THAILAND CARBON PROGRAM OF RICE-FIELD FOR ALTERNATIVE WET AND DRY IN THE AREAS OF THE CENTRAL AND NORTHERN

Project title	Thailand Carbon Program of Rice-Field for Alternative Wet and Dry in Areas of the Central and Northern
Project ID	5814
Crediting period	01/11/2025 to 31/10/2032
Original date of issue	24/11/2025
Most recent date of issue	24/11/2025
Version	1
***VCS Standard* Version**	4.7
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Rice cultivation is highly vulnerable to climate change, and it is also a significant source of greenhouse gas (GHG) emissions, particularly methane. In Thailand, conventional practices especially the continuous flooding of rice fields intensify methane production. Reducing these emissions is crucial to protecting the environment and building more resilient agricultural systems.

This program introduces water-efficient rice farming methods such as Alternate Wetting and Drying (AWD). These approaches reduce methane emissions by minimizing prolonged waterlogged conditions while also improving crop productivity. In addition, the program promotes sustainable rice production techniques, including conservation tillage, appropriate fertilizer use, and managing agricultural waste without burning.

To support farmers in adopting these sustainable practices, Charoen Pokphand Produce Co., Ltd. Will engage FarmPro as facilitators and mentors. FarmPro, a fully integrated agricultural service provider in Thailand, offers farmers inputs, machinery, market connections, and technical guidance. They will also deliver essential services throughout the rice production cycle covering land preparation, planting, pest and fertilizer management, harvesting, grain purchasing, and irrigation assistance such as tube-well construction. The FarmPro team will be responsible for farmer recruitment, training, and monitoring to ensure improved water management practices that reduce GHG emissions. The project will be implemented in eight clusters across northern and central Thailand: Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi. Training activities will focus on target areas such as water management for methane reduction, proper fertilizer application, conservation tillage, and sustainable agricultural waste management practices that avoid burning.

The program aims to promote a more sustainable and environmentally friendly agricultural system by equipping farmers with essential climate-smart techniques. Through these interventions, the program will lower GHG emissions and enhance the resilience and long-term prosperity of Thailand's rice-growing communities.

- Annual average GHG emission reduction: 54,645 tCO_2e
- Total GHG emission reductions: 382,514 tCO_2e

1.2 Audit History

This draft document for pipeline listing, not validation yet.
For projects undergoing crediting period renewal, include the audit history of the project using the table below. For the project validation, state the validation date in the Period column. This table should include all monitoring periods, including the period of this report.

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/ verification	*(DD-Month-YYYY—DD-Month-YYYY)*	*VCS*	*Validation/verification body name*	*One year*

1.3 Sectoral Scope and Project Type

Complete the table below with information relevant for AFOLU projects:

Sectoral scope	14. Agriculture, forestry and other land use (AFOLU)
AFOLU project category[1]	Agricultural Land Management (ALM)
Project activity type	Improved Management in Rice Production Systems (AWD), reduce agricultural inputs (fertilizer, fuel, liming), and reduce open burning in rice fields

1.4 Project Eligibility

1.4.1 General eligibility

Based on the requirements of the VCS Standard v4.7 and the VM0051 v1.0 methodology, this project satisfies all eligibility criteria for registration under the VCS Program. The project falls under the Agricultural Land Management (ALM) category and is not included in the excluded activities listed in Table 2.1 of the VCS Standard. The key eligibility considerations are as follows:

- The project activity aligns with the ALM and AFOLU-eligible categories and is not included in the exclusions specified in Table 1 of the VCS Standard v.4.7. Therefore, it is fully with the scope of the VCS Program.
- The project applies VM0051, a methodology formally “approved under the VCS Program through the methodology development and review process”.
- The project qualifies under the VCS Program as it implements improved rice cultivation practices that reduce net emissions of CH_4, N_2O, and/or CO_2. This is achieved primarily through enhanced water management techniques, including Alternate Wetting and Drying (AWD), which optimize irrigation efficiency and lower greenhouse gas emissions from paddy fields.

[1] *See Appendix 1 of the* VCS Standard

- In compliance with Section 3.8.2 of the VCS Standard v4.7, the project initiated the pipeline listing process within three years of the project start date.
- In accordance with Section 3.8.4, the project will complete validation within five years of the project start date.
- As stated in Section 1.15 of this document, the project adheres to all relevant local, regional, and national laws, regulations, and statutory requirements.
- The project is not a fragmented component of a broader initiative and remains within the small-scale project threshold of 60,000 tCO_2e per year.
- All participating farmers have provided informed consent, and the project clearly demonstrates the legal right to implement the activities and claim the resulting Verified Carbon Units (VCUs).

1.4.2 AFOLU project eligibility

Furthermore, the project is classified under the Agricultural Land Management (ALM) category of AFOLU in accordance with the VCS Standard, based on the following considerations:

- This project aims to reduce CH_4 emissions from rice paddies identified as cropland by implementing the Alternate Wetting and Drying (AWD) technique rather than continuous flooding. This aligns with eligible ALM activities under the VCS framework.
- According to map analyses, the project area has not undergone clearing of native ecosystems within the 10 years before the project's start date (1 November 2025).
- By applying AWD on existing croplands and achieving measurable reductions in CH_4 emissions, the project meets the criteria for an eligible ALM activity focused on lowering net GHG emissions.
- Rice cultivation has been practiced continuously across the target provinces Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi thereby supporting the project's eligibility as an ALM AFOLU activity under the VCS Program.

1.4.3 Transfer project eligibility

This is not a transfer project.

1.5 Project Design

Indicate if the project has been designed as:

☐ Single location or installation

☒ Multiple locations or project activity instances (but not a grouped project)

☐ Grouped project

1.5.1 Grouped project design

The project is an example of a single project activity that was produced as a single project rather than as a group effort and took place in different places.

1.6 Project Proponent

Organization name	Charoen Pokphand Produce Co., Ltd.
Contact person	Dr. Sadudee Supanpai
Title	Project President
Address	C.P. Tower 2 (Fortune Town), 23rd Floor, Ratchadapisek Rd., Din Daeng, Bangkok, Thailand, 10400.
Telephone	+66814677999
Email	carboncredit@cppcrop.com

1.7 Other Entities Involved in the Project

Organization name	Charoen Pokphand Produce Co., Ltd.
Role in the project	Project Owner
Contact person	Mr. Worasit Sittivichai
Title	Chief Operating Officer
Address	C.P. Tower 2 (Fortune Town), 23rd Floor, Ratchadapisek Rd., Din Daeng, Bangkok, Thailand, 10400.
Telephone	+668 1450 2478
Email	worasit@cppcrop.com

Organization name	Rajamangala University of Technology Lanna (Lampang)

Role in the project	Consultant
Contact person	Assistance Professor Dr. Suraphon Chaiwongsar
Title	Project Consultant
Address	200, Moo 17, Phahonyothin Road, Phichit, Mueang Lampang District, Lampang 52000
Telephone	+66 860 511 151
Email	suraphon.c@rmutl.ac.th

1.8 Ownership

Participating farmers have entered into Carbon Rights Agreements with Charoen Pokphand Produce Co., Ltd. granting the company exclusive ownership of all carbon credits generated, in accordance with Section 3.7.1 of the VCS Standard. Following successful implementation, the project will produce Verified Emission Reductions (VERs).

Through an Emission Reduction Rights Transfer Agreement, project beneficiaries formally transfer the rights to these emission reductions to Charoen Pokphand Produce Co., Ltd., ensuring complete and undisputed ownership. Importantly, land ownership remains with the farmers, as confirmed by official government land documentation.

1.9 Project Start Date

Project start date	01/11/2025
Justification	Under the VCS Standard, the project start date is defined as the point at which activities that directly lead to GHG emission reductions or removals begin such as land preparation, planting, or changes in management practices. For this project, the start date is identified as the moment when the first participating farmer submits a cultivation plan through the project's internal control system. This submission signals the farmer's commitment to adopt improved water management practices, transition from continuous flooding to controlled irrigation, and begin land preparation. This date represents the first documented land preparation activity, verified through the farmer's cultivation plan and

	corresponding logbook entries provided as supporting evidence.

1.10 Project Crediting Period

Crediting period	☒ *Seven years, twice renewable* ☐ *Ten years, fixed* ☐ *Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)*
Start and end date of first or fixed crediting period	01/11/2025 to 31/10/2032

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

Indicate the estimated annual GHG emission reductions/removals (ERRs) of the project:

☒ < 300,000 tCO2e/year (project)

☐ ≥ 300,000 tCO2e/year (large project)

Complete the table below for the first (if renewable) or fixed crediting period:

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO_2e)
01/11/2025 to 31/10/2026	54,645
01/11/2026 to 31/10/2027	54,645
01/11/2027 to 31/10/2028	54,645
01/11/2028 to 31/10/2029	54,645
01/11/2029 to 31/10/2030	54,645
01/11/2030 to 31/10/2031	54,645
01/11/2031 to 31/10/2032	54,645
Total estimated ERRs during the first or fixed crediting period	**382,515**
Total number of years	**7**
Average annual ERRs	**54,645**

1.12 Description of the Project Activity

The *Thailand Carbon Program of Rice-Field for Alternative Wet and Dry in Areas of the Central and Northern* is an Agricultural Land Management (ALM) project under the AFOLU category of the VCS Program v4.7, utilizing the VM0051: Improved Management in Rice Production Systems (v1.0) methodology. The project is implemented and managed by Charoen Pokphand Produce Co., Ltd., with technical assistance from FarmPro Thailand, and spans approximately 14,277 hectares of irrigated rice fields located across Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi.

The project aims to reduce methane (CH_4) emissions produced in continuously flooded rice systems by introducing enhanced water management and sustainable cultivation practices. In traditional rice production, methane is generated under anaerobic (waterlogged) soil conditions due to methanogenic microbial processes. To mitigate these emissions, the project promotes the following GHG reduction strategies:

1.12.1 Main Project Activities and Technologies Employed

Alternate Wetting and Drying (AWD):

Alternate Wetting and Drying (AWD) is a climate-resilient irrigation technique for rice production that replaces traditional continuous flooding with controlled cycles of wetting and drying. The practice involves inserting a perforated tube commonly a PVC pipe into the rice field to monitor the groundwater level. During the tillering stage, farmers adjust irrigation by allowing the field to dry until the water table drops to 15 cm below the soil surface (but not beyond this threshold to avoid crop stress), after which the field is re-irrigated to a shallow depth of approximately 5 cm. This drying cycle is not applied during the flowering stage, when adequate water is essential for successful fertilization and grain formation. AWD typically reduces irrigation water use by 20–30% without compromising yields and may even enhance productivity in some cases. The periodic drying phases introduce oxygen into the soil, creating aerobic conditions that suppress methane-producing microorganisms and promote deeper root development, which strengthens plant resilience. Environmentally, AWD substantially reduces methane emissions from rice paddies, a major contributor to agricultural greenhouse gases. Effective adoption of AWD depends on farmers having access to reliable irrigation and drainage systems, as well as proper training to prevent excessive drying that may reduce yields. Overall, AWD represents a practical, low-cost, and scalable water management strategy that conserves water, maintains or improves productivity, and significantly contributes to climate change mitigation.

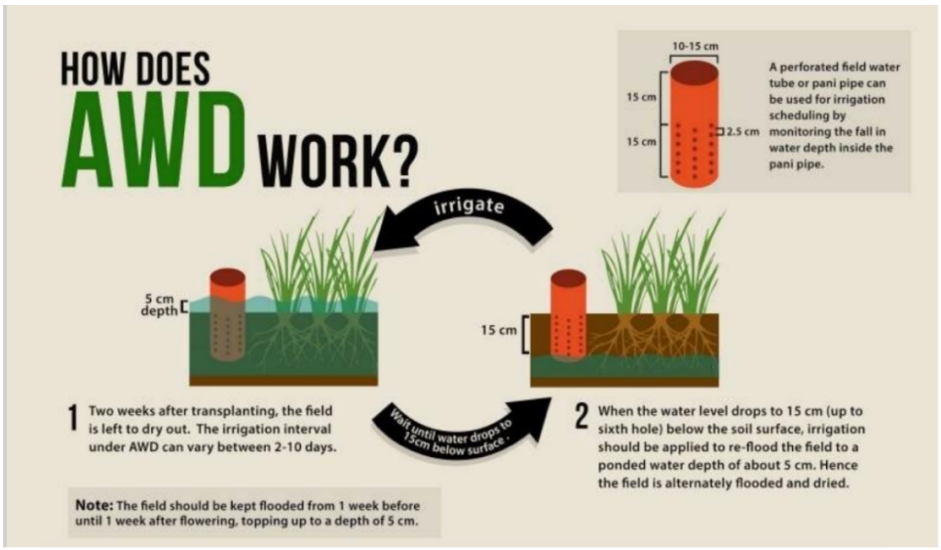

Figure 1: Working principle of AWD technique

SOURCE: *GHG mitigation in rice - alternate wetting and drying*. (n.d.). https://ghgmitigation.irri.org/mitigation-technologies/alternate-wetting-and-drying

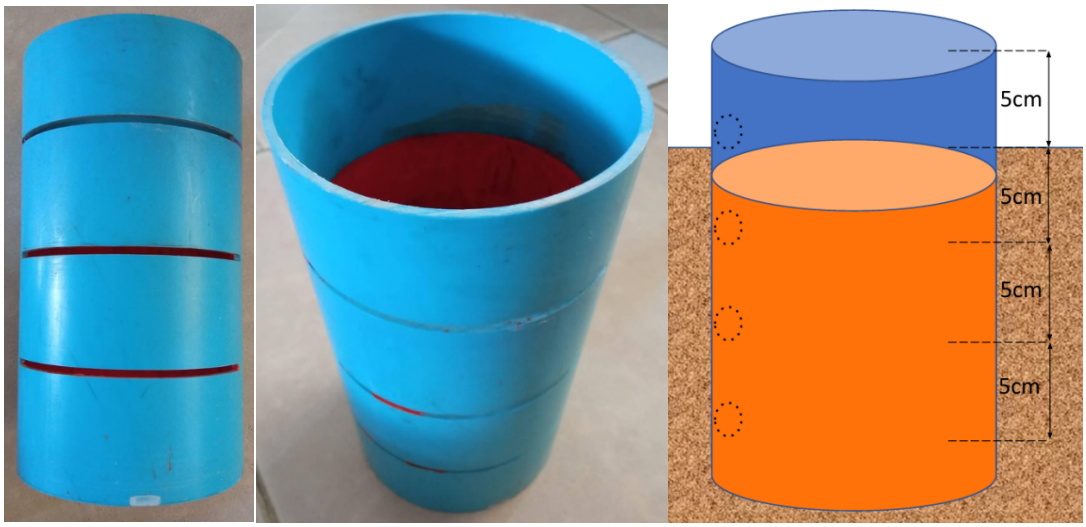

Figure 2: Perforated PVC pipe for monitor the subsurface water level

Figure 3: Installing perforated PVC pipe into the field to monitor the subsurface water level

1.12.2 Mechanism of Methane (CH_4) Reduction

By replacing continuous flooding with AWD, the project shortens the period in which soils remain anaerobic, the primary condition that leads to methane production. The reduction in CH_4 emissions is quantified through the decrease in waterlogged days and improved soil aeration. Additional practices including avoiding crop residue burning, applying fertilizers more efficiently, and reducing fossil fuel use further contribute to lowering other GHG emissions.

Emission following VM0051 procedures, using default regional emission factors for Southeast Asia. Farmer activity data, verified through routine field inspections and incorporated into the project's Internal Control System (ICS), ensure accurate and reliable accounting of GHG.

1.12.3 Sustainable Agricultural Practices

According to the applicability conditions of VM0051, participating farmers are encouraged to adopt sustainable agricultural practices. The project seeks to eliminate the open burning of rice straw and crop residues a major source of GHG emissions and PM2.5 pollution in Thailand by promoting alternative, sustainable residue management methods. Through training, farmers learn to incorporate residues into the soil, compost them, use them as mulch, or repurpose them as livestock feed. These practices improve soil health, reduce dependence on chemical fertilizers, and generate additional value from crop residues. Farmers are also encouraged to reduce their overall use of agricultural inputs, including fertilizers and fuel. Training in site-specific nutrient management enables them to apply fertilizers more efficiently, based on crop requirements, soil characteristics, and seasonal conditions. The project further promotes the use of enhanced-efficiency fertilizers and split applications to minimize nitrogen losses and improve nutrient uptake. Conservation tillage practices such as minimum or reduced tillage are also introduced to decrease fuel consumption and reduce CO_2 emissions from rice cultivation. To ensure effective implementation, farmers receive practical guidance and ongoing support through FarmPro extension services, farmer field schools, and demonstration plots. Participants are free to adopt the practices most suitable for their farming conditions; however, their cultivation outcomes must remain consistent with the applicability requirements outlined in VM0051.

1.12.4 Organizational Roles and Community Involvement

- Charoen Pokphand Produce Co., Ltd. acts as the Project Proponent, responsible for overall management, monitoring, and reporting under the VCS Program.

- Charoen Produce Co., Ltd. (FarmPro Thailand) acts as the implementing partner, providing technical assistance, training, and coordination with farmers.
- Farmer groups participate under Carbon Rights Agreements, retaining ownership of their land while transferring the rights to emission reductions to the project proponent.
- Local government agencies, including the Ministry of Natural Resources and Environment support the project through coordination, technical guidance, data sharing, and regulatory oversight.

Community engagement is central to the project's success. Farmers benefit from continuous capacity-building activities, including field demonstrations, on-farm coaching, and seasonal follow-ups. Additionally, the project establishes "Smart Farmer Networks," led by trained farmer leaders who facilitate peer-to-peer learning and ensure consistent adoption of sustainable agricultural practices.

1.12.5 Jurisdictional Context

The project is implemented across Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces in Thailand. These areas are not currently part of any jurisdictional REDD+ or other carbon credit programs, ensuring n overlap in GHG accounting frameworks. The project aligns with Thailand's Nationally Determined Contribution (NDC) and contributes to the country's national climate strategy by reducing agricultural emissions and promoting more efficient water use.

1.13 Project Location

The project located in Thailand, rice producing regions, divided into eight provinces, which are Phayao, Chiang Rai, Chiang Mai, Khamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces (Figure 4).

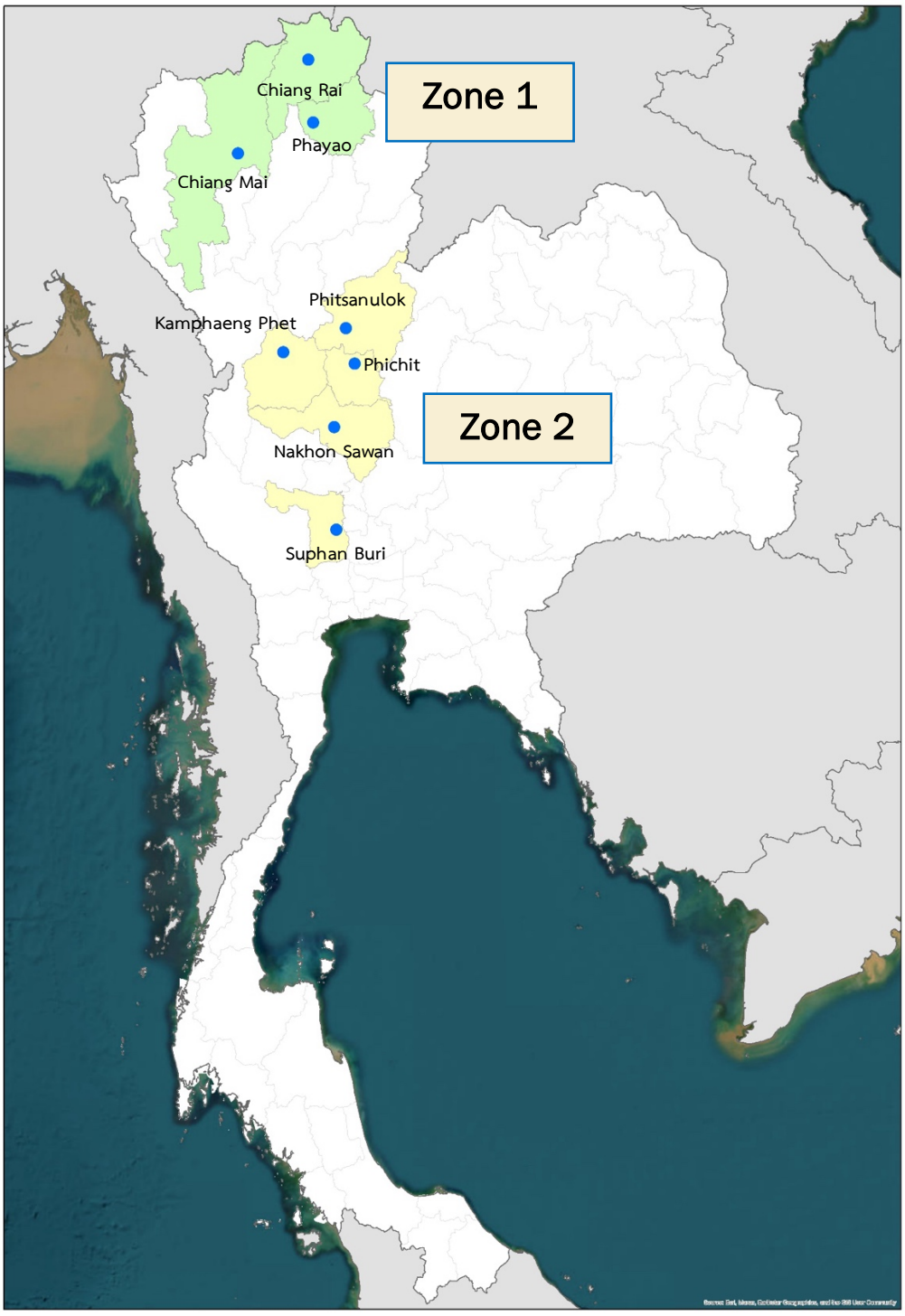

Figure 4: The Overview of the project area which is divided into 2 Zones (which are Zone 1 include Phayao, Chiang Rai, and Chiang Mai and Zone 2 include Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces)

Table 1 Project Boundary Coordinates (GPS Coordinates) for Each Zones

Zone	Provinces	Latitude	Longitude
1	Phayao	19.371558	100.149075
	Chiang Rai	20.15386821	100.40981422
	Chiang Mai	18.76184282	98.93618242
2	Khamphaeng Phet	16.21593736	99.73391836
	Phitsanulok	16.84449490	100.23323996
	Phichit	16.49623366	100.01861029
	Nakhon Sawan	15.96798140	100.1636320
	Suphanburi	14.47716174	100.08220400

*** (The exact coordinates of the site will be provided during project validation.)

1.14 Conditions Prior to Project Initiation

Prior to project initiation, rice cultivation in the project area relied on traditional continuous flooding, where fields remained submerged for most of the growing season. These conditions created anaerobic soil environments that facilitated methane (CH_4) production through microbial activity. The project's objective is not to increase greenhouse gas emissions but to reduce the emissions associated with conventional rice farming. The baseline scenario reflects these pre-project practices and is therefore consistent with conditions prior to project implementation (see Section 3.4, "Baseline Scenario"). Furthermore, the project does not affect environmental conditions such as climate, hydrology, topography, soil characteristics, historical land use, vegetation types, or ecosystems, as outlined below.

Ecosystem Type: The project area comprises lowland irrigated agricultural ecosystems, predominantly dedicated to rice cultivation.

Current and Historical Land Use: The land has been continuously cultivated for paddy rice for several decades, with documented rice production dating back to 1970s. No conversion or clearing of native ecosystems has taken place in the past ten years.

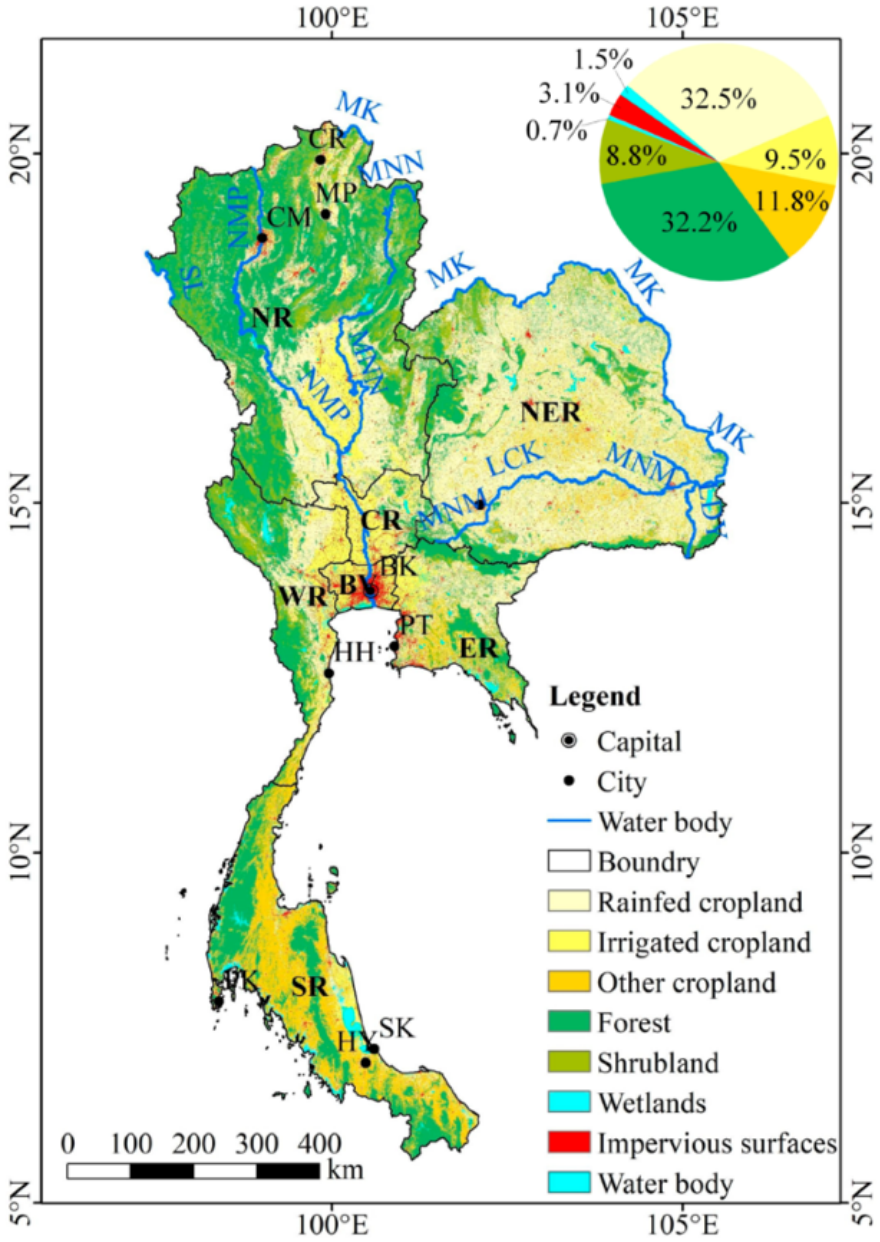

Figure 5: Land use change (LUC) map of Thailand in 2020

Source: Wang et al., 2022

Environmental Conditions: The project areas in Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces are characterized by a tropical monsoon climate, with annual rainfall ranging more than 1,000 mm. The terrain is predominantly flat to gently sloping, with fertile alluvial soils that are suitable for irrigated rice cultivation. Irrigation systems are supplied by canals and reservoirs, supporting intensive double-cropping in some areas. Vegetation is mainly agricultural, dominated by rice and seasonal crops, with limited patches of grass or trees around field boundaries.

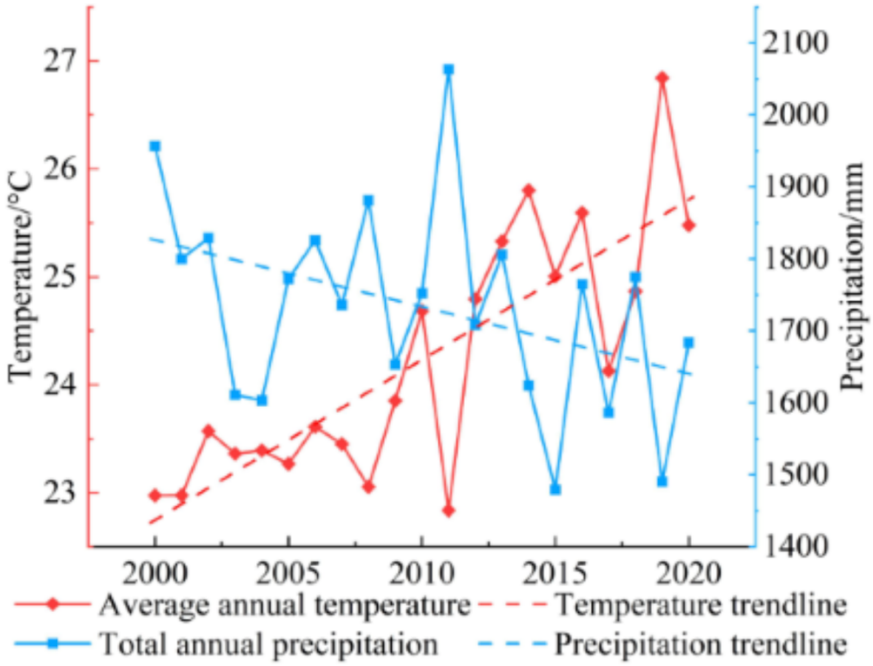

Figure 6: Climate factors status in Thailand from 2000 to 2020

Source: Wang et al., 2022

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project fully complies with all applicable local, regional, and national laws, statutes, and regulatory frameworks of the Kingdom of Thailand. It operates within the legal framework governing agricultural practices, environmental protection, land use, and climate change mitigation. The relevant laws and regulations applicable to project activities are as follows:

- Enhancement and Conservation of National Environmental Quality Act (B.E. 2535, amended B.E. 2561): Ensures that project activities align with national environmental protection objectives, including pollution control and sustainable resource management.
- Water Resources Act (B.E. 2561): Supports efficient irrigation and water resource management, including practices like Alternate Wetting and Drying (AWD).
- Agricultural Land Reform Act (B.E. 2518) and related regulations: Confirms that participating farmers retain legal ownership or use rights over their farmland
- Land Code Act (B.E. 2497) and amendments: Ensures that project lands remain legally designated for agricultural use and are not converted from protected or restricted areas.
- Fertilizer Control Act (B.E. 2522, amended B.E. 2562): Guides the safe and efficient use of fertilizers, supporting sustainable nutrient management practices.

All project activities, including improved water management, residue management, and farmer training, are conducted in compliance with these frameworks. The project also coordinates with relevant government agencies, including the Department of Agriculture (DOA) and the Royal Irrigation Department (RID), to ensure alignment with national agricultural and environmental policies.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

If yes, provide required evidence of no double issuance as outlined by the VCS Standard.

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

If yes, provide the registration number and the date of project inactivity under the other GHG program.

Is the project active under the other program?

☐ Yes ☒ No

Project proponents, or their authorized representative, must attest that the project is no longer active in the other GHG program in the Registration Representation.

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

If yes, provide the program name(s), reason(s) and date for the rejection, justification of eligibility under the VCS Program, and any other relevant information.

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.18 Sustainable Development Contributions

The project contributes to multiple Sustainable Development Goals (SDGs) by adopting sustainable agricultural practices and promoting inclusive community engagement. The following summarizes the project's contributions and associated monitoring approaches:

- **SDG 2 (Zero Hunger)**

Target 2.4. By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality

Impact Indicator Number of farmers reporting increased yields as a result of the project's activities.

Detail: The project promotes sustainable agriculture through the adoption of Alternate Wetting and Drying (AWD), which is expected to enhance crop yields compared to traditional continuous flooding methods. Yield improvements will be monitored using farmer questionnaires and

reports submitted through local authorities, ensuring consistent, accurate, and verifiable data collection.

- **SDG 3 (Good Health and Well Being)**

Target 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
Impact Indicators: - Area under reduced/avoided open burning of biomass, crop residue
Detail: Baseline data indicate that some farmers still engage in open burning of crop residues. The project aims to achieve a complete (100%) elimination of open burning among participating farmers. Through awareness campaigns and training sessions, farmers are educated on the health and environmental hazards of burning and are encouraged to adopt safe and sustainable residue management practices, contributing to improved local air quality.

- **SDG 4 (Quality Education)**

Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
Impact Indicator: Number of employees provided skill development training
Detail: The project enhances the essential knowledge and technical capacity for participating farmers, project's employees, and FarmPro officers through structured training sessions on sustainable agriculture and carbon-smart farming. It will track the number of participants, disaggregated by gender, to ensure inclusiveness and equal access to educational opportunities for all farmers and the project's workers.

Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
Impact Indicator: Number of individuals who received skill training at demonstration farms
Detail: The project supports Target 4.7 by utilizing the Demonstration Farm as a living learning center, where farmers, youth, and women acquire practical skills and knowledge in sustainable agriculture, carbon management, and climate resilience. The farm fosters education for sustainable development, promoting sustainable lifestyles, gender equality, respect for human rights and cultural diversity, and a culture of peace and global citizenship through inclusive and participatory learning approaches.

- **SDG 6 (Clean Water and Sanitation)**

Target 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

Impact Indicator: Number of farmers applying water management practices

Detail: As outlined in Section 1.12, the adoption of AWD is expected to reduce water consumption and improve overall irrigation efficiency. This approach directly supports Thailand's water conservation objectives by optimizing the use of limited freshwater resources in rice cultivation.

- **SDG 8 (Decent Work and Economic Growth)**

Target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Impact Indicator: Number of working hours created through direct in-field labor

Detail: The project generates local employment opportunities through field implementation, training, and monitoring activities. It is expected to account for 20,000 field labor hours, categorized by type of work (paid, unpaid, permanent, or occasional). These activities contribute to rural economic development and support improved livelihoods for participating communities.

- **SDG 12 (Responsible Consumption and Production)**

Target 12.2 By 2030, achieve the sustainable management and efficient use of natural resources

Impact Indicator: Average percentage reduction in water uses per hectare

Detail: The project contributes to Target 12.2 by promoting efficient water use through AWD practices among participating farmers. These practices reduce water consumption per hectare while maintaining crop yields, lower energy requirements and methane emissions, and improve overall resource efficiency, thereby supporting responsible consumption and production in rice farming.

Target 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

Impact Indicator: Number of people who received information and awareness training on sustainable development

Detail: At baseline, no formal capacity-building programs on sustainable farming or waste management existed. Through this project, at least 300 participants—including farmers and students—will receive training on sustainable consumption, climate change, and environmental

stewardship at the Training Center and demonstration farms, which serve as outdoor classrooms for hands-on, practical learning.

- **SDG 13 (Climate Action)**

Target 13.2 Integrate climate change measures into national policies, strategies and planning
Impact Indicator: Amount of GHGs emissions avoided or sequestered
Detail: By adopting Alternate Wetting and Drying (AWD), farmers are expected to achieve significant reductions in methane (CH_4) emissions from rice fields. Ongoing training and field support ensure consistent implementation of these practices, directly contributing to Thailand's Nationally Determined Contribution (NDC) targets under the Paris Agreement.

Monitoring and Reporting
Sustainable development outcomes will be tracked using project databases, farmer logbooks, training records, and field surveys. Data on water savings, training participation, and methane reduction will be reviewed annually to monitor progress and ensure continuous improvement. Findings will be shared with relevant government agencies and stakeholders to demonstrate alignment with Thailand's national sustainability and climate objectives.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

The project will not introduce any new use of organic amendments, and biomass residues previously allocated for biochar production will remain excluded from project activities. Rice yields will be continuously recorded and monitored for each cultivation season to ensure that project interventions do not result in yield reductions. Consequently, no leakage is anticipated from project activities. To maintain transparency and safeguard the integrity of results, monitoring will specifically address potential leakage risks, including: (1) The introduction of organic amendments from outside the project area that were not historically applied. (2) Any reduction in rice yields attributable to project interventions. (3) Diversion of biomass residues that were previously used for bioenergy purposes under the baseline scenario.

1.19.2 Commercially Sensitive Information

The public version of this project description does not exclude any commercially sensitive information. It includes all relevant details regarding the establishment of the baseline scenario, evidence of additionality, and the estimation and tracking of GHG emission reductions and removals, including both capital and operational expenditures.

1.19.3 Further Information

As of right now, there is no new information that could influence project eligibility, GHG emission reductions, or the project's effect estimation. Any new information that becomes available will be incorporated into the draft PDD for verification.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Stakeholders were identified through a structured and inclusive consultation process involving baseline surveys, community meetings, and coordination with relevant local and regional authorities. This approach ensured the participation of all stakeholder groups directly or indirectly affected by the project. Identified stakeholders include local rice farmers (project participants), village administrators, representatives from the Ministry of Natural Resources and Environment and local non-governmental organizations (NGOs), women's associations, and private sector partners such as FarmPro and CPP. Invitations to consultation meetings were extended through formal letters, public announcements, and coordination with village leaders.
Legal or customary tenure/access rights	The project is implemented exclusively on legally registered agricultural lands in Thailand. Each participating farmer holds official land-use documentation, such as a Chanote (Nor Sor 4 Jor) or other government-issued land title, confirming lawful ownership or use rights. For farmers who do not yet possess formal land titles, village heads compile verified lists of participants and coordinate with the Department of Land Development and the Department of Agriculture to ensure all participating lands are formally recognized and authorized for agricultural use. The project area does not include indigenous territories, community forests, or lands subject to customary or collective tenure claims. Farmers voluntarily enroll their lands, and no displacement, land conversion, or resettlement has occurred within or adjacent to the project boundary.

Stakeholder diversity and changes over time	The stakeholder groups represent a diverse cross-section of Thailand's agricultural communities, including male and female smallholders, farmer leaders, local authorities, and private sector partners. Socioeconomic diversity is evident in variations in farm size, income levels, and production capacity across the project clusters. The project fosters inclusive participation, with a particular focus on gender equity and youth engagement. Over time, the composition of stakeholders may expand as awareness grows and more farmers participate through ongoing outreach and training activities.
Expected changes in well-being	Compared to the baseline scenario, stakeholders are expected to experience positive impacts on well-being through increased agricultural productivity, reduced input costs, and greater resilience to climate variability. Farmers benefit from training in sustainable practices, participation in carbon-credit revenue sharing, and a 3-5% discount on agricultural inputs provided through project partners. Communities are expected to gain from improved air quality, reduced crop residue burning, and strengthened local capacity for sustainable resource management. No adverse social or economic impacts are anticipated.
Location of stakeholders	Stakeholders are located within the main project clusters in Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces of Thailand. These provinces represent the primary rice-producing areas targeted by the project. Local government agencies, academic institutions, and project partners are based in regional administrative centers and provide technical support, training, and oversight. No stakeholders outside the defined project area are expected to experience negative impacts.
Location of resources	The project makes use of existing agricultural lands and irrigation infrastructure, including canals, drainage systems, and on-farm water management facilities, all lawfully managed by participating farmers in coordination with local authorities. No protected areas, community forests, or ecologically sensitive zones are located within or adjacent to the project boundary. All resources are accessed and managed in accordance with national regulations and established local governance frameworks.

2.1.2 Stakeholder Consultation and Ongoing Communication

Use the table below to describe the process for and the outcomes from the stakeholder consultation conducted prior to project initiation.

Date of stakeholder consultation	Meeting-1 12/03/2025 Meeting-2 17/03/2025 Meeting-3 18/03/2025 Meeting-4 19/03/2025 Meeting-5 20/03/2025 Meeting-6 25/02/2025 Meeting-7 27/02/2025 Meeting-8 28/02/2025 Meeting-9 04/03/2025 Meeting-10 05/03/2025 Meeting-11 06/03/2025
Stakeholder engagement process	Stakeholder consultations were conducted in a culturally appropriate and inclusive manner across the project's eight provinces: Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi. Invitations were issued more than 30 days in advance through village leaders, formal letters, and public announcements, ensuring that all relevant groups were informed and able to participate. Meetings were conducted in Thai to ensure accessibility, with particular attention to gender inclusion, encouraging participation from both male and female farmers. The consultation process complied with Verra's AFOLU project guidelines and the Gold Standard Stakeholder Consultation and Engagement Requirements (v2.0). Outcomes and attendance were documented through signed participant lists, photographs, and meeting minutes collected by the FarmPro and Carbon Credit Program coordination teams.
Consultation outcome	Stakeholders expressed broad support and provided consent for the project's objectives and design. Discussions addressed the anticipated benefits, including improved water management, reduced methane emissions, farmer training, and increased crop productivity. Potential risks, such as initial adjustment challenges during technology adoption, were considered minor and manageable. Stakeholders were informed about national environmental and labor regulations, the VCS validation and verification process, and the principles of Free, Prior, and Informed

	Consent (FPIC). All participants acknowledged that project participation is voluntary and that land ownership remains with the farmers.
Ongoing communication	A continuous engagement and feedback system has been established to maintain communication with stakeholders throughout project implementation. FarmPro extension officers act as focal points at the township level, supported by a grievance mechanism accessible via telephone, email, or in-person submission at local offices. Project updates and training information are disseminated through community meetings, village notice boards, and digital QR codes. Annual stakeholder review meetings will be held to present progress, gather feedback, and address any emerging issues.
Stakeholder input	All feedback from consultations was recorded and evaluated by the project proponent. Stakeholders provided positive comments, emphasizing environmental and livelihood benefits, and suggested expanding farmer participation and training coverage. In response, the project design was refined to include broader farmer outreach and a 10% discount on agricultural inputs for all participants. No major design changes were required, as the project already aligned with community expectations. All inputs and corresponding responses are documented in the Stakeholder Consultation Report (v2.0).

2.1.3 Free Prior and Informed Consent

Use the table below to describe the outcome of the FPIC process as part of the stakeholder consultation process.

Obtaining consent	The FPIC process was carried out in a transparent and inclusive manner, in line with Verra's AFOLU standards. Prior to project implementation, consultations were held with stakeholders across Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces to ensure that farmers, village leaders, and local authorities were fully informed about the project's goals, scope, and potential impacts. All sessions were conducted in Thai, using visual aids and printed materials to facilitate participants' understanding.

	All farmers voluntarily agreed to participate in the project after receiving comprehensive information about their rights and responsibilities. The consent process addressed two main areas: • Land ownership and use rights: Farmers maintain their full rights over their land; participation does not change their tenure status. For those without formal deeds, their land-use certificates (e.g., Nor Sor 3, Nor Sor 3 Gor, or other relevant titles) are verified. The village head compiles a list of participants, which is then submitted to the local Land Office and the Department of Agriculture for confirmation, ensuring that all participating plots are officially recognized under Thai land-right frameworks. • Carbon credit agreements: Each participating farmer signs a Carbon Rights Agreement, transferring the rights to verified emission reductions to Charoen Pokphand Produce Co., Ltd., the project proponent. This agreement clearly sets out benefit-sharing mechanisms and the obligations related to carbon credit issuance. During the FPIC process, no disputes or conflicts emerged. Participation is entirely voluntary, and the project has not created or worsened any pre-existing land or community tensions.
Outcome of FPIC	The FPIC process received strong support from the local community and obtained formal consent from all participating farmers and local authorities. Stakeholders confirmed that the project will be implemented solely on existing agricultural lands, with no land conversion, resettlement, or physical displacement involved. Participants showed a clear understanding of the project's objectives, including reducing methane emissions, improving water-use efficiency, and enhancing livelihoods. They also recognized additional benefits such as capacity-building programs, local employment opportunities, and a 10 percent discount on agricultural inputs for registered farmers. The FPIC process is fully aligned with Thailand's national regulations and Verra's social and environmental safeguards, ensuring that: • No land has been encroached upon or converted • No individuals or communities have been relocated without consent

	• No physical or economic displacement has occurred Signed consent forms, attendance records, and meeting documentation are securely maintained by the project proponent and will be available for verification during the validation process.

2.1.4 Grievance Redress Procedure

Development process	The Grievance Redress Mechanism (GRM) was developed in close collaboration with local stakeholders to ensure that any concerns or disputes are addressed promptly, transparently, and in a manner consistent with local cultural norms. During stakeholder consultation meetings held from 25 February to 20 March 2025, participants were informed of the procedures for submitting complaints or suggestions. The mechanism is designed in accordance with Verra AFOLU Safeguard Requirements and aligns with Thailand's community-based conflict resolution practices. The GRM establishes clear procedures for receiving, reviewing, and resolving grievances within a reasonable timeframe. Stakeholders can submit complaints verbally, in writing, or digitally via local FarmPro offices, village leaders, or designated grievance officers. Each complaint is recorded in a grievance log, acknowledged within seven (7) working days, and addressed within thirty (30) working days through investigation and corrective action. More complex cases may require additional time, with written justification provided to the complainant. The effectiveness and inclusiveness of the GRM are reviewed annually to ensure that it remains accessible to all stakeholder groups, including women, youth, and other vulnerable populations.
Grievance redress procedure	The formal grievance redress procedure consists of the following steps: 1. Submission: Stakeholders can submit grievances by phone, email, written letter, or in person at the nearest FarmPro branch office. Contact details are provided during training sessions and displayed on village notice boards. 2. Acknowledgement: Each grievance is logged by the grievance officer, who provides written or verbal acknowledgement within seven (7) working days.

3. Assessment and Resolution: A committee including representatives from Charoen Pokphand Produce Co., Ltd., FarmPro Thailand, and local authorities reviews the case, investigates the issue, and proposes a resolution within thirty (30) working days.
4. Feedback and Documentation: The final decision and any corrective actions are communicated to the complainant, and all records are maintained in the Grievance Register to ensure transparency.
5. Appeal: If the complainant is not satisfied, the case can be escalated to senior project management or referred to relevant government agencies for independent mediation.

All stakeholders are informed of this procedure through training sessions, printed materials, and QR code access. The mechanism ensures that grievances are addressed respectfully, without discrimination or retaliation, and supports cooperative community relations throughout project implementation.

2.1.5 Public Comments

Comments received	Actions taken
There are concerns that different areas have varying conditions, making water management difficult, which may affect yield and production costs. Some areas may have challenges fully managing water.	The project allows flexible implementation and provides site-specific technical support to help farmers manage water more effectively depending on local conditions.
More project information is needed to help make informed decisions; ongoing education and clear manuals are important.	Detailed information materials, regular workshops, and practical manuals will be developed and shared to keep farmers well-informed and supported throughout the project.
Concerned about weed management and want guidance on prevention, control, and fertilizer scheduling.	A weed management manual tailored to alternate wetting and drying (AWD) rice cultivation will be produced and distributed, along with fertilizer recommendations.
Widespread support for the project, but since it's new, some farmers are hesitant to change. Demonstration/model plots are needed to build confidence.	Demonstration plots and learning centers will be established, and additional climate-friendly rice cultivation methods (such as AWD) will be

	introduced to broaden participation and ease transitions.
Success of the project will depend on how it is adapted to local conditions and farmer participation. Some would like to try joining for a year to evaluate results.	Collaboration with government agencies will allow the project to be locally adapted, and pilot programs with hands-on support from experts will help farmers evaluate the project's real-world results.
I'd like to try participating for a year to see how well the rice grows and to evaluate the results.	Visit farmers' fields together with Farm Pro B2C experts to provide hands-on knowledge and recommendations about AWD rice farming practices.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

Description	Details
Overview	The project is led by the Carbon Program of Charoen Pokphand Produce Co., Ltd. and implemented in collaboration with the FarmPro team, which has extensive experience in agricultural development and community engagement throughout Thailand. The project management team brings strong technical expertise in sustainable rice production, carbon project implementation, and greenhouse gas (GHG) reduction initiatives.
Experience in Similar Projects	The FarmPro team has implemented several sustainable agriculture initiatives promoting Alternate Wetting and Drying (AWD). These programs have introduced improved water-management techniques and enhanced fertilizer efficiency, fully aligning with the Verra VM0051 methodology for Improved Management in Rice Production Systems.
Community Engagement and Training	FarmPro has conducted extensive stakeholder consultations and farmer-training activities across the eight project provinces Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi covering more than 14,277 hectares. Farmer leaders are selected and trained to serve as focal points for peer-to-peer learning, feedback collection, and ongoing capacity building within their communities.

Partnerships and Technical Support	To enhance technical and scientific capacity, the project collaborates with Rajamangala University of Technology Lanna (RMUTL) and the Ministry of Natural Resources and Environment in Thailand. These partners provide expert guidance in agronomy, water management, and data validation to support monitoring and verification activities. In addition, external specialists are engaged to deliver training in digital MRV systems and greenhouse gas (GHG) quantification.
Capacity Building and Recruitment Strategy	The project incorporates a structured recruitment and training program for field staff and farmer representatives. Regular workshops are conducted to strengthen competencies in sustainable agricultural practices, data recording, safety procedures, and gender-inclusive facilitation. When specific capacity gaps are identified, qualified consultants are engaged to deliver targeted technical support and training.
Environmental and Risk Management	The management team has carried out comprehensive Risk and Capacity Assessments. Potential risks associated with natural disturbances, climate variability, and stakeholder welfare are continuously monitored, and corresponding mitigation measures are integrated into the project's operational plan.
Governance and Transparency	Charoen Pokphand Produce Co., Ltd. maintains a well-defined governance structure supported by an Internal Control System (ICS), ensuring accountability and compliance with Verra's AFOLU Safeguard requirements. The project implements a formal Free, Prior, and Informed Consent (FPIC) process and an established Grievance Redress Mechanism to safeguard stakeholder rights and ensure transparent, fair resolution of any concerns or conflicts.

The management team of Charoen Pokphand Produce Co., Ltd., working through FarmPro, has demonstrated strong capacity to implement large-scale sustainable rice initiatives and effectively manage environmental and social risks. Its long-standing engagement in Thailand's agricultural sector provides extensive local networks, while collaborations with research institutions and government agencies ensure solid scientific and technical support. By integrating practical field experience, institutional partnerships, and active community participation, the project team ensures the successful delivery of emission-reduction outcomes and long-term benefits for both stakeholders and the environment.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	Potential exposure of farmers to climate hazards such as droughts, floods, or heat stress during project implementation.	Training sessions on safe work practices and Adaptive Water Management (AWD) are regularly conducted for participating farmers. Seasonal climate advisories and early warning information are also disseminated through FarmPro field officers to support timely decision-making and reduce climate-related risks.
Risks to stakeholder participation	Limited participation of vulnerable farmers due to lack of awareness or mobility constraints.	Continuous engagement through local farmer leaders helps ensure inclusive participation across all groups. Regular consultations, mobile communication, and accessible feedback channels including a hotline and QR-code feedback forms are used to maintain open communication and ensure that all stakeholders can easily express concerns or suggestions.
Working conditions	Risk of unsafe field conditions during equipment operation, fertilizer handling, or monitoring activities.	Safety guidelines are incorporated into all training sessions, and personal protective equipment (PPE), including boots, gloves, and masks, is provided to both staff and participating farmers. Regular supervision and monitoring are conducted to ensure compliance with occupational safety standards.
Safety of women and girls	Risk of exclusion of women in training or decision-making processes due to cultural norms.	A gender-inclusive participation policy is implemented to ensure equal access for all stakeholders.

		Invitations explicitly encourage female participation, and female staff are engaged to facilitate discussions, creating a safe and comfortable environment for women to contribute fully.
Safety of minority and marginalized groups, including children	Potential marginalization of ethnic minority farmers or child labor risk during planting/harvest seasons.	Farmer contracts explicitly prohibit the use of child labor. Awareness training is provided to promote the inclusion of minority and marginalized communities, and ongoing monitoring ensures compliance with labor and inclusion standards.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	Improper use or disposal of chemical fertilizers and agricultural waste could cause water or soil contamination.	Farmers receive training on correct fertilizer application rates and non-burning waste management practices. The promotion of organic alternatives and Integrated Nutrient Management (INM) helps reduce reliance on chemical inputs. Waste is managed using designated covered bins and safely disposed of in approved areas.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified[2]	Mitigation or preventative measure(s) taken
Discrimination	Potential discrimination in recruitment or task assignment based on gender or ethnicity.	All project positions are filled through a transparent recruitment process based on qualifications and merit. The FarmPro HR policy strictly prohibits discrimination, ensuring equal opportunity and

[2] The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

		inclusive participation across all ethnic and social groups.
Sexual harassment	Risk of inappropriate behavior in mixed-gender work environments during training or field activities.	A zero-tolerance policy on harassment is strictly enforced. Awareness sessions and accessible grievance mechanisms allow for anonymous reporting, while supervisors are trained to promptly identify and address any misconduct.
Equal pay for equal work	Potential wage disparity between male and female laborers or local contractors.	The project complies with Thai labor laws and ILO principles, ensuring equal pay for equal work. Regular audits are conducted to verify fair wages for all employees and third-party contractors.
Gender equity in labor and work	Risk of unequal participation or limited leadership roles for women in project implementation.	Women are actively encouraged to assume decision-making roles as farmer leaders or field officers. Gender mainstreaming is integrated into all training programs, and participation data are systematically disaggregated by gender.
Forced labor	No risk identified.	All project contracts include clauses ensuring voluntary participation. Partner organizations and contractors are required to comply with Verra AFOLU safeguard standards as well as Thailand's labor laws.
Child labor	Potential risk during planting or harvesting periods where family labor is customary.	All farmer and staff agreements include a strict prohibition on child labor. Awareness campaigns educate communities about the

		legal working age and the importance of school attendance, while monitoring visits are conducted to ensure compliance.
Human trafficking	No risk identified.	Project activities are implemented locally and are community-based. Workers are recruited directly through transparent procedures, with proper identity verification and documented contracts to prevent any form of labor exploitation.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
Recognition of land tenure and customary rights: Potential misunderstanding regarding land-use rights among farmers, particularly in areas with informal or customary land tenure systems.	The project does not change or transfer land ownership. Participation is entirely voluntary and based on documented consent. Land-use rights are verified in coordination with local authorities and village leaders prior to project implementation.
Rights of Indigenous Peoples (IPs) and Local Communities (LCs): No risk identified. The project areas are located in established agricultural zones and not within recognized indigenous or tribal territories.	Continuous verification with local administrative offices ensures that project sites do not overlap with indigenous or community lands. Should new communities be identified during project expansion, FPIC will be obtained before any engagement.
Free, Prior, and Informed Consent (FPIC): Risk of inadequate understanding of project activities among participating farmers and community members.	FPIC was obtained during stakeholder consultations, ensuring that communities received comprehensive information on the project's objectives, benefits, and grievance

	mechanisms before participation. All meetings were documented, including attendance records and summaries of feedback received.
Respect for human rights and non-discrimination: Possible social exclusion of marginalized groups due to local socio-economic hierarchies.	The project adheres to Verra's AFOLU safeguard principles and the UN Guiding Principles on Business and Human Rights. Community engagement is conducted inclusively, ensuring active participation of women, youth, and other vulnerable groups.
Access to grievance mechanisms: Risk of delayed response to grievances or lack of awareness of complaint procedures.	A grievance redress procedure has been established and communicated during stakeholder consultations. Complaints can be submitted through local FarmPro officers, by telephone, or via QR-code feedback forms, with responses provided within 14 days.
Cultural heritage and traditional practices: No risk identified. Project activities do not affect local cultural or spiritual sites.	Site screening was carried out prior to project implementation. If any cultural or sacred areas are identified, project boundaries will be adjusted in consultation with the affected local communities.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified. The project area is situated within existing agricultural zones and does not overlap with any recognized Indigenous territories or customary lands.	The project boundary was verified using local administrative records and through community consultations. If Indigenous or customary communities are identified in future expansion areas, FPIC will be obtained prior to any implementation.
No risk identified. Project activities occur only in active rice fields with no known cultural or spiritual heritage sites.	Site verification and stakeholder consultations confirmed that project areas do not overlap with cultural or sacred sites. Should any such areas be identified in the future, project activities will be adjusted to ensure full protection and respect for cultural heritage.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified. The project operates solely on existing agricultural lands managed by registered farmers under recognized land-use arrangements. The project does not alter or transfer land ownership, and all activities are implemented voluntarily with the consent of landholders.	Land tenure verification was carried out through local authorities and community consultations prior to project implementation. All land-use agreements are documented and signed by both farmers and FarmPro representatives to ensure full transparency and voluntary consent.
No risk identified. The project does not restrict community access to farmland, water, or natural resources, and all participating farmers retain full control over their land and production decisions.	Participation in the project is entirely voluntary and based on clear, written agreements. In the event of any land-related disputes or claims, the established grievance redress mechanism will be activated to ensure timely resolution in coordination with the relevant local authorities.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	The benefit-sharing plan was developed through a participatory consultation process involving farmer representatives, village leaders, and local authorities across the eight project provinces: Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi. During stakeholder consultations, participants reviewed proposed benefit structures, emphasizing fair distribution of revenues from carbon credit sales and community development funds. Feedback collected during these consultations was incorporated into the final benefit-sharing framework to ensure transparency, equity, and community acceptance.
Summary of the benefit sharing plan	The benefit-sharing plan ensures that participating farmers receive both financial and non-financial benefits generated from carbon credit revenues. Benefits are allocated proportionally based on verified land area and participation in project activities. In addition to monetary benefits, non-financial support includes capacity-building programs,

	agricultural inputs, and community development initiatives. The plan was reviewed and validated by local farmer committees, and all participants were informed of their entitlements and responsibilities.
Approval and dissemination of benefit sharing plan	The final benefit-sharing plan was formally endorsed by the FarmPro team and witnessed by participating farmer members. The agreement was provided in both Thai and English to ensure accessibility and full comprehension. Copies are securely stored at FarmPro offices within each project cluster and are available upon request. Community awareness sessions were conducted to ensure that all stakeholders clearly understand the terms and procedures for benefit allocation.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	No risk identified. The project operates exclusively in existing cultivated rice fields and does not convert natural habitats or forested areas.	Field boundaries were verified using satellite imagery and local land-use maps to ensure that no natural ecosystems are encroached upon. The project promotes sustainable agricultural practices, including no-burning, integrated pest management, and reduced chemical fertilizer use, contributing to enhanced biodiversity in surrounding landscapes.
Soil degradation and soil erosion	Potential risk of soil nutrient loss due to improper water or fertilizer management.	The project implements Alternate Wetting and Drying (AWD) techniques, which improve soil structure, reduce compaction, and enhance organic matter retention. Farmers receive regular training on proper fertilizer application and residue management to maintain soil fertility and minimize erosion.
Water consumption and stress	Risk of increased irrigation water demand during prolonged dry periods.	Alternate Wetting and Drying (AWD) technology is applied to optimize water use, reducing irrigation

		demand by approximately 25–30%. Farmers are trained in field-level water monitoring and irrigation scheduling to ensure sustainable water consumption without impacting neighboring users or surrounding ecosystems.

2.4.1 Rare, Threatened, and Endangered Species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

Species and habitat	NA
Areas needed for habitat connectivity	NA

Use the table below to identify and summarize any risks related to habitats for rare, threatened, and endangered species, and for areas for habitat connectivity. Describe the commensurate mitigation or preventative measure(s) in place to prevent or mitigate the risk. Where no risk is identified, write "No risk identified" in the first column, and provide justification in the second column. Add rows as needed.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	No risk identified	The project area does not contain any known populations of rare, threatened, or endangered (RTE) species, as defined by the IUCN Red List or Thailand's national biodiversity inventory. The site consists primarily of long-established agricultural lands that have been under rice cultivation for decades, with no remaining natural habitats such as wetlands, forests, or conservation zones. All project activities, including sustainable rice cultivation and improved water management, are
Areas for habitat connectivity	No risk identified	

		conducted entirely within these existing agricultural areas and do not involve land conversion, deforestation, or disturbance to wildlife habitats. As such, the project poses no risk to rare, threatened, or endangered species and is fully compliant with biodiversity conservation requirements.

2.4.2 Introduction of Species

N/A

2.4.3 Ecosystem Conversion

ARR, ALM, WRC or ACoGS projects shall provide evidence that the project area was not cleared or drained of existing natural ecosystems, unless such clearing took place at least 10 years prior, or the dominant land cover was invasive.

Use the table below to identify and summarize any risks related to ecosystem conversion. Describe the commensurate mitigation or preventative measure(s) in place to prevent or mitigate the risk. Where no risk is identified, write "No risk identified" in the first column, and provide justification in the second column. Add rows as needed.

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	The project area has been under continuous rice cultivation for more than ten years prior to the project start date and contains no natural ecosystems such as forests, wetlands, or grasslands. Historical land-use records and satellite imagery confirm that the land had already been converted to agricultural use well before project implementation. No clearing, draining, or conversion of natural habitats has occurred as part of project activities. The project focuses on improving

	existing agricultural practices—such as water-efficient irrigation through AWD, soil health management, and sustainable residue utilization—to enhance productivity and environmental performance within established farmland boundaries. Therefore, the project involves no ecosystem conversion and fully complies with the requirement that no natural ecosystems have been cleared or drained within the past ten years.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Provide the title, reference and version number of the following information for the methodology(s), tools, and modules applied to the project (where applicable).

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	VM0051	VM0051 Improved Management in Paddy Rice Production Systems	v1.0
Tool	VT0001	Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities	v3.0

IPCC Guidelines	the 2006 IPCC Guidelines for National Greenhouse Gas Inventories	The 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories	2019

3.2 Applicability of Methodology

The following table demonstrates and justifies how the project activity meets each of the applicability conditions of the methodology VM0051, v1.0.

Methodology ID	Applicability condition	Justification of compliance
VM0051	1. Projects implement improved irrigation management practices that result in CH_4 emission reductions from methanogenesis (i.e., "main project activities"), including at least one of the following: a) Single drainage and/or a shortened period of flooded condition b) Alternate wetting and drying (AWD) Use of direct seeded rice (DSR)	The project seeks to transition irrigation practices on project plots from continuous flooding to intermittent flooding during the cultivation season using Alternate Wetting and Drying (AWD) techniques. Multiple drainage events are applied to reduce CH_4 emissions resulting from methanogenesis.
	2. Projects introducing or implementing quantitative adjustments (e.g., decrease in fertilizer application rate or fossil fuel use) exceed 5% of the pre-existing value calculated as the average value over the historical lookback period, developed for the baseline schedule of activities	The project introduces quantitative adjustments to irrigation volume, flooding duration, and water levels through improved water management practices, compared to historical baseline conditions.
VT0001	a) AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary	The project is implemented in full compliance with local regulations and is not subject to any

		performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced	prohibitions, in accordance with Section 1.15.
	b)	The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s) proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity.	The project's baseline scenario is established in accordance with the procedures outlined in the Verra VM0051 methodology.

3.3 Project Boundary

According to the methods used, the rice fields when the water regime and cultivation technique are altered are included in the geographic border. All fields that alter the cultivation technique within the framework of the project activity are included in the project boundary's spatial extent.

Source		Gas	Included?	Justification/Explanation
Baseline	Fossil fuels	CO_2	Yes	Sources of fossil fuel emissions are vehicles (mobile sources, such as trucks, tractors) and mechanical equipment required by the rice cultivation activity
	Use of nitrogen fertilizers	N_2O	Yes	N_2O emissions from nitrogen fertilizers
	Biomass burning	CH_4	Yes	Traditional burning activities are part of the baseline scenario of areas
		N_2O	Yes	

Source		Gas	Included?	Justification/Explanation
	Soil methanogenesis	CH_4	Yes	Major source of emissions due to anaerobic condition
Project	Fossil fuels	CO_2	Yes	Sources of fossil fuel emissions are vehicles (mobile sources, such as trucks, tractors) and mechanical equipment required by the rice cultivation activity
	Use of nitrogen fertilizers	N_2O	Yes	N_2O emissions from nitrogen fertilizers
	Biomass burning	CH_4	Yes	Emissions from biomass burning. No events or decreasing events are expected in the project boundary
		N_2O	Yes	
	Soil methanogenesis	CH_4	Yes	Major source of emissions

Growers who enroll in the project submit shapefiles of their fields, indicating the areas where they will adopt project-relevant practices. These shapefiles are submitted separately to the registry upon validation. The project targets rice-producing regions in Thailand, covering eight provinces divided into two zones: Zone 1 - Phayao, Chiang Rai, Chiang Mai; and Zone 2 - Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi.

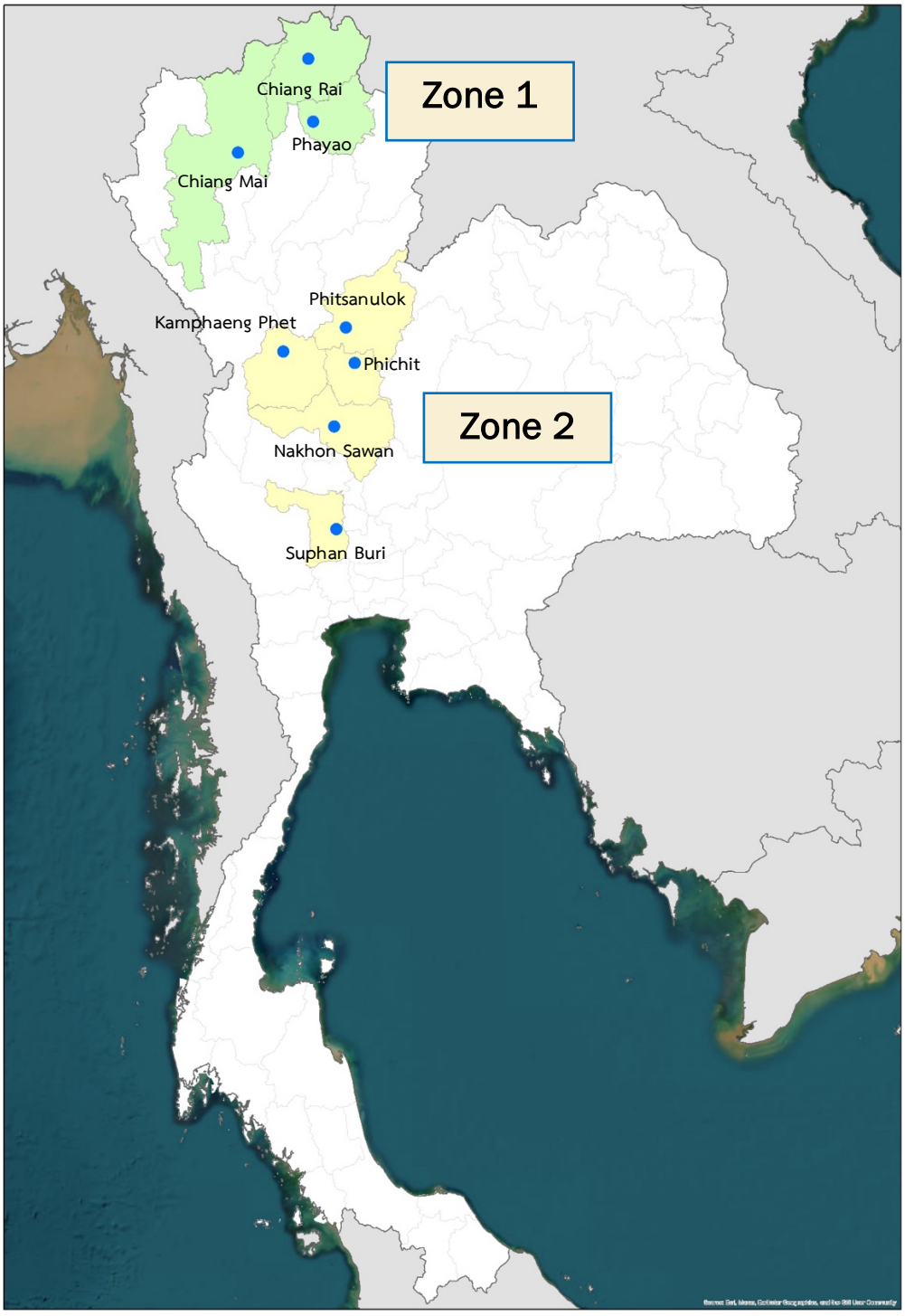

Figure 7: The Overview of the project area which is divided into 2 Zones (which are Zone 1 include Phayao, Chiang Rai, and Chiang Mai and Zone 2 include Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi provinces)

3.4 Baseline Scenario

Under the Verra VM0051 methodology—Improved Management in Rice Production Systems the baseline scenario represents the continuation of existing rice cultivation practices that have been applied in the project area for several years prior to project implementation. Historical land-use records and farmer surveys confirm that these areas have been under continuous flooded rice cultivation for more than ten years, using conventional water and nutrient management practices, without any mitigation-oriented interventions.

In the baseline scenario, farmers typically maintain continuous flooding throughout the cropping season, with minimal drainage or mid-season aeration. Water levels are managed manually and often exceed optimal requirements, resulting in high water use per hectare and elevated methane (CH_4) emissions due to anaerobic soil conditions. Straw residues are commonly incorporated or burned in the field after harvest, contributing further to greenhouse gas (GHG) emissions. Fertilizer application follows traditional practices, with limited efficiency control and no specific monitoring of nitrogen balance or water table dynamics.

No activities related to Alternate Wetting and Drying (AWD), precise irrigation scheduling, biochar application, or improved residue management are implemented under the baseline scenario. Energy use from irrigation pumping is higher due to prolonged flooding periods, and no emission-reduction strategies are applied.

In line with VM0051 methodology requirements, baseline GHG emissions (BE) include CH_4 emissions from flooded rice fields, N_2O emissions from fertilizer use, and CO_2 emissions from fossil fuel consumption for irrigation and field operations. If residue burning occurs, CH_4 and N_2O emissions from open burning are also included.

The baseline management schedule is established using at least three years of historical data, covering crop establishment, irrigation regime, fertilizer and organic amendment application, residue management, and land preparation practices. This information defines the baseline schedule of activities for each monitoring unit, which is assumed to continue in the absence of the project.

Thus, under the baseline scenario:

- Rice is cultivated using continuous flooding irrigation.
- High water consumption and CH_4 emissions occur due to prolonged anaerobic soil conditions.
- Short or long drainage periods during the flooding season indicate that single or double cropping is practiced depending on water availability.
- Crop residues (mainly rice straw) are either left in the field, burned on-site, or incorporated into the soil without treatment.
- Farmers follow traditional practices, including conventional tillage and standard fertilizer application rates using urea and chemical NPK, without optimization.
- Liming or other soil amendments are rarely applied due to high costs in the country.

- Diesel is the primary fossil fuel used for machinery and equipment operations.
- No interventions are implemented to improve resource efficiency or reduce GHG emissions.

In contrast, the project scenario introduces sustainable water management practices, including Alternate Wetting and Drying (AWD), along with improved fertilizer and residue management practices and low-emission technologies. The difference in GHG emissions between the baseline and project scenario represents the emission reductions attributable to the program.

3.5 Additionality

The Project's additionality is assessed through three main lenses: regulatory surplus, common practice, and implementation barriers.

1. Regulatory Additionality

The project activities, including the implementation of Alternate Wetting and Drying (AWD), are not mandated by any existing national or regional regulations in Thailand. Current agricultural policies primarily focus on food security and productivity enhancement, without specific requirements for GHG reduction or climate-smart rice practices. Therefore, all mitigation measures implemented under this project are voluntary and go beyond existing legal obligations.

2. Common Practice Analysis

The baseline assessment of the rice sector in the targeted areas of Thailand indicates that less than 20% of rice fields currently implement water-saving or methane reduction practices. The widespread adoption of AWD remains rare. Therefore, the proposed project activities are not considered common practice within the geographic and technological context of the region.

3. implementation barriers.

- Technical and Knowledge Barriers

Most rice farmers in the project areas have limited technical knowledge and experience in water-efficient or low-methane cultivation methods. AWD requires precise water management, soil moisture monitoring, and careful timing of irrigation, practices that are unfamiliar to farmers accustomed to continuous flooding. The lack of technical capacity and demonstration sites contributes to low confidence and reluctance among farmers to transition from conventional methods.

- Infrastructure and Resource Barriers

The successful implementation of AWD depends on infrastructure that allows controlled irrigation and drainage, such as field-level water gates, canals, and moisture monitoring tools (e.g., Pani pipes). In many parts of central and northern Thailand, irrigation systems are poorly maintained, fragmented, or managed communally without formal control structures. The lack of

reliable water regulation infrastructure makes it difficult to implement AWD practices effectively and consistently across farms.

- Financial Barriers

Adopting new rice cultivation methods entails initial investments and transitional costs, including training, equipment (e.g., moisture monitoring tools, seeding implements), and field modifications for water control. Farmers in the target regions generally operate at subsistence or low-commercial levels and have limited access to credit or financial incentives for sustainable farming. Without support from carbon finance, there is little economic motivation to adopt these practices, as they do not provide immediate monetary benefits.

- Institutional and Market Barriers

Currently, no institutional mechanisms or policy incentives in Thailand promote the adoption of AWD for climate mitigation. Agricultural extension services remain limited and focus primarily on yield improvement rather than GHG reduction. Additionally, the absence of recognized measurement, reporting, and verification (MRV) systems for agricultural GHG mitigation limits farmers' ability to benefit from emission reduction efforts. These factors create a barrier to scaling up such practices beyond pilot levels.

- Social and Behavioral Barriers

Rice farming practices in Thailand are deeply rooted in traditional knowledge and community norms. Farmers generally rely on inherited methods that ensure stable yields under unpredictable climatic and market conditions. Implementing AWD requires a shift in mindset and risk perception, as farmers are concerned about potential yield losses due to water stress, pest outbreaks, or uneven germination. Without collective demonstration sites and guaranteed benefit-sharing, adoption of these practices remains low.

3.5.1 Regulatory Surplus

Is the project located in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes ☐ No

If no, describe which mandated laws, statutes, or other regulatory frameworks require project activities and provide evidence of systematic non-enforcement to demonstrate regulatory surplus.

3.5.2 Additionality Methods

The additionality of the Thailand Carbon Program for Rice Fields using Alternate Wetting and Drying (AWD) in the Central and Northern Regions has been demonstrated through a Barrier Analysis in accordance with the "Tool for the Demonstration and Assessment of Additionality" (CDM, Version 07.0.0).

The program aims to reduce methane (CH_4) emissions from conventional rice cultivation by introducing AWD practices. These practices are not common under the baseline scenario and face multiple implementation barriers, which prevent their spontaneous adoption without the incentives and support provided by carbon finance.

Step 1 – Identification of Alternatives to the Project Activity

The following plausible alternatives to the proposed project activity were identified:

(1) Continuation of existing practices (Baseline scenario): Conventional flooded rice cultivation with residue burning and no methane mitigation measures.

(2) Implementation of AWD without carbon finance: Farmers voluntarily adopt low-emission techniques using their own resources.

(3) Implementation of AWD with carbon finance (Proposed project activity): Adoption of AWD supported by financial and institutional incentives.

Among these alternatives, only the third option—implementation with carbon finance—was found to be viable and realistic for achieving sustained emission reductions, as it provides both the financial and institutional support necessary for widespread adoption.

Step 2 – Investment Analysis (Not Applicable)

An investment analysis is not applied, as the project's primary objective is not to generate commercial profits. Instead, its feasibility relies on financial incentives from carbon revenue to offset costs associated with capacity building, monitoring, and equipment procurement. Therefore, the project's additionality is demonstrated using the Barrier Analysis approach.

Step 3 – Barrier Analysis

A barrier analysis was conducted to identify and justify the key constraints that prevent the adoption of low-emission rice cultivation under a business-as-usual scenario.

Barrier 1: Technical and Knowledge Barriers

Farmers in the central and northern regions of Thailand generally lack training and technical knowledge on AWD practices. These methods require skills in soil moisture monitoring, irrigation scheduling, and weed management, which are not commonly applied in conventional rice cultivation. Without structured training and demonstration through the carbon program, adoption of AWD would likely remain minimal.

Barrier 2: Infrastructure Barriers

The irrigation and drainage systems in some target areas are insufficient for controlled water management. AWD requires field-level gates and moisture monitoring tools, which are generally unavailable to smallholder farmers. The project provides both technical support and physical infrastructure improvements that would not be implemented under business-as-usual conditions.

Barrier 3: Financial Barriers

The transition to AWD requires investment in training, field modifications, and management of initial yield risks. Farmers in the target regions typically operate under low-profit margins and lack access to credit or subsidies for sustainable practices. Carbon finance provides the necessary revenue to cover these incremental costs and ensure the long-term sustainability of the project.

Barrier 4: Institutional and Policy Barriers
There are currently no national policies, extension programs, or incentives in Thailand that promote AWD for GHG mitigation. Institutional capacity for Measurement, Reporting, and Verification (MRV) of agricultural GHG reductions is limited. The project introduces structured MRV systems and capacity-building mechanisms that are not present under the baseline scenario.

Barrier 5: Social and Behavioural Barriers

Local farmers are generally risk-averse and rely on traditional continuous flooding methods that have provided stable yields for generations. Without demonstrations of success and assured benefit-sharing, behavioral resistance limits the adoption of new practices. These barriers are credible and are supported by evidence from field surveys and stakeholder consultations.

Step 4 – Common Practice Analysis
Baseline analysis of rice production systems in the targeted areas of Thailand indicates that over 80% of rice cultivation continues to use conventional continuous flooding. The adoption of AWD covers less than 20% of the total rice area. Therefore, the proposed practices are not common in the region and represent a significant departure from the prevailing baseline scenario.

Step 5 – Impact of the Project Activity

The Thailand Carbon Program addresses the identified barriers through the following measures:

- Capacity building and training on AWD practices;
- Provision of field-level monitoring tools and irrigation control systems;
- Establishment of MRV systems for GHG monitoring and verification;
- Financial incentives through carbon credit revenue;

- Institutional support for farmer cooperatives and local agricultural officers.

These interventions make the implementation of low-emission rice cultivation both technically and economically feasible. Without the project and the associated carbon finance, these practices would not be adopted at scale or within the project boundary.

Therefore, based on the application of the Barrier Analysis Method, the project activity is clearly additional. It would not occur in the absence of carbon finance due to multiple technical, financial, institutional, and social barriers. The project thus satisfies the additionality criteria as defined in the applied methodology and relevant carbon standards.

3.6 Methodology Deviations

There was no deviation in the methodology applied for the quantification of GHG emission reductions or removals.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Determining baseline emissions is essential for setting emission reduction targets, evaluating the effectiveness of mitigation strategies, and monitoring progress over time. Baseline emissions will be calculated using QA 3 (Default Factors) as described in Section 8.1 of the methodology. These calculations are based on baseline data collected individually from participating farmers. The baseline emissions will be calculated as follows:

GHGs	Sources/Inputs	Equation used*	Reference	Output
CO_2	Fossil fuel - Gasoline (L) - Diesel (L)	1, 2	IPCC 2019 Refinement, Vol 2 Ch 3	CO_2_ff
	Liming - Calcitic limestone ($CaCO_3$) (t) - Dolomite ($CaMg(CO_3)_2$) (t)	3, 4	Methodology	CO_2_lime

CH_4	Soil methanogenesis - water regime during the cultivation period - water regime in the pre-season before the cultivation period - Application rate of organic amendment Cultivation period of rice (days)	6, 7, 8	IPCC 2019 Refinement, Vol 4 Ch 5	CH_4_soil
	Biomass burning - Mass of rice straw burned (kg)	17	IPCC (2019), Refinement, Vol 4 Ch 2	CH_4_bb
N_2O	N fertilizer - Total nitrogen as synthetic fertilizer (t N) - Total nitrogen as organic fertilizer (t N)	19, 20, 21, 22	IPCC (2019), Refinement, Vol 4 Ch 11	N_2O_soil
	Crop residues - Total dry mass of rice straw returned to soils (t dry mass) - Nitrogen content in dry mass of crop residue (t N/t dry mass)	19, 22	IPCC (2019), Refinement, Vol 4 Ch 11	N_2O_soil
	Biomass burning - Mass of rice straw burned (kg)	23	IPCC (2019), Refinement, Vol 4 Ch 2	N_2O_bb

* Equations are used in accordance with Section 8.2 Baseline Emission in the VM0051: Improved Agricultural Land Management (v1.2) methodology

The project applies emission factors in accordance with VM0051: Improved Agricultural Land Management (v1.2) methodology, which specifies the use of default values from the IPCC 2006 Guidelines for National Greenhouse Gas Inventories or the 2019 Refinement when region-specific data are unavailable. Detailed calculations can be found in the accompanying Excel spreadsheet.

4.2 Project Emissions

Calculations of project emissions follow the same procedures described in Section 4.1. When estimating emission reductions (ER_{Rs}), the proposed project practices replace the historical baseline practices. Project activity quantification is based on a 12-month data collection cycle. Detailed calculations are provided in the accompanying Excel spreadsheet.

4.3 Leakage Emissions

According to VM0051: Improved Management in Rice Production Systems, potential sources of leakage in improved rice management projects may include:

- The introduction of organic amendments sourced from outside the project boundary that were not historically applied.
- Declines in rice yield resulting from project activities; and/or
- Diversion of biomass residues (e.g., rice straw or husk) that were previously used for bioenergy applications in the pre-project scenario.

For the Thailand Carbon Program, these leakage sources are considered unlikely for the following reasons:

- The project does not introduce new organic amendments from external sources. All organic inputs (e.g., composted straw or biochar) are produced locally within the project boundary using existing agricultural residues.
- Continuous monitoring and farmer training ensure that rice yields are maintained or improved under the new management practices, preventing displacement of production or economic activity.
- Biomass residues (mainly rice straw) that were previously unused for bioenergy will be either incorporated into the soil or processed into biochar within the same project area, ensuring no diversion from existing bioenergy uses.

Therefore, leakage is not expected under the Thailand Carbon Program.

However, if any of the above situations arise during project implementation, leakage emissions will be quantified in accordance with Section 8.3 of VM0051, using the applicable equations and parameters specified in the methodology:

- If external organic amendments are introduced, emissions associated with their upstream production and transport will be calculated using Equation 26 of VM0051;
- If a decline in rice yield is observed, potential leakage through market substitution effects will be assessed using Equation 27 or 28;
- If biomass residues are diverted from pre-project bioenergy uses, related leakage emissions will be calculated using the baseline for renewable fuel production (LEBR,t) as defined in CDM TOOL16: Project and Leakage Emissions from Biomass.

All leakage calculations will employ conservative assumptions and default emission factors as defined in VM0051 and the IPCC 2019 Refinement. Monitoring data, yield records, and residue management logs will be maintained to demonstrate the absence or magnitude of any leakage throughout the crediting period.
Accordingly, the project complies with the applied methodology and demonstrates that leakage risk is minimal and effectively managed.

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

The estimation of greenhouse gas (GHG) emission reductions under this project follows the quantification procedures outlined in VM0051: Improved Agricultural Land Management. The project focuses primarily on reducing GHG emissions rather than achieving CO_2 removals. The expected calculation is as follows:

GHGs	Sources/Inputs	Equation used*	Reference	Output
ΔCO_2	Fossil fuel - Gasoline (L) - Diesel (L)	1, 2, 30	IPCC 2019 Refinement, Vol 2 Ch 3	ΔCO_2_ff
	Liming - Calcitic limestone ($CaCO_3$) (t) - Dolomite ($CaMg(CO_3)_2$) (t)	3, 4	Methodology	ΔCO_2_lime
ΔCH_4	Soil methanogenesis - water regime during the cultivation period - water regime in the pre-season before the cultivation period - Application rate of organic amendment - Cultivation period of rice (days)	6, 7, 8, 31	IPCC 2019 Refinement, Vol 4 Ch 5	ΔCH_4_soil
	Biomass burning - Mass of rice straw burned (kg)	17	IPCC (2019), Refinement, Vol 4 Ch 2	ΔCH_4_bb
ΔN_2O	N fertilizer - Total nitrogen as synthetic fertilizer (t N) - Total nitrogen as organic fertilizer (t N)	19, 20, 21, 22, 33	IPCC (2019), Refinement, Vol 4 Ch 11	ΔN_2O_soil
	Crop residues - Total dry mass of rice straw returned to soils (t dry mass) - Nitrogen content in dry mass of crop residue (t N/t dry mass)	19, 22, 33	IPCC (2019), Refinement, Vol 4 Ch 11	ΔN_2O_soil
	Biomass burning - Mass of rice straw burned (kg)	23	IPCC (2019), Refinement, Vol 4 Ch 2	ΔN_2O_bb

* Equations are used in accordance with Section 8 in the VM0051: Improved Agricultural Land Management (v1.2) methodology

Based on findings from the regional baseline assessment, the adoption of fuel-saving or conservation-tillage technologies remains low across the participating areas. As a result,

expected reductions in fossil-fuel consumption are considered insignificant and are excluded from the project's GHG quantification to maintain a conservative approach.

Similarly, while crop residue management and the avoidance of open burning are promoted as key sustainable agriculture practices, their direct contribution to GHG mitigation is relatively minor compared to methane (CH_4) and nitrous oxide (N_2O) reductions achieved through improved water and nutrient management. Consequently, residue management is not included in the current emission reduction calculations, though it continues to be implemented and monitored for transparency.

The assessment therefore focuses on the primary emission pathways relevant to paddy cultivation:

- Reduction of CH_4 emissions through improved water management practices, such as Alternate Wetting and Drying (AWD);
- Reduction of N_2O emissions through optimized nitrogen management, primarily by lowering the application rate of synthetic fertilizers.

For N_2O quantification, only synthetic nitrogen inputs are considered, as organic amendments (e.g., compost, manure) and crop residues are assumed to remain constant between baseline and project scenarios and thus do not contribute to net emission reductions. These parameters are still monitored to allow recalculation if deviations occur.

Emission reductions are calculated by subtracting baseline emissions (subscript bsl) from project emissions (subscript wp). Equation 29 in VM0051 is used to determine net reductions under Quantification Approach 3. Since this approach has a capacity limit of 60,000 tCO_2e per year, a default uncertainty deduction of 15% is applied to CH_4 and N_2O emissions from soils in accordance with Section 8.6.4 of the methodology.

The result of GHG emission reduction calculation is as follows:

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)
01/11/2025 to 31/10/2026	128,018	73,373	*0*	54,645	*0*	54,645
01/11/2026 to 31/10/2027	128,018	73,373	*0*	54,645	*0*	54,645

01/11/2027 to 31/10/2028	128,018	73,373	*0*	54,645	*0*	54,645
01/11/2028 to 31/10/2029	128,018	73,373	*0*	54,645	*0*	54,645
01/11/2029 to 31/10/2030	128,018	73,373	*0*	54,645	*0*	54,645
01/11/2030 to 31/10/2031	128,018	73,373	*0*	54,645	*0*	54,645
01/11/2031 to 31/10/2032	128,018	73,373	*0*	54,645	*0*	54,645
Total	**896,127**	**513,613**	**0**	382,514	**0**	382,515

In practice, if monitoring indicates changes in other nitrogen sources (e.g., increased use of organic amendments or alterations in residue incorporation practices) or significant changes in fossil fuel use, the emission calculations will be updated accordingly. All updates will follow the procedures and equations defined in the methodology tables above. This ensures that GHG quantification remains accurate, complete, and reflective of actual project conditions at all times.

For projects required to assess permanence risk:

i) Provide the requested information using the table below:

State the non-permanence risk rating (%)	*Example: 20%*
Has the non-permanence risk report been attached as either an appendix or a separate document?	☐ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO2e, the Long-term Average (LTA). Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☐ No If no, provide justification.

State, in tCO_2e, the expected total GHG benefit to date. **Is the number of GHG credits issued below the LTA?**	☐ Yes ☐ No If no, provide justification.

ii) Complete the table below for the project crediting period. Note that the buffer pool allocation is split proportionally between the estimated reductions and removals. (For example, if a project is estimated to achieve 20,000 tCO_2e removals and 80,000 tCO_2e reductions and has a buffer contribution of 20%, or 20,000, the estimated removal VCUs would be 16,000 and reduction VCUs would be 64,000).

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated buffer pool allocation (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCU issuance (tCO_2e)
DD-MMM-YYYY to 31-Dec-YYYY	*Example:* *50,000*	*Example:* *20,000*	*Example:* *10,000*	*Example:* *4,000*	*Example:* *8,000*	*Example:* *8,000*	*Example:* *16,000*
01-Jan-YYYY to 31-Dec-YYYY							
01-Jan-YYYY to DD-MMM-YYYY							
Total							

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$FFC_{bsl,i,j,t}$
Data unit	liters

Description	Consumption of fossil fuel type j for quantification unit i in year t in the baseline scenario
Source of data	Baseline assessment report conducted by Rajamangala University of Technology Lanna, Thailand, prior to the project start date
Value applied	As mentioned in the baseline assessment report
Justification of choice of data or description of measurement methods and procedures applied	Fossil fuel consumption may be monitored or the amount of fossil fuel combusted may be estimated using fuel efficiency (e.g., L/100 km, L/km, L/hour) of the vehicle and the appropriate unit of use for the selected fuel efficiency (e.g., km driven where efficiency is given in L/100 km).
Purpose of data	Calculation of baseline and project emissions
Comments	Fuel efficiency may be obtained from peer-reviewed studies or the most recent version of the IPCC guidelines (Volume 2, Chapter 3).

Data / Parameter	$M_{limestone,bsl,i,t}$ $M_{dolomite,bsl,i,t}$
Data unit	tonnes
Description	Amount of calcitic limestone ($CaCO_3$) applied to quantification unit i in year t in the baseline scenario Amount of dolomite ($CaMg(CO_3)_2$) applied to quantification unit i in year t in the baseline scenario
Source of data	Baseline assessment report conducted by Rajamangala University of Technology Lanna, Thailand, prior to the project start date
Value applied	As mentioned in the baseline assessment report
Justification of choice of data or description of measurement methods and procedures applied	All limestone and dolomite applied to soils should be included, even the proportion applied in mixture with fertilizers. Use of oxides (e.g., CaO) and hydroxides of lime for soil liming need not be included in the calculations to estimate CO_2 emissions from liming. As these materials do not contain inorganic carbon, CO_2 is not released following soil application; it is only produced during material manufacture.
Purpose of data	Calculation of baseline and project emissions
Comments	For all equations, the subscript bsl must be substituted by wp where the relevant values are being quantified for the monitoring period.

Data / Parameter	GWP_{CH_4}
Data unit	$CO_2e/t\ CH_4$
Description	Global warming potential for methane
Source of data	IPCC Fifth Assessment Report (IPCC, 2014)
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	See "Source of data." Global warming potential values must be applied as described in the latest version of the VCS Standard and derived from IPCC Assessment Reports.
Purpose of data	Calculation of baseline and project emissions
Comments	None

Data / Parameter	$EF_{bsl,c}$
Data unit	kg CH_4/ha/day
Description	Baseline methane emission factor for continuously flooded fields without organic amendments
Source of data	IPCC guidelines (2019), volume 4, chapter 5.5, Table 5.11
Value applied	Regional value of Southeast Asia – 1.22 kg CH_4/ha/day
Justification of choice of data or description of measurement methods and procedures applied	See "Source of data".
Purpose of data	Calculation of baseline and project emissions
Comments	Default values are to be considered at a country-specific, regional, and global level, listed here in descending order of preference.

Data / Parameter	$SC_{bsl,w}$
Data unit	unitless
Description	Baseline scaling factor of account for differences in water regime during the cultivation period

Source of data	Most recent version of IPCC guidelines (Table 5.12, Chapter 5, Volume 4)
Value applied	Value depends on water regime employed. Values from IPCC (2019) are: - Continuously flooded: 1 - Single drainage period: 0.71 - Multiple drainage periods: 0.55
Justification of choice of data or description of measurement methods and procedures applied	See "Source of data."
Purpose of data	Calculation of baseline and project emissions
Comments	For all equations, the subscript *bsl* must be substituted by *wp* where the relevant values are being quantified for the monitoring period.

Data / Parameter	$SC_{bsl,p}$
Data unit	Unitless
Description	Baseline scaling factor to account for differences in water regime in the pre-season before the cultivation period
Source of data	Most recent version of IPCC guidelines (Table 5.13, Chapter 5, Volume 4)
Value applied	Value deepens on water regime employed. Values from IPCC (2019) are: - Non-flooded pre-season<180 days (indicating double cropping): 1.00 - Non flooded pre-season>180 days (indicating single cropping): 0.89
Justification of choice of data or description of measurement methods and procedures applied	See "source of data".
Purpose of data	Calculation of baseline and project emissions
Comments	For all equations, the subscript *bsl* must be substituted by *wp* where the relevant values are being quantified for the monitoring period.

Data / Parameter	$CFOA_a$

Data unit	Unitless
Description	Conversion factor for organic amendment type a
Source of data	Most recent version of IPCC guidelines (Table 5.14, Chapter 5, Volume 4)
Value applied	Value depends on organic amendment type applied (see Section 8.2.3)
Justification of choice of data or description of measurement methods and procedures applied	See "Source of data."
Purpose of data	Calculation of baseline and project emissions
Comments	None

Data / Parameter	$MB_{bsl,i,t}$
Data unit	Kg
Description	Mass of rice straw burned of quantification unit *i* in year *t* in the baseline scenario
Source of data	Baseline assessment report conducted by Rajamangala University of Technology Lanna, Thailand, prior to the project start date
Value applied	As mentioned in the baseline assessment report
Justification of choice of data or description of measurement methods and procedures applied	See "Source of data."
Purpose of data	Calculation of baseline and project emissions
Comments	Mass of residues burned is a function of the amount of aboveground biomass, the removal of aboveground biomass, and whether remaining residues are burned. It is assumed that 100% of aboveground biomass is burned in the baseline scenario. For all equations, the subscript *bsl* must be substituted by *wp* where the relevant values are being quantified for the monitoring period.

Data / Parameter	GWP_{N2O}
Data unit	tCO_2e/tN_2O

Description	Global warming potential for nitrous oxide
Source of data	Most recent version of the VCS Standard
Value applied	See the most recent version of the VCS Standard.
Justification of choice of data or description of measurement methods and procedures applied	The VCS Standard provides the GWPs that must be used under the VSC Program.
Purpose of data	Calculation of baseline and project emissions
Comments	None

Data / Parameter	CF_{N2O}
Data unit	Kg N_2O/kg N-input
Description	N_2O correction factor for calculation N_2O emissions flux due to period of drying on rice fields
Source of data	The correction factor is derived from the emission factors (kgN_2O - N/t N) from the most recent version of Table 11.1 (Update) in Chapter 11, Volume 4 in the IPCC guidelines. The difference between the aggregated default value emission factors continuously flooded rice fields and rice fields with single or multiple drainage was converted from N_2O-N into N_2O emissions.
Value applied	0.00314 (IPCC 2019)
Justification of choice of data or description of measurement methods and procedures applied	See “Source of data”
Purpose of data	Calculation of baseline and project emissions
Comments	None

Data / Parameter	P_{bsl}
Data unit	Output/ha
Description	Average rice yield during the historical look-back period

Source of data	Baseline assessment report conducted by Rajamangala University of Technology Lanna, Thailand, prior to the project start date
Value applied	As mentioned in the baseline assessment report
Justification of choice of data or description of measurement methods and procedures applied	Average productivity for each livestock/crop following guidance in Section 8.4.2
Purpose of data	Calculation of leakage
Comments	For all equations, the subscript *bsl* must be substituted by *wp* where the relevant values are being quantified for the monitoring period.

Data / Parameter	RP_{bsl}
Data unit	Output/ha
Description	Average regional rice yield during the historical look-back period
Source of data	Baseline assessment report conducted by Rajamangala University of Technology Lanna, Thailand, prior to the project start date
Value applied	As mentioned in the baseline assessment report
Justification of choice of data or description of measurement methods and procedures applied	Average regional productivity for each livestock/crop product following guidance in Section 8.4.2
Purpose of data	Calculation of leakage
Comments	For all equations the subscript *bsl* must be substituted by *wp* where the relevant values are being quantified for the monitoring period.

5.2 Data and Parameters Monitored

Data / Parameter	Ai
Data unit	ha
Description	Area of quantification unit i
Source of data	Measurement of each quantification unit within the project area
Description of measurement methods	The quantification unit area is measured prior to verification.

and procedures to be applied	
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	14,277
Monitoring equipment	geographic information system (GIS) coverages, ground survey data, remote imagery (satellite or aerial photographs)
QA/QC procedures to be applied	Delineation of the quantification unit area may be determined using a combination of geographic information system (GIS) coverages, ground survey data, remote imagery (satellite or aerial photographs), and other appropriate data. Any imagery or GIS datasets used must be geo-registered referencing corner points, landmarks, or other intersection points.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	Other units used to determine area (e.g., acres) must be converted to hectares.

Data / Parameter	$EF_{CO2,j}$
Data unit	t CO_2e/liter
Description	Emission factor for combustion of fossil fuel type j
Source of data	Most recent version of IPCC guidelines (Table 3.3.1 in Chapter 3, Volume 2)
Description of measurement methods and procedures to be applied	From IPCC (2019): • gasoline $EFCO_2$ = 0.002810 t CO_2e per liter • diesel $EFCO_2$ = 0.002886 t CO_2e per liter
Frequency of monitoring/recording	Source of data for emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	See “Source of data.”

Purpose of data	Calculation of baseline and project emissions
Calculation method	*N/A*
Comments	Assumes four-stroke gasoline engine for gasoline combustion and default values for energy content of 44.3 GJ/t and 43.0 GJ/t for gasoline and diesel respectively (IPCC 2006).

Data / Parameter	$EF_{limestone}$ $EF_{dolomlite}$
Data unit	t C/t limestone t C/t dolomite
Description	Emission factor for calcitic limestone ($CaCO_3$) Emission factor for dolomite ($CaMg(CO_3)_2$)
Source of data	Most recent version of IPCC guidelines (Section 11.3, Chapter 11, Volume 4)
Description of measurement methods and procedures to be applied	IPCC (2019) values: • $EF_{limestone}$ = 0.12 t C/t limestone • $EF_{dolomlite}$= 0.13 t C/t dolomite
Frequency of monitoring/recording	Source of data for emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	See “Source of data” and the guidance in Section 8.1.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$f(CH_{4_{soil_{bsl,i,t}}})$
Data unit	t CH_4/ha
Description	N/A
Source of data	N/A
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	N/A
Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	N/A
Calculation method	N/A
Comments	Not applicable for Quantification 3 – Default Value

Data / Parameter	ROA_a
Data unit	t/ha
Description	Application rate of organic amendment type a, in dry weight of straw and fresh weight for others
Source of data	Management records from project area
Description of measurement methods and procedures to be applied	See Box 1. In the baseline scenario, 5 t/ha of straw is assumed. This should be adjusted where material changes in biomass management occur in the project, such as increased biomass to soils.

Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Involved parties will follow the requirements of Box 1 of the Methodology.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	L_t
Data unit	days
Description	Cultivation period of rice in year t
Source of data	Farm management records In circumstances where climatic conditions result in a monitoring period's cultivation period lasting longer than the baseline cultivation period, project proponents may set the baseline cultivation period duration as the actual number of days in the cultivation period during the monitoring period.
Description of measurement methods and procedures to be applied	See Box 1. Each cultivation period commences at land preparation and continues until whichever comes later, harvest or post-season drainage.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	See Box 1.

Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	CF_r
Data unit	fraction
Description	Combustion factor for rice straw expressed as proportion of pre-fire fuel biomass consumed
Source of data	Most recent version of IPCC guidelines (Table 2.6 in Chapter 2, Volume 4)
Description of measurement methods and procedures to be applied	IPCC (2019) value
Frequency of monitoring/recording	Source of data for combustion factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	0.80
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	EF_{CH4}

Data unit	g CH_4/kg dry matter burned
Description	Methane emission factor for the burning of rice straw
Source of data	Most recent version of IPCC guidelines (Table 2.5 in Chapter 2, Volume4)
Description of measurement methods and procedures to be applied	IPCC (2019) value
Frequency of monitoring/recording	Source of data for the emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	2.7
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$f(N_2O_{soil_{bsl,i,t}})$
Data unit	t N_2O/ha
Description	Modeled nitrous oxide emissions from soil for quantification unit i in year t in the baseline scenario, calculated by modeling soil fluxes of nitrogen forms over the preceding year
Source of data	N/A
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	N/A

Value applied	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	N/A
Calculation method	N/A
Comments	Not applicable for Quantification 3 – Default value

Data / Parameter	EF_N
Data unit	(t N_2O-N/t N applied)
Description	Emission factor for nitrous oxide emissions from nitrogen additions from synthetic fertilizers, organic amendments, and crop residues in flooded rice
Source of data	See Section 8.2.6 under Quantification Approach 3. Where no information source is available that is applicable to the project conditions, project proponents may derive emission factors following the guidance in Chapter 11, Section 11.2.1.1 and Chapter 2, Section2.2.2 in Volume 4 of IPCC (2019). Where project proponents justify a lack of sufficient activity data and project-specific information sources, an appropriate disaggregated Tier 1 value from Table 11.1, Chapter 11, Volume 4 in IPCC (2019) may be selected.
Description of measurement methods and procedures to be applied	See “Source of data.”
Frequency of monitoring/recording	Source of data for emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	To be determined
Monitoring equipment	N/A

QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	SF
Data unit	dimensionless
Description	Synthetic nitrogen fertilizer type
Source of data	Determined in quantification unit *i*
Description of measurement methods and procedures to be applied	See Box 1. Synthetic fertilizer type is determined prior to verification.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	NC_{SF}

Data unit	t N/t fertilizer
Description	Nitrogen content of synthetic fertilizer type *SF*
Source of data	See Box 1.
Description of measurement methods and procedures to be applied	N content is determined following the fertilizer manufacturer's specifications.
Frequency of monitoring/recording	Monitoring must be conducted each season. Parameter value must be updated when synthetic fertilizer product is changed or when new manufacturer specifications are issued.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	See "Source of data" and Quantification Approach 3 in Section 8.2.6.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$M_{bsl,SF,i,t}$
Data unit	tonnes
Description	Mass of nitrogen-containing synthetic fertilizer type SF applied to quantification unit i in year t in the baseline scenario
Source of data	Management records from project area
Description of measurement methods and procedures to be applied	See Box 1.
Frequency of monitoring/recording	Monitoring must be conducted each season.

Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	For all equations, the subscript bsl must be substituted by wp where the relevant values are being quantified for the monitoring period.

Data / Parameter	OF
Data unit	dimensionless
Description	Organic nitrogen fertilizer type
Source of data	Determined in quantification unit *i*
Description of measurement methods and procedures to be applied	See Box 1. Organic fertilizer type is determined prior to verification.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A

Comments	None

Data / Parameter	NC_{OF}
Data unit	t N/t fertilizer
Description	Nitrogen content of organic fertilizer type *OF*
Source of data	Peer-reviewed published data may be used. For example, default manure N content may be selected from Edmonds et al. (2003) cited in US EPA (2021) or other regionally appropriate sources such as the European Environment Agency.
Description of measurement methods and procedures to be applied	See "Source of data."
Frequency of monitoring/recording	Monitoring must be conducted each season. Parameter value must be updated when organic fertilizer product is changed or as new default values become available in peer-reviewed publications or databases.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$M_{bsl,OF,i,t}$
Data unit	Data unit
Description	Mass of nitrogen-containing organic fertilizer type *OF* applied to quantification unit *i* in year t in the baseline scenario

Source of data	Management records from project area
Description of measurement methods and procedures to be applied	See Box 1.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	For all equations, the subscript bsl must be substituted by wp where the relevant values are being quantified for the monitoring period.

Data / Parameter	CR
Data unit	dimensionless
Description	Crop residue type
Source of data	Determined in quantification unit *i*
Description of measurement methods and procedures to be applied	See Box 1. Crop residue type is determined prior to verification.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks

QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	NC_{CR}
Data unit	t N/t dry mass
Description	Nitrogen content in dry mass of crop residue type *CR* (above and belowground) before the rice season
Source of data	Peer-reviewed published data may be used.
Description of measurement methods and procedures to be applied	See “source of data”
Frequency of monitoring/recording	Monitoring must be conducted each season. Parameter value must be updated as new default values become available in peer-reviewed publications or databases.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC 2003) Section 5.5 or IPCC (2000) Chapter 8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$M_{bsl,CR,i,t}$
Data unit	tonnes
Description	Total dry mass of crop residue returned to soils (aboveground and belowground) before rice season in quantification unit *i* in year *t* in the baseline scenario
Source of data	Management records from project area
Description of measurement methods and procedures to be applied	See Box 1.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	For all equations, the subscript bsl must be substituted by wp where the relevant values are being quantified for the monitoring period.

Data / Parameter	EF_{N2O}
Data unit	g N_2O/kg dry matter burned
Description	Nitrous oxide emission factor for the burning of rice straw
Source of data	Where no information source is available that is applicable to the project conditions, project proponents may define value from the most recent version of IPCC guidelines in Table 2.5 in Chapter 2, Volume 4 of IPCC (2019).
Description of measurement methods	IPCC (2019) default value: 0.07

and procedures to be applied	
Frequency of monitoring/recording	Source of data for the emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available.
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter8 must be applied.
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$EF_{eu,r}$
Data unit	kg CO_2e/t dry rice straw
Description	Emission factor for rice straw for off-farm end use category *r*
Source of data	Project proponents must derive suitable values for $EF_{eu,r}$ using evidence including peer-reviewed literature, government records, production facility records, survey data, publicly available life cycle analysis databases, or reports compiled by industry associations.
Description of measurement methods and procedures to be applied	See guidance in Section 8.3.1
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A

Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$RS_{removed,r}$
Data unit	t d.m.
Description	Mass of rice straw removed from field and sent to end use category *r*
Source of data	See guidance in Section 8.3.1
Description of measurement methods and procedures to be applied	See guidance in Section 8.3.1
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$Q_{N,i}$
Data unit	Kg N/ha

Description	Application rate of nitrogen input for quantification unit *i* in the project scenario
Source of data	Fertilizer application logbooks from farmers, surveys among farmers
Description of measurement methods and procedures to be applied	See Box 1
Frequency of monitoring/recording	Monitoring must be conducted each season
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Consolidated purchase receipts may be used to check N inputs
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	None

Data / Parameter	$M\_OA_{wp,l,t}$
Data unit	tonnes
Description	Mass of organic amendment (from livestock type *l*) applied as fertilizer in the project area in year *t*
Source of data	Management records from project area
Description of measurement methods and procedures to be applied	For manure application, data should be disaggregated for each livestock type *l*.
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined

Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter 8 must be applied.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	None

Data / Parameter	$CC_{wp,l,t}$
Data unit	t C/t organic amendment
Description	Carbon content of organic amendment applied as fertilizer in the project area in year *t*, disaggregated by livestock type *l* for manure
Source of data	See Box 1.
Description of measurement methods and procedures to be applied	For manure application, data should be disaggregated for each livestock type *l*.
Frequency of monitoring/recording	Monitoring must be conducted every five years or prior to each verification event where verification occurs more frequently.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter 8 must be applied.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	None

Data / Parameter	P_{wp}
Data unit	Output (e.g., kg)/ha
Description	Average rice yield during the monitoring period
Source of data	Farm productivity (e.g., yield) records
Description of measurement methods and procedures to be applied	Measured using locally available technologies (e.g., mobile weighing devices, commercial scales, storage volume measurements, fixed scales, weight scale tickets)
Frequency of monitoring/recording	Monitoring must be conducted each season.
Value applied	To be determined
Monitoring equipment	Farmer activity logbooks
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter 8 must be applied.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	None

Data / Parameter	RP_{wp}
Data unit	Output (e.g., kg)/ha
Description	Average regional rice yield during the monitoring period
Source of data	Regional productivity data from government (e.g., USDA Actual Production History data), industry, published, academic, or international organization (e.g., FAO) sources
Description of measurement methods and procedures to be applied	N/A

Frequency of monitoring/recording	Every 10 years
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	Guidance provided in IPCC (2003) Section 5.5 or IPCC (2000) Chapter 8 must be applied.
Purpose of data	Calculation of leakage
Calculation method	N/A
Comments	None

Data / Parameter	h
Data unit	Dimensionless
Description	Stratum identifier
Source of data	Determined in project area
Description of measurement methods and procedures to be applied	Project fields are grouped by cultivation pattern; stratum *h* covers all project fields with the same cultivation pattern.
Frequency of monitoring/recording	Monitoring must be conducted annually or prior to each verification event where verification occurs more frequently.
Value applied	To be determined
Monitoring equipment	N/A
QA/QC procedures to be applied	None
Purpose of data	Calculation of baseline and project emissions
Calculation method	N/A

Comments	None

5.3 Monitoring Plan

Item	Description
Overview	The monitoring plan outlines the procedures and schedule for collecting, recording, compiling, and analyzing all parameters defined in Section 5.2. It ensures that GHG emission reductions achieved through improved rice-water management practices, such as Alternate Wetting and Drying (AWD), are tracked consistently, transparently, and verifiably throughout the project area. Monitoring is conducted in accordance with VM0051 v1.0 (Section 9) and the VCS Standard v4.7, ensuring methodological compliance and the integrity of reported emission reductions.
Methods for Measurement and Recording	• Data Collection: Information on irrigation regime, water levels, fertilizer application, residue management, and crop yields is collected using farmer logbooks, field observation sheets, and digital monitoring applications (DMRV). • GHG Flux Measurement: Methane (CH_4) emissions are quantified following the selected approach, QA3 – default emission factor method with regional adjustments for Southeast Asia. • Field Recording: Field officers document all parameters for each quantification unit during every cropping season. • Equipment Calibration: Monitoring equipment, including digital water-level sensors and flow meters,

	is calibrated annually according to manufacturer specifications, and all calibration activities are logged in a dedicated calibration register.
Data Storage and Aggregation	• Data Storage: All monitoring data are digitally stored in a central database managed by Charoen Pokphand Produce Co., Ltd.. Hard copies of farmer logbooks and field records are retained at each FarmPro branch for local reference and verification. • Record Retention: Hard copies of farmer logbooks and field records are maintained for at least 10 years after issuance to allow cross-verification. • Data Aggregation: Data from each project provinces (Phayao, Chiang Rai, Chiang Mai, Kamphaeng Phet, Phitsanulok, Phichit, Nakhon Sawan, and Suphanburi) are aggregated by the Project Monitoring Team (PMT) before analysis. • Quality Assurance: Data integrity checks and completeness reviews are conducted prior to GHG calculation and reporting to ensure accuracy and reliability.

Organizational Structure and Responsibilities

Project Proponent (Charoen Pokphand Produce Co., Ltd.)	Overall supervision of monitoring activities, data management and report submission to Verra Registry.
FarmPro Field Officers / Cluster Coordinators	Supervise data collection in each cluster, train farmers on measurement and record-keeping, and validate data entry.
Farmer Participants	Record irrigation events, fertilizer use, and harvest information in logbooks according to project guidelines.
Project Monitoring Team (PMT)	• Conduct QA/QC logbook, documents, all data reviews, check errors, and corrective actions. • Spot verifications; compile and analysed data for annual monitoring reports.

	• Annual training on data collection and QA/QC procedures is provided to all enumerators and coordinators.
Internal Auditing	• Annual internal audits by PMT ensure accuracy and completeness of data. • Cross-checks between farmer records are performed every season. • 10% of plots are randomly re-measured for validation.
External Auditor (VVB)	Verify data accuracy and methodological compliance during each verification cycle.
Handling of Non-Conformances When data gaps or inconsistencies are identified:	• The issue is entered into a Non-Conformance Register. • Root-cause analysis and corrective actions (e.g., re-training or data replacement using conservative assumptions) are applied. • Revised data are approved by the Project Manager prior to submission. • All actions are recorded for audit traceability.
Sampling Approach and Frequency	• Sampling design follows VM0051 Appendix 1 and CDM Guideline (EB67 A06). • Stratified random sampling is applied by cluster, soil type, and irrigation system. • Target precision: ±10% at 95% confidence level. • Sampling frame: registered rice fields under each cluster. • Frequency: per cropping season (monsoon and dry). • 10% duplicate measurements for quality control and cross-checks by cluster supervisors.
GHG Data Collection and Management Flow	Line Diagram: Farmers → Field Officers → Regions Coordinator → PMT Database → Data Validation (QA/QC) → Emission

Calculations → Monitoring Report → VVB Verification → Verra Registry

Reporting Schedule

Annual (Nov – Oct)	Field data collection and aggregation by Regions coordinators and PMT.
Nov – Dec each year	Internal audit and preparation of annual Monitoring Report (MR).
Every 5 years	Third-party verification by VVB and submission to Verra Registry.
Record Retention	All monitoring records, digital files, calibration logs, and audit reports will be retained for at least two crediting periods (≥ 14 years) in accordance with VCS Program requirements.
Summary	The monitoring system ensures that data collection, storage, and analysis are transparent, verifiable, and consistent with VM0051 requirements. The robust QA/QC framework and trained personnel guarantee that the project's GHG emission reductions are measurable and credible for issuance of Verified Carbon Units (VCUs).

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Use the table below to describe the commercially sensitive information included in the project description to be excluded in the public version.

Section	Information	Justification

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.