I. INTRODUCTION AND HOW TO USE THIS METHODOLOGY

1.1 Purpose

This document serves as a technical guide for Project Proponents participating in the Malaysia Forest Carbon Offset (FCO) program. It provides a structured framework for quantifying and implementing projects that aim to remove, reduce or avoid Greenhouse Gas (GHG) emissions.

This FCO Methodology support a range of project types. It enables Project Proponents to :

a. Assess project eligibility
b. Define project boundary
c. Establish baseline scenarios
d. Quantify GHG reductions, and
e. Monitor project performances

This FCO Methodology is designed to be adaptable and can be used in conjunction with other FCO methodologies depending on project-specific needs.

Project proponents may reference the Theory of Change framework, which maps how interventions are expected to deliver emission reductions and co-benefits by identifying causal pathways, assumptions, and risks[1] to inform project design. Proponents may refer to *Theory of Change UNDAF Companion Guidance* by United Nations Development Group or other relevant frameworks developed by intergovernmental organisations, NGOs and NPOs, or jurisdictional authorities to guide the development of a project-specific Theory of Change.

1.2 Core FCO Methodologies

The FCO program currently supports key FCO Methodologies which is as illustrated in Annex 1:

a. **Afforestation, Reforestation, and Restoration (ARR):** Focuses on forest establishment or restoration on degraded lands to boost carbon sequestration.
b. **Improved Forest Management (IFM):** Enhances carbon stocks in production forests through sustainable practices like reduced impact logging and longer rotation cycles.
c. **Reducing Emissions from Deforestation and Degradation (REDD):** Aims to prevent deforestation and degradation in all forest types.
d. **Wetland Restoration (WR):** Activities on wetlands ecosystems including restoration, vegetation establishment, deforestation and degradation prevention as well as rewetting.

Additional FCO Methodologies may be incorporated in the future.

1.3 How to use this FCO Methodology

This FCO Methodology guides Project Proponents to assess and implement activities under the FCO framework. The process begins with a spatial and historical assessment of the land:

a. **Current Land Assessment**: Evaluate the present condition of the land using maps and satellite imagery.
b. **Historical Land Use**: Determine the land's previous state to establish a baseline.

[1] Theory of Change UNDAF Companion Guidance, United Nations Development Group, 2017

c. **Condition Classification**: Compare current and historical states to classify the land as either intact or disturbed.

Based on this classification, Project Proponents can identify suitable intervention types:

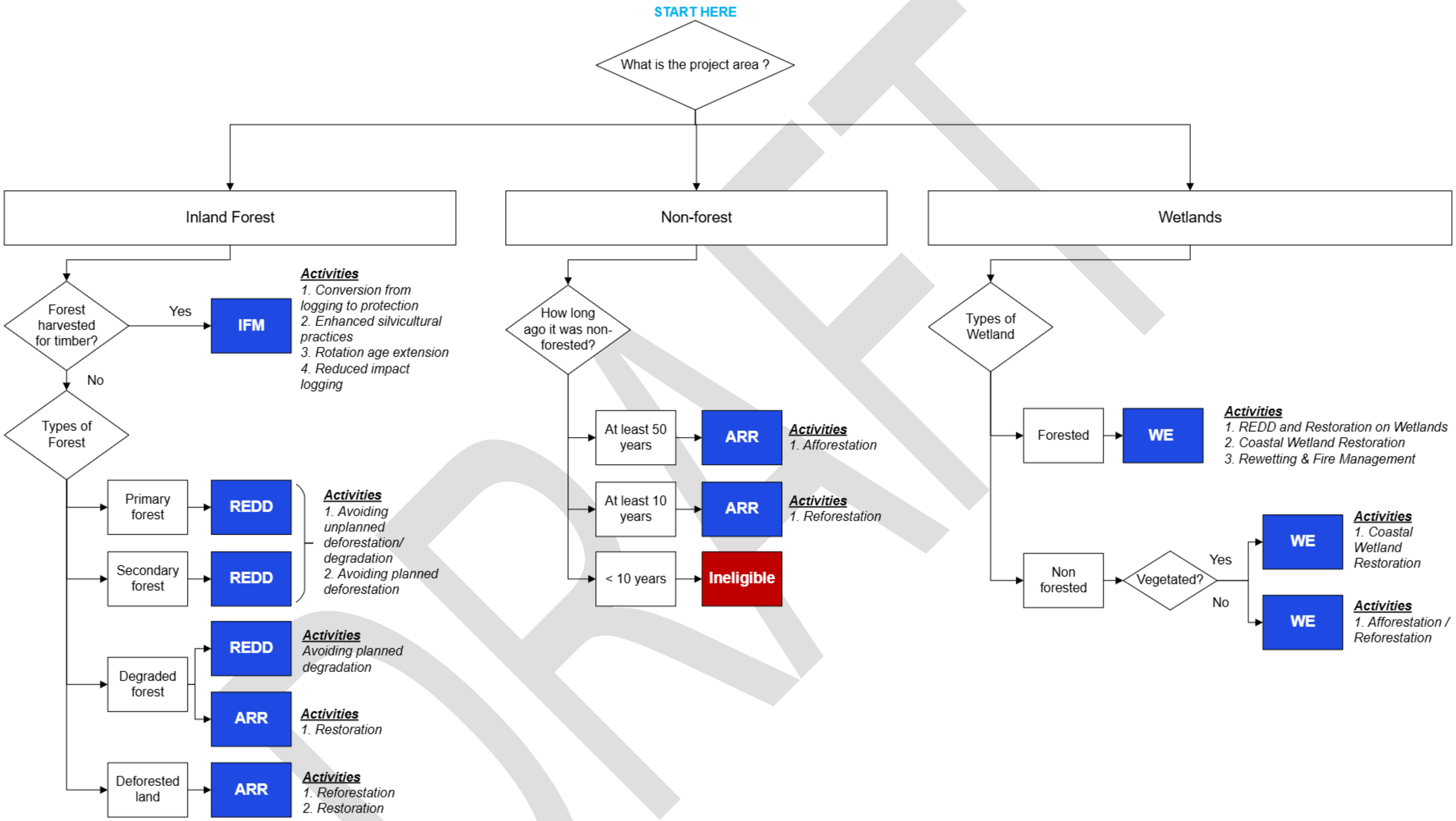
a. **GHG Avoidance Activities**: Actions that prevent emissions from occurring, such as avoiding planned or unplanned deforestation.
b. **GHG Reduction or Removal Activities**: Interventions that actively reduce or sequester emissions, tailored to forest lands, wetlands, or production forests.

1.4 Focus of this FCO Methodology document

This document specifically focuses on the IFM Methodology. It should be used in conjunction with the overarching FCO Program Guidelines, Subsidiary Guidelines, and standardized FCO Tools. These resources collectively ensure that project design, monitoring, and reporting are accurate, consistent, and aligned with program requirements.

Project proponents may reference relevant sources such as national strategies, sectoral reports, or frameworks developed by international organisations, NGOs and NPOs, or jurisdictional authorities, such as *Wetland Restoration: Contemporary Issues & Lessons Learned* by the National Association of Wetland Managers, when identifying anticipated implementation challenges, including data limitations, technical constraints, and other contextual factors.

Figure 1: Overall Flowchart for Methodologies under FCO



The eligibility flowchart for IFM activities is detailed in the following section.

II. ELIGIBILITY FLOWCHART

This flowchart guides Project Proponents in determining whether a proposed project area qualifies for IFM activities under the FCO program

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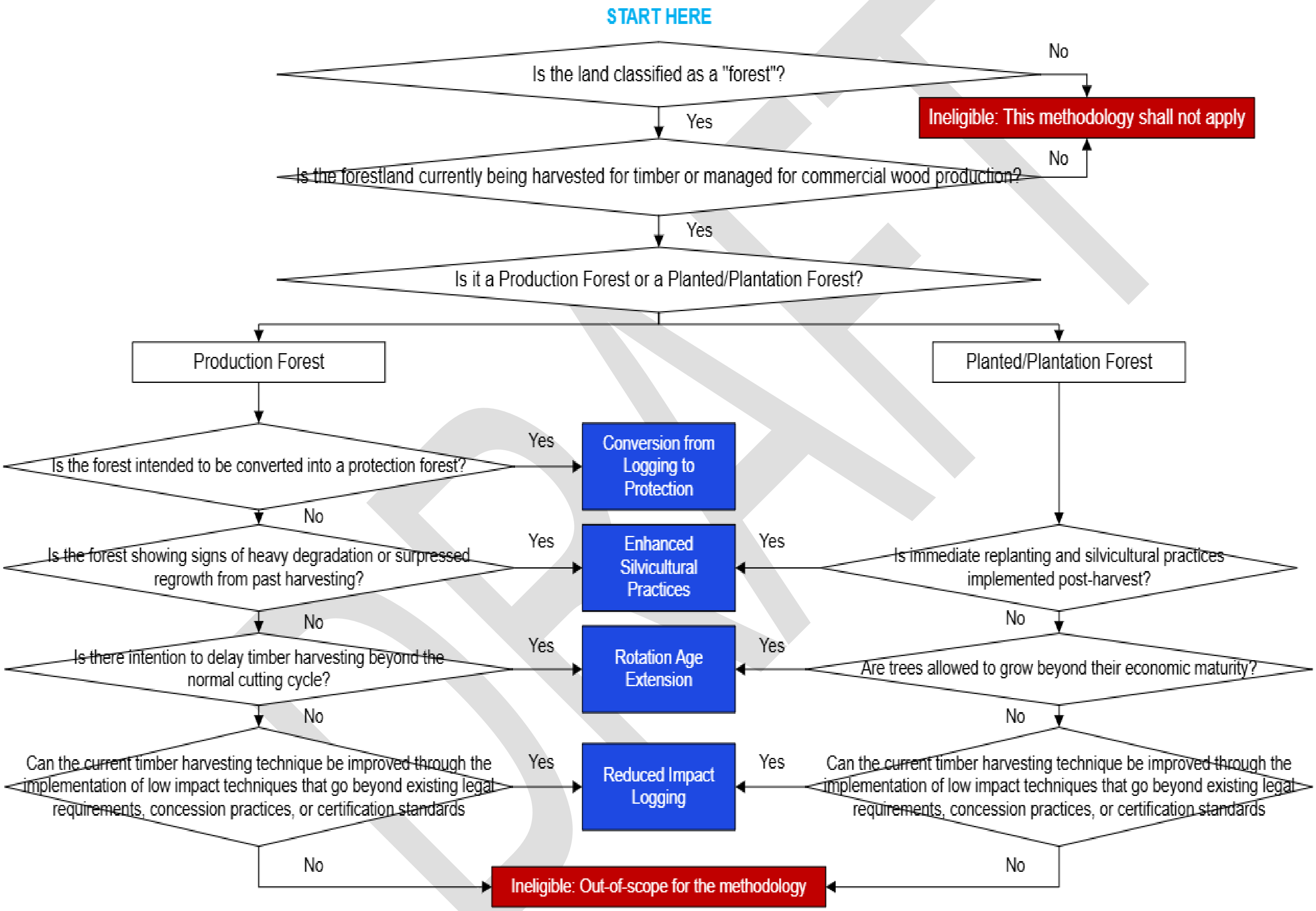
Figure 2: Eligibility Flowchart for IFM Project Activities



III. SUMMARY DESCRIPTION

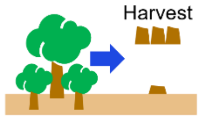
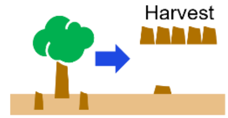
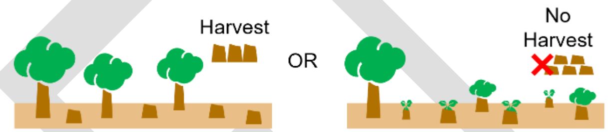
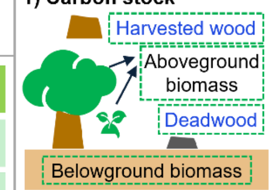
This section provides an overview of the IFM Methodology - activity description, applicable ecosystem as well as the pre-project, baseline and project scenarios for an applicable project.

Type of GHG Emissions Mitigation Action *Refers to how the project reduces GHG emissions*	Project activities that increase carbon sequestration and/or reduce GHG emissions through: • **Extension of Rotation Age :** Delaying timber harvest to allow trees to grow larger, storing more carbon before cutting. • **Conversion from Logging to Protection** : Permanently changing the land use from timber production to protected status. • **Enhanced Silvicultural Practices** : Applying improved forest management practices to increase tree growth rates and carbon sequestration such as fertilization, selective thinning, and genetic improvement of trees. • **Reduced Impact Logging** : Using low-impact harvesting methods that minimize damage to surrounding trees and soil
Applicable Ecosystem *Identifies the type of environment where the project can be implemented*	• **Legally designated** natural forests or production forests, where timber harvesting is permitted under SFM and conventional logging practices and planted/plantation forests where timber harvesting is conducted by clear felling practices.
Pre-Project *Refers to the state of the land prior to the start of the FCO project*	• **Forest classification** : area must be designated as production forest, for timber harvesting purposes • **Historical timber harvesting** : area must demonstrate a documented history of timber harvesting or active commercial wood production activities over a minimum lookback period of 10 years approved by the relevant forestry authority.
Baseline Scenario *Represents the "business-as-usual" projection on what would happen to the forest and its carbon stocks in the absence of the project*	• **Natural Production Forests :** Timber harvesting activities in natural production forests are governed under a structured forest management framework that applies the principles of SFM and conventional logging. This includes a 20-30 year cutting cycle with pre-harvesting, harvesting, and post-harvesting phases[2]. • **Planted/Plantation Forests** : Managed on fixed rotations with intensive silviculture, including site preparation, planting, fertilization, thinning, harvesting, and replanting. Clear-felling is commonly practiced at harvest, followed by immediate replanting.
Project Scenarios *Describes the proposed interventions to be implemented under the FCO project to prevent or reduce GHG emissions*	• **Rotation Age Extension** : Delaying the next timber harvest beyond the standard cutting cycle to allow longer carbon accumulation in forest biomass. • **Conversion from Logging to Protection :** Converting logged forest to a protected forest.

[2] Based on the Sub-Technical Working Group feedback received

	• **Enhanced Silvilcultural Practices** : Implementing silvicultural interventions to improve forest regeneration, productivity, and carbon stock recovery in heavily degraded or underperforming stands. These improve forest productivity by optimizing growing conditions, reducing competition and increasing biomass accumulation which in turn leads to higher carbon sequestration. • **Reduced Impact Logging :** Applying low-impact harvesting techniques that exceed prevailing legal, concessionary, or certification requirements to reduce carbon loss from soil and residual vegetation damage.

Figure 3: Summary of IFM Activities

IFM Activity	**Pre-Project** (occurs in both baseline and project scenario, before the implementation of the project) 	**Baseline Scenario** (what would happen if the project did not occur) 	**Project Scenario** (what occurs as a result of the project) 	**Components Used for the Calculation** (Carbon stock & emission source) Blue fonts = optional **1) Carbon stock**  **2) Emission Source** Biomass burning
Extension of Rotation Age	**Existing production forest is being managed as a short-rotation** (Note : Malaysia's SMS as per system on Forestry states that typical cutting cycles is between 25 – 30 years)	Production forest continues to be managed as a short rotation • Some carbon is stored on the land • Harvested wood products are mostly assumed to be short lifespan	The short rotation is converted to a long rotation • Additional carbon is stored on the land as trees are allowed to grow to larger size before harvest • Harvested wood products are mostly assumed to be long lifespan	
Conversion from Logging to Protection	**Existing production forest is being managed as it is** (in accordance with the Selective Management System under the Sustainable Forest Management Practice in Malaysia)	Production forest continues to be managed and harvested according to the current practices • Carbon stored on harvested wood products	Production forest is transitioned to protection forest (not for harvest) • Abatement generated through avoiding the loss of carbon in trees that would have been harvested • Abatement is generated in any retained production trees as they continue to grow • Abatement is generated in newly planted trees as they grow	**1) Carbon stock** • Aboveground biomass • Harvested wood • Deadwood **2) Emission Source** • Fossil fuel • Biomass burning
Enhanced Silvicultural Practices		Logged forest that is unlikely to revert to normal regrowth pattern due to vines and climbers • Some carbon is stored on the land • Harvested wood products are mostly assumed to be short lifespan	Production forest continues to be managed and harvested according to the current practices and additional activity to avoid emission from relogging of already logged-over forest; and/or rrehabilitation of previously logged over forest • Additional carbon is stored on the land as trees are allowed to grow faster and better quality before harvest • Harvested wood products are mostly assumed to be long lifespan	**1) Carbon stock** • Aboveground biomass • Belowground biomass • Harvested wood • Deadwood **2) Emission Source** • Fossil fuel
Reduced Impact Logging		Production forest continues to be managed and harvested according to the current practices • Some carbon is stored on the land • Harvested wood products are mostly assumed to be short lifespan	Production forest continues to be managed and harvested according to the current practices and additional activity to reduce impact logging • Additional carbon is stored on the land as trees are allowed to grow properly before harvest • Harvested wood products are mostly assumed to be long lifespan	**1) Carbon stock** • Aboveground biomass • Belowground biomass • Deadwood

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VII. MODULES & TOOLS

This methodology uses the following modules and tools:

- FCO Tool: Baseline Determination and Additionality Assessment
- FCO Tool: GHG Quantification Equations
- FCO Tool: Buffer Risk Assessment
- FCO Tool: Allometric Equations Guidance

VIII. LIST OF ABBREVIATIONS

Abbreviations	Definition
AAC	Annual Allowable Cut
AFOLU	Agriculture, Forestry and Other Land Use
DBH	Diameter at Breast Height
FAO	Food and Agricultural Organization
FCO	Forest Carbon Offset
FRIM	Forest Research Institute Malaysia
JPSM	Peninsular Malaysia Forestry Department
NRES	Ministry of Natural Resources and Environmental Sustainability
PRF	Permanent Reserved Forest
SFM	Sustainable Forest Management
SMS	Selective Management System
TPA	Totally Protected Area

1 Definitions

Terms	Definition
Alienated Land	Land lawfully granted or transferred by the State Authority to a person, company, or entity under applicable land laws, with a registered title or equivalent legal right, and not classified as State Land or Forest Reserve. Note: • In Peninsular Malaysia, alienated lands refer to land as defined in the National Land Code 1965 (Act 56). • In Sabah, alienated land refers to land as defined in the Sabah Forest Enactment 1968. • In Sarawak, alienated land refers to land as defined in the Sarawak Forests Ordinance 2015 and the Sarawak Land Code.
Annual Allowable Cut	Maximum volume of wood that can be harvested each year from a forest, that must be set at a level that maintains ecological integrity and does not exceed the long-term sustainable yield.
Commercial Timber Harvest	Felling, removal, transport, and processing of merchantable trees from a forest to obtain income from wood products, carried out under legal rights and approved forest management frameworks.
Conversion from Logging to Protected Forest	Permanent cessation of planned or legally permitted timber harvesting in a forest area that has historically been managed for timber production, with the intention to preserve forest cover and enhance long-term carbon stock.
Enhanced Silvicultural Practices	Improving forest management practices to increase tree growth rates and carbon sequestration such as fertilization, selective thinning, and genetic improvement of trees.
Forest Management	Any planned human intervention in a forest ecosystem to achieve certain outcomes e.g. timber, recreational opportunities, etc. which can be grouped as environmental, economic, and social. Forest management can include anything from low intensity to high intensity interventions using different practices, tools, and techniques .
Forest Reserve	A forest area legally gazetted by a state authority for the purpose of forest management, conservation or production under applicable state or national law. Forest Reserves may include Permanent Reserved Forests (Peninsular Malaysia), Forest Reserve under the Sabah Forest Enactment 1968, or Forest Reserves under the Sarawak Forests Ordinance 2015. Note:

Terms	Definition
	• In Peninsular Malaysia, Forest Reserve refers to Permanent Reserved Forests as defined under the National Forestry Act 1984. Type of Permanent Forest Reserves in Peninsular Malaysia: • Timber production forest under sustained yield • Soil protection forest • Soil reclamation forest • Flood control forest • Water catchment forest • Forest sanctuary for wildlife • Virgin jungle reserved forest • Amenity forest • Education forest • Research forest • Forest for federal purposes • State park forest • In Sabah, Forest Reserve refers to areas gazetted under Section 12 of the Sabah Forest Enactment 1968. Type of Forest Reserves in Sabah: • Class I: Protection Forest • Class II: Commercial Forest • Class III: Domestic Forest • Class IV: Amenity Forest • Class V: Mangrove Forest • Class VI: Virgin Jungle Reserve • Class VII: Wildlife Reserve • In Sarawak, Forest Reserves refer to areas constituted as Permanent Forest Estate under Part III of the Sarawak Forests Ordinance 2015. Type of Forest Reserves in Sarawak: • Forest reserve • Protected forest • Communal forest
Logging slash	A component of the deadwood pool, representing the downed or lying woody debris left in the forest (on-site), generated during a timber harvest event.
Permanent Forest Estate	Means all forest reserves, protected forests, communal forests in the State under the Sarawak Forests Ordinance 2015.

Terms	Definition
Permanent Reserved Forest	Under Section 2, National Forestry Act 1984 defines Permanent Reserved Forest as any land designated or deemed to have been designated as a permanent forest reserve under the act. This area is fully administered by the State Forestry Department and all forest produce within this area belongs to the State Government.
Plantation Forest ***As defined by Food and Agriculture Organization and adapted by NRES***	Plantation refers to a subset of planted forests that is intensively managed and meet all the following criteria at planting and stand maturity: i. one or two species; ii. even age class; and iii. regular spacing Plantation forests are typically subject to short-rotation harvest cycles for commercial timber production. Note: • In Peninsular Malaysia, forest plantation means an area planted with trees or forest plants, whether of local or commercial species, by open planting method with an area of not less than 50 hectares. Forest plantations can include areas located inside or outside Permanent Forest Reserves. • In Sabah Forestry Policy's Action Plan on Forest Plantation Development 2022 - 2036, forest plantation means trees in forest areas designated for forest plantation development through the planting of **mono or multiple** native or introduced species that is intensively managed and has regular tree spacing, to produce sustainable planted timber. • In some states, the structural criteria for plantation forests may differ. For the purpose of this methodology, plantation forests that are legally designated by the relevant state authorities shall also be considered eligible, as long as they meet all other applicability conditions under the IFM methodology.
Planted Forest ***As defined by Food and Agriculture Organization and adapted by NRES***	Forest predominantly composed of trees established through planting and/or deliberate seeding. Note: • In Sarawak, planted forest means a crop of trees planted or maintained on State land or alienated land under a licence issued pursuant to Section 65 of Sarawak Forests Ordinance 2015 and forming part of the permanent forests in the State. • For the purpose of this methodology, such areas are recognised as planted forests, provided they meet all other applicability conditions under the IFM methodology.

Terms	Definition
Production Forest	Natural forests typically gazetted under Permanent Reserved Forests (Peninsular Malaysia) or Permanent Forest Estate (Sarawak) or Class II – Commercial Forest (Sabah) or State Land Forests for the purpose of commercial timber harvesting.
Reduced Impact Logging	Measures that reduce emissions from timber harvest in one or more of three emission source categories: felling, skidding and hauling. Component practices may include, but are not limited to, directional felling, improved log bucking, improved harvest planning via pre-harvest inventory, skid trail planning, mapping, and oversight and/or long cable winching, and reduction in width of haul roads and size of log landings.
Extension of Rotation Age	Deliberate postponement of planned or legally permissible timber harvesting beyond the typical or economically optimal rotation for a forest stand, with the aim of increasing carbon stock accumulation.
Selective logging	Timber harvesting technique that involves removing only selected trees based on specific characteristics (e.g., diameter, height, species, market value) Unlike clear-cutting, where all trees are removed, selective logging means most trees remain in the forest stand with the objective of minimizing environmental impact of timber harvesting.
State Land	All land in the State other than a Forest Reserve or Alienated land.
State Land Forests	Means any areas in the State other than forest reserves, protected forests, communal forests, Government reserves and planted forests that meet the nationally recognized definition of forest.
Timber	Any tree which has been felled or which has fallen, and all wood whether or not cut up, fashioned or hollowed out for any purpose.
Timber Harvest Plan	Description of the methods and operations needed to harvest timber from a forest under a given set of legal conditions for harvest that includes: - Demarcation of non-harvest areas within the forest. - Division of the harvestable forest into annual operating areas (land parcels or compartments) presented with descriptions and maps. - Design and presentation of the transport system for the removal of harvested timber products, and a description of the harvest and transport machinery used for timber harvest.
Tree ***As defined by Food and Agriculture Organization***	A woody perennial with a single main stem, or in the case of coppice with several stems, having a definite crown.

2 Applicability Conditions

While the Eligibility Flowchart (Section II) provides a high-level visual guide to help Project Proponents quickly assess whether a proposed area may qualify for IFM activities under the FCO Program, this chapter on Applicability Conditions offers a more detailed technical criteria that must be met for a project to be formally considered eligible.
The Applicability Conditions outlined here, ensures that only those initiatives which align with the program's requirements proceed to quantification and crediting.

2.1 General Applicability Conditions

The following conditions must be met for any project to be eligible under this IFM Methodology:

1. The project area must be legally designated as forest under applicable national or international definitions.

2. Eligible areas must fall within forest classifications that are recognized as part of the national forest reserve or designated under relevant state laws and legally zoned or approved for timber harvesting under gazetted forest management plan, licence, or land-use classification scheme. This includes but not limited to natural production forests and planted or plantation forests designated for commercial timber production.

3. The project area must have a documented history of timber harvesting or active management for commercial wood production. This condition shall be demonstrated through verifiable records over a minimum lookback period of 10 years preceding the project start date. For short rotation planted or plantation forests with rotation cycles less than 10 years, a shorter lookback period of at least 5 years preceding the project start date may be accepted, provided that the lookback period is supported by verifiable documentation and formally approved by the relevant state authority.

4. For the purpose of this methodology, "active management for commercial wood production" is defined as intentional, ongoing forest operations aimed at timber harvesting. Acceptable evidence may include, but is not limited to:

    a. Issuance of timber harvesting permits or approved harvesting plans by the relevant forestry authority;
    b. Pre-harvest inventory – field assessment conducted prior to timber harvesting operations, which involves measuring and recording key forest attributes within designated area, which is typically required under forest management plans or harvesting permits;
    c. Historical records of harvest volumes or log removal reports;
    d. Concession-level silvicultural records or yield planning documents;
    e. Site preparation, planting, or thinning activities;
    f. Construction or maintenance of forest access roads for harvesting; or
    g. Remote sensing data showing logging infrastructure or canopy disturbance indicative of past harvesting activities.

5. Project Proponent must hold legally recognized rights to manage timber harvesting activities within the project area. These rights may be acquired through land ownership, leasehold agreements, concession licenses, community forestry agreement, or other formal engagements granted by the relevant national or state authority.

6. Project Proponent must hold or obtain the legal right to generate, own, and transfer carbon credits or verified emission reductions resulting from project activities. These rights must be recognised under national or state-level frameworks and may be subject to obligations such as royalties, cess, levies, or benefit-sharing arrangements imposed by relevant by authorities.

7. In states where carbon licensing framework is not yet established, Project Proponent shall provide credible documentation demonstrating the right to implement project activities and generate carbon credits. This may include, but not limited to:

   a. land title or lease agreements;
   b. concession or timber license;
   c. jurisdictional or state approvals;
   d. letter of consent or support from landowner or community;
   e. official correspondence or endorsement from forestry or carbon-related agencies;
   f. other forms of written acknowledgement from relevant landowners, community representatives, or authorities;
   g. evidence of previous logging activities, such as historical harvest records, log removal reports, or pre-harvest inventory data; or
   h. ownership or legal rights to the land or forest resources, including documentation of land tenure or resource use rights.

8. Project Proponents must also commit to revising benefit-sharing structures and updating applicable agreements once a formal carbon-related governance or legislation is enacted.

9. Where state legislation restricts concurrent issuance of timber and carbon licenses, such that the Project Proponent may hold either a license for commercial timber harvesting or a license for carbon project development, the eligibility of IFM activities shall be determined by the type of license granted:

   a. Where timber harvesting is not permitted under a carbon license, only IFM activities that involve full cessation of harvest may be eligible; and/or
   b. IFM activities that rely on continued or modified timber management are only applicable if the licensing framework permits both timber operations and carbon credit generation within the same concession or tenure.

10. The project must comply with applicable forestry and environmental laws, regulations, and SFM guidelines. These include, but are not limited to:

    a. National Forestry Act 1984 (Peninsular Malaysia)
    b. National Forestry Policy 1978 (Peninsular Malaysia)
    c. Sabah Forest Enactment 1968

d. Sabah's Establishment of Forest Reserves and Amendment Enactment 1984
e. Sarawak Forests Ordinance 2015
f. Sarawak Forest Rules 1973

11. In the event of conflict between national and state-level laws, definitions, or classification, the methodology shall prioritise the interpretation that is more specific or legally binding within the state. Where no specific state definition exists, the methodology shall apply national or internationally recognised definitions using a conservative approach. All legal interpretations must be confirmed by the relevant state forestry authority and are subject to verification and approval during validation.

12. Where the forest is certified under a recognised SFM schemes such as the Malaysian Timber Certification Scheme by the Malaysian Timber Certification Council (MTCC), Forest Management Certification by the Forest Stewardship Council, or any other scheme accepted by relevant authorities, the project must demonstrate that the proposed IFM activities result in a GHG emissions reductions or removals that are additional to those required by the applicable standards. To fulfil this requirement, the Project Proponent shall:

   a. Submit a documented comparison between the baseline forest management activities mandated by the SFM certification and the proposed with-project scenario.
   b. Justification showing how the proposed IFM activities will:
      i. Exceed the minimum standards or practices required by the certification; and
      ii. Represent voluntary improvements not already mandated.
   c. Supporting evidence, including but not limited to:
      i. Forest Management Plans submitted for certification;
      ii. Audit reports or monitoring records associated with the certification; and
      iii. Field data or operational plans reflecting enhanced practices.

   The comparison must explicitly assess differences in harvesting intensity, timing or techniques, rotation length and cutting cycles, biomass retention, regeneration or rehabilitation strategies, and/or any additional silvicultural interventions not required under certification.

13. The project must implement at least one of the four (4) eligible IFM activities defined in this methodology. The methodology shall apply if the following conditions are satisfied in sequence:

Table 1: Selection Criteria of Forest for IFM Activities

Steps	Description	Next steps
Step 1	Is the land classified as forest under national or state-level definitions?	• If no: This methodology shall not apply • If yes: Proceed to Step 2
Step 2	Is the forestland currently being harvested for timber or managed for commercial wood production?	• If no: This methodology shall not apply • If yes: Proceed to Step 3
Step 3	Is it a Production Forest or a Planted/Plantation Forest?	• If classified as a natural Production Forest, refer to Section 2.2 for the applicable IFM activities.

Steps	Description	Next steps
		• If classified as a Planted/Plantation Forest, refer to Section 2.3 for the applicable IFM activities.

2.2 Applicability Conditions for IFM Activities

The following is the applicability conditions for specific IFM activities:

Table 2: Applicability Conditions for IFM Activities

IFM Activity	Description	Applicability Conditions
Conversion from Logging to Protected Forest	Transitioning actively harvested areas into a protected forest with no further planned timber extraction	• Forest management in the baseline scenario involves harvesting technique such as planned selective logging, clear cuts, patch cuts, continuous thinning, etc. • Harvesting must not occur during the project crediting period • Project area does not include planted/plantation forests
Enhanced Silvicultural Practices	Implementing silvicultural interventions to improve forest regeneration, productivity, and carbon stock recovery in heavily degraded or underperforming stands	• Biomass burning, fuel gathering, removal of litter or removal of dead wood do not occur in the baseline scenario • The use of nitrogen fertiliser in the project activities is prohibited • Project can be implemented in Production Forests and/or Planted/Plantation Forests • Harvesting must not occur in the with-project scenario • Applicable only where the Project Proponent commits to no harvesting during the crediting period, or where harvesting volumes are demonstrably reduced relative to baseline and the carbon benefit from this activity can be measured and verified. • Use of climate resilient species in the advent of climate change impacts, but are not species of economic preference.
Extension of Rotation Age	Delaying the next timber harvest beyond the standard cutting cycle to	• Fire is allowed to be used as part of the forest management activity in the baseline scenario.

IFM Activity	Description	Applicability Conditions
	allow longer carbon accumulation in forest biomass	• Project can be implemented in Production Forests and/or Planted/Plantation Forests
Reduced Impact Logging	Applying low impact harvesting techniques that exceed prevailing legal, concessionary, or certification requirements to reduce carbon loss from soil and residual vegetation damage.	• Project activity does not involve a deliberate reduction in harvest levels • Project can be implemented in Production Forests and/or Planted/Plantation Forests

2.2.1 IFM Activity for Production Forest

1. Projects implemented in natural production forests must be designed to implement one or more IFM activities that result in measurable GHG emission reductions or removals relative to the baseline scenario, and in accordance with the general applicability conditions set out in section 2.1.

2. The following table guides Project Proponents in determining which IFM activity is applicable based on forest condition and management intent:

Table 3: Selection Criteria for Applicable IFM Activities in a Production Forest

Steps	Description	Next steps
Step 1	Is the forest intended to be converted into a protection forest?	• If no: proceed to Step 2 • If yes: **IFM activity: Conversion from Logging to Protection**
Step 2	Is the forest showing signs of degradation or suppressed regrowth from past harvesting?	• If no: proceed to Step 3 • If yes: **IFM activity: Enhanced Silvicultural Practices**
Step 3	Is there intention to delay timber harvesting beyond the normal cutting cycle?	• If no: proceed to Step 4 • If yes: **IFM activity: Extension of Rotation Age**
Step 4	Can current timber-harvesting technique be improved using low-impact techniques that exceed legal or certification requirements?	• If no: Project is out of scope • If yes: **IFM activity: Reduced Impact Logging**

3. At each step, Project Proponents must provide supporting documentation to justify their selection, which can include, but not limited to forest management plans, inventory data, harvest schedules, or operator guidelines.

2.2.2 IFM Activity for Planted or Plantation Forest

1. In planted or plantation forests, species are often selected for fast growth and short rotation harvesting cycles to maximize economic returns.

2. Projects implemented in planted or plantation forests must be designed to implement one or more IFM activities that lead to measurable GHG benefits beyond conventional planted or plantation forest practices and in accordance with the general applicability conditions set out in Section 2.1.

3. The following table guides Project Proponents in determining which IFM activity is applicable based on planted or plantation forests' management intention:

Table 4: Selection Criteria for Applicable IFM Activities in a Planted/Plantation Forest

Steps	Description	Next steps
Step 1	Is immediate post-harvest replanting and rehabilitation being implemented?	• If no: **IFM activity: Enhanced Silvicultural Practices** • If yes: proceed to Step 2
Justification	Standard planted/plantation management often includes immediate replanting and rehabilitation following harvest, in line with forest management plans or certification requirements. Where this is already practiced: • The baseline already includes rapid recovery interventions, leaving little or no room for additional carbon benefits from enhanced silvicultural practices • Enhanced Silvicultural Practices is meant for cases where the baseline involves low-effort natural regeneration or minimal intervention, and where the project can introduce meaningful new practices such as enrichment planting, liberation thinning, or soil enhancement that can increase carbon stocks. If immediate replanting and rehabilitation is not part of baseline practices, there is scope for introducing enhanced silvicultural methods that would generate measurable carbon gains.	
Step 2	Are trees allowed to grow beyond their economic maturity age?	• If no: proceed to Step 3 • If yes: **IFM activity: Extension of Rotation Age**
Justification	For projects to claim carbon benefits under Extension of Rotation Age, Project Proponents must assess: • Whether delaying harvest beyond economic maturity leads to substantial additional carbon stock accumulation that would not otherwise occur in the business-as-usual scenario • Whether the species and site conditions support significant biomass gains beyond the normal harvest age • Whether market, biological, or operational constraints would otherwise result in harvest at standard rotation	

Steps	Description	Next steps
	If delaying harvest does not provide material additional carbon benefit, for example, the species will stop accumulating significant biomass, or the wood quality declines rapidly after maturity, the project is not appropriate for crediting under this IFM activity.	
Step 3	Can current harvesting technique such as clear-felling be improved through low-impact techniques?	• If no: Project is out of scope • If yes: **IFM activity: Reduced Impact Logging**
Justification	Where planted/plantations are harvested using conventional techniques such as clear-felling with minimal controls on collateral damage, soil disturbance or waste, there may be scope to apply Reduced Impact Logging methods that: • Reduce damage to residual trees and soil • Minimize slash and waste • Lower disturbance-related emissions • Enhance soil carbon retention If such improvements over current practices are feasible, Reduced Impact Logging can deliver carbon benefits. If the existing harvesting practice is already highly optimized or if low-impact methods cannot meaningfully reduce emissions, then no further IFM activities are applicable for carbon crediting in a planted or plantation forests.	

4. At each step, Project Proponents must provide supporting documentation which can include, but not limited to management plans, growth models, site rehabilitation protocols, or operational harvesting records.

2.3 Ineligibility

While the above lists down the eligible project activities, certain scenarios are explicitly excluded to maintain the integrity, additionality and permanence of emission reductions. Projects are considered ineligible if they meet any of the following conditions:

1. Protection and conservation forests
    a. Protection forests including but not limited to:
        i. Totally Protected Areas (TPAs)
        ii. Class I Protection Forest (Sabah)
    b. Conservation forest reserves, including:
        i. National Parks
        ii. Wildlife Sanctuary;
        iii. Wildlife Reserves;
    c. Biodiversity Corridors
2. Forests that have never been harvested or managed for commercial timber production
3. Non-forested areas
4. Illegal logging areas

3 Project Boundary

This section defines the spatial and temporal boundaries within which the project activities are implemented and monitored. Establishing a clear project boundary is essential for ensuring transparency, consistency and credibility in the quantification of GHG emission reductions.

3.1 Geographical Boundary

1. Geographical boundaries refer to the clearly defined physical area in which the project is implemented. This includes the land parcels or forest areas where activities take place. The boundaries are essential as it delineates the spatial scope of the project, ensuring that carbon accounting is accurate, verifiable, and not double-counted across overlapping projects.

2. The Project Proponent must clearly define the spatial boundaries of the project by meeting the following criteria:

Table 5: Applicability Conditions for IFM Project Activities

Component	Description	Requirements
Project area delineation	Project proponents must delineate the project area using geospatial references.	Each discrete forest area must be uniquely identified with supporting documentation such as: • Digital maps; • Geographic coordinates obtained from a GPS or from geo-referenced digital map, with specified datum; • Official topographic or cadastral maps; • Land title, tenure, or licensing documents. If the project consists of multiple discrete forest parcels, each parcel should meet the eligibility criteria and be clearly documented
Land classification and eligibility	The project area must qualify as "forest" land under applicable national or international definitions and land-use classifications	Project area must: • Forest classification used to delineate project boundaries must be derived from satellite imagery, forest inventories, or remote sensing data. • Be areas that have been designated, sanctioned, or approved for timber harvesting activities (e.g. logging concessions or plantations) by the national or local regulatory bodies. • Exclude permanently deforested or non-forest areas from the carbon accounting boundary.

Component	Description	Requirements
		• Have legal documentation confirming forest tenure and rights to manage forest carbon.

3. Project Proponents must define and submit the project area boundaries using standard geospatial data formats e.g. shapefiles, KML, etc. accompanied by relevant metadata including the coordinate reference system. Mapping practice shall be consistent with **Tier 1 requirements** under the **IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (GPG - LULUCF)**[3], which requires spatially explicit boundaries and documentation of geographic location.

4. While specific national standards for spatial data submission under the FCO Program are under development, proponents are encouraged to adopt best available national or state-level forestry technical mapping guidelines, where applicable. Where such standards do not yet exist, internationally recognised practices such as using WGS 84 coordinate system, minimum map scales of 1:10,000 or better, and inclusion of geospatial boundary metadata should be followed to ensure consistency, traceability and verifiability.

3.2 Temporal Boundaries

1. Temporal boundaries refer to the timeframe in which a project starts and ends as well as the period in which emissions reductions/ removals are measured, monitored and credited. These boundaries are important because it sets and documents the period in which the activity will take place ensuring the accuracy and credibility of the project.

2. The Project Proponents must determine and provide the project crediting period, project crediting start date, and project crediting end date.

3. The carbon crediting period shall follow the requirements outlined in the FCO Subsidiary Guideline.

3.3 Stratification

1. If the project area is not homogenous at the start of the project, stratification must be carried out to improve the accuracy and the precision of carbon stock estimates.

2. Stratification is the process of dividing the project area into sub-units or strata that are internally homogeneous with respect to characteristics that significantly affect carbon stock changes and GHG quantification[4].

3. Project Proponents shall stratify the project area based on observable physical, biological, and management characteristics that have a significant impact on forest carbon stocks, forest growth

[3] *IPCC. (2003). Good Practice Guidance for Land Use, Land-Use Change and Forestry. IPCC. Retrieved from IPCC website: https://www.ipcc.ch/site/assets/uploads/2018/03/GPG_LULUCF_FULLEN.pdf*
[4] *Maniatis, Danae & Mollicone, Danilo. (2010). Options for sampling and stratification for national forest inventories to implement REDD+ under the UNFCCC. Carbon balance and management. 5. 9. 10.1186/1750-0680-5-9*

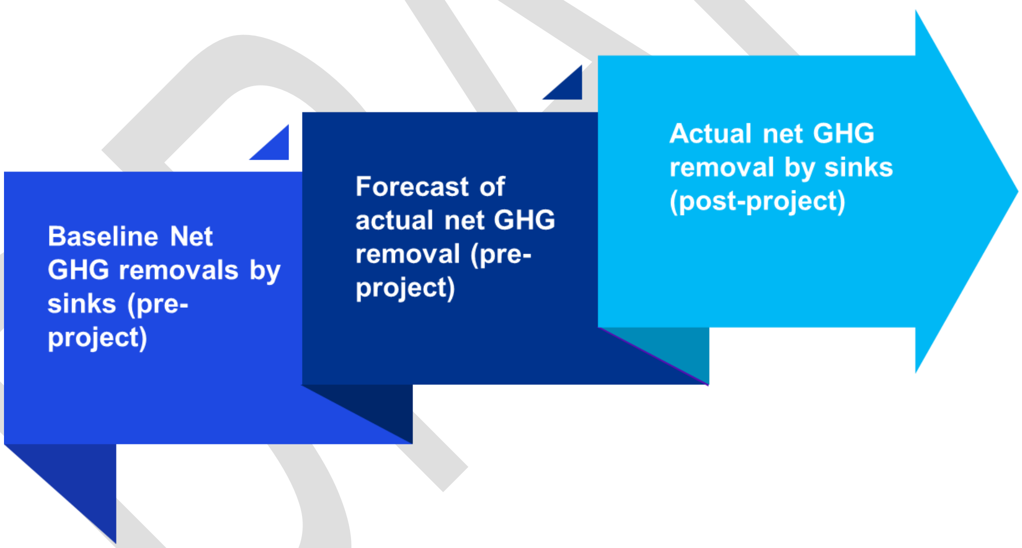
rates, intensity of silvicultural treatment and harvesting patterns. These may include, but are not limited to:

a. Canopy cover;
b. Diameter at breast height (DBH) or stand age class;
c. Harvest history and disturbance pattern;
d. Silvicultural pattern or management intensity;
e. Topography e.g. slope or elevation; or
f. Species composition

4. Stratification shall not be based on land ownership boundaries, administrative zones, or generic forest class classification, or concession or license demarcations unless such classifications directly influence carbon stock dynamics, legal harvesting rights, or management practices.

5. The design and justification of stratification shall be guided by the **2006 IPCC Guidelines for National GHG Inventories - Volume 3: AFOLU, Chapter 4 (Forest Land)**, and the **UNFCCC's CDM Tool for calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities version 2** as outlined in the **FCO Tool: GHG Quantification Equations**, and any applicable national forest inventory or carbon management guidelines.

6. The stratification approach shall be adapted to the specific context of each project phase, as outlined below:



a. Baseline Net GHG removals by sinks (pre-project)

Stratification should be conducted based on the area's predominant vegetation types (e.g., grassland, bushland), crown cover, and historical land use. This approach reflects the expected carbon stock in the absence of project intervention. It is generally assumed that baseline removals on degraded or degrading lands are minimal compared to those achieved through project activities.

b. Forecast of actual net GHG removal (pre-project)

Stratification shall be based on:

• The area's major vegetation types, which influence initial biomass levels and growth potential; and

• The proposed planting and forest management plan, which outlines species selection, planting density, and silvicultural practices.

This stratification enables the application of appropriate growth models tailored to each stratum's characteristics, thereby improving the accuracy of projected carbon sequestration.

c. Actual net GHG removal by sinks (post-project)

Following project implementation, stratification must be updated to reflect the actual conditions on the ground. This includes:

- Ex-Ante Stratification: Initially based on the intended planting and forest management plan as submitted in the project design documentation.
- Ex-Post Stratification: Revised to align with the actual implementation of planting and management activities. This ensures that monitoring and reporting are based on real, rather than planned, interventions.
- Adjustment for Disturbances: In the event of natural (e.g., fire, storms, pest outbreaks) or anthropogenic (e.g., harvesting, replanting) disturbances that significantly alter biomass growth patterns, strata must be redefined or adjusted accordingly. This dynamic approach ensures that carbon accounting remains accurate and reflective of on-the-ground realities.

3.4 Carbon Pools

1. Carbon pools are essential components of forest ecosystems where carbon is sequestered and stored, playing a crucial role in maintaining the balance of carbon stocks over time. These pools are integral for accurately measuring and monitoring changes in carbon levels, particularly in the context of assessing the effectiveness of emission reduction strategies. Each carbon pool within the ecosystem contributes uniquely to the carbon cycle, making it essential to understand how forest management practices, growth patterns, or disturbances can influence the overall carbon balance of a project.

2. In order to quantify emissions reductions or removals effectively, it is imperative to identify and differentiate specific carbon pools based on their significance and potential emissions impact.

Table 6: Applicable Carbon Pools for IFM Project Activities

	Carbon Pool	Included	Description
Baseline and Project	Above-ground tree biomass	✓	Aboveground tree biomass is a major carbon pool directly impacted by project activities and is included in all IFM scenarios. This pool is expected to increase under IFM interventions such as Extension of Rotation Age, Enhanced Silvicultural Practices, and Logging to Protection, relative to the baseline. Under Reduced Impact Logging, the rate of biomass reduction is expected to be lower than conventional logging. As this pool typically represents the largest source of carbon stock change in forest carbon projects, it must be consistently included in both baseline and project scenarios. It is measurable through established field-based inventory techniques and remote sensing methods, enabling reliable monitoring of changes over time.
Baseline and Project	Belowground biomass	✓	Below-ground biomass, comprising of live tree roots, is an important carbon pool that is directly correlated with above-ground biomass. Increases or decreases in above-ground tree biomass due to IFM activities are proportionally reflected in the below-ground biomass pool. Including this pool ensures completeness in accounting for biomass carbon stock changes, consistent with IPCC Guidelines and best practices in forest carbon quantification. It is estimated using allometric relationships tied to above-ground biomass measurements, making in both quantifiable and verifiable. To ensure consistency, this pool must be included in both baseline and project scenarios where above-ground biomass is included. Significant carbon is stored in tree roots, and changes in belowground biomass are closely linked to aboveground biomass dynamics. Including this carbon pool ensures that the full extent of biomass changes is accounted for accurately.

Carbon Pool	Included	Description
Dead wood	✓	In conventional logging, a considerable amount of felled or damaged trees may turn into dead debris that decomposes over time. Alternatively, low-impact logging practices and logging to protected forest projects may result in the accumulation of dead wood due to natural tree mortality. Including this carbon pool allows for accounting for carbon emissions from decaying logging debris and changes in dead wood stocks under different logging scenarios.
Harvested wood products	✓/✗	Carbon stored in harvested wood products continues to be sequestered off-site for varying periods, depending on product type and end use. Inclusion of this pool allows quantification of long-term carbon storage in durable wood products such as roundwood, sawnwood, and plywood, especially under IFM activities that alter harvest plans. Only long-lived harvested wood products such as sawn timber, plywood, and other construction-grade materials are included in this carbon pool. Short-lived wood products, such as fuelwood or paper pulp, which typically releases carbon emissions within a short period after harvest, are excluded to ensure conservative and accurate quantification of net GHG benefits. Accounting follows IPCC 2006 Guidelines using decay functions or half-life estimates, and must be verifiable using local utilisation data or default Tier 1 values. This pool is excluded for IFM activities where harvesting ceases.
Litter	✗	The litter pool comprises fine woody debris, fallen leaves, and organic matter on the forest floor, which tends to reach equilibrium relatively quickly. Although changes in forest structure can influence litter dynamics, its exclusion is a conservative approach given its smaller size and shorter-term variability.
Soil organic carbon	✗	Improved forest management practices typically have minimal effects on soil carbon, especially in the absence of intensive disturbances.

	Carbon Pool	Included	Description
			Any minor increases in soil carbon resulting from the project activity are considered de minimis, leading to the conservation exclusion of this carbon pool.

3.5 GHG Emission Sources

This subsection outlines the relevant GHG emission sources that must be considered within the defined project boundaries.

Table 7: Applicable GHG Emission Sources for IFM Project Activities

	Sources	Gas	Included	Description
Baseline and Project	Burning of woody biomass	CO_2	✗	Emissions from burned biomass are estimated from changes in carbon stocks.
		CH_4	✓/✗	Emissions from the open burning of woody biomass shall be included in the GHG boundary only when the practice is permitted and demonstrably conducted under the baseline or project scenario, and the emissions are expected to be material. Where burning is absent or prohibited in both scenarios, methane emissions are excluded as de minimis.
		N_2O	✓/✗	Emissions from biomass burning shall only be included in the project GHG boundary where the practice of burning is legally permitted, historically practiced or intended under the baseline or project activity, and emissions are expected to be material. In the absence of such conditions, this source is excluded as de minimis.
	Emission from nitrogen fertilizer	CO_2	✓/✗	Conservatively excluded if nitrogen fertiliser is rarely used in baseline forest management. Conditional only if baseline management such as planted/plantation forest regularly applies fertiliser.
		CH_4	✗	Conservatively excluded. Methane emissions from nitrogen fertiliser use are considered de minimis and not relevant to IFM projects.

<table>
<tr><th>Sources</th><th>Gas</th><th>Included</th><th>Description</th></tr>
<tr><td></td><td>N_2O</td><td>✓/✗</td><td>The most significant emission from nitrogen-based fertiliser use in land management.

Conservatively excluded unless fertiliser was used in the baseline. Conditional if the baseline scenario involves fertilisation, which shall be quantified and included.</td></tr>
<tr><td rowspan="2">Combustion of fossil fuels (e.g. by vehicles, chainsaws, or heavy equipment)</td><td>CO_2</td><td>✓/✗</td><td>Emission from fossil fuel combustion shall be conditionally included based on the IFM activity and whether operational fuel use differs significantly between the baseline and project scenarios.

Example:
<table>
<tr><td>Extension of Rotation Age</td><td>CO_2 is excluded, unless fuel usage pattern differs substantially from the baseline. Typically, longer harvest intervals lead to similar or reduced fuel emissions.</td></tr>
<tr><td>Enhanced Silvicultural Practices</td><td>CO_2 is conditionally included if mechanised interventions such as thinning or replanting increase fuel use relative to a non-logged baseline</td></tr>
<tr><td>Logging to Protection</td><td>CO_2 is included if significant. Logging ceases under the project, leading to reduced or no fuel use. If large emissions reductions from avoided fuel use are claimed, CO_2 must be included</td></tr>
<tr><td>Reduced Impact Logging</td><td>CO_2 is conservatively excluded, as improved efficiency leads to reduced emissions.</td></tr>
</table></td></tr>
<tr><td>CH_4</td><td>✓/✗</td><td>Emissions from fossil fuel combustion are typically minor but must be included when project operations involve sustained or intensive fossil fuel use.

Example:
<table>
<tr><td>Extension of Rotation Age</td><td>Excluded. No significant increase in combustion expected. CH_4 emissions are de minimis</td></tr>
</table></td></tr>
</table>

Sources	Gas	Included	Description
			Enhanced Silvicultural Practices: Conditionally included if activities such as tractor-aided thinning or intensive planting increase fuel use. Logging to Protection: CH_4 emission is included if significant. If large emissions reductions from avoided fuel use are claimed, CH_4 must be included Reduced Impact Logging: Conservatively excluded. Improved logging reduces machine hours and CH_4 output.
	N_2O	✓/✗	N_2O emissions from fossil fuel combustion are typically low but shall be included if mechanised operations or diesel equipment usage is extensive and materially changes between baseline and project. Example: Extension of Rotation Age: Excluded. N_2O emissions are de minimis. Enhanced Silvicultural Practices: Conditionally included if activities such as tractor-aided thinning or intensive planting increase fuel use. Logging to Protection: Conditionally included if significant contribution is expected. Reduced Impact Logging: Conservatively excluded. Improved logging reduces machine hours and N_2O output.

4 Baseline and Additionality

1. This section outlines the procedures for establishing and reassessing the baseline scenario and demonstrating additionality for IFM projects under the FCO framework. A robust baseline scenario is essential to conservatively estimate GHG emissions or removals that would occur in the absence of project intervention. Additionality ensures that project activities result in real, measurable climate benefits beyond business-as-usual practices.

2. This section applies to project activities implemented within two main forest types:

   Natural Production Forests
   In Peninsular Malaysia, timber harvesting activities in natural production forests are governed under a structured forest management framework that applies the principles of SFM. One of the

core components of SFM is Selective Management System (SMS) is implemented through a 25-30 year cutting cycle and includes three operational phases: pre-harvesting, harvesting, and post-harvesting[5]. Harvest volumes are regulated through state-level Annual Allowable Cut (AAC), ensuring long-term sustainability of timber yield and standing stock.

Planted/Plantation Forests
Planted forest/plantation forests are managed on fixed rotations with intensive silviculture. Forest managers use fast growing hardwood timber species, rubberwood[6] and other native species that can be harvested as early as 5-20 years[7]. Activities in planted/plantation forests include site preparation, planting, fertilisation, thinning, harvesting, and replanting. Clear-felling is commonly practiced at harvest, followed by immediate replanting, as required by licensing terms or legal obligations[8].

4. Project proponents must justify their choice of approach based on site conditions and data availability and obtain the approval with the respective State Forestry Department.

5. Throughout all approaches, the principle of conservativeness is applied, such as baseline assumptions, parameters and data that should be chosen such that emission reductions are more likely to be under-estimated than over-estimated.

6. Project proponents must follow a transparent evidence-based approach, and where applicable, may supplement site-level documentation with regional or jurisdictional assessments in line with international standards

4.1 Baseline Determination and Additionality Assessment

The baseline scenario represents the most likely land use or management practices that would occur in the absence of the project. It serves as the reference point for estimating GHG emissions or removals.

To determine and justify this scenario, Project Proponents should refer to the **FCO Tool: Baseline Determination and Additionality Assessment.** This standardised tool guides Project Proponents through a series of steps to ensure that the selected baseline is realistic, evidence based and conservative.

4.1.1 Baseline Scenario Determination

[5] *Life Cycle Assessment on Log Harvesting from Natural Forest in Peninsular Malaysia, Gan KS, Zairul AR, Geetha R & Khairul M, Forest Products Division, Forest Research Institute, Malaysia 52109 Kepong, Selangor, October 2020,* https://info.frim.gov.my/infocenter_applications/jtfsonline/jtfs/v33n2/213-223.pdf
[6] *Developments in Forest Plantations in Malaysia - Strategies and Challenges, Abdul Razak Mohd Ali, Forest Research Institute, Malaysia 52109 Kuala Lumpur, Malaysia, 1997,* https://info.frim.gov.my/infocenter_applications/ecompendium/FileCompendium/ec674.pdf
[7] *Sub-Technical Working Group Feedback*
[8] *Is Plantation Forestry a Wise Investment? A Perspective from Malaysia's Initiatives, Abd Latif M, Wan Rasidah K & Ahmad Zuhaidi Y, Forest Research Institute Malaysia, April 2018,*

1. As per the applicability conditions, the project must demonstrate a baseline scenario of forest management practices, using robust and verifiable evidence. Acceptable sources include, but are not limited to:
   a. Approved Forest Management Plans (FMPs);
   b. Forest inventory data and harvesting permits;
   c. Log removal reports, concession-level silvicultural records, or third-party forestry consultant assessments;
   d. Remote sensing data to demonstrate past harvesting trends; or
   e. Where project-specific data are unavailable, credible external sources such as regional or jurisdictional baseline assessments may be referenced, provided they are demonstrably applicable to the forest type, management context, and jurisdiction of the project.

2. Baseline scenarios with no timber harvesting or management without a timber harvesting objective must be excluded as per the methodology applicability conditions.

3. Project proponent must identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project area in the absence of the project activity. The scenario must be feasible for the Project Proponents considering relevant national or state level policies such as historical land uses, practices, and economic trends.

4. The baseline scenario above represents the most likely land use or management practices that would occur in the absence of the project. It serves as the reference point for estimating GHG emissions or removals. To determine and justify this scenario, Project Proponents should refer to the **FCO Tool: Baseline Determination and Additionality Assessment**. This standardised tool guides Project Proponents through a series of steps to ensure that the selected baseline is realistic, evidence based and conservative

5. IFM projects in these forests must demonstrate that proposed activities result in measurable GHG emission reductions or removals beyond the baseline. Activities such as rotation age extension must justify any deviation from the economically optimal harvest schedule. Enhanced silvicultural practices may only be credited where the baseline does not already include similar interventions. Where the baseline involves immediate and intensive replanting, project scenario that introduce delayed harvest or regrowth emissions must show significant additional carbon stock accumulation to be eligible.

6. To satisfy this requirement, Project Proponents need to gather historical evidence of forest use. Documentation such as past timber harvest records, log extraction volumes, logbooks or removal permits, forest management plans from previous management periods, and records of logging infrastructure (e.g. roads, skid trails, log yards) should be compiled. These records demonstrate how the forest was managed and are the foundation for projecting the trend of the same management.

7. If remote sensing data such as satellite imagery or aerial LiDAR is available, it should be used to quantify canopy changes or logging patterns over the lookback period. The inclusion of historical practices is critical to ensure the baseline is credible, and not an inflated scenario. In other words, the baseline must represent a continuation of documented trends or a legally/financially plausible

intensification of those trends supported by evidence, rather than an unrealistic escalation of harvesting intensity.

4.1.2 Additionality Assessment

Project Proponents should refer to the **FCO Tool: Baseline Determination and Additionality Assessment** for additionality assessments.

4.2 Reassessment of Baseline

1. The baseline scenario once established and validated, may require periodic reassessment throughout the project crediting period to reflect evolving conditions, regulations, or improved data availability.

2. Baseline scenario must be re-evaluated at the beginning of each new crediting period. Updates must reflect material changes in laws, policies, concession terms, or management practices.

3. Reassessment of the baseline scenario may occur under the following circumstances, including but not limited to:

    a. At the start of each new crediting period, if the project is applying for renewal under the FCO Program;
    b. Changes in national or subnational laws or policies that materially impact forest management regimes;
    c. Enactment or amendment of carbon licensing frameworks, such that the legal feasibility or economic plausibility of the original baseline scenario is affected;
    d. Availability of new or significantly improved data sources or analytical tools that could reduce uncertainty or improve the precision of baseline quantification; or
    e. If there are significant changes observed

4. The baseline may also be reassessed at the discretion of the Project Proponent if it improves methodological credibility, and must be transparently documented and subject to validation before use in crediting.

Any methodological updates or new national reference data must be incorporated where applicable.

5 Quantification of Estimated GHG Reductions and Removals

This section outlines the methodology for calculating the GHG emission reductions achieved through IFM project activities. It provides a structured approach to quantify the difference between baseline emissions (what would have occurred without the project) and actual project emissions (with IFM interventions in place).

5.1 Baseline Emissions

The baseline emissions represent the GHG emissions and removals that would have occurred in the absence of the project activity, based on the baseline scenario determined in Section 4.2. This includes changes in carbon stocks across selected carbon pools and relevant GHG sources and sinks.

Baseline emissions shall be quantified using stratified carbon stock data and documented harvesting schedules in line with the forest management plan that would have prevailed without the project. If stratification was applied under Section 4.4, baseline carbon stock estimations must be performed per stratum.

The total GHG emissions in the baseline for each stratum i in year t, are calculated by summing the net changes in carbon stocks for each carbon pool and converting them to CO_2 equivalent emissions, as shown below :

Equation 1: Net GHG Emissions in the Baseline per Stratum

$$GHG_{bsl,i} = \sum_{t}^{t^*} \left(\Delta C_{ABG,bsl,i,t} + \Delta C_{BGB,bsl,i,t} + \Delta C_{DW,bsl,i,t} + \Delta C_{HWP,bsl,i,t} - GHG_{bsl,i,t} \right) \quad \textbf{(1)}$$

Where:

Variable	Description	Unit
$\boldsymbol{GHG_{bsl,i}}$	Baseline emissions per stratum i	tCO_2e
$\boldsymbol{\Delta C_{ABG,bsl,i,t}}$	Change in the **above ground** carbon stocks in tree biomass per stratum i in year t in the baseline scenario	$tCO_2e\ yr^{-1}$
$\boldsymbol{\Delta C_{BGB,bsl,i,t}}$	Change in the **below ground** carbon stock biomass per stratum i in year t in the baseline scenario (if included)	$tCO_2e\ yr^{-1}$
$\boldsymbol{\Delta C_{DW,bsl,i,t}}$	Change in the carbon stock of **deadwood** per stratum i in year t in the baseline scenario (if included)	$tCO_2e\ yr^{-1}$
$\boldsymbol{\Delta C_{HWP,bsl,i,t}}$	Change in the carbon stock of **harvested wood product** per stratum i in year t in the baseline scenario (if included)	$tCO_2e\ yr^{-1}$
$\boldsymbol{GHG_{bsl,i,t}}$	Net emissions from machinery, site disturbances or biomass burning per stratum i in year t in the baseline scenario (if included)	$tCO_2e\ yr^{-1}$
$\boldsymbol{t}$	1, 2, 3 …t^* years elapsed since the project start date	-

The detailed calculation methods for each carbon pool and GHG emission source are specified in the **FCO Tool: GHG Quantification Equations.**

The amount of change estimation for GHG emissions from biomass burning, fossil fuel use or from the use of nitrogen-based fertiliser in the baseline need to be included in the equation, in the event that the implementation of the project significantly reduces GHG emissions from the baseline or may be set to zero according to conservative guidelines.

The total baseline emissions are then calculated as the sum of all baseline emissions per stratum i in the eligible project areas, as follows:

Equation 2: Total Baseline Emission

$$GHG_{bsl} = \sum_{i=1}^{M_{bsl}} GHG_{bsl,i} \quad (2)$$

Where:

Variable	Description	Unit
$\boldsymbol{GHG_{bsl}}$	Total baseline emissions from all strata in the eligible project area	tCO_2e
$\boldsymbol{GHG_{bsl,i}}$	Baseline emissions per stratum i	tCO_2e
$\boldsymbol{i}$	1, 2, 3 …M_{bsl} strata in the baseline scenario	-

5.1.1 Activity-specific Baseline Emissions Quantification Application

The baseline emissions must be estimated separately for each IFM activity type implemented within the project. Each activity requires tailored equations, reflecting the different forest management interventions and expected changes in carbon stock, in accordance with the activity specific applicability conditions set out in Section 2.1 to 2.3.

Table 8: Baseline Condition and Applicable Forest Type for Each IFM Activity

IFM Activity	Applicable Forest	Baseline Condition
Extension of Rotation Age	• Production Forest • Planted/Plantation Forest	• Trees harvested at economic maturity
Enhanced Silvicultural Practices	• Production Forest • Planted/Plantation Forest	• Forest left unmanaged, slow regrowth • Forests continue with routine replanting activities post-harvest
Conversion from Logging to Protection	• Production Forest	• Ongoing selective logging under SMS or legal harvesting
Reduced Impact Logging	• Production Forest • Planted/Plantation Forest	• Conventional logging with collateral damage

Project proponents shall quantify baseline emissions specific to the selected IFM activity. The quantification must apply the appropriate carbon pools, emission factors, and conversion parameters per stratum.

If multiple IFM activities are implemented within a single project boundary, proponents must calculate and report baseline emissions separately for each IFM activity and applicable strata, then aggregate the results.

5.2 Project Emissions

1. Project emissions refer to GHG emissions and removals occurring as a result of project activities. These estimates represent the actual performance of the project in contrast to the baseline scenario and form a key component in calculating the net GHG benefit.

2. Carbon stock changes under the project scenario must be quantified for each carbon pool that is included in the project, within each stratum, and for each reporting year. All carbon stock changes must be determined using verifiable field measurements, models or remote sensing consistent with the procedures outlined in the **FCO Tool: GHG Quantification Equations**.

3. The general equation for change in carbon stock of project activity for IFM activities:

Equation 3: Change in Carbon Stock in the Project Scenario

$$\Delta C_{p,i,t} = C_{p,i,t2} - C_{p,i,t1} \tag{7}$$

Where:

Variable	Description	Unit
$\Delta \boldsymbol{C_{p,i,t}}$	Change in carbon stock of project activities in stratum i between year t_2 and t_1	t C
$\boldsymbol{C_{p,i,t2}}$	Carbon stock at year t_2 in stratum i	t C
$\boldsymbol{C_{p,i,t1}}$	Carbon stock at year t_1 in stratum i	hectare
$\boldsymbol{i}$	1, 2, 3 $\ldots M_p$ strata of project activities	-
$\boldsymbol{t}$	1, 2, 3 $\ldots t^*$ years after project activities	year

4. In order to determine the GHG emissions or removals in the project scenario, the general equation is as follows:

Equation 4: GHG Emissions or Removals in the Project Scenario

$$GHG_{p,i} = \left(\sum_{t}^{t*} \Delta C_{p,i,t} \right) \times CF \times \frac{44}{12} \tag{8}$$

Where:

Variable	Description	Unit
$\boldsymbol{GHG_{p,i}}$	Project emissions per stratum i	t CO_2e
$\Delta \boldsymbol{C_{p,i,t}}$	Change in carbon stock of project activities per stratum i in year t in project scenario	$tCO_2e\ yr^{-1}$
$\boldsymbol{CF}$	Carbon fraction of dry biomass (default 0.47 as per local IPCC Tier 2 values)	-
$\boldsymbol{\frac{44}{12}}$	Molecular weight ratio of CO_2 to carbon	-
$\boldsymbol{i}$	1, 2, 3 $\ldots M_p$ strata of project activities	-
$\boldsymbol{t}$	1, 2, 3 $\ldots t^*$ years after project activities	year

5. The total project emissions are then calculated as the sum of all project emissions per stratum i in the eligible project areas, as follows:

Equation 5: Total Project Emissions from All Strata

$$GHG_p = \sum_{i=1}^{M_p} GHG_{p,i} \quad \textbf{(9)}$$

Where:

Variable	Description	Unit
GHG_p	Total project emissions from all strata in the eligible project area	t CO_2e
$GHG_{p,i}$	Project emissions per stratum i	t CO_2e
i	1, 2, 3 …M_p strata of project activities	-

6. Project emissions must be quantified separately for each IFM activity and for each stratum, if stratification is used. Allometric equations and expansion factors used must be validated and appropriate to forest type, ecological conditions, and tree species.

7. Emissions associated with fuel consumption, transport, and other operational activities must be estimated if material, as described in Section 3.4. Where emissions are negligible, they may be excluded with justification.

5.3 Leakage Emissions

1. Leakage refers to unintended GHG emissions outside the project boundary caused by project activities[9]. This section provides the approach for identifying, assessing and accounting for leakage to ensure net emission reductions or removals are accurately quantified and not overestimated.

2. In IFM projects, only activity-shifting leakage and market leakage are relevant. Activity-shifting leakage occurs when the activity that causes carbon loss in the project area is displaced outside the project boundary. Market leakage arises if reduced timber output from the project area causes higher wood prices or unmet demand, prompting increased harvest in non-project forests.

5.3.1 Activity-shifting leakage

1. Activity-shifting leakage refers to situations where the implementation of project activities displaces harvesting or forest degradation activities to other forest under the control of the Project Proponent.
2. Activity-shifting leakage must be assessed whenever a project reduces timber production. In Malaysia's natural production or planted/plantation forests, reducing harvest levels or converting a

[9] *5.3.3. Leakage, Land Use, Land-Use Change and Forestry, IPCC, 2000 - Robert T. Watson, Ian R. Noble, Bert Bolin, N. H. Ravindranath, David J. Verardo and David J. Dokken (Eds.)*

logged forest to a protected forest may incentivize shifting cutting to adjacent concessions or other forest areas. To mitigate this risk, the methodology requires Project Proponents to account for all forest lands under Project Proponent's control.

3. If the Project Proponent **does not control any forest land outside the project boundary**, only market leakage applies, and activity-shifting leakage is considered not applicable.

4. For projects where activity-shifting is applicable, Project Proponents must demonstrate that no displacement of harvesting or wood production has occurred as a result of project implementation. This must be demonstrated through:

   a. Historical records from the project period showing no increase in harvesting on other lands under the same ownership or control

   b. Forest management plans or harvesting schedules prepared at least 24 months prior to the project start date, covering all forest lands under the proponent's control and evidence that implementation of these plans remained consistent with pre-project projections during the project period

5. Failure to provide adequate documentation at validation or during any subsequent verification period shall render the project ineligible for crediting for the affected reporting period.

6. Activity-shifting leakage risk for specific IFM activity is applicable only when timber production change is involved.

5.3.2 Market leakage

1. Market leakage is the indirect effect of supply and demand shifts. In Malaysia, timber and wood products serve both domestic and international markets. If an IFM project reduces harvest output, local buyers may source wood from outside the project, potentially increasing harvest rates in other forests.

2. Both natural production forest and planted/plantation IFM projects can induce market leakage. For natural production forests, high-value logs are often exported or sold nationally which could spur increased logging in unprotected forests if there is a reduction in the supply. For planted/plantation forests, projects that extend rotations or reduce thinning may also alter market supply. Because quantifying these market dynamics is complex hence a standard methodology is applied to capture market leakage by referencing to market share.

5.3.3 Estimation of Market Leakage

1. Market leakage is calculated by applying a derived market leakage factor to the difference in harvested biomass between baseline and project scenarios. Leakage is calculated as:

Equation 6: Market Leakage Quantification

$$LK_{ME} = LF_t \times \left(\Delta C_{p,t} - \Delta C_{bsl,t}\right) \qquad \textbf{(10)}$$

Where:

Variable	Description	Unit
$\boldsymbol{LK_{ME}}$	Leakage in year t	t CO_2e
$\Delta\boldsymbol{C_{p,t}}$	Net GHG removals in the project scenario subject to harvest in the monitoring interval ending at time t (t CO_2e / unit area)	t CO_2e
$\Delta\boldsymbol{C_{bsl,t}}$	Net GHG removals in the baseline scenario (without avoided emissions activity), subject to harvest in the monitoring interval ending at time t (t CO_2e / unit area)	t CO_2e
$\boldsymbol{LF_t}$	Leakage factor (percent) at time t	percent

2. The leakage factor (LF) is determined per the following stepwise process:
   a) Determine whether the project activity involves any permanent reduction in timber supply
   b) Determine the market share of the ultimate beneficiary of the timber production from national records.
   c) The value for (LF_t) is determined based on the comparison as follows:

Equation 7: Leakage Factor Determination

$$LF_t = \Delta TP_t \times MS_t \qquad \textbf{(11)}$$

Where:

Variable	Description	Unit
$\Delta\boldsymbol{TP_t}$	Reduction in Timber Production	percent
$\boldsymbol{MS_t}$	Market share of the ultimate beneficiary of the timber production from national records. *If market share is not available as per national records, then apply a default 20%*	percent

3. The Project Proponent must document harvest volumes and baseline assumptions to justify any exemption.

5.4 Net GHG Emission Reductions and Removals

The total net GHG emission reductions or removals is calculated as follows:

Equation 8: Net GHG Emission Reductions or Removals from Project Activity

$$NER = GHG_p - GHG_{bsl} - \boldsymbol{LK_{ME}} \qquad \textbf{(12)}$$

Where:

Variable	Description	Unit
$\boldsymbol{NER}$	Net CO_2 emissions reductions/removals from project activity	t CO_2e

Variable	Description	Unit
GHG_p	Total project emissions from all strata in the project scenario	t CO_2e
GHG_{bsl}	Total project emissions from all strata in the baseline scenario	t CO_2e
$LK_{ME,t}$	Market leakage in year *t*	t CO_2e

5.5 Uncertainty

Uncertainty in emissions and carbon stock change estimates for both the baseline and project shall be determined following the procedures outlined in **FCO Tool: GHG Quantification Equations**.

5.6 Calculation of Forest Carbon Units

The calculation of FCU units issued must account for the buffer credits deposited in the FCO Buffer Account. The number of FCU units is calculated as below:

Equation 9: Forest Carbon Units Calculation

$$FCU_t = (adj\_NER_t) \times (1 - Buffer_t) \quad \textbf{(13)}$$

Where:

Variable	Description	Unit
FCU_t	Forest Carbon Units issued in year t	t CO_2e
adj_NER_t	Adjusted net emission reductions or removals in year t	t CO_2e
$Buffer_t$	Buffer contribution percentage in year t, as determined by **FCO Tool: Buffer Risk Assessment**	percentage

The buffer contribution to address non-permanence risk shall be determined using the **FCO Tool: Buffer Risk Assessment**, which applies a risk-based calculation across defined risk categories. Where a local jurisdiction has established a recognized buffer or insurance mechanism that demonstrably addresses non-permanence, the project may follow the jurisdictional approach, subject to MFF's approval and alignment with the tool .

6 Monitoring

1. Monitoring es an essential component of the FCO program to ensure that reported GHG emission reductions and removals are accurate, transparent and verifiable. This section outlines the requirements and procedures for monitoring carbon stock changes, GHG emissions, leakage, activity data, and other relevant parameters throughout the project crediting period.

2. All monitoring must be consistent with the methodological approach described in Section 6 and adhere to the principles set by the IPCC GPG for LULUCF, and relevant national forest carbon regulations.

6.1 Monitoring Plan

3. Project proponents must develop a Monitoring Plan, which outlines the procedures for measuring and verifying the project's carbon sequestration and emissions reductions, which contain at least the following sections:

    a. Description of each monitoring task to be undertaken
    b. Parameters to be measured
    c. Data to be collected and data collection techniques
    d. Frequency of monitoring
    e. Quality assurance and quality control procedures
    f. Data archiving procedures
    g. Roles, responsibilities and capacity of monitoring team and management

4. Project Proponents must ensure continued compliance with the applicability conditions throughout the project crediting period

6.2 Data and Parameters Not Monitored in the Baseline

Parameter	Description	Unit	Equation
CF	Carbon fraction of dry biomass	tC / t biomass	Equation 4 of FCO Tool: GHG Quantification Equation
BEF	Biomass Expansion Factor	Dimensionless	Equation 51 of FCO Tool: GHG Quantification Equation
Wood Density	Oven-dry mass per unit volume of wood, ρ	g/cm^3	Equation 15 of FCO Tool: GHG Quantification Equation
Root-to-shoot ratio, R	Ratio of belowground biomass to aboveground biomass	Dimensionless	Equation 4 of FCO Tool: GHG Quantification Equation
EF	Emission factors CO_2, CH_4, N_2O emissions per unit of activity	tCO_2e /unit of activity	Equations 43 and 54 of FCO Tool: GHG Quantification Equation

6.3 Data and Parameters Monitored in the Baseline and Project Scenario

Variables	Definition	Unit	Method of Monitoring
DBH	Diameter at breast height	cm	Field measurement in permanent sample plots
Tree height	Total height of trees in sample plots	m	Field measurement or imagery
Tree count	Number of trees per hectare	trees/hectare	Field inventory

Variables	Definition	Unit	Method of Monitoring
Species identification	Tree species or functional groups	n/a	Field inventory
Land use/ land cover	Type and extend of land cover	hectare	Remote sensing and ground truthing
Harvest volume	Volume of timber extracted during project activity	m^3	Operational records/ logbooks
Forest disturbances	Fire, pests, disease, illegal logging activities	Qualitative/ hectare	Field observation, satellite monitoring
Fuel use	Fuel consumption during forest operations	Liters/ year	Fuel logs, invoices, machinery logs
Area of project and strata	Area under each stratum or intervention type	Hectare	GIS-based delineation and remote sensing

6.4 Data and Parameters Available at Validation

Parameter	Description	Unit	Source/ Documentation
Legal rights to land and carbon	Proof of land tenure and carbon rights	n/a	Title deeds, concession agreements/ license, stakeholder consents
Historical harvest records	Past harvesting data to support baseline scenario	m^3/ year	Concession records, forestry department archives
Initial stratification	Maps and strata characteristics at project start	Hectare	GIS layers, shapefiles, baseline inventory
Allometric equations	Equations used to estimate biomass from DBH, height, and wood density	n/a	Peer-reviewed sources, national standards

7 General References

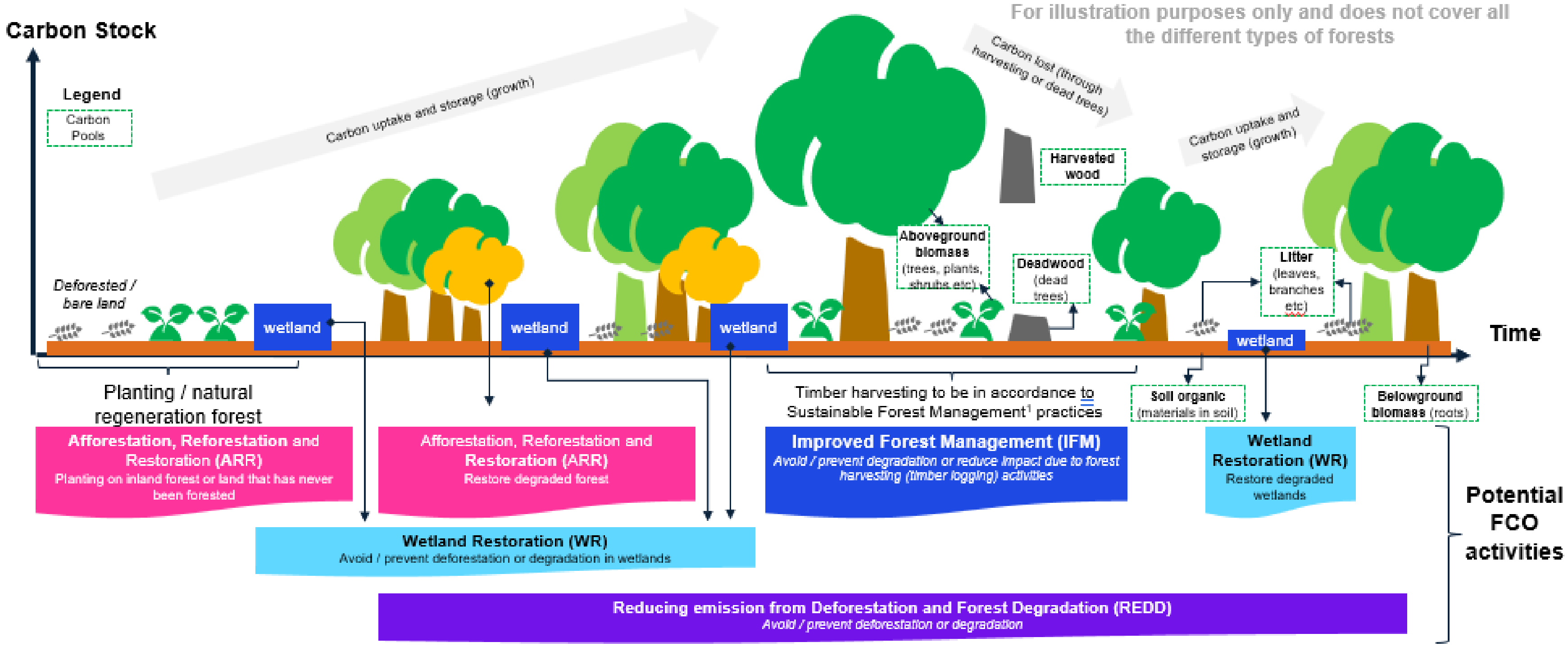
1. General Internet Research: Verified Carbon Standard, American Carbon Registry, Gold Standard, T-VER
2. Forest Research Institute Malaysia
3. IPCC, 2000 - Robert T. Watson, Ian R. Noble, Bert Bolin, N. H. Ravindranath, David J. Verardo and David J. Dokken (Eds.)
4. FAO (2023) Global Forest Resources assessment (FRA) Terms and Definitions.
5. IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 4 AFOLU
6. IPCC (2019) Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
7. Herfindahl-Hirschman Index (HHI): Definition, Formula, and Example, Investopedia, 12 June 2024
8. Ministry of Natural Resources and Environmental Sustainability (As of 04 June 2025)
9. Sub-TWG for IFM

IX. ANNEX

Annex 1: General Principles of the Forest Lifecycle

General Principles: Forest lifecycle and proposed FCO activities

The amount and distribution of carbon stored in various forest pools change over time, influenced by factors such as forest age, tree species, disturbances from natural events or human activities, and soil characteristics like texture and drainage.



[1]Source Malaysia Policy on Forestry on Selective Management System (SMS) - Implement sustainable logging practices by harvesting mature, high-quality trees, promoting the growth of younger trees, and maintaining the forest ecosystem through detailed inventories, replanting activities, and adherence to minimum cutting limits, with typical cutting cycles ranging between 25 to 30 years and each state having an Annual Allowable Coupe (AAC).