampler used for the leak. The uncertainty calculations are included in the CER calculations spreadsheet and the same has been checked by the audit team for all the leaks.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures the correct transfer of data and reporting of emission reductions, and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	Not Applicable

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	The leak flow rate of methane for leak (j, z) from the leaking component ($F_{CH4,\,j}/F_{CH4,\,z}$)
Measuring frequency/Time Interval:	As per the applied methodology and the registered PDD, it is to be monitored annually and this parameter has been measured once during the monitoring period
Reported value:	Multiple Values for each leak 'j' and 'z' (Please refer to the ER spread sheet for each leak /2/)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	**Instrument Name**: Hi-Flow Sampler **Manufacturer**: Heath Consultants

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	Serial Numbers: LP1002, LU1001, LX1011, MN1018, MN1032, MP1006, MP1032, NQ1000, NQ1002, NQ1003, NQ1005, NQ1007, NQ1008, NQ1009, NQ1011 **Accuracy Class**: +/-10%
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	Yes
Calibration frequency /interval: Is it as per monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	Every 30 days while in use
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Yes
Company performing the calibration (internal or external calibration):	Calibration of the HFS was done internally by the trained personnel of PSL by MBS /18/ /23/. The competence of the calibrating persons could be confirmed during the on-site interviews by the verification team including a live demonstration of the same.
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Yes
Is (are) calibration(s) valid for the whole reporting period?	Yes
If applicable, has the reported data been cross-checked with other available data?	Yes, the value of the parameter has been cross-checked with the Hi-Flow sampler readings records for the baseline survey period and also during the monitoring
How were the values in the monitoring report verified?	The values were verified with the raw data sheet and calculations in the ER spreadsheets

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
	Measurements with Hi-Flow™ Sampler are automatically adjusted to the methane content, temperature, and pressure and, thus, will directly yield methane leak flow rates. The audit team has verified the leak flow rate of methane for leaks j and z from the complete data for the leaks.
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures the correct transfer of data and reporting of emission reductions, and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	Capped quantity of the baseline emissions, defined as the baseline emissions for the first year of the crediting period (BE_{CAP})
Measuring frequency/Time Interval:	Monitored baseline emissions during the first year of the first crediting period
Reported value:	1,520,824 per year (2,291,653 for 550 days)
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Not applicable
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment,	Not applicable

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
does the monitoring equipment represent good monitoring practise?	
Calibration frequency /interval: Is it as per monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	Not applicable
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	Not applicable
Company performing the calibration (internal or external calibration):	Not applicable
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	Not applicable
Is (are) calibration(s) valid for the whole reporting period?	Not applicable
If applicable, has the reported data been cross-checked with other available data?	Not applicable
How were the values in the monitoring report verified?	The values were verified in the ER spreadsheets
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures the correct transfer of data and reporting of emission reductions, and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

The verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence, and calculations are done in accordance with the pre-defined formulae from registered PDD /B03/. The total number of emission reductions for the monitoring period (28/01/2019 to 30/07/2020) is 1,291,591 tCO_2e.

The verification team has checked and confirmed the calculations in the spreadsheet and found them to be accurate. The monitoring report is supported by the emission reduction spreadsheet. The consistency and formula were verified and found to be accurate.

Also of note is that any new leaks or leaks that reappear are immediately repaired. For this reason and the fact that finding and repairing gas leaks does not create emissions, PP assumed that there are no project emissions and has not calculated it. Hence, the parameters T_z and UR_z have not been monitored by the PP. which is deemed reasonable and acceptable.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

When verifying the report emission reduction, CCIPL ensured that there was a clear audit trail that contained the evidence and records that validate the stated figures. All source documents that form the basis for assumptions and other information underlying the GHG data are shown above.

When assessing the audit trails, CCIPL also examined:

1. Whether sufficient evidence was available, both in terms of frequency and in covering the full monitoring period

2. The source and nature of the evidence

3. If comparable information was available from sources other than that used in the monitoring report, CCIPL cross-checked the monitoring report against the other sources to confirm that the stated figures were correct. The sources and the data referenced are shown in Appendix 1 below.

The verification team confirms that all the monitoring equipment has been provided to adhere to the monitoring requirement as specified in the project activity as per the registered monitoring plan.

All Hi-Flow Samplers and Gasurveyors are calibrated to ensure accuracy in their measurements. The calibration is done as per the PDD at a 30-day and one-year frequency for HFS and GS respectively by certified and trained staff on the calibration procedure /18/ /23/. The verification team confirms that HFS and GS used for monitoring leaks were duly calibrated at the time of their usage for the current monitoring period. The Verification team checked the calibration records and the same was found to be satisfactory /20/.

CCIPL also assessed that the data collection system met the requirements of the monitoring plan as per the applied methodology. Proper data management inclusive of data acquisition and aggregation, data management system is being followed for the project activity. The monitoring personnel at the site are well trained and follow reproducible routines. Thus, they are competent to carry out the relevant tasks with sufficient accuracy.

4.6 Non-Permanence Risk Analysis

Not Applicable

5 VERIFICATION CONCLUSION

The Project Participant, EcoGas Asia Limited, has commissioned the VVB, Carbon Check (India) Private Ltd. to perform a verification of the VCS Project Activity "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh". This report summarises the findings of the verification of the project, performed based on VCS criteria, as well as criteria given to provide for consistent project operations, monitoring, and reporting.

The verification process was performed based on all guidelines and criteria as provided in VCS Standard version 4.3 /B01-a/, VCS Program Guide version 4.2 /B01-b/, VCS Validation and Verification Manual version 3.2 /B01-c/, and Registration & Issuance Process version 4.2 /B01-d/.

The selected baseline and monitoring methodology (AM0023, Version 04) applies to the project and is correctly applied.

The verification team confirms that the project has been implemented in accordance with the project description/06/.

Verification period: From 28/01/2019 to 30/07/2020 (both days inclusive)

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

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
28/01/2019 to 30/07/2020	1,291,591	0	0	1,291,591
Total	**1,291,591**	**0**	**0**	**1,291,591**

The verification team is of the opinion that the project has been implemented in accordance with the registered project description, the monitoring plan complies with the approved monitoring methodology, the monitoring complies with the monitoring plan, and the monitored data and calculation of ERs are assessed and confirmed as correct.

Therefore, CCIPL hereby certifies and requests the issuance of, the reported ERs during the monitoring period of 28/01/2019 to 30/07/2020 amounting to 1,291,591 tCO_2e to the VCS Registry.

APPENDIX 1.1: REFERENCE DOCUMENTS

Ref	Document
/01/	1. Monitoring report version 1, dated 29/04/2022 2. Monitoring report version 2, dated 23/06/2022 3. Monitoring report version 4, dated 26/10/2022
/02/	ER sheet corresponding to: /01-1/ /01-2/ /01-3/
/03/	Letter from PSL confirming the project start date (28/01/2019) of baseline survey
/04/	Proof of project ownership complying with section 3.6.1 of VCS Standard version 4.3 (agreement between EcoGas Asia, Ltd., Climate Compass, and Brawa Consulting dated 21/06/2019)
/05/	Certificate of incorporation of a Labuan company issued by Labuan Financial Services Authority dated 25/10/2018
/06/	VCS PD for the "Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh" version 6.0, dated 19/10/2022, and its corresponding validation report version 02, dated 01/11/2022
/07/	Map – Transmission and distribution pipeline of BGDCL
/08/	"Gas leak project service agreement" / contract between EcoGas Asia Ltd, Climate Compass LLC, Brawa Consulting Ltd, PSL and C-Quest
/09/	Organization structure for the project activity
/10/	Letter from MBS confirming feasibility study from 17th to 27th December 2018 dated 30/11/2020
/11/	Evidence for the meth applicability criteria: During the last three years before the implementation of the project activity, no advanced LDAR program was in place to address physical leakage from components that are included in the project boundary – self-declaration letter from PSL dated 13/09/2021 The project only addresses components that were included in the project boundary at the validation of the project activity. For instance, the project boundary will not include new sections of the distribution network. – self-declaration letter from PSL dated 13/09/2021 Physical leaks detected and repaired as part of the current maintenance programme are not covered by the CDM project activity. The leaks repaired under current practices by the Emergency Repair team are excluded from the project – self-declaration letter from PSL dated 13/09/2021 Physical leaks that can be repaired by tightening/re-greasing (incl. connectors and plug valves steams) or by similar measures are not covered by the project activity – self-declaration letter from PSL dated 13/09/2021 Log of the emergency repair and replacements done as a result of a failed part
/12/	Summary report from MBS for the project monitoring including inspection visits and baseline study database and monitoring database, dated 10/08/2022
/13/	Letter from MBS regarding the lifetime of the repair materials used in the leak repairs dated 15/06/2019
/14/	Log of the materials used for leakage repairing using advanced LDAR
/15/	Detailed log sheets of all leaks with leak code, photographs, and GPS coordinates the leaks detected, measurements were done following with repairs carried out (along with all relevant

Ref	Document
	details as stated under bullet points 1 to 11 under step 2 in section B.6.1 of the PDD: like along with the records of the downloaded data taken from the memory of HFS photographs, tags, handwritten records with raw data, etc.)
/16/	Letter provided by the gas company confirming that no leaks scheduled for replacement or emergency repair were included in the emission reduction calculation spreadsheet
/17/	Technical specifications and manuals for the Hi-Flow Samplers and GMI Gas surveyor (500 Series) and Photographs of the HFS and GS used during the monitoring period
/18/	Deed concerning training to perform the calibration of HFS, dated 24/11/2021
/19/	Evidence to confirm the Hi-Flow Sampler automatically accounts for standard temperature and pressure (i.e., 0 degrees Celsius and 101.3 kPa) in its leak flow rate (FCH4,j) measurements (HFS calibration memo issued by Heath Consultants dated 21/03/2008)
/20/	Calibration records for all the Hi-Flow Sampler and GS used during the monitoring period
/21/	Statutory Documents: Natural Gas Safety and Security Law Gas distribution rules (Domestic) & (Industry) Gas Act Gas Marketing Law
/22/	Letter from BGDCL confirming no system outages in gas supply during the monitoring period
/23/	Training-related letters and certificates for competence of the personnel involved in the monitoring issued by MBS
/24/	Letter from PSL demonstrating number of employment generated by the project dated 21/06/2022

APPENDIX 1.2: BACKGROUND DOCUMENTS

Ref	Document
/B01/	VCS Requirements a. VCS Standard (v4.3) b. VCS Program Guide (v4.2) c. VCS Validation and Verification Manual version (v3.2) d. Registration & Issuance Process (v4.2) e. VCS Program Definitions version (v4.2) f. VCS MR template version 4.1
/B02/	Applied baseline and monitoring methodology AM0023, version 04, “Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities”
/B03/	Registered CDM PDD for CDM project “Reducing Gas Leakages within the Bakhrabad Gas Distribution Network in Bangladesh” and the corresponding validation report including documents related to first and second CDM monitoring periods
/B04/	“Standard for sampling and surveys for CDM project activities and programme of activities” (version 09.0)

Ref	Document
	Guidelines for sampling and surveys for CDM project activities and Programme of Activities (version 04)
/B05/	Website and links: http://cdm.unfccc.int http://www.v-c-s.org

APPENDIX 2: ABBREVIATIONS

BGDCL	Bakhrabad Gas Company Limited
CDM	Clean Development Mechanism
BE	Baseline Emission
CAR	Corrective Action Request
CCIPL	Carbon Check (India) Private Ltd.
CDM	Clean Development Mechanism
CH_4	Methane
CL	Clarification Request
CO_2	Carbon Dioxide
CO_{2e}	Carbon Dioxide Equivalent
DPR	Detailed Project Report
DVR	Draft Validation Report
EB	CDM Executive Board
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
FVR	Final validation Report
GHG	Greenhouse Gas(es)
GS	Gasurveyor
GWh	Giga Watt Hour
GWP	Global Warming Potential
HFS	Hi Flow Sampler
IPCC	Intergovernmental Panel on Climate Change
LDAR	Leak Detection and Repairs
LDMT	Leak Detection and Measurement Team
MP	Monitoring Period
MR	Monitoirng Report
MW	Mega Watt
MWh	Mega Watt Hour
NA	Not Applicable
OSV	On Site Visit
PD	Project Description
PP	Project Proponent
PSL	Prokaushali Sangsad Limited
QA/QC	Quality Assurance/Quality Control
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVB	Validation Verification Body
VVM	Validation and Verificatoin Manual
VVS	Validation and Verification Standard

APPENDIX 3: CERTIFICATES OF COMPETENCE

Carbon CHECK

Carbon Check (India) Private Ltd.

Mr. Sanjay Agarwalla

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☒	**Team Leader**	☒	**Technical reviewer**	☒
Verifier	☒	**Technical Expert**	☒	**Local Assessor**[1]	☒

In the following Technical Areas:

TA 1.1	☒	**TA 3.1**	☒	**TA 5.2**	☒	**TA 9.2**	☒	**TA13.2**	☐
TA 1.2	☒	**TA 4.1**	☒	**TA 8.1**	☐	**TA 10.1**	☐	**TA14.1**	☐
TA 2.1	☒	**TA 5.1**	☒	**TA 9.1**	☒	**TA 13.1**	☒		

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

Valid Till
23/12/2022

Revision History of the Document

01/03/2020[2]	Interim Revision for office address change
01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision
24/12/2021	Annual Revision

[1] India
[2] Please refer to previous version of competency certificates for the revision history.

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL**: www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

Carbon
CHECK

Carbon Check (India) Private Ltd.

Mr. Ramchandra Nesari

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☐	**Team Leader**	☐	**Technical reviewer**	☐
Verifier	☐	**Technical Expert**	☒	**Local Assessor**[1]	☒

In the following Technical Areas:

TA 1.1	☒	**TA 4.1**	☒	**TA 9.1**	☒	**TA 13.1**	☒
TA 1.2	☒	**TA 5.1**	☒	**TA 9.2**	☒	**TA 13.2**	☐
TA 3.1	☒	**TA 5.2**	☒	**TA 10.1**	☒	**TA 14.1**	☐

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

Valid Till
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CARBON CHECK (INDIA) PRIVATE LIMITED
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Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

Carbon Check (India) Private Ltd.

Vikas Vilasrao Bankar

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☒	**Team Leader**	☒	**Technical reviewer**	☒
Verifier	☒	**Technical Expert**	☒	**Local Assessor**[1]	☒

In the following Technical Areas:

TA 1.1	☒	**TA 4.1**	☐	**TA 9.1**	☐	**TA 13.1**	☐
TA 1.2	☒	**TA 5.1**	☐	**TA 9.2**	☐	**TA 13.2**	☐
TA 3.1	☒	**TA 5.2**	☐	**TA 10.1**	☐	**TA 14.1**	☐

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

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24/12/2020	Annual Revision
24/12/2021	Annual Revision

[1] India.

[2] Please refer to previous version of competency certificates for the revision history.

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL**: www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

Carbon CHECK

Carbon Check (India) Private Ltd.

Mr. SP Reddy

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	☐	**Team Leader**	☐	**Technical reviewer**	☐
Verifier	☐	**Technical Expert**	☒	**Local Assessor**	☐

In the following Technical Areas:

TA 1.1	☐	**TA 4.1**	☐	**TA 9.1**	☐	**TA 13.1**	☐
TA 1.2	☐	**TA 5.1**	☐	**TA 9.2**	☐	**TA 13.2**	☐
TA 3.1	☐	**TA 5.2**	☐	**TA 10.1**	☒	**TA 14.1**	☐

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2021

Valid Till
23/12/2022

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01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision
24/12/2021	Annual Revision

[1] Please refer to previous version of competency certificates for the revision history

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

APPENDIX 4: FINDINGS LOG

Table 1. CLs from this Verification

Finding	CL 01		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	In section 1.1 of the MR, under the milestone of the project activity and timeline table, the VCS monitoring period is described as the "3rd monitoring period under VCS" and two different durations (28/01/2019-30/07/2020 and 01/01/2021-31/12/2021) are clubbed together. Whereas, as per the title page of this document, this monitoring period covers only 28/01/2019-30/07/2020 duration. Also to note, this is actually the 1st periodic verification under VSC. PP is requested to provide more clarity on the numbering of the monitoring periods and the duration they cover.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*The timeline and project period numbering has been updated to make it clearer and more consistent.*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has updated the timeline and project period numbering in the section 1.1 of the revised MR to make it more appropriate and clearer.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed		

Finding	CL 02		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	PP is requested to provide evidence for each of the claimed SDG parameters' values.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*The values have been updated to align with the excel sheet. Additional evidence has been provided to document the employment figures.*		

Finding	CL 02
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has provided evidence for each of the claimed SDG parameters. The CL is closed.
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed

Finding	CL 03		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	For the calculation of BE_{CAP}, the cell reference of "*Uncertainty!C15357*" within the formula applied on cell number X15364 of "*BGDCL Total*" sheet is incorrect. PP is requested to rectify this.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*The correction to the formula was made and the BEcap has been adjusted accordingly throughout the documents.*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has submitted a revised ER spreadsheet and MR with the formula corrected and BE_{CAP} value adjusted throughout the documents.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed		

Finding	CL 04		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	The stated value of parameters UR_j and UR_z in section 4.2 of the MR does not match with the ER calculation spreadsheet		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*The value has been updated as per the excel spreadsheet calculation.*		

Finding	CL 04
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has updated the value in the revised MR to align with the ER spreadsheet. Moreover, in the revised MR, PP has removed URz, since it is not used as there are no project emissions which is deedmed to be acceptable.
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed

Finding	CL 05		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	The sectoral scope mentioned in section 1.2 of the MR is inconsistent with https://verra.org/project/vcs-program/projects-and-jnr-programs/vcs-sectoral-scopes/ and the UN project webpage.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*Updated to same language used on UN Project webpage*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has updated secton 1.2 of the revised MR to be consistent Verra and CDM website.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed		

Finding	CL 06		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	The number of staff employed is inconsistent with the same mentioned in other sections of the MR.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*Updated*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has made the number staff employed consistent throughout the document and in line with supporig document.		

Finding	CL 06
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed

Finding	CL 07		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding *(VVB)*	For section 4.2 of the MR, please clarify why parameters URj and URz are not calculated separately as those should be used for calculations of baseline emissions and project emissions respectively.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*URz is not used as there are no project emissions so this has been removed.*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has removed URz, since it is not used as there are no project emissions.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed		

Finding	CL 08		
Classification	☐ CAR	☒ CL	☐ FAR

Finding	CL 08
Description of finding *(VVB)*	Following issues were identified related to the ER spreadsheet: 1. The header row of the monitored parameters should be mentioned in line with Data/Parameter symbol mentioned for easier identification. 2. The format of the worksheet "Outage" is not proper. It should have been as presented for "Outage" of ER spreadsheet of MP-2 of VCS. 3. The "Outage" worksheet data do not show the date of the resumption of the gas supply, whether the outage is due to a "Cut Off" or "Outage" for maintenance, and also the total numbers of shut-offs during the monitoring period of the year 2018, 2019 and 2020. 4. The data of "outage" for the monitoring period 2018 and 2019 (except for 3 numbers) appears to be missing. It appears that the data of "Outage" was taken from MP-1 of CDM, for which the monitoring period was from 31.07.2020 to 26.11.2020. So please confirm the "Outage" data from the records of 2018 and 2019 and correct the ER calculations. 5. The "Outage" hours have to be accounted for in the CER calculations presented in the worksheet "BGDCL Total" as it is done in MP-2 of VCS. Though the formula is used for "shut-off" hours in MP-1, all the cells corresponding to shut-offs show zero hours. 6. In "BGDCL Total", the monitoring data of leaks has been given only for the measurement M2. The measurement M1 reading is missing. 7. In the SDG worksheet, under "Total leakage found in project lifetime" the number mentioned includes the leakages in MP-2 of VCS, which after MP-1. Instead, it is desirable to indicate "Total leakage found up to MP-1". Also "Total ghg emissions reduced in project lifetime" should indicate the sum of GHG emissions till MP-1.

Finding	CL 08
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	1. *Symbols have been added.* 2. *The format was adjusted to meet the needs of this period's calculation.* 3. *The date of the shutoffs that were resumed have been included and the shutoffs have been labelled as outages.* 4. *The data has been updated and a confirmation from the gas company has been provided.* 5. *The shutoffs have been accounted for in the ER calcs as the shutoffs that have not been reconnected no longer generate any ERs since they were shutoff before the monitoring and did not get reconnected before the end of the monitoring period. The shutoffs that were reconnected have been adjusted to only calculate ERs during their period of operations.* 6. *Measurement one has been added.* 7. *The guidance we were given was that this should be total as per the date of the submission. Please confirm where this guidance comes from.*

Finding	CL 08
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	1. PP has added the information in header row. 2. The format was adjusted to meet the needs of this period's calculation 3. The date of the shutoffs that were resumed have been included and the shutoffs have been labeled as outages. 4. The data has been updated and a confirmation from the gas company has been provided. 5. The shutoffs have been accounted for in the ER calcs as the shutoffs that have not been reconnected no longer generate any ERs since they were shutoff before the monitoring and did not get reconnected before the end of the monitoring period. The shutoffs that were reconnected have been adjusted to only calculate ERs during their period of operations. 6. Measurement one has been added. 7. The guidance we were given was that this should be total as per the date of the submission. Please confirm where this guidance comes from. Moreover, PP has revised the crediting period start date and the start date of monitoring period from 17/12/2018 to 28/01/2019 and revised the ER sheet accordingly to be in line with the registered and validated VCS PD /06/. The database now shows that the first leak measured was on 28/01/2019, hence the findings releatd to the duration prior to this date are now not relevant for this MP.
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed

Table 2. CARs from this Verification

Finding	CAR 01		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *(VVB)*	In section 1.3 Project Proponent's address is missing. PP is requested to provide complete information as per the VSC monitoring report template filling guidelines.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*The address has been added.*		

Finding	CAR 01
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has provided the missing information in the revised MR.
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed

Finding	CAR 02		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *(VVB)*	Please clarify the appropriateness of the GWP of Methane considered in line with clause 3.14.4 of the VCS Standard.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*3.14.4 requires use of the 5th Assessment Report which defines a value for methane of 28 as used in the calculations for projects that are not validated by VCS before 1 January 2021.*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	VCS project standard, in section 3.14.4, states, "For GHG emission reductions occurring on or before 31 December 2020, all ex-ante estimates and ex-post calculations may be converted to CO2e using either the GWP values from the IPCC Fourth Assessment Report (AR4) or those from AR5". Hence, GWP value for methane of 28 used in the calculations is deemed appropriate.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification ☐ Outstanding finding (not closed) ☒ The finding is closed		

Finding	CAR 03		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *(VVB)*	Parameter BE_{CAP}: The estimation of ER for the monitoring period is incorrectly done. Please clarify.		
Corrective Action or clarification #1 *(PP shall write a detailed and clear corrective action or further information for clarification as per finding)*	*BCAP calculation has been updated and leaks from 1st crediting year only (28-Jan-2019 to 27-Jan-2020) have been considered to arrive at BCAP.*		
VVB Assessment #1 *The assessment shall encompass all open issues in the finding. In case of non-closure, additional corrective action and VVB assessments (#2, #3, etc.) shall be added.*	PP has rectified the BCAP calculation appropriately to be based on the repairs taken place withing the first crediting period only.		
Conclusion	☐ To be checked during the next periodic verification		

Finding	CAR 03
Tick the appropriate checkbox	☐ Outstanding finding (not closed) ☒ The finding is closed