Joint Crediting Mechanism Guidelines for Developing Project Design Document and Monitoring Report for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)

CONTENTS

1. Scope and applicability

1. The "Joint Crediting Mechanism Guidelines for Developing Project Design Document and Monitoring Report for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)" (hereinafter referred to as "these Guidelines") are intended to assist project participants on developing project design documents (hereinafter referred to as "PDD") and monitoring report.
2. REDD-plus safeguards are outside the scope of these Guidelines. Safeguards are supported and promoted by project participants in line with the "Joint Crediting mechanism Guidelines for Developing Proposed Methodology for REDD-plus", and the "Joint Crediting Mechanism Guidelines for Addressing and Respecting REDD-plus Safeguards".
3. These Guidelines describe standards which are requirements to be met, except guidance indicated with terms "should" and "may" as defined in paragraph 8 below.

2. Terms and definitions

4. "Project design document (PDD)" is prepared by the project participant of a JCM project and sets out in detail, in line with the JCM rules and guidelines, the JCM project which is to be realized.
5. "Monitoring" is collecting and archiving all relevant data necessary for estimating GHG emission that are significant and reasonably attributable to a registered JCM project.
6. "Monitoring plan" sets out the methodology to be used by project participants for the monitoring of, and by third-party entities for verification of the amount of GHG emission reductions achieved by the JCM project.
7. "Monitoring report" is prepared by a project participant and sets out the GHG emission reductions of an implemented registered JCM project for a particular monitoring period.
8. The following terms apply in these Guidelines:
    (a) "Should" is used to indicate that among several possibilities, one course of action is recommended as particularly suitable;
    (b) "May" is used to indicate what is permitted.
9. Terms in these Guidelines are defined in "JCM Glossary of Terms" available on the JCM website.

3. General guidelines

10. When designing a proposed JCM project and developing a PDD and a monitoring report, project participants apply these Guidelines and the selected methodology(ies), which

contain(s) approved methodology document(s) and Monitoring Spreadsheet(s). They also take note of the "Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)" and "Joint Crediting Mechanism Guidelines for Addressing and Respecting Safeguards for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)".

11. The project participants also communicate with the technical contact person for REDD-plus under the JCM to explain how they intend to establish the project reference level and estimate project net emissions following an approved methodology, consider any comments and other feedback they receive, and keep records of the communications. The technical contact person for REDD-plus under the JCM is provided on the JCM website.
12. The Monitoring Spreadsheet is provided as a part of each approved methodology and it consists of:
    (a) Monitoring Plan Sheet (input sheet and calculation process sheet) which is used before validation for developing a monitoring plan and calculating emission reductions *ex ante*;
    (b) Monitoring Structure Sheet which is used before validation for developing an operational and management structure to be implemented in order to conduct monitoring;
    (c) Monitoring Report Sheet (input sheet and calculation process sheet) which is used before verification for developing a monitoring report and calculating emission reductions *ex post.*
13. A PDD consists of a completed PDD form and monitoring plan using Monitoring Plan Sheet and Monitoring Structure Sheet. A monitoring report is completed by using Monitoring Report Sheet.
14. The project participants provide a description of the project that provides a comprehension of the nature of the project and its implementation.
15. The project participants monitor the registered JCM project and its emission reductions. The project participants establish and apply quality management procedures to manage data and information. The project participants should reduce, as far as is practical, uncertainties related to the quantification of emission reductions.
16. These Guidelines, the PDD form, and Monitoring Spreadsheet can be obtained electronically from the JCM website.

17. The Joint Committee may revise the PDD form and the Monitoring Spreadsheet if necessary.
18. The Monitoring Spreadsheet may be revised when the corresponding approved methodology is revised.
19. The PDD form and the Monitoring Spreadsheet are completed in English language.
20. The PDD form and the Monitoring Spreadsheet are not to be altered, that is, are to be completed without modifying its format, font, headings, except for those referred in paragraph 21 below.
21. Rows may be added to the table in the Annex of the PDD form.
22. Where a PDD contains information that the project participants wish to be treated as confidential or proprietary, the project participants are required to submit documentation in two versions:
    (a) One version where all parts containing confidential or proprietary information are made illegible (e.g. by covering those parts with black ink or overwrite those parts with letters such as "XXX") so that the version can be made publicly available without displaying confidential or proprietary information;
    (b) Another version containing all information that is to be treated as strictly confidential or proprietary by all parties handling this documentation (the third-party entities, the Joint Committee members, external experts).
23. Description related to application of the eligibility criteria and the environmental impact assessment is not considered confidential or proprietary.
24. The presentation of values in the PDD, including those used for the calculation of emission reductions, should be in international standard format e.g. 1,000 representing one thousand and 1.0 representing one. The units used should be accompanied by their equivalent S.I. units/norms (thousand/million) as part of the requirement to ensure transparency and clarity.

4. Developing a PDD

In the following section, a hypothetical project is described in red color as an example to show how to fill in the PDD form, Monitoring Plan Sheet, and Monitoring Structure and Procedures Sheet.

4.1. Completing a PDD form

<Example of a completed PDD>

A. Project description

A.1. Title of the JCM project

Reducing deforestation and forest degradation through community-based forest management and agricultural intensification in country XYZ

- *Provide an unambiguous title of the JCM project. The title should indicate the major project activities.*

A.2. General description of the proposed project

The project is the result of collaboration between Company ABC, Company DEF, national NGO ABC and the Department of Forestry of country XYZ. It builds on an earlier initiative, which supported 4 communities in province XYZ to establish community forests. These and other forests in the province are under threat of unplanned deforestation and degradation driven by population growth, in-migration, lack of livelihood options, insecure tenure of local communities and lack of resources for forest monitoring and enforcement of forest laws. Forest conversion and fires are the main proximate causes of deforestation. The primary agents of deforestation are local and migrant communities, who clear the forest for agriculture, use fire for hunting and land clearance, and collect timber and fuelwood for local use.

The project activities to avoid deforestation and forest degradation, and the displacement of emissions, are (i) Implementation of approved community forest management plans that maintain high carbon stocks through fire control measures and community controls on forest resource use, (ii) Forest patrols and cell-phone communications to prevent illegal activities and provide early warning of forest fires, (iii) Voluntary fire brigades to suppress forest fires, (iii) Cultivation and marketing of certified high-value organic produce to provide alternative livelihoods and reduce pressure on forests, (iv) Planting of woodlots to reduce dependence on forests for fuelwood. Monitoring of emissions to generate carbon offsets and monitoring of the project's socio-economic and biodiversity impacts will also be conducted.

Through these activities, the project aims to:
(i) Conserve biodiversity rich forests with high carbon stocks that provide important ecosystem services to adjacent communities and the country;
(ii) Improve community wellbeing through strengthened community institutions, increased agricultural productivity, and sustainable sources of timber and fuel wood for local use;
(iii) Support country XYZ's Community Forest Programme, National REDD+ Strategy, and National Agricultural Development Plan.

- *Provide a brief description of the project, including:*
  - *The purpose of the project;*
  - *Drivers of deforestation and/or forest degradation that are expected to impact forests in the project area;*
  - *The type of activities the proposed project will implement to reduce net emissions and any other major activities that will be conducted.*

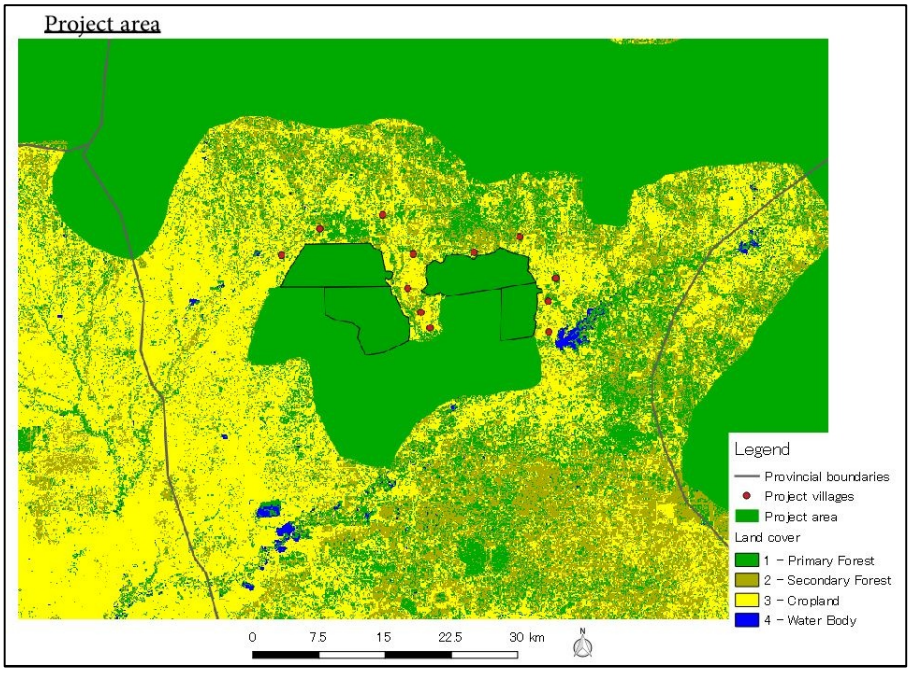
A.3. Project location

Country	Country XYZ
Region, province, district, villages, etc.	Province XYZ Villages A, B, C, D, E, F, G, H, I, J, K, L
Geographical coordinates	The project area consists of 4 community forests located within latitude XXX to XXX and longitude XXX to XXX

- *Provide information on the project location such as the name of the region, province, district, and/or village(s), etc. where the project is located in line with the related guidelines and the applied methodology(ies).*

A.4. Project area and activity area

Project area

Map	 A kml file of the project area has been submitted together with the PDD and can also be requested from NGO ABC.
Total size	17,400 ha

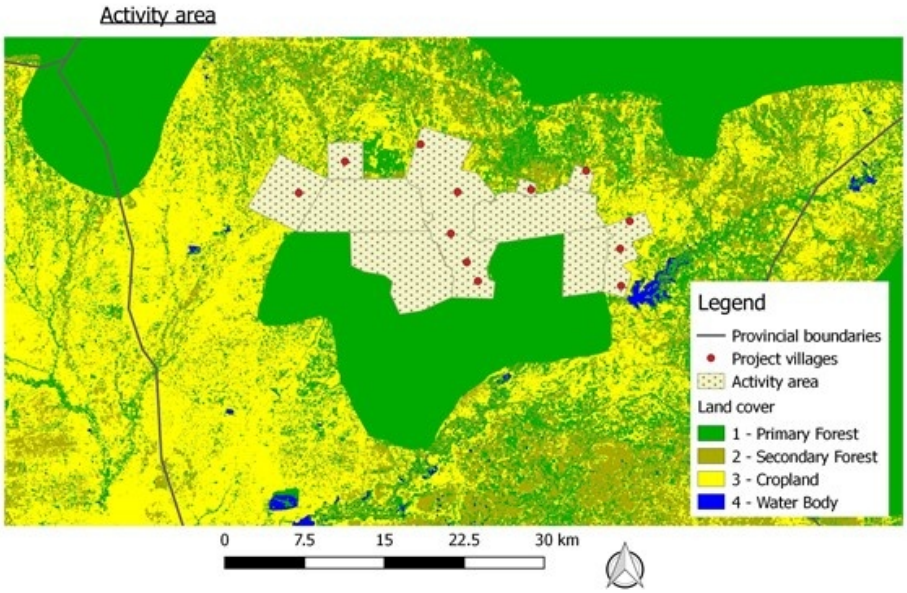
Forest parcels	Area (ha)
Community forest 1	5,100
Community forest 2	5100
Community forest 3	4900

	Community forest 4 2300 Total project area 17,400
Fulfillment of forest definition	The national definition of forest in Country XYZ for REDD-plus under the JCM is XXX (Reference: Annex 1, Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)). Land cover in Province XYZ in 2001 and 2015 was mapped using Landsat images with over 90% classification accuracy (see annex). The maps demonstrate that all 4 community forests that comprise the project area were completely forested for the past 15 years.
Forest type and conditions	The project area consists of 4 parcels of forest comprised of undisturbed lowland evergreen forest. These are multi-storey forests with more than 80% trees of evergreen species, and a canopy cover of over 80 per cent. Emergent trees include *Ficus*, *Dipterocarpus alatus*, *Shorea vulgaris*, *Anisoptera cochichinnensis* and *Tetrameles nudiflora*. Further details are provided in the annex.
Environmental conditions	Climate: Country XYZ has a monsoonal climate, with distinct wet and dry seasons. Average yearly rainfall is between 1,300-1,500 mm. Yearly temperatures range from 24°C-32°C, with an average of 28°C. Hydrology: Small streams dissect the gently undulating landscape, which slopes towards the fertile lowlands. Annual stream flows vary greatly between the wet and dry seasons. Rivers and streams supply downstream lakes on which local communities depend for freshwater fishery resources. Topography: In Province XYZ the terrain is mostly gently undulating, with small hills and wet land depressions. To the north the terrain rises to a forested range of hills between 400-650 m. Soils: Sandstone accounts for most of the basement geology and has a major influence on the properties of upland soils. Sandy materials cover much of the area, due to the siliceous sedimentary formations. The most prevalent soil groups include Acrisols and Leptosols. Vegetation and ecosystems: The main forest type is lowland evergreen forest. The majority of the forests are dryland ecosystems. Seasonal wetlands and swamps exist naturally within the forest systems. Due to the monsoonal climate, many areas are inundated for at least part of the year. A few lakes are found in the province. Relevant historic conditions: Province XYZ has a history of violent conflict; however, recent decades have been free of conflict and the region is becoming more prosperous. The province's rich natural resources, including forests, wildlife, freshwater fish, construction stone, minerals and natural and cultural tourism sites, are drawing people to the region. Cross-border trade with neighboring countries is becoming increasingly important. Demand on natural resources is growing fast as the rural population is growing rapidly. Development of roads is facilitating in-migration to forested areas, and migrants seek to clear the forest to gain title to the land. See annex for more details.

Rights of use for the project	The project area consists of permanent forest estate in province XYZ that has been declared by the Department of Forestry as 4 discrete community forests. The Department of Forestry has issued a community forest agreement for each community forest with a duration of 15-years (renewable). Under the agreements, each community forest is managed by a Community Forest Management Committee and the communities have the rights to the forests for subsistence needs and local uses, as well as any other uses specified in approved forest management plans. Agreements were signed between the government and each of the participating communities to clarify all rights regarding lands and resources, including carbon ownership, in the community forests. The rights to the carbon are held by the government and are managed by the Department of Forestry (one of the project participants). Copies of the agreements are provided in the annex. The project will support agricultural intensification activities (certified high-value organic produce) in the activity area, which is adjacent to the project area. Households have the legal title to this land, which can be confirmed by viewing the property titles.

- *Provide a map displaying the geographical boundaries of the project area and other geographical information that aids comprehension of the project location.*
- *Provide the total size of the project area in hectares.*
- *Describe the forest type and conditions (extent of disturbance, if any) in the project area. Details may be provided in the Annex.*
- *Provide an overview of present and prior environmental conditions of the project area including information on climate, hydrology, topography, relevant historic conditions, soils, vegetation and ecosystems. Details may be provided in the Annex.*
- *Explain the past and present tenure rights in the project area, including ownership rights and use rights. Provide documentary evidence that at least 80% of the forest in the project area is under the control of the project in the Annex.*

Activity area

Activity area	 The activity area consists of several areas adjacent to the project area and

	each consists of small agricultural plots that households hold legal title over. The 12 project villages are all located within the activity area. Under the project, the communities will be provided with training, extension and other support to cultivate certified high-value organic crops in the activity area. The map below shows the total extent of the activity area. Any forest inside the boundaries of the activity is excluded from the area.

- *Describe and provide a map of the activity area, if an activity area is employed in the project design.*
- *If an activity area is not employed in the project design, write "N/A" in the corresponding cell.*

A.5. Project participants

Project participants

Country	Project participants
the Lao People's Democratic Republic	NGO ABC, Department of Forestry
Japan	Company ABC, Company DEF

- *List the project participants from the Lao People's Democratic Republic and Japan in the corresponding cells.*

Project implementation structure

Assigned roles and responsibilities for each organization participating in the project
The project participants are 4 organizations and 4 communities that are implementing the project. They are supported by 3 organizations providing technical inputs. Assigned roles and responsibilities are as follows:

Name of organization	**Mandate**	**Roles and responsibilities in project**
Community Forest Management Committees; Project communities	Manage the community forests	Forest management planning and controls; Organizing patrols and voluntary fire brigades; Supporting organic agriculture and woodlot establishment.
Company ABC (project participant)	Japanese company specializing in organic production of high-value agricultural produce	Training and guidance to project communities on organic growing methods; Preparation for organic farming certification; Monitoring of agricultural production to ensure export quality; International sales of organic agricultural produce.
Company DEF (project participant)	Japanese company implementing forestry and conservation projects	Forest mapping and inventory; Advisory for development and implementation of community forest management plans.
NGO ABC	National NGO	Establishment of community-based voluntary

(project participant)	established in 2000, with a mission of promoting community-based natural resource management	fire brigades; Creation of cell-phone network; Safeguards planning and monitoring.
Department of Forestry (project participant)	Responsible for implementation of Forestry Act and supporting regulations and decrees	Project advisory and steering; Management of carbon offsets generated by the project
XYZ Provincial Forest Office (technical inputs)	Management of permanent forest estate in province XYZ	Support to Community Forest Management Committees on Community Forest Management Plans and patrols; Guidance on woodlots
University KLM (technical inputs)	Japanese university with expertise in spatial modeling	Development of project reference emissions level; Monitoring of land-use change using remote sensing
University NOP (technical inputs)	National University, Dept. of Ecology	Biodiversity assessment and monitoring

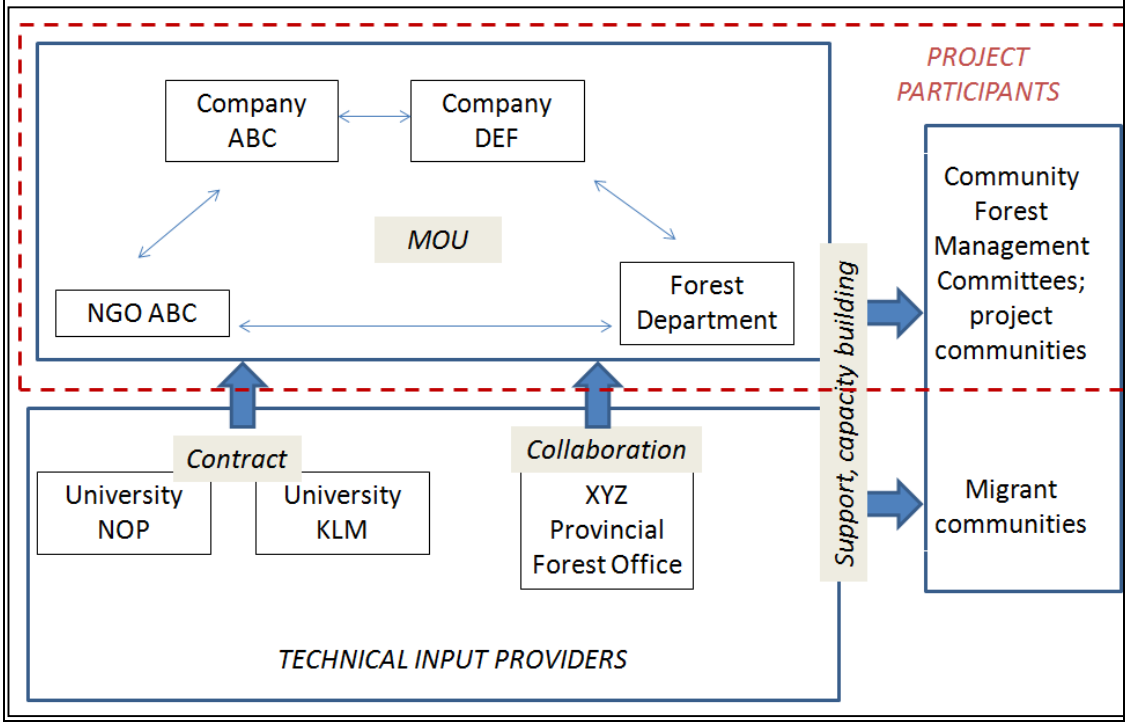
Implementation structure

The project will be managed from the Project Management Office, which is to be set up in provincial capital XYZ, enabling regular travel to the project and activity areas. The Project Management Office is responsible for the day-to-day decisions associated with running the project, including organizing the necessary technical and other inputs. It will hold an internal Monthly Project Management Meeting for review and planning purposes.

A Project Steering Committee will be established and will meet every six months. Meeting records will be kept as minutes at the Project Management Office. The Project Steering Committee reviews the performance of the Project Management Office and sets the strategy for the coming 6 months. The members of the Project Steering Committee will be senior officers of the project participants, a representative of the Provincial Forest Office and a representative of each of the Community Forest Management Committees.

The Community Forest Management Committees are responsible for establishing regulations and plans for the management and utilization of the Community Forests. The Community Forest Management Plans must be approved by the Department of Forestry. The Community Forest Management Committees will meet monthly to take decisions about the day-to-day management and use of the community forests.

The project participants have signed an MOU to implement the project (copy provided in annex).



- *Describe the roles of each project participant and other organizations in the project.*
- *Describe the project implementation structure using a diagram(s) that depicts the relationships between the project participants (and any other organizations that are involved in the project).*
- *Provide evidence for establishing the implementation structure, if any, such as a memorandum of cooperation between the project participants, in the Annex.*

A.6. Duration

Starting date of project operation	01/01/2017
Expected operational lifetime of project	30 years

- *Provide the project start date in DD/MM/YYYY and operational lifetime in years and months.*
- *Note: The starting date of a JCM project is the date on which the operation of a project begins, but may not predate* 2013/1/1.

A.7. Description of drivers of deforestation and/or forest degradation and project activities

Drivers of deforestation and/or forest degradation	The underlying drivers of deforestation and forest degradation expected to impact the forests in the project area in the absence of the project are population growth, in-migration, lack of livelihood options, insecure tenure of local communities and lack of resources for forest monitoring and enforcement of forest laws. Forest conversion and fires are the main proximate causes of deforestation expected. Extraction of timber and fuelwood for local use is also degrading the forest. The primary agents of deforestation are local and migrant communities, who clear the forest for agriculture. Fires are a natural part of the forest ecosystem, but forest fires are becoming more prevalent as they are used in an uncontrolled manner by hunters and by local communities to clear undergrowth. Conversion to cropland Forest lands in Province XYZ have been increasingly converted for agricultural use, due to growth of the local population and in-migration. Government statistics (Reference AAA) indicate that population in the province is growing at 1% per annum. The average annual influx of migrants is estimated to be 2,000 families (Reference BBB). With each family requiring about 2 ha. of agricultural land to sustain itself, 4,000 ha of new agricultural land is required each year. Forest fires Natural forest fires are part of and essential to the forest ecosystem in the province. However, fires lit by hunters and left to burn out of control are now presenting a threat to forests. It is estimated that in the dry season, 50% of forest fires result from hunters using fires (Reference CCC). Timber and fuelwood for local use Timber is harvested for local purposes, mostly the construction of dwellings. These are often semi-permanent, meaning they are abandoned after a number of years and more trees cut to build new dwellings. The need for housing of the growing population is increase pressure on the forests for local timber use. The growing population is also demanding greater volumes of fuelwood. Over 90% of country XYZ's population use fuelwood and other biomass for cooking (Reference DDD).
Project activities	(i) Provide support to 4 Community Forest Management Committees encompassing 12 villages to design and implement approved forest management plans Through training workshops and outreach, the project will support the local communities to develop and implement forest management plans to mitigate fire risk and ensure that the extraction of fuelwood and timber for local use is controlled and maintained at sustainable levels. Controlled extraction of fuelwood can in fact reduce forest fire risk through the removal of deadwood. Fire lines will be cut at the beginning of the annual fire season to minimize the spread of fires. They have been found effective in other parts of the country. The communities will participate in 3-yearly biomass and biodiversity surveys in the project area. The communities will be trained on the establishment and measurement of permanent sample plots to monitor forest biomass and estimate forest carbon stocks, and on biodiversity survey techniques. **Objectives**: Build community capacity to sustainably manage their

	forests and generate data to assess and strengthen the forest management strategies **Actors**: 4 project communities, Company DEF, NGO ABC, XYZ Provincial Forest Office, University NOP **Location**: Project Area **Duration/Frequency**: 3 training workshops will be conducted with each community in Year 1. Refresher trainings will be conducted as necessary. Project technical staff will provide guidance to communities when conducting forest management and monitoring activities. (ii) Conduct forest patrols and establish cell-phone network The project will employ community members to demarcate the community forest boundaries using signboards and posts and to conduct patrols to stop outsiders from encroaching on the forests, hunting using fires and overharvesting fuelwood and timber. Communication equipment and uniforms will be purchased and patrol huts constructed. The project will support meetings between the Community Forest Management Committees and migrant community leaders to request recognition of and support for the community forests. XYZ Provincial Forest Office will participate in the meetings with migrant community leaders and the forest patrols. A cell-phone network will be established in the project communities to quickly communicate information on illegal forest activities and forest fires. **Objectives**: Reduce encroachment, fires and over-extraction of fuelwood and timber **Actors**: 4 project communities, Company DEF, NGO ABC, XYZ Provincial Forest Office **Location**: Project Area **Duration/Frequency**: Planning workshops will be conducted to determine best patrolling routes and frequency. (iii) Establish voluntary fire brigades The project will form voluntary fire brigades consisting of village youth in each of the 4 communities. They will be equipped with communications equipment, protective clothing and firefighting tools. The project will seek ways of providing incentives for participation, such as buying equipment for youth sports teams or other clubs. Such voluntary fire brigades have been found effective in other parts of the country. **Objectives**: Reduce spread of forest fires **Actors**: Village youth, Company DEF, NGO ABC, XYZ Provincial Forest Office **Location**: Project Area, adjacent forests **Duration/Frequency**: Purchase of equipment, formation of the brigades and training will be conducted in Year 1. Support to the brigades will be provided throughout the life of the project. (iv) Cultivation and marketing of certified high-value organic produce Company ABC is a Japanese company that specializes in organic agriculture in Japan and several developing countries. It will provide

	training and extension to communities on the cultivation of high-value organic produce. Equipment necessary for nurseries, land preparation, planting out, harvesting and storage will be provided. Company ABC will acquire certification for the organically grown produce and will organise the marketing and export of the produce. **Objectives**: Reduce pressure on forests through increased agricultural productivity **Actors**: 4 project communities, Company ABC, NGO ABC. **Location**: Activity area **Duration/Frequency**: Organization of farmer groups and training will begin in Year 1. Extension services will be provided for the duration of the project. (v) Planting of woodlots The planting of woodlots is expected to reduce reliance on natural forests for timber and fuelwood for local uses. Woodlots are absent from the project villages, who lack the finances to purchase seedlings and knowledge on species selection and tree cultivation and maintenance. Company ABC, XYZ Provincial Forest Office and NGO ABC, will provide training and extension to the project communities and nearby migrant communities on woodlot establishment. Community forest management committees will assist in organizing the project communities and identifying suitable land. Traditional leaders will organize the migrant communities. **Objectives**: Avoid unsustainable harvesting of forests for fuelwood and timber **Actors**: 4 project communities, Company ABC, NGO ABC, XYZ Provincial Forest Office **Location**: Activity area **Duration/Frequency**: Woodlots will be established in Year 1 and will become productive by Year 6. Extension services will be provided for the first 3 years and thereafter as necessary.

- *Provide a description of the drivers of deforestation and/or forest degradation expected to impact the forests in the project area in the absence of the project.*
- *Describe the project activities, including objectives, actors involved, location (project area or activity area), duration/frequency, and other relevant information.*

A.8. Contribution from Japan

Company ABC is a Japanese company with a global reputation for the production of organic foods. It has developed a unique combination of methods for composting, soil enrichment and pest/disease management that provide high-quality, high-yield organic produce. Company ABC will build the capacity of, and provide the inputs necessary for, farmers in the activity area to cultivate high-value crops with export potential using these organic methods. Company ABC will acquire organic certification for this produce and organize sales on international markets. Company DEF is a Japanese company that has worked with communities on forest management in Japan and abroad and brings this expertise to the project. It will contribute to the forest inventories and building the capacity of the communities to implement the forest management plans. University KLM has advanced remote sensing and GIS facilities and expertise. It will contribute by developing the reference emissions level and will monitor deforestation and degradation after the project

start to monitor emissions displacement, calculate project net emissions, and reassess the reference emissions level and displacement belt.

- *Explain how Japan contributes to the implementation of the project (e.g. financial support, technological inputs, training, etc.).*

B. Application of the approved methodology(ies)

B.1. Methodology(ies) applied to the proposed JCM project

Approved methodology No.	XXX
Version number	XXX
Approved methodology No.	
Version number	
Approved methodology No.	
Version number	

- *Provide the number and version of the approved methodology(ies) applied to the proposed JCM project.*

B.2. Explanation of how the project meets eligibility criteria of the approved methodology(ies)

Eligibility criteria	Descriptions specified in the methodology	Explanation of compliance with criterion
Criterion 1	The main drivers of deforestation and forest degradation are conversion for agriculture and forest fire.	The main drivers of deforestation and forest degradation in the reference region, as observed through the application of remote sensing and GIS, and through local consultations, are conversion for agriculture and forest fire (see above). Degradation is also occurring because of over-extraction of timber and fuelwood for local use, but as a conservative measure is excluded from the project accounting.
Criterion 2	The project area does not include forest on peat soil. Peat is defined as organic soil with at least 65% organic matter and a minimum thickness of 50 cm	No peat soils have been mapped in province XYZ (Reference EEE) and none were detected in the project area during ground observations.
Criterion 3	Illegal logging to supply regional, national or international markets is not taking place.	There is no evidence (either from literature, media, local consultations or remote sensing and GIS analysis) of a significant volume of illegal logging in the reference area to supply regional, national or international markets. The road infrastructure is poor, making it difficult to transfer timber from the forests. Transportation routes are also closely monitored by the state government, making it difficult for anyone to transport large volumes

		of timber.
Criterion 4	Agricultural intensification activities do not involve large numbers of livestock or the application of inorganic fertilizers.	Stocking rearing will not be included as an agricultural intensification activity. Crop management practices that minimize emissions, such as conservation tillage, composting and no burning of farm residues, will be employed.
Criterion 5	The historic pattern of deforestation is mosaic.	A mosaic pattern of deforestation can be observed around the project area over the reference period. The image below displays deforested areas in the vicinity of the project area over the reference period in pink. See annex for details. 
Criterion 6	N/A	
Criterion 7	N/A	
Criterion 8	N/A	
Criterion 9	N/A	
Criterion 10	N/A	

- *Copy all descriptions specified in the approved methodology(ies) for each criterion.*
- *Provide a comprehensive explanation supported by detailed project information of how the project meets each eligibility criterion.*
- *Details may be provided in the annex.*

C. Calculation of emission reductions

C.1. Identification of all carbon pools and GHG sources relevant to the JCM project

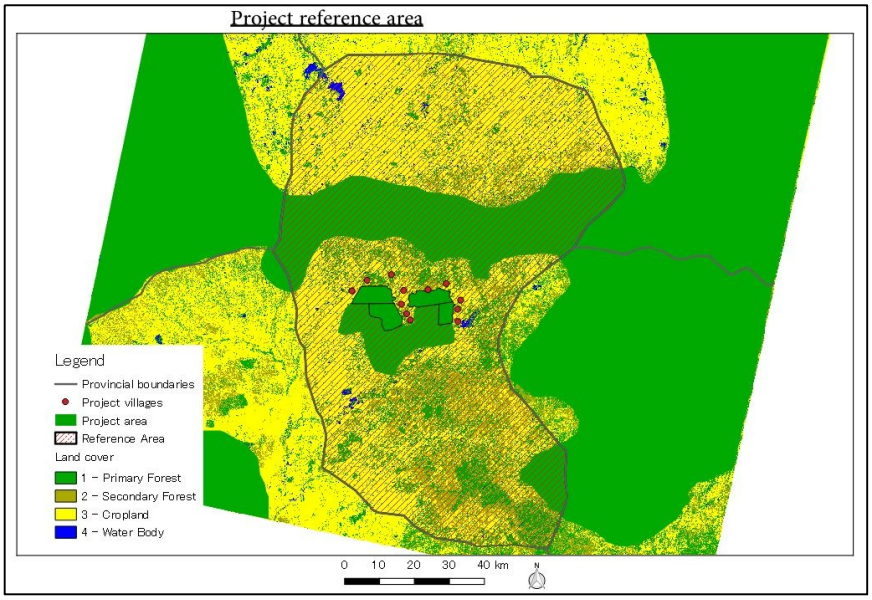
Carbon pools and GHG sources listed in the applied methodology		Included / excluded (Y/N)	Justification of inclusion or exclusion
Project reference level			
Carbon pools	Above ground biomass	Y	Required by methodology. Accounts for about 65% of total forest carbon stock in lowland evergreen forest in country XYZ (Reference: FFF). Major loss in reference scenario.
	Below ground biomass	Y	Required by methodology. Accounts for about 20% of total forest carbon stock (Reference: FFF). Major loss in reference scenario.

	Deadwood	Y	Required by methodology. Lying and standing deadwood account for about 10% of total forest carbon stock (Reference: FFF). Major loss in reference scenario.
	Litter	N	Not required by methodology.
	Soil organic carbon	N	Not required by methodology.
GHG sources	CH_4 in biomass burning	Y	Required by methodology.
	N_2O in biomass burning	Y	Required by methodology.
Project net emissions			
Carbon pools	Above ground biomass	Y	Required by methodology.
	Below ground biomass	Y	Required by methodology.
	Dead wood	Y	Required by methodology.
	Litter	N	Not required by methodology.
	Soil organic carbon	N	Not required by methodology.
GHG sources	CH_4 in biomass burning	Y	Required by methodology.
	N_2O in biomass burning	Y	Required by methodology.
	CO_2 in combustion of fossil fuels	Y	Required by methodology. Emissions anticipated from use of fuel for transportation of agricultural inputs and organic produce.

- *List all carbon pools and GHG sources covered in the applied methodology(ies).*
- *Identify whether each carbon pool and GHG source is included in the calculation of emission reductions. Justify the inclusion or exclusion of each pool and source.*
- *Carbon pools and GHG sources can be excluded if their exclusion leads to conservative estimates of the emission reductions.*

C.2. Establishment of project reference level

Reference area and period

Map	
Total size	970,996 ha.
Justification	The requirements for the reference area of the applied methodology are "The reference area is similar to the project area regarding the drivers of deforestation and/or forest degradation, landscape configuration, socio-economic and cultural conditions." Drivers of deforestation and/or forest degradation All forest in the reference region and project area is pemanent forest estate. There are no protected areas, logging concessions or land development concessions in the province. Forest clearance in the project area and reference area is the result of local and migrant communities clearing forest for agriculture and forest fires. Road access to the forest may be slightly higher for the project area than average accessibility for the reference region. The population density around the project area is similar to other rural areas in the reference region. Landscape configuration The elevation and slope in the reference region and the project area are within 8%. The soil types are similar, consisting mostly of Acrisols and Leptosols. Socio-economic and cultural conditions The primary rural activity across the province is smallholder agriculture for subsistence and supplying local markets. There are no economic activities that concentrate forest disturbance or clearance in specific areas. Migrant communities moving into the area are settling across the province, mostly along road links, with no noticeable concentrations in particular areas. Relative size The provincial boundaries of province XYZ were selected as the boundaries of the reference area. The reference area is thus 58 times larger than the project area. Further details are provided in the annex.
Period	2001-2015

- *Provide a map displaying the geographical boundaries of the reference area and the project area as well as other geographical information that aids comprehension of the reference area location. The accuracy of imagery analyses of land use classification is 80 percent or higher.*
- *Provide the total size of the reference area in hectares.*
- *Explain how the reference area is similar to the project area regarding drivers of deforestation and/or forest degradation, landscape configuration, and socio-economic and cultural conditions. List any additional requirements for the reference area set by the applied methodology(ies) and explain how the reference area meets these requirements.*
- *The reference period dates back at least 10 years from the start of the project and, if the applied methodology/ies sets a maximum date back period, it must not exceed the maximum date back period.*

Approach, procedure and data to establish the project reference level

Approach and procedure	Carbon stock change and GHG emissions for each period (RL_y) is calculated using Equation 1: $RL_y = \Delta CS_{ref\,y} * 44/12 + L_{fire\_ref\,y.}$ Carbon stock change at year *y* is projected using Equation 2: $\Delta CS_{ref\,y} = \Sigma (C_{yri} - C_{yri+1}) / \Sigma (yr_{i+1} - yr_i)$ and Equation 3: $C_{yr} = \Sigma C_{i,j,yr} = \Sigma (A_{i,yr} * EF_{i,j})$. Carbon stock during the reference period was calculated for 6 points in time. 6 classified land cover maps were generated from Landsat images for the reference period using a GIS. All classified images were classified with accuracy of greater than 90%. Example of classification report, Dec. 2015: Image LC81270502015342LGN00

Class	**Area (ha)**	**Percentage %**
Primary forest	263,085	27.1
Secondary forest	233,169	24.0
Cropland	462,658	47.6
Water bodies	12,084	1.2
Totals	**970,996**	**100.0**

Carbon stock was estimated for each of the 6 years from the area of each land cover stratum and the associated emissions factor, using default values. For the "in-between" years, carbon stock change across each interval was allocated equally between the years, assuming a linear rate of deforestation and degradation. Following this procedure, carbon stock was estimated for each of the 15 years in the reference period.

In line with the methodology, the interval with the highest change in carbon stock (2007-2009) was excluded from the calculation of $RL_{y.}$

CH4 and N2O emissions from forest fires are projected using Equation 4:

$L_{fire\_ref,y} = \Sigma_{yr} L_{fire\_ref,yr} / nyr$ and Equation 5: $L_{fire\_ref,y} = AB_{i,yr} * MB_i * C_f * G_{ef} * 10^{-3} *$ GWP.

Burnt area ($AB_{i,yr}$) for each period was calculated by identifying fire scars using the same Landsat images as were used for the carbon stock data. Fire scars are spectrally and visually distinct and can thus be identified by classification algorithms. Burnt area is considered a transition land cover, so was reclassified either as forest land or cropland. $L_{fire\_ref\,y}$ was calculated as the average annual emissions from forest fires over the reference period using all 6 Landsat images.

A complete description of the procedures (including image pre-processing, classification and accuracy assessment), results and quality controls for the establishment of the reference level is provided in the annex.

Data

Remote sensing data used (parameters $A_{i,yr}$ $AB_{i,yr}$)

Source	Type	Resolution	Acquisition date	Justification
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	Cloud cover < 15% for all images. All images from same season.
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	
USGS GLOVIS	Satellite, Multispectral	30 m	XX/XX/XXXX	

Non-remote sensing geographical and spatial data (parameter DE_y)

Map	Type	Source	Minimum mapping unit
Location of villages and settlements	Shapefile	Dept. of Geography	< 30 m
Road Maps	Shapefile	Dept. of Geography; Open Stree Map, https://www.openstreetmap.org/#map=5/51.500/-0.100	< 30 m
Provincial boundaries	Shapefile	Dept. of Geography	< 30 m

Emissions factors

Parameter	Value	Source	Justification
Emission factor (carbon stock per	200 tC ha^{-1}	Reference: 2006 IPCC	The value is more conservative than other estimates for similar

	hectare) in above ground biomass in primary forest, $EF_{1,1}$		Guidelines Vol.4 (Table 2.2, 2.3).	forest types (Reference: GGG, HHH). As a pilot exercise, 10 sample plots were established and measured in the project area. The average carbon stock in above ground biomass from these plots was 230±9 (1 std. dev.) tC ha. This is higher than the IPCC default, despite degradation due to overharvesting of fuelwood and timber. The IPCC default was selected as a conservative measure. Details provided in annex.
	Emission factor (carbon stock per hectare) in above ground biomass in secondary forest, $EF_{2,1}$	100 tC ha^{-1}	Reference: 2006 IPCC Guidelines Vol.4 (Table 2.2, 2.3).	2006 IPCC Guidelines default is more conservative than found in other studies (Reference GGG, Reference HHH).
	Emission factor (carbon stock per hectare) in above ground biomass in cropland, $EF_{4,1}$	30 tC ha^{-1}	Reference: 2006 IPCC Guidelines Vol.4 (Table 2.2, 2.3).	No values from local or regional studies available.
	Ratio to below-ground biomass of all types of forest, *RAtoB*	37.0	Reference: 2006 IPCC Guidelines Vol.4 (Table 2.2, 2.3).	Destructive sampling under one study in country XYZ produced a slightly higher but nevertheless comparable root-shoot ratio (Reference III).
Relationship with national or sub-national reference levels	N/A			

- *Describe the approach and procedure used to establish the project reference level in line with "4. Concepts for REDD-plus in the JCM" in "Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries" and the applied methodology(ies).*
- *Provide information on the data used to establish the project reference level, including parameters, values, sources and justification.*
- *Details may be provided in the Annex.*

C.3. Estimation of project net emissions

Estimation of project net emissions (excluding displaced emissions)

Project net emissions at year y during the monitoring period are estimated using Equation 6:

$PE_y = \Delta CS_{PJ,y} * 44/12 + L_{fire\_PJ,y} + E_{energy,PJ,y} + DE_y$

Carbon stock change at year *y* ($\Delta CS_{PJ,y}$) is determined according to the projected land use transitions in the project area in the absence of the project and the effectiveness of project activities.

Land cover transitions

The two land cover transitions projected for the project area are transition from primary forest to cropland and from primary forest to secondary forest. The ratio of these two transitions in the project area is taken from the average ratio in the reference region during the reference period, i.e. primary forest to cropland = 0.4 primary forest to secondary forest = 0.6.

Effectiveness of project activities

Conversion of primary forest to cropland

The activities to stop the transition of primary forest to cropland in the project area are anticipated to be 100 per cent effective from Year 1. Establishment of the community forests, implementation of the Community Forest Management Plans and patrols are expected to stop all encroachment in the project area.

Conversion of primary forest to secondary forest

Conversion of primary to secondary forest occurs when primary forests are destroyed by forest fires and replaced by naturally regenerated secondary forest. The implementation of forest management plans and the establishment of voluntary fire brigades are expected to gradually reduce forest fires in the project area, starting at 10% reduction in Year 1, and reaching a maximum of 50% by Year 5. All burnt forests are assumed to be replaced by secondary forest.

Amount of CO_2 emissions from energy use

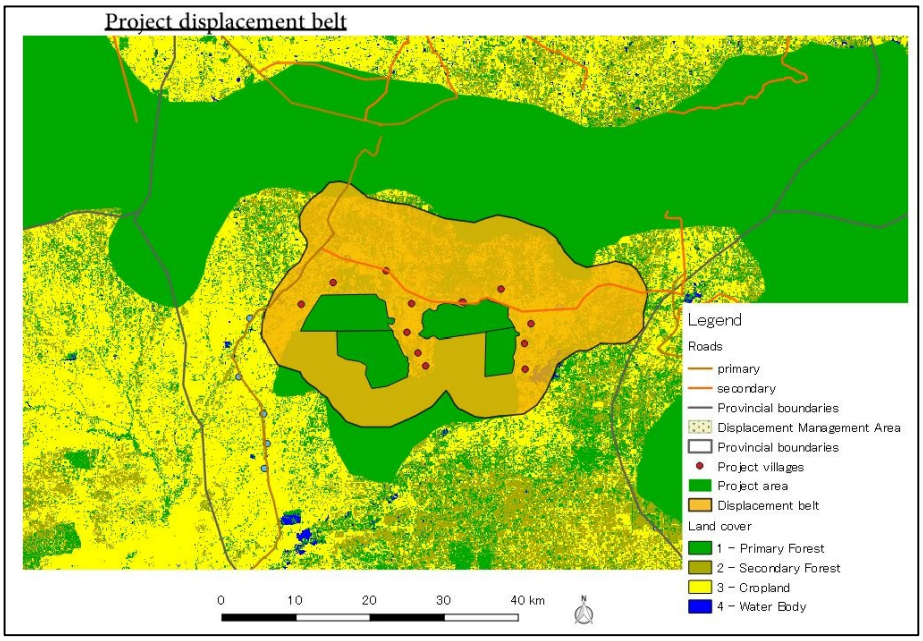
Amount of CO_2 emissions from energy use is calculated using Equation 11: $E_{energy,PJ,p} = LC_y * CC * ODU * 44/12$. It is assumed that on average 600 litres of automotive fuel would be used per month for transporting equipment and produce to and from the organic farms. Complete details for estimation of project net emissions are provided in the annex.

- *Describe the procedures for the estimation of project net emissions (excluding displaced emissions) covering all carbon pools and GHG sources in line with the applied methodology(ies).*
- *Details may be provided in the Annex.*

Estimation of displaced emissions

Reasons for including / excluding displaced emissions	Displacement of emissions is included as it is anticipated that if the project is implemented the agents of deforestation (migrant and local communities) will clear forests in the surrounding area as they are seeking to open up more land for cropping. It is also anticipated that some hunters who are no longer able to hunt in the project area will move to other areas to hunt using fires.
Ways and means to estimate emissions displacement	Emissions displacement is estimated by assessing the potential for and likely extent of activity shifting. Local and migrant communities clearing forest for agriculture The expansion of croplands in the project area will not be permitted under the approved Community Forest Management Plans. It is anticipated that the introduction of certified organic farming will increase farmer net annual

	household revenues by 100-200%. However project and migrant communities denied access to the project area for agriculture may clear forest in other areas. The projected annual rate of clearance for agriculture in the project area based on the analysis of deforestation drivers and land use change in the reference area during the reference period is 31.1 ha/yr. Without the project, due to population growth this can be anticipated to increase by an additional 5 ha/year. It is assumed that 100% of the forest clearance in the project area would be displaced to other adjacent areas that lie within the displacement monitoring belt in the first year, but that this will decrease by 10% per year as the organic farming begins to provide additional income to farmers. With these assumptions, the total area of forest clearance displaced by the project in the first 5-year monitoring period is 159.4 ha. Forest fires Hunters who use fires and are denied access to the forest area are expected to move their hunting activities to the displacement monitoring belt. About half of the hunters are farmers in the project communities and are expected to stop their hunting using fires to focus on the certified organic agriculture. The other half of the hunters are from migrant communities and can be expected to move their hunting to other areas once the project is introduced. It is thus assumed that 50% of fires that would have been caused by hunters in the project area in the absence of the project are displaced. Timber and fuelwood for local use Carbon stock is expected to increase in the project area because the project is anticipated to reduce the extraction of timber and fuelwood to sustainable levels. Woodlots will be planted to reduce demand on the forest, but they cannot be harvested until Year 6. For the first 5-year monitoring period, it is assumed that 100% of the avoided emissions from overharvesting of timber and fuelwood will be displaced to the displacement belt. However, any increase in carbon stock in the project area from a reduction in the extraction of timber and fuelwood is excluded from the project accounting; hence displacement of this activity is also excluded from the accounting. The calculations to estimate displaced emissions and the results are provided in the annex.
Total size of displacement belt	121,837 ha

Map of the displacement belt	
Explanation for setting the boundaries of the displacement belt	Accessibility to the forest can have a significant impact on deforestation rates. Deforestation is likely to be higher in areas with road and track access than areas without such access. Therefore, to establishing the boundaries of the displacement belt a cost-weighted distance value was used around each project site, rather than a constant distance buffer. The boundary of the displacement belt was delineated by selecting a cost threshold below which displacement was expected to be likely. Data was obtained locally from community surveys to establish the thresholds. Travel in areas without roads and on tracks and paths is by foot or bicycle, with a travel speed of about 1.0 km/hr. Travel on roads is by bike or tractor and is about 5 km/hr. It was assumed that households are prepared to travel up to 5 km/day for their agriculture when travelling only by tracks and paths, and 15 km/day when travelling by roads. See annex for further details.

- *Give the reasons for including / not including displaced emissions in the estimation of project net emissions. Note that any decrease in carbon stocks and increase of GHG emission from outside of the project area that are reasonably attributable to the project activities are quantified and accounted as displaced net emissions, while any increase in carbon stocks and decrease of GHG emissions compared to the situation without the project outside the project area due to the project activities are excluded from the accounting.*
- *Describe the ways and means applied to estimate the displacement of emissions in line with the applied methodology(ies).*
- *When the applied methodology(ies) requires the establishment of a displacement belt to monitor displaced emissions, provide:*
  - *The total size of the displacement belt in hectares;*
  - *A map of the displacement belt;*
  - *The process for setting the boundaries of the displacement belt*
- *When the applied methodology(ies) do not require the establishment of a displacement belt, write "N/A" in the relevant cells.*
- *Details may be provided in the Annex.*

C.4. Discount factor for the risk of reversals

Applied discount factor (%)	30
Approach for setting the discount factor	Default set by applied methodology.

- *Provide the discount factor used to account for the risk of reversals.*
- *Explain the approach for setting the discount factor in line with the applied methodology(ies).*
- *Details may be provided in the Annex.*

C.5. Ex ante estimation of emission reductions

Year	Estimated Project Reference Level (tCO_2e) *A*	Estimated Project Net Emissions (tCO_2e) *B*	Estimated Emission Reductions (tCO_2e) *C = A – B*	Estimated Emission Reductions to be Credited (tCO_2e) *D = C * (1-Discount factor)*
2018	112,836	45,161	67,675	47,373
2019	112,836	45,161	67,675	47,373
2020	112,836	45,161	67,675	47,373
2021	112,836	45,161	67,675	47,373
2022	112,836	45,161	67,675	47,373
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				
Total (tCO_2e)	564,180	225,805	338,375	236,863

- *Summarize the results of the ex ante estimation of emission reductions for all years of the monitoring period using the table above.*
- *The table presents the aggregate emission reductions of the project. Separate tables for difference project components, if more than one, and each approved methodology that is applied, if more than one, should be provided in the Annex.*

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No.

- *Answer "YES" or "NO" depending on whether the proposed project is subject to an environmental impact assessment according to national or local regulations.*
- *If YES, provide the conclusions of the environmental impact assessment in the Annex.*
- *If relevant, this information may also be provided in the Safeguards Implementation Plan (SGIP) form.*

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

A provincial stakeholder workshop was held in province XYZ and was well attended by all the major stakeholders identified by the project (see Criterion (b) Safeguards Implementation Plan in SGIP). A number of questions were raised and answered. The agenda of the workshop, the participants list and a full record of the discussions can be requested from the project participants.

- *Describe the process by which comments from local stakeholders have been invited for the proposed project.*
- *If relevant, this information may also be provided in the Safeguards Implementation Plan (SGIP) form.*

E.2. Summary and consideration of comments received

Stakeholders	Comments received	Consideration of comments received
Traditional leaders from local communities	"It is important for our communities to manage the forests well for our future generations. We support the project idea." "Can we be confident that the organic agriculture will be successful?"	The project includes intensive scientific monitoring and adoption of proven methods and practices, which are expected to generate high yields of quality organic produce. As safeguards to ensure community net benefits, a small grants programme for community projects and a microfinance scheme for micro-enterprises in the project communities will be implemented.
Provincial Forest OfficeProvincial Forest Office	"The project idea is relevant to the provincial forest management and land use plans. It is important that the project supports country XYZ's forest policies and strategy."	Consultations with the Ministry of Forestry, Ministry of Environment and Department of Lands were conducted to ensure the project design is fully aligned with national policies and programmes. The records of these meetings can be requested from the project participants.
N/A		

- *Identify stakeholders that have made comments and provide a summary of these comments.*
- *Explain how due consideration has given to the comments received.*

F. References

AAA,
BBB,
CCC,
…

Provide a list of references used to support the descriptions in the PDD, if any.

Annex
(For sake of brevity, the annex of the example given above is not provided in these guidelines.)

- *Use appropriate numbering and subheadings for easy reference to the relevant sections of the PDD. Use a row for each section of the Annex. Additional rows may be added.*

Revision history of PDD		
Version	Date	Contents revised
01.0	DD/MM/YYYY	First edition

4.2. Developing a Monitoring Plan

25. Project participants develop before validation a monitoring plan using Monitoring Plan Sheet and Monitoring Structure Sheet in the corresponding Monitoring Spreadsheet of the methodology applied. The monitoring plan utilizes data and estimates from the National Forest Monitoring System or from any relevant sub-national monitoring system, as appropriate.
26. Project participants input estimated values for each parameter in the Monitoring Plan Sheet including those fixed ex ante for parameters not to be monitored.
27. Project participants also describe the following items for each parameter specified in the Monitoring Plan Sheet in line with the applied methodology(ies). Project participants may add detailed information specific to the proposed project to the contents given in the applied methodology.
    (a) Estimated values: Provide the estimated values of the parameter for the purpose of calculating emission reductions *ex ante*;
    (b) Monitoring option: Select an option from below;
        (i) Option A: Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications);
        (ii) Option B: Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices);
        (iii) Option C: Based on the actual measurement using measuring equipments (Data used: measured values).
    (c) Source of data: Provide the source of data used or to be used. Clearly indicate the type of data source (e.g. official statistics, surveys, measured value, etc.) and spatial level of data (e.g. local, regional, national, international), if applicable;
    (d) Measurement methods and procedures: Describe how the parameters are to be measured/calculated including Quality Assurance/Quality Control (hereinafter referred to as "QA/QC") procedures applied. If the parameter will be measured, describe the equipments to be used to measure it, including details on accuracy level, and calibration information (frequency, date of calibration and validity) in line with section 4.3 below;
    (e) Monitoring frequency: Describe the monitoring frequency (e.g. continuously, annually).
28. The project participants ensure that data monitored and required for verification and issuance be kept and archived electronically for two years after the final issuance of credits.

29. In the Monitoring Structure Sheet, the project participants describe the operational and management structure to be implemented in order to conduct monitoring. The project participants establish and clearly indicate the roles and responsibilities of personnel, institutional arrangements, and procedures for data collection, archiving and reporting.
30. The project participants appoint a person who is responsible for overall monitoring activity including preparation of the monitoring report, and managing and archiving of data. The responsible person for monitoring:
    (a) Ensures the quality of the monitoring report and the structure and procedure for producing such a document;
    (b) Appoints a person(s) responsible for managing monitoring points, when necessary, to collect data and maintain and control measuring instruments (including calibration/regular inspection) at monitoring points.

4.3. Preparing for actual measurement[1]

31. For monitoring of parameters under Option C (i.e. parameters monitored through actual measurement), the project participants determine the frequency of calibration following the paragraphs 32, 33 and 34 below, unless otherwise stated in the applied methodology, and describe the frequency in the Monitoring Plan Sheet in line with paragraph 27(d).
32. The monitoring for carbon pools under Option C should be conducted using a combination of remote sensing and ground-based survey(s). The best available technology, including novel satellite observation technologies, may be employed to build effective GHG monitoring systems.
33. The monitoring for carbon pools under Option C is implemented by people who have adequate relevant monitoring experience and qualifications. If any parts of the monitoring are conducted by people with less relevant experience, such as members of local communities, appropriate procedures for quality assurance and quality control are implemented.[2]

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[1] The following documents may be referred to in developing a monitoring plan and in conducting the monitoring,
" REDD-plus Cookbook: How to measure and monitor forest carbon," Forestry and Forest Products Research Institute, 2012: www.ffpri.affrc.go.jp/redd-rdc/ja/reference/cookbook.html
" A sourcebook of methods and procedures for monitoring and reporting anthropogenic greenhouse gas emissions and removals associated with deforestation, gains and losses of carbon stocks in forests remaining forests, and forestation", GOFC-GOLD, 2015: http://www.gofcgold.wur.nl/redd/sourcebook/GOFC-GOLD_Sourcebook.pdf

[2] The following guide may be referred to when engaging local communities in monitoring for REDD-plus projects under the JCM: "Community Based Forest Biomass Monitoring - Training of Trainers Manual," Institute for Global Environmental Strategies, 2014: https://pub.iges.or.jp/pub/community-based-forest-biomass-monitoring-0

<Example of a Monitoring Plan Sheet (Input Sheet)>

Monitoring Plan Sheet (Input Sheet) [Attachment to Project Design Document]

Table 1: Parameters to be monitored ex post

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$A_{i,y}$	Area of stratum (= land use type) *i* at year *ym* during monitoring period.	→*Table 1-a.*	ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery. QA/QC: Experts process images, with double-checks included in classification and accuracy assessment procedures.	Once every three years	Table 1-a is used for ex post monitoring.
(2)	$AB_{i,y}$	Area burnt in stratum (= land use type) *i* at year *ym* during monitoring period.	→*Table 1-a.*	ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery. QA/QC: Same as (1)	Once every three years	Table 1-a is used for ex post monitoring
(3)	$EF_{1,1}$	Emission factor (carbon stock per hectare) in above ground biomass in primary forest	200	$tC\ ha^{-1}$	Option C	Forest sampling	Forest sampling. QA/QC: Training of community teams; Remeasurement of 10% of plots; Check for anomalies at data entry.	Once every three years	
(4)	$EF_{1,2}$	Emission factor (carbon stock per hectare) of dead wood, all types of forest	14	$tC\ ha^{-1}$	Option C	Forest sampling	Forest sampling. Same as (3)	Once every three years	
(5)	LC_{ym}	Project fuel consumption during year *ym* during monitoring period.	→*Table 1-b.*	TJ	Option B	Project records.	Sum of fuel receipts. QA/QC: Duplicates of fuel receipts made and archived.	Once a year	Table 1-b is used for ex post monitoring
(6)	$DE_{CO2,ym}$	Displacement of net CO_2 emissions during year *ym* during monitoring period.	5,419	tCO_2e	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery. QA/QC: Same as (1)	Once every three years	
(7)	$DE_{fire,ym}$	Displacement of CH_4 and N_2O emissions during year *ym* during monitoring period.	450	tCO_2e	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery. QA/QC: Same as (1)	Once every three years	

Table 1-a. Area of stratum *i* and area burnt in stratum *i* at year *ym* during monitoring period

Year during the monitoring period	(1) Forest area (ha): $A_{i,y}$			(2) Burnt area (ha): $AB_{i,y}$		
	Primary forest	Secondary forest	Cropland	Primary forest	Secondary forest	Cropland
	$A_{1,y}$	$A_{2,y}$	$A_{3,y}$	$AB_{1,y}$	$AB_{2,y}$	$AB_{3,y}$
ym1	17,266	134	0	134	0	0
ym2	17,147	253	0	119	0	0
ym3	17,042	358	0	104	0	0
ym4	16,953	447	0	89	0	0
ym5	16,879	522	0	74	0	0

Table 1-b. Project fuel consumption

Year	(3) Project fuel consumption (TJ): LC_y
ymf1	
ymf2	
ymf3	
ymf4	
ymf5	

Table 2: Project-specific parameters to be fixed ex ante

(a)	(b)	(c)	(d)	(e)	(f)
Parameters	**Description of data**	**Estimated value**	**Units**	**Source of data**	**Other comments**
A_{RE}	Size of reference area	970,996	ha	Various. Related to the drivers of deforestation and/or forest degradation, landscape configuration, socio-economic and cultural conditions	
A_{PJ}	Size of project area	17,400	ha	Decided by project proponents	
A_{DB}	Size of displacement belt	121,837	ha	Various. Related to mobility of deforestation/degradation agents	
$A_{i,yr}$	Size of stratum (= land use type) *i* at year *yr during the reference period.*	*→Table 2-a.*	ha	USGS GLOVIS, Landsat imagery	
$AB_{i,yr}$	Size burnt in stratum (= land use type) *i* at year *yr during the reference period.*	*→Table 2-a.*	ha	USGS GLOVIS, Landsat imagery	
DF	Discount Factor	30	%		Default value is 30%

Table 2-a. Area of stratum *i* and area burnt in stratum *i* at year *yr* during reference period

Year during the reference period	(1) Forest area (ha): $A_{i,yr}$			(2) Burnt area (ha): $AB_{i,yr}$		
	Primary forest	Secondary forest	Cropland	Primary forest	Secondary forest	Cropland
	$A_{1,y}$	$A_{2,y}$	$A_{4,y}$	$AB_{1,y}$	$AB_{2,y}$	$AB_{4,y}$
2001	354,000	293,000	365,000	2,600	330	40,500
2002	350,333	290,667	368,667	2,600	330	40,500
2003	346,667	288,333	372,333	2,600	330	40,500
2004	343,000	286,000	376,000	2,300	660	41,700
2005	339,667	284,000	379,667	2,300	660	41,700
2006	336,333	282,000	383,333	2,300	660	41,700
2007	333,000	280,000	387,000	9,300	1,660	42,900
2008	322,333	272,667	398,333	9,300	1,660	42,900
2009	311,667	265,333	409,667	9,300	1,660	42,900
2010	301,000	258,000	421,000	5,600	1,330	46,700
2011	294,333	253,667	428,333	5,600	1,330	46,700
2012	287,667	249,333	435,667	5,600	1,330	46,700
2013	281,000	245,000	443,000	3,300	660	51,200
2014	275,000	241,000	449,333	3,300	660	51,200
2015	269,000	237,000	455,667	3,300	660	51,200

Table 3: Ex ante estimation of CO2 emission reductions

CO2 emission reductions	Units
236,863	tCO_2/p

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipment (Data used: commercial evidence such as invoices)
Option C	Based on actual measurement using measuring equipment (Data used: measured values)

- *For the "Parameters to be monitored ex post" (Table 1), provide information for each of the items as follows:*
  - *Parameter: Provide the parameters used in equations in the proposed methodology;*
  - *Description of data: Provide a clear and unambiguous description of the data underlying the parameter;*
  - *Estimated value: Provide the estimated value;*

- *Unit: Use the relevant International System Unit (for SI units, refer to <http://www.bipm.fr/enus/3_SI/si.html>)*
- *Monitoring option: Select option(s) from below. If appropriate, provide the order of priority and the conditions when the options are chosen.*
    - *Option A: Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications, IPCC Guidelines, etc.)*
    - *Option B: Based on the amount of a transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)*
    - *Option C: Based on actual measurement using measuring equipments, including equipment for remote-sensing and ground-based survey (Data used: measured values)*
- *Source of data: Provide a description of which data source should be used to determine the parameter. Clearly indicate how the values are to be selected and justified, for example, by explaining:*
    - *What types of sources are suitable (official statistics, expert judgment, proprietary data, IPCC Guidelines, commercial and scientific literature, etc.);*
    - *What spatial level of data is suitable (local, regional, national, international).*
- *Basic description of measurement methods and procedures: For option B and C, provide a short description of the measurement procedures or reference to appropriate standards. Provide complete descriptions of the measurement methods and procedures and QA/QC procedures in sections 2. Monitoring Procedures and 4. QA/QC, respectively, in the Monitoring Structure and Procedures Sheet.*
- *Monitoring frequency: Describe the frequency of monitoring (e.g. continuously, annually, etc.).*
- *Comments: Provide comments to elaborate the monitoring of each parameter not covered by the items above, when appropriate.*

- *Where applicable, adhere to the instructions provided above when completing the table "Parameters to be fixed ex ante" (Table 2). Data that is determined only once and remains fixed should be considered under "I. Data and parameters fixed ex ante" in the applied methodology.*

<Example of a Monitoring Plan Sheet (Calculation Process Sheet)>

Monitoring Plan Sheet (Calculation Process Sheet)

[Attachment to Project Design Document]

1. Calculations for project emission reductions to be credited	Pool / Sources	Value	Units	Parameter
Project emission reductions to be credited during the period *p*		236,863	tCO2e	$ER_{credt,p}$
2. Basic data of the project				
Size of reference area	Carbon stock and biomass burning	970,996	ha	A_{RE}
Size of project area	Carbon stock and biomass burning	17,400	ha	A_{PJ}
Size of displacement belt	Carbon stock and biomass burning	121,837	ha	A_{DB}
Monitoring start date		2017		Y1
Monitoring end date		2021		Y5
3. Selected default values				
Emission factor (carbon stock per hectare) in above ground biomass in primary forest	Above ground biomass	200	tC ha^{-1}	$EF_{1,1}$
Emission factor (carbon stock per hectare) in above ground biomass in secondary forest	Above ground biomass	100	tC ha^{-1}	$EF_{2,1}$
Emission factor (carbon stock per hectare) in above ground biomass in cropland	Above ground biomass	30	tC ha^{-1}	$EF_{3,1}$
Ratio to below-ground biomass of all types of forest	Below-ground biomass	37.0	%	*RAtoB*
Emission factor (carbon stock per hectare) of dead wood, all types of forest	Dead wood	14	tC ha^{-1}	$EF_{1,2}$
Mass of fuel available for combustion * Combustion factor in primary forest	Biomass burning	119.6 * 0.36	t ha^{-1}	MB_1 * *Cf*
Mass of fuel available for combustion * Combustion factor in secondary forest	Biomass burning	42.2 * 0.55	t ha^{-1}	MB_2 * *Cf*
Mass of fuel available for combustion * Combustion factor in cropland	Biomass burning	5.5 * 0.80	t ha^{-1}	MB_4 * *Cf*
Emission factor for forest fires (CH_4)	Biomass burning	6.8	g kg-dm $burnt^{-1}$	*Gef-CH4*
Emission factor for forest fires (N_2O)	Biomass burning	0.2	g kg-dm $burnt^{-1}$	*Gef-N2O*
Global Warming Potential (CH_4)	Biomass burning	25	-	GWP
Global Warming Potential (N_2O)	Biomass burning	298	-	GWP
Carbon content of oil (Gasoline)	Combustion of fossil fuels from transport and machinery use	18.7	kt-C TJ^{-1}	CC
Oxidized during use factor	Combustion of fossil fuels from transport and machinery use	1.0	-	ODU
4. Calculations for project reference level				
Project reference level at year *y*		112,836	tCO2e	RL_y
Monitoring year during reference period				
2001				*yr1*
2002				*yr2*
2003				*yr3*
2004				*yr4*
2005				*yr5*
2006				*yr6*
2007				*yr7*
2008				*yr8*
2009				*yr9*
2010				*yr10*
2011				*yr11*
2012				*yr12*
2013				*yr13*
2014				*yr14*
2015				*yr15*

Carbon stock change at year *y*		30,072	tC	$\Delta CS_{ref\,y}$
Carbon stock at *yr1*		111,050,000	tC	
Primary forest	Carbon stock	354,000	ha	$A_{1,yr1}$
Secondary forest	Carbon stock	293,000	ha	$A_{2,yr1}$
Cropland	Carbon stock	365,000	ha	$A_{3,yr1}$
Carbon stock at year *yr2*		110,193,310		
Primary forest	Carbon stock	350,333	ha	$A_{1,yr2}$
Secondary forest	Carbon stock	290,667	ha	$A_{2,yr2}$
Cropland	Carbon stock	368,667	ha	$A_{3,yr2}$
Carbon stock at year *yr3*		109,336,390		
Primary forest	Carbon stock	346,667	ha	$A_{1,yr3}$
Secondary forest	Carbon stock	288,333	ha	$A_{2,yr3}$
Cropland	Carbon stock	372,333	ha	$A_{3,yr3}$
Carbon stock at year *yr4*		108,480,000		
Primary forest	Carbon stock	343,000	ha	$A_{1,yr4}$
Secondary forest	Carbon stock	286,000	ha	$A_{2,yr4}$
Cropland	Carbon stock	376,000	ha	$A_{3,yr4}$
Carbon stock at year *yr5*		107,723,410		
Primary forest	Carbon stock	339,667	ha	$A_{1,yr5}$
Secondary forest	Carbon stock	284,000	ha	$A_{2,yr5}$
Cropland	Carbon stock	379,667	ha	$A_{3,yr5}$
Carbon stock at year *yr6*		106,996,590		
Primary forest	Carbon stock	336,333	ha	$A_{1,yr6}$
Secondary forest	Carbon stock	282,000	ha	$A_{2,yr6}$
Cropland	Carbon stock	383,333	ha	$A_{3,yr6}$
Carbon stock at year *yr7*		106,210,000		
Primary forest	Carbon stock	333,000	ha	$A_{1,yr7}$
Secondary forest	Carbon stock	280,000	ha	$A_{2,yr7}$
Cropland	Carbon stock	387,000	ha	$A_{3,yr7}$
Carbon stock at year *yr8*		103,683,290		
Primary forest	Carbon stock	322,333	ha	$A_{1,yr8}$
Secondary forest	Carbon stock	272,667	ha	$A_{2,yr8}$
Cropland	Carbon stock	398,333	ha	$A_{3,yr8}$
Carbon stock at year *yr9*		101,156,710		
Primary forest	Carbon stock	311,667	ha	$A_{1,yr9}$
Secondary forest	Carbon stock	265,333	ha	$A_{2,yr9}$
Cropland	Carbon stock	409,667	ha	$A_{3,yr9}$
Carbon stock at year *yr10*		98,630,000		
Primary forest	Carbon stock	301,000	ha	$A_{1,yr10}$
Secondary forest	Carbon stock	258,000	ha	$A_{2,yr10}$
Cropland	Carbon stock	421,000	ha	$A_{3,yr10}$

Carbon stock at year *yr11*			97,083,290		
	Primary forest	Carbon stock	294,333	ha	$A_{1,yr11}$
	Secondary forest	Carbon stock	253,667	ha	$A_{2,yr11}$
	Cropland	Carbon stock	428,333	ha	$A_{3,yr11}$
Carbon stock at year *yr12*			95,536,710		
	Primary forest	Carbon stock	287,667	ha	$A_{1,yr12}$
	Secondary forest	Carbon stock	249,333	ha	$A_{2,yr12}$
	Cropland	Carbon stock	435,667	ha	$A_{3,yr12}$
Carbon stock at year *yr13*			93,990,000		
	Primary forest	Carbon stock	281,000	ha	$A_{1,yr13}$
	Secondary forest	Carbon stock	245,000	ha	$A_{2,yr13}$
	Cropland	Carbon stock	443,000	ha	$A_{3,yr13}$
Carbon stock at year *yr14*			92,579,990		
	Primary forest	Carbon stock	275,000	ha	$A_{1,yr14}$
	Secondary forest	Carbon stock	241,000	ha	$A_{2,yr14}$
	Cropland	Carbon stock	449,333	ha	$A_{3,yr14}$
Carbon stock at year *yr15*			91,170,010		
	Primary forest	Carbon stock	269,000	ha	$A_{1,yr15}$
	Secondary forest	Carbon stock	237,000	ha	$A_{2,yr15}$
	Cropland	Carbon stock	455,667	ha	$A_{3,yr15}$
Non-CO_2 emissions from forest fires at year *y*			2,573	tCO2e	$L_{fire\_ref\,y}$
Non-CO_2 emission at year *yr1*			68,376	tCO2e	
	Area of burnt primary forest at *yr1*	Biomass burning	2,600	ha	
	Area of burnt secondary forest at *yr1*	Biomass burning	330	ha	
	Area of burnt cropland at *yr1*	Biomass burning	45,000	ha	
Non-CO_2 emission at year *yr2*			68,376	tCO2e	
	Area of burnt primary forest at *yr2*	Biomass burning	2,600	ha	
	Area of burnt secondary forest at *yr2*	Biomass burning	330	ha	
	Area of burnt cropland at *yr2*	Biomass burning	45,000	ha	
Non-CO_2 emission at year *yr3*			68,376	tCO2e	
	Area of burnt primary forest at *yr3*	Biomass burning	2,600	ha	
	Area of burnt secondary forest at *yr3*	Biomass burning	330	ha	
	Area of burnt cropland at *yr3*	Biomass burning	45,000	ha	
Non-CO_2 emission at year *yr4*			68,381	tCO2e	
	Area of burnt primary forest at *yr4*	Biomass burning	2,300	ha	
	Area of burnt secondary forest at *yr4*	Biomass burning	660	ha	
	Area of burnt cropland at *yr4*	Biomass burning	41,700	ha	
Non-CO_2 emission at year *yr5*			68,381	tCO2e	
	Area of burnt primary forest at *yr5*	Biomass burning	2,300	ha	
	Area of burnt secondary forest at *yr5*	Biomass burning	660	ha	
	Area of burnt cropland at *yr5*	Biomass burning	41,700	ha	

Non-CO_2 emission at year *yr6*		68,381	tCO2e	
Area of burnt primary forest at *yr6*	Biomass burning	2,300	ha	
Area of burnt secondary forest at *yr6*	Biomass burning	660	ha	
Area of burnt cropland at *yr6*	Biomass burning	41,700	ha	
Non-CO_2 emission at year *yr7*		144,122	tCO2e	
Area of burnt primary forest at *yr7*	Biomass burning	9,300	ha	
Area of burnt secondary forest at *yr7*	Biomass burning	1,660	ha	
Area of burnt cropland at *yr7*	Biomass burning	42,900	ha	
Non-CO_2 emission at year *yr8*		144,122	tCO2e	
Area of burnt primary forest at *yr8*	Biomass burning	9,300	ha	
Area of burnt secondary forest at *yr8*	Biomass burning	1,660	ha	
Area of burnt cropland at *yr8*	Biomass burning	42,900	ha	
Non-CO_2 emission at year *yr9*		144,122	tCO2e	
Area of burnt primary forest at *yr9*	Biomass burning	9,300	ha	
Area of burnt secondary forest at *yr9*	Biomass burning	1,660	ha	
Area of burnt cropland at *yr9*	Biomass burning	42,900	ha	
Non-CO_2 emission at year *yr10*		109,625	tCO2e	
Area of burnt primary forest at *yr10*	Biomass burning	5,600	ha	
Area of burnt secondary forest at *yr10*	Biomass burning	1,330	ha	
Area of burnt cropland at *yr10*	Biomass burning	46,700	ha	
Non-CO_2 emission at year *yr11*		109,625	tCO2e	
Area of burnt primary forest at *yr11*	Biomass burning	5,600	ha	
Area of burnt secondary forest at *yr11*	Biomass burning	1,330	ha	
Area of burnt cropland at *yr11*	Biomass burning	46,700	ha	
Non-CO_2 emission at year *yr12*		109,625	tCO2e	
Area of burnt primary forest at *yr12*	Biomass burning	5,600	ha	
Area of burnt secondary forest at *yr12*	Biomass burning	1,330	ha	
Area of burnt cropland at *yr12*	Biomass burning	46,700	ha	
Non-CO_2 emission at year *yr13*		87,864	tCO2e	
Area of burnt primary forest at *yr13*	Biomass burning	3,300	ha	
Area of burnt secondary forest at *yr13*	Biomass burning	660	ha	
Area of burnt cropland at *yr13*	Biomass burning	51,200	ha	
Non-CO_2 emission at year *yr14*		87,864	tCO2e	
Area of burnt primary forest at *yr14*	Biomass burning	3,300	ha	
Area of burnt secondary forest at *yr14*	Biomass burning	660	ha	
Area of burnt cropland at *yr14*	Biomass burning	51,200	ha	
Non-CO_2 emission at year *yr15*		87,864	tCO2e	
Area of burnt primary forest at *yr15*	Biomass burning	3,300	ha	
Area of burnt secondary forest at *yr15*	Biomass burning	660	ha	
Area of burnt cropland at *yr15*	Biomass burning	51,200	ha	

5. Calculations of the project net emissions

Project net emissions during year *y*		45,161	tCO2e	PE_y
Monitoring year during first monitoring period				
2017				*ym1*
2018				*ym2*
2019				*ym3*

2020					*ym4*
2021					*ym5*
Carbon stock changes at year *y*			10,430	tC	$\Delta CS_{PJ,y}$
Carbon stock at year *ym1*			3,466,590	tC	
	Area of primary forest at year *ym1*	Carbon stock	17,266	ha	
	Area of secondary forest at year *ym1*	Carbon stock	134	ha	
	Area of cropland at year *ym1*	Carbon stock	0	ha	
Carbon stock at year *ym2*			3,454,670	tC	
	Area of primary forest at year *ym2*	Carbon stock	17,147	ha	
	Area of secondary forest at year *ym2*	Carbon stock	253	ha	
	Area of cropland at year *ym2*	Carbon stock	0	ha	
Carbon stock at year *ym3*			3,444,240	tC	
	Area of primary forest at year *ym3*	Carbon stock	17,042	ha	
	Area of secondary forest at year *ym3*	Carbon stock	358	ha	
	Area of cropland at year *ym3*	Carbon stock	0	ha	
Carbon stock at year *ym4*			3,435,300	tC	
	Area of primary forest at year *ym4*	Carbon stock	16,953	ha	
	Area of secondary forest at year *ym4*	Carbon stock	447	ha	
	Area of cropland at year *ym4*	Carbon stock	0	ha	
Carbon stock at year *ym5*			3,427,850	tC	
	Area of primary forest at year *ym5*	Carbon stock	16,879	ha	
	Area of secondary forest at year *ym5*	Carbon stock	522	ha	
	Area of cropland at year *ym5*	Carbon stock	0	ha	
Non-CO_2 emissions from forest fires at year *y*			1,031	tCO2e	$L_{fire\_PJ\,y}$
Non-CO_2 emission at year *ym1*			1,326	tCO2e	
	Area of burnt primary forest at year *ym1*	Biomass burning	134	ha	
	Area of burnt secondary forest at year *ym1*	Biomass burning	0	ha	
	Area of burnt cropland at year *ym1*	Biomass burning	0	ha	
Non-CO_2 emission at year *ym2*			1,178	tCO2e	
	Area of burnt primary forest at year *ym2*	Biomass burning	119	ha	
	Area of burnt secondary forest at year *ym2*	Biomass burning	0	ha	
	Area of burnt cropland at year *ym2*	Biomass burning	0	ha	
Non-CO_2 emission at year *ym3*			1,031	tCO2e	
	Area of burnt primary forest at year *ym3*	Biomass burning	104	ha	
	Area of burnt secondary forest at year *ym3*	Biomass burning	0	ha	
	Area of burnt cropland at year *ym3*	Biomass burning	0	ha	
Non-CO_2 emission at year *ym4*			884	tCO2e	
	Area of burnt primary forest at year *ym4*	Biomass burning	89	ha	
	Area of burnt secondary forest at year *ym4*	Biomass burning	0	ha	
	Area of burnt cropland at year *ym4*	Biomass burning	0	ha	
Non-CO_2 emission at year *ym5*			736	tCO2e	
	Area of burnt primary forest at year *ym5*	Biomass burning	74	ha	

Area of burnt secondary forest at year *ym5*	Biomass burning	0	ha	
Area of burnt cropland at year *ym5*	Biomass burning	0	ha	
CO_2 emissions from transport and machinery use during year *y*		17.4	tC02e	$E_{energy,PJ,y}$
Consumption of oil during year *y*		0.25	TJ	LC_y
Carbon content of oil (Gasoline)	Combustion of fossil fuels from transport and machinery use	18.7	kt-C TJ^{-1}	CC
Oxidized during use factor	Combustion of fossil fuels from transport and machinery use	1	-	ODU
Displacement of net emissions during the period *y*		5,869	tCO_2e	DE_y
Displacement of CO2 emissions during monitoring year *ym*	Carbon stock	5,419	tCO_2	$DE_{CO2,ym}$
Displacement of CH4 and N2O emissions during year monitoring *ym* due to forest fires	Biomass burning	450	tCO_2e	$DE_{fire,ym}$
5. Calculation of discount factor				
Discount factor	N/A	30	%	

<Example of a Monitoring Structure and Procedures Sheet>

Monitoring Structure and Procedures Sheet [Attachment to Project Design Document]

1. Monitoring Participants

Responsible organizations for implementing the methods and procedures for each data

Description of data	Basic description of measurement methods and procedures	Organizations involved
Area of stratum (= land use type) *i* at year *ym* during monitoring period.	Analyzing multispectral optical satellite imagery	Company DEF, Forest Department
Area burnt in stratum (= land use type) *i* at year *ym* during monitoring period.	Analyzing multispectral optical satellite imagery	Company DEF, Forest Department
Emission factor (carbon stock per hectare) in above ground biomass in primary forest	Forest sampling	NGO ABC, Company DEF, Forest Department, project communities
Emission factor (carbon stock per hectare) of dead wood, all types of forest	Forest sampling	NGO ABC, Company DEF, Forest Department, project communities
Project fuel consumption during year *ym* during monitoring period.	Reviewing project records	Company DEF
Displacement of net CO_2 emissions during year *ym* during	Analyzing multispectral optical satellite imagery	Company DEF, Forest Department

monitoring period.		
Displacement of CH_4 and N_2O emissions during year *ym* during monitoring period.	Analyzing multispectral optical satellite imagery	Company DEF, Forest Department

- *When each data when monitoring options B or C are applied, copy (c) Description of data and (h) Measurement methods and procedures from Table 1: Parameters to be monitored ex post in Monitoring Plan Sheet (Input Sheet) and paste the information into the first two columns of the table above.*
- *Identify the organizations responsible for implementing the methods and procedures for each data.*
- *Additional rows may be added.*

Responsible personnel and their roles

Personnel	Role(s)
Forest Division Head, Company DEF	Responsible for overall monitoring and monitoring report
Senior Lecturer, Geography Department, University KLM	Responsible for remote sensing and GIS analysis
Forest Division Head, Company DEF	Responsible for forest inventory, including training and supervising community forest inventory teams, and analysis of fuel consumption
International Co-operation Division Chief, Department of Forestry	Supporting remote sensing and forest inventory
Executive Director, NGO ABC	Supporting training and organization of community inventory teams

- *Provide the positions of the individuals responsible for the monitoring and describe their roles. When teams are involved, e.g. communities involved in forest inventory, provide the position of the individual responsible for managing or supervising the monitoring.*
- *Additional rows may be added.*

2. Monitoring procedures

Area of stratum (= land use type) *i* at year *ym* during monitoring period. Area burnt in stratum (= land use type) *i* at year *ym* during monitoring period. Displacement of net CO_2 emissions during year *ym* during monitoring period. Displacement of CH_4 and N_2O emissions during year *ym* during monitoring period.
The area of each land use stratum and burnt areas will be monitored through analysis of Landsat images, using the same procedures for establishing the reference level. Displacement of net CO_2, CH_4 and N_2O emissions will be monitored in the same manner.
Project fuel consumption during year *ym* during monitoring period.
Monitoring will be conducted using purchase receipts.
Emission factor (carbon stock per hectare) in above ground biomass in primary forest. Emission factor (carbon stock per hectare) of dead wood, all types of forest
A forest inventory using permanent sample plots (PSPs) will be conducted in year 1 of the project and repeated every 3 years. In line with the applied methodology, the number of sample plots will be determined to provide estimates of the net change in carbon stocks to within 10 per cent of the true value of the mean at the 95 per cent confidence level. A pilot survey using 10 PSPs has already been undertaken. From the pilot survey data, a total of 110 PSPs was calculated as necessary to meet this requirement. A field manual in local language will be developed for the forest sampling, covering plot location, size and dimensions; measurement equipment; procedures for estimating above ground tree biomass and standing and lying deadwood; data recording procedures; and QA/QC. Forest Inventory Manual (Department of Forestry, Country XYZ) will be one of the main references for the project inventory manual.

- *For each data for which options B or C are applied, provide a detailed description of the monitoring procedures.*
- *Details may be described in the Annex.*

3. Procedures for recording and archiving data

"Standard Operating Procedures for Terrestrial Carbon Measurement", Winrock International (2012) will be the basic reference for recording and archiving data. The procedures include:

- Forest inventory data will be recorded on prepared field sheets and then later entered into a MS Excel file. A digital image of each field sheet will be taken before departing each plot for back up. All field sheets will be filed and digital images will be stored electronically in labelled folders.
- Fuel purchase receipts will be filed in duplicate.
- Remote sensing data and analysis results will be organized and filed in labelled folders.
- All electronic files will be backed up on a server.

- *Describe the procedures for recording and archiving monitoring data.*

- *For each data for which options B or C are applied, provide a detailed description of the procedures*
- *Details may be described in the Annex.*

4. QA/QC procedures

Area of stratum (= land use type) *i* at year *ym* during monitoring period.
Area burnt in stratum (= land use type) *i* at year *ym* during monitoring period.
Displacement of net CO_2 emissions during year *ym* during monitoring period.
Displacement of CH_4 and N_2O emissions during year *ym* during monitoring period.

The following QA/QC procedures are applied to the remote sensing analysis:

- Horizontal accuracy assessment of all images used in remote sensing analysis is conducted to ensure proper alignment of images over multiple points in time. Root mean squared error (RMSE) of the difference between known digitized locations is calculated to assess linear accuracy of each image. Further QA/QC elements are described in the standard operating procedure, which can be requested from University KLM.
- Thematic accuracy assessment of all generated maps is conducted using high resolution imagery (5 m) supported by ground-based observations as necessary. Further QA/QC elements are described in the standard operating procedure, which can be requested from University KLM.

No equipment used requires calibration.

Project fuel consumption during year *ym* during monitoring period.

- Double check of fuel receipt data entry will be conducted.

No equipment used requires calibration.

Emission factor (carbon stock per hectare) in above ground biomass in primary forest.
Emission factor (carbon stock per hectare) of dead wood, all types of forest

Forest inventory will be conducted by trained community teams. Each community will select a team of about 10 people who will be carefully trained in the classroom and in the field on forest inventory. “Community Based Forest Biomass Monitoring - Training of Trainers Manual”, IGES (2014) will be the reference to design the trainings. QA/QC procedures will include:

- Re-measuring 10 per cent of PSPs during each inventory. Errors discovered will be expressed as a percentage of all plots that have been re-measured to provide an estimate of the measurement error.
- Assigning one experienced forester to supervise each team.
- Assignment of a team leader who will check off all field sheets before leaving plots.
- “Hot Checks” (supervising forester conducts occasional re-measurement and provides continual guidance to community teams).
- Check for anomalies during data entry: 10% of all data sheets will be selected randomly and checked for consistency and accuracy in data entry.

No equipment used requires calibration.

- *Describe the procedures that the project employs for quality assurance and quality control.*
- *For each data for which options B or C are applied, describe the calibration procedures of any measurement equipment used where applicable.*
- *Details may be described in the Annex.*

Annex

- *Use appropriate numbering and subheadings for easy reference to the relevant sections of the Monitoring Structure and Procedures Sheet. Use a row for each section of the Annex.*
- *Additional rows may be added or unnecessary rows removed.*

5. Monitoring

5.1. Conducting monitoring

34. Project participants conduct monitoring in line with the monitoring plan of the registered PDD.
35. When using remote sensing for monitoring of carbon pools under Option C, satellite imageries whose spatial resolution is 30 meters or higher is used for monitoring land use and land-use changes. For the classification of land cover and forest types, classification to reflect the amount of carbon stock per hectare is encouraged and the classification should reflect each country's forest designations. The accuracy of forest/non-forest maps and forest type maps is 80 percent or higher.

5.2. Data correction for actual measurement

36. For monitoring of parameters under Option C (i.e. parameters monitored through actual measurement), the project participants calibrate measuring equipments as per the monitoring plan.
37. The project participants determine the necessity for data correction in calculation of emission reductions following the decision tree shown in Figure 1 below. If any relevant protocols exist in the National Forest Monitoring System, equipments calibration and data correction should be conducted in line with these protocols.
38. Regarding parameters for which corresponding national laws and regulations on measurement exist, the project participants:
    (a) Apply measured values (uncorrected values) to those parameters in calculation of emission reductions, if measuring equipments are calibrated and/or qualified in accordance with the national laws and regulations on measurement;
    (b) Do not apply measured values in calculation of emission reductions for that monitoring period, if measuring equipments are not calibrated and/or qualified in accordance with the national laws and regulations on measurement.
39. Regarding parameters for which national laws and regulations on measurement do not exist, the project participants check whether the instrumental errors identified in the calibration test stay within the required level of accuracy (i.e. ±5%).
40. For parameters described in paragraph 39, if measuring equipments are calibrated in line with the monitoring plan, the project participants:
    (a) Apply measured values (uncorrected values) to those parameters in calculation of emission reductions, where the instrumental errors of the measuring equipments stay within ±5%;
    (b) Correct measured values by applying the difference resulted from the instrumental

error and required level of accuracy to the measured values during the period between the date of the previous calibration and the concerned calibration, in line with the Appendix to these Guidelines, and apply the corrected values to those parameters in calculation of emission reductions, where the instrumental errors of the measuring equipments do not stay within ±5%.

41. For parameters described in paragraph 39, if measuring equipments are not calibrated in line with the monitoring plan, but calibration is implemented after the scheduled date, the project participants:
    (a) Apply measured values (uncorrected values) to those parameters in calculation of emission reductions, where the instrumental errors identified in the delayed calibration test stay within ±5%;
    (b) Correct measured values by applying the difference resulted from the instrumental error identified in the delayed calibration and required level of accuracy to the measured values during the period between the date of previous calibration and the actual date of calibration in line with the Appendix to these Guidelines, and apply the corrected values to those parameters in calculation of emission reductions, where the instrumental errors identified in the delayed calibration test do not stay within ±5%.
42. Correction of values in line with paragraph 40(b) and 41(b) are conducted in a manner which results in a conservative calculation of emission reductions, as shown in the Appendix.
43. For parameters described in paragraph 39, if measuring equipments are not calibrated in line with the monitoring plan and calibration is not implemented after the scheduled date, the project participants do not apply measured values in calculation of emission reductions for that monitoring period.

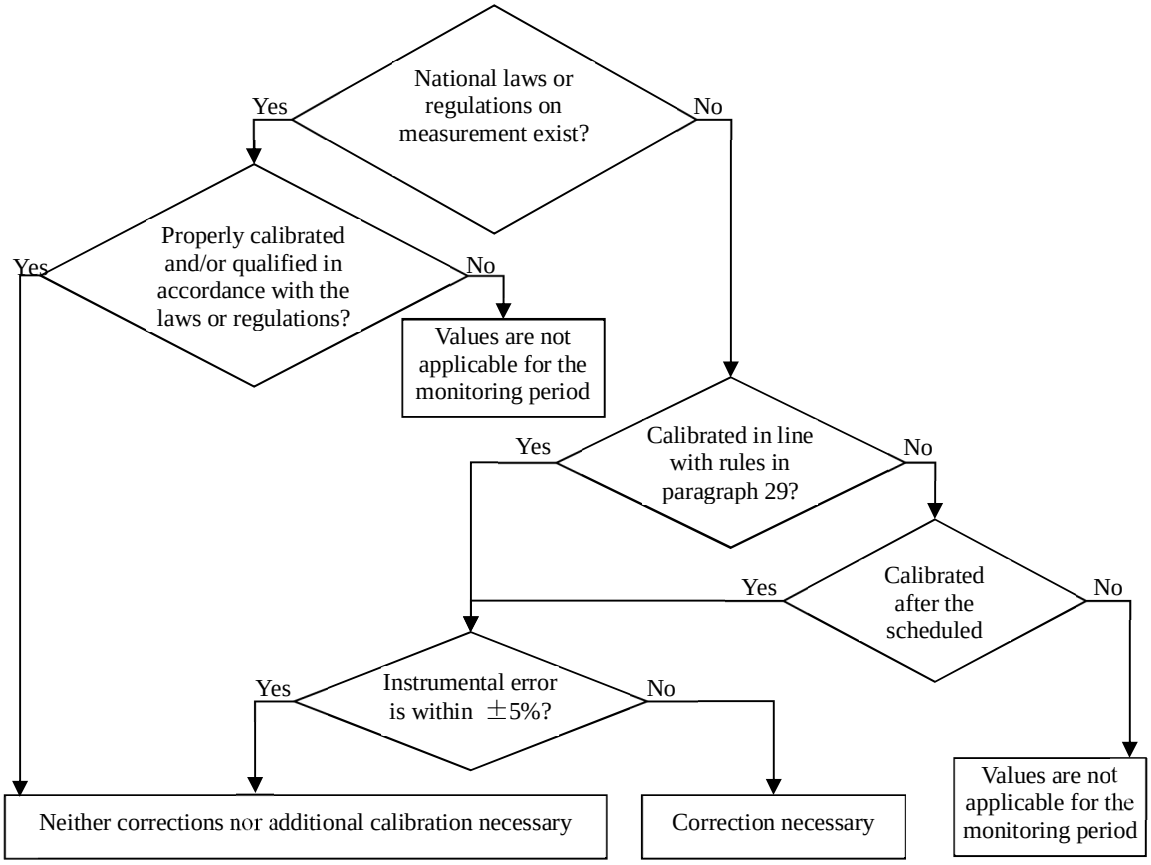

Figure 1 Decision tree for data correction

5.3. Recording and archiving data

44. The project participants record and archive the data as per the monitoring plan.
45. When conducting monitoring, the project participants archive the evidence and records that validate the figures to be stated in the monitoring report(s). It includes the source documents that form the basis for calculations and other information underlying the emission reductions.

6. Developing a Monitoring Report

46. The project participants develop a monitoring report using the Monitoring Report Sheet applied to the registered JCM project.
47. For each parameter in the Monitoring Report Sheet, the project participants describe appropriate information corresponding to the following items:
    (a) Monitoring period: Describe the monitoring period;
    (b) Monitored values: Provide the values of the monitored parameter for the purpose of calculating emission reductions;
    (c) Monitoring option: Fill in the monitoring option used;

(d) Source of data: Provide the source of data used. Clearly indicate the type of data source (e.g. logbooks, daily records, surveys, etc.) and spatial level of data (e.g. local, regional, national, international), if applicable;

(e) Measurement methods and procedures: Describe how the parameters are measured/calculated including QA/QC procedures applied. If the parameter is measured, describe the equipments used to measure it, including details on accuracy level, and calibration information (frequency, date of calibration and validity);

(f) Monitoring frequency: Describe the monitoring frequency.

48. In the Monitoring Report Sheet which is Attached Document to the Monitoring Report Sheet, the project participants provide the locations of monitoring points of the ground-based(s) survey on a map, the result of reassessment of the project reference level, and the situation of the actual recording and archiving of data.

<Example of a Monitoring Report Sheet (Input Sheet)>

Monitoring Report Sheet [Attachment to Project Design Document]

Table 4: Parameters to be monitored ex post

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Monitoring point No.	Parameters	Description of data	Estimated Values	Units	Monitoring option	Source of data	Measurement methods and procedures	Monitoring frequency	Other comments
(1)	$A_{i,y}$	Area of stratum (= land use type) *i* at year *ym* during monitoring period.	→*Table 1-a.*	ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery	Once every three years	Min. spatial resolution of 30 m
(2)	$AB_{i,y}$	Area burnt in stratum (= land use type) *i* at year *ym* during monitoring period.	→*Table 1-a.*	ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery	Once every three years	Min. spatial resolution of 30 m
(3)	$EF_{1,1}$	Emission factor (carbon stock per hectare) in above ground biomass in primary forest	200	$tC\ ha^{-1}$	Option C	Forest sampling	Forest sampling	Once every three years	
(4)	$EF_{1,2}$	Emission factor (carbon stock per hectare) of dead wood, all types of forest	14	$tC\ ha^{-1}$	Option C	Forest sampling	Forest sampling	Once every three years	
(5)	LC_{ym}	Project fuel consumption during year *ym* during monitoring period.	→*Table 1-b.*	TJ	Option B	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery	Once a year	
(6)	$DE_{CO2,ym}$	Displacement of net CO_2 emissions during year *ym* during monitoring period.		Ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery	Once every three years	Min. spatial resolution of 30 m
(7)	$DE_{fire,ym}$	Displacement of CH_4 and N_2O emissions during year *ym* during monitoring period.		Ha	Option C	USGS GLOVIS, Landsat imagery	Analyzing multispectral optical satellite imagery	Once every three years	Min. spatial resolution of 30 m

Table 1-a. Area of stratum *i* and area burnt in stratum *i* at year *ym* during monitoring period

Year during the	(1) Forest area (ha): $A_{i,y}$	(2) Burnt area (ha): $AB_{i,y}$

monitoring period	Primary forest	Secondary forest	Cropland	Primary forest	Secondary forest	Cropland
	$A_{1,y}$	$A_{2,y}$	$A_{3,y}$	$AB_{1,y}$	$AB_{2,y}$	$AB_{3,y}$
ym1						
ym2						
ym3						
ym4						
ym5						
…						

Table 1-b. Project fuel consumption

Year	(3) Project fuel consumption (TJ): LC_y
ymf1	
ymf2	
ymf3	
ymf4	
ymf5	
….	

Table 5: Project-specific parameters to be fixed ex ante

(a)	(b)	(c)	(d)	(e)
Parameters	**Description of data**	**Estimated value**	**Units**	**Source of data**
A_{RE}	Size of reference area	970,996	ha	Various. Related to the drivers of deforestation and/or forest degradation, landscape configuration, socio-
A_{PJ}	Size of project area	17,400	ha	Decided by project proponents
A_{DB}	Size of displacement belt	121,837	ha	Various. Related to mobility of deforestation/degradation agents
$A_{i,yr}$	Size of stratum (= land use type) *i* at year *yr during the reference period.*	→*Table 2-a.*	ha	USGS GLOVIS, Landsat imagery
$AB_{i,yr}$	Size burnt in stratum (= land use type) *i* at year *yr during the reference period.*	→*Table 2-a.*	ha	USGS GLOVIS, Landsat imagery
DF	Discount Factor	30	%	

Table 2-a. Area of stratum *i* and area burnt in stratum *i* at year *yr* during reference period

Year during the reference period	(1) Forest area (ha): $A_{i,yr}$			(2) Burnt area (ha): $AB_{i,yr}$		
	Primary forest	Secondary forest	Cropland	Primary forest	Secondary forest	Cropland

	$A_{1,y}$	$A_{2,y}$	$A_{4,y}$	$AB_{1,y}$	$AB_{2,y}$	$AB_{4,y}$
2001	354,000	293,000	365,000	2,600	330	40,500
2002	350,333	290,667	368,667	2,600	330	40,500
2003	346,667	288,333	372,333	2,600	330	40,500
2004	343,000	286,000	376,000	2,300	660	41,700
2005	339,667	284,000	379,667	2,300	660	41,700
2006	336,333	282,000	383,333	2,300	660	41,700
2007	333,000	280,000	387,000	9,300	1,660	42,900
2008	322,333	272,667	398,333	9,300	1,660	42,900
2009	311,667	265,333	409,667	9,300	1,660	42,900
2010	301,000	258,000	421,000	5,600	1,330	46,700
2011	294,333	253,667	428,333	5,600	1,330	46,700
2012	287,667	249,333	435,667	5,600	1,330	46,700
2013	281,000	245,000	443,000	3,300	660	51,200
2014	275,000	241,000	449,333	3,300	660	51,200
2015	269,000	237,000	455,667	3,300	660	51,200

Table 6: Ex-post estimation of CO2 emission reductions

Monitoring period	Emission reductions to be credited	Units
		tCO_2/p

[Monitoring option]

Option A	Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Option B	Based on the amount of transaction which is measured directly using measuring equipment (Data used: commercial evidence such as invoices)
Option C	Option C	Based on the actual measurement using measuring equipment (Data used: measured values)

Monitoring Report Sheet Attachment

1. Monitoring sites of the ground-based survey(s)

- *Provide a map that displays the locations of the monitoring sites used in the ground-based survey for the monitoring of net project emissions.*

2. Reassessment of project reference level

- *Provide information that is necessary for reassessment of the project reference level. Refer to the "Joint Crediting Mechanism Guidelines for Developing Proposed Methodology for Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries (REDD-plus)", noting that:*
- *The project reference level is reassessed within five years intervals to ensure that it adequately reflects the actual circumstances of the project area, such as drivers of deforestation and/or forest degradation, activities that lead to land-use changes, and changes of forest management methods.*
- *If the result of reassessment shows that project reference level doesn't adequately reflect the actual circumstances, the project reference level is reestablished.*
- *If a national or relevant sub-national reference level is established after the project start date, the national or relevant sub-national reference level should be taken into account when reestablishing the project reference level at the time of reassessment, and the validity of the new project reference level should be explained.*
- *Details may be provided in the Annex.*

3. Recording and archiving data

- *Describe the actual situation of the recording and archiving of the monitoring data.*
- *Details may be provided in the Annex.*

Annex

- *Use appropriate numbering and subheadings for easy reference to the relevant sections of the Monitoring Report Sheet. Use a row for each section of the Annex. Additional rows may be added.*