BAOSHAN EAST HOPE SWINE FARM AWMS GHG MITIGATION PROJECT

Document Prepared by CTI Certification Co., Ltd.

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Summary:

CTI Certification Co., Ltd. (hereafter referred to as "CTI") has been commissioned by Xi'an Carbon Neutral Environmental Technology Co., Ltd. to perform the validation of project activity "Baoshan East Hope Swine Farm AWMS GHG Mitigation Project" (hereafter referred to as "the project activity") and reported in the Validation Report.

- A description of the project

The project activity, located in Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, P.R. China, involves the installation of 1 set of new animal waste management systems (AWMSs) at 1 new built swine farm. This system is designed to treat the manure and wastewater on-site from a combined population of 57,534 heads of market swine, thus preventing methane emissions that would typically arise from uncovered anaerobic lagoons in a baseline scenario. The project is expected to handle 26,718 tons of manure annually, producing $6.04\times10^4 m^3$ of biogas annually. Out of this, all of the biogas will be recovered and combusted for electricity generation and used for the operation of AWMS. The project, started operation on 25/08/2023 with the VCS Ref. No.5431, is proposed to achieve annual emission reductions of 49,328 tCO_2e, and total emission reductions 493,280 tCO_2e over the fixed 10-year crediting period 25/08/2023-24/08/2025.

- A description of the validation

CTI Certification Co., Ltd has been commissioned by Xi'an Carbon Neutral Environmental Technology Co., Ltd. to perform the validation of “Baoshan East Hope Swine Farm AWMS GHG Mitigation Project” (Ref. No. 5431) (hereafter referred to as the project) in China and reported in the Validation Report.

The validation includes confirming the project’s design description, baseline, additionality, monitoring plan to be in compliance with relevant VCS and host party criteria in the Project Description (hereafter referred to as PD) to the application of the CDM methodology ACM0010 Version 08: “GHG emission reductions from manure management systems”.

- The purpose and scope of validation

The validation objective is an independent assessment by a Third Party of a proposed project against all defined criteria set for the registration under the VCS. In order to confirm that the project activity, as documented, is sound and reasonable and meets the identified criteria, the validation involves the assessment of: project conformance to VCS standards/programs, project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology; and likelihood that methods and procedures set out in the project description will generate verifiable GHG data and information when implemented. Validation is a requirement and is seen as necessary to provide assurance to stakeholders of the quality of project and its intended generation of VCUs. Validation is part of the VCS project cycle and will finally result in a conclusion by the executing VVB whether a project activity is valid to be submitted for registration to VCS registry.

- The method and criteria used for validation

Validation is conducted using CTI procedures in line with the requirements specified in the latest version of the VCS Validation and Verification Manual (Version 3.2) and applying auditing techniques. The validation team assessed the project's compliance against the VCS Standard Version 4.7, the selected CDM methodology and the project description. The project is eligible under Project Scope 1, 13 and 15. The validation criteria followed the guidance documents provided by VCS included the following: VCS Standard Version 4.7, VCS Program Guide Version 4.4, Program Definitions Version 4.5, and the applied CDM methodology ACM0010 "GHG emission reductions from manure management systems (Version 08) ", and referenced tools.

- The number of findings raised during validation

In the course of the validation, 4 Clarification Requests (CLs) and 3 Corrective Action Requests (CARs) were raised and successfully closed. No Forwarded Action Request (FAR) was raised.

- Any uncertainties associated with the validation

There are no restrictions of uncertainty for validation.

- Summary of the validation conclusions

Xi'an Carbon Neutral Environmental Technology Co., Ltd. has commissioned CTI to carry out the Verified Carbon Standard (VCS) validation of the project, "Baoshan East Hope Swine Farm AWMS GHG Mitigation Project" (VCS ID 5431) with regard to the relevant requirements of VCS Standard Version 4.7. CTI confirms all validation activities including objectives, scope and criteria, level of assurance, project description, monitoring plan adhere to VCS Standard Version 4.7 and all associated updated as documented in this report, are complete.

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1 INTRODUCTION

1.1 Objective

Xi'an Carbon Neutral Environmental Technology Co., Ltd. has commissioned the CTI to carry out the Verified Carbon Standard (VCS) validation of the project "Baoshan East Hope Swine Farm AWMS GHG Mitigation Project" (VCS ID 5431).

The objective of validation is an independent assessment by a Third Party of a proposed project activity against all defined criteria set for the registration under the VCS. In order to confirm that the project activity, as documented, is sound reasonable and meets the identified criteria, the validation involves the assessment of: project conformance to VCS standards/programs, project conformance to the applied methodology, including the procedure for the demonstration of additionality specified in the methodology; and likelihood that methods and procedures set out in the project description will generate verifiable GHG data and information when implemented. Validation is a requirement and is seen as necessary to provide assurance to stakeholders of the quality of project and its intended generation of VCUs. Validation is part of the VCS project cycle and will finally result in a conclusion by the executing VVB whether a project activity is valid to be submitted for registration to Verra registry.

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the Project Description to validate that (a) the project design is actual, (b) the baseline scenario is correctly defined as per the applied methodology and relate tools, (c) the project is additional, (d) the monitoring plan can be implemented and is transparent and adequate and (e) all data and information used for ex-ante calculation of emission reductions is of projected and/or hypothetical nature. The PD is reviewed against the criteria stated in VCS standard Version 4.7 /77/ and the approved baseline and monitoring methodology ACM0010 (Version 08). The validation was based on the requirements VCS Validation and Verification Manual and VCS Program Guide version 4.4/76/ and VCS standard Version 4.7/77/ applying auditing techniques. The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

1.3 Reasonableness of Assumptions

CTI Certification has assessed the claims and assumptions made in the Project Description, i.e., assumptions regarding the determination of baseline scenario, the investment analysis and additionality assessment, as well as validated the assumptions, limitations, and methods used

for determining parameters and calculation of baseline emission, project emission and leakage against the VCS Standard Version 4.7/77/, applied methodology ACM0010 (Version 08)/63/ and other VCS rules/61/- /78/. Based on the validated assumptions, limitations, and methods used during the validation, the project is expected to generated average GHG emission reductions of 49,328 tCO_2e per year, and it is confirmed that outcome of future activities will be achieved as the assumptions and limitations are reasonable.

The assessment was conducted to provide a reasonable level of assurance of compliance against the defined audit criteria and materiality threshold within the audit scope. Based on the VCS validation conducted, CTI is of the opinion that the project complies with the validation criteria for projects set out in VCS Standard Version 4.7, including any qualifications or limitations.

1.4 Summary Description of the Project

The project, implemented by Baoshan East Hope Animal Husbandry Co., Ltd., involves the installation of 1 set of new animal waste management systems (AWMS) at 1 new-built farm in Yunnan Province. This system will treat the manure and wastewater from the swine farm to avoid methane emissions that would generate in the baseline uncovered anaerobic lagoons.

The AWMS has been installed in the swine farm to treat the manure and wastewater from 57,534 heads of market swine (annual average number of animals, N_{LT}). The raw materials, such as swine manure and wastewater, are collected into waste collecting tanks and are first separated by solid-liquid separators. The solid waste is treated in a passive windrow composting system to produce organic fertilizer base materials for land use. The liquid waste undergoes anaerobic digestion, and the biogas produced in the process is either recovered and combusted to generate electricity for the AWMS's operation, or it is burned directly by the flare in case of the biogas generator failing to operate or there's surplus biogas. The digestate produced by the anaerobic digestion is also treated in passive windrow composting system, and the effluents from the anaerobic digestion is used as liquid fertilizer for land application.

The project is expected to handle 26,718 tons of manure annually, producing $6.04\times10^4 m^3$ of biogas annually. Out of this, all of the biogas will be recovered and combusted for electricity generation and used for the operation of AWMS, while the remaining biogas will be flared.

The project is expected to avoid GHG emission of methane from anaerobic treatment of swine manure and wastewater through recovery and destruction of biogas. The estimated emission reductions from the project are 49,328 tCO_2e per year, and total emission reductions 493,280 tCO_2e over the fixed 10-year crediting period 25/08/2023-24/08/2025.

2 VALIDATION PROCESS

2.1 Method and Criteria

A project specific validation plan was developed to guide the validation auditing process to ensure efficiency and effectiveness.

The purpose of the validation is to present a risk assessment for determining the nature and extent of validation procedures necessary to ensure the risk of auditing error is reduces to a reasonable level. According to the ISO14064-3, the criteria are the policy, procedure or requirement used as reference against which evidence is compared. The validation were performed through means of the following three phases in accordance with the requirement of the applied methodology, and the VCS Standard (Version 4.7) and other relevant VCS requirements.

- A desk review of the PD and all support documents;

- Follow-up interviews with project stakeholders and site inspection;

- The resolution of outstanding issues and the issuance of the validation report and statement.

CTI completed a strategic review and risk assessment of the project's activities and processes in order to gain a full understanding of (if applicable) project details; application of methodology; estimated GHG emission reduction and removals; monitoring; safeguards; SDG contributions etc.

CTI assessed that the reported information in the PD are complete and accurate in question. This validation report describes the findings of this assessment. The information of the assessment team has been included in below of this report.

2.2 Document Review

The PD/1/ and supporting background documents related to the project implementation were reviewed. Documents review was conducted to ensure consistency with and identify any deviation from VCS program requirements. Desk review included an examination of the project design details, baseline scenario, additionality, ex ante and monitoring data and parameters, and ex ante quantification of GHG emission reductions. The assessment team also used additional documentation by third parties like host party legislation, technical reports referring to the project design details, baseline scenario, additionality, monitoring or to the basic conditions and technical data.

The references used in the course of this validation are summarized in Appendix 3. The validation were performed basing on the documents check and site inspection/measurements, refer to the section 3 of this report for the validation process detail and Appendix 3 for corresponding documents review.

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, CTI has composed a project assessment team in accordance with the

appointment rules in CTI. The composition of CTI assessment team has to be approved by the CTI ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

Function	Name	Technical competence	Task Performance*
Team Leader/Technical Expert	Li Ziqi	1, 3, 4, 5, 11, 12, 13	☒ DR ☒ SV ☒ RP ☐ TR
Team Member	Zhang Qixin	1, 13	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer/Technical Expert	Lin Shunrong	1, 3, 13, 14, 15	☒ DR ☐ SV ☐ RP ☒ TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

2.3 Interviews

The objective of the interview process was to solicit important information from personnel related to project and relevant to the validation process. Onsite interviews and information discussions were conducted with PP. The key personnel interviewed are summarized in the table below:

<table>
<tr><th>Interviewed personnel</th><th>Role</th><th>Organization</th><th>Date</th><th>Subject</th><th>Team Member</th></tr>
<tr><td>Tian Zexin</td><td>Project Leader</td><td>Baoshan East Hope Animal Husbandry Co., Ltd.</td><td>24/06/2025</td><td rowspan="5">Project design and operation of the project activity;
Status of the project (including PPs);
Project proponent and ownership;
Applicability of selected methodology;
Applicable laws, statutes and other regulatory frameworks and any change;
Baseline of the project;</td><td>Li Ziqi
Zhang Qixin</td></tr>
<tr><td>Zi Yongzhao</td><td>Plant Director</td><td rowspan="3">Baoshan East Hope Swine Farm AWMS</td><td rowspan="3">24/06/2025</td><td rowspan="3">Li Ziqi
Zhang</td></tr>
<tr><td>Yang Anchun</td><td rowspan="2">O&M Staff</td></tr>
<tr><td>Wang Binshu</td></tr>
</table>

Sun Jiarong Liu Zhijun Yuan Xiaodong			24/06/2025	Emission factors of the project; Monitoring plan; Approval procedure; Applicable local laws and regulations on manure management projects; Other similar projects in the region; Environment Impact; EIA Approval; Applicable local laws and regulations on manure management projects Sustainable development contributions. Safeguards and stakeholder engagement	Qixin
Jiang Zhongman Zhao Xiaogan Zhao Yinhai Zhao Xuhui Zho Chengfeng	Local resident	Wangzhai Village	24/06/2025 24/06/2025	The process and participation of the stakeholder consultation; The impact of the project activity; The complaint by local stakeholders and the implementation of the mitigation measures.	Li Ziqi Zhang Qixin

Zhao Jijian					
Yang Shanchuan	Officer	Baoshan Municipal Ecology and Environment Bureau	24/06/2025		
Wang Guowen	Officer				
Liu Xin	Project Leader	Xi'an Carbon Neutral Environmental Technology Co., Ltd.	24/06/2025	Data collection and ER calculation.	Li Ziqi Zhang Qixin
Tian Zexin	Project Leader	Baoshan East Hope Animal Husbandry Co., Ltd.	25/06/2025	Finding Summary	Li Ziqi Zhang Qixin
Liu Xin	Project Leader	Xi'an Carbon Neutral Environmental Technology Co., Ltd.			

2.4 Site Visits

The assessment team performed the on-site validation (Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, People's Republic of China) on 23/06/2025-25/06/2025. The interviewed personnel and objective are listed in above table.

Duration of on-site inspection: 23/06/2025-25/06/2025				
No.	Activity performed on-site	Site location	Date	Team member
1.	Opening meeting Interview with PP Representative, local officers, local residents and Operation Staff	project proponent's office in the project site	23/06/2025	Li Ziqi Zhang Qixin
2.	On-site inspection Project site, farms, composting workshops, equipments etc., interviewing	project site	24/06/2025	Li Ziqi Zhang Qixin

	stakeholders			
3.	Documents check	project proponent's office in the project site	25/06/2025	Li Ziqi Zhang Qixin
4.	Finding Summary	project proponent's office in the project site	25/06/2025	Li Ziqi Zhang Qixin
5.	Close Meeting	project proponent's office in the project site	25/06/2025	Li Ziqi Zhang Qixin

The opening meeting of the validation process started on 23/06/2025 at project proponent's office in the project site (Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, People's Republic of China), as confirmed by the assessment team the project is listed on the project pipeline with a status of under validation before the opening meeting representing the beginning of the validation process.

Furthermore, the validation took place after the 30-day public comment period which begun on 21-05-2025, and CTI completed the validation until after the 30-day public comment period has ended.

During the on-site visit, CTI has applied standard auditing techniques to assess the quality of information provided, the implementation and current situation of the project activity, evaluate data management, QA/QC system, project technology and equipment, training provided, and monitoring etc.

2.5 Resolution of Findings

As an outcome of the validation process, the team can raise different types of findings.

Where a non-conformance arises the assessment team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

b) Modifications to the implementation, operation and monitoring of the project activity has not been sufficiently documented by the project participants;

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

The assessment team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM or VCS requirements have been met.

All CARs and CLs raised during validation shall be resolved prior to submitting a request for issuance.

The objective of this phase of the validation was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for CTI's positive conclusion on the PD/1/. 4 Clarification Request (CL), 3 Corrective Action Requests (CARs) and no Forward action request (FAR) raised by CTI. And communications were made between the Client and CTI to guarantee the transparency of the validation process, the concerns raised, and responses given are summarized below in the appendix 4.

The final PD (version 2.0 dated 29-06-2025) serves as the basis for the final assessment presented. Additional changes to the project during the validation process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation findings	No. of CL	No. of CAR	No. of FAR
Project Description and monitoring report	1	00	00
Description of project activity	00	00	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
- Applicability of methodology and standardized baseline	00	1	00
- Deviation from methodology	00	00	00
- Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
- Demonstration of additionality	00	00	00
- SDG or Environmental issues	00	1	00
- Project boundary	00	00	00
- Emission reductions	1	1	00
- Monitoring plan	1	00	00
- Stakeholders consultation process	1	00	00
- Public comments	00	00	00
Others (please specify) - Matter related to double counting - **for validation**	00	00	00
Total	4	3	00

2.5.1 Forward Action Requests

None FAR was raised during the validation process.

3 VALIDATION FINDINGS

3.1 Project Details

The project activity, located in Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, P.R China, uses 1 set of new animal waste management system (AWMS), to treat the manure from a new-built swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. This system is designed to treat the manure and wastewater on-site from a combined population of 57,534 heads of market swine, thus preventing methane emissions that would typically arise from uncovered anaerobic lagoons in a baseline scenario. The raw materials, such as swine manure and wastewater, are collected into waste collecting tanks and are first separated by solid-liquid separators. The solid waste is treated in a passive windrow composting system to produce organic fertilizer base materials for land use. The liquid waste undergoes anaerobic digestion, and the biogas produced in the process is either recovered and combusted to generate electricity for the AWMS's operation or directly flared. The digestate produced by the anaerobic digestion is also treated in passive windrow composting system, and the effluents from the anaerobic digestion is used for liquid fertilizer land application. The project is expected to handle 26,718 tons of manure annually, producing $6.04 \times 10^4 m^3$ of biogas annually. Out of this, all of the biogas will be recovered and combusted for electricity generation and used for the operation of AWMS.

During the 10-year fixed crediting period, the project activity avoids the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. It's estimated that the project activity could achieve average annual GHG emission reductions of *49,328* tCO_2e and total GHG emission reductions of 493,280 tCO_2e during the fixed 10-year crediting period.

The project activity is located at Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, P.R China. The project activity has been developed by Baoshan East Hope Animal Husbandry Co., Ltd. The geographic coordinates of the project activity are 24°56′15″N, 99°16′32″E which is confirmed by site visit.

By checking Environmental Impact Assessment (EIA) Approval/6/, the assessment team confirmed that the project activity has been approved by the Baoshan Municipal Ecology and Environment Bureau on 24-03-2021. By checking Daily operation record of treatment plant /27/ and onsite interview, the assessment team confirmed that the project activity started operation on 25-08-2023.

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Audit history	This is the validation of the project activity. No previous audit.
Sectoral scope	Through the onsite visit, interviewing the PP and reviewing the PD/1/, it was confirmed that the project is to introduce new Animal Manure Management System instead of the traditional open anaerobic lagoon with a closed anaerobic digester to a newly built swine farm in Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, P. R. China, which will treat the manure and wastewater from the swine farm to avoid methane emissions generated in the baseline uncovered anaerobic lagoon and the biogas produced is recovered and combusted for electricity generation and used by AWMS. Therefore, it was confirmed that the sectoral scope is Scope 13 Waste handling and disposal as per the UNFCCC Standard "Applicability of sectoral scopes version 01.0"/32/ and Scope 15 Livestock and manure management as per the applied methodology and VCS standard (V4.7)/77/.
AFOLU project category, if applicable	N/A
Project activity type	By checking EIA /10/ and on-site inspection against the applied technology by the project, it was confirmed the project involves the installation of 1 set of new AWMS at a new-built swine farm in Yunnan Province. This system treat the manure and wastewater from the swine farm to avoid methane emissions that would generate in the uncovered anaerobic lagoons in baseline scenario, and the biogas produced by this system is either recovered and combusted to generate electricity for the AWMS's operation, or it is burned directly by the flare in case of the biogas generator failing to operate or there's surplus biogas. Therefore, the assessment team can confirm that the project activity type is attributable to: Waste handling and disposal and Livestock and manure management.

General eligibility of the project to participate in the VCS Program

For the project activity, the applicability of VCS program as required in para 2.1 of VCS Standard (Version 4.7) is justified as below:

Criteria	Justification
The scope of the VCS Program includes: 1) The seven Kyoto Protocol greenhouse gases.	During the 10-year fixed crediting period, the Project can reduce CO_2 emissions by avoiding methane emissions through collecting and destroying the biogas generated from the anaerobic digester for energy (electricity) generation. Therefore, this criteria is applicable.
2) Ozone-depleting substances.	This criteria is not applicable for the project activity.
3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process.	This criteria is not applicable for the project activity.
4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).	The project activity applies methodology ACM0010 (version 08.0), the methodologies approved under CDM Program, which is a VCS approved GHG program.
5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements.	This criteria is not applicable for the project activity.
The scope of the VCS Program excludes projects that can reasonably be assumed to have generated GHG emissions primarily for the purpose of their subsequent reduction,	The project activity installs 1 set of new animal waste management system (AWMS) to treat the manure at a new-built swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester by

removal, or destruction. The VCS Program also excludes the following project activities under the circumstances indicated in Table 1 of VCS Standard (version 4.7).	generating electricity or flaring, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The project activity is not excluded under the circumstances indicated in Table 1 of VCS Standard (version 4.7).

For the project activity, the applicability of VCS program as required in para 3.1 of VCS Standard (Version 4.7) is justified as below:

Criteria	Justification
3.1.1 Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.1.	As justified in the above table, the project meets all applicable rules and requirements set out under the VCS program, including this document. The project has been guided by the principles set out in section 2.2.1 of VCS Standard (Version 4.7), i.e. principles taken from ISO-14064-2, including relevance, completeness, consistency, accuracy, transparency and conservativeness. Therefore, this criteria is applicable.
3.1.2 Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.14.1. The list of methodologies and their validity periods is available on the Verra website.	The project applies methodology ACM0010 (version 08.0), the methodologies approved under CDM Program, which is a VCS approved GHG program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology. Please refer to section 3.4 of this report for detailed assessment on the application of methodology. Therefore, this criteria is applicable.

	3.1.3 Projects shall apply the latest version of the applicable methodology in all cases unless a grace period applies to the project as set out in 3.22 below. Projects shall update to the latest version of the methodology when reassessing the baseline or renewing a crediting period.	This is the validation of the project activity. The project applies methodology ACM0010 (version 08.0), which is the latest version of the applicable methodology available at UNFCCC website. Therefore, this criteria is applicable.
	3.1.4 Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.	By checking public information, the assessment team can confirm that the project meets the policies/96/ including Environmental Protection Law of the People's Republic of China; Law of Solid Waste Pollution Prevention and Control; Regulations on the Prevention and Control of Pollution from Livestock and Poultry Scale Breeding; Administrative Licensing Law of the People's Republic of China; Law of the People's Republic of China on Environmental Impact Assessment; Regulations on Environmental Protection Management of Construction Projects. All these policies have been included in the PD and verified to be correct. Besides, the project obtained all the compulsory approvals from the local government, i.e. EIA Approval/6/, which means that the project is in line with the national and local laws and regulations based on the local expertise of the assessment team. Therefore, this criteria is applicable.
	3.1.5 Where projects apply methodologies that permit the project	As per VCS Program Definitions version 4.5, model means “a formula or set of formulae that

	proponent its own choice of model (see the VCS Program Definitions for the definition of model), the model shall meet the requirements set out in the VCS Methodology Requirements, and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or carbon dioxide removals).	uses parameters and input values to establish the value of one or more output variables". The project activity has applied formulae in methodology ACM0010 (version 08.0), tools referenced, 2006 IPCC Guidelines for National Greenhouse Gas Inventories and its 2019 Refinement to calculate emission reductions, which is verified to be reasonable and reliable. Therefore, this criteria is applicable.
	3.1.6 Where projects apply methodologies that permit the project proponent to choose a third-party default factor or standard to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality, such default factor or standard shall meet the requirements set out in the VCS Methodology Requirements.	All default values applied by the project activity have been verified to be sourced from either methodology ACM0010 (version 08.0) or tools referenced, which meet the requirements set out in the VCS Methodology Requirements. Therefore, this criteria is applicable.
	3.1.7 Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.	This is the validation of the project activity. The Project is not rejected by other GHG programs. A declaration/31/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/

		As verified, the project activity is in compliance with the rules and requirements in the VCS Program. Therefore, this criteria is applicable.
	3.1.8 Where projects apply methodologies from approved GHG programs, they shall conform with any specified capacity limits (see the VCS Program Definitions for the definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools referenced by the methodology under those programs.	This is the validation of the project activity. The Project is not rejected by other GHG programs. A declaration/31/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/ Besides, as per methodology ACM0010 (version 08.0) and it applicable tools, no capacity limit has been required. Therefore, this criteria is applicable.
	3.1.9 Where Verra issues new VCS Program rules, the effective dates of these requirements are set out in Appendix 3 Document History and Effective Dates or equivalent for other program documents, and are listed in a companion Summary of Effective Dates document which corresponds with each update.	As verified, all updates in VCS Standard version 4.7 has been applied. Therefore, this criteria is applicable.
AFOLU project eligibility, if applicable	N/A as this is not a AFOLU project.	
Transfer project eligibility, if applicable	N/A as this is not a Transfer project.	

Project design	N/A as this is not a grouped project.
Project ownership	To verify that the proposed project has been authorized by the relevant government authorities, CTI independently assess objectively obtained evidence of Land lease agreement and Environmental Impact Assessment (EIA): 1.Land lease agreement has a direct confirmation from Baoshan City Longyang District Xiyi Township People's Government. CTI contacts the relevant government authority and receives a reply: The government department has confirmed that the ownership of the land use rights for the project site located in Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province, P.R. China, is held by PP (Baoshan East Hope Animal Husbandry Co., Ltd.). The reply is not in English, so an English translation by a certified, independent translator are provided as separate attachments. 2.Environmental Impact Assessment (EIA) as the public record can be acquired on the official website of Baoshan Municipal Ecology and Environment Bureau: https://www.baoshan.gov.cn/info/7430/3498384.htm The independent review conducted by CTI concluded that the assessment and prediction of its environmental impacts of the proposed project involved a total 1 set of new animal waste management system (AWMS) to treat the manure from a new-built swine farm have been approved by Baoshan Municipal Ecology and Environment Bureau. The record is not in English, so an English translation by a certified, independent translator are provided as separate attachments. Via checking the Business License /4/, EIA Approval /6/, the construction contracts/9/, equipment purchase contracts /7/, it is confirmed the Project Proponent has the ownership of the project, and they have the legal right to control and operate project activity and has full legal and beneficial title to all of the GHG reductions generated by the project. .
Project start date	By checking the Daily operation record of treatment plant/27/ and on-site interview, the assessment team confirmed that the project activity started operation on 25-08-2023. This date signifies when the project began avoiding manure

	treatment in uncovered anaerobic lagoons and started generating emission reductions. Therefore, the assessment team confirmed that the project start date was 25-08-2023.
Project crediting period	PP has chosen the fixed ten years of crediting period, 25-08-2023 to 24-08-2033, which is in line with the concept for crediting period in section 3.9.1 of the VCS Standard version 4.7.
Project scale	As the estimated annual average GHG emission reductions per year is 49,328 tCO_2e, which is lower than 300,000 tCO_2e, the project classified as "Project" under VCS standard version 4.7.
Likelihood of achieving estimated GHG emission reduction or removals	The estimated annual average GHG emission reductions per year is 49,328 tCO_2e.

Year	Estimated GHG emission reductions or removals (tCO_2e)
25-08-2023 - 31-12-2023	17,434
2024	49,328
2025	49,328
2026	49,328
2027	49,328
2028	49,328
2029	49,328
2030	49,328
2031	49,328
2032	49,328
01-01-2033 - 24-08-2033	31,894
Total estimated ERs	493,280
Total number of crediting years	10
Average annual ERs	49,328

Through checking emission reductions calculation spreadsheets/2/ provided by PP, the assessment team confirmed the calculation of the estimated GHG emission reductions of the project activity is correct.

Technologies and measures implemented by the project activity or activities	By checking EIA/6/ and on-site inspection against the applied technology by the project, it was confirmed that the project is implemented by Baoshan East Hope Animal Husbandry Co.,

	Ltd. which aims to install 1 set of new AWMS at a new-built swine farm in Yunnan Province. This system will treat the manure and wastewater from the swine farm to avoid methane emissions generated in the baseline uncovered anaerobic lagoons. The AWMS has been installed in the swine farm to treat the manure and wastewater from the 57,534 heads of market swine. The raw materials, such as swine manure and wastewater, are collected into waste collecting tanks and are first separated by solid-liquid separators. The solid waste is treated in a passive windrow composting system to produce organic fertilizer base materials for land use. The liquid waste undergoes anaerobic digestion, and the biogas produced in the process is either recovered and combusted to generate electricity for the AWMS's operation or directly flared. The digestate produced by the anaerobic digestion is also treated in passive windrow composting system, and the effluents from the anaerobic digestion is used for liquid fertilizer land application. The anaerobic digestion system employs anaerobic lagoons covered with High-Density Polyethylene (HDPE) geomembranes, which have integrated biogas storage capabilities, to process swine manure. The biogas produced by the anaerobic digester, after desulphurization and purification, is directed to a biogas generator for utilization or is directly combusted through a flare. The sludge generated by the anaerobic digester undergoes aerobic composting before being used for land application. The effluent produced by the anaerobic digester is used as liquid fertilizer for land application. The project is expected to handle 26,718 tons of manure annually, producing $6.04\times10^4 m^3$ of biogas annually. The project site is equipped with biogas utilization equipment and flare, so $6.04\times10^4 m^3$ biogas will be recovered and combusted for electricity generation for the operation of the AMWS, while the remaining biogas will be flared (if there is surplus biogas or in case of the biogas generator failing to operate). Through site visit, checking Equipment purchase contracts/7/, Construction contract/9/, Technical agreement

of main equipment/11/, Technical flow chart/13/ and nameplate of the equipments /20/, the assessment team confirmed that the project activity installs anaerobic animal manure management system, biogas pre-treatment system, digestate advanced treatment unit, electricity generation system and emergency flare system. The main technical parameters were confirmed as follows:

Swine Farm Name	Wangzhai Swine Farm
Livestock population	Market Swine:57,534
Treatment of capacity of AWMS(m^3/a)	30000
Baseline anaerobic lagoon	
Size of baseline anaerobic lagoon (m^3)	90m × 85m × 6m
Technical life	Not less than 20 years
Underfloor pit storage	
Size of underfloor pit storage(m^3)	100m×60m×5m
Design height (m)	5
Technical life (year)	Not less than 20 years
Solid-liquid separators	
Type	QX-120TS
Power(KW)	3
Lifetime	Not less than 20 years
Anaerobic digester	
Design capacity (m^3)	20000

Anaerobic technology	Black membrane biogas digester
Stay time (day)	40
Fermentation temperature (℃)	30~35
Equipment Quantity	2
Equipment technical life	Not less than 20 years
Flared system	
Type	YHHJ-250
Treatment capacities (m^3/h)	250
Power (KW)	6
Height (m)	3.6
Equipment Quantity	1
Equipment technical life	Not less than 20 years
Generator sets	
Type	YC6K350N-D30
Rated power(kw)	235
Rated capacity(kwa)	250
Rated current (A)	360
Rated speed (r/min)	1500
Equipment	1

	<table><tr><td>Quantity</td><td></td></tr><tr><td>Equipment Technical life</td><td>Not less than 20 years</td></tr><tr><td colspan="2">Desulfurization tower</td></tr><tr><td>Type</td><td>YTQ-7018</td></tr><tr><td>Design working pressure (KPa)</td><td>2</td></tr><tr><td>Desulfurization efficiency</td><td>99%</td></tr><tr><td>Treatment capacities (m^3/h)</td><td>50</td></tr><tr><td>Quantity</td><td>1</td></tr><tr><td>lifetime</td><td>Not less than 20 years</td></tr><tr><td colspan="2">Dehydration tower</td></tr><tr><td>Type</td><td>ZFQ-6014</td></tr><tr><td>Design working pressure (KPa)</td><td>2</td></tr><tr><td>Dehydration efficiency</td><td>90%</td></tr><tr><td>Treatment capacities (m^3/h)</td><td>40</td></tr><tr><td>Quantity</td><td>1</td></tr><tr><td>lifetime</td><td>Not less than 20 years</td></tr></table> .
Implementation schedule of the project activity or activities	By checking the commencement report/87/, it can be confirmed that the construction of the swine farm and the AWMS started on 01/10/2021 simultaneously. By checking the completion report, it can be confirmed that the swine farm was officially put into operation on 25/06/2023. By checking the Daily operation record of treatment plant/27/ and on-site interviews, the assessment team confirmed that the AWMS started treating manure on the farm on 25/08/2023, thus the project's start date is 25/08/2023.
Project location	The project is located in Wangzhai Village, Xiyi Township, Longyang District, Baoshan City, Yunnan Province,P.R China.

	The geographical coordinate is 99°16′32″E and 24°56′15″N. The location of the project site was validated through on-site inspection and the coordinates were validated on-site by online GPS map and checking the KML/108/.
Conditions prior to project initiation	Through a review of the PD/1/, approved EIA report/6/, and on-site interviews with the PP, CTI confirmed that the project is a greenfield facility. In the absence of the project, the swine farm's animal waste would be disposed of in an uncovered anaerobic lagoon without a methane capture facility, resulting in the direct release of methane into the atmosphere. This constitutes the baseline scenario for the project. More details on the validation process for the baseline scenario can be found in section 3.3.4 of this report. Therefore, the baseline situation is consistent with the circumstances before the project activity was carried out. And via site inspection and checking the approved EIA/6/, Equipment purchase contracts/7/, Construction contract/9/ and Technical agreement of main equipment/11/, it is verified that all the equipment involved in AWMS covered by the project were newly built and there was no existing manure management system prior to the project activity hence no existing equipment in baseline scenario. Therefore, the project is confirmed not to be implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.
Project compliance with applicable laws, statutes and other regulatory frameworks	By checking laws and regulations/96/, i.e. Environmental Protection Law of the People's Republic of China; Law of Solid Waste Pollution Prevention and Control; Regulations on the Prevention and Control of Pollution from Livestock and Poultry Scale Breeding; Administrative Licensing Law of the People's Republic of China; Law of the People's Republic of China on Environmental Impact Assessment; Regulations on Environmental Protection Management of Construction Projects. All these policies have been included in the PD and verified to be correct. Besides, the project obtained the compulsory approval from the local government, i.e. EIA Approval/6/, which means that the project is in line with the national and local laws and regulations based on the local expertise of the assessment team.
Double counting and participation under other GHG programs	**Projects registered (or seeking registration) under other GHG program(s)** The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program. The declaration /31/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

	- http://cdm.unfccc.int/ - http://www.goldstandard.org/ **Rejection by other GHG programs** The project is not rejected by other GHG programs. A declaration/31/ for the same is checked and found correct by the assessment team. Also, assessment team checked the following registries to confirm the same. The details of the registries checked are as follows: - http://cdm.unfccc.int/ - http://www.goldstandard.org/ - http://verra.org/
No double claiming with emissions trading programs or binding emission limits	China has a national emissions trading scheme only cover the high-emission industries, such as energy (electricity and heat) generation sector that emitted at least 26,000 tons of CO_2e/year which has been validated by checking "Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management"/113/ issued by National Development and Reform Committee of P. R. China. By checking "Notice on Key Work Related to the Management of Greenhouse Gas Emission Reports for Enterprises in 2022"/114/ issued by Ministry of Ecology and Environment of P.R.China, it was confirmed China has a national emissions trading scheme only covering thermal energy (electricity and heat) generation industry. In addition, there are 7+1 Pilot ETSs in China, which include Beijing city, Shanghai city, Tianjin city, Chongqing city, Shenzhen city, Guangdong province, Hubei province and Fujian province. Hence, Yunnan Province is not a Pilot ETS, Therefore, it is confirmed the project activity is not included in the mandatory emission control scheme and thus no emission cap was enforced for the project activity and it is confirmed that the emission reductions will not be double counted. The declaration regarding the project/31/ is submitted by PP which is acceptable to the assessment team. The assessment team confirms that the net GHG emission reductions or removals generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits. The assessment team checked the relevant laws, statutes, and other regulatory, and found that there is no market-based tool like ETS in the European Union aiming at GHG emission reductions in China. Thus, the assessment team concluded that the project activity will not be involved on other Emissions trading programs and other binding limits.
No double claiming with other forms of environmental credit	The project has no intention to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program. The declaration regarding the project/31/ is submitted by PP

	which is acceptable to the assessment team.
Supply chain (Scope 3) emissions double claiming	As verified, the project activity installs 1 set of new AWMS at a new-built swine farm in Yunnan Province to treat the manure and wastewater from the swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation or flaring, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. The generated electricity is only for internal use for AWMS operation, not supplied to local power grid, which does not happen in a supply chain. Therefore, it is confirmed the Supply Chain (Scope 3) Emissions are not applicable for the project activity.
Sustainable development contributions	By checking China's National Plan on Implementation of the 2030 Agenda for Sustainable Development and 17 SDGs defined by UNDP, and interviewing with stakeholders during site visit, it is confirmed that the project activity would contribute sustainable development in the region in following aspects, which has been confirmed by site visit: • SDG 8: the project activity increases long term employment opportunities for the management, operation and maintenance of the power plant. Thus, the project will achieve Target 8.5 (Indicator 8.5.2: Unemployment rate, by sex, age and persons with disabilities) under SDG 8 "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all". By checking Employee Roster/111/, it was confirmed the project activity increases 5 long term employment opportunities (including 3 male and 2 female) for the management, operation and maintenance of the AWMS since the project start date. • SDG 12: the project uses swine manure as ferment material to produce organic fertilizer. Thus, the project will achieve Target 12.5 (Indicator 12.5.1: National recycling rate, tons of material recycled) under SDG 12 "Ensure sustainable consumption and production patterns". By checking EIA/6/, it was confirmed the project activity will produce 18,000 tons of organic fertilizer anually, which can be monitored and recorded in the Operation logs/112/ and sales records and receipt vouchers for organic fertilizer/59/. • SDG 13: the project will achieve GHG emission reductions of approximately 49,328 tCO_2e/year during the whole crediting period. Thus, the project will achieve Target 13.2 (Indicator: 13.2.2 Total greenhouse gas emissions per year) under SDG 13 "Take urgent action to combat climate change and its impacts".
Additional information relevant to the project	• Leakage management for AFOLU projects According to the methodology, the leakage of the project is zero, thus the leakage management is not applicable to the project.

	• Commercially sensitive information No commercially sensitive information has been excluded from the public version of the project description. • No additional relevant information that may have a bearing on the eligibility of the project, the reductions or removals, or the quantification of the project's reductions or removals.

3.2 Safeguards and Stakeholder Engagement

3.2.1 Stakeholder Engagement and Consultation

3.2.1.1 Stakeholder Identification

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Stakeholder identification	The assessment team has checked the PD and confirm that the stakeholder identification has been conducted as per the VCS standard version 4.7. People or groups who might be impacted by a project, including residents mainly in nearby village, staff from swine farm and the project activity. Therefore, residents nearby the project site, all staff (e.g. workers, farmers, experts and management personnel, unspecified) including males and females worked for swine farm and the project activity, and local authority (Baoshan Municipal Ecology and Environment Bureau), are identified as stakeholders of this project activity.
Legal or customary tenure/access rights	By checking the approved EIA/6/, the land rights certification/116/, land lease agreement/123/ and on-site verification, CTI has confirmed that the type of land use in the project area is non-basic farmland, non-industrial and mining area, non-ecological public welfare forest, and it is not within the urban planning area, which is in line with being a swine farm. Through checking the land lease agreement/96/ and on-site verification, it can be confirmed that the right to use the project area belongs to village collectives, and that they granted the right to use the land to PP for a period of 20 years(01/08/2020-31/07/2040) with compensation, which can cover the whole crediting period. By checking the purchase contracts of the equipment/7/, the assessment team confirmed that the project proponent has the legal right to control and operate all the equipment and facilities of project activity that generates GHG emission reductions. By checking Baoshan City Government Website/119/ and via onsite interview with government officials, it is verified that there have been no conflicts related to land tenure or access to resources in the project region. By checking Business License/4/, EIA Report and its approval/6/ and via onsite interviews, it was verified the project and Baoshan East Hope Swine Farm where the animal manure was collected

	belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. swine manure. Therefore, it was verified the project activity does not violate any legal or customary tenure/access rights to territories and resources, including collective and conflicting rights, held by stakeholders, indigenous people (IPs), local communities (LCs), and customary rights holders.
Stakeholder diversity and changes over time	As justified above, the stakeholders identified by PP includes residents nearby the project site, all staff (e.g. workers, farmers, experts and management personnel, unspecified) including males and females worked for swine farm and the project activity, and local authorities. The same has been confirmed through checking Local Stakeholder Consultation Questionnaires/29/ in 10/02/2021. Therefore, the assessment team deemed stakeholder diversity in the aspects of culture, society, economy has been considered by PP. Also, considering the identification of stakeholders by PP are very comprehensive, the assessment team deemed the make-up of stakeholders would not change overtime.
Expected changes in well-being	PP states that the implementation of the project will have a positive impact on the well-being and other characteristics of stakeholders. The project will result in the following changes compared to the baseline scenario: Villagers' well-being: By checking the EIA Report and its approval/6/ and on-site interviews, it can be confirmed that the surrounding villagers receive and use free organic fertiliser. This will positively affect crop yield and quality. Social welfare:By checking information such as labour contracts/33/, Monthly salary slips for employees/34/, the assessment team confirmed that the implementation of the project will promote local economic development, provide employment opportunities and contribute to the prosperity of the rural economy. Environmental well-being: By checking the EIA Report and its approval/6/ and the site visit, the assessment team confirmed that the project activity reduces the GHG emissions from the uncovered anaerobic lagoons in the baseline scenario by capturing and destroying methane. Climate change Impact: By checking the EIA Report and its approval/6/, equipment contracts /7/, operation logs/112/ and site visits, the assessment team confirmed that the project activity has had a positive impact on the atmospheric environment and cropland ecosystem through the installation of a new AWMS to generate electricity and organic fertiliser at a new-built swine farm. Therefore, the project is expected to improve local environment,

	increase clean electricity supply and provide work opportunities.
Location of stakeholders	As justified above, residents nearby the project site, all staff worked for (in the location of) Baoshan East Hope Swine Farm and the project activity, and local authorities, are identified as stakeholders of this project activity, which is considered to be reasonable by the assessment team.
Location of resources	By checking EIA Approval/6/, it is confirmed the project activity has been approved by local government. By checking Business License /4/, EIA Approval /6/, the construction contracts/9/, equipment purchase contracts /7/, it is confirmed that PP has the legal right to use swine manure. Therefore, it is confirmed that territories and resources occupied by the project does not affect those of stakeholders own or to which they have customary access.

3.2.1.2 Stakeholder Consultation and Ongoing Communication

<table>
<tr><th>Item</th><th>Evidence gathering activities, evidence checked, and assessment conclusion</th></tr>
<tr><td>Stakeholder engagement process</td><td>As per the VCS requirements, it is necessary to invite the relevant stakeholders, prior of the validation process. CTI checked the relevance of the date during the validation site visit. By checking the Notice about Stakeholders Consultation/29/, Minutes of stakeholder meetings/29/, Local Stakeholder Consultation Records/29/, CTI confirmed that a local stakeholder consultation meeting before project construction was held for the project.
<table>
<tr><td>Project activity instance</td><td>Meeting date</td><td>Meeting Location</td></tr>
<tr><td>Baoshan East Hope Swine Farm AWMS GHG Mitigation Project</td><td>10/02/2021</td><td>company office of Baoshan East Hope Animal Husbandry Co., Ltd.</td></tr>
</table>
Via interviewing stakeholders during site visit and by checking Notice about Stakeholders Consultation/29/, it was verified the project information with contact information were published on the bulletins at and nearby the project site on 03/02/2021 to invite Local stakeholders. To contact the local government officials the project proponent made direct phone calls. 30 survey questionnaires has been distributed to relevant personnel of Baoshan East Hope Swine Farm, local villagers and government officials by the project owner on 10/02/2021. The survey questionnaire was designed to assess the project impacts on the local environment and social economic development.</td></tr>
<tr><td>Consultation outcome</td><td>30 questionnaires has been distributed to collect the relevant</td></tr>
</table>

	comments and suggestions on 10/02/2021, which have been checked by the assessment team. The survey had a 100% response rate (30 questionnaires returned out of 30). By checking the Local Stakeholder Consultation Records and questionnaires/29/, as well as interviewing with the PP and local stakeholder, CTI assessment team confirm that the local stakeholder has no negative comments for the construction of the project. Thus no need to change the project design based on the stakeholder inputs.
Ongoing communication	By checking the grievance book/117/ and Monitoring Manual/120/, it is confirmed that the project proponent has established an ongoing communication mechanism to regularly conduct stakeholder consultations after the project comes into operation. This mechanism includes collecting feedback through surveys, phone calls, etc., issuing questionnaires, and addressing questions from various stakeholders in order to understand their opinions and regularly report back to company management. To ensure ongoing communication, the villagers in the nearby area have been informed by the Wangzhai Village Committee. This has been confirmed through interviews with stakeholders during VVB's site visits.
Stakeholder input	Via site inspection and checking all the questionnaires/29/ and grievance book/117/, CTI confirmed that no grievances or comments have been received from the project since its commencement of operation. And by interviewing Mr. Yang Shanchuan, the officer of Local Ecology and Environment Bureau, it was confirmed that the local authority also conducts spot checks on the implementation of the project at periodic intervals as per relevant regulations/96/ and the local authority also didn't have negative perceptions about the project.

3.2.1.3 Free, Prior, and Informed Consent

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Obtaining consent	The assessment team has checked the EIA Report and its approval/6/ from local government, and can confirm that every aspect of environmental impact has been considered in the Environmental Impact Assessment with corresponding measures during project development, and no net harm has been detected. By checking Business License /4/, EIA Report and its approval/6/, and via onsite interviews, it was verified the project and Baoshan East Hope Swine Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e.

	swine manure. Via interviewing the local stakeholders and staff from local Ecological Environment Bureau, and confirms that there do not exist any ongoing or unresolved conflicts.
Outcome of FPIC discussion	By checking EIA Report and its approval/6/ and interviewing the local stakeholders, the assessment team can confirm that the project obtained the approval letters from governmental authorities and there do not exist any ongoing or unresolved conflicts. By checking the approved EIA/6/, the land rights certification/116/, land lease agreement/123/ and on-site validation, CTI confirmed that the land users of the project site have authorized the PP to take the land use right. Therefore, the project does not involve land encroachment, non-consensual resettlement of residents and forced relocation. By checking Employee Roster/111/, it was confirmed the project activity increases 5 long term employment opportunities for the management, operation and maintenance of the power plant. In conclusion, the assessment team confirmed the project has not encroached on land, relocated people without consent, and forced physical or economic displacement.

3.2.1.4 Grievance Redress Procedure

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Development process	In order to resolve complaints relating to the project, the project has established a complaint resolution process with stakeholders to ensure fair, transparent and timely processing. Through interviews with project managers and via checking Local Stakeholder Consultation Records/29/, Grievance book/117/, Monitoring Manual /120/, CTI confirmed that the steps PP has developed in collaboration with stakeholders to resolve grievances are fair and reasonable: 1. Receiving Complaints: Any complaints relating to the project will be received and recorded. The Project owner has placed a Grievance book/117/ at the guard of the project site and posted contacts and posted the contact person and contact information for stakeholders to submit complaints either in writing or through a designated contact person. 2. Hearing: Upon receipt of a complaint, PP will schedule a hearing or meeting for stakeholders to express their views and concerns. This will provide an open platform to ensure that all relevant information

	is fully considered. 3. Response: Following the hearing or meeting, PP will provide a written response confirming that the stakeholder's complaint has been understood and documented, and explaining the action PP will take. This will ensure transparency and continuity of communication. 4. Complaint resolution: PP will use its best efforts to resolve the complaint within a reasonable time. This may include adopting appropriate conflict resolution methods such as mediation, negotiation or other appropriate solutions. PP will work with stakeholders to ensure they are satisfied with the solution.
Grievance redress procedure	The Grievance redress procedure/117/ established by PP consists of 3 stages, 1.PP shall attempt to resolve the complaint amicably and shall provide a written reply; 2. Complaints that cannot be settled through friendly negotiation shall be mediated by a third party; 3. Complaints that cannot be resolved by mediation shall be submitted to a) arbitration to the extent permitted by the law of the relevant jurisdiction, or b) to the competent court of the relevant jurisdiction, without prejudice to the ability of a party to submit a complaint to a competent supranational adjudicatory body, if any. Through review of Local Stakeholder Consultation Records/29/, Grievance book/117/ and Monitoring Manual /120/, CTI confirmed that the Grievance redress procedure established by PP is fair and reasonable. Via interviewing the specific team in charge of recording and collecting conflicts and grievances of local communities during site visit, it was verified no grievance has been received for the operation of this project activity.

3.2.1.5 Public Comments

Comments received	Actions taken by the project proponent	Evidence gathering activities, evidence checked, and assessment conclusion
No comment has been received	N/A	N/A

3.2.2 Risks to Local Stakeholders and the Environment

3.2.2.1 Management Experience

As confirmed with the project proponent during site visit, no new entity is involved in project design or implementation. By checking Business License/4/ and public information of PP/5/, it was verified the PP has rich experience in adopting AWMS to treat swine manure and realise the resourceful use of waste. In addition, PP operates a number of large-scale swine farms throughout China and has a mature farm management system. Therefore, the audit team deemed PP has expertise or experience in implementing similar project activities and engaging communities.

On-site training for the related procedures including monitoring, recording and reporting was verified to be in place and their implementation was confirmed by interview with the key operators and observing the operation. Monitoring Manual /120/ and Competence and training records/129/ of on-site personnel engaged in measurement of parameters were presented and found to be in order.

Besides, the consultancy party, i.e. Xi'an Carbon Neutral Environmental Technology Co., Ltd., has successfully developed emission reductions and/or removals projects under the VCS program and fully understands the requirements of the standard as well as the validation process.

3.2.2.2Risk Assessment

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Natural and human-induced risks to stakeholders' wellbeing	By checking EIA Report and its approval/6/ issued by Baoshan Municipal Ecology and Environment Bureau, it is confirmed the project has been approved by Chinese government, in this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The project activity uses AMWS to treat the swine manure, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. And PP provides villagers with free liquid digestate fertilize. Therefore, the assessment team deemed the project activity minimizes odour at the livestock farm, which improves the working environment of the workers. By checking Employee Roster/111/, it was verified the project offers job opportunities for local residents. Therefore, it was verified no natural or human induced risks

	to stakeholders' well being have been identified.
Risks to stakeholder participation	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The assessment team confirmed that as per Measures for Public Participation in Environmental Impact Assessment /130/, the government gives the legal right to the project proponent to access the stakeholders and consider their advice. Therefore, it is confirmed no risks has been identified to stakeholder participation.
Working conditions	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. The project activity uses AMWS to treat the swine manure, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. And PP provides villagers with free liquid digestate fertilize. Therefore, the assessment team deemed the project activity minimizes odour at the livestock farm, which improves the working environment of the workers. By checking EIA Report/6/, it was confirmed the project proponent has established and improved the safety production responsibility system; formulated safety production rules and regulations and operating procedures; formulated and implemented the safety production education and training plan. These measures ensure the effective implementation of safety production investment, eliminate safety hazards in time, and carry out the standardization construction of safety production. The same has been confirmed during site visit. Therefore, the assessment team deemed the staff from the project are working in safety working environment. And no risks identified for working conditions.
Safety of women and girls	As mentioned above, the project has been approved by Chinese government. In this sense, the project meets all the requirement of regulation and laws set up by Chinese government in aspect of environment, health and safety. In order to protect the physical and mental health of minors, China issued "Prohibition of Child Labor Regulations"/133/, prohibiting employers from recruiting minors under the age of 16. Also, China published "Law of the People's Republic of China on the Protection of Women's Rights and Interests"

	/131/ and "Law of the People's Republic of China on the Protection of Minors"/132/. Therefore, the Project will not expose women and girls to further risks or hazards. By checking Employee Roster/111/ and interviewing staff from PP, it was verified no girls have been recruited, also equal payment has been made to women and men. Therefore, it is confirmed no risks has been exposed to safety of women and girls.
Safety of minority and marginalized groups, including children	China has strict prohibition for child labour. Thus, the project does not involve child labour neither in construction nor at operation of project activity. In the HR policy is also mentioned that no child labour will be entertained. The same was confirmed by the assessment team through checking Employee Roster/111/ and on site interview. Besides, in order to protect the physical and mental health of minors, the State Council promulgated the "Prohibition of Child Labor Regulations" /133/, prohibiting employers from recruiting minors under the age of 16. By checking Employee Roster/111/ and on site interview, the assessment team was able to confirmed that no Minors under the age of 16 were employed.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials, and chemical pesticides and fertilizers)	The air pollution, noise, wastewater and solid wastes caused by project construction have been treated according to the measures in EIA Report/6/. The EIA Report has been approved by local government/6/. Via site investigation, interviewing stakeholders, as well as checking EIA Report and its approval/6/, it was verified the following key aspects have been addressed: **Air Quality** During the construction period, PP adopted a number of integrated management measures to minimise the environmental impacts of dust and emissions during construction. The results of the management have been verified by checking the completion and acceptance report/84/. During the operation period, the air pollution mainly includes the exhaust gas from the anaerobic fermentation system, biogas generator, biogas heat boiler, the emergency flare. The exhaust gas is to be treated through 2 stage purification equipment before being discharged through exhaust funnels with a height of 15 m. The H_2S, NH_3 and odorous substance in all the exhaust gas by the project can meet the requirements of Table 2 standard limit of the "Odorous Pollutant Emission Standard" (GB14554-1993). The SO_2, NO_x, and particulate matter in all the exhaust gas by the project meets Grade 2 emission standard of "Integrated Emission Standard of Air Pollutants" (GB16297-1996).

Therefore, the emission of exhaust gas and dust has little impact on surrounding environment.

Wastewater

During the construction period, wastewater includes construction wastewater, domestic sewage and surface runoff. By checking the completion and acceptance report/84/, it can be confirmed that all wastewater is recycled and does not cause water pollution.

During the operation period, the wastewater is mainly domestic sewage and biogas slurry from anaerobic digesters. The domestic sewage of the project is pre-treated in a septic tank and reused in anaerobic digesters. During onsite inspection, it was confirmed the biogas slurry will be directly returned to nearby farmland as fertilizer. No wastewater will be discharged to the environment.

Noise

During the construction period of this project, reasonably arrange the construction process, and prohibit the operation of high-noise equipment at night; reasonably arrange the time, and prohibit the construction from 12:00 to 14:00 and from 22:00 to 6:00 the next day.

During the operation period, the high noise equipment of the project mainly consists of various mechanical operation and vibration. All production equipment has been placed in the workshop or steel container, and measures i.e. sound insulation, vibration reduction, noise elimination, greening and distance attenuation, have been taken to reduce the noises to acceptable range. The noise at the plant boundary can meet the requirements of Class II standard of the "Emission Standard for Industrial Enterprises Noise at Boundary" (GB12348-2008).

Solid Waste

During construction, solid waste was recycled timely and disposed of centrally.

During the operation period, the solid waste of the project is mainly domestic garbage and Hazardous waste. Domestic waste will be collected, cleaned and disposed by the local sanitation department. The other general industrial solid wastes are regularly removed by the qualified company, the storage of general industrial solid wastes can meet the requirements of "Standard for pollution on the storage and disposal site for general industrial solid wastes" (GB18599-2001).

The project site has set up a hazardous waste collection site, and by checking Hazardous Waste Transfer Records /37/, it was verified the hazardous waste collected is disposed by the qualified company. Therefore, it was confirmed the storage and disposal of hazardous waste meet the requirements of "Standard for pollution control on

	hazardous waste storage" (GB18597-2001/2013 version). In conclusion, after the above measures are performed, the negative impacts on environment will be minimized below the requirements of laws and regulations during the construction and operational period.

3.2.3 Respect for Human Rights and Equity

3.2.3.1 Labor and Work

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Discrimination	China has published "Labor Law"/134/ and "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /131/ and "the Special Provisions on Labor Protection for Women Workers"/135/, which could prohibit such phenomena. It has been confirmed during onsite inspection and interviews that project proponent strictly obeys the anti-discrimination rules set out in the law. No discrimination has occurred or will occur.
Sexual harassment	It has been confirmed during onsite inspection and interviews that project proponent strictly obeys the anti-discrimination rules set out in the law. No sexual harassment has occurred or will occur.
Equal pay for equal work	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. "Law of the People's Republic of China on the Protection of Women's Rights and Interests" /131/, "Labor Law"/134/, "Labor Contract Law of the People's Republic of China" /136/ and "the Special Provisions on Labor Protection for Women Workers"/135/. Besides, China also ratified relevant ILO core conventions on equality, namely Equal Remuneration Convention (Convention No 100)/137/. In total 5 employees (including 3 male and 2 female) are hired working for the project. The PP employ 2 female staff responsible for project management. By checking Labor Contracts/33/ and interviewing staff from the project proponent during site visit, it was validated male and female employees enjoy equal pay for equal work.
Gender equity in labor and work	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. "Law of the People's Republic of China on the Protection of Women's Rights and Interests"/131/, "Labor Contract Law of the People's Republic of China" /136/ and "the Special

	Provisions on Labor Protection for Women Workers"/135/. Besides, China also ratified relevant ILO core conventions on equality, namely Equal Remuneration Convention (Convention No 100)/137/. In total 5 employees (including 2 female staff) are hired working for the project. By interviewing staff from the project proponent during site visit, it was validated male and female employees enjoy equity in labor and work.
Forced labor	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China /45/, and there is no forced labor.
Child labor	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China /134/, "Law of the People's Republic of China on the Protection of Minors"/132/ and "Prohibition of Child Labor Regulations"/133/. Besides, no child labor was identified from the Employee Roster/111/.
Human trafficking	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labor Law of the People's Republic of China/134/, and there is no human trafficking.

3.2.3.2 Human Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
N.A.	It has been confirmed during onsite inspect and interviews that project proponent strictly obeys the law, i.e. Labour Law of in line with People's Republic of China/134/ and the legal rights and interests of all employees are protected. No indigenous peoples or tribal peoples are treated differently from the majority of local people. As justified above, stakeholders have been consulted before construction of the project activity. Besides, PP has set up grievance redress procedure to solve any grievance from local stakeholders. Therefore, the assessment team deemed PP respects human rights of stakeholders.

3.2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion

N.A.	It has been confirmed during onsite inspect and interviews that no cultural heritage involved. Therefore, preservation and protection of cultural heritage is not applicable.

3.2.3.4 Property Rights

Risks identified	Evidence gathering activities, evidence checked, and assessment conclusion
N.A.	It has been confirmed during onsite inspect and interviews that there does not exist no identified stakeholders legally own or use Baoshan East Hope Swine Farm. By checking Business License /4/, EIA Report and its approval/6/, and via onsite interviews, it was verified the project and Baoshan East Hope Swine Farm where the animal manure was collected belongs to the same party. Therefore, the assessment team deemed the project activity has the access right of land and resource, i.e. swine manure. Therefore, the project activity does not violate rights to territories and resources and respect proper rights.

3.2.3.5 Benefit Sharing

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Process used to design the benefit sharing plan	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.
Summary of the benefit sharing plan	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.
Approval and dissemination of benefit sharing plan	Not applicable as the no benefit sharing event is involved in the project, which has been confirmed during onsite interviews.

3.2.4 Ecosystem Health

Item	Evidence gathering activities, evidence checked, and assessment conclusion
Impacts on biodiversity and ecosystems	The project activity installs 1 set of new animal waste management system (AWMS) to treat the manure at a new-built swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for

	electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. By checking EIA Report /6/ approved by government and via on site investigation, it is confirmed the project does not alter biodiversity and is not located in high conservation value areas, and there are no rare and valuable plant and animal species. Therefore, it is confirmed the project activity does not adversely impacted habitats for rare, threatened, or endangered species during the monitoring period.
Soil degradation and soil erosion	The project activity installs 1 set of new animal waste management system (AWMS) to treat the manure at a new-built swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility. During site visit, it is confirmed the an HDPE geomembranes- enclosed anaerobic digester as part of its AWMSs applied by the project activity is designed enclosed, no directly contact with soil. By checking EIA Report /6/ approved by government, it is confirmed the project will not cause soil degradation and soil erosion during its lifetime. By checking public reporting/138/, it was identified in traditional agricultural production, livestock and poultry manure is the best natural fertilizer, which can be directly absorbed by crops through anaerobic fermentation and harmless treatment, and also has a good effect on improving land fertility. Therefore, it is confirmed the project does not adversely impacted soil during the monitoring period.
Water consumption and stress	The project activity installs 1 set of new animal waste management system (AWMS) to treat the manure at a new-built swine farm, of which the main purpose is to collect and destroy the biogas generated from the anaerobic digester for electricity generation, avoiding the emission of methane that would be emitted to the atmosphere directly without any methane recovery and destruction facility.

	By checking EIA Report /6/ approved by government and via site investigation, it is confirmed the project will use less water in the biogas pre-treatment system. Circulating water would be used by biogas combustion facility for cooling, which will not cause water consumption stress. Therefore, it is confirmed the project activity will not cause water consumption stress.

3.2.4.1 Rare, Threatened, and Endangered species

Risk identified	Evidence gathering activities, evidence checked, and assessment conclusion
Species and habitat	Not applicable. By checking EIA Report and its approval/6/ and via interviewing with stakeholders, it is confirmed that the project does not involve habitats for rare, threatened, or endangered species.
Areas needed for habitat connectivity	Not applicable. By checking EIA Report and its approval/6/ and via interviewing with stakeholders, it is confirmed the project does not involve habitats for rare, threatened, or endangered species and will not impact areas needed for habitat connectivity.

3.2.4.2 Introduction of Species

Species introduced	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	Not applicable. By checking EIA Report and its approval/6/ and via interviewing with stakeholders, it is confirmed that the project does not involve any existing invasive species.

Existing invasive species	Evidence gathering activities, evidence checked, and assessment conclusion
N/A	Not applicable. By checking the EIA Report and its approval/6/ and via interviewing with stakeholders, it is confirmed that the project does not involve any existing invasive species.

	Evidence gathering activities, evidence checked, and assessment conclusion

Invasive species	Not applicable. By checking the EIA Report and its approval/6/ and via interviewing with stakeholders, it is confirmed the project does not involve existing invasive species.

3.2.4.3 Ecosystem conversion

Risks Identified	Evidence gathering activities and evidence checked
Ecosystem conversion	Not applicable as the project is not a ARR, ALM, WRC or ACoGS project.

3.2 Application of Methodology

3.2.1 Title and Reference

The approved consolidated methodology applied in the project activity is ACM0010 “GHG emission reductions from manure management systems (version 08.0)” /63/.

This methodology also refers to the latest approved version of the following tools and guidelines:

Tool 02 Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0) /64/

Tool 05 Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 03.0) /65/

Tool 06 Project emissions from flaring (Version 04.0) /66/

Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0) /67/

Tool 08 Tool to determine the mass flow of a greenhouse gas in a gaseous stream (version03.0) /68/

Tool 14 Project and leakage emissions from anaerobic digesters (Version 03.0) /69/

Tool 24 Common practice (Version 03.1) /70/

Tool 27 Investment analysis (Version 14.0) /71/

3.2.2 Applicability

Demonstration regarding the applicability of the methodology, and any tools selected by the project proponent as provided in below table.

Table 3-1 Assessment of Applicability conditions of ACM0010 (Version 08).

No.	Criteria	Validation Assessment	Conclusion
1	This methodology applies to	Upon reviewing the approved EIA /6/,	Applicable

No.	Criteria	Validation Assessment	Conclusion
	project activities that include destruction of methane emissions and displacement of a more GHG-intensive service in manure management of livestock farms by introducing a new animal waste management system or a combination of animal waste management systems that result in less GHG emissions.	examining related equipment purchase contracts /7/, and conducting on-site inspections, CTI validation team confirmed that the project activity employs an HDPE geomembranes- enclosed anaerobic digester as part of its AWMSs to treat manure waste at a new-built swine farms located in Baoshan City, Yunnan Province, P.R China. This new AWMS facility is designed to prevent methane emissions typically associated with uncovered anaerobic lagoons. Its primary object is to capture biogas. The project either harnesses the produced biogas to generate electricity for operation of AWMS or flares it directly. Therefore, it is confirmed that this criterion is applicable.	
2	This methodology is applicable to manure management on livestock farms where the existing anaerobic manure treatment system, within the project boundary, is replaced by one or a combination of more than one animal waste management systems (AWMSs) that result in less GHG emissions compared to the existing system. The methodology is also applicable to Greenfield facilities.	Upon reviewing the approved EIA /6/, Swine Farm construction contract/114/, examining related equipment purchase contracts /7/, and conducting on-site inspections, CTI validation team confirmed that this project is a Greenfield project, one set of new AWMS installed in a new-built swine farm to treat the manure and wastewater from the swine farm to avoid methane emissions generated in the baseline uncovered anaerobic lagoon in a swine farm respectively that result in less GHG emissions compared to the traditionnal system. Therefore, it is confirmed that this criterion is applicable.	Applicable
3	This methodology is applicable to manure management projects under the following conditions: (a) Farms where livestock populations, comprising of cattle, buffalo, swine, sheep,	a. Via site inspection and checking the approved EIA for the swine farm /10/, Animal Epidemic Prevention Certificate issued by the local government /10/ furthermore via checking the public information of the project owner/5/ and based on the local expertise of validation team, CTI confirmed that all the	Applicable

No.	Criteria	Validation Assessment	Conclusion
	goats, and/or poultry, is managed under confined conditions; (b) Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries); (c) In case of anaerobic lagoons treatments systems, the depth of the lagoons used for manure management under the baseline scenario should be at least 1 m; (d) The annual average ambient temperature at the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C; (e) In the baseline case, the minimum retention time of manure waste in the anaerobic treatment system is greater than one month; (f) The AWMS(s) in the project case results in no leakage of manure waste into ground water, for example the lagoon should have a non-permeable layer at the lagoon bottom.	livestock population in the new-built livestock farm are captive breeding, which is managed under confined conditions. Therefore, condition (a) is applicable. b. All the swine manure is dumped into AWMS and are not discharged into natural water resources. This is verified by checking the approved EIA /6/ and related "Regulations on Prevention and Control of Pollution from Livestock and Poultry Farming"/98/. Therefore, condition (b) is applicable. c. Section 3.4 of the PD describes the baseline scenario for manure treatment on the new swine farm as an uncovered anaerobic lagoon. And the depth of the open lagoons used for manure management under the baseline scenario is 3~6 meters higher than 1m. This is verified by checking the national standard "Technical Specification for Wastewater Treatment Engineering (CJJT54-2017)"/15/. Therefore, condition (c) is applicable. d. The annual average temperature in Baoshan City, Yunnan Province, where anaerobic manure treatment facility in baseline scenario is located is 15.7°C which is higher than 5°C. This is verified by checking the public information of local temperature /88/. Therefore, condition (d) is applicable. e. In the baseline scenario the retention time of manure waste in the uncovered anaerobic lagoons is 180 days. This is verified by site visits with environmental officials and reviewing the 'Technical Guide for the Construction of Manure Treatment Facilities in Livestock and Poultry Farms' jointly issued by the Office of the Ministry of Agriculture and Rural Affairs and the Office of the Ministry of Ecology and Environment on June 24/06/2022 /16/.	

No.	Criteria	Validation Assessment	Conclusion
		Therefore, condition (e) is applicable. f. By checking EIA Report /6/ and interview PP during site visit, it is confirmed that a non-permeable layer was placed at the bottom of the anaerobic digester. Therefore, the AWMS in the project case results in no leakage of manure waste into ground water and condition (f) is applicable.	
4	In addition, the applicability conditions included in the tools referred to below apply.	Refer to below assessments.	Applicable
Conclusion: Methodology ACM0010 (Version 08) is applicable to the project activity.			

Applicability conditions of "Tool 02: Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0)

Applicability criteria	Justification of the project situation
The tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established.	Baseline scenario and additionality of this project activity will be justified based on this tool. Refer to section 3.3.4 and 3.3.5 of this report for details.

Applicability conditions of "Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)

Applicability criteria	Justification of the project situation
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not	By checking the approved EIA/6/ and Electricity bill /109/ of the project activity, the validation team confirmed that the project activity will use electricity from China Southern Power Grid (CSPG), which falls under scenario A. Therefore, emissions related to electricity consumption need to be calculated.

operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	
This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	By checking the approved EIA/6/ of the project activity, Power wiring diagram/110/, and via on-site inspection, the validation team confirmed that the project activity generates electricity, but not supplying electricity to CSPG. The electricity generated by the project activity is prioritized for the normal operation of AWMS Therefore, Scenario II is applicable.
This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.	Via checking the ER/2/ calculation process, it is confirmed that Tool 05 is used to calculate project emissions of electricity consumption supplied by CSPG. Only CO_2 emissions will be accounted. Therefore, this criterion is applicable.

Applicability conditions of Tool 06 “Project emissions from flaring” (Version04.0)

Applicability criteria	Justification of the project situation

This tool provides procedures to calculate project emissions from flaring of a residual gas. The tool is applicable to enclosed or open flares and project participants should document in the CDM-PDD the type of flare used in the project activity.	By checking the purchase contracts of main equipment /7/ and via on-site inspection, all instances within the project have installed the open flare system at the project site. Hence this criteria is applicable for this project activity.
This tool is applicable to the flaring of flammable greenhouse gases where: (a) Methane is the component with the highest concentration in the flammable residual gas; and (b) The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	Methane is the component with the highest concentration in the biogas (methane accounts for 60% of the biogas) flared in the project which has been confirmed by site inspection and checking the approved EIA /6/. Hence this criteria (a) is applicable for this project activity. Through onsite inspection and the interview with project staff, and checking the approved EIA /6/, the purchase contracts of main equipment /7/, construction contracts of AWMS /9/, it has been confirmed that the biogas produced by the anaerobic digester is used by biogas generators to generate electricity. Any surplus biogas (if any) will be flared. Hence this criteria (b) is applicable for this project activity.
The tool is not applicable to the use of auxiliary fuels and therefore the residual gas must have sufficient flammable gas present to sustain combustion. For the case of an open flare, there shall be operating specifications provided by the manufacturer of the flare.	The project does not use auxiliary fuels which has been confirmed by site inspection of the project implementation and checking the approved EIA /6/, the Operation Log /27/. Hence this criteria is applicable for this project activity.

Applicability conditions of Tool07 "Tool to calculate the emission factor for an electricity system" (Version 07.0)

Applicability criteria	Justification of the project situation
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	By checking the approved EIA /6/ of the project activity, Power wiring diagram/110/, and via on-site inspection, the validation team confirmed that the project activity generates electricity to AWMS, but not supplying electricity to CSPG. Therefore, this criterion is not applicable.

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	By checking the approved EIA reports /6/ and Electricity bill/109/, CTI confirmed that electricity from CSPG is consumed by the project activity. The emission factor for the project electricity system (CSPG) can be calculated for grid power plants only. Therefore, this criterion is applicable.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	By checking the approved EIA reports /6/ and Electricity bill/109/ and through site inspection, CTI confirmed the project electricity system is located in Yunnan Province, P.R. China, which is not an Annex I country. Therefore, this criterion is not applicable.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The project activity uses electricity comes only from CSPG. The latest available emission factor of CSPG issued by China DNA on 08/07/2024 was used to calculate emissions. No biofuel is involved in the grid. Therefore, this criterion is not applicable.

Applicability conditions of Tool 08: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)

Applicability criteria	Justification of the project situation
Typical applications of this tool are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions.	By reviewing the approved EIA reports /6/ and the purchase contracts of main equipment /7/, it has been confirmed that the project activity involves the use of biogas generated from anaerobic digestion for either electricity generation or flaring. For ex post emission reduction calculation, this tool will be applied. Therefore, this criterion is applicable.

Methodologies where CO_2 is the particular and only gas of interest should continue to adopt material balances as the means of flow determination and may not adopt this tool as material balances are the cost effective way of monitoring flow of CO_2.	The project activity applies ACM0010 (Version 08). By checking the approved EIA reports /6/ and through on-site inspection, it is confirmed that the biogas (mainly CH_4) is captured from anaerobic digester and CO_2 is not the particular or only gas of interest. Therefore, this criterion is applicable.
The underlying methodology should specify: (a) The gaseous stream the tool should be applied to; (b) For which greenhouse gases the mass flow should be determined; (c) In which time intervals the flow of the gaseous stream should be measured; and (d) Situations where the simplification offered for calculating the molecular mass of the gaseous stream (equations (3) or (17)) is not valid (such as the gaseous stream is predominantly composed of a gas other than N_2).	The project activity adopts ACM0010: (a) the amounts of total biogas generated by anaerobic digestion, biogas used for electricity generation and biogas flared are all determined using the tool; (b) CH_4 is the greenhouse gas that the mass flow should be determined; (c) The mass flow should be calculated on an hourly basis for each hour h in year y; (d) The gaseous stream is dry and related equations have been used to calculate the mass flow of greenhouse gas. Therefore, this criterion is applicable.

Applicability conditions of “Tool 14: Project and leakage emissions from anaerobic digesters” (Version 02.0)

Applicability criteria	Justification of the project situation
The following sources of project emissions are accounted for in this tool: (a) CO_2 emissions from consumption of electricity associated with the operation of the anaerobic digester; (b) CO_2 emissions from consumption of fossil fuels associated with the operation of the anaerobic digester; (c) CH_4 emissions from the digester (emissions during maintenance of the digester, physical leaks through the roof and side walls, and release through safety valves due to excess pressure in the digester); and (d) CH_4 emissions from flaring of biogas.	By checking EIA Report/6/, the purchase contracts of main equipment /7/ and during on site inspection, it is confirmed that the project emissions sources of the project activity have been taken into account: (a) CO_2 emissions from consumption of electricity associated with the operation of the anaerobic digester; CH_4 emissions from the digester (c); CH_4 emissions from flaring of biogas(d) . And by reviewing the approved EIA reports /6/, the purchase contracts of main equipment /7/ and Technical agreement of main equipment/11/, it is verified that the project's anaerobic digesters do not involve the use of fossil fuels, so criterion (b) does not applicable. Hence this criterion is applicable for this project activity.
The following sources of leakage emissions are accounted for in this tool: (a) CH_4 and N_2O emission from composting of digestate; (b) CH_4 emissions from the anaerobic decay of digestate disposed in a	After anaerobic digestion, the sludge from anaerobic treatment and the solid manure separated through solid-liquid separation will be treated in aerobic composting system to produce

SWDS or subjected to anaerobic storage, such as in a stabilization pond.	organic fertilizer base materials which has been confirmed by site inspection of the project implementation and checking the approved EIA /6/. And CH_4 and N_2O emission from composting of digestate will be considered and calculated together with the project emission from composting of solid manure according to ACM0010. Thus, (a) is applicable. By site inspection, CTI confirmed that there was no additional storage yard to store the digestate produced from anaerobic digestion. The leakage emissions associated with the anaerobic digester should not be taken into account for this project. Thus, (b) is not applicable. Hence this criterion is applicable for this project activity.
Emission sources associated with N_2O emissions from physical leakages from the digester, transportation of feed material and digestate or any other on-site transportation, piped distribution of the biogas, aerobic treatment of liquid digestate and land application of the digestate are neglected because these are minor emission sources or because they are accounted in the methodologies referring to this tool.	N_2O emissions are neglected because these are minor emission sources via checking the applied methodology.

Applicability conditions of Tool 24 "Common practice" (Version 03.1)

Applicability criteria	Justification of the project situation
This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.	The project activity applies the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality" that use the common practice test for the demonstration of additionality. Therefore, this criterion is applicable.

Applicability conditions of Tool 27 Investment analysis" (version 13.0)

Applicability criteria	Justification of the project situation
This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", the guidelines "Non-binding best practice examples to demonstrate additionality for SSC project activities", or baseline and monitoring methodologies that use the investment analysis for the demonstration of	The project activity applies "Combined tool to identify the baseline scenario and demonstrate additionality" which uses investment analysis for the demonstration of additionality and the identification of the baseline scenario. Therefore, this criterion is applicable.

additionality and/or the identification of the baseline scenario.	

3.2.3 Project Boundary

As per ACM0010, the spatial extent of the project boundary encompasses the site of the AWMS(s), including the flare or energy and/or heat generation equipment and the power/heat source.

Therefore, for the project activity, the project boundary includes anaerobic animal manure management system (HDPE geomembranes enclosed anaerobic digester), the biogas generator, the emergency flare, and CSPG.

As per ACM0010, the sources and GHG gases involved for the project activity are as below:

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from the waste treatment processes	CH_4	Yes	The major source of emissions in the baseline
		N_2O	Yes	Direct and indirect N_2O emissions are accounted
		CO_2	No	CO_2 emissions from the decomposition of organic waste are not accounted
	Emissions from electricity consumption/ generation	CO_2	No	The project does not provide electricity for profitable use to displace electricity that would be generated by fossil-fuel power in the baseline scenario.
		CH_4	No	The project does not provide electricity for profitable use to displace electricity that would be generated by fossil-fuel power in the baseline scenario.
		N_2O	No	The project does not provide electricity for profitable use to displace electricity that would be generated by fossil-fuel power in the baseline scenario.
	Emissions from thermal energy generation	CO_2	No	The project does not use biogas for heating.
		CH_4	No	The project does not use biogas for heating.
		N_2O	No	The project does not use biogas for heating.
Project	Emissions from the waste treatment processes	N_2O	Yes	As per ACM0010, project N_2O emissions, including direct and indirect N_2O emissions, have been accounted for the project activity.
		CO_2	No	As per ACM0010, CO_2 emissions from the decomposition of organic waste are not accounted.
		CH_4	Yes	As per ACM0010, the emission from anaerobic digesters and aerobic treatment have been

Source		Gas	Included?	Justification/Explanation
				accounted for the project activity.
	Emissions from on-site electricity use	CO_2	Yes	The project emissions from electricity consumption has been accounted.
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Emissions from thermal energy use	CO_2	No	This project does not use thermal energy.
		CH_4	No	This project does not use thermal energy.
		N_2O	No	This project does not use thermal energy.

3.2.4 Baseline Scenario

The PP has applied an approved baseline and methodology ACM0010, version 08.0 which is approved under CDM scheme.

The PD applies the stepwise approach as given by section 5.2 of the ACM0010 /63/ and "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0)/64/.

Step 1: Identification of alternative to the project activity consistent with current laws and regulations

Step 1a: Define alternative scenarios to the project activity

Baoshan East Hope Swine Farm was equipped with anaerobic digester & aerobic composting system during construction, rather than building uncovered anaerobic lagoons for manure treatment. Therefore, this project does not fall under the 'replacing' category in the ACM0010 /63/ but belongs to the 'Greenfield facilities' type. According to the applied methodology, for Greenfield facilities, for the baseline alternatives for managing the manure, PP has listed the complete set of possible manure management systems listed in the 2019 Refinement to the IPCC 2006 Guidelines for National Greenhouse Gas Inventories (Volume 4, Chapter 10, Table 10.17) which is confirmed consistent with the IPCC/43/, and possible combinations of animal manure management systems have been taken into account.

No further scenario is considered reasonable under the given context. The alternatives are assessed by validation team as below

No.	IPCC Alternatives	Justification
1	The manure is collected from the pasture/Range/Paddock	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 1 means "the manure from pasture and range grazing animals is allowed to lie as deposited, and is not managed".

		By checking the approved EIA /6/ and through on-site inspection, CTI Validation Team confirmed that all the swine in the new-built swine farm are captive breeding, which is managed under confined conditions. Therefore, Scenario 1 is excluded.
2	Daily spread: Manure removed from confinement and applied to pasture within 24 hours of excretion	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 2 means "Manure is routinely removed from a confinement facility and is applied to cropland or pasture within 24 hours of excretion". By checking the approved EIA /6/ and interviewing with PP and on-site investigation, it is considered that for a large-scale swine farm, it is highly labor intensive to routinely remove manure from a confinement facility and apply manure in cropland or pasture within 24 hours of excretion. Therefore, Scenario 2 is excluded from economically attractive prospect.
3	Solid Storage: The manure is disposed by solid storage.	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 3 means "the storage of manure, typically for a period of several months, in unconfined piles or stacks. Manure is able to be stacked due to the presence of a sufficient amount of bedding material or loss of moisture by evaporation". By checking the approved EIA /6/ and via on-site investigation, it is validated that the swine farms where the the manure is from incorporate the use of leaky board and it is not possible to store manure for such a period of time in unconfined piles or stacks. Therefore, Scenario 3 is excluded.
4	Dry lot	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 4 means "a paved or unpaved open confinement area without any significant vegetative cover where accumulating manure may be removed periodically. Dry lots are most typically found in dry climates but also are used in humid climates". By checking the approved EIA /6/ and via on-site investigation, it is validated that all the livestock population in the livestock farm are captive breeding, which is housing in barns. A paved or unpaved open confinement area without any significant vegetative cover is not applicable for the condition of farm in either dry or humid climates and thereby Scenario 4 is excluded.

5	The manure is disposed as liquid/slurry.	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 5 means “Manure is stored as excreted or with some minimal addition of water in either tanks or earthen ponds outside the animal housing, usually for periods less than one year”. By checking the approved EIA /6/ and via on-site investigation, it is validated that the amount of manure waste from 57,534 heads of market swine (annually) are very huge, even on a daily basis. Via interviewing with PP and on-site investigation, it is considered that for a large-scale swine farm, it is highly labor intensive and unlikely to routinely remove such huge amount of manure stored in either tanks or earthen ponds and apply this manure in cropland or pasture. Therefore, the Scenario 5 is considered not realistic for the project located farm and excluded.
6	Uncovered anaerobic lagoon	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 6 means “a type of liquid storage system designed and operated to combine waste stabilization and storage. Lagoon supernatant is usually used to remove manure from the associated confinement facilities to the lagoon. Anaerobic lagoons are designed with varying lengths of storage (up to a year or greater), depending on the climate region, the volatile solids loading rate, and other operational factors. The water from the lagoon may be recycled as flush water or used to irrigate and fertilize fields”. Via site interview with chief and staff in swine farms and reviewing the nation standard/15/, /16/, /94/, CTI confirmed that this is a kind of harmless treatment of manure as per the “Technical specification for sanitation treatment of livestock and poultry manure”/93/ which means the animal waste that has been treated by uncovered anaerobic lagoon can satisfy the above regulations. In addition, according to the public information issued by Yunnan Provincial Bureau of Ecology and Environment/144/ and through literature review/145/, it can be confirmed that in the baseline scenario, it is common practice for more than 70% of livestock farms in Yunnan Province to treat manure directly in uncovered anaerobic lagoons, without solid-liquid separation. Comparing with the project activity, swine manure through solid-liquid separation is aerobically composted and anaerobically digested respectively,

		which can improve the utilisation of the manure. So, the uncovered anaerobic lagoon is an alternative baseline scenario.
7	Pit storage below animal confinements, <1month	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 7 means "Collection and storage of manure usually with little or no added water typically below a slatted floor in an enclosed animal confinement facility, usually for periods less than one year". By checking the approved EIA /6/ and via on-site investigation, it is validated that the amount of manure waste from 57,534 heads of market swine (annually) are very huge and is impossible to be pit stored under the barns. A lot of labor work is needed to remove the manure stored under the barns within a month. For storage under the barns longer than a month, the excreted volume accumulated under the barns will produce enteric fermentation gas which is toxic for pigs. Therefore, Scenario 7 is not realistic for the project located farm and thereby excluded.
	Pit storage below animal confinements,>1month	
8	Anaerobic digester (Anaerobic digester & Aerobic Composting system)	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 8 means "Animal excreta with or without straw are collected and anaerobically digested in a large containment vessel or covered lagoon. Digesters are designed and operated for waste stabilization by the microbial reduction of complex organic compounds to CO_2 and CH_4, which is captured and flared or used as a fuel". Anaerobic digester is an advanced manure management system that is used by the project activity. The captured biogas is used for either electricity generation or flaring, avoiding methane emissions. Scenario 8 faces high investment and operational cost, and results in investment barrier (refer to section 3.3.4 of this report for justification of financial analysis) compared with uncovered anaerobic lagoon. However, Scenario 8 does not violate laws and regulations and thereby Scenario 8 is an alternative scenario.
9	Burned for fuel	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 9 means "The dung and urine are excreted on fields. The sun dried

		dung cakes are burned for fuel". Via site interview with the staff in swine farms and reviewing the national standard /96/, CTI confirmed that this method is not suitable for such large-scale swine farms that generate too much dung and urine daily, which hard to dry and burned for fuel. This alternative is ruled out.
10	Cattle and Swine deep Bedding, <1month Cattle and Swine deep Bedding, >1month	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 10 means "As manure accumulates, bedding is continually added to absorb moisture over a production cycle and possibly for as long as 6 to 12 months. This manure management system also is known as a bedded pack manure management system and may be combined with a dry lot or pasture". Through interviewing with PP, it is confirmed that deep bedding is counter to achieving economies of scale associated with large animal counts. The concentration of gas in the bedding is toxic enough for pigs if not properly disposed. Also, high temperature and humidity are conducive to the survival and reproduction of pests and microorganisms. Therefore, Scenario 10 is excluded.
11	Composting - In-vessel	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 11 means "Composting, typically in an enclosed channel, with forced aeration and continuous mixing". By checking the publice information/151/ and the approved EIA/6/ and via on-site investigation, it is validated that composting in vessels requires high-cost reactors, aeration systems, and control systems, along with a continuous power supply to maintain aeration and environmental conditions. Compared to Scenario 14 requiring minimal equipment and only a simple site, Scenario 14 can result in significant savings costs. And Scenario 11 is suitable for treatment of solid manure, not applicable for manure with larger volume of water. Therefore, Scenario 11 is excluded.
12	Composting - Static pile	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 12 means "Composting in piles with forced aeration but no mixing". Via checking the publice information/151/ and the approved EIA /6/ and on-site inspection, CTI confirmed that composting in Static pile requires forced aeration, meaning equipment such as fans, aeration pipes and control systems must be installed,

		resulting in higher investment costs. And the manure in this project is in liquid with large volume of water will consume a great deal of electricity for forced aeration as the large quantity of swine manure. Compared to Scenario 14 where infrequent turning for mixing and aeration is required, Scenario 14 can result in significant savings in electricity costs., hence this alternative is not economically attractive. This alternative is ruled out.
13	Composting - Intensive windrow	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 13 means "Composting in windrows with regular (at least daily) turning for mixing and aeration". Via checking the publice information/151/ and the approved EIA /6/ and on-site inspection, CTI confirmed that composting in intensive windrow requires regular (at least daily) manual or mechanical turning to introduce oxygen for aerobic composting. Compared to Scenario 14 where infrequent turning for mixing and aeration is required, Scenario 14 can result in significant savings in electricity costs., hence this alternative is not economically attractive. This alternative is ruled out.
14	Composting – Passive windrow (Anaerobic digester & Aerobic Composting system)	As per 2019 Refinement to the IPCC 2006 guideline, Scenario 14 means "Composting in windrows with infrequent turning for mixing and aeration, with runoff/leaching.". By checking the approved EIA /6/ and via on-site investigation, it is validated that the amount of manure waste from 57,534 heads of market swine (annually) are very huge, even on a daily basis. By checking the approved EIA /6/ and via on-site investigation, it is confirmed that the waste from swine farms, after undergoing anaerobic digestion, is separated into solid digestate and liquid digestate by solid-liquid separation equipment. The solid digestate portion still needs further treatment to meet the requirements for factory discharge or reuse. Therefore, it is feasible to treat the solid digestate by aerobic composting, which generated by the anaerobic digestion tanks; Scenario 14 serves as a low-cost composting solution fro digest solids that is integrated into the combined treatment process. Thus, it is selected as the composting component within this combined system of project activity due to its significant cost advantages when processing the digestate that ha already been converted into a solid state. Scenario 14 is considered as an alternative option used in conjunction with Scenario 8.

		In addition, by checking public information/118/, the combined anaerobic digester and aerobic composting system is one of the most advanced fertiliser management systems, but with significant investment and operating costs. Therefore, it can be confirmed that the proposed project will not be invested and constructed without being registered as a VCS project.
15	Poultry manure with litter	Via site inspection, CTI confirmed that only large-scale swine farms involved in the project, no Poultry farm.
16	Poultry manure without litter	
17	Aerobic treatment	As per 2019 Refinement to the IPCC 2006 guideline, Scenario17 means "The biological oxidation of manure collected as a liquid with either forced or natural aeration. Natural aeration is limited to aerobic and facultative ponds and wetland systems and is due primarily to photosynthesis. Hence, these systems typically become anoxic during periods without sunlight". By checking the approved EIA /6/ and via on-site investigation, it is confirmed that the project treats mixed manure with a high solids content. Given that this method is suitable for treating liquid manure, it is not suitable for manure with a high solids content. Therefore, Scenario 17 is excluded.

Hence, based on above assessment, CTI confirmed that the remaining realistic and credible alternative scenarios for the new animal waste management system are:

Scenario 6: "The manure is disposed in an uncovered anaerobic lagoon"

Scenario 8&14: "Anaerobic digester & Aerobic Composting system i.e., the proposed project activity not being registered as a VCS project activity"

Outcome of Step 1a:

Based on the justification provided earlier, the list of plausible alternative scenarios to the project activity includes Scenario 6 and Scenarios 8 & 14 for the treatment of animal manure.

Step 1b: Consistency with mandatory applicable laws and regulations

Via searching the public website with laws and regulations in Yunnan Province and China by CTI, it is confirmed that there is no legal law and regulation to mandate the livestock farm owners to implement anaerobic digestion reactor, aerobic or other biological treatment techniques to treat the animal manure in China. And via checking the "Regulations on Prevention and Control of Pollution from Livestock and Poultry Farming"/98/ and "Technical specification for sanitation treatment of livestock and poultry manure"/97/, CTI confirmed that the manure is prohibited to discharge directly into

environment without any treatment and the uncovered anaerobic lagoon is a kind of manure treatment method recognized by the state.

Besides, the "Specifications for the construction of manure resource utilization facilities for large-scale livestock and poultry farms (for trial implementation)"/98/ has been checked and CTI confirmed that anaerobic digester, aerobic treatment or other biological treatment techniques methods to dispose manure waste are encouraged by the state but not mandatory.

As assessed above, CTI confirmed that the above options of Scenario 6 and Scenario 8 & 14 are considered to follow all mandatory applicable legal and regulatory requirements which are verified based in validation team's local expertise. The outcome of Step 1b is same to Step 1a.

Step 2: Barrier analysis

Based on above assessments, it is concluded that both the two alternatives have no technology barriers, acceptability barriers and financial barriers. Therefore, both alternatives come to Step 3.

3.2.5 Additionality

As per section 3.14.1 of VCS Standard, version 4.7: "*The project shall demonstrate regulatory surplus at validation*", the project proponent has stated in Section 3.5 of PD that the project is not mandated by any law, statute, or other regulatory framework in the host country i.e., in China. CTI has checked the relevant laws and regulations/96/ regarding livestock and manure treatment in China:

- *Prevention and Control of Pollution from Livestock and Poultry Farming issued by the State Council in Nov.2013;*
- *Technical specification for sanitation treatment of livestock and poultry manure issued by the State Administration for Market Regulation in Dec.2018;*
- *Specifications for the construction of manure resource utilization facilities for large-scale livestock and poultry farms (for trial implementation) issued by Ministry of Agriculture and Rural Affairs in Jan.2018;*
- *Technical specification for pollution control on the composting of biowaste;*
- *Law of the People's Republic of China on the Prevention and Control of Solid Waste Inducing Environmental Pollution*
- *Regulations on Prevention and Control of Pollution from Livestock and Poultry Farming on a Large Scale*

CTI confirmed that the manure is prohibited to discharge directly into environment without any treatment and uncovered anaerobic lagoon is the manure treatment method recognized by the state, while anaerobic digester, aerobic treatment or other biological treatment techniques methods to dispose manure waste are only encouraged by the state but not mandatory. And the state encourages

and supports the recycling of biogas and it is not mandatory. Therefore, there is no legal law and regulation to mandate the livestock farm owners to implement the project activity.

Additionality for the project activity is demonstrated using Tool 02 "Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)". Step 1 and Step 2 have been finished in Section 3.3.4 .

Step 3: Investment analysis

The purpose of this step is to determine which one is economic attractive.

The proposed project will generate revenue from organic fertilizers sales, not only from VERs, so the simple cost analysis method is not appropriate. The investment comparison analysis method (option II) applies to projects whose alternatives are also investment projects. Only on such a basis, comparison analysis can be conducted. Therefore, CTI has confirmed that the investment comparison analysis method (option II) selected for this project is appropriate.

As per paragraph 25 in section 4.4 of Tool 02 of Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0). Identify the financial indicator, such as IRR, NPV, cost benefit ratio, most suitable for the project type and decision-making context. Since there are no potential revenues involved in the baseline scenario, the economic comparison between project and baseline scenario should be based on the Net Present Value (NPV) indicator. According to Tool 27 (Version 02.0), paragraph 8, discount rate used in investment comparison analysis shall be determined following the requirements as set out in Section 6 of this tool for IRR benchmark. Via checking the "notice on adjusting financial benchmark rate of return of construction projects in some industries" issued by NDRC and the ministry of housing and urban-rural development of PRC in 2013/47/, CTI confirms the discount rate applies the equity IRR benchmark (after tax) of 9.5% in animal husbandry, and it is deemed appropriate as the benchmark supplied by national authorities that is in compliance with the requirement of Section 6 of Tool 27. Moreover, via searching the public information from NDRC and the ministry of housing and urban-rural development of PRC and based on the local expertise of VVB, there is no update to the version since issued in 2013. Therefore, it is confirmed that the discount rate is reasonable for the project and still valid when the PP conducted investment decision.

Crosscheck of input parameters

The parameters used in the financial calculations have been validated based on a review of the sources presented in the PD, including: the approved EIA reports /6/. The approved EIA reports /6/ of the project activity was completed by a qualified third-party designing institute. Among these, the completion time for the EIA report is finalized in 03/2021. The investment decision made by the PP was on 21/04/2021 which is the earliest signing date of an AWMS construction contract/53/. The time period is less than 2 months, therefore it's unlikely that the input values have significantly changed.

CTI validation team compared the values stated in the PD with values determined in the equipment purchase contract/7/ and General design and construction contract/9/, and was able to confirm that the input values are applied correctly in the PD.

The basic parameters of the uncovered anaerobic lagoon

Main Parameters		Unit	Value	10,000 CNY	Source	Crosscheck reference
	1 Basic parameter					
1.1	uncovered anaerobic lagoon volume	m^3	45,900		Calculated according to Design specifications for wastewater storage facility of animal farm (GB/T 26624-2011) requirements/139/	EIA report/6/ NPV calculation sheet /3/
	2 Investment					
2.1	Total investment	10,000 CNY	55.08			
2.1.1	Uncovered anaerobic lagoon volume	m^3	45,900		Calculated according to Design specifications for wastewater storage facility of animal farm (GB/T 26624-2011) requirements/139/	EIA report/6/ NPV calculation sheet /3/
2.1.2	Earth moving prices	CNY/m^3	12		Unit price of construction project in 2023/146/	NPV calculation sheet /3/
2.2	Construction period	Year	1		Data sources refer to the financial data in EIA/6/	NPV calculation sheet /3/
2.3	Operation period	Year	20		Data sources refer to the financial data in EIA/6/	NPV calculation sheet /3/
	3 Cost					
3.1	Annual O & M cost	10,000 CNY		10.99	EIA/6/	
3.1.1	Salary and welfare	10,000 CNY		10.58	EIA/6/	
	Employee number	Number	1		Analogy of the same industry situation	/
	Salary	10,000 CNY	7.5		Data sources refer to the financial data in EIA/6/	labor contracts/33/ payroll /34/
	Welfare	%	41%		Data sources refer to the financial data in EIA/6/	labor contracts/33/ payroll /34/

3.1.2	Annual Land cost	10,000 CNY		0.42		
3.1.2.1	Annual land price	CNY/m^2	0.54		Land lease contract/123/	/
3.1.2.2	Uncovered anaerobic lagoon area	m^2	7650		7650(=90*85) m^2, calculated according to Design specifications for wastewater storage facility of animal farm (GB/T 26624-2011) requirements/139/	EIA report/6/ NPV calculation sheet /3/

The main parameters of the Anaerobic Digester-Aerobic Treatment.

Main Parameters			Unit	Value	Source	Crosscheck reference
Total statistic investment			10,000 CNY	900	EIA/6/	Equipment purchase contract/7/ General design and construction contract/9/
Current capital			10,000 CNY	20	EIA/6/	Financial audit report/128/
Annual O&M cost	Total		10,000 CNY	160.21	EIA/6/	/
	Annual material cost		10,000 CNY	60	EIA/6/	Operation and maintenance cost statistics in 2024/58/ Industrial Producer Ex-factory Price Classification Index published by the National Bureau of Statistics/103/
	Annual Electricity Fee	Total	10,000 CNY	17.64	Calculated	Operation and maintenance cost statistics in 2024 /59/
		Electricity consumption	10,000 kwh	40.94	EIA/6/	Technical agreement of main equipment/11/
		Electricity price(With	CNY / kwh	0.430875	EIA/6/	Notice on Matters Relating to Transmission and Distribution Tariffs and

		VAT)				Sales Tariffs of Yunnan Power Grid for 2020-2022 issued by Yunnan Development and Reform Commission on 30/11/2020/105/
	Annual salary and welfare		10,000 CNY	52.88	Calculated	Employment contracts/33/ Payroll /34/
	Average annual maintenance expenses		10,000 CNY	27	EIA/6/	China Planning Press - Financial Evaluation Practice and Analysis of Difficult Problems-Feasibility study and evaluation of Bank loan projects /126/
	Average annual insurance expenses		10,000 CNY	2.7	EIA/6/	Compilation method of municipal engineering investment estimation issued by Ministry of Construction of China/91/
Annual sales of organic fertilizer	Total		10,000 CNY	216	EIA/6/	Sales records and receipt vouchers for organic fertilizer/59/
	Annual sales volume of organic fertilizer		ton	18000	EIA/6/	Organic Fertiliser Sales Agreement/59/
	price of organic fertilizers		CNY	120	EIA/6/	Price of organic fertilizer derived from the research report/141/
Construction period			Year	1	EIA/6/	EPC contract/53/
Operation period			Year	20	EIA/6/	Purchase contracts of main equipment/7/
Rate of residual value			%	5%	EIA/6/	Enforcement Regulation of Income Tax Law of the People's Republic of China for Enterprises/54/ Financial audit report /128/
VAT rate (Equipment & Material)			%	9%	EIA/6/	Financial audit report /128/
VAT rate (Revenue)			%	0%	EIA/6/	"Announcement on Relevant Policies on Deepening Value-added Tax Reform (Ministry of Finance General Administration of Taxation

				General Administration of Customs Announcement No. 39 of 2019)" effective from 20/03/2019/50/ Announcement of the State Administration of Taxation on the Clarification of the Implementation Standards for Organic Fertiliser Products/115/ Financial audit report /128/
Income tax rate (first 3 operation years)	%	0%	EIA/6/	Income Tax Law of the People's Republic of China or Enterprises /101/ Financial audit report /128/
Income tax rate (4-6 operation years)	%	12.5%		
Income tax rate (the rest operation years)	%	25%		
Urban maintenance and construction tax	%	5%	EIA/6/	Interim Rules on Additional Tax for City Development /105/ Financial audit report /128/
Surtax for education	%	3%	EIA/6/	Provisional Regulations of the People's Republic of China on Education tax /106/ Financial audit report /128/
Emission reduction	tCO_2e	49,328	ER spreadsheet	/
VCU Price	CNY/ton	18	Expected	Public information/147/

The accuracy and suitability of the input values for the investment analysis were crosschecked as below:

Baseline scenario:

Total static investment: 55.08×10^4 CNY

Based on the NPV calculation sheet /3/, it is established that the total static investment consists of the construction costs of the uncovered anaerobic lagoons. The total static investment of the assumption baseline scenario is calculated by design volume and earthmoving prices (the construction cost = design volume * cost per cubic meter), therefore, the investment cost is about 550,800 CNY(= 45,900 m^3 × 12 CNY/m^3). Via reviewing the EIA report/6/, and onsite inspection, CTI validated the baseline scenario (uncovered amerobic lagoon) is not existing. Via checking the NPV calculation sheet /3/, the volume of the assumption baseline scenario is 45,900(= 90m × 85m × 6m)m^3, which is compliance

with “Design specifications for wastewater storage facility of animal farm (GB/T 26624-2011)”/139/. Via checking the Unit price of construction project in 2023/140/, CTI confirmed that the unit construction cost, 12 CNY/m^3, adopted by PP and the total static investment value for baseline scenario is deemed reasonable.

O&M cost: 10.99×10^4 CNY

a)Employee salary and welfare : 10.58×10^4 CNY/ year,

Since there is no need to build sewage treatment equipment for the assumption uncovered anaerobic lagoon, because it is leak-proof and the manure is stored for more than 30 days before being returned to the field which is in compliance with Technical specification for sanitation treatment of livestock and poultry manure”/15/ and the “Specifications for the construction of manure resource utilization facilities for large-scale livestock and poultry farms (for trial implementation)/60/. The total O&M cost of the baseline scenario includes staff salaries and land lease costs. As the management of baseline scenario is much simpler than project management, it is confirmed as reasonable and conservative to have one staff members in the baseline scenario as well as the project.

Employee salaries is calculated by the employee salaries per person and the number of employees. For baseline scenario, wages refer to the value of project activity. Via checking the EIA/6/ and the NPV calculation sheet /3/, the salary and welfare of the farm is verified as 10.58*10^4 CNY per year per person. Thus, total employee salaries is calculated as 10.58*10^4×1 CNY/person per year. CTI has confirmed that the calculation formula is correct and the employee salaries in baseline scenario is appropriate.

b)Land cost : 0,42×10^4 CNY/ year,

Annual land cost was calculated by 0,42×10^4 CNY/ year=7650 m^2* 0.54 CNY/m^2 year. According to the requirements of the Design Code for Wastewater Storage Facilities on Animal Farms (GB/T 26624-2011)/139/, it is confirmed that the uncovered amerobic lagoon for the hypothetical baseline scenario covers an area of 7,650 (= 90m × 85m)m^2. By checking the EIA/6/ and Land lease contract/123/ and via onsite interview with village collectives, it is verified that the annual land lease price per square metre is 0.54 CNY/m^2. Therefore, CTI has confirmed that the land cost in the baseline scenario is reasonable.

The project:

Total static investment: 900×10^4 CNY

By checking the EIA/6/, NPV sheet/3/, CTI confirmed that the total static investment of the project was calculated by adding up the equipment purchase costs and construction engineering costs. By reviewing the equipment purchase contract/7/ and general design and construction contract/9/, CTI confirmed that actual total static investment is about 1,249.69*10^4 CNY, which is higher than estimated value of 900*10^4 CNY in EIA/5/. Thus, The validation team from CTI verified that this estimated value is reasonable and conservative.

O&M cost: 160.21×10^4 CNY

The total O&M cost including employee salary and welfare, maintenance fee, Insurance fee depreciation expense, materials fee and electricity fee.

a)Material fee: 60 *10^4 CNY/year

According to EIA/6/, the estimated annual material cost is 60 *10^4 CNY, including the cost of medicine added in the wastewater treatment process. CTI has verified the Operation and maintenance cost statistics in 2024/58/. In 2024, the material Fee is 61.32 *10^4 CNY, which is higher than the estimated value by EIA/6/. It is also confirmed that the price of different types of industrial goods indicates an overall increasing cost in recent five years and therefore will not cause significant decrease according to Industrial Producer Ex-factory Price Classification Index published by the National Bureau of Statistics/103/. CTI confirmed that material fee is considered reasonable and conservative.

b)Electricity fee*:* 17.64 *10^4 CNY/year

According to EIA/6/, the annual electricity consumption of the project is 50*10^4kwh. Yunnan Boxi Environmental Impact Assessment Co., Ltd. has analysed the electricity consumption based on the installed capacity of the project and approved by Baoshan Ecological Environment Bureau. In addition, by checking the EIA/6/ and Technical agreement of main equipment/11/, it can be confirmed that the capacity of the generator is 1.5 kWh/m^3 , and the estimated annual biogas production is 6.04 x 10^4 m^3 , so the estimated annual electricity saving is 90.6 MWh (=6.04 x 10^4 m^3 x 1.5 kWh/m^3), since all of the electricity generated is used for AWMS, thus PP needs to purchase 40.94*10^4kwh (=50*10^4kwh - 9.06*10^4kwh) from the grid.

According to the Notice on Matters Relating to Transmission and Distribution Tariffs and Sales Tariffs of Yunnan Power Grid for 2020-2022 issued by Yunnan Development and Reform Commission on 30/11/2020/105/, the electricity tariff(With VAT) in Yunnan Province is 0.430875 CNY/kwh. The project activity was approved in 24/03/2021 and by checking the actual tariff of the project/109/ is the same with the estimated tariff in the EIA.. And by checking the Operation and maintenance cost statistics in 2024 /59/, In 2024, the Electricity Fee is 18.75 *10^4CNY, which is higher than the estimated value by EIA/6/. Therefore, CTI validation team considers that the Electricity fee estimated in the EIA is conservative.

c)Employee salary and welfare : 52.88×10^4 CNY/ year,

Employee salaries(including salary and welfare) is calculated by the employee salaries per person and the number of employees. According to EIA/6/, estimated annual salary and welfare cost of employees is 5 people *7.5*10^4 CNY/person year*(1+41%)=52.88*10^4 CNY/year. Via checking the labor contracts/33/ and payroll /34/, the salary of the farm in 2024 is verified as 11*10^4 CNY/per year per person,which is higher than estimated value 10.58*10^4 CNY/per year per person(7.5*10^4 CNY/person year*(1+41%)) by EIA/6/. According toYunnan Province government issued the average employee salary/148/, the average salary in animal husbandry in 2020 is 113,623CNY/year, which is higher than the estimate in the EIA. As per the financial expert of the assessment team, the welfare rate 41%

including the social insurances, housing fund, supplementary provident fund living and other benefits is reasonable in China.

5 employees are employed due to implementation of the project activity, which was confirmed by CTI via on-site visit and checking employment contracts/33/ and payroll /34/. CTI has confirmed that the calculation formula is correct and the employee salaries is appropriate.

d)Maintenance Fee :27 *10^4 CNY/year,

The maintenance cost was estimated as 27 ×10^4CNY/year in NPV calculation, which accounts for 3.0% of the fixed assets. CTI validation team did not find suitable guidelines for maintenance cost of the specific project activity. However, as per the publication issued by China Planning Press - Financial Evaluation Practice and Analysis of Difficult Problems-Feasibility study and evaluation of Bank loan projects /126/, a rate of 3%~5% as a common practice is adopted as the ratio of maintenance cost to the fixed assets value for investment projects in China.. Therefore, the maintenance fee is deemed as reasonable and conservative.e) Insurance Fee : 27 *10^4 CNY/year

e)Insurance fee :2.7 *10^4 CNY/year,

The insurance fee was estimated as 2.7 *10^4 CNY in EIA/6/, which accounts for 0.3% of the fixed assets. CTI validation team did not find suitable guidelines for equipment insurance of the specific project activity. However, by checking Compilation method of municipal engineering investment estimation issued by Ministry of Construction of China/91/ (public available at internet), it is validated that such rate is 0.3%~0.6% of fixed asset investment. Therefore, the insurance fee is deemed as reasonable and conservative.

e)Depreciation period and residual rate: 20 years and 5%

As per the EIA/6/, the residual rate is determined as 5% of the fix assets and the depreciation period is 20 years. As per Article 31 of the "Rules for the Provisional Regulations on Enterprise Income Tax of the People's Republic of China", the ratio of residual value shall be within 5% of the original value and shall be determined by the enterprise. Therefore, CTI validation team was able to confirm that a rate of 5% is reasonable.

According to the Enforcement Regulation of Income Tax Law of the People's Republic of China for Enterprises/54/ issued by State Council on 16/03/2007, it stipulates that the depreciation period of production equipments should be at least 10 years. Thereby the 20 years of depreciation periods of the project activity is appropriate.

The depreciation rate of 4.75% is determined based on a depreciation period of 20 years and a residual rate of 5%. Thus, the depreciation expense is calculated as 900×10^4×4.75%= 42.75×10^4CNY, which is verified reasonable.

Regarding the application of Para 7 of TOOL27 Investment Analysis which requests 'The fair value of any project activity assets at the end of the assessment period shall be included as a cash inflow in the final year. The fair value should be calculated in accordance with local accounting regulations where

available, or international best practice. It is expected that such fair value calculations will include both the book value of the asset and the reasonable expectation of the potential profit or loss on the realization of the assets. ′

The detailed assessment and justification are as below:

1.Compliance with authoritative national regulation

Upon detailed review of the project′s EIA and equity NPV spreadsheet, and the ′Methods and Parameters for Economic Evaluation of Construction Projects′ (Third Edition) issued by National Development and Reform Commission (NDRC) and Ministry of Housing and Urban-Rural Development (MOHURD) CTI confirmed:

- The project′s financial model, which was established at the stage of EIA, strictly adheres to the aforementioned authoritative document, which serves as the technical standard for investment decision-making and economic evaluation of all new and expansion/renovation projects in China. The document mandates the inclusion of ′recovery of fixed assets residual value′ as the terminal cash inflow. The rate of fixed assets residual is reasonable set based on the physical life of fixed assets, technological update and industry practice, which shall be within 5% of the original value in line with the Article 31 of ′Rules for the Provisional Regulations on Enterprise Income Tax of the People's Republic of China′.

- In the final year of the project′s cash flow calculation period (Year 20), the cash inflow includes the ′recovery of fixed assets residual value′. This amount is calculated based on the original value of fixed assets, and the fixed assets residual rate. CTI confirms the approach fully complies with the requirements of the aforementioned Chinese national standard. Its economic substance is the recovery of the undepreciated value of the assets. During the project feasibility study phase, since future disposal proceeds, disposal costs, market conditions cannot be predicted, the "original value of fixed assets× residual value rate" is adopted as a conservative, comparable, and standardized terminal cash flow assumption to ensure consistency in economic evaluations across different industries.

- TOOL27 explicitly states that fair value should be calculated ′in accordance with local accounting regulations where available′. This project′s prioritization of and full compliance with the aforementioned authoritative document represent the primary and most correct pathway to meet the requirement of TOOL27. Adopting any other non-mandatory estimation method would deviate form the actual context of project approval in China, compromising the comparability and compliance of the financial analysis.

Based on the professional financial expertise of CTI, the residual value represents the estimated amount that could be obtained from disposing the equipment at the end of its service life, however, the actual selling price of the asset to be disposed may deviate from this estimate, which may lead to be higher or lower than the book value, due to factors such as market conditions, technological evolution, equipment status, supply-demand dynamics, etc, carrying a high level of uncertainty at the stage of

feasibility study stage. The principle outlined in the 'Methods and Parameters for Economic Evaluation of Construction Projects' (Third Edition) regarding the recovery of fixed assets residual value in the end of project period is using the approach of "original value of fixed assets × residual value rate" to assume the asset can be disposed at its scrap value at the end of period to avoid the uncertainty.

2.Supplementary of the reasonable expectation of profit of asset to be disposed for terminal

We understand TOOL27's requirement of fair value to consider the reasonable profit expectations, aims to ensure the financial analysis to avoid underestimating the residual value. However, as per TOOL27, it is also allowed fair value may consider the reasonable loss expectation of the asset.

To thoroughly address the concerns raised, CTI conducted the following sensitivity analysis:

Since there is no available reference of similar assets disposal for estimation for reasonable expected profit, the possible 10% increased of the 'recovery of fixed assets residual value' is used as the terminal cash inflow in the financial model.

The result of NPV is -395.59 is far more negative than that of the uncovered anaerobic lagoon which means the cost of the project activity without VCU revenues is much higher than the uncovered anaerobic lagoon(-139.14). This sensitive analysis confirms that even when the terminal asset value is adjusted upward by a reasonable margin to account for potential market value, the NPV without carbon credit revenue continues to be insufficient. And this insignificant change in NPV demonstrate that the NPV is relatively insensitive to variations in the terminal residual value.

f)Lifetime: 20 years.

The lifetime of the project activity was estimated to be 20 years in the EIA/6/. The lifetime of the project activity has been crosschecked with Technical agreement of main equipment/11/ in which it mentioned that the guarantee period of the project activity is 20 years. Therefore, CTI validation team was able to confirm that the lifetime estimated in EIA/6/ is reasonable and the project operation period could cover the fixed 10-year from the crediting period without affecting the additionality of the project activity.

Annual organic fertilizers sales revenue: 216×10^4 CNY

Annual sales volume of organic fertilizer: 18,000 t/year

Organic ferterlizer price:120 CNY/t

By reviewing the approved EIA/6/, CTI Certification confirmed that the annual organic fertilizer base material production 18,000 t is the aggregate production from the AWMS in this project, and that it is conservative to use this as annual sales volume of organic fertilizer in the NPV calculation to calculate the revenue. Additionally, the organic fertilizer base material production of the AWMS is estimated based on the production of the swine farm under fully operation conditions. And by checking the Organic fertiliser sales records/59/, the actual sales volume in 2024 is 17,578 tons, which is lower

than the estimate in the EIA. Therefore, the annual organic fertilizer base material production by the project activity is deemed reasonable.

The price of organic fertilizer derived from the research report/141/ was determined based on the purchasing prices from nearby farmers and fertilizer processing plants in the survey area. After reviewing the sales records and receipt vouchers for organic fertilizer/59/ and Organic Fertiliser Sales Agreement/59/, CTI confirmed that the actual selling price of the organic fertilizer is fixed 120 CNY/t, which is the same as the estimated 120 CNY/t. Therefore, CTI validation team considered that the estimated organic fertilizer price used for investment analysis is conservative.

Taxes: see below

The taxes applied in the financial assessment are listed as:

Items	Value
VAT rate (equipment & material)	9%
VAT rate (revenue)	0%
Urban maintenance and construction tax	5%
Surtax for education	3%
Income tax	*0%(first 3 operation years)* *12.5% (4-6 operation years)* 25%*(the rest operation years)*

Value Added Tax (VAT) for equipment and material is determined as 9% in the EIA/6/ which is consistent with that in "Announcement on Relevant Policies on Deepening Value-added Tax Reform (Ministry of Finance General Administration of Taxation General Administration of Customs Announcement No. 39 of 2019)" effective from 20/03/2019/50/. Value Added Tax (VAT) for revenue is determined as 0 in the EIA/6/ since the project achieves revenue through organic fertilizer sale. By checking the Announcement of the State Administration of Taxation on the Clarification of the Implementation Standards for Organic Fertiliser Products/115/, organic fertiliser products are exempt from VAT and therefore the Value Added Tax (VAT) for revenue is 0%.

By cross checking with the national taxation regulations, sectoral regulations and other evidences, i.e. the "interim Rules on Additional Tax for City Development" /105/ and the "Provisional Regulations of the People's Republic of China on Education tax" /106/, CTI validation team was able to confirm that the Urban maintenance and construction tax and Surtax for education in the financial assessment are all in line with national regulations.

The income tax is consistent with the Income Tax Law of the People's Republic of China or Enterprises /101/ issued by the Chairman of the People's Republic of China on 16/03/2007. As per Regulations for the implementation of the enterprise income tax law of the people's Republic of China issued on 06/12/2007 /107/, the income of the enterprise engaged in the qualified environmental protection,

energy and water saving projects specified in the preceding paragraph shall be exempted from corporate income tax from the first year to the third year starting from the tax year in which the first production and operation income of the project is obtained. The corporate income tax will be halved from the fourth year to the sixth year. The above tax rates have been verified by CTI through cross-checking Financial audit report /128/.

Conclusion and comparison of financial indicators

Via checking investment analysis in Section 3.5.2 of the PD, CTI has confirmed that the formula and calculation process are correct. By comparing the results, the average annual O&M cost of the project is far more than the organic fertilizers sales revenue, thus, the Net Present Value (NPV) of the project activity is negative.

According to the PD/1/, the NPV for baseline scenario is calculated as -139.14 while for the proposed project is -395.89. In addition, the NPV of the baseline scenario takes into account the annual Land cost which the proposed project does not. Nevertheless, the NPV of the baseline scenario is much higher than the NPV of the proposed project; thus, the NPV of the baseline scenario is conservative and reasonable. This clearly indicates that the baseline scenario (uncovered anaerobic lagoon) is the most economical scenario. Hence, the project cannot be considered as financially attractive in the absence of VCS benefits.

Sensitivity analysis

The purpose of this step is to examine whether the conclusion regarding the financial attractiveness is robust to reasonable variations of the critical assumptions. According to Para 27 of methodological tool 27" Investment Analysis" (Version 11.0), the "variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation". Therefore, the total static investment, annual sales volume of organic fertilizer and organic fertilizer Price were taken as uncertain factors for sensitive analysis. Furthermore, the O&M cost which was widely included in the sensitivity analysis for projects in China was also examined in the analysis. As a result, the following parameters are selected for the analysis:

- Total static investment
- Annual sales volume of organic fertilizer
- Organic fertilizer Price
- Annual O&M cost

The variation range of -10%~10% is conducted and the results of sensitivity analysis of the three parameters are shown in the following table:

Table 3-5 Sensitivity analysis of the baseline

	Variation				
Indicator	90%	95%	100%	105%	110%

NPV (discount rate=9.5%)					
Total static investment	-98.95	-103.60	-108.50	-113.66	-119.07
Annual O&M cost	-97.78	-103.01	-108.50	-114.27	-120.31

Table 3-6 Sensitivity analysis of the project

	Variation				
Indicator	90%	95%	100%	105%	110%
NPV (discount rate=9.5%)					
Total static investment	-225.34	-308.56	-395.89	-487.33	-582.88
Annual sales of organic fertilizer	-553.81	-469.62	-395.89	-322.16	-248.43
Organic fertilizer Price	-553.81	-469.62	-395.89	-322.16	-248.43
Annual O&M cost	-286.51	-341.20	-395.89	-450.58	-508.91

The sensitivity analysis was further conducted, and the project NPV could reach the baseline scenario if one of the following conditions can be achieved:

- Total static investment: decrease about 25.02%.
- Annual sales volume of organic fertilizer: increase about 26.85%
- Organic fertilizer Price: increase about 26.85%
- O&M cost: decrease about 36.20%.

Total static investment decreasing about 25.02%

The project NPV would exceed the baseline NPV value when the total static investment decreases by 25.02%., however, via checking the price index of investment in fixed asset for China/92/, CTI confirmed that the price index was rising in the past years. Therefore, it is not likely to implement the project activity with the Total static investment reducing by 25.02% to make the project becomes economical attractive.

In addition, due to the project has been operated during the joint audit process, via checking the Equipment purchase contracts/7/ and General design and construction contract/9/, CTI confirmed that the actual investment costs of the project is about 1,249.69 $*10^4$CNY, which is higher than estimated value of $900*10^4$ CNY in EIA/6/. Therefore, it is not likely to implement the project activity through decreasing the total static investment by 25.02%.

Annual sales volume of organic fertilizer: increase about 26.85%

If the annual organic fertilizer production is increased by 26.85%, the project NPV would exceed the baseline NPV value. However, according to the EIA, the project activity is designed to treat 26,718

tonnes of animal manure with the operation time of 365 days. The produced organic fertilizer is based on the treated manure and it is unlikely that the project could increase the amount of produced organic fertilizer by 26.85%. And by checking the Organic fertiliser sales records/59/, the sales volume of 17,578 tonnes after commissioning is less than the expected production in EIA. Thus, CTI validation team validated that the fluctuation of the variable will not make the IRR reach the benchmark.

Organic fertilizer Price: increase about 26.85%

If the organic fertilizer price is increased by 26.85%, the project NPV would exceed the baseline NPV value. By checking the national standard for bio-organic fertiliser (NY 884-2012) issued by the Ministry of Agriculture of the People's Republic of China and on-site inspection, it is verified that due to the short composting time of the project, the organic fertiliser fertility is lower than that of the bio-organic fertilisers available in the market, PP sold it at a price lower than the market price. After reviewing the sales records and receipt vouchers for organic fertilizer/59/ and Organic Fertiliser Sales Agreement/59/, CTI confirmed that the actual selling price of the organic fertilizer is fixed 120 CNY/t, which is the same as the estimated 120 CNY/t. By checking the public information, the price of organic fertiliser in Yunnan Province has stayed stable throughout the year, with no fluctuations. Therefore, it's unlikely that the selling price of the project's organic fertilizer could increase by 26.85%.

O&M cost: decrease about 36.20%

The NPV would exceed the baseline NPV value when the annual O&M cost decreases by 36.20%. However, via checking the EIA/6/, CTI confirmed that O&M costs mainly consist of employee salary and welfare, maintenance fee, Insurance fee depreciation expense, materials fee and electricity fee. Via checking the average monthly wage level in Yunnan Province/103/, CTI confirmed that the average monthly wage keeps increasing in past years. Besides, via checking the indices of purchasing price of raw material and power/103/, CTI confirmed that the price index was rising in the past years. Via checking the Operation and maintenance cost statistics in 2024/58/, CTI confirmed the actual operation and maintenance cost of the project in 2024 is $162.28*10^4$ CNY, which is higher than the value estimated according to the project evaluation report ($160.21*10^4$ CNY). Therefore, it is not likely to implement the project activity with the O&M cost reducing by 36.20% to make the project NPV would exceed the baseline NPV value.

Project NPV with and without revenues from VERs

	Without VERs	With VERs
NPV (discount rate=9.5%)	-395.89	113.24

As shown in the sensitivity analysis above, the project NPV(discount rate=9.5%) will not reach the baseline NPV value within reasonable fluctuation range, and the fluctuation scenario of the uncertain factors which could make the proposed project financially feasible is unlikely to occur. Therefore, the conclusion regarding the infeasibility of the proposed project is robust to reasonable variations of the critical assumptions.

It is assessment team's conclusion that sensitivity analysis used in PD and NPV calculation sheet is appropriate and reasonable.

Outcome of step 3: scenario 8 & 14, which is the implementation of project activity without VCS, is not financially attractive to the project owner, and it is thus not a baseline scenario. Therefore, only one alternative scenario (scenario 6) is left and is determined as baseline scenario of the project activity.

Hence the scenario 6 is considered as baseline scenario which is "The manure is disposed in an uncovered anaerobic lagoon".

Based on the checking the data provided in PD and above related assessment, it proves that the baseline scenario determined in the PD is correct and reasonable. Therefore, baseline scenario is identified transparently for the project activity.

The assessment team has reviewed the PD in line with the applied methodology and methodological tool and CTI confirmed that PP has correctly identified the baseline scenario.

By means of comparison of the PD with Tool02:"Combined tool to identify the baseline scenario and demonstrate additionality" (Version 07.0)/64/, the validation team has assessed the additionality demonstration in accordance with applicable methodology and tool.

Step 1-3 of the tool were already done in section 3.5 of this PD for selection of alternative 6 and 8&14 as assessed in above section 3.3.5.

Then for the demonstration of additionality, the below step is assessed,

Step 4 Common practice analysis

The common practice analysis was checked strictly followed Methodological tool "Common practice" (Version 03.1)/70/.

Step 1: calculate applicable capacity or output range as +/-50% of the design capacity or output of the proposed project activity

The project activity is to treat the manure from the swine farm, and the swine farm involving 57,534 heads of market swine in stock are included, and are estimated to produce 26,718 tons of manure every year. So the range is the projects handle manure from 13,359 tons to 40,077 tons are considered as similar projects.

Step 2: identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

a) The projects are located in the applicable geographical area,

b) The projects apply the same measure as the proposed project activity,

c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity,

d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant,

e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1,

f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Demonstration as follow,

a) The region selected for common practice of Yunnan Province is assessed as appropriate and reasonable. A province is the second administrative level of China after central Government and it is authorized to execute administrative examination and approval for construction projects considering local regulations based on local expertise of the validation team; also by considering differences of economic development level, population size, industrial structure, fundamental infrastructure, strategic planning etc, the investment environment of each province, and unique geological conditions in Yunnan Province results in the different resource, thus region selected for common practice is Yunnan Province.

b) Same measures are defined as: Methane formation avoidance

c) Same energy source/fuel and feedstock: biogas captured for electricity generation and used in Swine Farm,

d) Treat manure waste and produce electricity technology,

e) Output range: handle manure from 13,359 tons to 40,077 tons annually

f) Commercial operation started when the earliest AWMS Construction contract of Baoshan East Hope Swine Farm/53/ was signed, 21/04/2021. By reviewing the Daily operation record of treatment plant /27/ and CDM Terms (Version 11.0) /72/, CTI Certification confirmed that the selected date aligns with the definition of the 'start date' under the CDM mechanism.

Thus, the Swine Farm Animal Manure Management System GHG Mitigation projects operated before 21/04/2021, handle manure from 13,359 tons to 40,077 tons annually in Yunnan Province are determined similar projects.

The information source from Development and Reform Commission of Yunnan Province /93/ and other public information from Department of Agriculture and Rural affairs of Yunnan Province /94/ for the common practice analysis is available and checked by the audit team. The information used is evaluated to be credible.

Via the source, CTI confirmed that there are no similar projects identified in Yunnan Province based on the above criteria.

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

There are no similar projects identified in Yunnan Province.

Hence N_{all}=0.

Step 4: within similar projects identified in Step 3, identify those that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

Due to N_{all}=0, N_{all}=N_{diff}=0.

Step 5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

For this project, F=1- N_{diff}/N_{all} =1-1=0 and N_{all}-N_{diff}=0. It can be concluded that the project is not a common practice. In conclusion, the project meets the criteria and tool "Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)", thus deemed as additional.

3.2.6 Quantification of GHG Emission Reductions and Carbon Dioxide Removals

For validation of the estimated GHG emission reductions in the PD/1/ and ER calculation sheet/2/.

Further, the VVB has downloaded from the UNFCCC website the applicable version of the CDM methodology.

Via verify the PD/1/, it is confirmed the calculation of ERs is done as per the applied methodology (ACM0010 Version 08) with follow steps listed below.

Baseline Emission:

As per the approved consolidated Methodology ACM0010 Version 08, the baseline emissions are calculated by the following equation:

$$BE_y = BE_{CH4,y} + BE_{N2O,y} + BE_{elec/heat,y} \quad \text{Equation 1}$$

Where:

BE_y	Baseline emissions in year y (tCO_2e/yr)
$BE_{CH4,y}$	Baseline CH_4 emissions in year y ($t\ CO_2/yr$)
$BE_{N2O,y}$	Baseline N_2O emissions in year y ($t\ CO_2/yr$)
$BE_{elec/heat,y}$	Baseline CO_2 emissions from electricity and/or heat used in the baseline ($t\ CO_2/yr$)

1. Baseline CH_4 emissions ($BE_{CH4,\,y}$)

$$BE_{CH_4,y} = GWP_{CH_4} \times D_{CH_4} \times \sum_{j,LT} (MCF_j \times B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_{Bl,j}) \quad \textbf{Equation 2}$$

Where:

$BE_{CH_4,y}$	Baseline CH_4 emissions (t CO_2/yr)
GWP_{CH_4}	Global Warming Potential (GWP) of CH_4 (t CO_2e/t CH_4)
D_{CH_4}	Density of CH_4 (t/m^3)
MCF_j	Annual methane conversion factor (MCF) for the baseline AWMSj
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated by animal type LT (m^3CH_4/kg -dm)
N_{LT}	Annual average number of animals of type LT for the year y (number)
$VS_{LT,y}$	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis (kg -dm/animal/yr)
$MS\%_{Bl,j}$	Fraction of manure handled in system j in the baseline
LT	Type of livestock
j	Type of treatment system

Estimation of various variables and parameters for above equation:

(A) $VS_{LT,y}$

As per the methodology, there are four options to determine this value, via checking the options provided, CTI confirmed there is no published country specific data available based on the local expertise of audit team. The energy intake of the swine is not available, Option 2 can't be used. Option 3 utilizes the average weight of the swine, this data is available and therefore Option 3 is adopted by PP to calculate $VS_{LT,y}$. Option 4 is excluded as no formulated feed ratios (FFR) is available for validation. Therefore, PP has selected Option 3 in the prescribed order of preference, as stipulated by the methodology, after Options 1,2,4 were found to be inapplicable to the project.

Scaling default IPCC values $VS_{default}$ to adjust for a site-specific average animal weight as shown in equation below:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) \times VS_{default} \times nd_y \quad \textbf{Equation 3}$$

Where:

$VS_{LT,y}$	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis (kg -dm/animal/yr)
W_{site}	Average animal weight of a defined livestock population at the project site (kg)
$W_{default}$	Default average animal weight of a defined population (kg)
$VS_{default}$	Default value for the volatile solid excretion per day on a drymatter basis for a defined livestock population (kg-dm/animal/day)
nd_y	Number of days treatment plant was operational in year y

(B) N_{LT}

As per the methodology, there are two options to determine this value, via checking the options provided, via site inspection, CTI confirmed that since there is no way to trace the daily stock of market swine, so the Option 1 is adopted to calculate N_{LT} for Market swine.

Option 1:

$$N_{LT} = N_{da,LT} \times \frac{N_{p,LT}}{365} \quad \textbf{Equation 4}$$

Where:

N_{LT}	Annual average number of animals of type LT for the year y (number)
$N_{da,LT}$	Number of days animal of type LT is alive in the farm in the year y (number)
$N_{p,LT}$	Number of animals of type LT produced annually for the year y (number)

Option 2:

$$N_{LT} = \frac{\sum_1^{365} N_{AA,LT}}{365} \quad \textbf{Equation 5}$$

Where:

N_{LT}	Annual average number of animals of type LT for the year y (number)
N_{AA}	Daily stock of animals of type LT in the farm, discounting dead and discarded animals (number)

(C) $B_{0,LT}$

As per the applied methodology, this value varies by species and diet. Default values are used and they are taken from tables 10A-4 through 10A-9 (IPCC 2006 Guidelines for National Greenhouse Gas Inventories volume 4, chapter10)/43/.

CTI confirms that the maximum methane production potential ($B_{0,LT}$) of 0.45 m^3 CH_4/kg VS from 'High productivity systems' under 'Other regions' in Table 10.16 of Chapter 10, Volume 4 of 2019 Refinement to IPCC 2006/43/ is applicable to this project. This is because the total investment of Baoshan East Hope Swine Farm is 900*10^4CNY. The swine farms are intelligent management farms. It means this proposed project has high level of capital input requirements and high level of overall herd (flock) performance. The feed is specially designed for the swine of project proponent and provided by dedicated feed companies in local market. The project proponent applies a unique rotational binary breeding system through the experiment of crossbreeding and matching combinations of different products on other farms and has bred swines with stable genetic and high comprehensive benefits which are introduced to the Baoshan East Hope Swine Farm. Therefore, all market swines in the project activities that are improved through breeding practices for commercial production. The produced swine are mainly sold to trading companies and food-processing plants which is 100% market-oriented. Thus, the swine farms of this project are high productivity systems verified by CTI as per the purchase records of feed /18/, breeding records of the farms /19/ and recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd./142/, CTI has verified that Baoshan East Hope Swine Farm aligns with the definition of 'High productivity systems' as per 2019 Refinement to the IPCC 2006 Guidelines/43/.

(D) MCF_j

As per the applied methodology, the MCF_j values given in table 10.17, chapter 10, volume 4, 2019 Refinement to the IPCC 2006 Guidelines/43/ should be used. MCF_j values depend on the climate zone of the area in which the baseline anaerobic manure treatment facility is to be located.

i. For this project, the MCF_j is taken as 73%, corresponding to the Warm temperature moist climate zone from Table 10.17, Chapter 10, Volume 4, 2019 Refinement to IPCC 2006 /43/. By checking local official climate information /88/ and related literature /86/, CTI has confirmed that the annual average temperature (MAT=15.7℃) of the project location is greater than 10, and the ratio of the annual potential evapotranspiration (PET) 1,612.6 mm to the average precipitation (MAP) 975.6 mm is higher than 1.

ii.A conservativeness factor should be applied by multiplying MCF_j values (estimated as per above bullet) with a value of 0.94, to account for the 20% uncertainty in the MCF_j values as reported by 2019 Refinement to IPCC 2006 /43/.

The actual values of parameters MCF_j, $B_{0,LT}$, $N_{LT,y}$, W_{site}, nd_y, and N_{AA} will be monitored by PP and determined ex post as per ACM0010 (Version 08), more details in Section 3.3.8.

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI has confirmed that the pre-determined parameters used in Equation 2 during the $BE_{CH4,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process

GWP_{CH_4}	28 t CO_2e/t CH_4	AR5	Via checking the 100-year values from Topic 3, Box 3.2, Table 1 in the IPCC Fifth Assessment Report (AR5) /44/ and Paragraph 3.15.4 in VCS Standard Version 4.7/77/, it is verified that the value is correct.
$\rho_{CH_4,n}$	6.7x10^{-4} t/m^3	ACM0010	Confirmed as correct for ex ante determination as per ACM0010 (Version 08).
MCF_j	73%	Calculated (MCF_j= the 2019 Refinement to IPCC 2006 MCF value 73%*0.94)	Upon verification, CTI Certification has confirmed that the baseline for this project is an uncovered anaerobic lagoon, as detailed in Section 3.3.4 of this report. By reviewing the climatic data (Mean Annual Temperature (MAT) = 15.7℃> 10℃ and the Mean the Potential Evapotranspiration (PET) 1,612.6 mm/Annual Precipitation (MAP) 975.6 mm > 1) from Baoshan City /88/, /89/ and 2019 Refinement to IPCC 2006 /43/, CTI Certification confirmed that the project site falls within the Warm temperature moist climate zone. Therefore, CTI confirms the correctness of the chosen MCF value and the calculation of MCF_j.
$B_{0,LT}$	0.45 m^3 CH_4/kg_VS_dm	Table 10.16 Chapter 10, Volume 4 of 2019 Refinement to IPCC 2006	Through the review of the approved EIA /6/, 2019 Refinement to IPCC 2006 /43/, and on-site interviews with the staff of the swine farm, CTI confirmed that that the project is located in Yunnan Province, China, Asia, and the farm is of a specific scale and market-oriented. And by checking feed purchase invoices /18/, feeding records /19/ and Feeding

			logs of swine farm/24/ and and conducting on-site inspections, CTI validation team confirmed that feed is purchased from local market. And through PP's Screenshot of the financial system/25/, Invoice for the purchase and sale of swine/26/, recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd./142/ and conducting on-site inspections, it is verified that PP raises excellent swine breeds with a market-oriented approach. This makes the livestock farms within the project boundary more aligned with the definition of high-productivity systems according to 2019 Refinement to IPCC 2006. Therefore, CTI confirmed the reasonableness of the $B_{0,LT}$ values selected by PP for market swine.
$N_{p,LT}$	125,000head	EIA/10/	The data of $N_{p,LT}$ is from the EIA/6/ which was estimated by the third party by researching the operation of farms around the project, and the EIA was approved by the local government/6/, so the CTI confirmed that the $N_{p,LT}$ taken for market swine is reasonable.
$N_{da,LT}$	168 Days	The livestock production guidance document of PP/20/	The ex-ante value 168 days are derived from livestock production guidance document of PP/143/, which is verified as consistent with the number of days for swine to be slaughtered by existing large-scale breeding groups in China /21/.

W_{site}	115Kg	The livestock production guidance document of PP /20/	By reviewing the approved EIA/6/ and livestock production guidance document of PP/143/, CTI validates that the W_{site} data for market swine is reasonable. Upon reviewing the information from PP's website/83/ and through on-site interviews with the PP, CTI affirms Baoshan East Hope Animal Husbandry Co., Ltd. being a prominent player in the national livestock industry with a centralized management model and a wealth of expertise in livestock breeding, guarantees the credibility and applicability of the livestock production guidance document.
$W_{default}$	56 Kg	2019 Refinement to IPCC 2006, Table 10A.5, Chapter 10, Volume 4	By reviewing the methodology, 2019 Refinement to IPCC 2006/43/, the approved EIA/6/, and through on-site interviews with the staff of the swine farm, it is confirmed that the project is located in Yunnan Province, China, Asia. And by checking feed purchase invoices /18/, feeding records /19/ and Feeding logs of swine farm/24/ and and conducting on-site inspections, CTI validation team confirmed that feed is purchased from local market. And through PP's Screenshot of the financial system/25/, Invoice for the purchase and sale of swine/26/, recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd./142/ and conducting on-site inspections, it is verified that PP raises excellent swine breeds with a market-oriented approach. This makes the livestock farms within the project boundary more aligned with the definition of high-productivity.

			Therefore, CTI confirmed that the project is applicable to the values in 2019 Refinement to IPCC 2006, Table 10A.5, Chapter 10, Volume 4.
$VS_{default}$	0.2856 kg-VS-dm/animal/day	2019 Refinement to IPCC 2006, Table 10.13A, Chapter 10, Volume 4	It's confirmed as correct for the ex ante determination in line with the IPCC/42/. The values in 2019 Refinement to IPCC 2006 and US-EPA were compared, and the lower value from 2019 Refinement to IPCC 2006 was applied. By reviewing the methodology, 2019 Refinement to IPCC 2006/43/, the approved EIA/6/, and through on-site interviews with the staff of the swine farm, it is confirmed that the project is located in Yunnan Province, China, Asia. Further, through the local expertise of assessment team and the assessment above, CTI confirmed that the farm in project boundary fall under the definition of High Productivity Systems in 2019 Refinement to IPCC 2006. Therefore, CTI Certification confirms that the project is applicable to the values in 2019 Refinement to IPCC 2006, Table 10.13A , Chapter 10, Volume 4/43/. Additionally, in Table 10.13A of 2019 Refinement to IPCC 2006, the value for 'Market swine' in 'Asia-High PS' are 5.1 and 2.3, with the unit being Kg VS (1000kg animal mass)-1 Day-1. CTI Certification confirmed through the ER calculation sheet /2/ that the PP has conducted unit conversion according to Equation 10.22A of 2019 Refinement to IPCC 2006, and the calculation process is correct.

$VS_{LT,y}$	214.07 kg-dm/animal/year	Calculated by Equation 3	CTI Certification confirmed through the ER calculation table that $VS_{LT,y}$ was calculated using Equation 3 ($VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) \times VS_{default} \times nd_y$) and confirmed that the calculation process was correct.
nd_y	365	EIA/10/	Through the approved EIA/6/, CTI confirmed that it is expected that the manure treatment system operates daily. And by reviewing the operation records of the anaerobic digester /27/ and on-site interviews with PP, CTI confirmed that the anaerobic digester operates continuously throughout the year, so the nd_y value of 365 taken in the ex-ante calculation is reasonable.
$MS\%_{Bl,j}$	100%	/	CTI has confirmed that the project's baseline scenario is an uncovered anaerobic lagoon, as detailed in Section 3.3.4. As such, the value of this parameter is deemed reasonable.

2. Baseline N_2O emissions ($BE_{N20,y}$)

$$BE_{N_2O,y} = GWP_{N_2O} \times CF_{N_2O-N,N} \times \frac{1}{1000} \times (E_{N_2O,D,y} + E_{N_2O,ID,y}) \quad \textbf{Equation 6}$$

$$E_{N_2O,D,y} = \sum_{j,LT} EF_{N_2O,D,j} \times NEX_{LT,y} \times N_{LT} \times MS\%_{Bl,j} \quad \textbf{Equation 7}$$

$$E_{N_2O,ID,y} = \sum_{j,LT} EF_{N2O,ID} \times F_{gasMS,j,LT} \times NEX_{LT,y} \times N_{LT} \times MS\%_{Bl,j} \quad \textbf{Equation 8}$$

Where:

$BE_{N_2O,y}$	Annual baseline N_2O emissions in (t CO_2e/yr)
GWP_{N_2O}	Global Warming Potential (GWP) for N_2O (t CO_2e/tN_2O)
$E_{N_2O,D,y}$	Direct N_2O emissions in year y (kg N_2O-N/year)

$E_{N_2O,ID,y}$	Indirect N_2O emissions in year y (kg N_2O-N/year)
$CF_{N_2O-N,N}$	Conversion factor N_2O-N to N_2O (44/28)
$EF_{N_2O,D,j}$	Direct N_2O emission factor for the treatment system j of the manure management system (kg N_2O-N/kg N)
$NEX_{LT,y}$	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/yr) estimated as described in appendix 2
N_{LT}	Annual Average number of animals of type LT for the year y estimated as per equation (5(a)) or (5(b)) (number)
$MS\%_{Bl,j}$	Fraction of manure handled in system j (fraction)
$EF_{N2O,ID}$	Indirect N_2O emission factor for N_2O emissions from atmospheric deposition of nitrogen on soils and water surfaces (kgN_2O-N/kg NH_3-N and NO_X-N)
$F_{gasMS,j,LT}$	Default values for nitrogen loss due to volatilisation of NH3 and NOX from manure management (fraction)

Estimation of various variables and parameters for above equations:

(A) $NEX_{LT,y}$

As per the Appendix 2 of the applied methodology, two options provided, for this project, CTI checked the livestock production guidelines issued by PP/143/ and on-site interviews, it is confirmed that protein intake data could not be obtained due to PP's practice of adjusting feed types and quantities at any time. And via searching the data from Yunnan Provincial Statistics Bureau/152/, the data from China National Statistics Bureau/153/, it is verified that the specific information on N intake is not available in the country or region data. So, the Option 2 is adopted to calculate $NEX_{LT,y}$.

Option 2:

In the absence of availability of project specific information on protein intake, which should be justified in the PD, national or regional data should be used for the nitrogen excretion $NEX_{LT,y}$, if available. In the absence of such data, default values from table 10.19 of the IPCC 2006, volume 4, chapter 10) may be used and should be corrected for the animal weight at the project site in the following way:

$$NEX_{LT,y} = \frac{W_{site}}{W_{default}} \times NEX_{IPCC,default} \qquad \textbf{Equation 9}$$

Where:

NEX_{site}	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/yr)

W_{site} Average animal weight of a defined livestock population at the project site (kg)

$W_{default}$ Default average animal weight of a defined population (kg)

$NEX_{IPCC,default}$ Default value for the nitrogen excretion per head of a defined livestock population (kg N/animal/year)

Via checking the IPCC, it is confirmed that below equation is used for calculate $NEX_{IPCC\ default}$

$$NEX_{IPCC,default} = N_{rate(T,P)} \times \frac{TAM_{(T,P)}}{1000} \times 365 \quad \textbf{Equation 10}$$

Where:

$N_{rate(T)}$ default N excretion rate, kg N/ (1,000 kg animal mass)/ day for animal category T (and production level P), see table 10.19, chapter 10, volume 4 of 2019 Refinement to IPCC 2006

$TAM_{(T,P)}$ Typical animal mass for livestock in kg/animal

By reviewing 2019 Refinement to IPCC 2006 /43/, CTI confirmed the value of $N_{rate(T,P)}$ and the method to convert it to $NEX_{IPCC,default}$ (using Equation 10), both of which are correctly cited from 2019 Refinement to IPCC 2006. Furthermore, upon examining the ER sheet, CTI confirmed that the calculations in Equations 9-10 are accurate and comply with the requirements of the methodology.

The actual values of parameters W_{site}, $N_{LT,y}$ and $NEX_{LT,y}$ will be monitored by PP and determined ex post as per ACM0010 (Version 08), more details in Section 3.3.8.

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI has confirmed that the pre-determined parameters used in Equation 6 during the $BE_{N20,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process
GWP_{N_2O}	265 t CO_2e/tN_2O	AR5	Via checking the 100-year values from Topic 3, Box 3.2, Table 1 in the IPCC Fifth Assessment Report (AR5) /44/ and Paragraph 3.15.4 in VCS Standard Version 4.7 /77/, it is verified that the value is correct.
$CF_{N_2O-N,N}$	44/28	ACM0010 Version 08	Confirmed as correct for ex ante determination as per ACM0010 (Version 08).

$EF_{N_2O,D,j}$	0 kg N_2O-N/kg N	EF3 Default value (2019 Refinement to IPCC 2006, Table 10.21, Chapter 10, Volume 4, for Uncovered anaerobic lagoon	For this project, neither specific information on direct N_2O emission factor for uncovered anaerobic lagoon nor site-specific national or regional data is available. CTI has confirmed that the project's baseline scenario is uncovered anaerobic lagoon, as detailed in Section 3.3.4. Therefore, the value of this parameter is reasonable.
$EF_{N2O,ID}$	0.01 kgN_2O-N/kg NH_3-N and NO_X-N	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	Through the methodology and 2019 Refinement to IPCC 2006/43/, it is confirmed that the default value of EF_4 in Table 11.3, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project.
$F_{gasMS,j,LT}$	40%	2019 Refinement to IPCC 2006, Table 10.22, Chapter 10, Volume 4	The value of this parameter was determined by both the livestock species and the manure treatment system. Through the approved EIA/6/ and on-site interviews with the staff of each swine farm, it was confirmed that the farm within the project boundary is swine farm, and the baseline scenario of the project is uncovered anaerobic lagoon. Therefore, CTI confirmed that the value of this parameter is reasonable.
$TAM_{(T,P)}$	56Kg	2019 Refinement to IPCC 2006, Table 10A.5, Chapter 10, Volume 4	By reviewing the methodology, 2019 Refinement to IPCC 2006/43/, the approved EIA/6/, and through on-site interviews with the staff of each swine farm, it is confirmed that the project is located in Yunnan Province, China, Asia. Further, through the local expertise of assessment team and the assessment above, CTI Certification confirmed that the farm in project boundary fall under the definition of High Productivity System in 2019 Refinement to IPCC 2006. Therefore,

			CTI confirmed that the project is applicable to the values in 2019 Refinement to IPCC 2006, Table 10A.5, Chapter 10, Volume 4.
$N_{rate(T,P)}$	0.63kg N (1000 kg animal mass) $^{-1}$ day^{-1}	2019 Refinement to IPCC 2006, Table 10.19 , Chapter 10, Volume 4	Through the approved EIA/6/ and on-site interviews with the staff of swine farm, it was confirmed that the farm within the project boundary is swine farm. Further, through the local expertise of assessment team and the assessment above, CTI confirmed that the farms in project boundary fall under the definition of High Productivity Systems in 2019 Refinement to IPCC 2006. Therefore, CTI confirms that the value of this parameter is reasonable.
$NEX_{IPCC,default}$	12.88 kg N/animal/year	Calculated by Equation 10	By reviewing 2019 Refinement to IPCC 2006/43/, CTI confirmed the value of $N_{rate(T,P)}$ and the method to convert it to $NEX_{IPCC,default}$ (using Equation 10), both of which are correctly cited from 2019 Refinement to IPCC 2006. Furthermore, upon examining the ER sheet, CTI confirmed that the calculations in Equations 9-10 are accurate and comply with the requirements of the methodology.
$NEX_{LT,y}$	26.44kg N/animal/year	Calculated by Equation 9	

3. Baseline CO_2 emissions from electricity and/or heat used in the baseline ($BE_{elec/heat,y}$)

$$BE_{elec/heat,y} = BE_{EC,y} + BE_{HG,y} \quad \textbf{Equation 11}$$

Where:

$BE_{elec/heat,y}$	Baseline CO_2 emissions from electricity and/or heat used in the baseline (t CO_2/yr)
$BE_{EC,y}$	Baseline emissions associated with electricity generation in year *y* (t CO_2/yr)
$BE_{HG,y}$	Baseline emissions associated with heat generation in year *y* (t CO_2/yr)

Upon verification, CTI has confirmed that the baseline for this project is uncovered anaerobic lagoon, as detailed in Section 3.3.4 of this report. CTI confirmed that the baseline scenario for this project is uncovered anaerobic lagoon with no heat or electricity used in the baseline. The biogas generated

during the treatment process of this project will be collected for electricity production and used by AWMS. The electricity generated will not be connected to other users nor will it be used to generate electricity for feed-in to the grid. Therefore, the CO_2 emissions of the electricity and/or heat used in the baseline are 0.

In conclusion, $BE_y = BE_{CH4,y} + BE_{N20,y} + BE_{elec/heat,y} = 71{,}347 + 2{,}533 + 0 = 73{,}880\ tCO_2e$.

Project emission:

Based on the applied methodology, and via site inspection checking the project implementation, CTI confirmed that there are 3 stages involved in the manure treatment for the project activity: (1) temporary underfloor pit storage; (2)anaerobic digester; (3) passive windrow process.

The Project emissions are estimated as follows:

$$PE_y = PE_{AD,y} + PE_{Aer,y} + PE_{N_2O,y} + PE_{EC/FC,y} \quad \textbf{Equation 12}$$

Where:

PE_y	Project emissions in year y
$PE_{AD,y}$	Project emissions associated with the anaerobic digester in year y (t CO_2e/yr)
$PE_{Aer,y}$	Project CH_4 emissions from aerobic AWMS treatment (t CO_2e/yr)
$PE_{N20,y}$	Project N_2O emissions in year y (t CO_2/yr)
$PE_{EC/FC,y}$	Project emissions from electricity consumption and fossil fuel combustion (t CO_2e/yr)

1. Project emissions associated with the anaerobic digester ($PE_{AD,y}$)

$PE_{AD,y}$ is determined using the methodological tool "Project and leakage emissions from anaerobic digesters" (Version 02.0) as defined in the applied methodology, as per the tool

$$PE_{AD,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH4,y} + PE_{flare,y} \quad \textbf{Equation 13}$$

Where:

$PE_{AD,y}$	Project emissions associated with the anaerobic digester in year y (t CO_2e)
$PE_{EC,y}$	Project emissions from electricity consumption associated with the anaerobic digester in year y (t CO_2e)
$PE_{FC,y}$	Project emissions from fossil fuel consumption associated with the anaerobic digester in year y (t CO_2e)

$PE_{CH4,y}$ Project emissions of methane from the anaerobic digester in year y (t CO_2e)

$PE_{flare,y}$ Project emissions from flaring of biogas in year y (t CO_2e)

1.1 $PE_{EC,y}$

During the site review and visit with the PP, it was confirmed that the power consumption associated with anaerobic digestion was not separately monitored for this project. As a result, all emissions resulting from power consumption for this project were calculated in $PE_{EC/FC,y}$. More validation details are in the confirmation of 'Project emissions from use of heat and/or electricity' below. Therefore, $PE_{EC,y}$=0.

1.2 $PE_{FC,y}$

Via site inspection, CTI Certification confirmed that there are no fossil fuels involved in the project for anaerobic digestion process, hence $PE_{FC,y}$=0.

1.3 $PE_{CH4,y}$

The project emissions from methane from the anaerobic digester is calculated according to the tool "Project and leakage emissions from anaerobic digesters (Version 02.0)"/69/. According to the tool, Project emissions of methane from the anaerobic digester include emissions during maintenance of the digester, physical leaks through the roof and side walls, and release through safety valves due to excess pressure in the digester.

These emissions are calculated using a default emission factor ($EF_{CH4,default}$), as follows:

$$PE_{CH4,y} = Q_{CH4,y} \times EF_{CH4,default} \times GWP_{CH4} \quad \textbf{Equation 14}$$

Where:

$PE_{EC,y}$ Project emissions of methane from the anaerobic digester in year y (t CO_2e)

$Q_{CH4,y}$ Quantity of methane produced in the anaerobic digester in year y (t CH_4)

$EF_{CH4,default}$ Default emission factor for the fraction of CH_4 produced that leaks from the anaerobic digester (fraction)

GWP_{CH4} Global warming potential of CH_4 (t CO_2 / t CH_4)

1.3.1 $Q_{CH4,y}$

According to tool14, For large scale projects only Option 1 shall be used. For small scale projects, project participants may choose between Option 1 or Option 2., hence $Q_{CH4,y}$ was determined following step 1 and Option 1 of the applied tool. Below is the formula used for the calculation of $Q_{CH4,y}$.

Option1: Procedure using monitored data $Q_{CH4,y}$ shall be measured using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (version 03.0)/68/. When applying the tool, the following applies:

a. The gaseous stream to which the tool is applied is the biogas collected from the digester;

b. CH_4 is the greenhouse gas i for which the mass flow should be determined; and

c. The flow of the gaseous stream should be measured on an hourly basis or a smaller time interval; and then accumulated for the year y. Please note that units need to be converted to tons, when applying the results in this tool.

The biogas is produced and collected from anaerobic digestion process. The flowmeters are installed at the outlet of the biogas digesters and the measured on an hourly basis time interval. So the quantity of methane produced in the digester in year y ($Q_{CH4,y}$) is the accumulation of the mass flow of methane in the gaseous stream in an hourly basis time interval. i.e.,$Q_{CH4,y} = \sum_{i=1}^{8760} F_{i,t}$

Similar to the confirmation process for the temperature of the gaseous stream at the monitoring point where Flow Meter 3 is located above, CTI also verified that the biogas produced from the anaerobic digestion tank is first dewatered and desulfurized before being stored and then used in the biogas generators. This was confirmed by reviewing the EIA report/6/ and through site inspections and visits with the project participant (PP). Therefore, CTI Certification confirms that the temperature of the gaseous stream at the monitoring point where Flow Meter 1 is located is below 60℃. It is thus reasonable for the PP to use Option A in Tool08 for calculating the total methane mass flow rate.

As per the tool, the mass flow of greenhouse gas i ($F_{i,t}$) is determined as follows:

$$F_{i,t} = V_{t,db} \times \upsilon_{i,t,db} \times \rho_{i,t} \qquad \textbf{Equation 15}$$

$$\rho_{i,t} = \frac{P_t \times MM_i}{R_u \times T_t} \qquad \textbf{Equation 16}$$

Where:

$F_{i,t}$	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)
$V_{t,db}$	Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
$\upsilon_{i,t,db}$	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas)
$\rho_{i,t}$	Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m^3 gas i)
P_t	Absolute pressure of the gaseous stream in time interval t (Pa)
MM_i	Molecular mass of greenhouse gas i (kg/kmol)

R_u Universal ideal gases constant (Pa.m^3/kmol.K)

T_t Temperature of the gaseous stream in time interval t (K)

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI Certification has confirmed that the pre-determined parameters used in Equation 16 during the $PE_{CH4,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process
GWP_{CH_4}	28 t CO_2e/t CH_4	AR5	Via checking the 100-year values from Topic 3, Box 3.2, Table 1 in the IPCC Fifth Assessment Report (AR5) /44/ and Paragraph 3.15.4 in VCS Standard Version 4.7 /77/, it is verified that the value is correct.
$Q_{CH4,y}$	24.29 t	EIA/10/	By reviewing the approved theEIA /6/ and on-site interview with the PP, CTI confirmed that the biogas generated by the anaerobic digestion is either recovered and combusted to generate electricity for the AWMS's operation or directly flared. In addition, by crosschecking EIA /6/ and ACM0010/63/, it is verified that the volumetric fraction of methane is 60% and CH_4 density is 0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure. And The project is expected to produce 6.04×10^{4}m^3 of biogas annually. Thus, $Q_{CH4,y}$=6.04×10^{4}m^{3}m^3*0.00067 t/m^3*60%=24.29 t So the $Q_{CH4,y}$data is reasonable.
$EF_{CH4,default}$	0.10	EIA/10/	By reviewing the Tool 14: “Project and leakage emissions from anaerobic digesters” (Version 02.0) /6/, CTI confirmed that the default emission factor for the fraction of CH_4 produced that leaks from the anaerobic digester is reasonable.

1.4 $PE_{flare,y}$

Via site inspection, it is confirmed that the residual gas stream will be flared by flaring in the monitoring period, so the project emissions from flaring of biogas ($PE_{flare,y}$) shall be estimated using the tool 06 "Project emissions from flaring" (version 04.0)/67/

The calculation procedure in this tool determines the project emissions from flaring the residual gas ($PE_{flare,y}$) based on the flare efficiency ($\eta_{flare,m}$) and the mass flow of methane to the flare ($F_{CH4,RG,m}$). The flare efficiency is determined for each minute m of year y based either on monitored data or default values.

The calculation procedure of project emissions from flaring is given in the following steps:

STEP 1: Determination of the methane mass flow of the residual gas;

STEP 2: Determination of the flare efficiency;

STEP 3: Calculation of project emissions from flaring.

Step 1: Determination of the methane mass flow in the residual gas

The tool 08 "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" shall be used to determine the following parameter $F_{CH4,m}$:

The following requirements apply:

(a) The gaseous stream to which the tool is applied is the residual biogas for flaring;

(b) The flow of the gaseous stream shall be measured continuously;

(c) CH_4 is the greenhouse gas i for which the mass flow should be determined;

(d) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations 3 and 17 in the tool); and

(e) The time interval t for which mass flow should be calculated is every minute m.

$F_{CH4,m}$, which is measured as the mass flow during minute m, shall then be used to determine the mass of methane in kilograms fed to the flare in minute m ($F_{CH4,RG,m}$). $F_{CH4,m}$ shall be determined on a dry basis.

Through the EIA reports/6/ and the technical agreement of the anaerobic digester/11/, CTI confirmed that the reaction temperature of the anaerobic digester ranges between 35-38 ℃. Further, during a site inspection and interview with the PP, it was confirmed that the biogas is not warmed before being delivered to the flare for combustion. In actual operation, the temperature of the gas delivered to the flare is monitored by flow meter 3, installed at the flare's inlet. Thus CTI confirmed that the temperature of the gaseous stream at the monitoring point will not exceed 60℃, meeting the requirements of Tool08 and making Option A applicable. The mass flow rate of methane in the residual gas is calculated by the following equation：

$$F_{i,t} = V_{t,db} \times \upsilon_{i,t,db} \times \rho_{i,t} \quad \text{Equation 17}$$

$$\rho_{i,t} = \frac{P_t \times MM_i}{R_u \times T_t} \quad \text{Equation 18}$$

Where:

$F_{i,t}$	Mass flow of greenhouse gas i in the gaseous stream in time interval t (kg gas/h)
$V_{t,db}$	Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
$\upsilon_{i,t,db}$	Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas)
$\rho_{i,t}$	Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m^3 gas i)
P_t	Absolute pressure of the gaseous stream in time interval t (Pa)
MM_i	Molecular mass of greenhouse gas i (kg/kmol)
R_u	Universal ideal gases constant (Pa.m^3/kmol.K)
T_t	Temperature of the gaseous stream in time interval t (K)

Step 2: Determination of flare efficiency

Via site inspection, CTI confirmed that the open flares are applied.

According to tool 06 paragraph 18: in the case of open flares, the flare efficiency in the minute m ($\eta_{flare,m}$) is 50% when the flame is detected in the minute m ($Flame_m$), otherwise $\eta_{flare,m}$ is 0%.

After reviewing the technical agreement for the flare /11/, conducting an on-site inspection, and holding interviews with the PP on-site, it was confirmed that the flame is not detected in the minute, therefore, fixed value of 0% for the flare efficiency will be applied for this project, and this is for conservative.

Step 3: Calculation of project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions for each minute m in year y, based on the methane mass flow in the residual gas ($F_{CH4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows:

$$PE_{flare,y} = GWP_{CH4,y} \times \sum_{m=1}^{525600} F_{CH4,GR,m} \times (1 - \eta_{flare,m}) \times 10^{-3} \quad \text{Equation 19}$$

Where:

$PE_{flare,y}$ Project emissions from flaring of the residual gas in year y (tCO_2e)

$GWP_{CH4,y}$ Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)

$F_{CH4,GR,m}$ Mass flow of methane in the residual gas in the minute m (kg)

$\eta_{flare,m}$ Flare efficiency in minute m

$F_{CH4,RG,m}$ will be determined as above assessment. So the Project emissions from flaring can be calculated by:

$$PE_{flare,y} = GWP_{CH4,y} \times \sum_{t} V_{t,db} \times \upsilon_{i,t,db} \times \rho_{i,t} \times (1 - \eta_{flare,m}) \times 10^{-3} \quad \text{Equation 20}$$

Where:

$V_{t,db}$ Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)

$\upsilon_{i,t,db}$ Volumetric fraction of greenhouse gas i in the gaseous stream in a time interval t on a dry basis (m^3 gas i/m^3 dry gas)

$\rho_{i,t}$ Density of greenhouse gas i in the gaseous stream in time interval t (kg gas i/m^3 gas i)

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI has confirmed that the pre-determined parameters used in Equation 20 during the $PE_{flare,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process
GWP_{CH_4}	28 t CO_2e/t CH_4	AR5	Via checking the 100-year values from Topic 3, Box 3.2, Table 1 in the IPCC Fifth Assessment Report (AR5) /44/ and Paragraph 3.15.4 in VCS Standard Version 4.7 /78/, it is verified that the value is correct.
$V_{t,db}$	0 m^3	EIA/10/	By reviewing the approved the EIA reports /6/ and on-site interview with the PP, CTI confirmed that the biogas generated by the anaerobic digestion is either recovered and combusted to generate electricity for the AWMS's operation or directly flared. Based on the approved EIA reports /6/ and the technical agreement for the flare /11/, CTI Certification validates that the flare will not be used when the biogas generator are in normal

			operation (only for emergency). Thus the $V_{t,db}$=0 is reasonable.
$\upsilon_{i,t,db}$	60%	EIA/10/	By reviewing the approved the EIA reports /6/ and on-site interview with the PP, CTI Certification confirmed that the volumetric fraction of methane is reasonable.
$\rho_{i,t}$	0.00067 t/m^3	ACM0010	As per ACM0010, CH_4 density is 0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure. During actual operations, this parameter will be calculated by Equation 18.

Therefore, $PE_{flare,y}$ = 0.

In conclusion, $PE_{AD,y}$= $PE_{CH4,y}$ + $PE_{flare,y}$ = 69 + 0 = 69 tCO_2e.

2. Project CH_4 emissions from aerobic AWMS treatment ($PE_{Aer,y}$)

$$PE_{Aer,y} = GWP_{CH_4} \times D_{CH_4} \times 0.001 \times F_{Aer} \times \left[\sum_{n=1}^{N}(1 - R_{VS,n})\right] \times \sum_{j,LT}(B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_j) + PE_{sl,y}$$ **Equation 21**

Where:

GWP_{CH_4}	Global Warming Potential (GWP) of CH_4 (t CO_2e/tCH_4)
$R_{VS,n}$	Fraction of volatile solid degraded in AWMS treatment method n of the N treatment steps prior to waste being treated (fraction)
D_{CH_4}	Density of CH_4 (t/m^3)
F_{Aer}	Fraction of volatile solid directed to aerobic system (fraction)
LT	Type of livestock
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated by animal type LT (m^3CH_4/kg dm)
$VS_{LT,y}$	Annual volatile solid excretion livestock type LT entering all AWMS on a dry matter weight basis in (kg -dm/animal/yr)
N_{LT}	Annual average number of animals of type LT for the year y (number) as estimated in equation (5(a)) or (5(b))

$PE_{sl,y}$ Project CH_4 emissions from sludge disposed of in storage pit prior to disposal during the year y (t CO_2e/yr)

$MS\%_j$ Fraction of manure handled in system j in the project activity (fraction)

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI Certification has confirmed that the pre-determined parameters used in Equation 21 during the $PE_{Aer,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process
GWP_{CH_4}	28 t CO_2e/t CH_4	AR5	Via checking the 100-year values from Topic 3, Box 3.2, Table 1 in the IPCC Fifth Assessment Report (AR5) /44/ and Paragraph 3.15.4 in VCS Standard Version 4.7 /77/, it is verified that the value is correct.
$R_{VS,n}$	pre-treatment: 20 % anaerobic digester: 90 %	Appendix 1 of methodology ACM0010	By reviewing the approved EIA/6/ and conducting an on-site interview with the PP, CTI Certification confirmed that the pre-treated manure is separated into solid and liquid portions by solid-liquid separation; the solid portion undergoes aerobic composting, while the liquid portion undergoes anaerobic treatment to produce sludge, which is then also aerobically composted. Upon reviewing Appendix 1 of methodology ACM0010 /63/, CTI confirmed that before the manure undergoes aerobic composting, it receives a pre-treatment. This pre-treatment corresponds to "underfloor pit storage" as listed in Appendix 1 of the applied methodology ACM0010 (Version 08). Therefore, the $R_{VS,n}$ is set at 20%, which is the most conservative value. The anaerobic digester treatment technology belongs to two cell lagoon in the Appendix 1 of applied methodology ACM0010 (version 08.0), so the $R_{VS,n}$ 90% which is the most conservative value.

D_{CH_4}	0.00067 t/m^3	ACM0010	As per ACM0010, CH_4 density is 0.00067 t/m^3 at room temperature (20 °C) and 1 atm pressure.
F_{Aer}	100%	EIA/10/	As this parameter is not monitored in the actual operation. Therefore, in the monitoring period, the value of this parameter in the emission reduction calculation is 100% which is confirmed as conservative.
$MS\%_j$	50%	EIA/10/	Upon reviewing the approved EIA/6/, conducting an on-site inspection, and through interview with the PP during the site visit, CTI confirmed that the value of this parameter in the ex-ante calculation is based on the estimated separation efficiency of the solid-liquid separation equipment as mentioned in the EIA /6/. Furthermore, this parameter will be monitored during actual operations. Thus, CTI confirmed that the parameter's value used in the ex-ante calculation is reasonable.
$PE_{sl,y}$	/	/	All sludge produced from the aerobic composting will be used for land application, which is calculated as leakage emission, so the $PE_{sl,y}$=0.

3. Project N_2O emissions in year y ($PE_{N20,y}$)

$$PE_{N_2O,y} = GWP_{N_2O} \times CF_{N_2O-N,N} \times \frac{1}{1000} \times (E_{N_2O,D,y} + E_{N_2O,ID,y}) \quad \text{Equation 22}$$

Where:

$PE_{N_2O,y}$	Project N_2O emissions in year y (t CO_2/yr)
GWP_{N_2O}	Global Warming Potential (GWP) for N_2O (t CO_2e/tN_2O)
$CF_{N_2O-N,N}$	Conversion factor N_2O-N to N_2O (44/28)
$E_{N_2O,D,y}$	Direct N_2O emission in year y (kg N_2O-N/year)
$E_{N_2O,ID,y}$	Indirect N_2O emission in year y (kg N_2O-N/year)

The same method used to estimate the emissions in the baseline should be used to estimate the project emissions of nitrous oxide, so the Option 1 is used to calculate the Project N_2O emissions $PE_{N20,y}$.

$$E_{N_2O,D,y} = \sum_{j,LT} EF_{N2O,D,j} \times NEX_{LT,y} \times N_{LT} \times MS\%_j \quad \text{Equation 23}$$

$$E_{N_2O,ID,y} = \sum_{j,LT} EF_{N2O,ID} \times F_{gasMS,j,LT} \times NEX_{LT,y} \times N_{LT} \times MS\%_j \quad \text{Equation 24}$$

Where:

$E_{N_2O,D,y}$	Direct N_2O emission in year y (kg N_2O-N/yr)
$E_{N_2O,ID,y}$	Indirect N_2O emission in year y (kg N_2O-N/year)
$EF_{N2O,D,j}$	Direct N_2O emission factor for the treatment system j of the manure management system (kg N_2O-N/kg N). For homogenization, aerobic composting and anaerobic digestion in this project, j takes the values of 1, 2, and 3, respectively
$NEX_{LT,y}$	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/yr) estimated as described in appendix 2
N_{LT}	Annual Average number of animals of type LT for the year y estimated as per equation 4 and 5 (number)
$MS\%_j$	Fraction of manure handled in system j (fraction)
$EF_{N_2O,ID}$	Indirect N_2O emission factor for N_2O emissions from atmospheric deposition of nitrogen on soils and water surfaces (kgN_2O-N/kg NH_3-N and NO_X-N)
$F_{gasMS,j,LT}$	Default values for nitrogen loss due to volatilisation of NH_3 and NO_X from manure management (fraction). For homogenization, aerobic composting and anaerobic digestion in this project, j takes the values of 1, 2, and 3, respectively

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI Certification has confirmed that the pre-determined parameters used in Equation 23 during the $PE_{N20,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value		Source	Validation process
$EF_{N2O,D,j}$	pre-treatment	0.002	2019 Refinement to IPCC 2006 default	$EF_{N20,D,1}$=0.002 for the pre-treatment stage of this project (corresponding to the treatment method in Table 10.21 of 2019 Refinement to IPCC 2006 as Underfloor pit storage);
	anaerobic digester	0.0006		

	aerobic composting: 0.005 kg N_2O-N/kg N	value EF_3, vol. 4, ch. 10, Table. 10.21	$EF_{N20,D,2}$=0.006 for the anaerobic digestion step of this project (corresponding to the treatment method in Table 10.21 of 2019 Refinement to IPCC 2006 as Anaerobic digester); $EF_{N20,D,3}$=0.005 for the aerobic composting stage of this project (corresponding to the treatment method in Table 10.21 of 2019 Refinement to IPCC 2006 as Composting - Passive Windrow) Through the approved EIA/6/, on-site visits and interview with the PP, CTI has verified the details of all treatment stages involved in this project. More details are in Section 3.1 of this report. By cross-referencing Table 10.21 of the 2019 Refinement to IPCC 2006 /43/, CTI confirmed that the $EF_{N20,ID,j}$ for each treatment stage is reasonable.
$MS\%_j$	pre-treatment: 100% anaerobic digester: 50% aerobic composting: 50%	EIA/10/	Through the approved EIA/6/, on-site visits and interview with the PP, CTI has verified the details of all treatment stages involved in this project. All the manure first undergoes pre-treatment, and after solid-liquid separation, it is divided into liquid and solid components. These are then separately subjected to anaerobic digestion and aerobic composting, respectively. Upon reviewing the approved EIA/6/, conducting an on-site inspection, and through interview with the PP during the site visit, CTI confirmed that the value of this parameter in the ex-ante calculation is based on the estimated separation efficiency of the solid-liquid separation equipment as mentioned in the EIA/6/. Furthermore, this parameter will be monitored during actual operations. Thus, CTI confirmed that the values of this parameter used in the ex-ante calculation is

<table>
<tr><td></td><td></td><td></td><td>reasonable.</td></tr>
<tr><td>$EF_{N_2O,ID}$</td><td>0.01 kg N_2O/kg N</td><td>2019 Refinement to IPCC 2006 default value of Aggregated EF_4, vol. 4, ch. 11 Table 11.3</td><td>Default values for EF_4 from table 11.3, chapter 11, volume 4 of 2019 Refinement to IPCC 2006</td></tr>
<tr><td>$F_{gasMS,j,LT}$</td><td><table><tr><td>pre-treatment</td><td>25%</td></tr><tr><td>anaerobic digester</td><td>50%</td></tr><tr><td>aerobic composting</td><td>60%</td></tr></table></td><td>2019 Refinement to IPCC 2006, vol. 4, ch. 10, tbl.10.22</td><td>$F_{gasMS,1,LT}$=25% for the pre-treatment stage of this project (corresponding to the treatment method in Table 10.22 of 2019 Refinement to IPCC 2006 as Underfloor pit storage);

$F_{gasMS,2,LT}$=50% for the anaerobic digestion step of this project (corresponding to the treatment method in Table 10.22 of 2019 Refinement to IPCC 2006 as Anaerobic digester);

$F_{gasMS,3,LT}$=60% for the aerobic composting stage of this project (corresponding to the treatment method in Table 10.22 of 2019 Refinement to IPCC 2006 as Composting - Passive Windrow)

Through the approved EIA/6/, on-site visits and interview with the PP, CTI has verified the details of all treatment stages involved in this project. More details are in Section 3.1 of this report. By cross-referencing Table 10.22 of the 2019 Refinement to IPCC 2006 /43/, CTI confirmed that the $F_{gasMS,j,LT}$ for each treatment stage is reasonable.</td></tr>
</table>

4. Project emissions from use of heat and/or electricity ($PE_{EC/FC}$)

$$\mathrm{PE}_{\mathrm{EC/FC,y}} = \mathrm{PE}_{\mathrm{EC,y}} + \sum_{\mathrm{j}} \mathrm{PE}_{\mathrm{FC,j,y}}$$ **Equation 25**

Where:

$\mathrm{PE}_{\mathrm{EC,y}}$ Project emissions from electricity consumption in year y. The project emissions from electricity consumption will be calculated following the latest version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". In case, the electricity consumption is not measured then the electricity consumption shall be estimated as follows $\mathrm{EC}_{\mathrm{PJ,y}} = \sum_{\mathrm{i}} \mathrm{CP}_{\mathrm{i,y}} \times 8760$, where $\mathrm{CP}_{\mathrm{i,y}}$ is the rated capacity (in MW) of electrical equipment i used for the project activity

$\mathrm{PE}_{\mathrm{FC,j,y}}$ Project emissions from fossil fuel combustion in process j during the year y. The project emissions from fossil fuel combustion will be calculated following the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". For this purpose, the processes j in the tool corresponds to all fossil fuel combustion in the AWMS (not including fossil fuels consumed for transportation of feed material and sludge or any other on-site transportation)

4.1 $\mathrm{PE}_{\mathrm{EC,y}}$

During the site review and visit with the PP, it was confirmed that the power consumption associated with anaerobic digestion was not separately monitored for this project. Therefore, all emissions resulting from power consumption for this project were calculated using the subsequent equation.

The project emissions from electricity consumption is calculated according to the "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (version 03.0).

$$PE_{EC,y} = \sum_{\mathrm{j}} EC_{\mathrm{PJ,j,y}} \times \mathrm{EF}_{\mathrm{EF,j,y}} \times (1 + \mathrm{TDL}_{\mathrm{j,y}})$$ **Equation 26**

Where:

$PE_{EC,y}$ Project emissions from electricity consumption in year y (t CO_2e)

$EC_{\mathrm{PJ,j,y}}$ The total electricity consumption associated with the anaerobic digestion facility in year y (MWh/yr)

$\mathrm{EF}_{\mathrm{EF,j,y}}$ Emission factor for electricity generation for source j in year y (t CO_2/MWh)

$\mathrm{TDL}_{\mathrm{j,y}}$ Average technical transmission and distribution losses for providing electricity to source j in year y

The Combined margin CO_2 emission factor for grid connected power generation in year y ($EF_{EF,j,y}=EF_{grid,CM,y}$) is calculated in a transparent and conservative manner as a combined margin (CM),

consisting of the combination of operating margin (OM) and build margin (BM) according to the steps prescribed in the "Tool to calculate the emission factor for an electricity system", version 07.0.

The PD (Version 2.0 dated 29/06/2025) applies the calculation of the grid emission factor as per the latest available official guidance "2023 Baseline Emission Factors for Regional Power Grids in China" published by the DNA of China based on the data from China Electric Power Yearbook (2017~2021) and China Energy Statistical Yearbook (2019~2021). $EF_{grid,OM,y}$ is calculated to be 0.7738 tCO_2e/MWh and $EF_{grid,BM,y}$ is calculated to be 0.1981 tCO_2e/MWh. The validation team has checked the website of China's DNA (Designated National Authority)/83/ and can confirm the most recent data available at the time of submission of crediting renew request is applied in the PD. It is confirmed that the calculation is in accordance with the calculation process of the corresponding methodology and tools.

As per the "Tool to calculate the emission factor for an electricity system" (version 07.0)/63/ and based on the weight ω_{OM} and ω_{BM} of 0.5:0.5 by default for the fixed crediting period, the combined margin emission factor $EF_{EF,j,y}$= 0.4860 tCO_2/MWh. This value is fixed ex-ante for the crediting period.

The actual values of parameter $TDL_{j,y}$ will be monitored by PP and determined ex post as per ACM0010 Version 08, more details in Section 3.4.8.

Through a review of the ACM0010 Version 08, relevant tools and site visits, the CTI validation team determined that the parameters in Equation 27 were correctly valued during the estimation process of $PE_{EC,y}$, as shown in the following table:

Parameter	Value	Source	Validation process
$EC_{PJ,j,y}$	409.4 MWh	EIA/10/	By checking the EIA/6/ and Technical agreement of main equipment/11/, it can be confirmed that the capacity of the generator is 1.5 kWh/m^3 , and the estimated annual biogas production is 6.04 x 10^4 m^3 , so the estimated annual electricity saving is 90.6 MWh (=6.04 x 10^4 m^3 x 1.5 kWh/m^3), since all of the electricity generated is used for AWMS, thus PP needs to purchase 40.94*10^4kwh (=50*10^4kwh - 9.06*10^4kwh) from the grid. Thus, CTI confirmed that the value of this parameter used in the ex-ante calculation is reasonable.
$TDL_{j,y}$	20%	Tool 05 Version3.0	Default value is derived from "Baseline, project and/or leakage emissions from electricity consumption and monitoring of heat generation" (version 03.0)/62/.

4.2 $PE_{FC,y}$

Via site inspection, CTI Certification confirmed that there are no fossil fuels involved in the project, hence $PE_{FC,y}$=0.

Therefore, $PE_{EC/FC,y}$ =$PE_{EC,y}$ + $PE_{FC,y}$ = 239 +0 = 239 tCO_2e.

In conclusion, PE_y= $PE_{AD,y}$ + $PE_{Aer,y}$ + $PE_{N2O,y}$ + $PE_{EC/FC,y}$ = 69 tCO_2 + 46 tCO_2 +8,110 tCO_2 + 239 tCO_2 = 8,464 tCO_2

Leakage

As per the applied methodology, Leakage covers the emissions from land application of treated manure as well as the emissions related to anaerobic digestion in a digester, occurring outside the project boundary. These emissions are estimated as net of those released under project activity and those released in the baseline scenario. Net leakage is only considered if they are positive.

$$LE_y = (LE_{PJ,N2O,y} - LE_{BL,N2O,y}) + (LE_{PJ,CH4,y} - LE_{BL,CH4,y}) + LE_{AD,y} \quad \text{Equation 27}$$

Where:

$LE_{PJ,N2O,y}$	Leakage N_2O emissions released during project activity from land application of the treated manure in year y (t CO_2e/yr)
$LE_{BL,N2O,y}$	Leakage N_2O emissions released during baseline scenario from land application of the treated manure in year y (t CO_2e/yr)
$LE_{PJ,CH4,y}$	Leakage CH_4 emissions released during project activity from land application of the treated manure in year y (t CO_2e/yr)
$LE_{BL,CH4,y}$	Leakage CH_4 emissions released during baseline scenario from land application of the treated manure in year y (t CO_2e/yr)
$LE_{AD,y}$	Leakage emissions associated with the anaerobic digester in year y (t CO_2e)

1. Estimation of leakage N_2O emissions released during baseline scenario from land application of the treated manure in year y ($LE_{BL,N2O,y}$)

$$LE_{BL,N2O,y} = GWP_{N_2O} \times CF_{N_2O-N,N} \times \frac{1}{1000} \times (LE_{N_2O,land,y} + LE_{N_2O,runoff,y} + LE_{N_2O,vol,y}) \quad \text{Equation 28}$$

$$LE_{N_2O,land,y} = EF_1 \times \prod_{n=1}^{N} (1 - R_{N,n}) \times \sum_{LT} NEX_{LT,y} \times N_{LT} \quad \text{Equation 29}$$

$$LE_{N_2O,runoff,y} = EF_5 \times F_{leach} \times \prod_{n=1}^{N} (1 - R_{N,n}) \times \sum_{LT} NEX_{LT,y} \times N_{LT} \quad \text{Equation 30}$$

$$LE_{N_2O,vol,y} = EF_4 \times \prod_{n=1}^{N} (1 - R_{N,n}) \times F_{gasm} \times \sum_{LT} NEX_{LT,y} \times N_{LT}$$

Equation 31

Where:

GWP_{N_2O}	Global Warming Potential (GWP) for N_2O (t CO_2e/tN_2O)
$CF_{N_2O-N,N}$	Conversion factor N_2O-N to N_2O (44/28)
$LE_{N_2O,land,y}$	Leakage N_2O emissions from application of manure waste in year y (kg N_2O-N/year)
$LE_{N_2O,runoff,y}$	Leakage N_2O emissions due to leaching and run-off in year y (kg N_2O-N/year)
$LE_{N_2O,vol,y}$	Leakage N_2O emissions due to volatilization in year y (kg N_2O-N/year)
EF_1	Emission factor for N_2O emissions from N inputs (kg N_2O-N/kg N input)
EF_5	Emission factor for N_2O emissions from N leaching and runoff in (kg N_2O-N/kg N leached and runoff)
EF_4	Emission factor for N_2O emissions from atmospheric deposition of N on soils and water surfaces, [kg N- N_2O/ (kg NH_3-N + NO_X-N volatilized)]
F_{leach}	Fraction of all N added to/mineralized in managed soils in regions where leaching/runoff occurs that is lost through leaching and runoff (fraction)
F_{gasm}	Fraction of N lost due to volatilization (fraction)
$R_{N,n}$	Nitrogen reduction factor (fraction). For uncovered anaerobic lagoon in baseline, n equals 0
$NEX_{LT,y}$	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/year) estimated as described in appendix 2
N_{LT}	Annual average number of animals of type LT estimated as per equation 4 and 5 (number)

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI has confirmed that the pre-determined parameters used in Equation 28 during the $LE_{BL,N2O,y}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process

$R_{N,n}$	80%	Appendix 1 of methodology ACM0010 /63/	Via checking Appendix 1 of methodology ACM0010 /63/, CTI Certification confirmed that the baseline is uncovered anaerobic lagoon which similar to the anaerobic treatment of One-cell lagoon in the Appendix 1 of applied methodology ACM0010 (version 08.0), so, the $R_{N,n}$ is 80% which is the most conservative value
EF_1	0.01 kg N_2O-N/kg N	2019 Refinement to IPCC 2006, Table 11.1, Chapter 11, Volume 4	CTI Certification confirmed that there is no published site-specific, regional or national data available based for this parameter. Trough the methodology and 2019 Refinement to IPCC 2006 /43/, it is confirmed that the default value of EF_1 in Table 11.1, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project..
EF_4	0.01 kg N_2O-N/ kg NH_3-N and NO_x-N	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	CTI confirmed that there is no published site-specific, regional or national data available based for this parameter. Through the methodology and 2019 Refinement to IPCC 2006/43/, it is confirmed that the default value of EF_4 in Table 11.3, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project.
EF_5	0.011 kg N_2O-N/ kg N	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	CTI confirmed that there is no published site-specific, regional or national data available based for this parameter. Through the methodology and 2019 Refinement to IPCC 2006 /43/, it is confirmed that the default value of EF_5 in Table 11.3, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project.
F_{leach}	0.24 Fraction	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	Default value is derived from 2019 Refinement to IPCC 2006, Table 11.3 , Chapter 11, Volume 4 /43/.

F_{gasm}	0.21 (kg NH_3-N + NO_x-N) (kg N applied or deposited)$^{-1}$	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	Default value is derived from 2019 Refinement to IPCC 2006, Table 11.3 , Chapter 11, Volume 4 /43/.

2. Estimation of leakage N_2O emissions released during project activity from land application of the treated manure in year y ($LE_{PJ, N2O}$)

$$LE_{PJ,N20,y} = GWP_{N_2O} \times CF_{N_2O-N,N} \times \frac{1}{1000} \times (LE_{N_2O,land,y} + LE_{N_2O,runoff,y} + LE_{N_2O,vol,y}) \quad \text{Equation 32}$$

$$LE_{N_2O,land,y} = EF_1 \times \prod_{n=1}^{N} (1 - R_{N,n}) \times \sum_{LT} NEX_{LT,y} \times N_{LT} \quad \text{Equation 33}$$

$$LE_{N_2O,runoff,y} = EF_5 \times F_{leach} \times \prod_{n=1}^{N} (1 - R_{N,n}) \times \sum_{LT} NEX_{LT,y} \times N_{LT} \quad \text{Equation 34}$$

$$LE_{N_2O,vol,y} = EF_4 \times \prod_{n=1}^{N} (1 - R_{N,n}) \times F_{gasm} \times \sum_{LT} NEX_{LT,y} \times N_{LT} \quad \text{Equation 35}$$

Where:

GWP_{N_2O}	Global Warming Potential (GWP) for N_2O (t CO_2e/tN_2O)
$CF_{N_2O-N,N}$	Conversion factor N_2O-N to N_2O (44/28)
$LE_{N_2O,land,y}$	Leakage N_2O emissions from application of manure waste in year y (kg N_2O-N/year)
$LE_{N_2O,runoff,y}$	Leakage N_2O emissions due to leaching and run-off in year y (kg N_2O-N/year)
$LE_{N_2O,vol,y}$	Leakage N_2O emissions due to volatilization in year y (kg N_2O-N/year)
EF_1	Emission factor for N_2O emissions from N inputs (kg N_2O-N/kg N input)
EF_5	Emission factor for N_2O emissions from N leaching and runoff in (kg N_2O-N/kg N leached and runoff)
EF_4	Emission factor for N_2O emissions from atmospheric deposition of N on soils and water surfaces, [kg N- N_2O/ (kg NH_3-N + NO_X-N volatilized)]
F_{leach}	Fraction of all N added to/mineralized in managed soils in regions where

leaching/runoff occurs that is lost through leaching and runoff (fraction)

F_{gasm}	Fraction of N lost due to volatilization (fraction)
$R_{N,n}$	Nitrogen reduction factor (fraction). For homogenization, and anaerobic-aerobic combined treatment in the project, n takes the values of 1 and 2, respectively.
$NEX_{LT,y}$	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/year) estimated as described in appendix 2
N_{LT}	Annual average number of animals of type LT estimated as per equation 4 and 5 (number)

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI Certification has confirmed that the pre-determined parameters used in Equation 32 during the $LE_{PE,N2O}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below:

Parameter	Value	Source	Validation process
EF_1	0.01 kg N_2O-N/kg N	2019 Refinement to IPCC 2006, Table 11.1, Chapter 11, Volume 4	CTI Certification confirmed that there is no published site-specific, regional or national data available based for this parameter. Trough the methodology and 2019 Refinement to IPCC 2006 /43/, it is confirmed that the default value of EF_1 in Table 11.1, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project..
EF_4	0.01 kg N_2O-N/ kg NH_3-N and NO_x-N	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	CTI Certification confirmed that there is no published site-specific, regional or national data available based for this parameter. Through the methodology and 2019 Refinement to IPCC 2006 /43/, it is confirmed that the default value of EF_4 in Table 11.3, Chapter 11, Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project.
EF_5	0.011 kg N_2O-N/ kg N	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	CTI Certification confirmed that there is no published site-specific, regional or national data available based for this parameter. Through the methodology and 2019 Refinement to IPCC 2006 /43/, it is confirmed that the default value of EF_5 in Table 11.3, Chapter 11,

			Volume 4, 2019 Refinement to IPCC 2006 is applicable to this project.
F_{leach}	0.24 Fraction	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	Default value is derived from 2019 Refinement to IPCC 2006, Table 11.3 , Chapter 11, Volume 4 /43/.
F_{gasm}	0.21 (kg NH_3-N + NO_x-N) (kg N applied or deposited)$^{-1}$	2019 Refinement to IPCC 2006, Table 11.3, Chapter 11, Volume 4	Default value is derived from 2019 Refinement to IPCC 2006, Table 11.3 , Chapter 11, Volume 4 /43/.
$R_{N,n}$	pre-treatment: 5% anaerobic treatment: 50%	Appendix 1 of methodology ACM0010 /63/	Upon reviewing Appendix 1 of methodology ACM0010 /63/, CTI Certification confirmed that the pre-treatment corresponds to "underfloor pit storage" as listed in Appendix 1 of the applied methodology ACM0010 (Version 08). Therefore, the $R_{N,1}$ is set at 5%, which is the most conservative value. The anaerobic digester treatment technology belongs to two cell lagoon in the Appendix 1 of applied methodology ACM0010 (version 08.0), so the $R_{N,2}$ 50% which is the most conservative value.

3. Estimation of leakage CH_4 emissions from land application of the treated manure

The calculation of methane emissions from land application of manure in the baseline and project cases are estimated as below:

$$LE_{BL,CH4,y} = GWP_{CH4} \times D_{CH4} \times MCF_d \times \left[\prod_{n=1}^{N}(1 - R_{VS,n})\right] \times \sum_{j,LT}(B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_j) \quad \text{Equation 36}$$

$$LE_{PJ,CH4,y} = GWP_{CH4} \times D_{CH4} \times MCF_d \times \left[\prod_{n=1}^{N}(1 - R_{VS,n})\right] \times \sum_{j,LT}(B_{0,LT} \times N_{LT} \times VS_{LT,y} \times MS\%_j)$$ **Equation 37**

Where:

$LE_{BL,CH4,y}$	Leakage CH_4 emissions released during baseline scenario from land application of the treated manure in year y (t CO_2e/yr)
$LE_{PJ,CH4,y}$	Leakage CH_4 emissions released during project activity from land application of the treated manure in year y (t CO_2e/yr)
$R_{VS,n}$	Fraction of volatile solid degraded in AWMS treatment method n of the N treatment steps prior to sludge being treated. For uncovered anaerobic lagoon in baseline, n equals 0; for homogenization, and anaerobic-aerobic combined treatment in the project, n takes the values of 1 and 2, respectively.
GWP_{CH4}	Global Warming Potential (GWP) of CH_4 (t CO_2e/tCH_4)
D_{CH4}	Density of CH_4 (t/m^3)
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated by animal type LT (m^3CH_4/kg dm)
N_{LT}	Annual average number of animals of type LT estimated as per equation 4 and 5, expressed (number)
$VS_{LT,y}$	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis (kg -dm/animal/yr)
$MS\%_j$	Fraction of manure handled in system j in the project activity (fraction)
MCF_d	Methane conversion factor (MCF_d) assumed to be equal to 1

After reviewing Version 08 of ACM0010, related tools, and site visits, CTI Certification has confirmed that the pre-determined parameters used in Equation 36 during the $LE_{BL,CH4}$ estimation process and in Equation 37 during the $LE_{PJ,CH4}$ estimation process are correctly selected, and the estimated monitoring parameters are reasonable, as shown in the table below, other parameters have been validated by CTI Certification as mentioned above.

Parameter	Value	Source	Validation process

<table>
<tr><td>MCF_d</td><td>1</td><td>ACM0010 /63/</td><td>Confirmed as correct for ex ante determination as per the applied methodology /63/.
Methane conversion factor for leakage calculation assumed to be equal 1.</td></tr>
<tr><td>$R_{VS,n}$</td><td><table><tr><td>pre-treatment</td><td>20%</td></tr><tr><td>anaerobic digester</td><td>90%</td></tr><tr><td>Uncovered anaerobic lagoon</td><td>85%</td></tr><tr><td>Passive windrow composting</td><td>40%</td></tr></table></td><td>Appendix 1 of methodology ACM0010</td><td>Upon reviewing Appendix 1 of methodology ACM0010 /63/, CTI confirmed that before the manure undergoes aerobic composting, it receives a pre-treatment. This pre-treatment corresponds to "underfloor pit storage" as listed in Appendix 1 of the applied methodology ACM0010 (Version 08). Therefore, the $R_{VS,1}$ is set at 20%, which is the most conservative value.
The anaerobic digester treatment technology belongs to two cell lagoon in the Appendix 1 of applied methodology ACM0010 (version 08.0), so the $R_{VS,2}$ 90% which is the most conservative value.
The uncovered anaerobic lagoon belongs to one cell lagoonn in the Appendix 1 of applied methodology ACM0010 (version 08.0) so the$R_{VS,n}$85% which is the most conservative value.
The passive windrow composting belongs to heated digester effluent prior to storage in the Appendix 1 of applied methodology ACM0010 (version 08.0), so the $R_{VS,3}$ 40% which is the most conservative value.</td></tr>
</table>

4. Estimation of leakage emissions associated with the anaerobic digester ($LE_{AD,y}$)

$LE_{AD,y}$ is determined using the methodological tool “Project and leakage emissions from anaerobic digesters” (Version 02.0)/69/.

The leakage emissions associated with the anaerobic digester ($LE_{AD,y}$) depend on how the digestate is managed. They include emissions associated with storage and composting of the digestate and are determined as follows:

$$LE_{AD,y} = LE_{storage,y} + LE_{comp,y} \quad \text{Equation 38}$$

Where:

$LE_{AD,y}$	Leakage emissions associated with the anaerobic digester in year y (t CO_2e)
$LE_{storage,y}$	Leakage emissions associated with storage of digestate in year y (t CO_2e)
$LE_{comp,y}$	Leakage emissions associated with composting digestate in year y (t CO_2e)

The anaerobic digestion process for this project takes place in a fully enclosed system. The biogas produced during this process is either used to generate electricity for the farm or is flared. After anaerobic digestion, the fermented sludge is treated together with the solid manure in passive windrow composting system and organic fertilizer base materials can be produced. Wastewater from anaerobic digestion is used for agriculture irrigation. CTI Certification confirmed the above treatment details by reviewing the EIA report /6/, site inspections and on-site interviews with PP.

By checking the EIA report and its approval /6/, Operation logs/112/, Technical flow charts provided by PP/13/ and via on-site visit, it can be confirmed that swine manure passes through the anaerobic digesters and produces liquid digestate and solid digestate. CTI checked the Technical flow charts in the project site/13/, Monitoring Manual established by PP /120/, Operation logs/112/ and on-site inspection, it is verified that the liquid digestate is conveyed directly to surrounding farmland via an aerated aerobic tank with continuous aeration and dose not involve composing treatment, ensuring it remains in an aerobic environment throughout. And the solid digestate (sludge) is sent directly to the passive windrow composting plant and the compost is applied directly to the land as fertiliser, there is no storage in an anaerobic environment. According to TOOL14/69/, $LE_{storage,y}$ for liquid digestate and solid digestate are calculated in the case that the digestate is stored under the following anaerobic conditions. Therefore, $LE_{storage,y}$ = 0.

In addition, leakage emissions ($LE_{comp,y}$) from solid digestate (sludge) used for aerobic composting should be considered according to TOOL14. According to para32 of TOOL14, $LE_{comp,y}$ is calculated by $PE_{comp,y}$+$LE_{comp,y}$ based on TOOL13. By checking the EIA report and via on-site visit, it is confirmed the solid digestate sent back to composting system for aerobic fermentation together with solid manure, the project emission of methane from the composting process($PE_{CH4,y}$) has been calculated on the page 74 of PD, which is not be double-counted. Project emission of N_2O from the composting process($PE_{N20,y}$) has been calculated on the page 75 of PD, included in project emission(PEy). Since this project activity does not involve co-composting, thus $PE_{RO,y}$=0. Overall, $PE_{comp,y}$=0.

Moreover, Via checking Operation logs/112/, the sales records for organic fertilizer/59/, Organic Fertiliser Sales Agreement/59/ and on-site interview, CTI confirmed that during the sale and transport of fertilisers, PP can ensure that solid digestate (organic fertiliser) remains in an aerobic condition throughout storage/disposal and/or sale/distribution, via the following measures:

-PP turns over unsold organic fertiliser at the project site each month to expose it to air and maintain aerobic conditions.

-Users are situated near the project site, PP employs truck transport without sealed packaging, leaving it exposed to the air and thus unable to create an anaerobic environment.

-Via checking the public information/154/, it is verified that under users' natural storage conditions (piled on the ground), organic fertilisers typically require over a month to form anaerobic conditions. PP advises users in the purchase contract to apply the fertiliser within 30 days and recommends periodically turning it over to ensure the organic fertiliser remains in an aerobic environment during usage.

Overall, PP can ensure that solid digestate (organic fertiliser) remains in an aerobic condition throughout storage/disposal and/or sale/distribution According to TOOL13, composting ($LE_{COMP\ ,\ y}$) shall be accounted for if compost is subjected to anaerobic storage or disposed of in a SWDS. Thus, $LE_{COMP,\ y}$ in TOOL13 is not applicable, $LE_{COMP,\ y}$=0.

And after the project construction is completed and put into operation, the digestate will not be stored in un-aerated lagoons nor in any SWDS, since the manure treatment process was designed and fixed in the EIA reports and were approved by local government, if any significant change happened to the treatment process, it would require additional investment and new government approvals.

So, the Estimation of leakage emissions associated with the anaerobic digester is 0. i.e., $LE_{AD,y}$ =0.

In conclusion, $\mathrm{LE_y} = (\mathrm{LE_{PJ,N2O,y}} - \mathrm{LE_{BL,N2O,y}}) + (\mathrm{LE_{PJ,CH4,y}} - \mathrm{LE_{BL,CH4,y}}) + \mathrm{LE_{AD,y}}$ =(4,437 - 1,867) tCO_2 + (29,114 – 15,596) tCO_2 + 0 tCO_2 = 16,088 tCO_2

Emission reductions

$$\mathrm{ER_y} = \mathrm{BE_y} - \mathrm{PE_y} - \mathrm{LE_y} \qquad \textbf{Equation 39}$$

Where:

$\mathrm{ER_y}$	Emission reductions in year y (t CO_2e/yr)
$\mathrm{BE_y}$	Baseline emissions in year y (t CO_2e/yr)
$\mathrm{PE_y}$	Project emissions in year y (t CO_2/yr)
$\mathrm{LE_y}$	Leakage emissions in year y (t CO_2/yr)

As per ACM0010, in estimating emissions reduction for claiming certified emissions reductions, if the calculated CH_4 baseline emissions from anaerobic lagoons are higher than the measured CH_4 generated in the anaerobic digester in the project situation ($Q_{CH4,y}$) in the tool “Project and leakage emissions from anaerobic digesters”), then the latter shall be used to calculate the emissions reduction for claiming certified emissions reductions. Therefore, the actual methane captured from an anaerobic digester shall be compared to the ($BE_{CH4,y}$ - $PE_{AD,y}$) in the tool “Project and leakage emissions from anaerobic digesters”) and if found lower, then ($BE_{CH4,y}$ - $PE_{AD,y}$) (which is a component of BE_y - PE_y) [in equation (39) of this report] is replaced by $Q_{CH4,y}$.

Therefore, for ex-ante estimation, $ER_y = BE_y - PE_y - LE_y$ =73,880 tCO_2 – 8,464 tCO_2 – 16,088 tCO_2= 49,328 tCO_2

In conclusion, the estimated amount of GHG emission reductions (ER_y) ex ante for the project activity is 493,280 tCO_2e during the fixed crediting period from 25/08/2023-24/08/2033, resulting in estimated average annual emission reductions of 49,328 tCO_2e.

Year	BE_y (tCO_2e)	PE_y (tCO_2e)	LE_y (tCO_2e)	ER_y (tCO_2e)
25/08/2023-31/12/2023	26,111	2,991	5,686	17,434
01/01/2024-31/12/2024	73,880	8,464	16,088	49,328
01/01/2025-31/12/2025	73,880	8,464	16,088	49,328
01/01/2026-31/12/2026	73,880	8,464	16,088	49,328
01/01/2027-31/12/2027	73,880	8,464	16,088	49,328
01/01/2028-31/12/2028	73,880	8,464	16,088	49,328
01/01/2029-31/12/2029	73,880	8,464	16,088	49,328
01/01/2030-31/01/2030	73,880	8,464	16,088	49,328
01/01/2031-31/01/2031	73,880	8,464	16,088	49,328
01/01/2032-31/01/2032	73,880	8,464	16,088	49,328
01/01/2033-24/08/2033	47,769	5,473	10,402	31,894
Total(tCO_2e)	**738,800**	**84,640**	**160,880**	**493,280**
Average(tCO_2e)	73,880	8,464	16,088	**49,328**

The detail of emission reduction calculation is transparently discussed in the PD/1/. The assessment team has checked the PD/1/ and ER sheet/2/ for the detail calculation of all the particulars and found it to be correct.

In conclusion, based on above values for each parameter for determine the ex-ante of emission reduction calculation, the CTI verified that results in PD are correct for the ex-ante ER values during the fixed crediting period.

The ER calculation sheet/2/ has been duly checked. Further it has been checked whether the results have been correctly calculated in PD/1/ for determination of ex-ante ER. The VVB has further checked the PD/1/ against the latest version of the applicable methodology for consistency.

3.2.7 Methodology Deviations

No methodology deviations were applied for the project activity.

3.2.8 Monitoring Plan

The project applies the approved monitoring methodology - ACM0010: GHG emission reductions from manure management systems, version 8.0. The selected monitoring methodology is applicable for the project. The monitoring plan is in accordance with the monitoring methodologies. The monitoring plan will give opportunity for real measurements of achieved emission reductions and contains principles and concepts on which it is based, operational and monitoring obligations of the Project Proponent such as resources involved in the monitoring process, training, support activities, calibration and data collection, quality assurance procedures, data management, electronic support tools.

1. Date and parameters available at validation

Data and Parameters	Ex-ante Determined Value
GWP_{CH_4}	28 t CO_2e/t CH_4
D_{CH4}	0.00067 t/m^3
MCF_j(with the conservative value)	68.62%
$VS_{default}$	0.2856 kg-VS-dm/animal/day
$W_{default}$	56 Kg
TAM	56 Kg
$MS\%_{Bl,j}$	100%
GWP_{N_2O}	265 t CO_2e/tN_2O
$EF_{N_2O,D,j}$	Uncovered anaerobic lagoon in baseline scenario: 0 pre-treatment: 0.002 anaerobic digester: 0.0006 aerobic composting: 0.005
$EF_{N2O,ID}$	0.01 kgN_2O-N/kg NH_3-N and NO_X-N
$EF_{CH4,default}$	0.1 t CH_4 leaked / t CH_4 produced
$R_{VS,n}$	Uncovered anaerobic lagoon in baseline: 85%

	scenario: [blank] pre-treatment: 20% anaerobic digester: 90% aerobic composting: 40%
$R_{N,n}$	pre-treatment: 5% anaerobic digester: 50% uncovered anaerobic lagoon: 80%
$F_{gasMS,j,LT}$	Uncovered anaerobic lagoon in baseline scenario: 40% pre-treatment: 25% anaerobic digester: 50% aerobic composting: 60%
$N_{rate(T)}$	0.63 kg N (1000 kg animal mass) $^{-1}$ day^{-1}
$NEX_{IPCC,default}$	12.88 kg N/animal/year
EF_1	0.01 kg N_2O-N/kg N
EF_4	0.01 kg N_2O-N/ kg NH_3-N and NO_x-N
EF_5	0.011 kg N2O-N/ kg N
F_{leach}	0.24
F_{gasm}	0.21 (kg NH_3-N + NO_x-N) (kg N applied or deposited)$^{-1}$
$EF_{EF,j,y}$	0.4860 tCO_2e/MWh
$EF_{grid,OM,y}$	0.7738 tCO_2e/MWh
$EF_{grid,BM,y}$	0.1981 tCO_2e/MWh
ω_{OM}	0.5

ω_{BM}	0.5
$\eta_{flare,m}$	0%
MCF_d	1
R_u	8,314 Pa.m^3/kmol.K
MM_i	16.04 kg/mol

2. Date and parameters Monitored

The monitoring parameters required by the methodology and applicable tools for the project are summarized in the below table.

Parameter	Description	Monitoring procedure
$N_{p,LT}$	Number of animals of type LT produced annually for the year y (number)	CTI confirmed that a specific personnel at the swine farm will monitor the parameter on a monthly basis, as per ACM0010 (Version 08). CTI checked the livestock production guidelines issued by PP/143/, invoice for the sale of swine/26/, Operation Log of Baoshan East Hope Swine Farm/112/ and on-site interviews with staff at the swine farm, it can be verified that PP records the daily market swine stock, while deducting the number of diseased and deceased swine to determine the actual daily stock. The data is recorded in the operation log, with monthly summaries cross-checked with swine sales invoices.
$N_{da,LT}$	Number of days animal of type LT is alive in the farm in the year y (number)	Through on-site interviews with staff at the swine farm and checking the livestock production guidelines issued by PP, CTI Certification confirmed that farm operators will monitor this parameter monthly as required in ACM0010 (Version 08), and will provide indirect information (e.g., sales records) for cross-checking. PP places an electronic ear tag on each pig to record its entry and exit dates to monitor the number of days it is alive on the farm.
N_{LT}	Annual average number of animals of type LT for the year y(number)	According to ACM0010, there is no way to trace the daily stock of market swine, thus Option 1 is adopted to calculate this parameter $N_{LT} = N_{da,LT} \times \left(\frac{N_{p,LT}}{365}\right)$
W_{site}	Average animal weight of a defined	Average animal weight of market swine at the swine farm will be recorded manually by the project owner. CTI checked the Operation Log of Baoshan East Hope Swine Farm/112/ and on-site interviews

	livestock population at the project site	with staff at the swine farm, it can be verified that PP monitors the weight of market swine monthly and records this in the operation log. And PP determinates the monthly sample size of market swine based on the monthly market swine in-stock quantity, using stratified random sampling to select measurement samples based on age group, which are then weighed and recorded using a Class III precision weighing instrument. Based on the records of sampling measurement each month, **average animal weight** in different phases (lactation, growth , maturity) will be calculated. As per ACM0010, Sampling procedures can be used to estimate this variable, taking into account the following guidance: (a) To ensure representativeness, each defined livestock population should be classified into a minimum of three age categories; (b) For each defined livestock population, a minimum of one monthly sample per age category should be taken; (c) When estimating baseline emissions and emissions released during baseline scenario from land application of the treated manure in the leakage section, the lower bound of the 95% confidence interval obtained from the sampling measurements should be used; (d) When estimating project emissions and emissions released during project activity from land application of the treated manure in the leakage section, the upper bound of the 95% confidence interval obtained from the sampling measurements should be used. The method of calculation of sample size is checked by CTI, it is confirmed that the calculation process is in compliance with the Appendix 6 of the Guideline of the “Sampling and surveys for CDM project activities and programmes of activities (Version 04.0)”/58/ and PP will use 95/10 confidence/precision as the criteria for the reliability of sampling efforts which is confirmed in line with Standard of “Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)”/60/. The calculation result of sample size is 423, with 141 of lactation period with 30-60 days, 141 of growth period with 60-130 days and 141 of maturity period with 130-168 days. The same has been described in the PD, which is in compliance with ACM0010. CTI Certification confirmed that the frequency and methodology of this parameter's monitoring meet the requirements of the methodology. And the calibration of weight measures will be done

		annually.
nd_y	Number of days treatment plant was operational in year y	The number of days the treatment plant was operational will be monitored and recorded by the project owner. nd_y will be daily recorded, monthly aggregated. CTI checked Operation Log of Baoshan East Hope Swine Farm/112/ and on-site interviews with staff at the swine farm, it can be verified that PP considers both the aerobic composting system and the anaerobic digestion system to be operational when functioning normally, counting these days as the treatment plant's operational days and recording them in the operational log. If either system malfunctions, that day can not be counted, and the PP will record the cause of the fault and the time of repair in the Operation Log of Baoshan East Hope Swine Farm/112/. The data is cross-checked with the breeding record/19/, manure collection record and solid-liquid separation record/27/.
$EC_{PJ,j,y}$	The electricity supplied by the grid for the proposed project in year y	This parameter will be monitored by Electricity Meter 1 continuously and at least monthly recording by PP. The electricity consumption supplied by the gird company, then the value will be determined by the electricity meter monitoring and cross-check with the grid statement. The calibration of electricity meter, including the frequency of calibration, should be done in accordance with national standards or requirements.
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	As per the Methodological Tool 05: "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation", the default value of $TDL_{j,y}$ is 20%. This parameter will be monitored annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
V_f	Biogas flow	The biogas flow will be measured at 3 points, the biogas flow from the anaerobic digester system at the outlet of the anaerobic digester system, and to generation system at the inlet of the biogas electricity generator, or to flaring system at the inlet of the flare. The meter readings will be reported cumulatively on weekly basis. Flow meters will undergo maintenance/calibration subject to appropriate industry standards. All these are in compliance with ACM 0010.
$V_{t,db}$	Volumetric flow of the gaseous stream in time interval t on a	This parameter will be monitored continuously by flow meter and hourly recorded. Volumetric flow measurement is referred to the actual pressure and temperature. The flow meter installed at the outlet of the anaerobic digester system will be calibrated periodically

<table>
<tr><td></td><td>dry basis</td><td>in accordance with manufacturer's specifications or relevant requirements. The accuracy of flow meter will satisfy with manufacturer's specifications or relevant requirements.

By checking the calibration certificate of the gas flow meter/125/, it can be confirmed that the flow meters can operate correctly during the monitoring period. Details are given below:
<table>
<tr><td>No.</td><td>Flow meter 1</td><td>Flow meter 2</td><td>Flow meter 3</td></tr>
<tr><td>Model</td><td>SDLUGB-DN100</td><td>SDLUGB-DN100</td><td>SDLUGB-DN100</td></tr>
<tr><td>Factory No</td><td>WJ20232702</td><td>WJ20232703</td><td>WJ20232704</td></tr>
<tr><td>Calibration frequency</td><td>Annually</td><td>Annually</td><td>Annually</td></tr>
<tr><td>Period of validity of Calibration Certificates</td><td>25/08/2023~ 24/08/2024
25/08/2024~ 24/08/2025</td><td>25/08/2023~ 24/08/2024
25/08/2024~ 24/08/2025</td><td>25/08/2023~ 24/08/2024
25/08/2024~ 24/08/2025</td></tr>
<tr><td>Calibration Status</td><td>Calibrated</td><td>Calibrated</td><td>Calibrated</td></tr>
</table></td></tr>
<tr><td>$v_{i,t,db}$</td><td>Volumetric fraction of greenhouse gas i in time interval t on a dry basis</td><td>This parameter will be monitored continuously by gas analyzer and hourly recorded. The gas analyzer installed at the outletill be calibrated periodically. As per Tool 08: "Tool to determine the mass flow of a greenhouse gas in a gaseous stream", calibration should include zero verification with an inert gas (e.g. N_2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufactur of the anaerobic digester system and must be under their validity period.</td></tr>
<tr><td>T_t</td><td>Temperature of the gaseous stream in time interval t</td><td>T_t will be monitored continuously by Instruments with recordable electronic signal and hourly recorded. The instruments are periodically calibrated. The calibration records will be kept available. Provided $V_{t,db}$ is converted to normal conditions during the monitoring process, T_t will not be needed.</td></tr>
<tr><td>P_t</td><td>Pressure of the gaseous stream in time interval t</td><td>P_t will be monitored continuously by Instruments with recordable electronic signal and hourly recorded. The instruments are periodically calibrated. The calibration records will be kept available. Pressure</td></tr>
</table>

		transducers (either capacitive or resistive) will be calibrated monthly. Provided $V_{t,db}$ is converted to normal conditions during the monitoring process, Pt will not be needed.
F_{Aer}	Fraction of volatile solids directed to aerobic treatment	As this parameter is not monitored in the actual operation. so in the monitoring period, the value of this parameter in the emission reduction calculation is 100% which is confirmed as conservative.
MS%j	Fraction of manure handled in system j in project activity	This parameter is monitored by the project owner annually, which is in compliance with ACM 0010.
$B_{0,LT}$	Maximum methane producing potential of the volatile solid generated by animal type LT	This parameter uses the default value from 2019 Refinement to IPCC 2006 in the current crediting period, as detailed in section 3.4.6. Upon reviewing the PD, CTI Certification confirmed that PP will review the data sources annually. If the data source is updated, the value of this parameter will be updated accordingly during the actual emission reduction calculation process.
T	Annual average ambient temperature at project site	Through on-site inspection and on-site interview with PP, CTI Certification confirmed that monitoring staff would obtain monthly temperature data from official public information and then calculate the annual averages.
$NEX_{LT,y}$	Annual average nitrogen excretion per head of a defined livestock population (kg N/animal/yr)	The parameter is calculated as the equation of option 2 in Appendix 2 of methodology ACM0010 Version 08 and the value of other parameter applied in the equation is taken from published sources (2019 Refinement to IPCC 2006/42/). The value should be updated on latest available public data source.The value should be calculated based on the weight of swine of this project by the project owner. $$NEX_{LT,y} = \frac{W_{site}}{W_{default}} \times NEX_{IPCC\ default}$$ QA/QC procedure for W_{site}, please refer to the monitoring parameter W_{site}
Type	Type of barn and AWMS	This parameter will be monitored once each monitoring period, and any change in the type of barn and AWMS during the crediting period will be reported by the PP.

$VS_{LT,y}$	Annual volatile solid excretions for livestock LT entering all AWMS on a dry matter weight basis.	The parameter is calculated based on the weight of swine and the operation days of treatment plant of this project by the project proponent. $$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) \times VS_{default} \times nd_y$$ QA/QC procedure for W_{site} and nd_y, please refer to the monitoring parameter W_{site}
$\rho_{i,t}$	Density of greenhouse gas i in the gaseous stream in time interval t	This parameter will be calculated according to the pressure and temperature. Pressure and temperature are measured continuously by the biogas flow meters. The instruments are periodically calibrated. The calibration records will be kept available.
Sale of swine	Annual sale of swine	The price quantity and destination of the swine sold will be recorded. Confirm the swine farm is 100 percent market oriented to prove the swine farm in the monitoring period still meet the requirement of high productivity systems in the Volume 4-Chapter 10, of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
Purchase of Feed	Annual Purchase of Feed	The Purchase of Feed and the invoice will be recorded. Confirm the feed of the swine farm is purchased from local or international market or intensively produced on farm to prove the swine farm in the monitoring period still meet the requirement of high productivity systems in the Volume 4-Chapter 10, of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Swines improved through breeding practices	*Demostrate animals are improved through breeding practices for commercial production.*	The number of swine introduced that have been improved through breeding practices in commercial production will be recorded. Confirm swines are improved through breeding practices for commercial production to prove the swine farm in the monitoring period still meet the requirement of high productivity systems in the Volume 4-Chapter 10, of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
W_{jx}	Total amount of waste disposed in a SWDS in year x	Via checking Operation logs/112/, Technical flow charts provided by PP/13/, the sales records for organic fertilizer/59/, Organic Fertiliser Sales Agreement/59/ and on-stie interview, CTI confirmed that PP monitors the storage/disposal and/or sale/distribution of compost through monitoring the parameter 'The status of digestate'. Once the compost has been stored anaerobically or treated in SWDS, this

		portion of compost is weighed and LEcomp is calculated based on TOOL13. The total amount of waste disposed in a SWDS in year x will be recorded continuously and aggregated at least annually. And the weight measurer will be calibrated according to JJG 539-2016 Verification Regulation of weight measurer" in China every years with accuracy grade of M1 level.
The status of digestate	Monitoring of storage/disposal and/or sale/distribution of compost and digestate	By checking the EIA report and its approval /6/, Operation logs/112/, Technical flow charts provided by PP/13/ and via on-site visit, it can be confirmed that swine manure passes through the anaerobic digesters and produces liquid digestate and solid digestate. -PP monitors oxygen concentrations within the aerated aeration tank to ensure liquid digestate remains under aerobic conditions. It is verified by checking Operation logs/112/. -1.PP monitors the turning date of unsold organic fertiliser to ensure that PP turns unsold organic fertiliser at least once per month, maintaining it in an aerobic environment. It is verified by checking Operation logs/112/. 2.PP monitors the transportation methods for organic fertilisers to ensure short transport distances and that the fertilisers are exposed to air during transportation. It is verified by checking the sales records for organic fertilizer/59/. 3.PP monitors users' application periods and storage methods through follow-up visits within 30 days of organic fertiliser sales to ensure compliance with the usage timelines and storage conditions (turning fertilizer at varying intervals) specified in the purchase contract. It is verified by checking the sales records for organic fertilizer/59/ and Organic Fertiliser Sales Agreement/59/. Once there is digestate being stored anaerobically during the monitoring period, calculate $LE_{storage,y}$ based on TOOL14. It will be monitored continuously and aggregated at least annually.
The status of biogas destruction	Monitoring of operational status of biogas destruction devices (flare and electricity)	This parameter will be continuously monitored by a flame detector installed at each project activity instance. The electric signal from the detector will be continuously sent to the operating system to record whether the flame for the flares is on or off. The UV detector will be calibrated by an independent qualified third party as per China national standard GB 12791-2006 Point Type Ultraviolet Detectors. The Electricity meters will be calibrate by an officially accredited entity in compliance with JJG 596-2012

High level of capital input	The capital that the PP used to improve the productivity	The the capital used in the production process will be recorded, cross-checked with O&M cost and sales revenue provided by PP. Confirm the high level of capital input requirements with high level of overall herd (flock) performance in the monitoring period still meet the requirement of high productivity systems in the Volume 4-Chapter 10, of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories

3. Monitoring plan

The VVB has checked the monitoring plan of the PD against the applied methodology.

The monitoring plan in the PD has been designed to comply with the latest applicable version of the methodology (ACM0010 Version 08).

The validation team evaluated the feasibility and sufficiency of the monitoring plan. The key components of the monitoring plan are as follows.

Monitoring framework:

The PD contains a diagram illustrating the Organization Structure of the Monitoring Team to be implemented by the project owner in order to implement the project activity. The VCS monitoring team will be responsible for the monitoring of all the parameters to be monitored. And all the data will be reviewed by the project developer and VVB. The organizational structure is considered sufficient to fulfil the monitoring requirements of the methodology and to ensure that emission reductions can be verified.

Monitoring equipment and installation:

Measurement instruments are described in the monitoring plan as subject to appropriate national standards with respect to installation, accuracy and calibration interval. Main instruments flow meters, electricity meters, weight measurers, gas analyzers are used to monitor related parameters as assessed in the above tables of monitored parameters.

This equipment setup is considered sufficient to carry out the monitoring requirements of the methodology, and the appropriate national standards will be followed.

Principle of Monitoring:

Listed as above table for each monitored value and assessed by VVB.

Parameters to be monitored:

Listed as above tables and assessed by VVB accordingly.

Quality assurance and quality control procedures:

The PD contains sufficient description on how quality will be controlled and assured in the monitoring of emission reductions.

Training:

Training will be provided to relevant personnel.

Data management:

All data collected as part of monitoring plan will be archived electronically on hard disks and be kept at least 2 years after the end of the last crediting period.

Corrective actions:

In case of nonconformities would be observed, a corrective action plan will be established and the whole VCS monitoring team will follow recognized standard data evaluation methods to guarantee that the data is reliable and accurate.

Sample Plan:

Sample plan is designed by PP for monitoring the parameter W_{site} which is confirmed in line with the requirement for this parameter monitoring in the applied methodology. The sample plan is designed according to the Standard of "Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)"/60/.

The sample plan including the below designs,

a. To ensure representativeness, the defined livestock population should be classified into a minimum of three age categories - verified as in line with the applied methodology;

b. For the defined livestock population, a minimum of one monthly sample per age category should be taken - verified as in line with the applied methodology;

c. PP will use 95/10 confidence/precision as the criteria for the reliability of sampling efforts - verified as in line with the standard of "Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)" and applied methodology.

Via site inspection and interview with chiefs of farms and PP, CTI confirmed that the monitoring activities of the W_{site} will be conducted in the three age groups in the swine farm at least one monthly which is verified as in line with the above requirements. The three age categories of Market swine are classified according to the age in days, i.e lactation period with 30-60 days, growth period with 60-1300 days and maturity period with 130-168 days.

Via checking the request of applied methodology, it stated "The PD should describe the system of random sampling taking into account stratification of the livestock population into a minimum of three weight categories as described above". Via site inspection, it is confirmed that for the swine farm including market swine in stock. According to the applied methodology, the defined livestock population

should be classified into a minimum of three age categories, so the sampling method is chosen as Stratified random sampling which is confirmed as applicable to the project situation.

Hence, based on this, PP designed the sampling method as Stratified random sampling in the swine farm and divide the swine from each into at least 3 age groups (lactation period with 30-60 days, growth period with 60-1300 days and maturity period with 130-168 days), which is verified by CTI as correct and reasonable and in line with the request of applied methodology/59/.

The method of calculation of sample size is checked by CTI, it is confirmed that the calculation process is in compliance with the Appendix 6 of the Guideline of the "Sampling and surveys for CDM project activities and programmes of activities (Version 04.0)"/58/ and PP will use 95/10 confidence/precision as the criteria for the reliability of sampling efforts which is confirmed in line with Standard of "Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)"/60/. The calculation result of sample size is 423, with 141 of lactation period, 141 of growth period and 141 of maturity period.

The implementation of sample plan including monitoring, data recording and collection, QA/QC procedure, emergency procedure is stated by PP which is confirmed as actual and reasonable by site inspection and interview with the chief of farms and monitoring team. The one monthly monitoring activity of the samples will be completed in the swine farm during each monitoring periods. The monitoring forms will be filled out daily by the Breeders in the swine farm to record the animal weight of the samples. All the samples will be changed at the beginning of next monitoring periods which is confirmed as conservative and more representative.

3.3 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 VALIDATION OPINION

4.1 Validation Summary

CTI Certification Co., Ltd (CTI) has been commissioned by Xi'an Carbon Neutral Environmental Technology Co., Ltd. to performed the validation of the project activity "Baoshan East Hope Swine Farm AWMS GHG Mitigation Project" in China (VCS Project ID: 5431) for the 1st crediting period 25-08-2023 to 24-08-2033 on the basis of requirements of Verified Carbon Standard (VCS) version 4.7, VCS Validation and Verification Manual version 3.2, and the approved Clean Development Mechanism (CDM) methodology ACM0010 version 8.0.

The validation scope is defined as an independent and objective review of the Project Description, the baseline scenario, the additionality, the monitoring plan and all data and information used for ex-ante calculation of emission reductions. The validation report are summarizing the findings of the validation.

In the course of the validation, 4 Clarification Request (CL), 3 Corrective Action Requests (CARs) and no Forwarded Action Requests (FARs) was raised.

4.2 Validation Conclusion

The review of the project design documentation and additional documents related to baseline and monitoring methodology and subsequent background investigation have provided the CTI with sufficient evidence to validate the fulfilment of the stated criteria. In detail the conclusions can be summarized as follows:

- the baseline scenario is correctly defined as per the applied methodology and relate tools;

- the project is additional;

- all data and information used for ex-ante calculation of emission reductions is of projected and/or hypothetical nature;

- a reasonable level of assurance has been applied;

- the monitoring plan in the validated PD is as per the applied methodology ACM0010 version 8.0;

- the project has been implemented and operated as per the PD;

- the project complies with the validation criteria for projects set out in VCS Standard version 4.7;

- The calculation of the ex ante emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 493,280 tCO_2e are most likely to be achieved within the 10-year fixed crediting period started from 25-08-2023.

It is CTI's responsibility to provide an independent validation statement on the Project's compliance with the VCS Program requirements as set out in the VCS Program Rules. The conclusions of this report show that the project, as it was described in the project description contained in the PD, is in line with all criteria applicable for the validation against the VCS standard version 4.7 without any qualifications or limitations.

Crediting Period: From 25-08-2023 to 24-08-2033

Validated estimated GHG emission reductions and carbon dioxide removals for the project crediting period:

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)

25-08-2023 - 31-12-2023	26,111	2,991	5,686	17,434	0	17,434
2024	73,880	8,464	16,088	49,328	0	49,328
2025	73,880	8,464	16,088	49,328	0	49,328
2026	73,880	8,464	16,088	49,328	0	49,328
2027	73,880	8,464	16,088	49,328	0	49,328
2028	73,880	8,464	16,088	49,328	0	49,328
2029	73,880	8,464	16,088	49,328	0	49,328
2030	73,880	8,464	16,088	49,328	0	49,328
2031	73,880	8,464	16,088	49,328	0	49,328
2032	73,880	8,464	16,088	49,328	0	49,328
01-01-2033 - 24-08-2033	47,769	5,473	10,402	31,894	0	31,894
Total	**738,800**	**84,640**	**160,880**	**493,280**	**0**	**493,280**

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Section	Information	Justification	Assessment method and conclusion
N.A.	N.A.	N.A.	N.A.

APPENDIX 2: ABBREVIATIONS

Abbreviations	Full texts
AFOLU	Agriculture, Forestry, and Other Land Use
AWMS	Animal waste management system
CCER	China Certified Emission Reduction
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CSTR	Continuous Stirred Tank Reactor
DNA	Designated National Authority
GHG	Greenhouse gas(es)
EIA	Environmental Impact Assessement
ER	Emission Reduction
ETS	Emission Trading Scheme
FAR	Forward Action Request
GHG	Greenhouse gas(es)
M&P	Modalities and Procedures
NCPG	Northwest China Power Grid
PD	Project Description
PDD	Project Design Document
PER	Project Evaluation Report
PP	Project Participant
PV	Photovoltaic
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit
VVB	Validation/Verification Body

APPENDIX 3: <COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS>

Mr. Ziqi LI

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	-	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 4: Manufacturing industries	TA 4.1. Cement and lime production
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1: Emissions of fluorinated gases
	TA 11.2: Refrigerant gas production
SS 12: Solvents use	TA 12.1: Chemical industry
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Shunrong LIN Shunrong Lin

Technical Competent Manager

Shenzhen, 01/01/2024

Ms. Qixin ZHANG

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification					
GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
√	√	-	-	-	-

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 13: Waste handling and disposal	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Shunrong LIN Shunrong Lin

Technical Competent Manager

Shenzhen, 01/05/2024

Ms. Shunrong LIN

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure
SS 14: Afforestation and reforestation	TA 14.1: Afforestation and reforestation
SS 15: Agriculture	TA 15.1: Agriculture

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by: Wu Lin

Wu LIN

Technical Competent Manager

Shenzhen, 25/10/2022

CERTIFICATE OF APPOINTMENT

Mr. Qinghua DAI

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	-	-	-	-	-	√

Scope	Technical Area
SS 13: Waste handling and disposal	TA 13.2: Manure
SS 15: Agriculture	TA 15.1: Agriculture

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Shunrong LIN

Technical Competent Manager

Shenzhen, 01/01/2024

APPENDIX 4: <REFERENCE LIST>

/1/	VCS PD Version 01 dated 25/12/2024, final Version 2.0 dated 29/06/2025
/2/	Emission reduction spreadsheet for ex-ante estimation
/3/	IRR calculation sheet
/4/	Business License of Baoshan East Hope Animal Husbandry Co., Ltd. Business License of Xi'an Carbon Neutral Environmental Technology Co., Ltd.
/5/	Public information on Baoshan East Hope Animal Husbandry Co., Ltd. https://aiqicha.baidu.com/company_detail_30214291737246
/6/	The EIA of Baoshan East Hope Swine Farm issued by Yunnan Boxi Environmental Impact Assessment Co., Ltd. in 03/2021 and approved by Baoshan Municipal Ecology and Environment Bureau on 24/03/2021
/7/	Purchase contracts of main equipment (including biogas generator, HDPE and Dehydration and desulfurization tanks etc.)
/8/	Research Report on Operation and Maintenance Costs and Economic Benefits
/9/	Construction contract of AWMS at Baoshan East Hope Swine Farm signed with Yunnan Haojie Construction Engineering Co., Ltd. on 01/10/2021.
/10/	Animal Epidemic Prevention Certificate issued by the local government
/11/	Technical agreement of main equipment
/12/	The equipment inspection and maintenance record form of AWMSs
/13/	Technical flow charts in the project site
/14/	Baoshan East Hope Animal Husbandry Co., Ltd., Operation Record of Flare at AWMS
/15/	Housing and Urban-Rural Development Bulletin, “Technical Specification for Wastewater Treatment Engineering (CJJT54-2017)”, Implementation on 01/09/2017
/16/	General Office of the Ministry of Agriculture and General Office of the Ministry of Ecology and Environment, “Technical Guidelines for the Construction of Livestock and Poultry Farm (Household) Manure Treatment Facilities”, issued on 24/06/2022
/17/	Ministry of the Environment, “Guideline on Project Construction and Investment for Rural Sewage Treatment”, issued in 03/2012

/18/	Feed purchase invoices
/19/	Feeding records of Baoshan East Hope Swine Farm
/20/	Nameplate of the equipment provided by Baoshan East Hope Animal Husbandry Co., Ltd.
/21/	Number of days for swine to be slaughtered by existing large-scale breeding groups in China https://zhuanlan.zhihu.com/p/38676811 http://finance.people.com.cn/n1/2017/1121/c1004-29658996.html
/22/	Monthly records of animal weight of a defined livestock population of three age categories
/23/	Calculation sheet of sample size for monitoring W_{site}
/24/	Feeding logs of Baoshan East Hope Swine Farm
/25/	Screenshot of the financial system
/26/	Invoice for the purchase and sale of swine
/27/	Daily operation record of treatment plant
/28/	Power Specification Table for All Electrical Devices in AWMS
/29/	Local stakeholder consultation process evidences - The Meeting Notice Letter for invitation; - Minutes of meeting - Questionnaires
/30/	The manual of ongoing communication with stakeholders
/31/	Declaration of no double counting and not involved in other GHG scheme
/32/	UNFCCC Standard “Applicability of sectoral scopes version 01.0
/33/	Labor contracts signed with employees for implementation of this project
/34/	Monthly salary slips for employees
/35/	Opinions of the Central Committee of the Communist Party of China and the State Council on the Effective Connection between Consolidating and Expanding the Achievements of Poverty Alleviation and Rural Revitalization.
/36/	Law on Promotion of Employment

/37/	Hazardous Waste Transfer Records signed among PP, transfer parties and the qualified acceptance parties
/38/	Electrical Meters for Measuring Alternating-current Electrical Energy
/39/	Verification Regulation of Vortex-shedding Flow meter
/40/	Verification Regulation of Alarmer Detectors of Combustible Gas
/41/	Digital Indicator Scale Verification Regulations
/42/	2006 IPCC Guidelines for National Greenhouse Gas Inventories
/43/	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
/44/	IPCC Fifth Assessment Report
/45/	Economic Evaluation Method and Parameter of Construction Projects
/46/	China Engineering Science 2018 Vol. 20, No. 5, “Analysis on the Amount and Utilization of Manure in Livestock and Poultry Breeding in China”
/47/	China's National Development and Reform Commission (NDRC), “Notice on Update of Financial Benchmarks from Economic Evaluation for Construction Project: Methods and Parameters (Version 03)”, issued on 15/03/2013 https://www.ndrc.gov.cn/fggz/gdzctz/tzfg/201907/t20190729_1197578.html?code=&state=123
/48/	China Statistical Yearbook 2022, 5-1 Various price indices http://www.stats.gov.cn/sj/ndsj/2022/indexch.htm
/49/	UNFCCC website available for searching Annex I countries： https://unfccc.int/process-and-meetings/the-convention/glossary-of-climate-change-acronyms-and-terms#a
/50/	Ministry of Finance, State Administration of Taxation and General Administration of Customs, "Notice on Relevant Policies for Deepening the Value-Added Tax Reform", issued on 20/03/2019
/51/	State Council (PRC), “Provisional Regulations of the People's Republic of China on Urban Maintenance and Construction Tax” issued on 08/02/1985
/52/	State Council (PRC), “Provisional regulations for the collection of education surcharges”, issued on 07/06/1990
/53/	Date of signing of EPC contract between PP and Jiangsu Joyner Environmental Protection Technology Co., Ltd. (as the date of investment decision) on 21/04/2021

/54/	Enterprise Income Tax Law of the People's Republic of China, 2007
/55/	State Administration of Taxation, “Notice on clarifying the implementation time for enterprises to adjust the proportion of residual value of fixed assets”, issued on 14/09/2005
/56/	Ministry of Environmental Protection “Guideline on Project Construction and Investment for Rural Sewage Treatment (Draft for comments)”, issued in 03/2012
/57/	Sludge management in anaerobic swine lagoons: A review https://www.x-mol.com/paper/1275511380841623552/t?recommendPaper=1213054167937126400
/58/	Details of the AWMS operation and maintenance costs for Baoshan East Hope Swine Farm in 2024
/59/	The sales records and receipt vouchers for organic fertilizer
/60/	Specifications for the construction of manure resource utilization facilities for large-scale livestock and poultry farms (for trial implementation) http://www.moa.gov.cn/gk/tzgg_1/tfw/201801/t20180111_6134801.htm
/61/	Standard of “Sampling and surveys for CDM project activities and programmes of activities (Version 09.0)”
/62/	Guideline of the “Sampling and surveys for CDM project activities and programmes of activities (Version 04.0)”
/63/	ACM0010-“GHG emission reductions from manure management systems” (Version 08.0)
/64/	Tool02 - Combined tool to identify the baseline scenario and demonstrate additionality (Version 07.0)
/65/	Tool05 - Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (Version 3.0)
/66/	Tool06 - Project emissions from flaring (Version 04.0)
/67/	Tool 07 Tool to calculate the emission factor for an electricity system (Version 07.0)
/68/	Tool 08 - Tool to determine the mass flow of a greenhouse gas in a gaseous stream (Version 03.0)
/69/	Tool 14 - Project and leakage emissions from anaerobic digesters (Version 03.0)
/70/	Tool 24 - Common practice (Version 03.1)
/71/	Tool 27 - Investment analysis (Version 14.0)
/72/	CDM Terms (Version 11.0)

/73/	VCS-Project-Description-Template-v4.2
/74/	Registration and Issuance Process version 4.4
/75/	VCS Program Definitions, v4.4
/76/	VCS Program Guide, v4.4
/77/	VCS Standard Version 4.7
/78/	Applicability of sectoral scopes version 01.0
/79/	China CER platform http://cdm.ccchina.org.cn/ccer.a spx
/80/	UNFCCC website https://cdm.unfccc.int
/81/	VCS website https://verra.org/project/vcshttps://verra.org/project/vcs-program/program/
/82/	GS website http://globalgoals.goldstandard.org/
/83/	Number of days for pigs to be slaughtered by existing largescale breeding groups in China https://zhuanlan.zhihu.com/p/3 8676811 http://finance.people.com.cn/n 1/2017/1121/c100429658996.html
/84/	Completion and acceptance report
/85/	Enforced company list http://mee.gov.cn/xxgk2018/xxg k/xxgk03/202012/W02020123 0736907682380.pdf
/86/	2023 China regional power grid carbon dioxide baseline emission factor OM calculation instructions https://ccer.cets.org.cn/notice/noticeDetail?bulletinInfoId=1259913708889575424
/87/	Commencement report of the Baoshan East Hope Swine Farm
/88/	Public information of local temperature https://www.longyang.gov.cn/info/15875/13674609.htm
/89/	LIU Yiling CHEN Yuanxiang WANG Ke. Adaptation Strategies for Climate Change in Yunnan Province[J]. Journal of Environmental Science, 2024, 43(6):1-5,12.DOI:10.13623/j.cnki.hkdk.2024.06.003
/90/	Public literature of methane producing potential of the volatile solid generated by swine manure http://www.doc88.com/p-9902182440715.html

/91/	Public information of local temperature for this monitoring period http://jx.cma.gov.cn/zfxxgk/zwgk/sjtj_1/202109/P020210909527255110935.pdf
/92/	Price index of investment in fixed asset http://www.stats.gov.cn/
/93/	Local DRC of Yunnan Province website https://yndrc.yn.gov.cn/
/94/	Other public information from Department of Agriculture and rural affairs of Yunnan Province https://nync.yn.gov.cn/
/95/	Photo taken by VVB during site visit including main equipment, swine farms, monitoring devices, etc.
/96/	Law&Regulation 1.Environmental Protection Law of the People's Republic of China; 2.Law of Solid Waste Pollution Prevention and Control; 3.Regulations on the Prevention and Control of Pollution from Livestock and Poultry Scale Breeding; 4.Administrative Licensing Law of the People's Republic of China; 5.Law of the People's Republic of China on Environmental Impact Assessment; 6.Regulations on Environmental Protection Management of Construction Projects. 7.Regulations on Prevention and Control of Pollution from Livestock and Poultry Farming on a Large Scale
/97/	Technical specification for sanitation treatment of livestock and poultry manure GB-T 36195 https://oss.baigongbao.com/202 0/12/14/MRyhTKQcWC.pdf
/98/	Regulations on Prevention and Control of Pollution from Livestock and Poultry Farming http://politics.people.com.cn/n/2013/1126/c1001-23662445.html
/99/	Ministry of Environmental Protection, Guideline on Best Available Technologies for Pollution Prevention and Control of Livestock and Poultry Farms (on Trial) issued on 17/07/2013
/100/	Ministry of Environmental Protection, Best Available Techniques Guideline for Pollution Prevention and Control in Livestock and Poultry Farming (Trial) (Draft for Comment), issued in 05/2011

/101/	Income Tax Law of the People's Republic of China for Enterprises issued by the Chairman of the People's Republic of China
/102/	Income Tax Law of the People's Republic of China or Enterprises issued by the Chairman of the People's Republic of China on 16/03/2007
/103/	Increasing price index for material fee and increasing salary level: https://www.stats.gov.cn/sj/ndsj/2023/indexch.htm, Table 5-14 https://www.stats.gov.cn/sj/ndsj/2023/indexch.htm, Table 4-13
/104/	Provisional Regulations of the People's Republic of People's Republic of China on Value-added Tax (No. 538 of the State Council of People's Republic of China) effective from 01/01/2009
/105/	Notice on Matters Relating to Transmission and Distribution Tariffs and Sales Tariffs of Yunnan Power Grid for 2020-2022 issued by Yunnan Development and Reform Commission https://www.yn.gov.cn/ztgg/yhyshj/zcwj/hddl/202203/t20220315_238689.html
/106/	Provisional Regulations of the People's Republic of China on Education tax
/107/	Regulations for the implementation of the enterprise income tax law of the people's Republic of China issued by the State Concil of P.R.China on 06/12/2007
/108/	KML file of the project area
/109/	Electricity bill
/110/	Power wiring diagram
/111/	Employee Roster
/112/	Operation Log of Baoshan East Hope Swine Farm,
/113/	Notice on Strengthening Enterprise Greenhouse Gas Emission Report Management issued by Ministry of Ecology and Environment of P.R.China on 29-03-2021 https://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html
/114/	Notice on Key Work Related to the Management of Greenhouse Gas Emission Reports for Enterprises in 2022 issued by Ministry of Ecology and Environment of P.R.China on 15-03-2022 https://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202203/t20220315_971468.html
/115/	Announcement of the State Administration of Taxation on the Clarification of the Implementation Standards for Organic Fertiliser Products http://shanxi.chinatax.gov.cn/zcfg/detail/sx-11400-3815-1698218

/116/	Land rights certification
/117/	Grievance book Grievance redress procedure
/118/	Livestock and poultry wastewater treatment, manure wastewater treatment equipment and technology process introduction https://www.bmlink.com/weidianjietialiao/news/2228783.html
/119/	Baoshan City Government Website https://www.baoshan.gov.cn/xin2022/hdjl.jsp?wbtreeid=1010
/120/	Monitoring Manual established by Baoshan East Hope Animal Husbandry Co., Ltd.
/121/	Publish information issued by Ministry of Agriculture and Rural Affairs of the People's Republic of China https://www.moa.gov.cn/ztzl/jsshzyxnc/qt/200703/t20070306_780669.htm
/122/	Regulations of the People's Republic of China on the Implementation of the Enterprise Income Tax Law issued by State Council of the People's Republic of China https://www.gov.cn/gongbao/content/2008/content_859860.htm
/123/	Land lease agreement signed by PP with villagers' committee
/124/	UV detector's calibration certificate provided by Baoshan East Hope Animal Husbandry Co., Ltd..
/125/	Gas flow meter's calibration certificate provided by Baoshan East Hope Animal Husbandry Co., Ltd.
/126/	Chen Pucai. Financial Evaluation Practice and Difficult Problem Analysis Feasibility Study and Bank Loan Project Evaluation [M]. China Planning Press, 2007 https://xueshu.baidu.com/usercenter/paper/show?paperid=90d7ac66dee2c49fd9ed93ce1ca1a5c7&site=xueshu_se
/127/	Working Capital Estimation Act https://www.docin.com/p-642473505.html
/128/	Financial audit report provided by Baoshan East Hope Animal Husbandry Co., Ltd.
/129/	Competence and training records of employees
/130/	Environmental Impact Assessment Law of the People's Republic of China

	https://cjjg.mee.gov.cn/xxgk/zcfg/202302/t20230209_1015877.html
/131/	"Law of the People's Republic of China on the Protection of Women's Rights and Interests" https://www.gov.cn/banshi/2005-05/26/content_980.htm
/132/	"Law of the People's Republic of China on the Protection of Minors" https://www.gov.cn/xinwen/2020-10/18/content_5552113.htm
/133/	"Prohibition of Child Labor Regulations" https://fgw.sh.gov.cn/ys-laogong-1.3.2.1/20240124/9174629f4b0c4453ad48edd741b50ae7.html
/134/	"Labor Law of the People's Republic of China" https://www.gov.cn/banshi/2005-05/25/content_905.htm
/135/	"Special Provisions on Labor Protection for Women Workers" https://www.gov.cn/zwgk/2012-05-Jul-content_2131567.htm
/136/	"Labor Contract Law of the People's Republic of China" http://www.mohrss.gov.cn/xxgk2020/fdzdgknr/zcfg/fl/202011/t20201102_394622.html
/137/	Equal Remuneration Convention, 1951 (No. 100) https://www.ilo.org/publications/equal-remuneration-convention-1951-no-100
/138/	SHEN Zhongquan,GUO Yuntao,YUAN Jiafu. Role and mechanism of organic fertilisers in improving the quality of agricultural products[J]. Journal of Plant Nutrition and Fertiliser,1995,(02):54-60. https://kns.cnki.net/kcms2/article/abstract?v=UThtwiquHbfYp7OxtqsIhli6uOTNm519vTK5Rqd2WZtI2z7FyXbcUW_tc8typ-MIARuP1K8SHVicYNtEypLUZNOWyPJd88xdUA2k88xU4kGGrUWa30IWZYC7CixYy7ZUya2e3wry-mWrFQZxBT4IgIRQABY9iCYEEP_OdD80kwqUYnJegy9TPQ==&uniplatform=NZKPT&language=CHS
/139/	Design specifications for wastewater storage facility of animal farm (GB/T 26624-2011) https://openstd.samr.gov.cn/bzgk/gb/newGbInfo?hcno=677F1F753B88FE5000E7F52441CAFACB
/140/	Unit price of construction project in 2023 https://zhuanlan.zhihu.com/p/496642337
/141/	Price of organic fertilizer derived from the research report https://www.renyuanshengwu.com/newsshow-103-2028-1.html

/142/	Recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd.
/143/	Livestock production guidance document issued by Baoshan East Hope Animal Husbandry Co., Ltd.
/144/	General Office of the Yunnan Provincial People's Government on the issuance of Yunnan Province livestock and poultry breeding waste resource utilisation work assessment measures (for trial implementation) [2018] No. 109 https://www.yn.gov.cn/zwgk/zfgb/2019/2019d1q/szfbgtwj/201812/t20181228_146059.html
/145/	ZHONG Tao, HE Zonglin, ZHANG Fuquan, et al. A preliminary study on animal manure utilisation[J]. Xinjiang Animal Husbandry,2017,(05):15-18.DOI:10.16795/j.cnki.xjxmy.2017.05.005. https://kns.cnki.net/kcms2/article/abstract?v=G9uEhVDeKuIwLDbENeOj7HyLN1mZ38InqOj-1SPOVCOdnrGepXVJ7wncMw5SsSxitUwImknBzULaZqMSjyZ9za83tEC4O0T4m_ArA7QYmv4lWp36f8VsmzrkbnuzIMUERb8eSfnEa62diEvrLyvw6cjeTdINLJj5_nIY2sa8cOVs6kJuTXCMYw==&uniplatform=NZKPT&language=CHS
/146/	Unit price of construction project in 2023 https://wenku.baidu.com/view/a11683f2bad528ea81c758f5f61fb7360b4c2b82.html?_wkts_=1753085083043&needWelcomeRecommand=1
/147/	VCU Price https://app-na1.hubspotdocuments.com/documents/3298623/view/125182374?accessId=a759f9
/148/	Yunnan Province government issued the average employee salary http://gonganting.yn.gov.cn/Pages_16782_855800.aspx
/149/	National standard for bio-organic fertiliser (NY 884-2012) issued by the Ministry of Agriculture of the People's Republic of China https://www.doc88.com/p-185692838307.html
/150/	Price of organic fertilizer in Yunnan Province https://www.chinabgao.com/jiage/15300605.html
/151/	Public information about Composting – In-vessel, Composting – Static pile and Composting – Intensive windrow and Passive Windrow Composting:

	https://www.ctc-n.org/sites/default/files/UNFCCC_docs/ref15x07_35.pdf https://files.h2o-china.com/paper/200911/671681257490514.pdf https://m.fx361.com/news/2020/1230/13729090.html
/152/	Yunnan Provincial Statistics Bureau http://stats.yn.gov.cn/
/153/	China National Statistics Bureau https://www.stats.gov.cn/
/154/	Anaerobic fermentation time for organic fertiliser https://wenku.baidu.com/view/4116c789950590c69ec3d5bbfd0a79563c1ed43e.html?_wkts_=1769139061492

APPENDIX 5: <CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS, FORWARD ACTION REQUESTS (CAR/CL/FAR)>

Table 1: Corrective Action Requests

CAR ID	01	Section no.	1.18	Date: 25/06/2025
Description of CAR				
According to the VCS-Project-Description-Template-v4.4： A description of how the project contributes to achieving any nationally stated sustainable development priorities, including any provisions for monitoring and reporting these. There is missing to which parameters are monitored to achieve these SDG indicators.				
Project proponent response				**Date: 29/06/2025**
This project systematically contributes to SDG 8.5 (promoting inclusive employment), SDG 12.5 (Production of organic fertilizer per year) and SDG 13.2 (climate action) by producing 6.04×10^4 m^3 of biogas annually (parameter Vf monitoring), creating five permanent local jobs (two women and three men), and achieving an annual emission reduction of 49,328 tCO_2e. It precisely aligns with China's "dual carbon" goals and rural revitalization strategy. The specific monitoring plan includes: (1) For SDG 8.5, job sustainability is verified through salary records and personnel change logs; (2)For SDG 12.5, the volume of livestock manure entering all animal waste management systems and the final output of organic fertilizer can be monitored. (3) For SDG 13.2, GHG key parameters (such as CH_4 concentration and treatment efficiency) are continuously monitored to ensure quantifiable emission reductions. All raw data is encrypted and stored, with third-party audits ensuring full lifecycle traceability.				
Documentation provided by project proponent				
Updated PD, Employee Contract, Personnel Information Sheet, Personnel Salary Sheet, ER calculation sheet				
VVB assessment				**Date: 05/07/2025**
By checking the Monitoring Manual /62/, Employee Roster /84/, Emission reduction spreadsheet/2/ and on-site inspection, it is verified that SDG8, SDG12 and SDG13 will be reasonably monitored throughout the crediting period. Thus, CAR 01 was closed.				

CAR ID	02	Section no.	3.2	Date: 25/06/2025
Description of CAR				
Please supplement the describe of applicability of Tool 27 in the PD.				
Project proponent response				**Date: 29/06/2025**
The applicability of Tool 27 has been comprehensively addressed in Section 3.2 of the updated Project Description (PD).				
Documentation provided by project proponent				
Updated PD				
VVB assessment				**Date: 05/07/2025**
By checking the revised PD/1/, it is verified that the project activity applies “Combined tool to identify the baseline scenario and demonstrate additionality” which uses TOOL27 for the demonstration of additionality and the identification of the baseline scenario. Thus, CAR 02 was closed.				

CAR ID	03	Section no.	4	Date: 25/06/2025
Description of CAR				
The Section 4 of the PD does not comply with the PD template in terms of describing the selection and basis for parameter values: Describe the procedure for quantification of baseline emissions (project emissions, leakage emissions, net GHG emission reductions) and/or removals in accordance with the applied methodology. Include all relevant equations, and explain and justify all relevant methodological choices (e.g., with respect to selection of emission factors and default values).				
Project proponent response				**Date: 29/06/2025**
The project has fully refined Section 4 in accordance with the VCS PD template requirements, ensuring compliance in emission quantification procedures and parameter selection. Please refer to the updated PD for specific details.				
Documentation provided by project proponent				
Updated PD				

VVB assessment	Date: 05/07/2025
By checking the revised PD/1/ and ER sheet/2/, it is confirmed that the calculation of the ex ante emission reductions is carried out in a transparent and conservative manner. Thus, CAR 03 was closed.	

Table 2: Clarification Requests

CL ID	01	Section no.	1.9	Date: 25/06/2025
Description of CL				
Please clarify why the proposed project start date is different from the published version.				

Project proponent response	Date: 29/06/2025
This project simultaneously initiated the construction of a swine farm and an Anaerobic Waste Management System (AWMS) in October 2021, achieving synchronized operation of both facilities on June 25, 2021. The initial registration set the crediting period start date as June 25, 2023 (aligned with the pig farm's operational commencement). However, verification revealed that the AWMS—the core facility enabling quantifiable emission reductions—only became fully operational on August 25, 2023. This time gap arose from the natural preparation period required for AWMS activation, which involves accumulating sufficient livestock manure (typically 8-10 weeks post farm operation). In accordance with VCS Standard v4.7 Section 3.8.1 stipulating that "the crediting period must reflect the actual commencement of quantifiable emission reductions," the crediting period start date has been revised to August 25, 2023, ensuring precise alignment between emission reductions and AWMS operational cycles. To implement this adjustment, the Project Description (PD) will be updated with the revised start date, and monitoring data will be correspondingly updated in the next verification report.	

Documentation provided by project proponent
Project completion and acceptance documents, Project Commissioning Certification Documents, AWMS System Operation Log

VVB assessment	Date: 05/07/2025
By checking the commencement report/57/, it can be confirmed that the construction of the swine farm and the AWMS started on 01/10/2021 simultaneously. By checking the completion report, it can be confirmed that the swine farm was officially put into operation on 25/06/2023. By checking the operation log /57/ and on-site interviews, the assessment team confirmed that the AWMS started treating manure on the farm on 25/08/2023, thus the project's start date is 25/08/2023. Thus, CL 01 was closed.	

CL ID	02	Section no.	2.1.2	Date: 25/06/2025
Description of CL				
In Section 2.1.2 of VCS PD, PP mentioned that 'comments collection books' are maintained at the project site to collect stakeholder feedback. However, the procedure for handling negative comments or complaints has not been outlined as required under Section 3.18.4 of the VCS Standard.				
Project proponent response				Date: 29/06/2025
The project proponent has established a systematic communication and grievance mechanism, ensuring stakeholder participation through multiple channels. Key information (including project progress, carbon reduction project development data, risk-benefit assessments, etc.) is displayed in real-time on bulletin boards in the project area and in the project office, with dedicated liaison officers available to address inquiries. Regular stakeholder consultation meetings are held to facilitate open discussions on core issues such as operations management and monitoring and evaluation, while clearly communicating the grievance process and feedback channels (written/oral submission methods) to ensure transparency and effective participation. Daily grievance handling follows standardized procedures: The project office maintains a complaint logbook to receive written or electronic grievance materials, with management committing to a formal written response within 14 calendar days of consolidated review. For negative feedback or complaints, public hearings are organized within 30 days to negotiate solutions, with final resolutions publicly posted on bulletin boards and the official website under the supervision of the local ecological and environmental authority. If the proposed solution is not accepted by the complainant, stakeholders may seek administrative or judicial remedies through the local ecological and environmental bureau or People's Court in accordance with Article 19 of the Environmental Protection Law, forming a closed-loop management mechanism.				
Documentation provided by project proponent				
Updated PD, Grievance book				
VVB assessment				Date: 05/07/2025
Through interviews with project managers and via checking Grievance redress procedure/100/, Local Stakeholder Consultation Records/27/, Grievance book/99/, Monitoring Manual /62/, CTI confirmed that the steps PP has developed in collaboration with stakeholders to resolve grievances are fair and reasonable. Thus, CL 02 was closed.				

CL ID	03	Section no.	5.2	Date: 25/06/2025
Description of CL				

In section 5.2 of the PD, all default IPCC values have been considered for high productivity system, which according to Volume 4-Chapter 10, of 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, are systems which are:

1. 100 percent market oriented
2. High level of capital input requirements with high level of overall herd (flock) performance
3. Feed is purchased from local or international market or intensively produced on farm.
4. Animals are improved through breeding practices for commercial production.

In absence of any monitoring carried out to establish the above features with respect to the AWMS project, please clarify that the project farm will qualify as high productivity system for each monitoring period and hence can use IPCC defaults for high productivity system throughout the crediting period.

Project proponent response	Date:29/06/2025

Based on the classification criteria outlined in Table 10.16 of Chapter 10, Volume 4 of the 2006 IPCC (2019 Refinement), this swine farm is explicitly defined as a high-productivity system, with the following core justifications:

The farm operates entirely under market-driven principles, adopting a high-capital-investment model that encompasses breeding stock selection, facility upgrades, and supply chain management to ensure the overall production performance of the herd remains at the industry's leading level. Specifically, it integrates a diversified feed supply system combining local procurement, international market imports, and on-farm intensive production (for certain feeds). Through scientific breeding practices, the farm continuously improves pig genetics, targeting the optimization of commercial production metrics such as growth rate, feed conversion ratio, and reproductive efficiency.

These characteristics align closely with the defining indicators of high-productivity systems in the IPCC guidelines—including the application of advanced technologies (genetic improvement, automated facilities), optimized resource utilization efficiency, and a comprehensive documentation chain (feed procurement contracts, standardized rearing records, and piglet introduction archives). Collectively, they confirm the farm's compliance with the systematic requirements of modern agricultural industrialization management.

Documentation provided by project proponent

EIA, purchase records of feed, breeding records of the farms, recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd.

VVB assessment	Date: 05/07/2025

By checking the EIA/5/, the total investment of Baoshan East Hope Swine Farm is $900*10^4$CNY. The swine farms are intelligent management farms. It means this proposed project has high level of capital input requirements and high level of overall herd (flock) performance. The feed is specially designed for

the swine of project proponent and provided by dedicated feed companies in local market. The project proponent applies a unique rotational binary breeding system through the experiment of crossbreeding and matching combinations of different products on other farms and has bred swines with stable genetic and high comprehensive benefits which are introduced to the Baoshan East Hope Swine Farm. Therefore, all market swines in the project activities that are improved through breeding practices for commercial production. The produced swine are mainly sold to trading companies and food-processing plants which is 100% market-oriented. Thus, the swine farms of this project are high productivity systems verified by CTI as per the purchase records of feed /18/, breeding records of the farms /19/ and recording of the swine in the breeding practices issued by Baoshan East Hope Animal Husbandry Co., Ltd. /123/, CTI has verified that Baoshan East Hope Swine Farm aligns with the definition of 'High productivity systems' as per 2019 Refinement to the IPCC 2006 Guidelines/43/.

Thus, CL 03 was closed.

CL ID	04	Section no.	4.1	Date: 25/06/2025
Description of CL				
MCF_j value depends on the climate zone where the anaerobic manure treatment facility in the baseline existed. Please clarify the specific potential evapotranspiration to precipitation ratio to verify that the value MCF_j is reasonable.				
Project proponent response				**Date: 29/06/2025**
This project is located in a subtropical monsoon climate zone, with an average annual temperature of 15.7 °C, average annual precipitation of 975.6 mm, and average annual potential evapotranspiration of 1612.6 mm[1]. The calculated ratio of potential evapotranspiration to precipitation is 1.65 (>1). According to the climate zone classification criteria recommended by the IPCC Greenhouse Gas Inventory Guidelines (primarily based on the aridity index, i.e., the ratio of annual potential evapotranspiration to precipitation), a ratio greater than 1 indicates that the project site meets the classification conditions for a warm temperate humid climate. Therefore, the applicable baseline scenario MCF_j value for this project should be 73%.				
Documentation provided by project proponent				
Updated PD				
VVB assessment				**Date: 05/07/2025**
By checking local official climate information /88/ and related literature /86/, CTI has confirmed that the annual average temperature (MAT=15.7℃) of the project location is greater than 10, and the ratio				

[1] https://www.longyang.gov.cn/info/15875/13674609.htm

of the annual potential evapotranspiration (PET) 1612.6 mm to the average precipitation (MAP) 975.6 mm is higher than 1. For this project, the MCF_j is taken as 73%, corresponding to the Warm temperature moist climate zone from Table 10.17, Chapter 10, Volume 4, 2019 Refinement to IPCC 2006 /43/.

Thus, CL 04 was closed.

FAR ID	N/A	Section no.	N/A	Date: N/A
Description of CAR				
N/A				
Project proponent response				**Date: N/A**
N/A				
Documentation provided by project proponent				
N/A				
VVB assessment				**Date: N/A**
N/A				