METHODOLOGY ASSESSMENT REPORT OF "CARBONTRIBE METHODOLOGIES"

Document Prepared by Earthood Services Limited

Methodology Titles	Carbontribe Common Methodology and Framework Carbontribe Mangroves Methodology Carbontribe Methodology for Forest Land Projects Carbontribe Methodology for Reducing Agricultural Emissions (Nitrous Oxide)
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Earthood completed this report based on the review of information given in the Carbontribe methodology document, virtual meetings, and finding clarifications and shall not be held liable for any miss re-presentation of the information whatsoever. Wherever possible, information gathered was cross-referenced with secondary sources.

EXECUTIVE SUMMARY

The proposed methodology, titled "Carbontribe Methodologies" has been developed by Carbontribe Labs OÜ. This methodology outlines the foundational principles and processes that govern all Carbontribe initiatives. It primarily focuses on establishing core principles and an overarching framework for the design and implementation of various projects aimed at reducing GHG emissions and enhancing carbon storage. The methodology ensures consistency by defining the tools, technologies, and approaches applied across different projects.

This document serves as the common methodology and provides the foundation for all project-specific methodologies (e.g., Mangroves, Forest, and Agriculture). Through this approach, Carbontribe strives to uphold environmental integrity, market credibility, transparency and best practices.

Carbontribe has engaged Earthood Services Limited (formerly known as Earthood Services Private Limited, hereafter referred to as Earthood) to conduct the validation assessment of the "Carbontribe Methodologies." The proposed methodology establishes a comprehensive framework and guidelines for project design and development, ensuring adherence to core principles.

- The proposed methodology falls under UNFCCC's sectoral scope 14 – Agriculture, Forestry, and Other Land Use (AFOLU).
- The purpose of the validation was to conduct an independent assessment of the proposed "Carbontribe Methodologies". The information given in the Carbontribe proposed methodology documents were found to be clear and appropriate.
- Validation was performed using a combination of document review, virtual meetings, finding clarifications and review of the available references.
- All the findings that were raised have throughout the validation process now been appropriately closed.

The validation team can confirm that:

- The proposed methodology has correctly identified the scope of the programme.
- The document fulfils all the methodological requirements and is well-defined.
- The document has correctly included the framework for the calculation of GHG emissions reductions and removals of the project by upholding environmental integrity, market credibility, transparency and best practices.
- Uncertainties identified during the assessment of methodology were satisfactorily addressed.
- All relevant information has been consistently applied within the applicable sections in the proposed methodologies.

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1. Introduction

1.1. Objective

The assessment's goals are to conduct an independent assessment of the proposed "Carbontribe Methodologies" and to evaluate the framework for the calculation of GHG emission reductions and removals of the project by upholding environmental integrity, market credibility, transparency and best practices. The validation process of this methodology also evaluates how well the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, 2003, ISO 14064/65 for certifying projects, and other industry best practices of relevant Standards / Procedures / Guidance are being incorporated in the methodology.

1.2. Summary Description of the Methodology

The "Carbontribe Common Methodology and Framework" document outlines the foundational principles and processes that guide all Carbontribe initiatives. It provides an overarching framework for the design and implementation of projects aimed at reducing greenhouse gas (GHG) emissions and enhancing carbon storage. The methodology establishes consistent tools, technologies, and approaches that are applied across various efforts to ensure uniformity and effectiveness.

The methodology for the Afforestation, Reforestation, and Revegetation (ARR) projects within mangrove ecosystems, ensuring precise and transparent greenhouse gas (GHG) removal estimations from projects conserving or restoring the coastal wetlands. Activities under this methodology include efforts to restore of coastal wetlands, including previously barren, degraded, or deforested mangroves revegetation, restoring disturbed wetlands through measures like afforestation, reforestation, and revegetation. The goal is to positively impact carbon stock changes in both woody and non-woody biomass, reduce emissions of CO_2, CH_4, and N_2O.

The methodology for afforestation-based projects ensures precise and transparent estimations of CO_2 sequestration by focusing exclusively on activities aimed at restoring degraded ecosystems and enhancing forest carbon sinks. These activities include the careful selection of species, implementation of appropriate restoration techniques and the re-establishment of ecological

conditions conducive to forest growth. The goal is to promote afforestation as a viable climate mitigation strategy, leading to measurable increases in carbon sequestration while supporting biodiversity and ecosystem resilience. Projects under this methodology must demonstrate verifiable carbon sequestration through detailed project plans, baseline assessments of degraded land and continuous monitoring of forest growth and biomass accumulation. The methodology adheres to internationally recognized frameworks, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and the 2019 Refinement, ensuring scientifically validated carbon accounting practices. Activities unrelated to afforestation-based CO_2 sequestration, such as carbon reductions from non-forest-related activities, are excluded. This targeted approach enhances the methodology's integrity by focusing on direct contributions to climate mitigation through afforestation efforts.

The methodology for projects implementing Carbontribe's fertilizer reduction framework ensures precise and transparent estimations of greenhouse gas (GHG) reductions by focusing exclusively on activities aimed at reducing nitrous oxide (N_2O) emissions. These activities involve the reduction or substitution of synthetic nitrogen fertilizers with alternatives such as organic fertilizers, biofertilizers, or precision nutrient applications. The goal is to optimize fertilizer use, leading to measurable reductions in N_2O emissions while promoting soil health and sustainable farming practices. Projects under this methodology must demonstrate verifiable reductions through detailed project plans, historical fertilizer use records, and documented implementation of alternative practices. Activities unrelated to N_2O emission reductions, such as carbon dioxide or methane mitigation outside the defined project scope, are excluded. This targeted approach enhances the methodology's integrity by focusing on direct sources of N_2O emissions from fertilizer application.

While the common methodology serves as the foundation, supplementary documents will address specific areas of emissions reduction and carbon sequestration, building upon these core principles. Each chapter offers practical guidance tailored to these specialized areas while maintaining alignment with the overarching framework. Together, these methodologies create a comprehensive framework that facilitates effective emissions reduction and carbon sequestration while ensuring environmental integrity and market credibility. Additionally, this document explores Carbontribe's core values, guiding principles and overall approach to achieving these objectives.

2. VVB Assessment Approach

Carbontribe has contracted Earthood to conduct the validation assessment on "Carbontribe Common Methodology and Framework". The purpose and scope of the assessment was to conduct an independent assessment and validate the methodology. This methodology provides the framework for the calculation of GHG emission reductions and removals of the project by upholding core values, environmental integrity, market credibility, transparency and best practices.

As per the proposed methodology caters to all the fundamental requirements for the transparency, independent third-party validation and verification, no double counting, baseline, additionality, permanence, and uncertainty analysis satisfactorily. This approach ensures that the methodology remains a valuable tool for promoting environmentally sustainable practices along with the benefits and safeguards towards contributing to net zero transition.

2.1. VVB Assessment Tools/Reference Documents:

- Carbontribe Common Methodology and Framework,
- 2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[1],
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[2],
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[3],
- 2014 Good practices for estimating area and assessing accuracy of land change[4]
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[5],
- The Core Carbon Principles by Integrity Council for Voluntary Carbon Market[6],
- UN's 2030 SDG Agenda[7],
- National Imagery Interpretability Rating Scale (NIIRS)[8]
- The European Space Agency: Newcomers Earth Observation Guide[9]
- Deep Learning: Ian Goodfellow, Yoshua Bengio, and Aaron Courville (2016)[10]
- References provided in the methodology.

2.2. Methods and Criteria

The method used for assessment was undertaken by a competent team of Earthhood (as mentioned in Section 2.4) and comprised of the following activities:

- Desk review of the documents and evidence submitted by the client in context of the reference of standard, methodology, and other evidence.
- Reporting assessment findings with respect to clarifications and non-conformities and the closure of the findings, as appropriate.
- Preparing a draft assessment opinion based on the raised findings and conclusions.

[1] https://www.ipcc.ch/publication/good-practice-guidance-for-land-use-land-use-change-and-forestry/
[2] https://www.ipcc-nggip.iges.or.jp/public/2006gl/
[3] https://www.ipcc-nggip.iges.or.jp/public/wetlands/
[4] https://www.sciencedirect.com/science/article/abs/pii/S0034425714000704
[5] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html
[6] https://icvcm.org/core-carbon-principles/
[7] https://sdgs.un.org/2030agenda
[8] https://irp.fas.org/imint/niirs.htm
[9] https://business.esa.int/newcomers-earth-observation-guide?utm_source=chatgpt.com
[10] https://www.deeplearningbook.org/

- Technical review of the draft assessment opinion along with other documents as appropriate by an independent competent technical review team.
- Finalization of the third-party assessment opinion (this report).

The methodology has been assessed for the data sufficiency and completeness of the parameters.

2.3. Resolution of the Findings

The methods and requirements Include Document Review (DR), Literature review and evidence provided by the Methodology developer. Inconsistencies, clarification and other doubts were raised as findings in the form of Clarification Requests (CLs) and Corrective Action Requests (CARs). The findings were suitably closed based on the methodology developer's response and the accepted clarifications made against the non-conformities. There were 12 CLs, and 11 CARs were raised during the assessment process (refer ANNEXURE 1).

2.4. Assessment Team

Earthood is accredited by Executive Board (EB) of Clean Development Mechanism (CDM) as a Designated Operational Entity (DOE), and ANSI National Accreditation Bureau (ANAB) and Global Accreditation Bureau (GAB) as Validation and Verification Body (VVB). The UNFCCC accreditation has been granted for 11 different sectoral scopes including sectoral scope 14. Afforestation and Reforestation. The information about Earthood Services Limited's accreditation and sectoral scope is available at the UNFCCC interface[11]. The personnel worked on the methodology has sufficient knowledge and experience of working on the projects in sectoral scope 14 Afforestation and Reforestation.

No.	Role	Type of resource	Last name	First name	Affiliation (Central or Other office of VVB or Outsourced)	Involvement in		
						Desk Review	Validation findings	Technical Review
1.	Team Leader	IR	Gautam	Ashok Kumar	Central Office	Y	Y	N
2.	TA Expert (14.1) & Validator	IR	Nazneen	Sadaf	Central Office	Y	Y	N
3.	RS and GIS Expert (Trainee)	IR	Atulya	Dhar	Central Office	Y	Y	N
4.	Validator (Trainee)	IR	M	Vignesh	Central Office	Y	Y	N

[11] https://cdm.unfccc.int/DOE/list/DOE.html?entityCode=E-0066

5.	Technical Reviewer	IR	Guleria	Shifali	Central Office	N	N	Y
6.	TA Expert to TR (TA 14.1)	IR	Monga	Rajesh	Central Office	N	N	Y

3. Assessment Findings

3.1. Assessment of the Core values and principles

The validation and verification body (VVB) confirms that Carbontribe's core values and guiding principles are effectively embedded within the "Carbontribe Common Methodology and Framework." These values consistently guide the design of methodologies, stakeholder collaboration and the measurement of project outcomes. The assessment affirms that Carbontribe's commitment to transparency, credibility and integrity is reflected throughout its processes, ensuring alignment with global climate goals and maintaining trust in the carbon market.

3.1.1. Innovation and Technology

As per the section 2.1, VVB confirms that Carbontribe effectively integrates innovation and technology within the "Carbontribe Common Methodology and Framework." The methodology leverages advanced tools such as remote sensing, machine learning and computer vision models to enhance accuracy and efficiency in project monitoring and management. The use of blockchain technology further strengthens transparency and security in carbon credit transactions by creating a traceable and tamper-proof record of each credit's lifecycle.

The assessment affirms that Carbontribe's commitment to technological advancement not only meets but exceeds global standards for carbon accounting, enabling scalable solutions that address the complexities of climate change while promoting sustainable development.

3.1.2. Integrity and Transparency

Section 2.2 confirms that Carbontribe upholds integrity and transparency as core principles within the "Carbontribe Common Methodology and Framework." The methodology ensures that all carbon credits represent verifiable, high-quality emissions reductions or removals. By leveraging blockchain technology, Carbontribe provides a secure and immutable ledger that guarantees traceability and prevents discrepancies such as double counting.

The assessment further confirms that Carbontribe maintains transparency by offering stakeholders clear and accessible data on project methodologies, baselines and monitoring reports. These practices foster trust, combat greenwashing and enhance credibility within the carbon market.

3.1.3. Alignment with Best Practices

The assessment team confirms that Carbontribe's methodologies are aligned with best practices, particularly the Intergovernmental Panel on Climate Change (IPCC) guidelines. In cases where specific methodologies, equations or parameters are not explicitly provided, Carbontribe adheres to IPCC best practices to ensure consistency, accuracy and credibility in carbon accounting and monitoring.

The assessment affirms that Carbontribe upholds the principles of Transparency, Consistency, Comparability, Completeness and Accuracy (TCCCA) across all aspects of parameter monitoring and carbon estimation. Where default values are applied, additional literature reviews are conducted to identify opportunities for incorporating country-specific or site-specific data, enhancing the accuracy and relevance of the results. By adhering to IPCC best practices, Carbontribe ensures that its methodologies remain scientifically robust, credible and aligned with international standards for forest monitoring and carbon accounting.

3.1.4. Environmental Stewardship

As per the section 2.4, Carbontribe demonstrates a strong commitment to environmental stewardship through its "Carbontribe Common Methodology and Framework." The methodology emphasizes protecting ecosystems, fostering biodiversity and ensuring sustainable land use while maintaining a focus on carbon sequestration and community strengthening.

The assessment affirms that Carbontribe's methodologies upholds key principles such as additionality, ensuring that project outcomes result in carbon removals that would not have occurred otherwise. Accurate baseline predictions and a focus on leakage prevention further ensure that emissions reductions are genuine, measurable and verifiable. Through thoughtful planning, transparent monitoring and a dedication to long-term ecological health, Carbontribe advances sustainable solutions that contribute to a balanced and thriving planet.

3.1.5. Scalability and Impact

VVB confirms that section 2.5 effectively supports scalability and drives measurable impact across diverse project types (i.e. Mangroves, REDD and ALM). The methodology adopts a flexible approach that considers project size, financial feasibility and technical requirements, ensuring that both small community-led initiatives and large institutional efforts can align with its principles and generate meaningful outcomes.

The assessment affirms that Carbontribe framework not only facilitates immediate emissions reductions but also fosters a ripple effect by encouraging broader environmental improvements among organizations investing in carbon credits. This approach ensures that Carbontribe's efforts contribute to permanence, lasting, systemic change across industries, ecosystems and communities.

3.2. Assessment of the Carbontribe technologies

The assessment team confirms that section 3 of the Carbontribe's common methodology effectively integrates advanced technologies to enhance the accuracy, transparency and scalability of its carbon sequestration and emissions reduction efforts. The methodology leverages digital tools such as satellite imagery, computer vision, machine learning models and blockchain technology to ensure precise measurement of biomass, accurate calculation of carbon credits and reliable data management.

The assessment affirms that Carbontribe approach offers several key benefits, including large-scale coverage, cost-effectiveness, frequent monitoring and consistent data collection. Additionally, the use of blockchain technology strengthens the security and transparency of carbon credit management, ensuring environmental integrity and market trust.

3.2.1. Satellite data

Carbontribe common methodology effectively incorporates satellite data to ensure accurate measurement, monitoring and management of carbon storage. Through its partnership with Google Earth Engine, Carbontribe leverages a vast catalogue of satellite imagery and geospatial datasets, supported by advanced analysis tools and computer vision models. This approach enhances the accuracy, scalability and transparency of its methodologies.

The assessment insists that Carbontribe adheres to rigorous Data Source Requirements, Accuracy Standards and Compliance Protocols in selecting and utilizing satellite data. The methodology ensures that:

- Appropriate spatial resolution and temporal frequency are matched to project requirements.
- Verified datasets from reputable sources such as NASA and the European Space Agency (ESA) are used.
- Metadata is consistently reviewed to validate data quality and compatibility.
- Compliance with data licensing, privacy, and security protocols is maintained.

Additionally, Carbontribe's emphasis on continuous training, quality assurance and periodic platform reviews ensures that the use of satellite data remains aligned with evolving project goals and international best practices.

CL#09, CL#10, CL#12, CAR#06, CAR#08 and CAR#11 has been raised and resolved successfully.

3.2.2. Computer vision model

Section 3.2 of the methodology effectively incorporates computer vision models to enhance the precision, scalability and efficiency of environmental monitoring and carbon accounting. By

leveraging advanced machine learning algorithms and computer vision techniques, Carbontribe automates the analysis of satellite imagery and other visual data to accurately detect and monitor changes in land use, vegetation and carbon storage.

The assessment confirms that Carbontribe adheres to best practices in Data Requirements, Model Development and Evaluation Standards, ensuring that:

- High-quality, diverse and annotated datasets are used to train models with minimal bias.
- Appropriate model architectures (e.g., CNNs, YOLO, U-Net) are selected based on project goals, with the option of using pre-trained models to enhance efficiency.
- Model evaluation follows established industry metrics (e.g., accuracy, precision, recall, IoU) to ensure robustness and reliable performance.
- Compliance with data privacy and security regulations is maintained when handling sensitive information.

Additionally, Carbontribe's commitment to continuous monitoring, version control, and periodic model reviews ensures that models remain aligned with project objectives and evolving technological standards.

CL#09, CL#10, CAR#05 CAR#06, CAR#07, CAR#08, CAR#10 and CAR#11 has been raised and resolved successfully.

3.2.3. Carbon Credit Management on Blockchain

Carbontribe integrates the blockchain technology to ensure transparency, traceability and security in carbon credit management. By issuing carbon credits as Non-Fungible Tokens (NFTs), Carbontribe establishes a unique, tamper-proof digital record for each credit, enhancing accountability and trust within the carbon market.

As per the section 3.3 the methodology upholds that Carbontribe's blockchain-based approach adheres to best practices in Credit Issuance, Data Management, Ownership and Retirement, ensuring that:

- **Issuance:** Carbon credits are issued as NFTs, guaranteeing uniqueness and verifiability.
- **Data Management:** Metadata and project information are securely stored using the Inter Planetary File System (IPFS), ensuring data integrity and decentralized access.
- **Ownership Management:** Blockchain technology records all transactions, enabling seamless, secure transfers of credit ownership while maintaining authenticity.
- **Carbon Registry and Retirement:** Retiring a credit involves transferring the NFT to a "null address," ensuring permanent removal from circulation with full transparency.

By leveraging blockchain technology, Carbontribe establishes a unified and immutable carbon credit registry, setting a higher standard for security and reliability in carbon credit management.

CL#05 further confirms that transparency and accountability of the blockchain model.

3.3. Assessment of the Project cycle

Project Cycle Framework as detailed under the section 4, is well-structured and aligned with recognized best practices for carbon project development and implementation. As illustrated in Figure 1: Carbontribe Project Cycle, the framework outlines five critical stages:

1. Conceptualization and Onboarding, where project objectives, scope and impact are identified.
2. Feasibility and Design, involving detailed project planning, boundary definition, and baseline establishment.
3. Implementation and Execution, focusing on carrying out planned activities and quantifying carbon sequestration.
4. Monitoring and Reporting, ensuring continuous tracking of project progress, validation and sequestration levels.
5. Issuance of Carbon Credit, where validated credits are issued and made available for trade.

The VVB also acknowledges that Carbontribe maintains a process of ongoing monitoring and continuous improvement throughout the project lifecycle, ensuring transparency, accuracy and long-term environmental impact.

3.3.1. Project Conceptualization and Onboarding

Project Conceptualization and Onboarding phase is aligned with industry best practices and ensures a solid foundation for project success. During this initial phase, Carbontribe effectively identifies project objectives, defines the project scope and evaluates potential environmental impacts. The process includes meaningful stakeholder engagement to ensure alignment and support, enhancing project credibility and long-term success. By clearly outlining goals, timelines and expected outcomes while assessing implications for carbon sequestration and ecosystem restoration, Carbontribe ensures that projects are positioned to deliver measurable and lasting environmental benefits.

3.3.2. Feasibility & Design

As per the section 4.2 of the methodology, Feasibility and Design phase follows best practices and ensures a robust framework for project implementation. During this phase, Carbontribe develops a comprehensive implementation plan that outlines the specific steps necessary to achieve project objectives. The project boundaries both geographical and temporal are clearly defined and the baseline scenario is established to represent projected emissions or sequestration levels in the

absence of the project. This approach enables accurate measurement of additionality and project impact. By considering local conditions, species and environmental factors in the design phase, Carbontribe ensures that projects are well-prepared for successful execution and long-term effectiveness.

3.3.3. Implementation & Execution

Based on the assessment, section 4.3 adheres to best practices and ensures effective project delivery. This phase involves carrying out planned activities such as land preparation, planting and ecosystem restoration to meet project objectives. Carbon sequestration is quantified using robust monitoring methods, including field measurements and remote sensing, in accordance with established guidelines such as the IPCC. Accurate execution during this phase is critical for achieving carbon removal targets and ensuring reliable carbon credit accounting, aligning with international standards for environmental integrity.

3.3.4. Monitoring & Reporting

Carbontribe ensures the continuous tracking of project validation, progress and carbon sequestration levels. Regular monitoring evaluates the effectiveness of restoration activities, measures environmental impact and identifies any changes in conditions. Data is systematically collected and reported to ensure alignment with expected outcomes. This phase also documents any necessary adjustments or improvements based on observed results, enhancing transparency and maintaining the credibility of issued carbon credits.

3.3.5. Issuance of Carbon Credits

Issuance of Carbon credits follows established protocols by ensuring that validated and verified carbon credits are officially issued and made available for trade. This phase marks the successful completion of carbon sequestration activities and verifies that the carbon savings meet the required standards. The issuance process guarantees that the project's environmental impact is properly recognized, contributing to emission reduction goals and providing measurable benefits to stakeholders. These verified credits can then be sold or retired in carbon markets, enhancing transparency and accountability.

3.3.6. Ongoing monitoring

Carbontribe maintains high standards of project performance through continuous assessment and improvement. This phase includes regular coaching and technical guidance to refine sequestration techniques and adapt to unforeseen environmental changes. By incorporating rigorous, real-time monitoring and risk mitigation strategies addressing potential carbon reversal risks such as extreme weather events or ecosystem disturbances. Carbontribe ensures that only verified carbon removals are accounted for the annual credit issuance cycle minimizes over crediting risks and increases accessibility for smaller-scale participants. Moreover, the use of blockchain based credit

retirement prevents double counting, reinforcing transparency and permanence While insurance mechanisms address any monitoring discrepancies. These measures collectively enhance the credibility, reliability and long-term impact of the generated carbon credits.

4. Assessment Conclusion

Earthood Services Private Limited has performed validation of the proposed "Carbontribe Common Methodology and Framework" along with all the supporting documents as referred in the methodology document. The validation was performed based on Earthood's internal procedures and fundamental requirements set for any standard carbon registry. Principles such as IPCC Good practices, carbon core values, integrity, transparency, additionality, and innovative technologies were assessed to review the common methodology. The methodology follows IPCC Guidelines for National Greenhouse Gas Inventories (2006), Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2013), Good practices for estimating area and assessing accuracy of land change (2014) and Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2019). The VVB has reviewed the proposed methodology and has raised findings based on the assessment procedures. Based on the findings and suggestions the methodology was improved.

This is the first version of the methodology validation and it will be further subjected to revisions and as when required given there shall be no deviation from the requirements of fundamental principles and materiality set in the current version of the Methodology.

Approved by

Dr. Kaviraj Singh,
CEO,
Earthood Services Limited.

Date: 16/05/2025
Place: Gurugram, Haryana

Annexure 1: Carbontribe Common Methodology's Clarification Requests and Corrective Action Requests

Table 1.Remaining FAR from validation

FAR ID	00	Section no.		Date : DD/MM/YYYY
Description of FAR				
NIL				
Project participant response				**Date :** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

There is no FAR from this validation.

Table 2. CL from this validation

CL ID	01	Section no.		Date : 23/08/2024
Description of CL				
The Carbontribe Methodology document has no Specific Title of the Methodology. The document does not describe the objectives of the methodology. Additionally, the document needs to describe the framework and sources on which the document has been developed. PP needs to provide all these details in the document. Furthermore, to understand the objectives and application of the methodology a summary description needs to provided.				
Project participant response				**Date :** DD/MM/YYYY
Titles and objectives are added to the methodologies. Referenced papers and frameworks are more clearly described within reference and in sections if required.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
Upon review of the common and different methodology documents it was observed that they still lack the required information. Therefore, this finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
Titles and objectives are added to the methodologies. Referenced papers and frameworks are more clearly described within reference and in sections if required.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date: 25/12/2024**

Upon review of the common and different methodology documents it was observed that the required information has been sufficiently added. Therefore, this finding is CLOSED.

CL ID	02	**Section no.**		**Date :** 23/08/2024
Description of CL				
The Methodology document describes methods for green carbon, blue carbon, CH_4 and NO_2 reduction in single document. It is not clear how three different types of Carbon removal methods can be described and defined in single methodology. The rationale behind combining different methods in a single document needs to be elaborated.				
Project participant response				**Date :** DD/MM/YYYY
Methodologies are split per green, blue, CH_4 and NO_2 to avoid confusion.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
Separate documents for different approaches have been provided. Therefore, this finding is CLOSED.				

CL ID	03	**Section no.**		**Date :** 23/08/2024
Description of CL				
The methodology document does not describe how the project boundary would be described and what are the different carbon pools that need to be included for carbon removal calculations.				
Project participant response				**Date :** DD/MM/YYYY
Project boundary is added at each methodology				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
The project boundary and carbon pools described need additional information. Therefore, this finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
Project boundary is added at each methodology				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/12/2024
The project boundary has been added in all the documents. Therefore, this finding is CLOSED.				

CL ID	04	Section no.		Date : 23/08/2024
Description of CL				
Baseline and additionality are the crucial aspects of any carbon removal/reduction project. However, the methodology does not cover baseline, additionally aspects in the document.				
Project participant response				**Date :** DD/MM/YYYY
Clearer definitions of baseline (per methodology) and additionally (in common) were added				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
This finding will be assessed further with new findings added for different methodology documents. Therefore, this finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
Clearer definitions of baseline (per methodology) and additionally (in common) were added				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/12/2024
The baseline and additionality sections have been added in the different methodology documents. Therefore, this finding is CLOSED.				

CL ID	05	Section no.	Common methodology	Date : 23/08/2024
Description of CL				
1. PP is requested to clarify which established standards and guidelines the Carbontribe methodology follow/aligns with? 2. What measures are incorporated within the methodology to maintain methodological rigor and facilitate verification and validation processes? Are there particular practices or protocols adopted to adhere to these standards? How does the methodology handle documentation and reporting to meet the requirements of these standards? Are there specific formats or protocols followed to ensure compliance and ease of verification?				
Project participant response				**Date :** DD/MM/YYYY
Our goal is to create our own standard and make it transparent referring to relevant scientific papers and other existing standards that Carbontribe can transparently comply. The standard and exactly how we comply are stored on blockchain so transparency, tamper-proofness accountability and reproducibility are secured without asking another standard to manually verify: Everything we do is available openly for public. How we exactly do this is described in 1.methodology_common and we are filing a patent application for an end-to-end procedure we developed.				
Documentation provided by project participant				
1.methodology_common				

VVB assessment	Date: 25/11/2024
The finding is OPEN till the assessment of different methodologies is complete.	
Project participant response	**Date :** 06/12/2024
Our goal is to create our own standard and make it transparent referring to relevant scientific papers and other existing standards that Carbontribe can transparently comply with. The standard and exactly how we comply are stored on blockchain so transparency, tamper-proofness, accountability and reproducibility are secured without asking another standard to manually verify: Everything we do is available openly for the public. How we exactly do this is described in 1.methodology_common and we are filing a patent application for an end-to-end procedure we developed.	
Documentation provided by project participant	
Our Common Methodology	
VVB assessment	**Date:** 25/12/2024
The response provided above explains that PP will develop its own standard which will comply with points explained in common methodology. Therefore, this finding is CLOSED.	

CL ID	06	Section no.		Date : 23/08/2024
Description of CL				
The project document lacks clarity regarding the conditions under which it can be applied and the criteria that determine eligibility. Clear applicability conditions and eligibility criteria are essential to ensure that the project's objectives are met, and emission reduction & removals are accurately calculated.				
Project participant response				**Date :** DD/MM/YYYY
Eligibilities and conditions are added				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
Applicability conditions and eligibility criteria are still not clear in the documents. Hence the finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
Eligibilities and conditions are added				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date :** 25/12/2024
Eligibilities and conditions are added in the different methodology documents. Therefore, this finding is CLOSED.				

CL ID	07	Section no.		Date : 23/08/2024
Description of CL				
The methodology does not outline the procedures for establishing baseline estimates and ensuring additionality, both of which are pivotal factors in the context of calculating Emission Reductions. This lack leaves a critical gap in the understanding of how project effectiveness and efficiency will be measured. Accurate baseline estimates and the demonstration of additionality are essential to evaluate the				
Project participant response				**Date :** DD/MM/YYYY
Calculation details are added for both baseline and additionality per methodology.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
Baseline and additionality have not been described with clarity. There are still major gaps in the description of baseline and additionality. Therefore, this finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
Calculation details are added for both baseline and additionality per methodology.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/12/2024
Calculation details are added for both baseline per methodology. Therefore, this finding is CLOSED.				

CL ID	08	Section no.		Date : 23/08/2024
Description of CL				
The equations given for various forms of carbon calculation i.e Green Carbon, Blue Carbon, N2O and Methane are incomplete. Furthermore, the units given are not uniform.				
Project participant response				**Date :** DD/MM/YYYY
More detailed calculations and descriptions are added for each methodology and units are uniformed to avoid confusion				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
The calculation processes are still incomplete and units provided are not correct. Therefore, this finding is OPEN				
Project participant response				**Date :** 06/12/2024
More detailed calculations and descriptions are added for each methodology and units are uniformed to avoid confusion				

Documentation provided by project participant	
All the methodologies	
VVB assessment	**Date:** 25/12/2024
Upon review of the different methodologies, it was observed that all calculations have been described in detail alongwith correct units. Therefore, this finding is CLOSED.	

CL ID	09	**Section no.**	3.2	**Date :** 23/08/2024
Description of CL				
Under monitoring heading under different sections it is mentioned “Area: Direct measurements backed by computer vision”. However, no description or process of computer vision has been provided. It needs to be explained what the computer vision is that will be applied in the methodology.				
Project participant response				**Date :** DD/MM/YYYY
The digital tool conditions are added including computer vision and satellite data quality to be assured				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
The calculation processes are still incomplete, and units provided are not correct. Therefore, this finding is OPEN				
Project participant response				**Date:** 06/12/2024
The digital tool conditions are added including computer vision and satellite data quality to be assured.				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/12/2024
The methodology documents have added how area will be calculated with the help from computer vision and satellite data. Therefore, this finding is CLOSED.				

CL ID	10	**Section no.**	3	**Date:** 23/08/2024
Description of CL				
The very first page of the document mentions “**Machine learning based data enhancement & estimation”.** However, there is no clarity or explanation as to how machine learning based data enhancement would occur.				
Project participant response				**Date :** DD/MM/YYYY
The digital tool conditions are added including computer vision and satellite data quality to be assured				
Documentation provided by project participant				

1.methodology_common	
VVB assessment	**Date:** 25/11/2024
The finding is OPEN till detailed explanation is provided in the Common methodology document.	
Project participant response	**Date :** 06/12/2024
The digital tool conditions are added including computer vision and satellite data quality to be assured.	
Documentation provided by project participant	
Our Common Methodology	
VVB assessment	**Date:** 25/12/2024
Required information has been added in the common methodology. Therefore, finding is CLOSED.	

CL ID	11	**Section no.**		**Date : :** 23/08/2024
Description of CL				
The document lacks clarity on data and parameters. There is no guidance on monitoring and data recording.				
Project participant response				**Date :** DD/MM/YYYY
The monitoring data and parameters are described more in detail in each methodology				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/11/2024
The data and parameters are still not very clear. Finding remains OPEN.				
Project participant response				**Date :** 06/12/2024
The monitoring data and parameters are described more in detail in each methodology				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 25/12/2024
The monitoring data and parameters have been described in detail in all the methodologies. Therefore, this finding is CLOSED.				

CL ID	12	**Section no.**	3.1.1	**Date** 06/11/2024
Description of CL				
The PP has stated in the methodology that:" High-resolution satellite data is a key to ensure granular level of digital monitoring and we require at least 100m pizel size." However, a 100-metre pixel size satellite dataset is not a high-resolution data. It is a low-resolution dataset. The PP needs to clarify this statement and correct the spelling of pixel. A pixel can also becalled a pel, but there is nothing like a pizel.				
Project participant response				**Date :** 06/12/2024

(i)(ii)(iii) Further explanations are added to clarify the mentioned points (iv) National Imagery Interpretability Rating Scale (NIIRS) is referenced to back up the resolution chapter
Documentation provided by project participant
Our Common Methodology
VVB assessment | **Date:** 10/12/2024
In Section 3.1.1, the PP has mentioned that "For high-level assessments (e.g., regional or global),moderate-resolution imagery (10-100 meters) may be sufficient, while detailed studies may require higher resolutions (1-5 meters). For training a land cover classification machine learning model, the resolution of the land cover data is crucial; therefore, a minimum resolution of 10 meters is required." (i)This statement has been made keeping in mind that the satellite data explained by the PP here is in its raw form; hence the word medium-resolution imagery must be used, and not moderate-resolution imagery. The PP is requested to correct the same. (ii)The PP needs to explain the meaning of high-level assessments (e.g. Regional or global) and detailed studies by citing examples based on how moderate-resolution imageries and high-resolution imageries are apt for usage in high-level assessments and detailed studies respectively. (iii)It still remains unclear whether this project will use Low, Medium, High or Very High-Resolution satellite imagery. A very generic statement regarding a 10-meter satellite imagery being utilized in general for training a land cover classification machine learning model has been made, however no statement has been definitively made highlighting its project-specific nature. Also, the types of satellite data that is used or will be used by the PP needs to be briefly explained. (iv)For generic statements made, the PP must add relevant citations and references backing them. Hence, CL#12 stands OPEN.
Project participant response | **Date :** 06/12/2024
(i)(ii)(iii) Further explanations are added to clarify the mentioned points (iv) National Imagery Interpretability Rating Scale (NIIRS) is referenced to back up the resolution chapter
Documentation provided by project participant
Our Common Methodology
VVB assessment | **Date:** 25/12/2024
As per the updated Common Methodology document provided by the PP, the following observations were made by the VVB: (i)The PP has changed the resolutions as well of the medium-resolution and high-resolution imageries, apart from changing the name "moderate" to "medium". The PP has changed the resolution range of medium-resolution imageries to 30-300 meters and high-resolution imageries to 5-30 meters in the newly updated Common Methodology document. However, this is incorrect. The PP is requested to maintain the same resolutions of 10-100 meters and 1-5 meters for medium-resolution and high-resolution imageries as mentioned in the previously sent Common Methodology Document. (ii)The PP has changed the name "regional" to "country" now. However, this wasn't asked for by the VVB. The VVB would want to reiterate the finding raised on the date 10/12/2024: "The PP needs to explain the meaning of high-level assessments (e.g. Regional or global) and detailed studies by citing examples based on how moderate-resolution imageries and high-resolution imageries are apt for usage in high-level assessments and detailed studies respectively."

(iii)This part of the finding is subject to closure only after (i) and (ii) are sufficiently addressed. (iv)Citations related to the spatial resolutions of Low, Medium and High-Resolution datasets can also be included in the Common Methodology document, train, test, validation split ratio, choice of neural network architectures and model evaluation metrics, etc Until then, CL#12 stands OPEN.

Project participant response	**Date :** 17/01/2025
(i) We now use categories defined by ESA https://business.esa.int/newcomers-earth-observation-guide?utm_source=chatgpt.com#ref_3.1 and the link was added as also mentioned in (iv) (ii) "country" is reverted back to "regional" (iv) Following links and citations were added - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 11: Practical Methodology for 1.3.2.2 General: model architecture selection - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 5 for 1.3.2.1 data split - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 11: Practical Methodology for 1.3.2.3 Performance Metrics - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 11: Practical Methodology for 1.3.2.3 Cross-validation - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 11: Practical Methodology for 1.3.2.3 Cross-validation - Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, specifically in Chapter 11: Practical Methodology for 1.3.2.3 Cross-validation	
VVB assessment	**Date:** 27/01/2025
The PP has incorporated all the suggested changes by the VVB. Hence, no further clarification on this is required from the PP. CL#12 stands CLOSED now.	

Table 3. CAR from this validation

CAR ID	01	**Section no.**		**Date :** 23/08/2024
Description of CAR				
The different headings in the document have no numbering. The document needs to be divided into different sections and sub-sections with proper numbers.				
Project participant response				**Date :** 06/12/2024
Headings with numbers are introduced per methodology with relevant sub sections				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 10/12/2024
Headings with proper numbering has been provided. Therefore, this finding is CLOSED.				

CAR ID	02	Section no.		Date : 23/08/2024
Description of CL				
There are several links provided for references. However, most of the links either do not open or are obsolete. The methodological approach should be backed by clear and scientific references.				
Project participant response				**Date :** 06/12/2024
Broken links are fixed and sorted well per methodology				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 10/12/2024
The links are functional. Therefore, this finding is CLOSED.				

CAR ID	03	Section no.		Date : 23/08/2024
Description of CL				
There are several inconsistencies and missing references throughout the document. For example on Page 4 **"Dry woody biomass (DWB), kg** This is based on an extension publication from the University of Nebraska. This publication has a table with average weights for one cord of wood for different temperate tree species." No details of the Publication from Nebraska have been provided.				
Project participant response				**Date :** 06/12/2024
Broken references and links including the specified example are fixed				
Documentation provided by project participant				
All the methodologies				
VVB assessment				**Date:** 10/12/2024
The referred papers and links have been provided. Therefore, this finding is CLOSED.				

CAR ID	04	Section no.	3.1	Date : 06/11/2024
Description of CAR				
The PP must give a brief description explaining the Land Cover Classification Problem in the methodology in Section 3.1.				
Project participant response				**Date :** 06/12/2024
Brief description of land cover classification was added				
Documentation provided by project participant				

Our Common Methodology	
VVB assessment	**Date:** 10/12/2024
The PP has updated and explained about land cover classification briefly in the PD. Hence CAR#04 stands CLOSED.	

CAR ID	05	**Section no.**	3.2.3	**Date :** 06/11/2024
Description of CAR				
In Section 3.2.3, the PP has mentioned that:" For classification problem such as land cover classification, the computer vision model needs to be at least 90% accurate with validation set." The PP needs to mention any citations or references in the methodology that validate this percentage accuracy claim.				
Project participant response				**Date :** 06/12/2024
To align with industry standards and best practices (despite the absence of a universally required accuracy level), methodologies adhere to established guidelines such as those outlined in Good Practices for Estimating Area and Assessing Accuracy of Land Change. These best practices, widely recognized in remote sensing and environmental research, ensure the reliability and robustness of land cover classification and accuracy assessments.				
Documentation provided by project participant				
Our Common Methodology				
VVB assessment				**Date:** 10/12/2024
In Section 3.2.3 of the PD, the PP has stated that "In general, an accuracy of 80-90% is considered sufficient for most non-medical applications. For land cover classification tasks, where the input data typically consists of satellite images, the resolution of the imagery often imposes limitations on accuracy. Consequently, for classification tasks like land cover mapping, a computer vision model should achieve at least 90% accuracy on the validation set to ensure reliable performance." While this explanation can be considered reasonably sufficient for the purpose of justification, however there are no proper citations or references added in the PD to back these statements. The PP is requested to add relevant citations or references alongside these statements in the PD to add more value to these claims. Thus, CAR#05 stands OPEN.				
Project participant response				**Date :**
To align with industry standards and best practices (despite the absence of a universally required accuracy level), methodologies adhere to established guidelines such as those outlined in Good Practices for Estimating Area and Assessing Accuracy of Land Change. These best practices, widely recognized in remote sensing and environmental research, ensure the reliability and robustness of land cover classification and accuracy assessments.				
Documentation provided by project participant				
Our Common Methodology				
VVB assessment				**Date:** 10/12/2024

The PP has provided the relevant research paper as a reference at the end of the Common Methodology document, to back these statements. Hence, no further explanation from the PP is required on this. CAR#05 stands CLOSED.

CAR ID	06	Section no.	3.2	Date : 06/11/2024
Description of CAR				
In Section 3.2 under the title Computer Vision Model, the PP must also include the following details: **(i)Description about training, testing and validation Dataset:** The PP needs to briefly describe the meaning of training, testing and validation dataset. **(ii)Data Sources:** The PP must mention the sources of the data that are used for training, testing and validation, including any satellite imagery or other geospatial data. **(iii)Train, Test, Validation Split:** The PP must mention the ratio or percentage of data that will be utilized for training, testing and validation. **(iv)Model Specifications:** The PP must provide information about the architecture of the computer vision model (e.g., CNN, ResNet), any pre-trained models used or ensemble model, and the specific training, testing and validation frameworks. **(v)Training Details:** The PP must include information on the training process, such as the number of epochs, batch size, learning rate, and any data augmentation techniques applied. **(vi)Evaluation Metrics:** Besides accuracy, the PP must detail other evaluation metrics used to assess the model's performance, such as Precision, Recall, F1 score, and AUC-ROC. **(vii)Model Evaluation and Hyperparameter Tuning:** The PP needs to provide a detailed explanation of the Model Evaluation process, and the methods used for Hyperparameter Tuning. **(vii)Error Analysis:** The PP must conduct and report on an error analysis to identify common misclassifications and their potential causes, providing insights into the model's limitations. **(viii)Deployment and Monitoring:** The PP must describe how the model will be deployed and monitored in real-world applications, including any mechanisms for updating the model as new data becomes available. **(ix)Use Case Examples:** The PP must include specific examples of how the model will be applied in practice, detailing potential benefits and limitations.				
Project participant response				**Date :** 06/12/2024
More detailed about “model information” was added				
Documentation provided by project participant				

- Train, test validation split

In machine learning, datasets are typically divided into three subsets to ensure robust model evaluation. By separating the data into these subsets, you ensure the model is reliable and performs well on new, unseen data. The data split ratio has to be reported. The commonly used dataset splits, such as 80:10:10 or 70:15:15 (for training, validation, and testing, respectively), are generally recommended. However, alternative split ratios may be acceptable if justified with a clear and appropriate rationale Training set should be used to train the model, enabling it to learn patterns, relationships, and features in the data Validation set should be used to fine-tune the model and select the best hyperparameters (e.g., learning rate, number of layers) Test set should be used to assess the model's final performance on unseen data

- evaluation metrics

Performance Metrics: Use relevant performance metrics based on the application. For classification, common metrics include accuracy, precision, recall, and F1 score. For object detection and segmentation, use metrics like mAP (mean Average Precision), IoU (Intersection over Union), and pixel accuracy.

- hyperparameter tuning
- Model information: Details about the model—including specifications, training methodology, evaluation metrics, hyperparameter tuning processes (epochs, batch size, learning, rate, data augmentation, etc if relevant), deployment strategies, monitoring protocols, and use case examples—should be thoroughly documented and shared, provided that doing so does not conflict with intellectual property laws or other legal frameworks.
- the PP is requested to explain in brief about the Machine Learning approach that they would be incorporating for their project or will it be a completely new (ensemble model) approach, which will be developed from scratch?

There is no universally "best" model, as better-performing models continuously emerge. A recommended best practice is to begin with a simple model that satisfies the required accuracy level, as it is easier to train, maintain, and deploy. Once the initial model is implemented, its performance metrics—such as accuracy, precision, recall, and F1 score—should be monitored to determine the next steps, such as introducing additional complexity such as adding extra layers or fine-tuning hyperparameters. Starting with an overly complex model can create significant challenges in training, maintenance, and deployment without ensuring meaningful performance improvements. Thus, simplicity is often the most efficient and effective starting point.

VVB assessment	**Date:** 10/12/2024
The PP has added the required information asked to sufficient extent currently in the PD. However, the training, testing and validation ratio or percentage split has still not been updated in the PD. The PP is requested to explain about the types of evaluation metrics like Precision, Recall, F1 score and AUC-ROC in detail. The PP is also requested to explain about hyperparameter tuning in detail with definitions of epochs, batch size, learning, rate, data augmentation, etc. in the PD. Also, the PP is requested to explain in brief about the Machine Learning approach that they would be incorporating for their project, or will it be a completely new (ensemble model) approach, which will be developed from scratch? Hence, CAR#06 stands OPEN.	
Project participant response	**Date:**
Documentation provided by project participant	

VVB assessment	**Date:** 10/01/2025
The VVB acknowledges the explanation provided by the PP in response to the finding raised and confirms that the explanation provided suffices as a good enough justification for the finding raised. Also, the PP has included a detailed overview of the model information that has been incorporated in the Common Methodology document. Hence, CAR#06 stands closed now.	

CAR ID	07	**Section no.**	3	**Date :** 06/11/2024
Description of CAR				
In Section 3, the PP has mentioned that:" Digital tools play a crucial role in estimating biomass, which is essential for calculating carbon credits in carbon offset programs." The PP needs to explain in depth how these digital tools utilized in this project help in estimation of biomass.				
Project participant response				**Date :** 06/12/2024
General methodological approach how Carbontribe utilizes technology is detailed in "Carbontribe's Technology and Approach"				
Documentation provided by project participant				
We decided to discuss - in common: generic technical specifications and requirements - In separate standards like Blue, Green or Fertilizer: how to utilise these digital tools in GHG estimation. For example in Blue, this is addressed in 3.3.1 Process Flow and Green, this is addressed in 2.3.1 Process Flow				
VVB assessment				**Date:** 10/12/2024
The PP has provided sufficient information regarding the digital tools that will be utilized for this project. However, the way these digital tools will be applied/utilized for the estimation of biomass has not been explained. The PP is requested to explain as to how the digital tools mentioned in the PD will be utilized for the estimation of biomass in this PD. Hence, CAR#06 stands OPEN.				
Project participant response				**Date :**
Documentation provided by project participant				
VVB assessment				**Date:** 10/01/2025
The PP is requested to correct the word "computer vision mode" mentioned in Step 2. It is model, not mode in the newly updated Fertilizer document. Also, in some documents, the PP has mentioned that a decadal (10 year) Land Cover Analysis will be carried out to see whether native ecosystems have been cleared or not, while in some documents a Land Cover Analysis of 5 years has been mentioned.				

The PP is requested to keep a consistent numerical range value of the number of years over which the Land Cover Analysis will be carried out. Until then, CAR#06 stands OPEN.
Documentation provided by project participant
> "computer vision mode" This is corrected in all the documents > The PP is requested to keep a consistent numerical range value of the number of years over which the Land Cover Analysis will be carried out As indicated, we have updated all the documents to have consistent 5 years.
VVB assessment **Date:** 27/01/2025
The VVB confirms that all the suggested changes have been incorporated by the PP across all documents. Hence, CAR#07 stands CLOSED now.

CAR ID	08	**Section no.**		**Date :** 06/11/2024
Description of CAR				
In Section 1.4, the PP has mentioned that:" Generally use of digital tools like satellite data or computer vision provides these comparative benefits over manual inspections." The PP needs to explain this statement succinctly.				
Project participant response				**Date :** 06/12/2024
General methodological approach how Carbontribe utilizes technology is detailed in "Carbontribe's Technology and Approach"				
Documentation provided by project participant				
Our Common Methodology				
VVB assessment				**Date:** 10/12/2024
This finding is subject to closure only after CL#12 has been sufficiently addressed and closed. Hence, CAR#08 stands OPEN.				
Project participant response				**Date :** 06/12/2024
Documentation provided by project participant				
VVB assessment				**Date:** 10/01/2025
Since this finding's closure is dependent on the closure of CL#12, CAR#07 still stands OPEN.				
VVB assessment				**Date:** 27/01/2025

The PP has sufficiently addressed CL#12 for its closure. And since CAR#08's closure is also dependent on CL#12, CAR#08 stands CLOSED now.

CAR ID	09	Section no.		Date : 06/11/2024
Description of CAR				
The PP needs to explain the following statements for more clarity on the DMRV system: (a) A broad range of the flexible monitoring frequency needs to be mentioned in the methodology by the PP or the minimum and maximum frequency at which the system can be configured to monitor? (b) The PP needs to explain if there are any specific intervals (e.g., daily, weekly, monthly) that are commonly used? (c)The PP needs to explain as to how the flexibility in monitoring frequency enhances the overall effectiveness of your monitoring program?				
Project participant response				**Date :** 06/12/2024
Monitoring frequencies are described per equation and parameter in each methodology.				
Documentation provided by project participant				
Methodology Mangroves				
VVB assessment				**Date:** 10/12/2024
The PP has sufficiently addressed the finding raised above by providing the respective equations and parameters used for monitoring, how they will be monitored and how frequently they will be monitored. Hence, CAR#09 stands CLOSED.				

CAR ID	10	Section no.		Date : 07/11/2024
Description of CAR				
The PP needs to include the following explanations for The Baseline Definition given in Section 2.2.1: (a) How does the Computer Vision Model validate whether the baseline is a non-forest area? (b) What are the official documents used for supporting this validation? (c) How is the PP conducting the Physical Monitoring of the baseline?				
Project participant response				**Date :** 06/12/2024
(a) 3.3.1 Process Flow was added to address what computer vision does and how computer vision step becomes a part of the entire flow (b) 1.2.3 Alignment with Best Practices summarises general approach and alignment with documents (c) Monitoring is described in 3.3 Quantification of Estimated Removals per parameter				
Documentation provided by project participant				
Our Common Methodology & Methodology Mangroves				
VVB assessment				**Date:** 10/12/2024

This finding is subject to closure after CAR#11 has been sufficiently addressed and closed. Hence, CAR#10 stands OPEN.
VVB assessment **Date:** 27/01/2025
Since, CAR#11 still stands OPEN, this finding CAR#10, whose closure is dependent on the closure of CAR#11, also stands OPEN.
VVB assessment **Date:** 12/02/2025
Since the closure of this finding was dependent on CAR#11, CAR#10 now stands CLOSED.

CAR ID	11	**Section no.**		**Date :** 07/11/2024
Description of CAR				
(i) (a) Section 2.3.1 states that "CO2 cerficate will be calculated machanically and automatically using satellite imagery data and computer vision model will detect landcover at pixel level." The PP must explicitly explain the data sources and inputs used for mechanically and automatically calculating CO2 certificates. (b)The PP must also explain the procedure for carrying out this process. (ii)The PP is also requested to correct the spellings: cerficate and machanically.				
Project participant response				**Date :** 06/12/2024
(1) The project scope is expected to grow but for now our focus is on satellite imagery and best usage of aerial data citation *(2)* Proposed change has been made *(3)* Proposed change has been made *(4)* Aerial statements are removed				
Documentation provided by project participant				
Our Common Methodology & Methodology Mangroves				
VVB assessment				**Date:** 10/12/2024

In Section 3.3.1 of the PD: (i)The PP has mentioned that “Satellite imagery and aerial data are collected from various sources such as remote sensing platforms.” The PP needs to mention if they have utilized satellite or aerial dataset or both specifically. (ii)The PP is requested to replace the word cloud detection and removal with Atmospheric Correction, as Data Pre-Processing can involve atmospheric correction, which is not just limited to cloud detection and removal. (iii)The PP is requested to correct the word “computer vision mode” mentioned in Step 2. It is model, not mode. (iv)The PP has mentioned in the PD that: “The model processes high-resolution images to identify forested areas based on spectral, textural, and structural features.” The PP is requested to mention the high-resolution images utilized as per this statement (if it is satellite or aerial or both). The PP is also requested to give examples of the spectral, textural and structural features used for the identification of forested areas. (v)The PP is requested to explain the term pixel-level accuracy. Hence, CAR#11 stands OPEN.

Project participant response	**Date :** 20/01/2025
(i) “Aerial“ parts have been removed (ii) The suggested change has been made (iii) The PP has corrected the word to ‘model’ (iv) The suggested change has been made and “aerial” parts have been removed (v) pixel-level accuracy was replaced with “accuracy of classification made at pixel level”	
Documentation provided by project participant	
VVB assessment	**Date:** 27/01/2025

(i)Section 4.3.1 of the document Chapter 4 titled "Methodology Reducing Agricultural Emissions (Nitrous Oxide)" still mentions "Satellite imagery and aerial data are collected from various sources such as remote sensing platforms" under Step 1 of Data Acquisition and Preprocessing. The PP is requested to correct the same. Until then, this sub-section of the CAR#10 finding stands OPEN.

(ii) The PP has already replaced the word cloud detection and removal with Atmospheric Correction. Hence, this sub-section of the CAR#11 finding stands CLOSED.

(iii)Everywhere the term 'mode' was used instead of 'model' alongside the term "computer vision" across all documents has been changed rightly now by the PP. Hence, this sub-section of the CAR#10 finding remains CLOSED.

(iv)Same as (i). Hence, this sub-section of the CAR#11 finding stands OPEN as well.

(v)The PP has now replaced the term pixel-level accuracy with "accuracy of classification made at the pixel level". While these terms can be used interchangeably, however they can have subtle differences depending on context.

Pixel-Level Accuracy:

- This term typically refers to the accuracy of predictions made on individual pixels in an image. In the context of image segmentation, for example, pixel-level accuracy would measure how accurately each pixel in the image is classified into the correct category. This metric gives a detailed view of how well an algorithm is performing on a granular level.

Accuracy of Classification Made at the Pixel Level:

- This phrase essentially describes the same concept but with a slight emphasis on the process. It indicates that the classification task is being performed at the pixel level rather than at the image level (where the whole image is classified as one category). This term reinforces that the evaluation is being made for each pixel separately, rather than as a bulk measure for the whole image.

The PP is requested to justify and clarify the change in term from pixel-level accuracy to accuracy of classification made at the pixel level.

Until the above sub-sections which are OPEN of this finding aren't resolved, CAR#11 stands OPEN.

Project participant response	Date : 05/02/2025

(i) "Aerial" parts have been removed from Methodology Reducing Agricultural Emissions (Nitrous Oxide)

(iv) The suggested change has been made and "aerial" parts have been removed
(v) As indicated, pixel-level accuracy and accuracy of classification made at the pixel level can be interpreted differently by various readers, potentially leading to misunderstandings. We decided to use "accuracy of pixel-based classification" to avoid this confusion

Our primary objective for land cover classification is to train a model and classify land cover at the **pixel level**, ensuring that each classified category aligns with the ground truth on a per-pixel basis.

When it comes to a model evaluation, we then aggregate these pixel level results to compute overall model accuracy.

The outputs are per-pixel classifications, which serve as the foundation for subsequent biomass calculations and greenhouse gas (GHG) removal estimations. To clarify, our focus is exclusively on pixel-level classification. We do **not** conduct classification at the **image level**, and per-image classification is entirely out of the scope of this study because one category per image classification won't be utilized in our system.

VVB assessment	**Date:** 12/02/2025
The PP has made the necessary change required and the explanation/justification provided for justifying pixel-level accuracy is deemed sufficient and credible by the VVB. Hence, CAR#11 stands CLOSED now.	

CAR ID	12	**Section no.**		**Date :** 07/11/2024
Description of CAR				
All the sent documents need corrections with regard to misspelt words. The PP is requested to correct the same and send the revised documents.				
Project participant response				**Date :** 06/12/2024
Spelling is corrected across the documents.				
Documentation provided by project participant				
All				
VVB assessment				**Date:** 10/12/2024
On assessment by the VVB, it was found that all the misspelt words previously have been corrected and the documents have been revised accordingly now. Hence, CAR#12 stands CLOSED.				

Annexure 2: Methodology assessment of "Carbontribe Mangroves Methodology"

1. Introduction

1.1. Objective

The assessment's goals are to conduct an independent assessment of the proposed "Carbontribe Mangroves Methodology" and to evaluate the process used for calculating net GHG emission reductions and removals from projects conserving or restoring the coastal wetlands. The validation process of this methodology also evaluates how well the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, 2003, ISO 14064/65 for certifying projects, and other industry best practices of relevant Standards / Procedures / Guidance are being incorporated in the methodology.

1.2. Summary Description of the Methodology

The methodology for the Afforestation, Reforestation, and Revegetation (ARR) projects within mangrove ecosystems, ensuring precise and transparent greenhouse gas (GHG) removal estimations from projects conserving or restoring the coastal wetlands. Activities under this methodology include efforts to restore of coastal wetlands, including previously barren, degraded, or deforested mangroves revegetation, restoring disturbed wetlands through measures like afforestation, reforestation, and revegetation. The goal is to positively impact carbon stock changes in both woody and non-woody biomass, reduce emissions of CO_2, CH_4, and N_2O.

2. VVB Assessment Approach

Carbontribe has contracted Earthood to conduct the validation assessment on "Carbontribe Mangroves Methodology". The purpose and scope of the assessment was to conduct an independent assessment and validate the methodology. This methodology provides procedures for quantifying net greenhouse gas (GHG) emission reductions and removals from projects conserving or restoring the coastal wetlands particularly mangroves. The version of the methodology provides guidance to quantify, report, and verify carbon dioxide removals generated through these practices.

The proposed methodology caters to all the fundamental requirements for the transparency, independent third-party validation and verification, no double counting, baseline, additionality, permanence, and uncertainty analysis satisfactorily. The sources of Carbon Pool and Emission been adequately mentioned under Section 3.4 of the mangrove methodology. This approach ensures that the methodology remains a valuable tool for promoting environmentally sustainable practices. This methodology particularly concentrates on the degraded mangroves ecosystem restoration and revegetation.

2.1. VVB Assessment Tools/Reference Documents:

- Carbontribe Mangroves Methodology,
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[12],
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetland[13],
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[14],
- 2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[15],
- The Core Carbon Principles by Integrity Council for Voluntary Carbon Market[16],
- UN's 2030 SDG Agenda[17],
- References provided in the methodology.

3. Assessment Findings

3.1. Assessment of the Definitions

Section 3.9 of the Mangrove methodology provides definitions of certain terms that have been used in the methodology. These definitions are conclusive for calculation of GHG emissions from mangroves conservation and restoration practices and makes the inclusion in the methodology comprehensive for this version.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR02 was raised regarding the definition of certain terms used in the methodology. This includes corrective actions for both the baseline and project scenarios, covering project area, affected area, activity shift, AGB, BGB, SOC, and carbon stock, while also providing further clarity on other definitions used.
C	Conclusion	Section 3.9 of the proposed methodology thoroughly incorporates all significant terms utilized throughout the methodology. It accurately defines each term, ensuring a clear understanding of how these terms are applied within the methodology. Therefore, CAR02 is considered closed.

[12] https://www.ipcc-nggip.iges.or.jp/public/2006gl/
[13] https://www.ipcc-nggip.iges.or.jp/public/wetlands/
[14] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html
[15] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html
[16] https://icvcm.org/core-carbon-principles/
[17] https://sdgs.un.org/2030agenda

3.2. Assessment of the Applicability conditions of the methodology

As per the assessment on section 2.1.1 of the proposed methodology, it primarily focuses on Afforestation, Reforestation, and Revegetation (ARR) within mangrove ecosystems, aiming to restore and create coastal wetlands to mitigate climate change impacts. Projects must be exclusively dedicated to ARR activities and must not include activities classified under REDD (Reducing Emissions from Deforestation and Forest Degradation).

The applicability conditions of the methodology define the specific circumstances under which a project is considered eligible or ineligible. Specifically, the methodology applies to projects that meet the following criteria:

- **Eligible Project Activities:** Projects must involve the establishment, restoration, or enhancement of mangrove forests on land classified as barren, degraded, or deforested at the project start date. Additionally, projects must solely focus on ARR activities and exclude any activities classified as REDD.
- **Project Start Date:** The start date is defined as the date when measurable ARR activities commence (e.g., site preparation, planting). Projects must provide verifiable evidence, such as documented plans or satellite imagery, to confirm the start date. The methodology allows retroactive projects with a start date up to 10 years prior to validation, provided they include sufficient verifiable evidence.
- **Ownership and Rights:** Project participants must demonstrate clear ownership or legal rights to implement ARR activities within the project area. This may include legal land ownership, lease agreements, or formal written consent from landowners or relevant authorities.

However, the methodology explicitly excludes certain activities to maintain consistency in accounting methodologies and environmental outcomes:

- Activities unrelated to ARR, such as REDD, conservation without active enhancement, or initiatives focused solely on avoiding emissions.
- Mangrove restoration projects with overlapping boundaries with other carbon offset projects to prevent double counting of carbon credits.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR08 was raised regarding the Applicability Conditions, as the assessment team was unable to identify clear applicability criteria in the relevant sections. Carbontribe is required to incorporate detailed applicability conditions specific to the project activities, including the scope and nature of activities, project scale, alignment of the project start date with methodology requirements, combinations of

		activities, and the geographic extent of the project area. Additionally, the Carbontribe should clarify ownership and rights related to the project area, specify excluded conditions not covered by the methodology, and ensure alignment with quantification procedures that uphold environmental integrity and practical considerations. These conditions must be clearly, precisely and consistently defined to meet the methodology's requirements and ensure transparency.
C	Conclusion	The assessment team has reviewed the updated methodology documents and confirms that Section 2.1.1 of the methodology now comprehensively includes key aspects such as eligibility criteria, project start dates, project goals and boundaries. The revised applicability conditions are now well-defined, concise, and clearly stated. Therefore, this finding is considered closed.

3.3. Assessment of the Project Boundary

Section 2.1.3 of the methodology comprehensively addresses all necessary requirements related to project boundaries, aligning with standard requirements. It clearly defines the carbon pools and GHG sources, requiring projects to specify carbon pools and GHG sources for both the project and baseline scenarios. These include above-ground biomass, below-ground biomass, soil organic carbon, and dead organic matter. Project developers must provide detailed data on these carbon pools, along with methodologies for measuring and monitoring carbon stocks.

The methodology also establishes clear geographical boundaries to define the physical area where mangrove restoration or protection activities will take place. To prevent spatial overlap, Carbontribe cross-checks and overlays the proposed project boundaries onto its existing repository database. Additionally, Carbontribe validates the project area and analyzes land cover usage, requiring project developers to submit geographic information in a standardized format.

To ensure accuracy and compatibility with GIS and GPS software, project boundaries must be submitted either as a KML file or as an array of geographic coordinates. The KML file must precisely delineate the project boundary using a single contiguous polygon or set of polygons, formatted for use with software such as Google Earth, ArcGIS, and QGIS. If a KML file is not provided, an alternative option is to submit an array of latitude and longitude coordinates in sequential order, forming a closed boundary loop.

Furthermore, the methodology specifies essential file requirements to maintain precision and consistency. All coordinates must be in the WGS84 datum (EPSG:4326), ensuring global compatibility. To prevent ambiguity, a minimum of six decimal places is required for geographic coordinates. Additionally, all submitted files must be error-free and validated against standard KML or GIS file validators.

Overall, Section 2.1.3 of the methodology fully meets standard requirements by ensuring that project boundaries are clearly defined, precisely recorded, and verifiable. These measures enhance transparency, maintain environmental integrity, and prevent spatial conflicts with other carbon offset projects.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR02 was raised regarding the need for a more detailed description of the project boundary. The assessment team identified a lack of information on project boundary mapping and the type of satellite imagery to be used. Additionally, CAR09 was raised concerning Section 2.1.3, where the Carbontribe had described the geographical boundaries. However, the assessment team found that specific details regarding GHG sources, sinks, and reservoirs in both the project and baseline scenarios were missing. To enhance clarity and completeness, the Carbontribe is requested to include specifications for carbon pools and GHG sources, ensuring the section is more precise and comprehensible for project developers.
C	Conclusion	Upon reviewing Section 2.1.3 of the updated methodology, it was confirmed that the necessary information related to project boundaries, including carbon pools, GHG sources, sinks, and reservoirs, has been incorporated. Therefore, CAR02 and CAR09 findings were considered closed.

3.4. Assessment of the Stakeholder Engagement

Section 2.1.4 of the methodology has been assessed to confirm its alignment with best practices for stakeholder engagement in mangrove restoration projects. Effective engagement ensures project sustainability by fostering collaboration, trust, and alignment with local priorities. The methodology outlines a structured approach to involving local communities, governments, environmental organizations, and other relevant stakeholders at all project stages—planning, implementation, and monitoring. Key engagement strategies include regular meetings, consultations, and feedback mechanisms, ensuring transparency and inclusive decision-making.

To validate compliance, projects must provide documented evidence of stakeholder participation, such as records of consultations, signed agreements, and participatory decision-making processes. Additionally, ongoing communication mechanisms must be in place to ensure stakeholders remain informed, engaged, and able to address concerns throughout the project lifecycle.

This structured and transparent engagement approach aligns with international best practices and enhances the project's social acceptance, credibility, and long-term success.

3.5. Assessment of the Carbon pools

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	Nil
C	Conclusion	The stakeholder consultation in a project is well-defined in section 3.8 of the methodology.

Section 2.1.3 of the methodology comprehensively defines the carbon pools associated with both the project and baseline scenarios. The methodology includes key carbon pools such as above-ground biomass, below-ground biomass, soil organic carbon, and dead organic matter. Project developers are required to provide detailed data on these carbon pools, along with methodologies for measuring and monitoring carbon stocks, ensuring transparency and accuracy.

Furthermore, Section 3 of the methodology explicitly outlines and confirms the inclusion of Above-Ground Biomass (AGB), Below-Ground Biomass (BGB), Dead Organic Matter (DOM), and Soil Organic Carbon (SOC). These carbon pools align with the Intergovernmental Panel on Climate Change (IPCC) guidelines, which recommend these pools for comprehensive carbon accounting in land-use projects, particularly within mangrove ecosystems. By incorporating these elements, the methodology ensures consistency with international standards, reinforcing its scientific robustness and applicability for carbon sequestration projects.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR04 was raised regarding the need for a clear description of the carbon pools considered in the calculation of carbon sequestration. The methodology should explicitly specify carbon pools such as Above-Ground Biomass (AGB), Below-Ground Biomass (BGB), and Soil Organic Carbon (SOC). Additionally, other pools relevant to the mangrove ecosystem, such as litter and dead wood, should be addressed. The methodology should also provide an option for project developers to decide whether to include these additional pools. Furthermore, CAR09 was raised as the assessment team was unable to find specific details regarding carbon pools. Carbontribe is requested to include clear specifications for carbon pools and GHG sources to enhance clarity and comprehensibility for project developers.
C	Conclusion	Upon reviewing Section 2.1.3 on Project Boundaries and Section 3 on Quantification of Estimated Removals in the updated methodology, it has been confirmed that the carbon pools are now clearly defined. The methodology explicitly includes Above-Ground Biomass (AGB), Below-Ground Biomass (BGB), Dead Organic Matter

		(DOM), and Soil Organic Carbon (SOC), which are appropriate for the mangrove ecosystem. As a result, this finding is considered closed.

3.6. Assessment of the Baseline scenario

The audit team reviewed Section 2.2 of the updated methodology on the baseline and confirmed that it accurately represents the pre-restoration state of the ecosystem. The baseline reflects conditions before any Afforestation, Reforestation, and Revegetation (ARR) activities take place. Since the methodology applies exclusively to ARR projects, only areas where new mangroves are being established are considered. As such, the baseline carbon stock is assumed to be zero, as these areas were previously barren, degraded, or historically devoid of mangroves. This baseline serves as a reference point for calculating the net carbon benefits of the project and ensuring additionality—confirming that carbon sequestration would not have occurred without ARR intervention. To ensure accurate carbon accounting, any existing mangrove areas within the proposed project boundary must be excluded. Project developers are responsible for identifying and removing these areas during project planning and submission to maintain a clear focus on the establishment or restoration of new mangrove ecosystems.

Additionally, Section 2.2.1 on Baseline Validation provides clear criteria for verifying that the area was non-forested during the baseline period. To validate this, project developers must submit an official certification from the landowner or relevant government authority confirming that the land was not classified as forested during the baseline period. In cases where official certification is unavailable, Carbontribe will conduct a land cover analysis using historical remote sensing data. This analysis will verify land use and vegetation cover up to five years before the baseline period, ensuring that the area meets the eligibility criteria for ARR projects. The methodology aligns with IPCC guidelines, ensuring that baseline conditions are scientifically validated and that ARR projects are implemented in areas where additional carbon sequestration benefits can be achieved.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR02 was raised regarding Section 2.2 on Baseline Scenario, highlighting the need for a more detailed description. Specifically, the methodology should provide a comprehensive explanation of emissions from Soil Organic Carbon (SOC) in the baseline scenario.
C	Conclusion	In response, Carbontribe has provided the necessary details and incorporated all required information on the baseline scenario into the relevant sections 2.2 of the Mangroves methodology. The updated content has been reviewed and found to be in full compliance with IPCC standard requirements. Therefore, this finding is CLOSED.

3.7. Assessment of Additionality

In mangrove restoration projects, additionality ensures that carbon credits represent real, measurable, and surplus carbon removals that would not have occurred without the project. To establish additionality, the project activities must be clearly distinct from the baseline scenario, which assumes zero carbon sequestration for newly established mangrove areas. The project must lead to tangible outcomes—such as the restoration or establishment of mangrove ecosystems—that would not have taken place without intervention.

To confirm additionality, the methodology requires the following key conditions to be met:

- **Clear Description of Activities** – Projects must provide a detailed account of the activities being implemented, including mangrove planting, hydrological restoration, and soil retention improvements. These activities must be clearly outlined with defined timelines and objectives, demonstrating their direct role in mangrove ecosystem restoration.
- **Comparison with Previous Land Use** – The project must establish how its activities differ from prior land use practices, such as agriculture, urban development, or degraded land conditions. To substantiate this, historical records or satellite imagery should be provided to confirm that the land would not naturally regenerate into mangroves without intervention.
- **Deforestation Assessment** – A thorough assessment must be conducted to determine whether deforestation has occurred within the project area in the last five years. Historical satellite imagery should be used to validate land clearance, reinforcing the claim that restoration activities are reversing previous degradation and actively contributing to carbon sequestration.

The additionality framework outlined in the methodology aligns with IPCC guidelines, ensuring that carbon sequestration directly results from the restoration efforts and would not have happened in the absence of the project. These conditions confirm that the project meets the required standards for additionality, strengthening its credibility in the Voluntary Carbon Market (VCM).

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR01 was raised because the methodology did not initially include a section on additionality. In any Voluntary Carbon Market (VCM) project, it is essential to demonstrate what aspects of the project go beyond regulatory requirements and are not mandated by the government. The methodology document must clearly outline the methods used to determine additionality to ensure transparency and compliance with standard criteria.

C	Conclusion	In response, Carbontribe has incorporated Section 2.3 on additionality into the updated methodology, emphasizing it as a core principle. The revised methodology now provides a clear and structured approach to assessing additionality, with specific criteria tailored to mangrove projects. These requirements ensure that additionality is properly implemented and transparently documented. The details outlined in Section 2.3 of the updated Mangroves Methodology Document are now comprehensive and fully aligned with standard requirements. Therefore, this finding is CLOSED.

3.8. Assessment of Quantifications of GHG emission reductions and removals

3.8.1. Assessment of Quantification of Baseline emissions

The audit team reviewed Section 2.2 of the updated methodology and confirmed that the baseline accurately represents the pre-restoration state of the ecosystem. Since the methodology applies solely to Afforestation, Reforestation, and Revegetation (ARR) projects, only areas where new mangroves are being established are considered, with a baseline carbon stock of zero for previously barren or degraded land. This baseline ensures accurate carbon accounting and supports additionality by confirming that sequestration would not occur without ARR intervention. To maintain accuracy, existing mangrove areas within the project boundary must be excluded, and developers must ensure their removal during project planning and submission.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	Nil
C	Conclusion	Carbontribe has provided the necessary details and incorporated all required information on the baseline scenario into the relevant sections 2.2 of the Mangroves methodology. The updated content has been reviewed and found to be in full compliance with IPCC standard requirements.

3.8.2. Assessment of Quantification of Project emissions

The audit team reviewed the updated methodology and confirmed that the Quantification of Project Emissions aligns with the IPCC 2013 Wetlands Supplement. In mangrove restoration projects, emissions are assumed to be negligible since activities such as planting native species and minimizing land disturbance do not result in significant greenhouse gas emissions. This assumption

is consistent with IPCC guidelines, which indicate that restoration projects avoiding large-scale land-use changes typically have low emissions.

If a project is expected to generate significant emissions—such as from large-scale land clearing, infrastructure development, or biomass burning—IPCC methodologies will be applied for accurate estimation. Any emissions from fossil fuel use in project activities, such as flights and management operations, are considered minimal and may be excluded. The methodology ensures that all project emissions are quantified appropriately and aligned with IPCC standards.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	CAR03 was raised because the methodology does not provide a detailed explanation of Project Emissions and Removals. A clearly defined section outlining the step-by-step process for quantifying project emissions and removals needs to be included in the methodology document.
C	Conclusion	Section 3.7 of the updated methodology confirms that emissions from mangrove restoration activities are assumed to be negligible, as these projects primarily involve low-impact actions such as planting native species. However, if significant emissions arise from land clearing or infrastructure development, IPCC guidelines will be applied for accurate estimation. The assumption that mangrove restoration has minimal emissions is well-justified, and Section 3.7 explicitly states that IPCC guidelines will be followed when necessary. The provided justification is comprehensive and acceptable. Therefore, this finding is CLOSED.

3.8.3. Assessment of Quantification of Leakage

Section 3.8 of the methodology has been assessed to confirm its alignment with the IPCC 2013 Wetlands Supplement regarding leakage emissions. Leakage refers to the unintended displacement of carbon emissions or removals due to project activities. In mangrove restoration projects, leakage is generally minimal but varies based on specific activities and land-use dynamics.

The methodology applies a tiered approach to leakage assessment:

- Tier 1: Assumes zero leakage, as restoration activities primarily involve low-impact interventions such as planting native species and avoiding land-use changes that could lead to increased emissions. This follows IPCC guidance, which suggests that low-disturbance activities typically do not cause significant leakage.
- Tier 2: Leakage remains assumed to be zero, but active monitoring is introduced. Carbontribe utilizes a computer vision model to track landscape changes around the

restoration site, ensuring early detection and mitigation of any unintended deforestation or land-use shifts.

- Tier 3: When a higher risk of leakage is identified—such as nearby deforestation or infrastructure development—a detailed analysis is conducted following IPCC guidelines to quantify and address potential emissions displacement.

This structured approach ensures that potential leakage risks are systematically assessed and mitigated, confirming compliance with IPCC best practices for carbon accounting in mangrove restoration projects.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	Nil
C	Conclusion	The quantification of leakage emissions in a project is well-defined in section 3.8 of the methodology.

3.9. Assessment of Monitoring, Reporting and Verification (MRV)

Section 2.5 of the methodology has been assessed to confirm its alignment with international best practices and scientific guidelines, including the IPCC 2006 Guidelines and the 2013 Wetlands Supplement. Monitoring, reporting, and verification (MRV) are critical components of Carbonitride's methodology, ensuring the accuracy, integrity, and credibility of carbon sequestration outcomes and carbon credits generated.

- **Monitoring:** Carbontribe employs a systematic monitoring framework to track carbon sequestration, ecological health, and compliance with baseline and leakage parameters. This includes measuring changes in above-ground biomass, below-ground biomass, and soil organic carbon levels. The methodology integrates field measurements with advanced technologies such as remote sensing, geographic information systems (GIS), and computer vision models. These tools enhance precision, enable real-time tracking, and support adaptive management by detecting deviations from expected outcomes.
- **Reporting:** The methodology outlines clear monitoring requirements for each parameter, specifying data collection methods and frequency. Default IPCC values are applied when site-specific data is unavailable, ensuring consistency in carbon sequestration estimates. For higher accuracy, peer-reviewed sources and project-specific data are incorporated where applicable.
- **Verification:** Verification is conducted by independent third-party auditors to ensure transparency and compliance with the established methodology. This process validates monitoring data and confirms that carbon sequestration results are measurable, verifiable,

and accurately reported. By incorporating independent verification, Carbontribe enhances the credibility and reliability of its carbon crediting system.

Through a robust MRV framework, Carbontribe ensures that its projects achieve quantifiable climate benefits, adhere to global carbon accounting standards, and continuously improve through feedback mechanisms. This structured approach reinforces trust and accountability in carbon market participation.

A	Means of validation	Carbontribe Mangrove Methodology
B	Findings	Nil
C	Conclusion	Section 2.5 and 3.10 of the methodology provides a clear and well-structured framework for Monitoring, Reporting, and Verification (MRV) in the project.

4. Assessment Conclusion

Earthood Services Private Limited has performed validation of the proposed "Carbontribe Mangrove Methodology" along with all the supporting documents as referred in the methodology document. The validation was performed based on Earthood's internal procedures and fundamental requirements set for any standard carbon registry. Principles such as baseline, additionality and leakage & uncertainty, and monitoring parameters were assessed to review the methodology. The methodology follows IPCC Guidelines for National Greenhouse Gas Inventories, 2006, 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands and 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The VVB has reviewed the proposed methodology and has raised findings based on the assessment procedures. Based on the findings and suggestions the methodology was improved.

This is the first version of the methodology validation, and it will be further subjected to revisions and as when required given there shall be no deviation from the requirements of fundamental principles and materiality set in the current version of the Methodology.

Annexure 3: Methodology assessment of "Carbontribe Methodology for Forest Land Projects"

1. Introduction

1.1. Objective

The assessment's goals are to conduct an independent assessment of the proposed "Carbontribe Methodology for Forest Land Projects" and to evaluate the process used for calculating net GHG emission reductions and removals from conserving and restoring the forest ecosystem. The validation process of this methodology also evaluates how well the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, 2003, ISO 14064/65 for certifying projects, and other industry best practices of relevant Standards / Procedures / Guidance are being incorporated in the methodology.

1.2. Summary Description of the Methodology

The methodology for afforestation-based projects ensures precise and transparent estimations of CO_2 sequestration by focusing exclusively on activities aimed at restoring degraded ecosystems and enhancing forest carbon sinks. These activities include the careful selection of species, implementation of appropriate restoration techniques and the re-establishment of ecological conditions conducive to forest growth. The goal is to promote afforestation as a viable climate mitigation strategy, leading to measurable increases in carbon sequestration while supporting biodiversity and ecosystem resilience.

Projects under this methodology must demonstrate verifiable carbon sequestration through detailed project plans, baseline assessments of degraded land and continuous monitoring of forest growth and biomass accumulation. The methodology adheres to internationally recognized frameworks, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and the 2019 Refinement, ensuring scientifically validated carbon accounting practices. Activities unrelated to afforestation-based CO_2 sequestration, such as carbon reductions from non-forest-related activities, are excluded. This targeted approach enhances the methodology's integrity by focusing on direct contributions to climate mitigation through afforestation efforts.

2. VVB Assessment Approach

Carbontribe has contracted Earthood to conduct the validation assessment on "Carbontribe Methodology for Forest Land Projects". The purpose and scope of the assessment was to conduct an independent assessment and validate the methodology. This methodology provides procedures for quantifying net greenhouse gas (GHG) emission reductions and removals from preserving and conserving forest ecosystem. The version of the methodology provides guidance to quantify, report and verify carbon dioxide removals generated through these practices.

The proposed methodology caters to all the fundamental requirements for the transparency, independent third-party validation and verification, no double counting, baseline, additionality, permanence and uncertainty analysis satisfactorily. The sources of Carbon Pool and Emission been adequately mentioned under Section 3 of the methodology. This approach ensures that the methodology remains a valuable tool for promoting forest protection and conservation.

2.1. VVB Assessment Tools/Reference Documents:

- Carbontribe Methodology for Forest Land Projects,
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[18],
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[19],
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[20],
- 2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[21],
- Global ecological zones for FAO forest reporting: 2000 update[22],
- The Core Carbon Principles by Integrity Council for Voluntary Carbon Market[23],
- UN's 2030 SDG Agenda[24],
- References provided in the methodology.

3. Assessment Findings

3.1. Assessment of the Definitions

Section 3.9 of the methodology provides definitions of key terms used throughout the document. These definitions are essential for ensuring consistency and accuracy in the calculation of greenhouse gas (GHG) emissions, with a particular focus on activities aimed at conserving and preserving the forest ecosystem. Their inclusion enhances the comprehensiveness of this methodology version, ensuring clarity and precision in its application.

Parameter	Unit	Definition	Monitoring Method	Frequency	VVB Assessment Focus
Planted Area	ha (hectares)	The total area of mangroves planted each year as part of the project.	Project-specific data: satellite imagery and land cover classification model.	Annual	The VVB will ensure that satellite imagery and classification models provide accurate and consistent land cover assessment. Any

[18] https://www.ipcc-nggip.iges.or.jp/public/2006gl/
[19] https://www.ipcc-nggip.iges.or.jp/public/wetlands/
[20] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html
[21] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html
[22] https://www.fao.org
[23] https://icvcm.org/core-carbon-principles/
[24] https://sdgs.un.org/2030agenda

					discrepancies in planted area estimates must be justified with transparent methodologies.
AGB Sequestration Rate	tC/ha/year	Annual rate of carbon accumulation in above-ground biomass (AGB) of mangroves per hectare.	Default rates (Tier 1) from IPCC 2019 Refinement Volume 4, Chapter 4 (Tables 4.9 & 4.10). Tier 2 and 3 data sourced from peer-reviewed studies or field measurements.	Annual	The VVB will confirm that the appropriate sequestration rates are applied based on project location, species and classification. If site-specific data is used, the methodologies and sources must be validated for accuracy and credibility.
BGB to AGB Ratio	Ratio (unitless)	Proportion of carbon stored below-ground relative to above-ground biomass.	Default ratios (Tier 1) from IPCC 2019 Refinement Volume 4, Chapter 4 (Table 4.4). Tier 2 and 3 ratios based on peer-reviewed studies or field data.	Periodic	The VVB will assess the justification for ratio selection and ensure that site-specific data meets quality control requirements. Any adjustments or deviations from default ratios must be well-documented.
C-to-CO_2 Conversion Ratio	Ratio (unitless)	Conversion factor to calculate equivalent CO_2 from stored carbon using the molecular weight ratio.	IPCC 2006 Guidelines standard conversion factor (44/12 = 3.67).	Fixed	The VVB will verify that the standard conversion factor is correctly applied to calculations and remains consistent throughout reporting.
Affected Area	ha (hectares)	The total area within the project site where activities may cause leakage.	Project site assessment, remote sensing data (GIS mapping, land-use data, historical satellite imagery).	Periodic	The VVB will ensure that spatial analysis tools and GIS assessments are applied consistently and that affected areas are correctly delineated and quantified.

% Activity Shift	Percentage (%)	The estimated percentage of an activity (e.g., firewood collection, agriculture) that will be displaced outside the project area.	Surveys, interviews with landowners, historical deforestation, and land-use change data.	Periodic	The VVB will validate the methodology used for estimating activity displacement, ensuring that assumptions are well-supported by survey data and historical trends.
CO_2 Stock	tCO_2/ha	The carbon stock per hectare in biomass (tree biomass in forests or shrubs) in the area where displacement occurs.	National forest inventories, IPCC guidelines, peer-reviewed literature, or host-country datasets on carbon stocks.	Periodic	The VVB will assess the accuracy and applicability of carbon stock data used for leakage calculations, ensuring that site-specific or regional data aligns with established methodologies.

3.2. Assessment of the Applicability conditions of the methodology

As per the section 2.1.1, the applicability of this methodology is strictly defined to ensure accurate and transparent carbon sequestration assessments. Carbontribe focuses on afforestation projects within forest ecosystems, emphasizing the establishment of forests on previously barren or non-forested lands. This targeted approach ensures precise measurement of greenhouse gas (GHG) removals while supporting ecosystem enhancement through deliberate and well-documented afforestation efforts.

Projects related to reforestation, revegetation, or activities under Reducing Emissions from Deforestation and Forest Degradation (REDD) are explicitly excluded from this methodology. While these initiatives contribute significantly to global climate and conservation goals, they involve distinct objectives, challenges, and accounting methodologies. To meet the applicability conditions, projects applying under this methodology must provide verifiable evidence of afforestation activities. This includes detailed project plans, historical land-use data and satellite imagery to confirm that project sites were previously barren or non-forested. These stringent requirements uphold the integrity and credibility of the GHG removal estimations, ensuring compliance with internationally recognized carbon accounting standards.

3.3. Assessment of the Project Boundary

The assessment team confirm the project boundary requirements ensures the accurate definition of geographical limits and the inclusion of relevant carbon pools and greenhouse gas (GHG) sources as

detailed in the section 2.1.3 of the methodology. Projects must define the carbon pools and GHG sources associated with both the project and baseline scenarios, including above-ground biomass, below-ground biomass, soil organic carbon and dead organic matter. To ensure transparency and accuracy, project developers are required to provide detailed data on these carbon pools, along with methodologies for measuring and monitoring carbon stocks over time. The geographical boundaries define the physical area where afforestation activities will occur and it is essential to clearly delineate these boundaries to avoid overlap with other carbon offset projects. Carbontribe conducts a cross-check of project boundaries against its repository database to detect any spatial overlap or inconsistencies. Additionally, the validation process includes land cover analysis to confirm the suitability of the designated area for afforestation.

To ensure the accuracy and integrity of the project boundary, developers must submit geographic information in a standardized format, using either a KML file or an array of geographic coordinates. The KML file must accurately delineate the project boundary, contain a single contiguous polygon or multiple polygons representing the entire project area, and be compatible with common GIS (Geographic Information Systems) and GPS software such as Google Earth, ArcGIS and QGIS. If a KML file is not submitted, the project boundary may alternatively be defined using an array of latitude and longitude coordinates separated by commas, where each row is separated by a new line to form a closed loop representing the boundary.

All geographic data must adhere to specific file specifications. The coordinate system must follow the WGS84 datum (EPSG:4326), ensuring uniformity across all submissions. Boundary precision is required, with coordinates recorded to at least six decimal places (e.g., 37.774929, -122.419416) to prevent ambiguity. Additionally, all submitted files must be free of errors and validate against standard KML or GIS file validators. By adhering to these requirements, projects maintain the integrity of their boundary delineation, ensuring compliance with internationally recognized standards for afforestation-based carbon sequestration initiatives.

3.4. Assessment of the Stakeholder Engagement

Section 2.1.4 of the methodology outlines the Stakeholder engagement requirements as crucial for the success of afforestation projects, ensuring collaboration with local communities, governments, and environmental organizations. It fosters trust, transparency and alignment with local priorities. Projects impacting Indigenous peoples and local communities must follow Free, Prior, and Informed Consent (FPIC) principles, ensuring early engagement and documented consent.

To ensure accountability, project developers must submit records of consultations, FPIC agreements and compliance evidence. This commitment to responsible land-use practices strengthens community relationships and enhances project sustainability.

3.5. Assessment of the Baseline scenario

As defined in Section 2.2 of Carbontribe methodology, the baseline scenario represents the state of the ecosystem before afforestation activities, serving as a reference point for measuring carbon sequestration benefits. Since this methodology applies exclusively to afforestation, only areas where new forests are established are considered, with baseline carbon stock assumed to be zero. This ensures additionality by demonstrating that carbon sequestration would not occur without afforestation intervention. If methodologies for reforestation or revegetation are introduced in the future, separate baselines will be developed.

To ensure accuracy, existing forested areas within the project boundary must be excluded. Project developers must identify and remove such areas during planning and submission. Validation of the baseline condition requires either official certification from the landowner or government authority confirming non-forested status during the baseline period or a Carbontribe-conducted land cover analysis using historical remote sensing data. This analysis verifies land use and vegetation cover up to five years before the baseline period, ensuring project eligibility.

3.6. Assessment of Additionality

Additionality requirement under the section 2.3 ensures that carbon credits represent real and surplus carbon removals that would not have occurred without the project. Since the baseline scenario assumes zero carbon sequestration, projects must clearly demonstrate that their afforestation activities lead to measurable carbon benefits beyond what would naturally happen.

To establish additionality, projects must provide a detailed description of their activities, such as forest planting, soil retention improvements or hydrological restoration, with clear timelines and objectives. They must also compare current activities with previous land use, showing that the land would not have reverted to forest without intervention. Historical records or satellite imagery should be submitted as supporting evidence. Additionally, a deforestation assessment must confirm that no significant forest loss has occurred in the project area within the past five years. By meeting these criteria, projects validate their additionality, ensuring that carbon sequestration results directly from restoration efforts.

3.7. Assessment of Leakage

Leakage occurs when afforestation activities unintentionally displace carbon emissions to surrounding areas, reducing the net benefits of carbon sequestration. As outlined in the section 2.4, this methodology, Carbontribe employs real-time satellite monitoring to track forest growth, detect land use changes and ensure that carbon removals are not offset by environmental degradation elsewhere.

Minimizing leakage begins with careful project design, including clearly defined boundaries and thorough baseline assessments to identify potential risks. Buffer zones are established around restoration areas and surrounding ecosystems are monitored for any signs of degradation. This

comprehensive approach ensures that carbon credits generated by afforestation projects represent real, lasting removals without shifting emissions elsewhere.

3.8. Assessment of Quantifications of GHG emission reductions and removals

The VVB assessment of the quantification of project emissions ensures that section 3 of the Carbontribe's methodology adheres to internationally recognized standards, including the IPCC 2006 Guidelines and the 2019 Refinement. The VVB independently evaluates the accuracy and transparency of the quantification process, confirming that carbon sequestration estimates are based on scientifically sound methods and robust data collection.

During the assessment, the VVB examines the application of Tier 1 default values and where applicable, the incorporation of project-specific data to enhance precision. The review process ensures that all calculations reflect real-world sequestration conditions, accounting for above-ground biomass, below-ground biomass, dead organic matter and soil organic carbon. Additionally, the VVB evaluates leakage and project emissions to verify that net removals are accurately reported and comply with methodological requirements.

By confirming the consistency and reliability of the quantification approach, the VVB assessment strengthens the credibility of Carbontribe's carbon credit generation process. This verification step upholds transparency and integrity, reinforcing trust among stakeholders and ensuring alignment with global carbon market standards.

3.8.1. Assessment of Quantification of Project emissions

The assessment of baseline emissions quantification ensures that Carbontribe’s methodology section 3.7 aligns with internationally recognized carbon accounting standards, including the IPCC Guidelines. This independent evaluation verifies that the approach used to estimate baseline emissions is scientifically sound, transparent and accurately reflects pre-project conditions.

The VVB review examines the assumptions and data sources used to determine baseline emissions, ensuring that they appropriately represent the emissions levels in the absence of the project. In cases where project emissions are assumed to be zero due to low-impact restoration activities, the VVB assesses the justification for this assumption, confirming its validity based on field conditions and best practices. For scenarios where project activities may lead to measurable emissions—such as land clearing, infrastructure development, or machinery use—the VVB ensures that Carbontribe follows IPCC methodologies to quantify these emissions appropriately. This assessment guarantees that all emissions sources are accurately accounted for and that baseline estimates provide a reliable reference for measuring net carbon sequestration.

Through rigorous verification process, the VVB assessment strengthens the credibility and transparency of Carbontribe’s carbon crediting process, ensuring that baseline and project emission calculations meet the highest standards of accuracy and integrity.

3.8.2. Assessment of Quantification of Leakage

The VVB assessment confirms that the quantification of leakage defined in the section 3.8 of the methodology is conducted in accordance with IPCC 2006 and IPCC 2019 Refinement guidelines, ensuring a comprehensive evaluation of potential emissions displacement. Carbontribe follows a tiered approach based on the risk level of leakage:

- **Tier 1:** Leakage is assumed to be negligible for low-impact restoration activities such as native species planting and non-disruptive land management.
- **Tier 2:** Active monitoring of surrounding areas is implemented using computer vision models to detect potential land-use changes and mitigate risks.
- **Tier 3:** In cases of higher leakage risks, such as emissions displacement due to nearby deforestation or infrastructure development, detailed calculations are performed in compliance with IPCC methodologies.

For projects where leakage is more likely, emissions displacement is quantified based on the affected area, percentage of displaced activity and carbon stock differentials. If the displacement location is unknown, country-specific CO_2 stock values for natural forests are used to ensure accuracy. Independent validation ensures that leakage quantification aligns with best practices, reinforcing the credibility of reported net sequestration figures.

3.9. Assessment of the Monitoring Parameters

Parameter	How to Monitor	Frequency	VVB Assessment
Planted Area	Satellite imagery and landcover classification model.	Annually	The methodology is appropriate for estimating the planted area, ensuring accuracy through remote sensing and classification techniques.
AGB Sequestration Rate	Monitor default rates provided by IPCC (IPCC 2019 Refinement Table 4.9 & 4.10); verification through regional studies in peer-reviewed literature.	Annually	The approach aligns with IPCC guidelines. Additional regional studies improve accuracy, ensuring reliable AGB sequestration estimates.
BGB to AGB Ratio	Apply default values from the IPCC 2019 Refinement (Table 4.4) for consistency and use site-specific measurements or species-based ratios (Tier 2 or 3) for greater accuracy when available.	Annually	The use of default IPCC values ensures consistency, while site-specific ratios enhance accuracy where applicable.

DOM Sequestration Rate	Project-specific or species-specific data from peer-reviewed sources will be used for more accurate and localized estimates if available.	Annually	The methodology allows for improved accuracy through localized data sources, ensuring project-specific relevance.
SOC Sequestration Rate	Project-specific or species-specific data from peer-reviewed sources will be used for more accurate and localized estimates if available.	Annually	The approach follows best practices in soil carbon monitoring, ensuring data relevance and accuracy.
Project Emissions	Default assumption of zero emissions for low-impact activities (Tier 1); monitor and estimate emissions (fuel use, transport logs, etc.) for higher-impact activities using IPCC guidelines for Tier 2/3.	Annually	The tiered approach aligns with IPCC recommendations, ensuring emissions are accurately accounted for when necessary.
Leakage	Analyze nearby areas using satellite imagery and computer vision models; conduct field surveys to detect land-use changes.	Annually	The combination of remote sensing and field surveys provides a robust approach to monitoring leakage risks effectively.

3.10. Assessment of Monitoring and Verification (MRV)

3.10.1. Monitoring Assessment

Section 2.5.1 of the Carbontribe monitoring framework is designed to ensure systematic and precise data collection, enabling accurate tracking of carbon sequestration and ecological health. The framework integrates traditional field measurements with advanced technological tools such as remote sensing, GIS and computer vision models to enhance the accuracy and efficiency of data collection. These methodologies allow for continuous assessment of above-ground and below-ground biomass, soil organic carbon levels and other project-specific indicators.

A key aspect of monitoring assessment is evaluating the effectiveness of data collection protocols and their alignment with international best practices, including the IPCC 2006 Guidelines and the 2019 Refinement. The integration of multiple monitoring techniques enables early detection of deviations from projected sequestration outcomes, supporting adaptive management strategies to optimize project performance. Furthermore, monitoring assessment ensures compliance with baseline and leakage parameters, reinforcing the credibility of reported results.

3.10.2. Verification Assessment

Verification is a critical step in ensuring the integrity of Carbontribe's carbon sequestration outcomes. Section 2.5.2 of the Carbontribe methodology detailed the verification process. Independent third-party auditors conduct rigorous evaluations to validate monitoring data and confirm adherence to established methodologies. This independent verification process ensures that reported carbon sequestration figures are measurable, verifiable, and accurately documented.

The verification assessment focuses on the robustness and transparency of Carbontribe's verification process. It examines the consistency and reliability of data collected during monitoring and evaluates whether third-party assessments effectively mitigate risks of overestimation or misreporting. By maintaining stringent verification standards, Carbontribe upholds its commitment to credible carbon credit generation and transparent market participation. Additionally, the verification assessment serves as a feedback mechanism, identifying areas for improvement and innovation in both monitoring and verification practices, thereby strengthening long-term project effectiveness.

4. Assessment Conclusion

Earthood Services Private Limited has conducted the validation of the proposed "Carbontribe Methodology for forest land projects" along with all supporting documents referenced in the methodology. The validation was carried out following Earthood's internal procedures and the fundamental requirements set by standard carbon registries. Key principles, including baseline scenario, additionality, leakage, quantification of GHG emissions, and monitoring parameters, were thoroughly assessed to ensure the methodology's compliance with best practices.

The proposed methodology has been developed to provide a scientifically rigorous framework for afforestation-based carbon sequestration projects. This methodology addresses the widespread deforestation and land degradation that have significantly reduced the planet's natural carbon sinks. By focusing on afforestation as a restoration strategy, it aims to enhance carbon sequestration, restore degraded ecosystems and contribute to climate change mitigation.

The methodology adheres to the IPCC Guidelines for National Greenhouse Gas Inventories (2006), the 2019 Refinement to the 2006 IPCC Guidelines, and other relevant scientific frameworks. The VVB has reviewed the proposed methodology and identified findings during the assessment, which were subsequently addressed to improve the methodology's robustness.

Annexure 4: Methodology assessment of "Carbontribe Methodology for Reducing Agricultural Emissions (Nitrous Oxide)"

1. Introduction

1.1. Objective

The assessment's goals are to conduct an independent assessment of the proposed "Carbontribe Methodology for Reducing Agricultural Emissions (Nitrous Oxide)" and to evaluate the process used for calculating net GHG emission reductions and removals from mitigating N_2O emissions by optimizing fertilizer use. The validation process of this methodology also evaluates how well the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry, 2003, ISO 14064/65 for certifying projects, and other industry best practices of relevant Standards / Procedures / Guidance are being incorporated in the methodology.

1.2. Summary Description of the Methodology

The methodology for projects implementing Carbontribe's fertilizer reduction framework ensures precise and transparent estimations of greenhouse gas (GHG) reductions by focusing exclusively on activities aimed at reducing nitrous oxide (N_2O) emissions. These activities involve the reduction or substitution of synthetic nitrogen fertilizers with alternatives such as organic fertilizers, biofertilizers, or precision nutrient applications. The goal is to optimize fertilizer use, leading to measurable reductions in N_2O emissions while promoting soil health and sustainable farming practices. Projects under this methodology must demonstrate verifiable reductions through detailed project plans, historical fertilizer use records, and documented implementation of alternative practices. Activities unrelated to N_2O emission reductions, such as carbon dioxide or methane mitigation outside the defined project scope, are excluded. This targeted approach enhances the methodology's integrity by focusing on direct sources of N_2O emissions from fertilizer application.

2. VVB Assessment Approach

Carbontribe has contracted Earthood to conduct the validation assessment on "Carbontribe Methodology for Reducing Agricultural Emissions (Nitrous Oxide)". The purpose and scope of the assessment was to conduct an independent assessment and validate the methodology. This methodology provides procedures for quantifying net greenhouse gas (GHG) emission reductions and removals from mitigating N_2O emissions by optimizing fertilizer use. The version of the methodology provides guidance to quantify, report and verify carbon dioxide removals generated through these practices.

The proposed methodology caters to all the fundamental requirements for the transparency, independent third-party validation and verification, no double counting, baseline, additionality, permanence, and uncertainty analysis satisfactorily. The sources of Carbon Pool and Emission been adequately mentioned under Section 3 of the methodology. This approach ensures that the methodology remains a valuable tool for promoting agricultural sustainable practices.

2.1. VVB Assessment Tools/Reference Documents:

- Carbontribe Methodology for Reducing Agricultural Emissions (Nitrous Oxide),
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories[25],
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[26],
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[27],
- 2003 IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry[28],
- The Core Carbon Principles by Integrity Council for Voluntary Carbon Market[29],
- UN's 2030 SDG Agenda[30],
- References provided in the methodology.

3. Assessment Findings

3.1. Assessment of the Definitions

Section 2.1.2 of the methodology provides definitions of key terms used throughout the document. These definitions are essential for ensuring consistency and accuracy in the calculation of greenhouse gas (GHG) emissions, with a particular focus on activities aimed at reducing nitrous oxide (N_2O) emissions. Their inclusion enhances the comprehensiveness of this methodology version, ensuring clarity and precision in its application.

3.2. Assessment of the Applicability conditions of the methodology

The applicability conditions outlined in Carbontribe's fertilizer reduction methodology are clearly defined to ensure that projects adhere to sustainable agricultural practices aimed at reducing nitrous oxide (N_2O) emissions.

Section 2.1.1 specifies that the methodology is applicable exclusively to projects implementing sustainable agricultural practices that reduce N_2O emissions. Eligible activities include reducing or substituting synthetic nitrogen fertilizers with alternatives such as organic fertilizers, biofertilizers,

[25] https://www.ipcc-nggip.iges.or.jp/public/2006gl/
[26] https://www.ipcc-nggip.iges.or.jp/public/wetlands/
[27] https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html
[28] https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html
[29] https://icvcm.org/core-carbon-principles/
[30] https://sdgs.un.org/2030agenda

or precision nutrient applications. Projects must demonstrate verifiable reductions in N_2O emissions through detailed project plans, historical fertilizer use records and documented implementation of alternative practices. Activities outside the defined scope, such as those targeting carbon dioxide or methane reductions are explicitly excluded. This condition ensures that project activities align strictly with the methodology's objective of optimizing fertilizer use and reducing N_2O emissions.

These applicability conditions collectively ensure that projects remain aligned with the methodology's objectives, guaranteeing measurable and verifiable reductions in N_2O emissions while promoting sustainable agricultural practices.

3.3. Assessment of the Project Boundary

Section 2.1.2 defines the project boundaries, establishing that eligible land must be classified as cropland or grassland at the project start date and remain within these land-use categories throughout the project duration, except in two scenarios:

- **Temporary Grassland Integration:** Grassland may be introduced into cropland as part of a long-term agroforestry or integrated crop-livestock system, provided that management plans, proposed practices and expected benefits are documented over the project's lifetime.
- **One-Time Land-Use Conversion:** Conversion between grassland and cropland is permissible if the baseline land is degraded and improved land-use practices will significantly enhance soil health. Baseline degradation and ongoing pressures must be validated prior to project approval.

Additionally, land-use activities must not affect wetlands or significantly reduce agricultural productivity, ensuring the reliability of the emission reductions.

The methodology limits emission reduction activities exclusively to those aimed at reducing N_2O emissions through both direct and indirect pathways associated with nitrogen-based fertilizers. The project boundary requirements specify that while the fertilizer application site must be clearly defined, locations where byproducts are redeposited outside the project area do not require explicit identification, maintaining a focused approach on N_2O emissions.

To delineate the project area, applicants must submit precise geographic information in either of the following formats:

- **KML File:** Must include single or contiguous polygons compatible with GIS software.
- **Array of Coordinates:** Latitude and longitude in WGS84 datum (EPSG:4326) with at least six decimal places, ensuring an accurate boundary representation.

Eligible land must not have involved clearing of native ecosystems within the last five years and must maintain stable boundaries to prevent significant displacement of productive activities, livestock, or soil productivity.

3.4. Assessment of the Stakeholder Engagement

The stakeholder engagement requirements outlined in Section 2.1.4 of Carbontribe's fertilizer reduction methodology ensure that project activities are aligned with local and environmental priorities while fostering collaboration and long-term sustainability. The methodology mandates active involvement of key stakeholders, including farmers, local communities, agricultural organizations, government bodies and other relevant parties, throughout the project lifecycle.

3.4.1. Stakeholder Participation:

To exhibit compliance, projects must engage stakeholders at various stages, including planning, implementation, and monitoring. This involves conducting regular consultations, promoting participatory decision-making, and establishing transparent communication channels. Such engagement ensures that stakeholder concerns and insights are integrated into project design and execution, enhancing overall project effectiveness.

3.4.2. Documentation and Evidence:

To demonstrate compliance, projects are required to maintain comprehensive records of stakeholder involvement. Acceptable forms of evidence include:

- Meeting records and attendance sheets
- Signed agreements or memoranda of understanding (MoUs)
- Documentation of feedback mechanisms and stakeholder responses

3.4.3. Ongoing Communication and Trust Building:

Sustained stakeholder engagement through ongoing communication helps maintain transparency and trust, ensuring that stakeholders remain informed and involved throughout the project duration. This continuous dialogue fosters long-term project acceptance and enhances the likelihood of achieving sustainable outcomes.

The methodology's emphasis on active, documented and ongoing stakeholder engagement strengthens project accountability, promotes inclusivity and supports the successful implementation of sustainable agricultural practices aimed at reducing nitrous oxide (N_2O) emissions.

3.5. Assessment of the Monitoring Parameters

Section 3.6 of Carbontribe's fertilizer reduction methodology outlines the key monitoring parameters required to assess the effectiveness of project activities in reducing N_2O emissions. The methodology mandates the collection of reliable data to ensure that emission reductions are

accurately quantified and verified. Parameters include the amount of nitrogen fertilizer applied, the type of synthetic or alternative fertilizers used and the emission, volatilization and leaching factors associated with fertilizer application.

The monitoring process involves obtaining as-applied maps, purchase records and application logs to confirm fertilizer use, while emission factors and fractions are derived from IPCC guidelines or validated field studies. The VVB (Validation and Verification Body) assessment will ensure that all data sources are properly documented, verified, and consistently reported. It will also confirm the integrity of monitoring practices by cross-checking field measurements, ensuring data completeness, and validating that emission factors align with project-specific conditions.

Parameter	Description	Monitoring Method	Frequency	VVB Assessment Focus
$N_{applied}$	Amount of nitrogen fertilizer applied	As-applied maps, purchase records, and grower logs	Annual	Verification of consistency, accuracy, and completeness of historical and project application records.
Fertilizer Type	Type of synthetic or alternative fertilizer	Purchase receipts, labels from agricultural service providers	Annual	Validation of fertilizer type consistency and verification against recorded application data.
EF & $Frac$ values	Emission, volatilization, and leaching factors	IPCC defaults, field studies, and regional data	Annual	Review and confirmation of emission factors, fraction values, and use of appropriate IPCC tiers or locally validated studies.

The VVB assessment will verify the integrity of data collection, confirm alignment with IPCC guidelines, and ensure transparency in reported project outcomes.

3.6. Assessment of the Baseline scenario

The baseline scenario, as defined in Section 2.2 of Carbontribe's fertilizer reduction methodology, reflects the continuation of historical agricultural practices where synthetic fertilizers are applied at business-as-usual (BAU) rates. Without project intervention, nitrous oxide (N_2O) emissions from these practices are expected to remain high. This baseline serves as a critical reference point for assessing the project's impact and additionality by demonstrating that the observed reductions in N_2O emissions would not have occurred without the project. To establish a credible baseline, developers must confirm that synthetic fertilizers were historically used as part of the agricultural management practices on the project land, with baseline emissions representing the estimated amount of N_2O released during the project crediting period if these practices continued unchanged.

Section 2.2.1 outlines the baseline validation requirements, ensuring that the baseline scenario accurately reflects historical farming practices. Developers are required to provide detailed records of synthetic fertilizer application, including the type, quantity, and timing of application, for at least one year prior to project initiation. While a minimum of one year of pre-project data is mandatory, a longer period (e.g., 3–5 years) is recommended to account for variations in weather, crop rotation, and farming practices. If only one year of data is available, supplementary sources such as regional agricultural records or farmer surveys may be used to strengthen the baseline assessment. Post-project implementation data must cover at least one year to demonstrate the reduction or substitution of synthetic fertilizers and the corresponding decrease in N_2O emissions.

3.7. Assessment of Additionality

The additionality requirements outlined in Section 2.2.2 of Carbontribe's fertilizer reduction methodology ensure that emission reductions achieved through project implementation are real, measurable and exceed business-as-usual (BAU) practices. To demonstrate additionality, projects must implement actions that go beyond legal or regulatory requirements and represent a significant departure from standard agricultural practices. This includes identifying specific project activities such as transitioning to precision nutrient applications, using slow-release fertilizers, adopting organic alternatives, or introducing nitrogen-fixing rhizobia with leguminous crops to reduce reliance on synthetic nitrogen fertilizers. These interventions must be demonstrably different from conventional practices in the region to establish a meaningful shift towards sustainable nutrient management.

Projects must provide evidence through baseline comparisons to show that, without project intervention, fertilizer application rates and the associated N_2O emissions would have remained at BAU levels. This can be demonstrated using historical data or modelled scenarios reflecting typical agricultural practices. Additionally, projects should address technological and financial barriers that may hinder the adoption of these practices, such as high upfront costs or limited knowledge among farmers. Finally, the methodology requires proof of regulatory surplus by confirming that the reduction of fertilizer use is not mandated by any existing laws or regulations. This ensures that emission reductions are voluntary and not driven by regulatory obligations, thereby validating the project's additionality.

3.8. Assessment of Leakage

The leakage assessment outlined in Section 2.2.3 of Carbontribe's fertilizer reduction methodology indicates that leakage risks are considered negligible due to the continued use of land for agricultural production. Historical evidence demonstrates that optimizing nitrogen fertilizer application to economic levels does not compromise crop yields, thereby eliminating incentives for production shifts that could increase emissions or reduce soil carbon pools outside the project

boundary. Studies such as Zhao et al. (2017), Nasiro & Mohammednur (2024), and Hoben et al. (2011) support this conclusion, affirming that reducing synthetic fertilizer use can achieve emission reductions without adversely impacting agricultural productivity.

To further mitigate potential leakage risks, Carbontribe's methodology recommends the use of advanced computer vision models to monitor agricultural activities and detect any increased emissions or production shifts in neighboring areas. This proactive approach enhances the methodology's robustness by providing an additional safeguard against potential indirect impacts, ensuring that emission reductions achieved within the project boundaries are not offset by unintended consequences elsewhere.

3.9. Assessment of Quantifications of GHG emission reductions and removals

The quantification methodology outlined in Section 3 of Carbontribe's fertilizer reduction framework provides a structured approach to estimating the reduction of greenhouse gas (GHG) emissions, with a primary focus on nitrous oxide (N_2O) emissions. Emission reductions are categorized into three key sources:

- **Direct N_2O Emissions:** These result from the nitrification and denitrification processes of nitrogen in fertilizers applied to the soil. Synthetic fertilizers increase nitrogen availability in the soil, which can be converted into N_2O, a potent GHG.
- **Indirect N_2O Emissions:** These occur through the volatilization of nitrogen from fertilizers, followed by its deposition onto soils or water bodies, contributing to N_2O emissions.
- **Emissions from Leaching and Runoff:** Nitrogen loss through leaching into groundwater or runoff into nearby water bodies can contribute to N_2O formation in aquatic systems.

The methodology leverages computer vision models and remote sensing technologies to classify cropland and non-cropland areas, monitor critical agricultural parameters, and estimate annual N_2O reductions. The process includes data acquisition from remote sensing platforms, preprocessing for accuracy, cropland classification using computer vision models, and monitoring of nitrogen flow parameters aligned with IPCC guidelines. Relevant equations or estimation models are applied to quantify N_2O reduction, with all data securely stored on a decentralized blockchain platform to ensure traceability and transparency.

3.9.1. Assessment of Quantification of Baseline emissions

The baseline emissions quantification methodology outlined in Section 3.3 of Carbontribe's fertilizer reduction methodology establishes the reference point for measuring future emission reductions resulting from the project. Baseline emissions are calculated based on historical data related to the use of synthetic fertilizers, including the type and quantity of fertilizers applied in the baseline year. These values are combined with default emission factors derived from IPCC guidelines (Volume 4, Chapter 11, 2006, updated 2019) to estimate direct and indirect N_2O emissions.

Project-specific data such as the amount of nitrogen applied, the fraction of nitrogen volatilized, and the fraction of nitrogen leached are used to ensure that the baseline emissions calculation reflects site-specific conditions. To enhance accuracy, supplementary information may be drawn from farm records, receipts, and regional agricultural practices. This rigorous approach ensures that the baseline emissions represent a realistic and scientifically validated estimate, serving as a reliable benchmark for evaluating emission reductions achieved through the implementation of sustainable agricultural practices.

3.9.2. Assessment of Quantification of Project emissions

Section 3.4 of Carbontribe's fertilizer reduction methodology outlines the approach for calculating project emissions, which are based on the reduced or alternative fertilizer use compared to baseline levels. The same framework used for baseline emissions is applied but with adjustments to reflect the actual amount of synthetic fertilizers used in the project or the adoption of alternative fertilizers such as organic options or precision nutrient applications. The methodology follows a tiered approach aligned with IPCC guidelines, where Tier 1 calculations use global default values and standard emission factors, while more refined Tier 2 or Tier 3 approaches apply project-specific measurements or species-specific values from peer-reviewed literature for greater accuracy.

Project emissions are assessed by accounting for direct, indirect, and leaching-related N_2O emissions resulting from the use of fertilizers. Parameters such as the quantity of synthetic fertilizer applied, nitrogen volatilized, and nitrogen lost through leaching are monitored using farm records, regional measurements, and relevant emission factors. Emission factors are derived from IPCC guidelines (Volume 4, Chapter 11) or, where available, context-specific studies. These refined approaches ensure that project emissions are quantified with high accuracy, reflecting the actual impacts of reduced fertilizer use or the adoption of alternative practices.

3.9.3. Assessment of Quantification of Leakage

Section 3.5 of Carbontribe's fertilizer reduction methodology outlines the approach for estimating leakage by calculating the amount of nitrogen volatilized and leached during the project. In cases where detailed project-specific data is unavailable or when a simplified estimation is preferred, a fraction-based approach is applied. This method uses default fractions for nitrogen volatilization and leaching, as prescribed by IPCC guidelines (Volume 4, Chapter 11). By applying these default fractions to the total nitrogen applied in the project, emissions from volatilization and leaching can be estimated without requiring detailed field measurements, ensuring consistency and comparability across projects.

The methodology assumes that a specific percentage of the nitrogen applied as fertilizer volatilizes or leaches, with associated emission factors accounting for these processes. This approach, consistent with Tier 1 IPCC guidelines, provides a streamlined and transparent method to quantify potential leakage. The fraction-based estimation method ensures that any emissions resulting from

volatilization or leaching, which may contribute to indirect N_2O emissions beyond the project boundaries, are accurately accounted for, minimizing the risk of unintentional leakage.

3.9.4. Assessment of Total Emission Reduction

Section 3.2 of Carbontribe's fertilizer reduction methodology describes the approach for determining the total reduction in greenhouse gas (GHG) emissions achieved by the project. The total emission reduction is calculated by comparing the baseline emissions, which reflect the continuation of historical agricultural practices using synthetic fertilizers, with the project emissions, which account for the reduced or alternative fertilizer applications implemented under the project.

The methodology ensures that emission reductions are accurately captured by systematically assessing the difference between baseline and project emissions. By considering all relevant sources of N_2O emissions, including direct, indirect, and leaching-related emissions, the methodology provides a robust framework for quantifying the project's impact on reducing GHG emissions. This approach offers a scientifically validated and transparent method to assess the effectiveness of sustainable agricultural practices in mitigating climate change.

3.10. Assessment of Monitoring and Verification (MRV)

3.10.1. Monitoring Assessment:

CarbonTribe's fertilizer reduction methodology establishes a rigorous monitoring framework designed to track and quantify nitrous oxide (N_2O) emission reductions resulting from improved fertilizer management practices. The framework adheres to internationally recognized guidelines, including the IPCC 2006 Guidelines and the 2019 Refinement, ensuring consistency with best practices in GHG accounting. The monitoring approach combines field-based measurements with advanced technologies such as remote sensing, GIS, and machine learning models to enhance the accuracy and efficiency of data collection. This multi-tiered approach ensures comprehensive monitoring across project boundaries and enables early detection of deviations, allowing for timely corrective actions to maintain project integrity.

3.10.2. Verification Assessment:

Verification is performed through an independent assessment by qualified third-party auditors to validate the accuracy of monitoring data and ensure compliance with the methodology's requirements. These auditors conduct a detailed review of project documentation, field data, and monitoring reports to confirm that the reported reductions in N_2O emissions are accurate and credible. The verification process involves assessing conformity with project plans, verifying adherence to monitoring protocols, and confirming the reliability of emission reduction claims. By engaging impartial experts with specialized knowledge in agricultural carbon offset projects and

GHG accounting, the verification process strengthens transparency, enhances credibility, and ensures that the carbon credits generated are scientifically validated and trustworthy.

4. Assessment Conclusion

Earthood Services Private Limited has conducted the validation of the proposed "Carbontribe Fertilizer Reduction Methodology" along with all supporting documents referenced in the methodology. The validation was carried out following Earthood's internal procedures and the fundamental requirements set by standard carbon registries. Key principles, including baseline scenario, additionality, leakage, quantification of GHG emissions, and monitoring parameters, were thoroughly assessed to ensure the methodology's compliance with best practices.

The methodology adheres to the IPCC Guidelines for National Greenhouse Gas Inventories (2006), the 2019 Refinement to the 2006 IPCC Guidelines, and other relevant scientific frameworks. The VVB has reviewed the proposed methodology and identified findings during the assessment, which were subsequently addressed to improve the methodology's robustness.

This methodology, focusing exclusively on reducing nitrous oxide (N_2O) emissions through the reduction or substitution of synthetic nitrogen fertilizers, ensures accurate and transparent estimations of GHG reductions while promoting sustainable agricultural practices. The methodology will undergo further revisions as necessary, with future updates ensuring continued alignment with fundamental principles and materiality requirements established in this version.

Annexure 5: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWER

Competence Statement	
Name	Ashok Gautam
Country	India
Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)
Experience	16 Years +
Field	Energy, Climate Change & Environment
Approved Roles	
Team Leader	YES
Validator	YES
Verifier	YES
Methodology Expert	AMS-I.D., AMS-I.A., AMS-I.C., AMS-I.E, AMS-II.D., AMS-II.G., AMS-III.E., AMS-III.H., AMS-III.Q, AMS-III.Z., AMS-III.AV., AMS III.AR, AM0029, AM0025, AM0056, ACM0001, ACM0002, ACM0004, ACM0012, ACM0006, AM0018, ACM0017, ACM0009, AM0034, AMS.I.B, ACM0016, AMS-III.BL, AMS-II.L, AMS-I.I., AMS-III.A.O., ACM0010, ACM0025
Local expert	YES (India)
Financial Expert	YES

Technical Reviewer	YES		
TA Expert	YES (TA 1.1, TA 1.2, TA 3.1, TA 13.1 & 14.1)		
Reviewed by	Shifali Guleria	**Date**	18/10/2024
Approved by	Deepika Mahala	**Date**	18/10/2024

Competence Statement			
Name	Dr. Sadaf Nazneen		
Education	PhD (Environmental Sciences)		
Experience	5+ Years		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	YES (14.1)		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	11/09/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	11/09/2024

Competence Statement			
Name	Atulya Dhar		
Education	M.Tech (Remote Sensing and GIS); BE (Electronics and Communication Engineering)		
Experience	5 Months		
Field	Information Technology and Engineering		
Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	YES		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	16/09/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	16/09/2024

Competence Statement			
Name	Vignesh M		
Education	M.Sc. (Forestry) specialization in Silviculture and Agroforestry B.Sc. (Forestry)		
Experience	02 Years		
Field	Carbon Trading		
Approved Roles			
Team Leader	NO		
Validator	NO		
Verifier	NO		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee (Validator)	YES		
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	08/10/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	09/10/2024

Competence Statement			
Name	Shifali Guleria		
Education	M.Sc. (Environmental Studies and Resource Management), TERI University		
Experience	3+ year		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	YES (AMS-I.A., AMS-II.G., AMS-II.E., AMS-III.A.V., AMS-I.D, ACM0002)		
Local expert	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (1.2, 3.1)		
Reviewed by	Deepika Mahala	**Date**	18/02/2022
Approved by	Ashok Gautam	**Date**	18/02/2022

Competence Statement			
Name	Dr. Rajesh Monga		
Education	PhD: Forestry M.Sc.: Forestry B.Sc.: Agriculture		
Experience	6+ Years		
Field	Climate Change		
Approved Roles			
Team Leader	NO		
Validator	YES		
Verifier	YES		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
add rows, if necessary			
Reviewed by	Shifali Guleria (Quality Manager)	**Date**	12/11/2024
Approved by	Deepika Mahala (Technical Manager)	**Date**	12/11/2024