Gunung Mas Community Forest Restoration Project

Document Prepared by

ASIA ASSETS DEVELOPMENTS CO.,LTD

Project title	Gunung Community Forest Restoration Project
Project ID	*Verra Project ID*
Crediting period	01 January 2026 to 31 December 2066
Project lifetime	01 January 2026 to 31 December 2065; 40 years lifetime
(CCB) GHG accounting period	01 January 2026 to 31 December 2065; 40 years lifetime
Original date of issue	01 January 2026
Most recent date of issue	01 January 2026
Version	1.0

VCS Standard version	v4.4
CCB Standards version	v3.0
Project location	Gunung Mas Regency, Central Kalimantan Province, Indonesia
Project proponent(s)	Asia Assets Developments Co., Ltd. Contact: Alex Chi. Email: chi@asiaassetsdev.com Tel: 886-2-82269177
Validation/verification body	Earthood Services Limited New Delhi, India Contact: Archit Srivastava Email: architsrivastava@earthood.in Tel: +91 8758145642
History of CCB status	First application
Gold Level criteria	The Gunung Mas Community Restoration Project (GMCRP) is designed to meet the Gold Level criteria for exceptional community and biodiversity benefits under the CCB Standards, v3.0. The project's integrated approach to ecological restoration within the Heart of Borneo landscape and community empowerment through Social Forestry is summarized below. **GL1: Exceptional Climate Change Adaptability.** The project will result in an estimated net removal of ~13.36 million tCO_2e over the 40-year crediting period (net removal is currently calculated for 30 year crediting period, with the last 10 years of the crediting period dependent on 10 year renewal of PS licenses; total 40 year net removal will be calculated and provided at a later time). By aggressively reclaiming 19,008.60 hectares of critically degraded mining lands (ex-PETI) and scrub using resilient pioneer species (Black Locust and Melaleuca), the project restores critical ecosystem functions. The re-established forest cover will stabilize fragile sandy soils, increase moisture retention, and create a fire-resistant buffer against El Niño events, specifically protecting the upstream catchment areas of the Kahayan and Katingan watersheds. Finally, the project directly builds the adaptive capacity of the local communities. By supporting the revitalization of traditional livelihoods (Rotan and Rubber) in community zones and reducing economic vulnerability through the Subsidized Rice Logistics Program, the project reduces the communities' exposure to climate-induced price volatility. Improved watershed function from reforestation also enhances the reliability of water

resources for domestic use for the 7,145 community members across the 12 partner villages.

GL2: Exceptional Community Benefits with Direct Benefits, Community Engagement and Sustainability.

Poverty Alleviation and Livelihood Enhancement (SDG 1, 8): The project creates a "Restoration Economy," generating direct employment in nurseries and ranger patrols for the 12 distinct village entities. It diversifies income by technically supporting the value chains for Rotan (Rattan) and Rubber in off-site community zones. A dedicated micro-finance mechanism provides capital for community members to upgrade their processing equipment, diversifying the local economy beyond the allure of illegal gold mining (PETI).

Food Security (SDG 2): To address the high cost of living and ensure Zero Hunger, the project establishes a Subsidized Rice Distribution Channel. This logistics network ensures that households in remote riverine villages have access to affordable staple food year-round, insulating them from price spikes caused by difficult river transport logistics.

Empowerment and Institutional Strengthening (SDG 5, 16): The project is built on the foundation of Indonesia's Social Forestry (Perhutanan Sosial) program. By channeling all activities through the 18 legally recognized community institutions (comprising 10 Hutan Adat, 4 Hutan Desa/LPHD, and 4 Hutan Kemasyarakatan/HKm), the project strengthens their land tenure and enhances governance capacity. Gender equality is promoted through requirements for inclusive participation in the cooperatives.

Access to Essential Services (SDG 3, 6): A core component of the benefit-sharing mechanism is the Community Development Fund. This will address critical infrastructure gaps identified in the baseline (specifically the centralization of health services at the subdistrict level). The fund will support the establishment and staffing of Village-Level Health Posts (Poskesdes) to bridge the gap for the 7,145 residents who currently lack direct access to the single Puskesmas in their subdistrict. Additionally, investment in clean water reservoirs will protect the community from river pollution.

GL3: Exceptional Biodiversity Benefits with efforts to protect endangered species, restore habitats, and maintain ecosystem functions.

The project is located in the Kalimantan Lowland Rainforest ecosystem, a key part of the Heart of Borneo conservation priority, and will generate exceptional biodiversity outcomes:

First, the project will reclaim barren mining lands and degraded shrubland. By planting fast-growing Black Locust and Melaleuca, the project rapidly re-establishes a continuous canopy structure. This creates a vital "Emerald Corridor" that physically reconnects fragmented forest patches between the Kahayan and Katingan river ecosystems.

Next, this connectivity allows for the movement and genetic exchange of globally significant species. The restored cover provides visual screening and travel routes for the Critically Endangered Bornean Orangutan (Pongo pygmaeus), the Critically Endangered Sunda Pangolin (Manis javanicus), and the Vulnerable Sun Bear (Helarctos malayanus), which are currently isolated in fragmented remnant forests.

	Finally, the project protects High Conservation Value (HCV) Flora through active guardianship. While the project plants pioneer species for land reclamation, the "Guardian" patrol teams actively monitor and protect existing wild populations of threatened native giants such as Ulin (Eusideroxylon zwageri) and Agarwood (Aquilaria spp.) found in the surrounding landscape, preventing illegal logging and allowing natural regeneration to occur under the new canopy.[1] Ultimately, the project generates exceptional biodiversity outcomes by restoring 19,008.60 ha of degraded habitat, directly contributing to the conservation of threatened species and strengthening ecosystem health (SDG 15).
Expected verification schedule	TBD
Prepared by	

[1] **Badan Pusat Statistik (BPS) Kabupaten Gunung Mas.** (2023). *Kecamatan Damang Batu Dalam Angka 2023.[* Available at: https://gumaskab.bps.go.id

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1 Summary of Project Details

Gunung Mas Community Restoration Project (GMCRP) will bring the following benefits for climate, community, and biodiversity, aligned with the 12 UN Sustainable Development Goals (SDGs) selected by the proponent.

1.1 Unique Project Benefits

Table 1. Unique Project Benefits

Outcome or impact estimated by the end of project lifetime	Section reference
1) Ecosystem Restoration and Sustainable Agri-Ecosystem Land Uses (SIGS): The project will establish 18 Sustainable Income Generating Scheme (SIGS) groups, corresponding to each Social Forestry license holder (Hutan Adat, LPHD, HKm). Inside the PAA (19,008.60 Ha): Activities focus on intensive Land Reclamation of ex-mining sites using Black Locust (Robinia pseudoacacia) and Cajeput (Melaleuca cajuputi) as phytoremediation pioneer species, alongside Enrichment Planting of High Conservation Value (HCV) Agarwood (Aquilaria spp.) using non-destructive microbial inoculation technology. Community Zones (Off-Site): The project will technically and financially support the revitalization of traditional Rotan (Rattan) and Rubber (Karet) gardens to boost local incomes. Food Security: To address high living costs and ensure Zero Hunger (SDG 2), the project establishes a Subsidized Rice Distribution Channel, providing affordable staple food to partner villages to reduce the economic pressure driving illegal mining (PETI) and logging activities identified in the RPHJP documents.[2]	*4.1.2, 4.1.3, 4.2.1, 4.2.4*
2) Strengthening Community Organizations and Improving Health Facilities: GMCRP will improve dental/oral health by adding a mobile dental annual service targeting schools in the sub-districts of Damang Batu, Miri Manasa, and Rungan Barat, where health facilities are currently minimal (e.g., only 2	*4.2.1, 4.4.1, 4.5*

[2] **Government of Indonesia, Rencana Pengelolaan Hutan Jangka Panjang (RPHJP) KPHP Unit XV Kahayan Hulu (2020-2029)**. *States threats from illegal mining (PETI) and logging.*

Puskesmas serve the entire Damang Batu sub-district).[3] The project will work with local clinics to increase healthcare capability by investing in telecommunication infrastructure for telehealth/telemedicine, linking international medical teams to these remote riverine villages. GMCRP will also build drinking water wells, reservoirs, and purification systems in the 12 partner villages to ensure access to safe water, addressing the water quality issues in the Kahayan and Katingan watersheds noted in the government baselines.[4] Baseline data indicates mercury contamination in the Kahayan River has reached levels of 2,260 ng/L, exceeding the national drinking water standard of 1,000 ng/L due to upstream gold mining.[5]	
3) Micro-finance Set Up: The GMCRP will revolve a micro-finance fund, micro-loans, and family savings systems to support SIGS activities. This is specifically designed to provide capital for Agarwood inoculation kits, Rotan processing tools, and Rubber productivity inputs. This financial mechanism provides a sustainable economic alternative to the high-risk, immediate-return nature of illegal mining, directly addressing the economic barriers identified in the baseline analysis (VT0001). Revenue from carbon credit sales will directly support these funds.	*4.2.1, 4.2.3*
4) Enhanced Forest Conservation and Law Enforcement: A participatory ranger force comprising government forestry officials (from KPHP Unit XV and XVI) and community watch-posts (Masyarakat Peduli Api/Hutan) will be established. They will be equipped and trained to address threats identified in the RPHJP, specifically encroachment for shifting cultivation and poaching of protected species like the Bornean Orangutan and Sun Bear.[6] Continuous forest conservation education programs will build sensitization and awareness of ecosystem protection among the 12 partner communities.	*4.2.1* *5.1.1* *5.2.1* *5.4.1*

[3] **Badan Pusat Statistik (BPS) Kabupaten Gunung Mas**. *Kecamatan Damang Batu Dalam Angka 2015* (Population: 4,034; Health Facilities: 2 Puskesmas).
[4] **RPHJP KPHP Unit XV Kahayan Hulu**. *Section II.8 Hidrologi* (Confirms status as critical upstream watershed for Kahayan and Katingan rivers).
[5] **Elvince, R., Inoue, T., et al.** (2008).] Assessment of Mercury Contamination in the Kahayan River, Central Kalimantan, Indonesia. Journal of Water and Environment Technology, (Confirms mercury levels exceed safety standards, justifying the Clean Water intervention for CCB Gold).
[6] **RPHJP KPHP Model Gunung Mas Unit XVI (2016-2025)**. *Table II.18 Data Fauna Langka* (Lists Orangutan, Sun Bear, and Hornbills as present in the landscape).

1.2 Standardized Benefit Metrics

Table 2. Standardized Benefit Metrics.

Category	Metric	Estimated by the end of project lifetime	Section reference
GHG emission reductions or carbon dioxide removals	Net estimated removals in the project zone, measured against the without-project scenario	13,357,314 tCO_2e[7]	3.2.4.2
	Net estimated reductions in the project zone, measured against the without-project scenario	Not Applicable	N/A
Forest[8] cover	For REDD[9] projects: Estimated number of hectares of reduced forest loss in the project zone measured against the without-project scenario	Not Applicable	N/A
	For ARR[10] projects: Estimated number of hectares of forest cover increased in the project zone measured against the without-project scenario.	19,008.60 Hectares	2.1.18 3.1.2
Improved land management	Number of hectares of existing production forest land in which IFM[11] practices are expected to occur as a result of project activities, measured against the without-project scenario	Not Applicable	N/A
	Number of hectares of non-forest land in which improved land management practices are expected to occur as a result of project activities, measured against the	Not Applicable	N/A

[7] Note on GHG Removals: This value represents the ex-ante estimated removals for the initial 30 years (2025-2055) of the project's 40-year crediting period
[8] Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO, or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests (VCS Program Definitions)
[9] Reduced emissions from deforestation and forest degradation (REDD) - Activities that reduce GHG emissions by slowing or stopping conversion of forests to non-forest land and/or reduce the degradation of forest land where forest biomass is lost (VCS Program Definitions)
[10] Afforestation, reforestation and revegetation (ARR) - Activities that increase carbon stocks in woody biomass (and in some cases soils) by establishing, increasing and/or restoring vegetative cover through the planting, sowing and/or human-assisted natural regeneration of woody vegetation (VCS Program Definitions)
[11] Improved forest management (IFM) - Activities that change forest management practices and increase carbon stock on forest lands managed for wood products such as saw timber, pulpwood, and fuelwood (VCS Program Definitions)

	without-project scenario		
Training	Total number of community members who are expected to have improved skills and/or knowledge resulting from training provided as part of project activities	About 10% of Total Population = ~715 persons (Based on approx. population of 7,145 in key villages)[12]	2.1.15 4.2.1 4.4.1
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	3,328 Females[13]	2.1.15 4.2.1 4.4.1
Employment	Total number of people expected to be employed in project activities[14], expressed as number of full-time employees[15]	1000	2.1.15 4.2.1 4.4.1
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	500	2.1.15 4.2.1 4.4.1
Livelihoods	Total number of people expected to have improved livelihoods[16] or income generated as a result of project activities	7,145 persons (Total population of the 12 partner villages and surrounding project zone - see footnote 11)	2.1.15 4.2.1 4.4.1
	Number of women expected to have improved livelihoods or income generated as a result of project activities	3,328 Females based on government data (see footnote 12)	2.1.15 4.2.1 4.4.1
Health	Total number of people for whom health services are expected to improve as a result	Dental service through the school system:	2.1.15

[12] **Badan Pusat Statistik (BPS) Kabupaten Gunung Mas.** (2023). Kecamatan Damang Batu Dalam Angka 2023. Available at: https://gumaskab.bps.go.id

[13] **Badan Pusat Statistik (BPS) Kabupaten Gunung Mas.** (2023). Kecamatan Damang Batu Dalam Angka 2023. Available at: https://gumaskab.bps.go.id

[14] Employed in project activities means people directly working on project activities in return for compensation (financial or otherwise), including employees, contracted workers, sub-contracted workers and community members that are paid to carry out project-related work.

[15] Full time equivalency is calculated as the total number of hours worked (by full-time, part-time, temporary and/or seasonal staff) divided by the average number of hours worked in full-time jobs within the country, region or economic territory (adapted from the UN System of National Accounts (1993) paragraphs 17.14[15.102];[17.28])

[16] Livelihoods are the capabilities, assets (including material and social resources) and activities required for a means of living (Krantz, Lasse, 2001. The Sustainable Livelihood Approach to Poverty Reduction. SIDA). Livelihood benefits may include benefits reported in the Employment metrics of this table.

[17] Well-being is people's experience of the quality of their lives. Well-being benefits may include benefits reported in other metrics of this table (e.g. Training, Employment, Livelihoods, Health, Education and Water), and may also include other benefits such as strengthened legal rights to resources, increased food security, conservation of access to areas of cultural significance, etc.

[18] Managed for biodiversity conservation in this context means areas where specific management measures are being implemented as a part of project activities with an objective of enhancing biodiversity conservation, e.g. enhancing the status of endangered species
[19] Per IUCN's Red List of Threatened Species
[20] In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit
[21] IUCN Red List of Threatened Species. Pongo pygmaeus (CR), Manis javanicus (CR), Helarctos malayanus (VU).

2 PROJECT DETAILS

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (VCS, 3.2, 3.6, 3.10, 3.11, 3.13, 3.14; CCB, G1.2)

The **Gunung Mas Community Restoration Project (GMCRP)** is a community-based ecological restoration initiative located in the Gunung Mas Regency, Central Kalimantan Province, Indonesia. The project zone encompasses **44,214 Ha** of state forest land managed under the Forest Management Unit (KPHP) Unit XV and Unit XVI. Within this landscape, the specific **Project Accounting Area (PAA)** totals **19,008.60 Ha**, comprised of 18 specific Social Forestry (*Perhutanan Sosial*) licenses held by local communities.

The project involves the afforestation, reforestation, and revegetation (ARR) of degraded lands distributed across the sub-districts of **Damang Batu, Miri Manasa, and Rungan Barat**. Geographic coordinates for the project area are approximately **113˚00'00" BT – 113˚40'00" BT** and **0˚40'00" LS – 1˚30'00" LS**.

The project is strategically stratified into two distinct Project Accounting Areas (PAAs) based on a rigorous geospatial analysis of the baseline land cover, totaling an eligible project area of **19,008 hectares**:

- **PAA 1: Intensive Reforestation & Reclamation (4,335.30 Ha):** This stratum combines critically degraded open lands ("Other Land"), mining tailings (*ex-PETI*), and severely degraded shrubland (*semak belukar*). These areas are characterized by sandy, toxic soils and high competition from invasive weeds (e.g., *Imperata cylindrica*). The intervention involves intensive site preparation and the planting of hardy, fast-growing pioneer species to rapidly re-establish canopy cover, fix nitrogen, and stabilize fragile soils.
  - **Species: Black Locust (*Robinia pseudoacacia*)** and **Cajeput (*Melaleuca cajuputi*)**.
  - **Justification:** Although *Robinia pseudoacacia* is a temperate pioneer, it is selected specifically for its proven efficacy in phytoremediation and nitrogen-fixation on degraded mine spoils.[22] It acts as a **sacrificial nurse**

[22] **Vlachodimos, K., et al.** (2013). Robinia pseudoacacia as a restoration strategy for reclaimed mine spoil heaps. (Validates nitrogen-fixing nurse crop function).

crop, rapidly stabilizing the soil structure and rebuilding organic matter to facilitate natural succession.[23] *Melaleuca* is selected for its native resilience to acidic, waterlogged conditions common in Central Kalimantan's riparian zones.

- **Density:** 1,000 trees/ha (High density for rapid canopy closure).

- **PAA 2: Enrichment of Degraded Forest (14,673 ha):** This PAA consists of forest that, while not recently cleared, is logged-over, unmanaged, and ecologically suboptimal with low carbon stock. In full compliance with VM0047 v1.1, project activities will focus on enhancing forest carbon stocks through enrichment planting to restore the forest's ecological integrity and biodiversity density.
  - **Species**: Enrichment planting of Robinia and Melaleuca in canopy gaps.
  - **Density**: 100 trees/ha (Low density to minimize disturbance to existing vegetation).

Led by project proponent Asia Assets Developments Co., Ltd. (AAD) and its local partners, the project's core activity is the restoration of lands that have been in a long-term state of degradation. This is confirmed by analysis of the **JRC Tropical Moist Forest (TMF) Transition Map**, which classifies the eligible project areas as 'Degraded' and 'Other land' (e.g., shrubland and grasslands), verifying their non-forested or degraded status for well over a decade. This restoration will be achieved through a combination of native species planting, assisted natural regeneration, and the development of sustainable agroforestry systems, all of which are implemented by and for the local community license holders.

GMCRP implements measures designed to protect the natural ecosystems in these PAAs, focusing on preventing the main drivers of degradation: illegal gold mining (Pertambangan Emas Tanpa Izin - PETI) and illegal logging. These activities provide new opportunities to change agents' behavior and include:

- **Increased employment opportunities** through community-managed nurseries, planting teams, and "Guardian" patrol activities.
- Implementation of **sustainable livelihood activities**, including revitalization of Rotan and Rubber value chains in community zones (off-site) and the development of Agarwood inoculation enterprises.
- **Food Security:** Establishment of a **Subsidized Rice Distribution Channel** to lower the cost of living and ensure food security for partner villages.

[23] Popescu, G., et al. (2024). Afforestation of Mine Waste Dumps: Adaptability of Robinia pseudoacacia. Notulae Botanicae Horti Agrobotanici Cluj-Napoca.

- **Training and equipping of community monitoring teams** to build local capacity for long-term forest stewardship and protection.
- **Empowerment of local communities** through the reinforcement of land tenure rights under the 18 Social Forestry licenses and the establishment of a Community Development Fund to address local infrastructure needs (Water/Health).

Project objectives and activities are designed to generate significant, verifiable benefits for the climate, local communities, and regional biodiversity.

Climate Objectives

- To generate net GHG removals of approximately **13,357,314** over the 40-year crediting period (net removal is currently calculated for 30 year crediting period, with the last 10 years of the crediting period dependent on 10 year renewal of PS licenses; total 40 year net removal will be calculated and provided at a later time) through large-scale restoration activities.

Community Objectives

- To improve community welfare by creating direct employment and establishing sustainable livelihoods through agroforestry and NTFP value chains (Agarwood, Rotan, Rubber), reducing poverty (SDG 1 & 8).
- To enhance food security and health by providing affordable staple food (Rice Program) and investing carbon revenues into clean water systems and mobile health clinics (SDG 2, 3, & 6).
- To strengthen local governance and promote gender equality by building the capacity of the Social Forestry institutions and ensuring equitable participation in project activities (SDG 5 & 16).

Biodiversity Objectives

- To maintain and restore critical habitat for viable populations of endemic and threatened species within the project area.
- Restore and connect fragmented habitats for High Conservation Value (HCV) fauna, specifically the Bornean Orangutan (Pongo pygmaeus), Sun Bear (Helarctos malayanus), and Hornbills (Buceros spp.).

Beyond climate mitigation, the project is strategically designed to deliver high-integrity co-benefits, aligning with the Climate, Community & Biodiversity (CCB) Standards. It aims

to restore critical habitat within the Heart of Borneo / Sundaland biodiversity hotspot, create sustainable livelihoods, and strengthen local governance.

Planting Strategy and Species Selection

The project's planting strategy is tailored to the baseline conditions of each Project Accounting Area (PAA), using a mix of native and resilient species selected for their ecological suitability, rapid growth, and value to local communities. Key species include **Black Locust (*Robinia pseudoacacia*)**, and **Cajeput Tree (*Melaleuca leucadendra*)**. These species were selected based on their native status (Melaleuca), proven resilience in tropical restoration, fire-resistant properties (Melaleuca), nitrogen-fixing capabilities (Robinia), and high biomass accumulation rates that support the project's climate objectives.

The planting density is stratified to match the restoration goals of each PAA:

- **PAA1 (Afforestation and Reforestation):** A density of **500 trees/ha (Robinia)** and **500 trees/ha (Melaleuca)** will be planted to rapidly establish canopy cover on the most degraded, non-forest lands.

  The species will be cross-planted to maximize soil recovery. Although thinning is not currently planned, it can be applied if needed in the future based on growth monitoring.

- **PAA2 (Enrichment):** A lower density of **50 trees/ha (Black Locust)** and **50 trees/ha (Melaleuca)** will be used for enrichment planting to enhance the carbon stock and biodiversity of the unmanaged forest without disrupting the existing ecosystem structure.

2.1.2 Audit History (VCS, 4.1)

Table 3. Audit History.

Audit type	Period	Program	Validation/verification body name	Number of years
N/A	N/A	N/A	N/A	N/A

2.1.3 Sectoral Scope and Project Type (VCS, 3.2)

Table 4. Sectoral Scope and Project Type.

Sectoral scope	14: Agriculture, forestry, and other land use
AFOLU project category [24]	Afforestation, Reforestation and Revegetation (ARR)
Project activity type	• Increasing vegetation cover through direct planting: Afforestation + Reforestation (PAA1) • Increasing vegetation cover through direct planting: Reforestation and Enrichment of the Biodiversity (PAA2)

2.1.4 Project Eligibility (VCS, 2.1.1, 3.1, 3.6, 3.8, 3.18, 4.1; APPENDIX 1 ELIGIBLE AFOLU PROJECT CATEGORIES for REDD; CCB Program Rules, 4.2.4, 4.6.4)

The scope of VCS 2.1.1 Program requirements has been discussed following:

1) The seven Kyoto Protocol greenhouse gases.

CO_2, Included

CH_4, Not Included

N_2O, Not Included

HFC_s, Not Included

PFC_s, Not Included

SF_6, Not Included

NF_3, Not Included

2) Ozone-depleting substances (ODS).

CFCs, Not Included

HCFCs, Not Included

Halons, Not Included

Methyl Bromide, Not Included

CCl4, Not Included

1,1,1-trichloroethane, Not Included

HBFCs, Not Included

3) Project activities supported by a methodology approved under the VCS Program through the methodology development and review process.

[24] See Appendix 1 of the VCS Standard

VCS VM0047 V 1.1

4) Project activities supported by a methodology approved under an approved GHG program, unless explicitly excluded (see the Verra website for exclusions).

N/A

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the Jurisdictional and Nested REDD+ (JNR) Requirements.

N/A

The scope of VCS 3.0 Program requirements has been discussed following:

VCS 3.1.1. Projects shall meet all applicable rules and requirements set out under the VCS Program, including this document. Projects shall be guided by the principles set out in Section 2.2.1.

Described above.

VCS 3.1.2 Projects shall apply methodologies eligible under the VCS Program. Methodologies shall be applied in full, including the full application of any tools or modules referred to by a methodology, noting the exception set out in Section 3.14.1.

The current applied methodology is VCS methodology VM0047 Version 1.1 in full and project activities have not been mandated by any law, statute, or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute, or other regulatory framework.

VCS 3.1.3 Projects shall apply the latest version of the applicable methodology in all cases unless a grace period applies to the project as set out in 3.22 below. Projects shall update to the latest version of the methodology when reassessing the baseline or renewing a crediting period.

The current applied methodology is VCS methodology VM0047 Version 1.1, May 14, 2025, which is the newest version. Also VCS Standard v4.7 16 April 2024. Project Template CCB 3.0 VCS 4.3.

VCS 3.1.4 Projects and the implementation of project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.

Project activities have not violated any applicable laws. (see section 3.1.2 and 3.1.5)

VCS 3.1.5 Where projects apply methodologies that permit the project proponent its own choice of model (see the VCS Program Definitions for the definition of model), the model shall meet the requirements set out in the VCS Methodology Requirements, and it shall be demonstrated at validation that the model is appropriate to the project circumstances (i.e., use of the model will lead to an appropriate quantification of GHG emission reductions or carbon dioxide removals).

Project uses VM0047 methodology standards and demonstrates all calculation according to the Methodology. (section 3.2)

VCS 3.1.6 Where projects apply methodologies that permit the project proponent to

choose a third-party default factor or standard to ascertain GHG emission data and any supporting data for establishing baseline scenarios and demonstrating additionality, such default factor or standard shall meet the requirements set out in the VCS Methodology Requirements.

All third-party default factors or standards to ascertain GHG emission data are quoted from FAO, IPCC, Indonesia Government publication and published scientific papers.

VCS 3.1.7 Where the rules and requirements under an approved GHG program conflict with the rules and requirements of the VCS Program, the rules and requirements of the VCS Program shall take precedence.

There is no conflict between the GHG program and VCS program in this project.

VCS 3.1.8 Where projects apply methodologies from approved GHG programs, they shall conform with any specified capacity limits (see the VCS Program Definitions for the definition of capacity limit) and any other relevant requirements set out with respect to the application of the methodology and/or tools referenced by the methodology under those programs.

The project follows the delineation of capacity limit.

VCS 3.1.9 Where Verra issues new VCS Program rules, the effective dates of these requirements are set out in Appendix 3 Document History and Effective Dates or equivalent for other program documents, and are listed in a companion Summary of Effective Dates document which corresponds with each update.

The most recent and effective version of VCS standards (v4.4) Project description document template (CCB 3.0 VCS 4.4) is used following the effective date.

CCB Program Rules, 4.2.4,4.6.4

CCB 4.2.4 VCS shall receive the validation and/or verification report and validation and/or verification statement within one year of the initiation of the relevant public comment period.

Project Complied

CCB 4.6.4 The public comment period should be completed before the start of the validation/verification body site visit, so that the validation/verification body may make appropriate enquiries onsite about any comments received. In the event that the public comment period ends after the site visit is complete, the validation/verification body shall give full consideration to any comments received and may need to return to the project site to do so.

The first Public comment will be listed after the project listing. The responses will be listed at section 2.3.10 Table 10 afterward.

VCS 3.2 AFOLU-Sepcific matter of VCS standard: 3.2.1-3.2.8

VCS 3.2.1 There are currently six AFOLU project categories eligible under the VCS Program.

The project is eligible under the scope of the VCS program as an afforestation, reforestation and revegetation (ARR) project. It does not include Reduced Emissions from Deforestation and Degradation (REDD), Improved Forest Management (IFM), agricultural land management (ALM), avoided conversion of grasslands and shrublands (ACoGS), and wetland restoration and conservation (WRC).

VCS 3.2.2 Where projects are located within a jurisdiction covered by a jurisdictional REDD+ program, project proponents shall follow the requirements in this document and the requirements related to nested projects set out in the Jurisdictional and Nested REDD+ Requirements.

The project is not a Jurisdictional and Nested REDD+ project.

VCS 3.2.3 Where an implementation partner is acting in partnership with the project proponent, the implementation partner shall be identified in the project description. The implementation partner shall identify its roles and responsibilities with respect to the project, including but not limited to implementation, management, and monitoring of the project, over the project crediting period.

No implementation partner is acting in partnership with the project proponent.

VCS 3.2.4 The project proponent shall demonstrate that project activities that lead to the intended GHG benefit have been implemented during each verification period in accordance with the project design. Where no new project activities have been implemented during a verification period, project proponents shall demonstrate that previously implemented project activities continued to be implemented during the verification period (e.g., forest patrols or improved agricultural practices of community members).

As this is before the first monitoring validation verification period, the intended GHG benefit has been implemented according to the project design and there are no new project activities.

VCS 3.2.5 For all IFM, Avoiding Planned Deforestation (APD) (except where the agent is unknown), Restoring Wetland Ecosystems (RWE), Avoiding Planned Wetland Degradation (APWD), Avoiding Planned Conversion (APC), and ALM project types, the project proponent shall, for the duration of the project, reassess the baseline every ten years.

The project areas include ARR which the reassessment of the baseline is not stipulated in VCS 4.4 and the project will reassess the baseline every year to two years according to the VCS methodology 0047.

VCS 3.2.6 The following shall apply with respect to the baseline reassessment:

1) The latest version of the VCS Program rules (including the latest version of the VCS Standard) and applied methodology, or its replacement shall be applied at the time of baseline reassessment. The grace periods for using the previous version of a methodology are set out in Section 3.22 and in the document history section of each VCS Program document.

   Project Complied.

2) The baseline shall be reassessed in accordance with the timelines in Section 3.2.5 above and shall be validated at the same time as the subsequent verification.

   Project Complied.

3) The reassessment will capture changes in the drivers and/or behavior of agents that cause the change in land use, hydrology, sediment supply and/or land or water management practices and changes in carbon stocks, all of which shall then be incorporated into revised estimates of the rates and patterns of land-use change and estimates of baseline emissions.

   The project reassessment will comply.

4) The validity of the original baseline scenario shall be reassessed. Such assessment shall include an evaluation of the impact of new relevant national and/or sectoral policies and circumstances on the validity of the baseline scenario. If still valid, the GHG emissions associated with the original baseline scenario shall be reassessed for the new baseline validity period following the provisions of the applied methodology. If no longer valid, the current baseline scenario shall be established in accordance with the VCS Program rules.

   The project reassessment will comply.

5) Ex-ante baseline projections beyond the baseline reassessment period specified in Section 3.2.5 above are not required.

   The project reassessment will comply.

6) Sections 1.14, 3.1-3.4, Section 4 and Section 5 of the project description shall be updated to reflect any changes as described in Section 3.2.6 (3) and any updates to the baseline emissions quantifications.

   The Project will comply.

VCS 3.2.7 The following shall apply with respect to Agricultural Land Management ALM baseline reassessment:

This project is not a ALM project.

VCS 3.2.8 Where ARR, ALM, IFM or REDD project activities occur on wetlands, the project shall adhere to both the respective project category requirements and the WRC requirements,

This project is not a project on wetland

Appendix 1 Eligible AFOLU Project Categories regarding ARR (A1.1)

VCS A1.1 Eligible ARR activities are those that increase carbon sequestration and/or reduce GHG emissions by establishing, increasing, or restoring vegetative cover (forest or non-forest) through the planting, sowing, or human-assisted natural regeneration of woody vegetation. Eligible ARR projects may include timber harvesting in their management plan.

Note – Tree planting activities on forest lands managed for wood products (i.e., with a forest management plan) are categorized as IFM project activities.

The Project Area definition of forest as set by the Indonesia Ministry of Environment and Forestry, who is the designated national authority (DNA) as "a land area of more than 0.25 hectares with trees higher than 5 metres at maturity and a canopy cover of more than 30 percent (reference 38) for more than 10 years.

The Gunung Mas Community Restoration Project Project is an afforestation, reforestation and revegetation (ARR) project and complied the VCS A1.1.

For Justifying and demonstrating that the project activity is included under VCS Scope 14, that the correct AFOLU project category was selected, and that all related category requirements are met as follows.

There are 2 project activities PAA1 and PAA2 both of which are eligible under ARR.

For projects seeking registration/validation approval, provide the relevant information to demonstrate that the project underwent public comment prior to the opening meeting with the validation/verification body and the validation report and validation statement was submitted within one year of the initiation of the public comment period.

Gunung Mas Community Restoration Project submitted: 2026 January 1

Public comment period: TBD

Public comment expiration date: TBD

The current applied methodology is VCS methodology VM0047

VVB on site validation: TBD.

The project was submitted on 2026 January 1, within 3 years of its project start date.

The Project meets all Verra specified deadlines.

2.1.5 Transfer Project Eligibility (VCS, 3.23, Appendix 2)

No CPA included in this project: Not applicable

2.1.6 Project Design (VCS, 3.6)

Indicate if the project has been designed as:

☐ Single location or installation

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

☐ Grouped project

2.1.6.1 Eligibility Criteria for Grouped Projects (VCS, 3.6; CCB, G1.14)

Not Grouped Project: Not applicable

2.1.7 Project Proponent (VCS, 3.7; CCB, G1.1)

Table 5. Project Proponent

Organization name	Asia Assets Developments Co., Ltd.
Contact person	Alex Chi
Title	Managing Director
Address	7F-8, No. 738 Zhongzheng Rd., Zhonghe Dist., New Taipei City 23511, Taiwan (R.O.C.)
Telephone	+886-2-82269177
Email	chi@asiaassetsdev.com

Organization name	Yayasan Antang Patagu Mahaga Lewu
Contact person	Apep
Title	President
Address	Jl. Kwitang Raya No 13, Gedung Graha Ketut Masagung lantai 4, Desa/Kelurahan Kwitang, Kec. Senen, Kota Adm. Jakarta Pusat, Provinsi DKI Jakarta, Kode Pos: 10420

Telephone	62-8128745881
Email	a.yusup1970@gmail.com

2.1.8 Other Entities Involved in the Project

2.1.9 Project Ownership (VCS, 3.2, 3.7, 3.10; CCB, G5.8)

The project area encompasses 19,008.60 Ha of state forest land located in Gunung Mas Regency. Legally, the land is designated as Production Forest (HP) and Limited Production Forest (HPT). Direct management authority over these lands is held by the 18 Social Forestry (Perhutanan Sosial) license holders (Hutan Adat, LPHD, HKm), while UPT KPHP Unit XV Kahayan Hulu and KPHP Unit XVI Gunung Mas function as the technical supervisors and facilitators for the government. The land cover was primarily secondary degraded forest, shrubland, and open land resulting from historical logging concessions (e.g., ex-HPH PT. Inhutani III) and subsequent illegal mining activities.[25]

Land Tenure: Project activities are implemented on lands covered by 18 Social Forestry licenses granted by the Indonesian Ministry of Environment and Forestry. These licenses provide long-term operational control for 35 years. Crucially, under Indonesian regulation (e.g., Permen LHK No. 9/2021), these Social Forestry permits are extendable, providing a clear legal pathway to secure tenure and ensure operational control for the project's full 40-year longevity, which is required to meet the permanence requirements of the VCS Standard.

Carbon Rights: The legal basis for the project's carbon rights is explicitly established in each of the 18 Social Forestry decrees. Under these permits, the community groups are granted the right to the "pemanfaatan jasa lingkungan" (utilization of environmental services). According to the prevailing Indonesian regulatory framework, including Ministry of Environment and Forestry Regulation No. 21/2022, carbon sequestration is defined as an environmental service. Therefore, the license holders possess the clear legal right to develop and benefit from carbon projects within their designated areas. The project structure, wherein Asia Assets Developments Co., Ltd. (AAD) and Yayasan Antang Patagu Mahaga Lewuact as technical and financial partners to the license-holding communities, and is designed to be fully compliant with these regulations.

[25] *RPHJP KPHP Unit XV Kahayan Hulu (2020-2029).* Government of Indonesia.

Ownership Structure:

- **Land Rights**: Held collectively by 18 Social Forestry license holders, granting them secure, long-term tenure. The 18 project areas are held by the local community institutions under 35-year Social Forestry licenses issued by the Indonesian Ministry of Environment and Forestry.
- **Implementation Rights**: Shared between community license holders and project partners through formal benefit-sharing agreements.
- **Carbon Credit Ownership**: Project Proponent owns full ownership of carbon credits issued, with benefits shared among community license holders and project stakeholders according to benefit-sharing agreements that are compliant with both Indonesian law and Verra standards.
- **Project Coordination**: Led by Asia Assets Developments Co., Ltd.

Legal Documentation: All ownership arrangements are supported by:

- The 18 original Social Forestry license decrees (Surat Keputusan) issued by the Ministry of Environment and Forestry.
- Community consent and participation agreements (FPIC documentation).
- Legally-binding benefit-sharing agreements defining carbon revenue distribution.
- Partnership agreements between AAD and Yayasan Antang Patagu Mahaga Lewu.

The Gunung Mas Community Forest Restoration Project is legally founded on the following 18 Social Forestry (Perhutanan Sosial - PS) licenses issued by the Indonesian Ministry of Environment and Forestry, granting the community institutions the right to manage the forest land.

No.	License Holder	Village(s)	Permit Number
1	HA Dayak Ot Danum Himba Antang	Rangan Hiran, Harowu	SK. 7911/MENLHK

2	HA Dayak Ot Danum Lowu Tumbang Mohuroi	Tumbang Mahuroi	SK. 7913/MENLHK
3	HA Dayak Ot Danum	Karetau Rambangun	SK. 7916/MENLHK
4	HA Dayak Ot Danum Lowu Karatau Sarian	Karatau Sarian	SK. 7914/MENLHK
5	HA Dayak Ot Danum	Tumbang Anoi	SK. 7915/MENLHK
6	HA Dayak Ngaju Lewu Tumbang Hatung	Tumbang Hatung	SK. 7912/MENLHK
7	HA Dayak Ngaju	Tumbang Kuayan	SK. 7917/MENLHK
8	HA Dayak Ot Danum Tbg.Maraya	Tumbang Maraya	SK. 7921/MENLHK
9	HA Dayak Ot Danum	Tumbang Marikoi	SK. 7923/MENLHK
10	HA Dayak Ot Danum Lowu	Tumbang Posu	SK.

	Tumbang Posu		7922/MENLHK
11	LPHD Harowu	Harowu	SK. 6603/MENLHK
12	LPHD Karatau Sarian	Karatau Sarian	SK. 8296/MENLHK
13	LPHD Rangan Hiran	Rangan Hiran	SK. 6608/MENLHK
14	LPHD Tumbang Maraya	Tumbang Maraya	SK. 8630/MENLHK
15	HKm Anoi Sangkuwak	Tumbang Anoi	SK. 5919/MENLHK
16	HKm Jaga Asam	Tumbang Posu	SK. 1276/MENLHK
17	HKm Marikoi Hapakat	Tumbang Marikoi	SK. 1277/MENLHK
18	HKm Sopan Lawang Bulan	Tumbang Mahuroi	SK. 6179/MENLHK

This structure ensures that the project operates with clear legal title to the carbon rights and that project benefits directly support the community development and forest stewardship objectives of the Social Forestry program, while maintaining full compliance with Verra ownership requirements.

2.1.10 Project Start Date (VCS, 3.8)

Table 6. Project Start Date

Project start date	**01-January-2026**
Justification	Project Activity started at the initiation of the project after Yayasan Antang Patagu Mahaga Lewu signed an agreement with 18 entities of Community//Social Forest permits. VCS Standard v4.4 (Section 3.8) and CCB Standards v3.0 (G1.9): The project start date of an AFOLU project is the date on which activities that lead to the generation of reductions or removals are implemented (e.g., preparing land for seeding, planting, changing agricultural or forestry practices, rewetting, restoring hydrological functions, or implementing management or protection plans). VCS Standard v4.4 (Section 3.8.2): Pipeline listing process shall be initiated within three years of the project start date. VCS Standard v4.4 (Section 3.8.3): Validation will be completed within eight years of the project start date. VM0047 v1.1 (Section 4.1(4)): The project start date is documented as the earliest of the following: a) The date on which site preparation activities began; b) **The land use change date**

2.1.11 Benefits Assessment and Project Crediting Period (VCS, 3.9; CCB, G1.9)

Table 7. Crediting Period

Crediting period	The project lifetime will be 40 years from the Project start date of 01-January-2026 and an end date of 31-December-2065 The GHG accounting period will be the same 40 years as the lifetime of the project
Start date of first or fixed crediting period	01-January-2026 and an end date of 31-December-2065

CCB benefits assessment period	01-January-2026 and an end date of 31-December-2065

2.1.12 Differences in Assessment/Project Crediting Periods (CCB, G1.9)

The GHG emissions accounting, climate adaptive capacity and resilience, community, and/or biodiversity assessment periods are identical for this project. The project lifetime will be 40 years commencing from 01-January-2026 and an end date of 31-December-2065. The ex-ante quantification of GHG removals in this document is presented for the initial 30 years, as the final 10 years are contingent upon the successful extension of the underlying Social Forestry permits.

2.1.13 Project Scale and Estimated Reductions or Removals (VCS, 3.10)

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

☐ < 300,000 tCO_2e/year (project)

☒ ≥ 300,000 tCO_2e/year (large project)

Table 8. Project Scale

Calendar year of crediting period	Estimated reductions (tCO_2e)	Estimated removals (tCO_2e)
01-Jan-2026 to 31-Dec-2026	0	139
01-Jan-2026 to 31-Dec-2027	0	2,326
01-Jan-2026 to 31-Dec-2028	0	13,597
01-Jan-2026 to 31-Dec-2029	0	40,411
01-Jan-2026 to 31-Dec-2030	0	87,147
01-Jan-2026 to 31-Dec-2031	0	154,552
01-Jan-2026 to 31-Dec-2032	0	235,229
01-Jan-2026 to 31-Dec-2033	0	325,602

01-Jan-2026 to 31-Dec-2034	0	424,257
01-Jan-2026 to 31-Dec-2035	0	508,603
01-Jan-2026 to 31-Dec-2036	0	589,443
01-Jan-2026 to 31-Dec-2037	0	641,063
01-Jan-2026 to 31-Dec-2038	0	679,230
01-Jan-2026 to 31-Dec-2039	0	698,456
01-Jan-2026 to 31-Dec-2040	0	707,876
01-Jan-2026 to 31-Dec-2041	0	698,502
01-Jan-2026 to 31-Dec-2042	0	673,721
01-Jan-2026 to 31-Dec-2043	0	673,571
01-Jan-2026 to 31-Dec-2044	0	630,072
01-Jan-2026 to 31-Dec-2045	0	608,380
01-Jan-2026 to 31-Dec-2046	0	579,756
01-Jan-2026 to 31-Dec-2047	0	547,791
01-Jan-2026 to 31-Dec-2048	0	535,997
01-Jan-2026 to 31-Dec-2049	0	524,014
01-Jan-2026 to 31-Dec-2050	0	510,258
01-Jan-2026 to 31-Dec-2051	0	473,158
01-Jan-2026 to 31-Dec-2052	0	454,617
01-Jan-2026 to 31-Dec-2053	0	434,675
01-Jan-2026 to 31-Dec-2054	0	414,303
01-Jan-2026 to 31-Dec-2055	0	419,719
Total number of years	30	70,851
Average annual ERRs		13,357,314

Note: *This ex-ante quantification table covers the initial 30 years of the project's 40-year crediting period. The quantification for the final 10 years (*01-January-2056 to 31-December-2065*) is contingent upon the successful extension of the underlying Social Forestry permits and will be calculated and included in a future project description update or monitoring report prior to the respective verification.*

2.1.14 Physical Parameters (CCB, G1.3)

Topography

The project area is located in the central interior of Kalimantan, positioned south of the Schwaner Mountain Range. Geologically, the region is part of the Sunda Shelf, characterized by a stable continental crust. The landscape is defined by a transition from the alluvial plains of the major rivers to the undulating hills of the interior production forests.

Based on the official RPHJP KPHP Unit XV Area Description, the topography of the project zone is varied but predominantly favorable for forestry activities. The landscape is dominated by flat to gently undulating terrain, which facilitates accessibility for planting and maintenance operations while minimizing the risk of severe erosion during site preparation. However, the northern reaches of the project zone (towards Damang Batu) feature steeper gradients typical of the foothills of the Schwaner range.

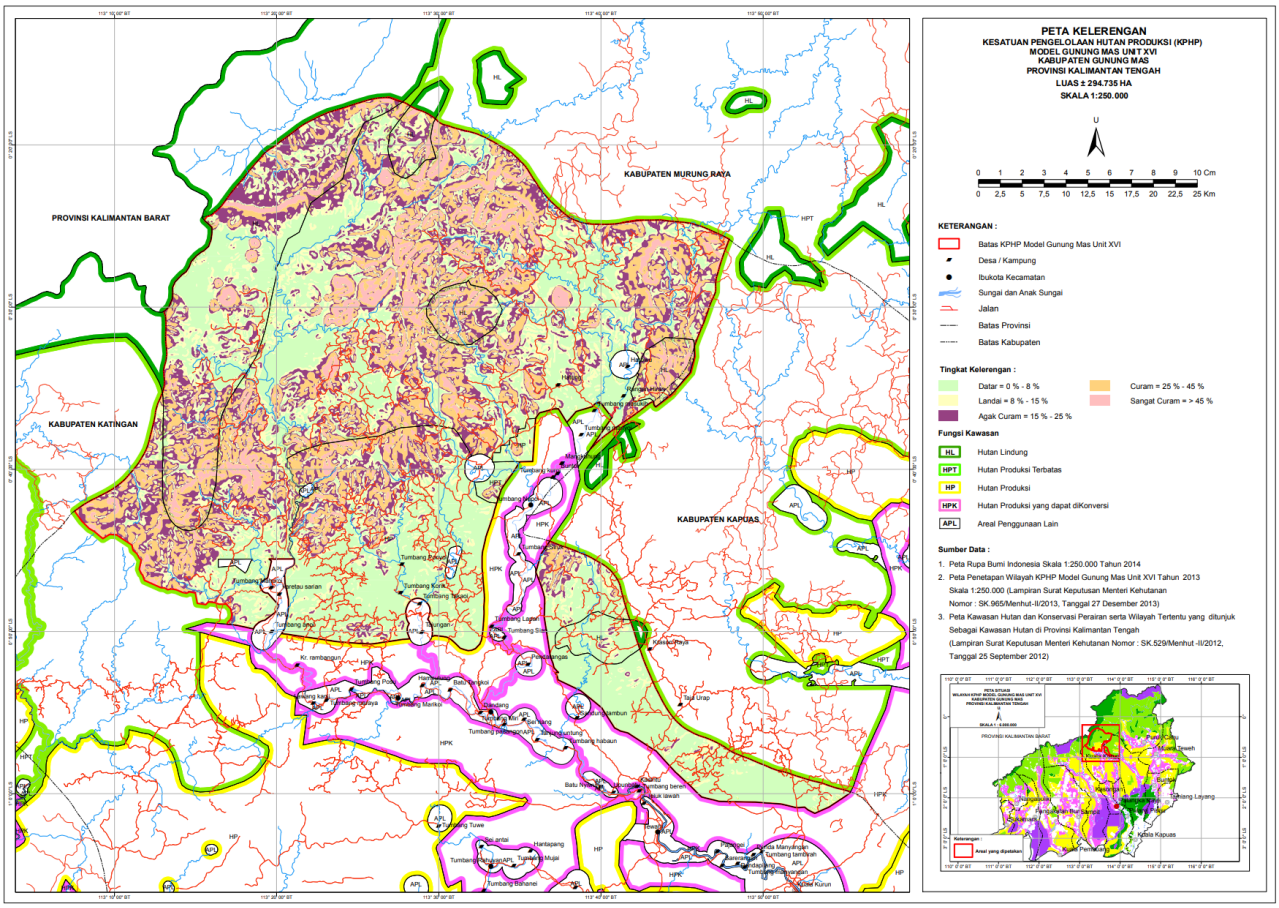

Figure 1. Map of the elevation within the project[26]

Slope

The topography within the Gunung Mas Regency project zone has been analyzed using Shuttle Radar Topography Mission (SRTM) data as presented in the RPHJP documents. The slope classes are distributed as follows:

- **0 – 8% (Flat):** Covers **60.05%** of the landscape. This dominant class represents the alluvial plains and lower foothills.
- **8 – 15% (Gentle):** Covers **10.21%** of the landscape, typically found in the transition zones between the river basins and the interior hills.
- **15 – 25% (Moderate):** Covers **17.57%** of the landscape.
- **25 – 45% (Steep):** Covers **10.45%** of the landscape, mostly located in the northern upland areas bordering the Schwaner mountains.
- **>45% (Very Steep):** Covers **1.72%** of the landscape.

Source: RPHJP KPHP Unit XV Kahayan Hulu (Table II.5).

Project Impact:

To ensure operational safety and prevent soil erosion during site preparation, the project applied a strict **slope exclusion filter**. All areas with slopes greater than **25%** were systematically removed from the eligible Project Accounting Area (PAA) during the geospatial delineation process. Consequently, all active planting interventions for **PAA 1 (Reforestation)** and **PAA 2 (Enrichment)** are exclusively located on the flat to moderate terrain (0-25%) deemed feasible for sustainable management. Areas >25% remain within the broader license boundaries but are designated for passive protection only.

[26] **KPHP Model Gunung Mas.** (2013). *Peta Kelerengan Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah* [Map]. Scale 1:250,000. Based on SK.965/Menhut-II/2013 and SK 529/Menhut-II/2012.

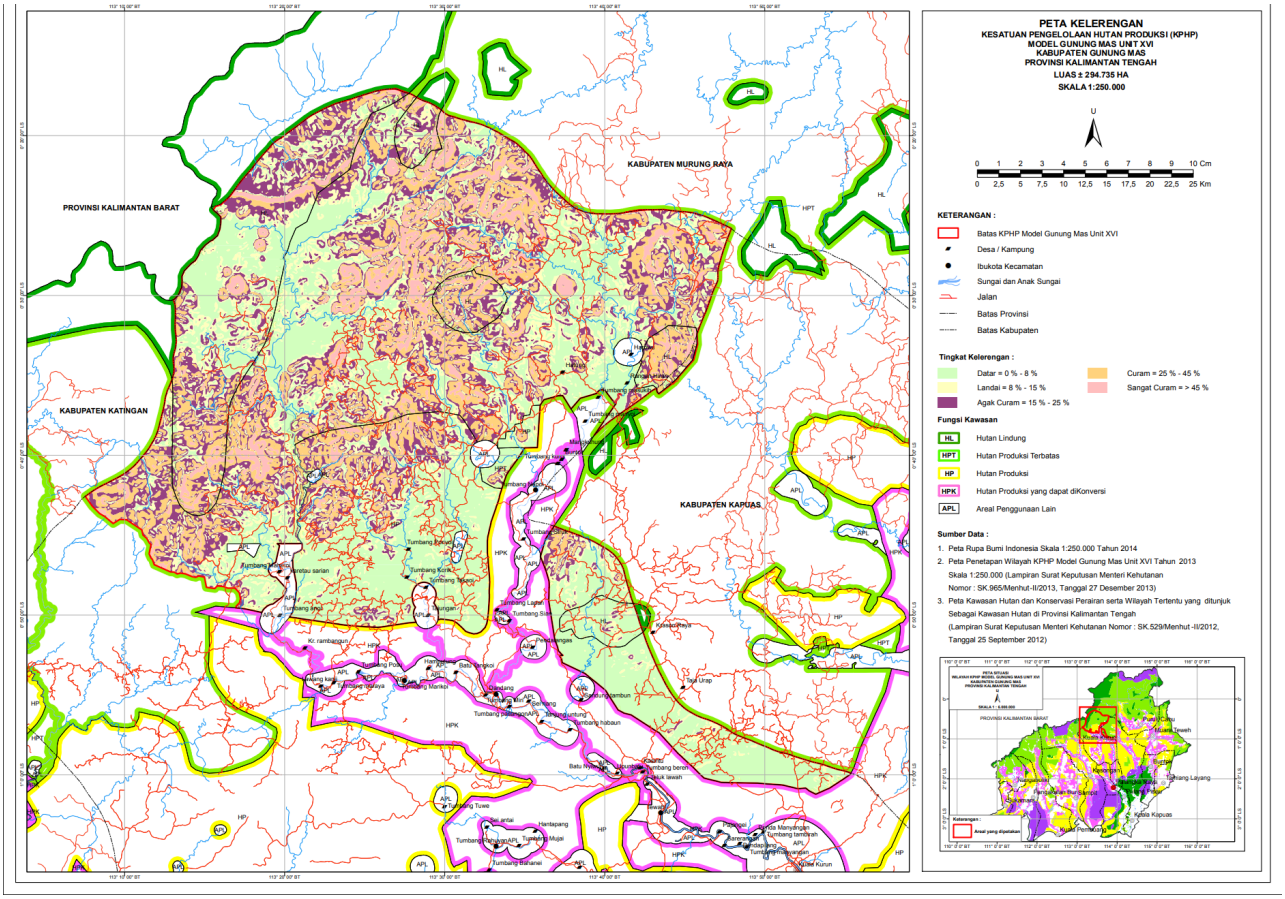

Figure 2. Map of the slope within the project[27]

[27] **Ministry of Forestry (Kementerian Kehutanan).** (2013). *Peta Kelerengan Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah*. Scale 1:250,000. Based on Decree No. SK.965/Menhut-11/2013

Soils

The soil conditions in Gunung Mas are a critical determinant for the planting strategy. The region does not contain significant peat domes within the specific Project Accounting Areas (mineral soils are targeted), avoiding the technical complexities of peatland subsidence.

Based on the **RPHJP KPHP Unit XV** soil analysis (derived from BPKH Region XXI Palangka Raya data), the project zone is dominated by two primary soil orders:

1. **Latosol (62.56%):** These are deep, weathered, reddish-brown soils typical of tropical rainforests. While they have good physical structure (permeable and resistant to erosion), they are chemically poor due to high leaching. They are acidic (pH 4.5 – 6.5) and require organic amendments to support initial seedling growth.
2. **Podsolik (Red-Yellow Podzolic) (36.94%):** These soils are highly leached, acidic, and have low natural fertility. They are particularly susceptible to erosion if the forest canopy is removed.

Relevance to the Project:
The dominance of acidic, low-nutrient Latosols and Podsoliks—exacerbated in PAA 1 by mining activities that strip organic topsoil—explains why the degraded areas have failed to recover into forest naturally. The soil lacks the nutrient bank to support the immediate re-establishment of climax rainforest species.

To overcome these biophysical barriers, the GMCRP employs a targeted Land Reclamation strategy using specialized pioneer species:

1. Black Locust (*Robinia pseudoacacia*) A nitrogen-fixing legume tree selected for its extreme hardiness on degraded mineral soils. It acts as a biological fertilizer, fixing atmospheric nitrogen into the soil and rapidly building up organic matter through leaf litter to restore fertility.
2. Cajeput (*Melaleuca cajuputi*): A native species (*Gelam*) highly adapted to acidic, nutrient-poor, and seasonally waterlogged conditions. Its inclusion ensures high survival rates in areas where other species would succumb to soil toxicity or acidity.

This species selection allows the project to rapidly re-establish a canopy and stabilize the soil profile without relying on synthetic chemical fertilizers.

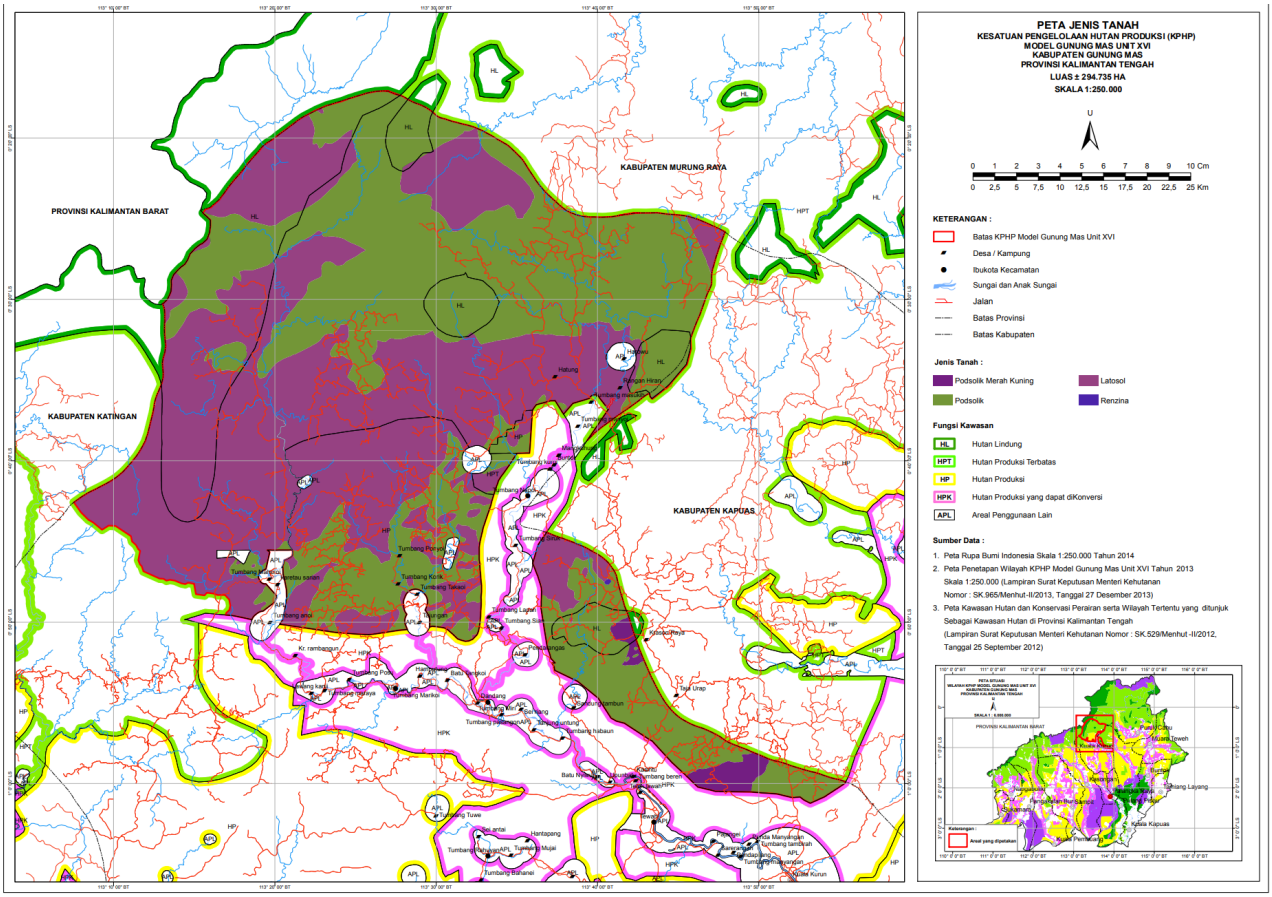

Figure 3. Map of the Soil Type within the project[28]

[28] **Ministry of Forestry (Kementerian Kehutanan).** (2013). *Peta Jenis Tanah Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah*. Scale 1:250,000. Based on Decree No. SK.965/Menhut-11/2013.

Climate

The climate of the Gunung Mas Islands is a defining environmental parameter that directly influences the project's design, species selection, potential for biomass growth, and risk management strategies (particularly for fire).

Climate Classification

The project area experiences a **Tropical Monsoon Climate (Am)** under the widely used Köppen-Geiger classification system. This is further specified in the official government planning document for the region. The KPHP Unit XVIII "Area Description" classifies the project area's climate as **Schmidt-Ferguson Type "B" (wet tropical)**. This classification is based on the ratio of dry months to wet months and indicates a climate with a short, pronounced dry season and a long, very wet season, which is highly conducive to the growth of tropical moist forests.

Temperature

The temperature in the Gunung Mas area is consistently high and stable throughout the year, with minimal seasonal variation. The average annual temperature is approximately **26-27°C (79-81°F)**. This stable, warm thermal regime provides year-round growing conditions for native tropical tree species, supporting high potential rates of biomass accumulation for the project's restoration activities.

Precipitation and Humidity

Annual precipitation in the project area is high, though subject to strong seasonal patterns driven by the monsoon.

- **Annual Rainfall:** The average annual rainfall typically ranges between **2,000 mm and 3,000 mm**.
- **Seasonal Pattern:** The climate is defined by a distinct wet season, generally occurring from **December to March**, when the majority of the annual rain falls. This is followed by a pronounced dry season from approximately **May to October**.
    - **Wet Season (Oct - May):** High intensity rainfall ensures high survival rates for out-planted seedlings without the need for irrigation.
    - **Dry Season (Jun - Sep):** While shorter than in Eastern Indonesia, the dry season in Central Kalimantan can be intense, specifically increasing the risk of forest fires.

- **Humidity:** Relative humidity is consistently high, typically averaging around 80-85%, which helps to reduce water stress on vegetation, even during the dry season.

The long wet season provides ample water to support the establishment and rapid growth of planted seedlings, while the distinct dry season is a critical consideration for the project's fire prevention and management strategy.

The following table summarizes the key climatic parameters for the project area:

Table 10: Summary of Climatic Conditions in the Project Zone

Parameter	Value	Source
Climate Classification (Köppen)	Am (Tropical Monsoon)	Beck, H. E., et al. (2018)[29]
Climate Classification (Schmidt-Ferguson)	Type "B" (Wet Tropical)	KPHP Unit XVIII Area Description
Average Annual Temperature	26 - 27 °C	World Bank Climate Change Knowledge Portal (Gunung Mas)[30]
Average Annual Rainfall	1,500 - 2,000 mm	Global Precipitation Climatology Centre (GPCC) / World Bank
Seasonal Pattern	Wet Season: December - March Dry Season: May - October	General climatology for the Banda Sea region.

[29] **Beck, H. E., Zimmermann, N. E., McVicar, T. R., Vergopolan, N., Berg, A., & Wood, E. F.** (2018). Present and future Köppen-Geiger climate classification maps at 1-km resolution. *Scientific data*, 5(1), 1-12.
[30] **World Bank Group.** (n.d.). *Climate Change Knowledge Portal: Indonesia*. Retrieved from https://climateknowledgeportal.worldbank.org/country/indonesia/climate-data-historical

Relevance to the Project

The climatic conditions are fundamental to the project's design and viability. The combination of consistently high temperatures and significant annual rainfall creates highly favorable conditions for rapid biomass growth and carbon sequestration, supporting the project's climate mitigation objectives. However, the pronounced dry season represents a key risk factor for anthropogenic fires, a primary historical driver of degradation. Therefore, the project's implementation plan, including the timing of planting activities and the focus on community-based fire management, is designed in direct response to these specific climatic patterns.

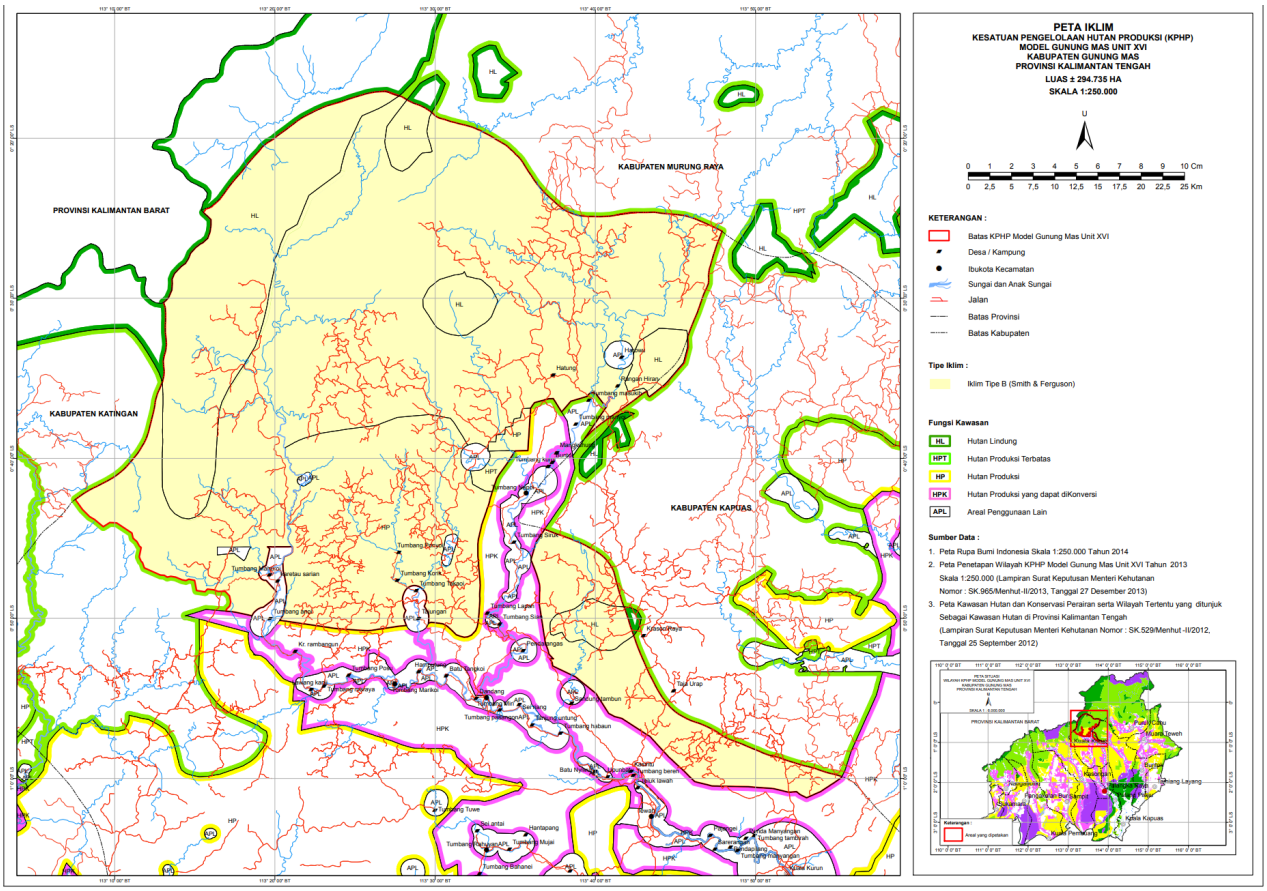

Figure 4. Climate Map within the project[31]

[31] **Ministry of Forestry (Kementerian Kehutanan).** (2013). *Peta Iklim Tanah Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah*. Scale 1:250,000. Based on Decree No. SK.965/Menhut-11/2013.

MISSING

Figure 5: Average Temperature Map using temperature classification to show average temperature distribution across the area.

Watershed

The hydrological systems of the area are a critical physical parameter, directly influencing local ecosystems and community water resources. The restoration of these systems is a key co-benefit of the project.

Watershed (Daerah Aliran Sungai - DAS) Characteristics

The project acts as a critical "Water Tower" for Central Kalimantan. The project zone is situated in the upstream catchment areas (Hulu) of two of the province's most vital river systems:

- DAS Kahayan (Kahayan Watershed): Covering ~51% of the KPHP landscape. This river flows through the provincial capital, Palangka Raya.
- DAS Katingan (Katingan Watershed): Covering the western portion of the project zone.

Baseline Condition:

The RPHJP documents note that illegal mining (*PETI*) and deforestation in these upstream areas have led to increased sedimentation, turbidity, and flash flooding downstream.

Project Impact:

By reforesting **19,008 Ha** of upstream catchment, the GMCRP will:

- **Reduce Surface Runoff:** Slowing water movement during heavy rains.
- **Decrease Sedimentation:** Stabilizing riverbanks and reducing soil loss into the Kahayan and Katingan rivers.
- **Improve Water Quality:** Filtering runoff from upstream mining activities before it reaches downstream communities.

  This hydrological restoration is a primary **CCB Gold Level** benefit, directly protecting the water security of over 22,000 people in the immediate vicinity and hundreds of thousands downstream.

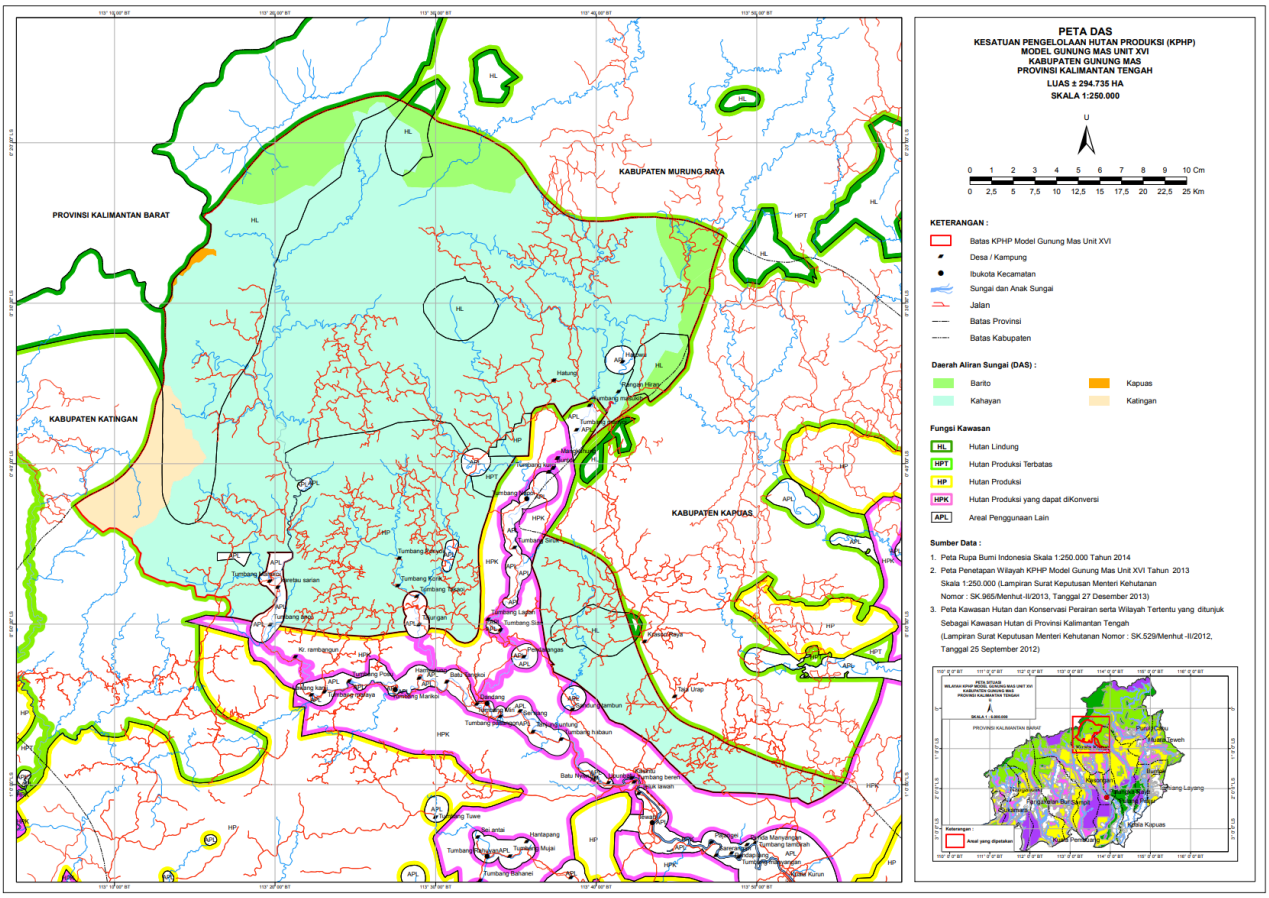

Figure 6. Map of the Water Basin within Project Area[32]

[32] **Ministry of Forestry (Kementerian Kehutanan).** (2013). *Peta DAS Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah*. Scale 1:250,000. Based on Decree No. SK.965/Menhut-11/2013.

Precipitation

The precipitation regime is the most critical climatic factor, directly influencing the region's hydrology, ecosystem type, and the operational planning for the project's restoration activities.

Annual Rainfall and Data Sources

The project zone receives high annual rainfall, consistent with its tropical monsoon climate. Analysis of global climate datasets, including the Global Precipitation Climatology Centre (GPCC) and the World Bank Climate Change Knowledge Portal, indicates that the average annual rainfall is in the range of **2,000 mm to 3,000 mm**.

Seasonal Pattern and Monsoon Influence

The defining feature of the region's climate is the strong seasonal distribution of rainfall, driven by the West Pacific Monsoon system. This creates a distinct hydrological cycle with a long, intense wet season and a pronounced dry season.

- **Wet Season (Musim Hujan):** This period generally occurs from **December to March**. It is characterized by heavy, consistent rainfall, often exceeding 300 mm per month during its peak. This season provides the optimal window for the project's planting activities, ensuring high soil moisture for seedling establishment and survival.
- **Dry Season (Musim Kemarau):** A significant dry period follows, typically from **May to October**. During these months, monthly rainfall can drop below 100 mm, and in the driest months (August-September), it is often less than 50 mm. This extended dry period increases water stress on vegetation and significantly elevates the risk of anthropogenic fires, which is a key driver of degradation that the project's management plan is designed to mitigate.

Climate Classification Confirmation

This distinct seasonal rainfall pattern provides the basis for the region's formal climate classification. The KPHP Unit XVIII "Area Description" classifies the climate as **Schmidt-Ferguson Type "B"**. This classification system is based on the ratio of dry months (average rainfall < 60 mm/month) to wet months (average rainfall > 100 mm/month). A Type "B" classification confirms that the project area is a wet region with a short dry season, which naturally supports the growth of a tropical moist forest ecosystem. This data substantiates that the pre-project degraded grasslands and shrublands are not a natural climax ecosystem but are the result of historical disturbances.

Missing

Figure 7. Precipitation Map within Project Area

Vegetation Land Cover and Forest Type

The project area is situated within the **Borneo Lowland Rain Forest** ecoregion. The potential natural vegetation is Dipterocarp-dominated rainforest. However, the actual pre-project land cover is a mosaic of degradation resulting from historical logging concessions (ex-HPH) and recent unauthorized activities.

To establish a precise and conservative baseline for carbon accounting, a rigorous multi-stage geospatial analysis was conducted. This involved an initial broad classification using the **EU JRC Tropical Moist Forest (TMF) Transition Map (1982–2024)**, followed by the application of strict exclusion criteria (settlements, agriculture, infrastructure buffers, slopes >25%). Finally, a detailed visual verification process using high-resolution Sentinel-2 imagery was applied to delineate the most degraded areas suitable for intensive afforestation.

This process resulted in the final stratification of the eligible project area into three distinct Project Accounting Areas (PAAs), as presented in Table X below.

Table 11: Final Baseline Land Cover Stratification of Eligible Project Area

Project Accounting Area (PAA)	Baseline Land Cover Description	Derivation Method	Area (ha)
PAA1	**Non-Forest / Degraded Forest**	Visually verified subset of TMF "Degraded" and "Other land" classes, confirmed as plantable non-forest land.	**4,335**

PAA2	**Unmanaged Forest**	Eligible areas classified as TMF Class 10 ("Undisturbed"), representing ecologically suboptimal forest not under active commercial management.	**14,673**
Total		**Final Eligible Project Area**	**19,009**

Source: Project-specific geospatial analysis combining JRC TMF data, official exclusion layers, and manual visual verification (see Section 3.3 for detailed methodology).

This final stratification confirms that 100% of the project's accounting area meets the eligibility criteria of VM0047. PAA1 represents the most severely degraded areas targeted for intensive afforestation, while PAA2 represents forest areas requiring reforestation and enrichment to restore their full ecological function and carbon storage potential.

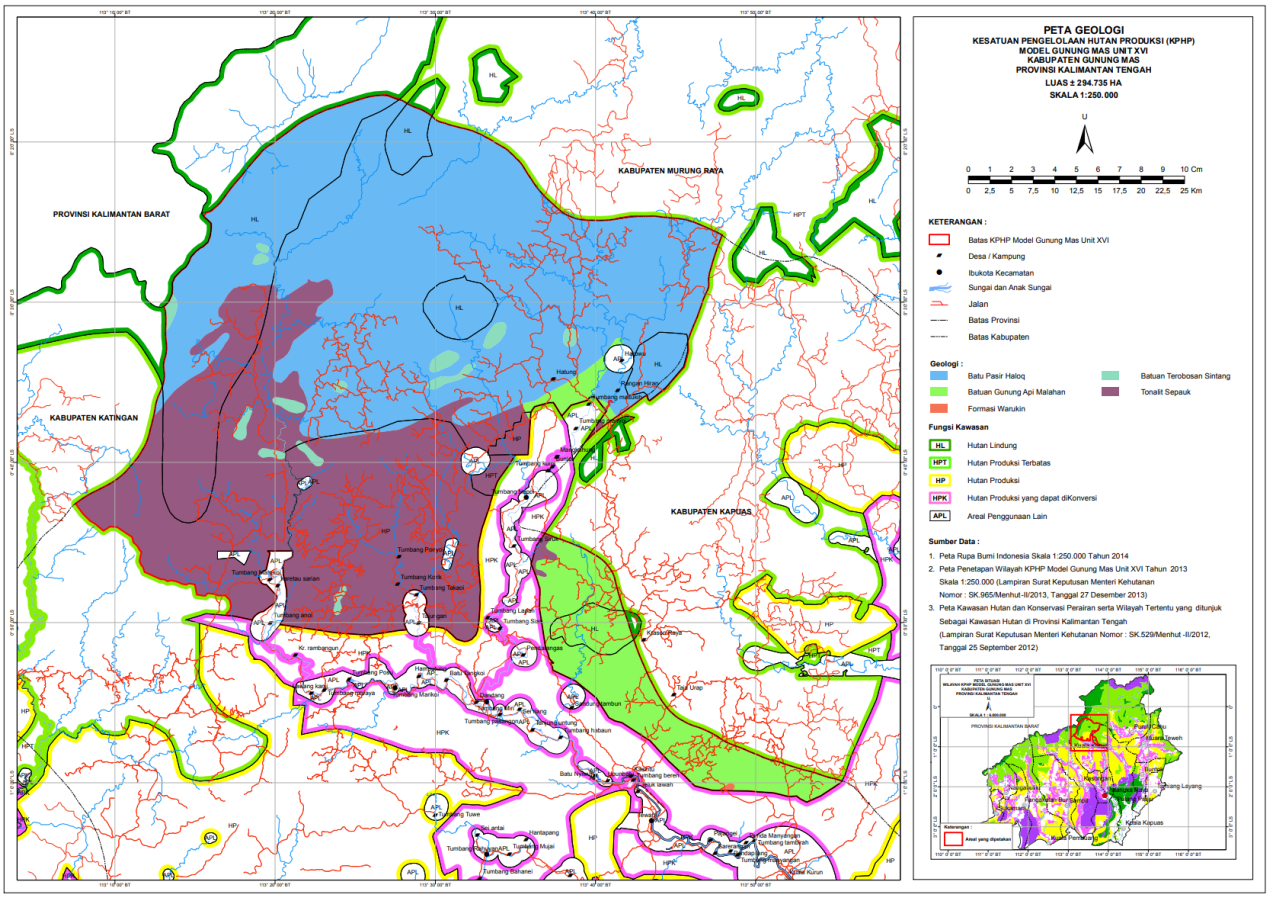

Figure 9. Vegetation Density Map within Project Area[33]

2.1.15 Social Parameters (VCS, 3.18; CCB, G1.3)

Communities and Main Settlements

The project zone is located within the interior of Central Kalimantan and directly involves **12 distinct village entities** organized under **18 Social Forestry**. These communities are administratively located within the sub-districts (*Kecamatan*) of **Damang Batu**, **Miri Manasa**, and **Rungan Barat** in the Gunung Mas Regency.

The total direct beneficiary population across these partner villages is **7,145 people** (3,817 Male / 3,328 Female). Village sizes vary, ranging from small, remote riverine settlements like **Tumbang Maraya** to larger sub-district hubs like **Tumbang Marikoi**. The local governance structure is a blend of formal government administration (*Pemerintah Desa*) and the deeply rooted traditional Dayak customary system known as **Kelembagaan Adat**,

[33] **Ministry of Forestry (Kementerian Kehutanan).** (2013). *Peta Geologi Kesatuan Pengelolaan Hutan Produksi (KPHP) Model Gunung Mas Unit XVI, Kabupaten Gunung Mas, Provinsi Kalimantan Tengah*. Scale 1:250,000. Based on Decree No. SK.965/Menhut-11/2013.

overseen by a **Damang** (customary chief) and **Mantir Adat** (customary council members), who govern community resource management and resolve disputes.

Land Uses and Economic Activities

Land Uses:
The land use within the Gunung Mas project zone is defined by a dual system of formal state law and deeply rooted customary tradition.

- **Formal Land Use Designation:** The project operates exclusively on **State Forest Land (*Kawasan Hutan Negara*)**. The legal basis for all project activities is the **18 Social Forestry licenses** (comprising *Hutan Adat*, *Hutan Desa/LPHD*, and *Hutan Kemasyarakatan/HKm*) granted by the Indonesian Ministry of Environment and Forestry (MoEF). These licenses provide the communities with a formal, legally recognized right to manage these lands for 35 years.
- **Traditional and Historical Land Use:** Historically, the dominant land use practice is shifting cultivation, locally referred to as **Ladang Berpindah**. This involves the rotational clearing of shrubland for subsistence rice farming. However, in recent decades, a significant portion of the land has been degraded by **Illegal Gold Mining (*Pertambangan Emas Tanpa Izin* - PETI)**, creating vast areas of open land and tailing ponds that require restoration.
- **Customary Land Tenure:** Parallel to the state system, land access is governed by **Dayak Customary Law**. Customary rights (*Hak Ulayat*) are held collectively or by families. The project's design explicitly recognizes this by partnering directly with the 10 *Hutan Adat* (Customary Forest) license holders, ensuring activities align with ancestral claims.

Economic Activities:
The economy is heavily reliant on natural resources, characterized by a mix of subsistence farming and extractive activities.

- **Primary Economic Sector: Agriculture & Agroforestry**
  - **Shifting Cultivation:** The primary subsistence activity is the cultivation of upland rice (*padi ladang*) and vegetables.
  - **Rubber (*Karet*) & Rotan (*Rattan*):** Rubber tapping and wild rattan collection are traditional cash sources. However, productivity is low due to aging trees,

lack of processing facilities, and reliance on middlemen (*tengkulak*), leaving farmers vulnerable to global price fluctuations.

- **Extractive Activities (The "Drivers"):**
  - **Illegal Gold Mining (PETI):** Due to the lack of viable economic alternatives, many community members engage in small-scale alluvial gold mining. This is the primary driver of environmental degradation (sedimentation, mercury pollution) that the project's **SIGS** program aims to replace.
  - **Illegal Logging:** Small-scale timber extraction for local construction and black-market sale remains a livelihood strategy for some households.
- **Economic Barriers:**
  - **River Transport Reliance:** Access to many villages (e.g., in Miri Manasa) is primarily via river (*Klotok* boat) due to poor road infrastructure. This isolates farmers from markets and raises the cost of imported goods (high cost economy).
  - **Lack of Processing:** Rubber and Rotan are sold as raw materials, capturing very little value locally.

Ethnic Groups and Migration

The project zone is the ancestral home of the **Dayak** people, specifically the **Ngaju** and **Ot Danum** tribes. The population is indigenous to Central Kalimantan, with deep historical and cultural roots in the Kahayan and Rungan river basins.

- **Social Structure:** The social structure is built upon **Huma Betang** (Longhouse) philosophy, emphasizing communal living and **Handep** (mutual cooperation/gotong royong). Although most people now live in individual houses, the spirit of *Handep* remains vital for agricultural labor and ceremonies.
- **Migration:** Unlike the coastal areas or Transmigration zones of Kalimantan, the upstream (*Hulu*) areas of Gunung Mas have experienced relatively low in-migration. The population remains culturally homogeneous. The primary demographic trend is the out-migration of youth to Palangka Raya for education and employment, creating a "brain drain" that the project aims to reverse by creating local green jobs.

Religion

The religious landscape is a unique blend of formal religion and indigenous belief.

- **Kaharingan:** A significant portion of the Dayak Ot Danum and Ngaju population practices *Kaharingan*, an indigenous animistic belief system involving a deep spiritual connection to the forest, ancestors, and sacred sites (**Sandung**).
- **Christianity:** Protestantism is widely practiced, with **42 Protestant Churches** serving as key community centers in the project zone.
- **Implication:** The project respects sacred sites such as *Sandung* (bone repositories) and *Pantar* (memorial poles) located within the forest. These sites will be mapped and excluded from planting activities.

Historical Context

Gunung Mas holds a special place in Dayak history. The village of **Tumbang Anoi** (one of the project's partner villages, License No. 5) was the site of the historic **Tumbang Anoi Peace Treaty of 1894**, which ended inter-tribal warfare (headhunting) among Dayak tribes across Borneo.

In the modern era, the region shifted from being a site of large-scale logging concessions (HPH) in the 1970s-90s to a landscape fragmented by small-scale illegal mining and logging after the decentralization era. The GMCRP represents a new historical chapter: transitioning from extraction to restoration.

Population Expansion

Population growth in the project zone is moderate and driven primarily by natural increase. The total population of the partner villages is **7,145**. There is no significant pressure from state-sponsored transmigration. The primary pressure on the land comes not from population density (which is low, ~3-5 people/km^2), but from the nature of economic activities (mining/logging) which have a disproportionately large environmental footprint per capita.

Poverty

The communities face significant economic vulnerability.

- **Status:** The *RPHJP* documents classify many households in the area as *Pra-Sejahtera* (Pre-prosperous) or *Sejahtera I* (subsistence level).
- **Drivers:** The reliance on fluctuating commodities (rubber) and the high cost of living due to remote river transport logistics contributes to poverty. The "quick cash" from illegal mining creates a "boom and bust" cycle that does not lead to long-term wealth accumulation or infrastructure development.

Food Security

Food security is precarious. While families cultivate rice (*padi ladang*), yields are often low and susceptible to climate variability (unpredictable rainy seasons).

- **Vulnerability:** Dependence on imported goods for protein and other staples is high. During the dry season, river levels drop, making transport difficult and expensive, threatening food supply chains.
- **Project Intervention:** The project establishes a **Subsidized Rice Logistics Channel**. This program leverages the project's supply chain to provide staple rice to the **~1,786 households** in partner villages at stabilized, below-market rates, ensuring food security (**SDG 2: Zero Hunger**) without the risks associated with livestock management.

Public Health

Public health infrastructure is critically deficient. Government data (BPS 2023) indicates that:

- **Limited Facilities:** In the **Damang Batu** and **Miri Manasa** sub-districts, there are **Zero Hospitals**. Primary care is centralized at the sub-district level (1 Puskesmas per subdistrict), which is insufficient for the widely dispersed riverine population.
- **Access Barriers:** Most villages rely on river transport. In emergencies, reaching a hospital in the regency capital (Kuala Kurun) can take 4-8 hours or more.
- **Health Outcomes:** Common issues include water-borne diseases (due to river pollution from mining), malaria/dengue, and limited maternal health support.
- **Project Impact:** The project will deploy **Mobile Dental and Health Clinics** and invest in **Telehealth** infrastructure to bridge this gap.

Drinking Water

Access to clean water is a severe challenge, exacerbated by the very activities the project aims to stop.

- **Source:** Communities rely heavily on the **Kahayan** and **Rungan** rivers for water.
- **Contamination:** These rivers are heavily turbid and polluted with sediment and potentially mercury from upstream **Illegal Gold Mining (PETI)**.
- **Project Impact:** By stopping illegal mining within the project zone and reforesting the catchment, the project improves raw water quality. Furthermore, the project's Benefit Sharing Mechanism includes the installation of **Deep Wells and Filtration**

Systems in all **12 distinct partner villages** to ensure safe, potable water independent of the river.

Education

Educational facilities are limited to the primary level in most villages.

- **Infrastructure:** While most villages have an Elementary School (SD), there are only **2 Senior High Schools (SMA)** serving the entire project zone (1 in Damang Batu, 1 in Miri Manasa).
- **Barriers:** The cost of transport and boarding to send children to high school is a major burden for families, often leading to dropouts.
- **Project Impact:** The project will provide **Scholarships** funded by carbon revenues and support the improvement of local school facilities (libraries, solar power for lighting).

2.1.16 Project Zone Map and Project Location (VCS, 3.11, 3.18; CCB, G1.4-7, G1.13, CM1.2, B1.2)

The **Gunung Mas Community Restoration Project (GMCRP)** is located in the **Gunung Mas Regency**, Central Kalimantan Province, Republic of Indonesia. The project is situated within the heart of Borneo, specifically in the upstream (*Hulu*) catchment areas of the Kahayan and Katingan rivers.

Geographic Coordinates:

The project zone lies approximately between the geographic coordinates of **113˚00'00" to 113˚40'00" East Longitude** and **0˚40'00" to 1˚30'00" South Latitude**.

Project Zone and Administrative Area:

The **Project Zone** is legally defined by the boundaries of **18 Social Forestry (*Perhutanan Sosial* - PS) licenses**, covering a gross total area of approximately **44,214.7 hectares**. These license areas are administratively distributed across the sub-districts (*Kecamatan*) of **Damang Batu**, **Miri Manasa**, and **Rungan Barat**.

The project directly involves the 18 Social Forestry entities (including *Hutan Adat*, *LPHD*, and *HKm*) associated with these licenses, which represent the primary stakeholder communities for the project (as identified in Section 2.1.9).

Project Accounting Areas (PAAs):

Within the broader Project Zone, a final eligible project area of **19,008.60 hectares** has been delineated for carbon accounting purposes. This area excludes settlements, productive agriculture, and infrastructure buffers. It is stratified into three distinct Project Accounting Areas (PAAs) based on baseline land cover and intervention strategy:

- **PAA1 (Afforestation/Reforestation): 4,335 Ha**
- **PAA2 (Enrichment): 14,673 Ha**

2.1.17 Project Activities and Theory of Change (VCS, 3.6; CCB, G1.8)

Table 11. Project Activities description and output, outcome and impact

Activity description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Establish and maintain infrastructure to efficiently manage the area	Training and equipping rangers, community watch-posts (Masyarakat Peduli Api).	A team of well-trained rangers and community watch-posts perform eco-monitoring across the entire Project Zone.	The Project Accounting Area (PAA) is well protected. Illegal Gold Mining (PETI) and logging activities are eliminated/ reduced.	Build and maintain the patrol infrastructure for PAAs to secure ARR activities generating ~13,357,314 tCO_2e over the initial 30-year quantification period of the project's 40-year lifetime.
Build a stronger enforcement of the law infrastructure and consensus by local authorities and cooperatives.	Training the community for enforcement of law and customary (Adat) regulations.	A participatory forest protection team integrated with Damang/Mantir Adat (customary leaders) is built for	The PA is well protected and managed in a comprehensive way. Deforestation, degradation and encroachment in the PA is	Build and maintain the Law Enforcement infrastructure to reduce forest destruction, wildlife poaching (Orangutan/Sun Bear), and land

		eco-protection.	eliminated/reduced.	encroachment in the project zone.
Improved Sanitation/ Healthcare by drinking water system by AAD.	Build pilot Clean Water Reservoir filter system or fix existing water-shed in targeted villages.	Build Clean Water Reservoir filter systems in 18 Social Forestry Areas to provide safe alternatives to river water polluted by upstream mining.	The wellbeing of all 18 Social Forestry partner communities is directly improved. Confidence in the project is fortified.	Improved Community Livelihoods: Ensuring access to safe drinking water (SDG 6) for approx. 7,145 people, mitigating health risks from river pollution (mercury/turbidity).
Improved Healthcare by Mobile dental service by AAD.	Build a mobile dental/oral health service system.	Construct a school-based dental/oral service and education system linked to local clinics (Puskesmas).	The overall dental/oral health improvement from school to community.	Addressing the critical lack of health infrastructure in the 12 distinct partner villages (SDG 3).
Establish Food Security Logistics (Rice Program)	Establish supply chain for bulk rice purchasing and transport to village cooperatives.	Reduced household expenditure on staple foods; Improved food availability during dry season (low river levels).	Zero Hunger (SDG 2): Enhanced food security and economic resilience for 7,145 people, reducing the pressure to engage in illegal mining for quick cash.	Livelihood Support: Replaces high-risk livestock farming with a stable, immediate cost-of-living reduction strategy.
Training and employment in income generating activities (SIGS)	Build SIGS training on Agarwood inoculation, Rotan processing, and Rubber tapping techniques.	Establish 18 Cooperatives capable of processing and marketing commodities directly, bypassing exploitative middlemen.	Risks reduced through livelihood diversification; Communities transition from "extraction" (mining) to "production" (agroforestry).	Implement sustainable livelihood programs by supporting community-led agroforestry and enterprises based on NTFPs (Agarwood, Rotan, Rubber).
Protect the Native habitat of	Training to identify	Identify and protect native	Set up HCV-based	Maintain habitat for viable, abundant, and

Agarwood, Ulin, and Orangutan	Aquilaria (Agarwood), Eusideroxylon (Ulin), and Orangutan nests; setup protection landmarks.	Agarwood/Ulin trees and Orangutan/Sun Bear corridors from poachers.	Agarwood and Wildlife sanctuary in the Heart of Borneo landscape.	diverse natural populations of High Conservation Value Fauna and Flora (GL3).

2.1.18 Sustainable Development Contributions (VCS, 3.17)

TThe Gunung Mas Community Restoration Project (GMCRP) is fundamentally designed to generate significant, lasting sustainable development benefits in alignment with the UN Sustainable Development Goals (SDGs) and Indonesia's national development priorities. Project activities, including community-led reforestation, agroforestry, and capacity building across the 18 Social Forestry license areas, directly address the core challenges of poverty, environmental degradation from Illegal Gold Mining (PETI), and lack of economic opportunity faced by the ~7,145 community members in the project zone.

The project contributes to sustainable development by creating green jobs, diversifying local economies beyond the "boom-and-bust" cycle of extractive activities, and enhancing food security through the establishment of a Subsidized Rice Logistics Channel and the development of Non-Timber Forest Product (NTFP) value chains (specifically Agarwood, Rotan, and Rubber). A key component of the project is the establishment of a Community Development Fund, which will use a portion of carbon revenues to address community-identified needs, such as improving access to clean water in riverine villages and supporting mobile health services. Furthermore, by restoring over 19,008.60 hectares of degraded land, the project enhances critical watershed functions for the Kahayan and Katingan rivers, improves climate resilience, and protects the unique biodiversity of the Heart of Borneo landscape.

The project's contributions will be monitored through specific social and environmental indicators, which will be reported at each verification. These activities directly support Indonesia's national strategies for Social Forestry (Perhutanan Sosial), poverty alleviation, and achieving its Nationally Determined Contribution (NDC) under the Paris Agreement.

Summary of Project SDG Contributions

SDG Number & Title	Contribution Description	Estimated Project Contribution	Relevant SDG Target(s)	Key Project Indicator(s)
SDG 1: No Poverty	The project provides direct employment (500+ jobs) and supports 18 community-based **SIGS (Sustainable Income Generating Scheme)** groups to generate sustainable, legal income, replacing reliance on illegal gold mining (*PETI*).	Diversified and increased income streams for participating households in 12 villages.	1.2, 1.4	Proportion of population living below the national poverty line; Number of households with new income sources (Agarwood/Rotan).
SDG 2: Zero Hunger	The project establishes a Subsidized Rice Logistics Channel to insulate remote riverine communities from high food prices caused by difficult transport logistics, ensuring staple food availability year-round.	~1,786 households with guaranteed access to affordable staple food, stabilizing household nutrition.	2.1, 2.3	Number of households participating in the rice subsidy program; Stability of local rice prices.

SDG 3: Good Health & Well-being	The Community Development Fund will be used to address the severe lack of health infrastructure in Damang Batu and Miri Manasa by funding **Mobile Dental/Health Clinics** and telehealth connectivity.	Improved access to basic health services for ~7,145 people currently isolated by river transport logistics.	3.8	Coverage of essential health services; Number of mobile clinic visits conducted.
SDG 5: Gender Equality	The project ensures equal participation and pay for women in nursery and processing roles (Agarwood inoculation/Rotan weaving) and supports their leadership in the 18 Social Forestry cooperatives.	Women hold leadership positions in community forest groups; equal pay for equal work is enforced.	5.5	Proportion of women in managerial/leadership positions within SIGS cooperatives.
SDG 6: Clean Water & Sanitation	Reforestation of the upstream **Kahayan and Katingan** catchments will reduce turbidity/sedimentation. Direct investment in deep wells and filtration systems will provide safe drinking water independent of polluted rivers.	Improved water quality and availability for the 12 partner villages.	6.1, 6.6	Proportion of population using safely managed drinking water services; Change in the extent of water-related ecosystems.

SDG 8: Decent Work & Economic Growth	The project creates new, formal "green jobs" (rangers, nursery staff), transitioning workers from hazardous illegal mining to sustainable forestry, developing transferable skills in land reclamation and silviculture.	Creation of **500+ full-time equivalent (FTE)** jobs over the project lifetime.	8.3, 8.5	Full and productive employment and decent work for all women and men; Formalization of informal sector jobs.
SDG 13: Climate Action	The project will sequester an estimated ~13.36 million tCO_2e, directly mitigating climate change and supporting Indonesia's Nationally Determined Contribution (NDC) via the FOLU Net Sink 2030 strategy.	**13,357,314 tCO_2e** sequestered over the 30-year crediting period.	13.2	Integration of climate change measures into national policies; Net GHG removals achieved.
SDG 15: Life on Land	The project restores **19,008.60 ha** of degraded terrestrial ecosystems in the **Heart of Borneo**, creating biological corridors for the **Bornean Orangutan** and **Sun Bear**.	Restoration of a globally significant biodiversity area; enhanced habitat connectivity for endangered primates.	15.1, 15.5	Forest area as a proportion of total land area; Red List Index (Orangutan population stability).

SDG 16: Peace, Justice and Strong Institutions	The project is built on the **Social Forestry (** legal framework, strengthening the governance capacity and land tenure security of **18 Customary (*Adat*) and Village institutions**.	Enhanced capacity and empowerment of local, inclusive, and accountable institutions (*LPHD/KTH*).	16.7 Responsive, inclusive, participatory and representative decision-making at all levels.

2.1.19 Implementation Schedule (CCB, G1.9)

Missing

Table 11: The Implementation schedule for the Gunung Mas Community Restoration Project, showing key dates and milestones for the Project.

2.1.20 Risks to the Project (CCB, G1.10)

Table 12. Project Risk

Identified Risk	Potential impact of risk on climate, community and/or biodiversity benefits	Actions needed and designed to mitigate the risk
Human induced risks	**1. Illegal Gold Mining (PETI) and Logging** Within the Project Accounting Area and the wider Project Zone, the most significant extractive threat identified in the government's long-term plan (RPHJP KPHP Unit XV & XVI) is Illegal Gold Mining (Pertambangan Emas Tanpa Izin - PETI). This activity causes direct deforestation, severe soil degradation (loss of topsoil), and	Mitigation Strategy: The project addresses the root cause: economic necessity. The Sustainable Income Generating Schemes (SIGS) provide a legal, safer, and more reliable income source (Agarwood/Rotan/Rubber) compared to the hazardous and illegal nature of PETI. 1. Patrols: AAD will fund and equip a "Guardian" force, integrating government rangers (Polhut) with

	water pollution (mercury/sedimentation) in the Kahayan and Katingan watersheds. Additionally, illegal logging remains a persistent threat. The RPHJP notes that while large-scale concessions have ceased, small-scale unauthorized logging for local construction and black-market sale continues. Data from the Central Kalimantan Forestry Agency indicates that forest encroachment for these activities is often driven by a lack of economic alternatives. These activities pose a dual risk: direct reversal of carbon stocks (climate) and destruction of riverine habitats critical for community health (water quality) and biodiversity.	community members (Masyarakat Peduli Hutan). Regular patrols will monitor key access points. 2. Tenure Security: By formalizing Social Forestry rights, communities have the legal standing to exclude illegal miners from their Hutan Adat. 3. Technology: Use of drones and satellite monitoring to detect new mining openings or logging trails early.
	2. Poaching of High Conservation Value (HCV) Species The project zone is home to critically endangered species including the Bornean Orangutan and Sunda Pangolin, as well as the Sun Bear and Agarwood (Aquilaria spp.) trees. Threats include: - Opportunistic Hunting: Orangutans are sometimes killed as agricultural pests or for the illegal pet trade. - Agarwood Poaching: Wild Aquilaria trees are destructively harvested by "gaharu hunters" seeking resin, often killing the tree in the process. This threatens the project's GL3 (Exceptional Biodiversity) status.	Mitigation Strategy: The project shifts the community relationship with biodiversity from "extraction" to "stewardship." 1. Inoculation Technology: The SIGS program teaches sustainable Agarwood resin induction. This makes keeping trees alive more profitable than cutting them down. 2. Education: Conservation awareness campaigns in schools and villages focused on the legal protection status of Orangutans and Sun Bears. 3. Enforcement: Joint patrols to remove snares and report wildlife crimes to the BKSDA (Natural Resources Conservation Agency).

	3. Anthropogenic Fires Fire is a severe threat in Central Kalimantan, primarily driven by the traditional practice of slash-and-burn (Ladang Berpindah) for land preparation. While the project area focuses on mineral soils (Latosol/Podsolik) rather than deep peat, the risk of fire spreading from agricultural areas into the restoration zones during the dry season (El Niño events) is significant.	Mitigation Strategy:The project implements an Integrated Fire Management (IFM) approach. Action: 1. Fire Breaks: Planting rows of fire-resistant Melaleuca (Gelam) and other green breaks along project boundaries. 2. MPA Teams: Training and equipping Masyarakat Peduli Api (Fire Care Community) brigades in all 12 partner village entities. 3. Agroforestry: Promoting permanent agroforestry systems reduces the need for annual burning associated with shifting cultivation.
Natural Risks	The Gunung Mas region is located on the tectonically stable Sunda Shelf and is not prone to major earthquakes or volcanic activity. The primary natural risks are : -Climate-driven: specifically drought (increasing fire risk) and seasonal riverine flooding. -Flooding: Heavy rains can cause the Kahayan/Rungan rivers to overflow, potentially damaging seedlings in low-lying riparian zones. -Pests: Monoculture planting can invite pests; however, the project uses diverse native species mixtures.	Mitigation Strategy 1. Site Selection: Planting areas are stratified by topography. Flood-tolerant Melaleuca is selected for riparian zones and wet depressions, while Black Locust is planted on higher/drier ground and tailings. 2. Diversity: The system uses a mosaic of species (Black Locust, Melaleuca, wild Agarwood) to create ecological resilience. 3. Fire Management: (As detailed above) to counter drought risks.
Political Risks	Central Kalimantan has historically been a target for large-scale conversion projects (e.g., Palm Oil, Food Estate). There is a slight risk of overlapping land use designations or future policy shifts favoring	1. Legal Lock-in: The Social Forestry licenses provide a 35-year tenure security (extendable), legally earmarking the land for community forest management, effectively blocking industrial conversion

	conversion over conservation. However, the likelihood of conversion within the PAA is low because the area is now covered by 18 specific Social Forestry Decrees (SK Perhutanan Sosial) issued by the MoEF. These decrees mandate sustainable forest management and prohibit conversion to monoculture plantations like palm oil.	2. Government Alignment: The project supports the government's FOLU Net Sink 2030 targets and the Program Kampung Iklim (ProKlim), ensuring strong political alignment at the Regency and Provincial levels. 3. Visibility: As a flagship international carbon project, GMCRP brings visibility and reputational incentives for the local government to protect the area.
Policy risks	**1. Risk of reversal** Risk of project reversal due to community opposition is considered minimal, as they have openly and widely been consulted through numerous outreach and information-sharing meetings throughout project development.	As a project governance policy, all stakeholders are always able to seek further information or air grievances if desired. The Project will continue to engage the surrounding communities, provide education and support for community social services, and improved livelihood opportunities. All these factors build and enhance community support for the project and make them authentic stakeholders, thereby reducing the risk of opposition to the project and its goals.
	2. Insufficient Revenues The majority of ARR credits are currently sold on the voluntary market, posing a risk to recurring, sustainable income flow. If credits are not sold, there will be no revenue, and thus no monetary support for the Project over its 40-year lifetime, losing initial investments.	1. Diverse Funding: AAD provides initial CAPEX. The SIGS model (Agarwood/Rotan sales) creates a secondary revenue stream for communities independent of carbon. 2. Market Position: High-quality removals (ARR) with triple-gold CCB benefits (Orangutans + Water + Poverty Alleviation) attract premium pricing and long-term offtake agreements.

2.1.21 Benefit Permanence (CCB, G1.11)

The GMCRP activities are designed to ensure the permanence of benefits beyond the project's 30-year crediting period.

- **Economic Permanence:** The **SIGS** model transforms the local economy from "extraction" (mining/logging) to "production" (Agarwood resin, Rotan, Rubber). Once established, these agroforestry systems provide a perpetual income source that relies on *standing trees*, aligning community economic self-interest with forest conservation.
- **Institutional Permanence:** By strengthening the 18 Social Forestry cooperatives and integrating them with KPHPs and other governmental forestry departments, the project builds local capacity to manage resources long after AAD's direct intervention scales down.
- **Ecological Permanence:** The restored forest will naturally regenerate. The removal of threats (via established ranger patrols and cultural shifts away from burning) allows the ecosystem to reach a stable climax state.

2.1.22 Financial Sustainability (CCB, G1.12)

The **Gunung Mas Community Restoration Project (GMCRP)** has a clear financial plan designed to ensure its successful implementation and the long-term sustainability of its climate, community, and biodiversity objectives. The project's financial structure relies on initial investment provided by the project proponent, supplemented by projected revenues from the sale of carbon credits.

Initial Funding & Proponent Commitment:
Asia Assets Developments Co., Ltd. (AAD), as the project proponent, possesses significant experience in project development and asset management. AAD is providing and securing the necessary upfront financial resources to cover all costs associated with project initiation, development (including technical studies, RPHJP data integration, and FPIC consultations), validation, and initial operational years until the project becomes self-sustaining through carbon revenue. AAD is fully committed to the project's success and has allocated internal resources to guarantee operational continuity during the pre-revenue phase. Furthermore, AAD has a demonstrated track record of successfully developing and managing projects within the Verified Carbon Standard framework, underscoring its capacity to navigate the carbon market and manage project finances effectively.

Long-Term Sustainability through Carbon Finance:

The long-term financial viability of the project is fundamentally dependent on the successful generation and sale of **Verified Carbon Units (VCUs)** under the VCS Program. Revenue generated from VCU sales is the primary mechanism intended to fund the project's ongoing operational costs over its **30-year lifetime**. These costs include, but are not limited to:

1. **Forest Protection:** Implementing and maintaining forest protection measures, including the salaries and equipment for joint Ranger and Community Watch-post (*Masyarakat Peduli Api*) patrols to prevent illegal mining and logging.
2. **MRV:** Carrying out required monitoring, reporting, and verification activities for both carbon (VCS) and co-benefits (CCB), including periodic biodiversity surveys and biomass plots.
3. **Community Development:** Supporting community development initiatives and benefit-sharing mechanisms designed through stakeholder consultations. This specifically includes funding the **Sustainable Income Generating Schemes (SIGS)** (focused on Agarwood, Rotan, and Rubber agroforestry enterprises) and the maintenance of clean water and health infrastructure.
4. **Management:** Funding project management, administrative overhead, and personnel costs.

Internal financial planning and modeling have been conducted to project these operational costs and estimate the level of carbon revenue required to ensure project sustainability and the delivery of anticipated co-benefits. This reliance on carbon finance underscores the project's additionality, as the comprehensive conservation and community development activities would not be financially feasible under the baseline scenario without this revenue stream.

Financial Management & Transparency:

AAD employs robust financial management practices and internal controls to ensure the effective, efficient, and transparent use of all project funds. This includes clear budgeting, expenditure tracking, and financial reporting procedures. Furthermore, AAD maintains a strong commitment to financial integrity and has incorporated anti-corruption mechanisms within its corporate governance and project management systems to prevent fraud, bribery, or mismanagement of funds. Detailed financial projections and documentation supporting the project's financial plan, including evidence of these management practices, are maintained and will be made available to the validation/verification body upon request.

This comprehensive financial strategy, combining strong proponent commitment and experience, secured initial funding, a clear plan for long-term operational funding through VCU sales, and a commitment to financial integrity, provides confidence in the project's financial sustainability and its ability to achieve its stated goals over the project lifetime.

2.2 Without-project Land Use Scenario and Additionality

2.2.1 Conditions Prior to Project Initiation and Land Use Scenarios without the Project (VCS, 3.13; CCB, G2.1)

The conditions existing prior to the project's initiation are identical to the baseline scenario described in Section 3. The project areas consist of landscapes that have been in a state of arrested ecological succession and degradation for over a decade. The project has been designed exclusively to restore these degraded areas and has not been implemented to generate GHG emissions for their subsequent reduction.

In accordance with the requirements for AFOLU projects, the following sections provide a detailed description of the pre-project conditions.

Ecosystem Type

The project is located in **Central Kalimantan**, situated on the **Sunda Shelf**. The area falls within the **Heart of Borneo** initiative boundaries, a globally recognized priority area for conservation. The native ecosystem is classified as **Tropical Lowland Rainforest** (*Hutan Hujan Tropis Dataran Rendah*), specifically falling within the **Borneo Lowland Rain Forests** ecoregion. This ecosystem is characterized by towering Dipterocarp trees and high biodiversity but has been subjected to significant historical pressures from industrial logging concessions (*Hak Pengusahaan Hutan* - HPH) that operated from the 1970s to the 1990s.

Current and Historical Land-Use

The current land use within the project's eligible areas is a mosaic of degraded, non-productive landscapes including open land, scrub (*semak belukar*), and mining tailings (*lahan bekas tambang*). Historical land use for at least the past 10 years has been dominated by unsustainable extractive practices that have prevented the natural

regeneration of the native forest ecosystem. The primary historical drivers of this degradation include:

1. **Illegal Gold Mining (*PETI*)** Unlike many other regions, the Gunung Mas landscape has been severely impacted by small-scale alluvial gold mining. This activity involves stripping vegetation and topsoil along riverbanks and forest interiors, leaving behind barren, sandy tailings and mercury-contaminated pools that cannot regenerate naturally.
2. **Illegal Logging:** Following the expiration of formal logging concessions, "open access" illegal logging targeting remaining valuable timber (e.g., Ulin/Ironwood) has degraded the forest structure, reducing canopy cover and biodiversity density.
3. **Shifting Cultivation (*Ladang Berpindah*):** The traditional practice of rotational slash-and-burn agriculture for rice cultivation has led to the progressive clearing of forest patches.
4. **Anthropogenic Fires:** Fires used for land clearing often escape into degraded shrublands, suppressing tree seedling survival and favoring the dominance of fire-tolerant grasses (*Imperata cylindrica*).

Analysis of historical satellite imagery and the **JRC Tropical Moist Forest (TMF) Transition Map** confirms that the project areas allocated for reforestation (PAA 1) have been in a non-forested or severely degraded state for over a decade, fulfilling the core eligibility requirements of the VM0047 methodology.

Present and Prior Environmental Conditions

- **Climate:** The project zone experiences a **Tropical Rainforest Climate** (Af under Köppen; Type A/B under Schmidt-Ferguson), characterized by high humidity and significant rainfall year-round. Average annual rainfall typically ranges from **2,000 to 3,000 mm**, with no distinct dry season comparable to Eastern Indonesia, although precipitation decreases between June and September. The average annual temperature is stable at **27-28°C**. While conducive to growth, this climate also accelerates soil nutrient leaching in deforested areas.
- **Topography and Hydrology:** The landscape serves as the upstream catchment (*Hulu*) for two major river basins: **DAS Kahayan** and **DAS Katingan**. The topography is predominantly flat to undulating (0-25% slope), transitioning to steeper hills in the northern districts. The degraded baseline condition contributes to high surface runoff, erosion, and sedimentation in these critical waterways.

- **Soils and Geology:** The area is geologically stable, located on the Sunda Shelf. Based on the **RPHJP KPHP Unit XV** soil analysis, the dominant soil types are **Latosol (62%)** and **Podsolik (Red-Yellow Podzolic) (36%)**. These are old, highly weathered mineral soils. They are naturally acidic (pH 4.5-6.5) and have low nutrient reserves. Once the forest canopy is removed (via mining or logging), these soils rapidly lose fertility and organic matter, creating a significant biophysical barrier to natural recovery.
- **Vegetation:** The baseline vegetation within the project's eligible areas (PAA 1) is a direct result of historical mining and fire degradation. It is not a natural ecosystem but rather a degraded landscape dominated by opportunistic pioneer shrubs (*Semak Belukar*), ferns, and invasive Alang-alang grass (*Imperata cylindrica*). In PAA 2, the vegetation consists of logged-over forest with significantly reduced biomass and structural complexity compared to primary forest.
- **Biodiversity:** Prior to project initiation, the degraded state of the landscape offers fragmented and poor-quality habitat for the region's unique fauna. The loss of canopy connectivity severely limits movement for arboreal species. The project area is critical habitat for globally significant species, including the **Critically Endangered Bornean Orangutan (*Pongo pygmaeus*)**, the **Critically Endangered Sunda Pangolin (*Manis javanicus*)**, and the **Vulnerable Sun Bear (*Helarctos malayanus*)**, whose populations are threatened by habitat fragmentation and poaching facilitated by open access.

This comprehensive baseline of long-term ecological degradation—driven specifically by mining and logging legacies—and prohibitive biophysical barriers (acidic soils, aggressive weeds) demonstrates the clear need for active restoration intervention and forms a robust foundation for the project's additionality argument under the VM0047 methodology.

2.2.2 Most-Likely Scenario Justification (CCB, G2.1)

Based on a thorough analysis of the conditions prior to project initiation (detailed in Section 2.2.1) and an evaluation of potential land-use alternatives, the **continuation of the pre-project state of degradation** driven by extractive activities is determined to be the most likely without-project land use scenario for the entire **19,008.60 ha** eligible project area.

This justification is based on a systematic evaluation of land-use scenarios and the prohibitive barriers that prevent any alternative outcomes, applying the logic of the **VT0001 Additionality Tool**.

Land Use Scenarios Without the Project:

In the absence of the Gunung Mas Community Restoration Project (GMCRP), the following alternative land-use scenarios were considered for the degraded Social Forestry lands:

1. **Continuation of Degradation (The Baseline Scenario):** The project area remains in its current state of arrested succession—a mosaic of open land ravaged by **Illegal Gold Mining**, degraded shrubland dominated by invasive *Imperata cylindrica*, and ecologically depleted secondary forest. It continues to be subject to pressures from recurrent fires, illegal logging, and soil toxicity from mining tailings, with no significant net increase in carbon stocks or biodiversity value.
    a. Historical analysis using JRC Tropical Moist Forest (TMF) data confirms that PAA 1 areas have remained in a non-forested state for over 10 years. Natural regeneration is arrested due to soil toxicity (mercury and acid drainage from gold mining) and the dominance of fire-prone Imperata cylindrica grass. Without significant human intervention and soil amelioration—which are absent in the baseline due to lack of funding—biomass stocks are expected to remain at a steady state of near-zero growth. Therefore, the baseline carbon removal is conservatively set to zero for PAA 1
2. **Active, Large-Scale Reforestation by Communities:** The **18 Social Forestry community institutions** (Hutan Adat, LPHD, HKm), as the legal rights holders, undertake a large-scale, coordinated effort to restore the degraded lands and reclaim mining sites without the support of the VCS project.
3. **Active Reforestation by Government or Other Third Party:** A government agency or another private/non-profit entity implements a large-scale restoration project in the area without carbon finance.
4. **Conversion to Other Land Uses:** The land is converted to more intensive commercial use, such as industrial-scale plantations (e.g., Oil Palm) or formal mining concessions.

Barriers to Alternative Scenarios:

A comprehensive barrier analysis (detailed in Section 3.5) demonstrates that all alternative scenarios, other than the continuation of degradation, are not plausible.

- **Barriers to Community-Led Reforestation (Scenario 2):** This scenario is prevented by prohibitive barriers faced by the local Dayak communities:
    - **Financial Barriers:** The communities are engaged in subsistence livelihoods or low-margin commodity farming (rubber). They lack the significant upfront capital required for land reclamation (rehabilitating sandy mining tailings requires heavy investment in organic amendments) and long-term maintenance.
    - **Technological Barriers:** There is a lack of local technical expertise in restoration silviculture for mined lands, large-scale nursery management, and the complex monitoring required for such an initiative.
    - **Economic Opportunity Cost:** Without the **SIGS** program (which provides immediate value from Agarwood/Rotan/Rubber), the immediate cash return from illegal mining/logging—however risky—outweighs the long-term, uncertain return of planting trees.
- **Barriers to Government/Third-Party Reforestation (Scenario 3):** The **RPHJP for KPHP Unit XV and XVI** explicitly identifies "insufficient funding" (*Pendanaan belum mencukupi*) and "lack of personnel" (*Kekurangan SDM*) as critical weaknesses in the current management regime. There are no existing funded government programs capable of implementing large-scale ecological restoration across these 18 specific remote sites.
- **Barriers to Conversion to Industrial Plantations (Scenario 4):** While Central Kalimantan has a history of oil palm expansion, the specific legal status of these lands as **Social Forestry (*Perhutanan Sosial*)** provides a strong regulatory barrier. The MoEF decrees explicitly designate these areas for community management and forest rehabilitation, legally prohibiting conversion to industrial monoculture plantations by third-party corporations. Therefore, this is not a probable baseline scenario.

Conclusion on the Most Likely Scenario:
Considering the significant financial and technological barriers to restoration, particularly the high cost of rehabilitating ex-mining land, and the lack of government resources identified in the RPHJP, the **continuation of the pre-project state of degradation (Scenario 1)** represents the most credible, well-documented, and justifiable baseline scenario.

The evidence from the government data (confirming "Somewhat Critical" land status and prevalence of PETI) and the initial community research (confirming the lack of capital) overwhelmingly supports the conclusion that, without the intervention of this VCS project,

the land would remain degraded. The project's activities are therefore fully additional to this baseline.

2.2.3 Community and Biodiversity Additionality (CCB, G2.2)

The significant community and biodiversity benefits generated by the **Gunung Mas Community Restoration Project (GMCRP)** are demonstrably additional and would not occur under the baseline scenario of continued land degradation across the **19,008.60 ha** project area. Without the project's specific interventions, its participatory Social Forestry model, and the crucial enabling factor of carbon finance, these positive social and ecological outcomes would not be realized.

Community Additionality

- **Contrast with Baseline Socioeconomic Conditions:** The baseline scenario for the **~7,145 people** in the project communities is characterized by economic vulnerability and reliance on hazardous extractive activities. A significant portion of the population depends on **Illegal Gold Mining** and illegal logging due to a lack of viable alternatives. While these activities provide quick cash, they create a "boom and bust" cycle that leaves behind degraded land, polluted water, and social instability, without building long-term wealth or infrastructure. The government's *RPHJP* documents confirm that these communities face systemic barriers to market access for legal commodities (Rubber/Rotan) due to poor infrastructure (river transport reliance) and lack of processing facilities. The baseline is a continuation of this extractive poverty trap.

The project introduces specific community benefits that are **additional** because:

1. **Structured Empowerment and Participation:** The project mandates a full **Free, Prior, and Informed Consent (FPIC)** process, transforming communities from passive residents into active partners in forest management through their **18 Social Forestry (*Perhutanan Sosial*)** institutions. The establishment of a formal Feedback and Grievance Redress Mechanism (FGRM) provides channels for accountability that are absent in the unregulated baseline economy.
2. **Sustainable Livelihood Development (SIGS):** Crucially, the project is not just planting trees; it is actively creating new, legal economic pathways. The implementation of **Sustainable Income Generating Schemes (SIGS)**—specifically for **Agarwood (*Gaharu*)** inoculation, sustainable **Rotan** harvesting, and **Rubber**

revitalizaton—are targeted interventions designed to create resilient, long-term income sources that rival the profitability of illegal mining. These activities require technical expertise (e.g., inoculation technology) and market linkages that the communities do not possess and would not otherwise receive.

3. **Targeted Development through a Dedicated Funding Mechanism:** The project includes the creation of a **Community Development Fund**, financed by carbon revenues. This mechanism will address critical infrastructure gaps identified in the baseline, such as supporting **Mobile Health Clinics** in remote sub-districts like Damang Batu. Such targeted social investment is not occurring in the baseline and is beyond the fiscal capacity of the local government.
4. **Overcoming Financial and Capacity Barriers:** All of these positive community outcomes are prevented in the baseline by the same barriers that make the restoration itself additional: a lack of capital to reclaim mined land and a lack of technical capacity. Carbon finance is the essential mechanism that funds the training, materials, and direct investments that make these additional community benefits possible.

Biodiversity Additionality

The baseline scenario of continued degradation leads to direct and ongoing negative biodiversity impacts:

- **Habitat Degradation and Fragmentation:** In the baseline, the landscape remains a mosaic of open mining tailings and degraded shrubland (*semak belukar*). This fragmentation severs the canopy connectivity vital for arboreal species, specifically the **Bornean Orangutan**, effectively isolating populations and reducing their genetic viability. This directly threatens biodiversity in the **Heart of Borneo** landscape.
- **Ongoing Anthropogenic Pressure:** The baseline is characterized by unregulated access, facilitating poaching of high-value species (Sun Bears, Pangolins) and recurrent fires from land clearing. The *RPHJP* confirms there are no existing, funded government programs with sufficient personnel to effectively patrol this vast 44,214.7 ha area.
- **Lack of Conservation Mandate or Funding:** While the area is designated as Production Forest, there is no active concession holder responsible for conservation. In the baseline, the "open access" nature of the land means there is

no financial mechanism to cover the costs of habitat restoration or species protection.

The project generates **additional** biodiversity benefits by:

1. **Active Large-Scale Habitat Restoration:** The core additionality is the restoration of **19,008.60 ha** of degraded land. This involves active reforestation of severely degraded areas (PAA 1) and enrichment of logged forests (PAA 2), physically re-connecting the canopy to create a contiguous biological corridor for the **Bornean Orangutan** between the Kahayan and Katingan river ecosystems.
2. **Implementing Active Threat Reduction:** The project specifically funds and implements a "Guardian" ranger program, integrating government forestry officials with community patrols. This provides a level of active, landscape-scale threat management against poaching and illegal logging that is completely absent in the baseline.
3. **Targeted Benefits for Species of Conservation Concern:** The project's activities will directly restore critical habitat for **Critically Endangered** species, including the **Bornean Orangutan (*Pongo pygmaeus*)** and **Sunda Pangolin (*Manis javanicus*)**, as well as the **Vulnerable Sun Bear (*Helarctos malayanus*)**.
4. **Funding Biodiversity Monitoring:** The project incorporates a dedicated biodiversity monitoring plan (Section 5.4), enabling adaptive management informed by conservation targets. This capacity to monitor and respond to biodiversity trends is a key additional benefit that is unfunded in the baseline scenario.

These biodiversity outcomes are additional because the baseline lacks both the enforcement capacity and the financial mechanism to cover the significant operational costs of large-scale restoration and monitoring. **Carbon finance** provides the necessary revenue stream to make this shift from a degrading, extractive landscape to a restored, protected ecosystem viable.

2.2.4 Benefits to be used as Offsets (CCB, G2.2)

Only the climate benefits (i.e., quantified GHG emission reductions and removals verified under the VCS Program and issued as VCUs) generated by the project are intended to be used as carbon offsets.

No distinct community or biodiversity benefits generated by the project are intended to be used, quantified, or claimed as separate offsets under any other crediting scheme. The community and biodiversity outcomes are co-benefits resulting from the project activities

funded primarily through the climate mitigation (carbon offset) component, and their value is recognized through the CCB certification.

2.3 Safeguards and Stakeholder Engagement

2.3.1 Stakeholder Identification (VCS, 3.18, 3.19; CCB G1.5)

Table 13: Stakeholder Identification

Stakeholder Identification	Primary Community Partners: The 18 Social Forestry community groups (License Holders: Hutan Adat, LPHD, HKm). Traditional Authorities: The Damang (Sub-district Customary Chief) and Mantir Adat (Village Customary Leader) who oversee customary law. Village Government: Village Heads (Kepala Desa) and Village Consultative Bodies (BPD) in the 12 partner villages. Local Community Members: Residents of the villages in Damang Batu, Miri Manasa, and Rungan Barat sub-districts. Implementation Partner: Yayasan Antang Patagu Mahaga Lewu Project Proponent: Asia Assets Developments Co., Ltd. (AAD). Government Regulators: Ministry of Environment and Forestry (MoEF), Central Kalimantan Provincial Forestry Department, and KPHP Unit XV/XVI. Stakeholders were primarily identified through the legal framework of Indonesia's Social Forestry (Perhutanan Sosial - PS) program and the customary structures of the Dayak people. The process involved: 1. Legal Identification: Identifying the 18 community institutions holding the formal Social Forestry decrees (Surat Keputusan - SK) issued by the Ministry of Environment and Forestry (MoEF). These entities (Hutan Adat, LPHD, HKm) legally define the project area and represent the community rights holders. 2. Community Consultation: Engaging with these license holders to identify broader stakeholders, including the Customary Council (Kelembagaan Adat), Village Government officials (Pemerintah Desa), and specific livelihood groups (e.g., rubber farmers, rotan collectors). 3. Partner Identification: Identifying implementing

	partners (Yayasan Antang Patagu Mahaga Lewu) and relevant government agencies (UPT KPHP Unit XV and XVI, Central Kalimantan Forestry Department).
Legal or customary tenure/access rights	**Legal Rights**: The 18 community groups hold legally binding Social Forestry decrees (SK Perhutanan Sosial) issued by the MoEF. These decrees grant them secure land tenure and management rights for 35 years (extendable). Crucially, pursuant to MoEF Regulation No. 9/2021, these rights include the "utilization of environmental services" (pemanfaatan jasa lingkungan), which explicitly covers carbon trading. The Cooperation Agreements (Perjanjian Kerja Sama - PKS) signed between the communities and the Proponent formalize the transfer of the mandate to manage these carbon rights. **Customary Rights**: Underlying the state legal framework is the Dayak Customary Law (Hukum Adat Dayak). This governs community access to ancestral lands (Tanah Ulayat) and resources. These rights are held collectively and overseen by the Damang and Mantir. The project explicitly recognizes these rights; notably, 10 of the 18 licenses are specifically designated as Customary Forests (Hutan Adat), providing the strongest possible legal recognition of indigenous tenure. There are no known conflicting rights, as the legal licenses were granted based on verified community claims.
Stakeholder diversity and changes over time	The primary stakeholder groups are the local Dayak (Ngaju and Ot Danum) communities. They are culturally homogenous but organized under different legal structures (Customary Forest vs. Village Forest) depending on their specific decree. - **Economic Profile**: The main economic activities are small-scale rubber tapping, rotan collection, and subsistence farming. A significant portion of the workforce has historically engaged in illegal gold mining (PETI) due to lack of alternatives. Incomes are generally volatile and often below the regional poverty line. - **Social Structure:** Strongly influenced by the Huma Betang philosophy (communal cooperation) and the leadership of the Mantir Adat. - **Interaction**: Interactions between community groups and the project proponents (AAD, Yayasan Antang Patagu Mahaga Lewu are formalized through the PKS agreements. - **Changes**: The structure of the groups is expected to remain stable. However, the project will catalyze a shift in economic roles, transitioning community members

	from "illegal miners" to "forest guardians" and "sustainable agroforestry farmers," thereby integrating them into a formal, legal economy.
Expected changes in well-being	Relative to the baseline of degraded lands, river pollution from mining, and economic vulnerability, the project is expected to cause significant positive changes in well-being: Economic: Creation of direct employment (nurseries, rangers, monitoring) and generation of long-term income through the Sustainable Income Generating Schemes (SIGS) focused on Agarwood, Rotan, and Rubber. This diversifies livelihoods beyond the hazardous "boom-and-bust" cycle of illegal mining. Social: Strengthening of community institutions (cooperatives) and increased capacity for sustainable land management. Investment in critical infrastructure via the Community Development Fund, specifically targeting Health Services (mobile clinics). Ecosystem Services: Restoration of forest cover will protect the Kahayan and Katingan watersheds, reducing turbidity and sedimentation, regulating water flow, and securing the supply of non-timber forest products.
Location of stakeholders	The local communities (LCs), who are also the customary rights holders, are located in the villages associated with the 18 Social Forestry licenses across Gunung Mas Regency, Central Kalimantan (specifically within the sub-districts of Damang Batu, Miri Manasa, and Rungan Barat). The project proponents and partners are based in Indonesia (Jakarta/Palangka Raya) and Taiwan. No negative impacts are predicted for areas outside the project boundary; rather, the project is expected to reduce leakage by providing legal economic alternatives to encroachment.
Location of resources	The territories are the 18 legally defined Social Forestry license areas, totaling 44,214.7 hectares. These are the same lands to which the communities have customary access rights. The key resources are the land itself for restoration, and the future benefits derived from the restored forest, including Verified Carbon Units (VCUs), sustainable NTFPs (Agarwood resin, Rotan, Latex), and improved hydrological services. Sacred sites (Sandung, Bukit Keramat) within these territories have been participatory mapped and are excluded from all project planting activities to preserve cultural heritage.

2.3.2 Stakeholder Descriptions (VCS, 3.18, 3.19; CCB, G1.6, G1.13)

Key stakeholders identified include, but are not limited to:

Local Communities (18 Social Forestry Institutions):
The most critical stakeholders are the **~7,145 people** comprising the 18 community institutions that hold the legal Social Forestry (*Perhutanan Sosial*) licenses.

- **Rights and Interests:** As the legal license holders (*Hutan Adat*, *LPHD*, *HKm*), they hold the primary rights to manage the land.Their primary interests are in securing sustainable, legal livelihoods to replace dangerous illegal mining (*PETI*), improving access to clean water and health services, and preserving their ancestral *Dayak* territories.
- **Relevance:** They are the project's core partners and the primary implementers of all on-the-ground restoration and protection activities. The project's success is entirely dependent on their active and willing participation.

Indigenous Peoples (IP):
Specifically, the **Dayak Ngaju** and **Dayak Ot Danum** peoples residing in the project zone. These groups have distinct cultural identities, customary rights, and a deep spiritual connection to the forest (often linked to the *Kaharingan* belief system).

- **Rights:** They possess Customary Rights (*Hak Ulayat*) over the land.
- **Relevance:** Their traditional ecological knowledge is vital for species selection and forest protection.

Project Proponent (AAD):

- **Asia Assets Developments Co., Ltd. (AAD):** Responsible for project design, implementation, funding, carbon accounting (MRV), and overall management. Interest lies in successful conservation outcomes, generation of high-quality carbon credits, and maintaining positive stakeholder relationships.
- Yayasan Antang Patagu Mahaga Lewu**:** The local implementation partner responsible for on-the-ground coordination, managing the micro-finance mechanism, and facilitating the SIGS programs.

Government Agencies:

- **Ministry of Environment and Forestry (MoEF):** National authority for forestry licensing, regulation, and the National Registry System (SRN PPI).
- **Central Kalimantan Provincial Forestry Department:** Regional oversight authority.

- **UPT KPHP Unit XV Kahayan Hulu & Unit XVI Gunung Mas:** The Forest Management Units responsible for the site-level supervision of the production and protected forests where the project operates. They are key partners in joint patrols and fire prevention.
- **Sub-district (** Local administration, crucial for communication, coordination, and the integration of project activities with village development plans (*APBDes*).

Customary Institutions (*Kelembagaan Adat*):

- **Traditional Leaders:** The **Damang** (Customary Chief at the Sub-district level) and **Mantir Adat** (Customary Functionaries at the Village level).
- **Relevance:** They hold customary authority over land disputes, cultural ceremonies, and the enforcement of *Hukum Adat* (Customary Law). Their endorsement is essential for the social legitimacy of the project.

(A detailed Stakeholder Description Table will be compiled in Appendix 1)

Table 14: Communities included in the Project Accounting Area for the Gunung Mas Community Restoration Project

Village (Nama Desa)	**Social Forestry Group (Nama PS / License Holder)**	**Total Population**
Rangan Hiran, Harowu, & Masukih *(Joint Customary Area)*	**HA Dayak Ot Danum Himba Antang Tambun Tiang Bungai**	1,218
Tumbang Mahuroi	1. **HA Dayak Ot Danum Lowu Tumbang Mohuroi** 2. **HKm Sopan Lawang Bulan**	1,017
Tumbang Marikoi	1. **HA Dayak Ot Danum** (Marikoi)	1,361

	2. **HKm Marikoi Hapakat**	
Tumbang Kuayan	**HA Dayak Ngaju**	642
Karatau Sarian	1. **HA Dayak Ot Danum Lowu Karatau Sarian** 2. **LPHD Karatau Sarian**	596
Tumbang Anoi	1. **HA Dayak Ot Danum** (Tumbang Anoi) 2. **HKm Anoi Sangkuwak**	511
Tumbang Maraya	1. **HA Dayak Ot Danum Tbg. Maraya** 2. **LPHD Tumbang Maraya**	488
Rangan Hiran *(Village Forest Zone)*	**LPHD Rangan Hiran**	380
Tumbang Posu	1. **HA Dayak Ot Danum Lowu Tumbang Posu** 2. **HKm Jaga Asam**	287
Karetau Rambangun	**HA Dayak Ot Danum** (Karetau Rambangun)	256
Harowu *(Village Forest Zone)*	**LPHD Harowu**	213
Tumbang Hatung	**HA Dayak Ngaju Lewu Tumbang Hatung**	176
TOTAL	**18 License Holders (Groups)**	**7,145**

The following list of community groups and specific stakeholders was derived from the stakeholder analysis performed during the SOCIAL AND BIODIVERSITY IMPACT ASSESSMENT (SBIA/PRA) workshops

Table 15**:** Stakeholder Assessments

Stakeholder	Rights, interest, and overall relevance to the project
Project Proponent	Enforcer of project.
Local and Provincial Forest Bureau	Supervising body for this project.
Local Cooperatives	Representative for the local communities. Provide lessons and trainings, micro-finance, and direct employment.
Local Residents	Residents who may possibly have their lifestyle or rights affected by project activities.

2.3.3 Stakeholder Access to Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

Full project documentation will be made accessible throughout the project lifetime via:

- **Verra Registry:** Publicly available project documents (PD, monitoring reports, validation/verification reports) will be uploaded to the Verra Project Hub.
- **Project Website:** www.asiaassetsdev.com where key documents and updates will be posted.
- **Local Access:** Hard copies of key documents (especially summaries in Bahasa Indonesia) will be made available upon request at Designated project field office location(s) - TBD and potentially deposited at relevant Sub-district and/or Village offices within the project zone.

2.3.4 Dissemination of Summary Project Documents (VCS, 3.18, 3.19; CCB, G3.1)

Summary project information will be actively disseminated using culturally appropriate methods:

- **Initial Information:** Project summaries (objectives, activities, location, proponent, basic carbon/CCB concepts, contact information) translated into Bahasa Indonesia will be prepared in accessible formats (e.g., simple brochures, posters). These will be distributed during initial consultations and made available in village offices/community centers.

- **Monitoring Results:** Summaries of monitoring reports (key findings on carbon performance, community impacts, biodiversity status) will be prepared in Bahasa Indonesia and shared through community meetings, posters in villages. The project website will also host these summaries.
- **Language:** All summary materials and key consultations will be primarily in Bahasa Indonesia, the national language widely understood in the region. Translation or facilitation into local dialects will be provided if necessary during specific community meetings.

2.3.5 Informational Meetings with Stakeholders (VCS, 3.18, 3.19; CCB, G3.1)

Initial informational meetings and comprehensive stakeholder consultations were conducted during the primary site assessment period, commencing on **October 1st, 2025** and concluding on **October 18th, 2025**. These sessions were convened within the jurisdiction of each of the **18 Social Forestry**, covering all partner villages where stakeholders were mapped and the project's major focal points were introduced.

To ensure the process was inclusive and culturally aligned with **Dayak Ngaju and Ot Danum** customs, the engagement followed a rigorous participatory framework:

3 **Village-Level Engagement:** Meetings were held directly within the communities to maximize accessibility.
4 **Language & Comprehension:** All technical information (regarding carbon rights, restoration activities, and the transition from illegal mining) was presented in **Bahasa Indonesia**, with local facilitation provided in Dayak dialects to ensure full comprehension by elders and non-fluent speakers.
5 **Inclusivity:** Invitations were broadcast in advance through Village Heads and Customary Leaders (*Mantir Adat*) to ensure the participation of diverse groups, specifically women, youth, and those currently dependent on extractive activities.
6 **Documentation:** The outcomes of these meetings, including attendance records (*Daftar Hadir*) and expressions of preliminary consent, were formally documented through signed minutes (*Berita Acara*) and agreements, establishing the foundation of the FPIC process.

6.1.1 Risks from the Project and No Net Harm (VCS, 3.18, 3.19)

While the project's primary impacts are expected to be positive, potential risks *resulting from project activities* are identified and mitigated to ensure the principle of 'no net harm':

- **Exclusion Risk:** Project protection activities (patrols, zoning of restoration areas) could potentially limit communities' access to resources they traditionally used. Specifically, the enforcement of bans on **Illegal Mining (*PETI*)** and **Logging** will displace those currently relying on these extractive activities for income.
    - *Mitigation:*
        - **Participatory Mapping:** Detailed mapping of customary use areas (*Simpuk* fruit gardens, *Hutan Karet*, *Kebun Rotan*) during FPIC to ensure legitimate traditional uses are not blocked.
        - **Alternative Livelihoods:** Immediate deployment of the **SIGS** program (Agarwood, Rotan, Rubber) and **Rice Logistics Channel** to provide economic buffers for those transitioning out of illegal extraction.
        - **Zoning:** Clear demarcation of "Core Restoration Zones" (PAA) vs. "Community Utilization Zones" (Off-site) in consultation with the *Mantir Adat*.
- **Benefit Inequality:** Project benefits (e.g., employment in nurseries, Community Development Fund projects) may be captured by local elites or specific village factions, marginalizing women, poorer households, or those outside the main patronage networks.
    - *Mitigation:*
        - **Transparent Governance:** Benefit sharing is managed through formal Cooperatives with bylaws requiring equitable distribution.
        - **Targeting:** Proactive targeting of vulnerable groups (women, youth, former miners) for employment in nurseries and patrols.
        - **Oversight:** Monitoring benefit distribution by the **Damang** (Customary Chief) and project staff; accessible FGRM.
- **Expectation Management:** High community expectations regarding the speed and magnitude of "Carbon Money" or instant agricultural yields may not be fully met, leading to disappointment or conflict, especially given the volatility of the illegal gold market it replaces.
    - *Mitigation:*
        - **Realistic Communication:** Clear communication about project timelines (validation/verification cycles), the performance-based

nature of carbon finance, and the growing cycles of Agarwood/Rotan.
        - **Early Wins:** Delivering immediate tangible benefits (e.g., **Rice Program**, **Clean Water Systems**) before carbon revenues materialize to build trust.
- **Safety & Security Risks:** Project staff (especially "Guardian" patrols) could face safety risks from difficult terrain, wildlife (Snakes, Sun Bears), or potential confrontation with **Illegal Miners (*Penambang Liar*)** or loggers who may be armed or aggressive.
    - *Mitigation:*
        - **De-escalation Protocols:** Strict "Non-Confrontation" SOPs for community patrols; enforcement actions involving illegal mining camps are led by authorized **Forestry Police (SPORC/Polhut)** and local Police (*Polsek*), not unarmed civilians.
        - **PPE & Training:** Provision of appropriate safety equipment (boots, helmets, GPS, communication radios) and first aid training.
        - **Health Safety:** Mercury awareness training for staff working near former mining sites.
- **Pollutants/Waste:** Project operations (nursery plastic polybags, vehicle use for rice logistics) could generate waste.
    - *Mitigation:*
        - **Waste Management:** Implementation of a strict waste management plan. Plastic polybags from the **19,008 Ha** planting effort must be collected and recycled, not burned or left in the forest.
        - **Organic Protocols:** Prohibition of chemical fertilizers and pesticides in the PAA; use of organic compost and *Sesbania* mulch only.

The project commits to the principle of 'no net harm' and will actively monitor and manage these risks throughout its lifetime, adapting strategies as needed based on monitoring results and stakeholder feedback via the FGRM.

6.1.2 Community Costs, Risks, and Benefits (CCB, G3.2)

Information regarding potential costs (e.g., opportunity cost of restricted forest access), risks (e.g., participation risks, potential negative impacts as per 2.3.6), and benefits (e.g., employment, livelihood support, ecosystem services, capacity building) has been and will

continue to be shared with communities in a transparent, timely, and culturally appropriate manner. This occurs primarily through:

- **FPIC Consultations:** Dedicated meetings where project details, potential impacts (positive and negative), proposed mitigation measures, and benefit-sharing plans are discussed openly using clear language (Bahasa Indonesia, local facilitation if needed) and visual aids.
- **Information Materials:** Dissemination of summary documents (brochures, posters) outlining key project aspects.
- **Ongoing Dialogue:** Regular communication via project staff/liaison officers and accessible feedback channels (FGRM).

This information is provided *before* communities are asked to provide formal consent, allowing ample time for internal discussion, questions, and informed decision-making regarding participation. Community feedback gathered during this process is used to refine project design and mitigation measures.

6.1.3 Information to Stakeholders on Validation and Verification Process (VCS, 3.18.6, 3.19; CCB, G3.3)

Communities and other stakeholders will be informed about the VCS and CCB validation and verification processes, including their purpose, timelines, and the role of the independent auditor (VVB):

- **Measures Taken**: Specific announcements and explanations will be provided during community meetings and consultations preceding the audit activities. Information will also be disseminated via village leadership and local project contacts.
- **Communication Methods**: Verbal explanations (in Bahasa Indonesia, with local facilitation if needed), simple written summaries or posters outlining the audit process, and contact information for the project team for further questions.

6.1.4 Site Visit Information and Opportunities to Communicate with Auditor (VCS, 3.18.6; CCB, G3.3)

Notification: Communities and relevant stakeholders will be notified of the planned VVB site visit schedule at least [e.g., two-three weeks] in advance, through village heads and project liaison staff.

Facilitation of Communication: The project will facilitate direct and independent communication between the VVB and stakeholders. This includes:

- Organizing meetings where the VVB can speak directly with community members (including separate focus groups for women, IPs, or other specific groups if requested by the VVB or community).

- Ensuring VVB auditors can travel freely within the project zone to meet stakeholders without undue influence from project staff (though logistical support will be provided).
- Providing contact information (e.g., VVB public contact, project FGRM channel which can forward concerns) should stakeholders wish to communicate confidentially outside of planned meetings.
- Emphasizing to communities their right to speak freely and raise any concerns with the auditors.

6.1.5 Stakeholder Consultations (VCS, 3.18; CCB, G3.4)

Stakeholder consultations are foundational to the project design and ongoing implementation.

- **Initial Phase:** Informal consultations (as mentioned in 2.3.5) helped gauge initial interest and identify key local concerns (e.g., related to 18 Community/Village/ Social Forestry, community needs, forest access). This informed the preliminary project concept.
- **FPIC Process:** A formal, documented FPIC process was implemented involving all identified communities, IP groups, and customary rights holders. This involves multiple rounds of information sharing and consultation meetings, conducted in a culturally sensitive manner (respecting local protocols, timing, language needs) and ensuring representation of diverse groups (women, youth, elders, different livelihoods). The aim is to achieve documented consent for project activities and agreement on benefit-sharing and grievance mechanisms.
- **Government & Other Stakeholders:** Ongoing consultations are held with relevant government agencies (Provincial Forestry Department) to ensure alignment, collaboration, and compliance.
- **Impact on Design:** Stakeholder input gathered to date has emphasized the importance of clear communication, respect for customary areas, tangible livelihood benefits, and local employment. Project design incorporates these elements, for example, by prioritizing local hiring for patrols and ensuring community development activities are designed based on local needs identified during consultations.

(Table for documenting specific comments and responses will be populated during and after formal consultations and the public comment period).

Table 16**:** Stakeholder Engagement

Date of stakeholder consultation	*October 1st- October 18*
Stakeholder engagement process	The process was designed to be culturally appropriate for the **Dayak Ngaju and Ot Danum** communities and inclusive of all subgroups (women, youth, former miners). It involved a series of community-level meetings (Musyawarah Desa) held in the village hubs representing the **18 Social Forestry Areas**. **Methodology:** • All information was presented in **Bahasa Indonesia**, with local facilitation in **Dayak Ngaju** or **Ot Danum** languages to ensure full comprehension by elders. • Meetings were announced in advance via Village Heads and Customary Leaders (Mantir Adat) to allow for maximum participation. • Outcomes, including attendance (Daftar Hadir) and consent, were formally documented through signed agreements (Berita Acara) and meeting minutes.
Consultation outcome	The consultations resulted in broad community consent for the project design. Key discussion points included: **1. Project Design:** The transition from illegal mining/logging to restoration was agreed upon. The planting strategy using **Black Locust/Melaleuca** for land reclamation (PAA 1) and for enrichment (PAA 2) was explained. **2. Risks & Benefits:** A transparent discussion covered the risks of stopping immediate cash flow from mining (PETI) versus the long-term benefits of the **Rice Logistics Program** (Food Security) and **SIGS** income (Rotan/Agarwood). **3. Legal Rights:** The tenure security provided by the **18 Social Forestry Decrees** was reinforced, along with explanations of carbon rights transfer under the Cooperation Agreements (PKS). **4. FPIC & VCS Process:** The principles of Free, Prior, and Informed Consent (FPIC) were discussed, and communities were informed about the VCS and CCB validation/verification process.
Ongoing communication	A framework for continuous communication is established: • **Annual Community Meetings:** To report on restoration progress, monitoring results (biodiversity/carbon), and provide full transparency on financials from carbon credit sales.

	· **Customary Integration:** Regular updates provided to the **Damang** and **Mantir Adat** to ensure alignment with customary law. · **Publicly Available Documentation:** The PDD and all subsequent monitoring reports will be made publicly available online via the Verra Registry. · **Local Language Summaries:** Key findings will be summarized, translated into local languages, and distributed via village notice boards and the local cooperatives.

Table 17**:** Public Comments and Response

Summary of comment received	When comment was received	Actions taken
TBD	TBD	TBD

6.1.6 Continued Consultation and Adaptive Management (VCS, 3.18; CCB, G3.4)

The project establishes a plan for continuous communication and consultation throughout its lifetime:

- **Regular Meetings**: Periodic meetings (e.g., annually or biennially) will be held in key villages or representative forums to provide project updates, discuss monitoring results, and gather feedback.
- **Liaison Staff**: Dedicated project field staff/community liaison officers will maintain regular contact with communities.
- **FGRM**: The Feedback and Grievance Redress Mechanism provides a formal channel for ongoing input and concerns.
- **Participatory Monitoring**: Involving community members in monitoring activities (e.g., patrols, biodiversity monitoring) provides continuous feedback opportunities.
- **Adaptive Management**: Project management will regularly review stakeholder feedback and monitoring results. This information will be used to make necessary adjustments to project activities, implementation strategies, benefit distribution, or risk mitigation measures, ensuring the project remains relevant, effective, and responsive to stakeholder needs and changing conditions. Decisions on significant adaptations will involve consultation with affected stakeholders.

6.1.7 Stakeholder Consultation Channels (CCB, G3.5)

Consultations are conducted directly with communities or through their legitimate representatives, identified through a combination of formal government structures and customary (*Adat*) recognition within the Dayak social system:

- **Formal Representatives:**
  - Village Heads (*Kepala Desa*).
  - Village Consultative Bodies (*Badan Permusyawaratan Desa* - **BPD**), which act as the parliament of the village.
  - Sub-district Heads (*Camat*).
- **Customary Representatives (*Tokoh Adat*)**
  - **Damang Kepala Adat:** The highest customary leader at the Sub-district (*Kecamatan*) level, crucial for resolving land disputes.
  - **Mantir Adat:** The customary functionaries at the Village (*Desa*) level who oversee daily customary law (*Hukum Adat*) and cultural protocols.
- **Community Groups:**
  - Direct engagement with representatives of community cooperation groups.
- **Information Sharing:**
  - Adequate information sharing is ensured through multiple channels (village meetings/*Musyawarah Desa*, distribution of project documents, and postings on village notice boards).
  - Communication is primarily in **Bahasa Indonesia**, with local facilitation in **Dayak Ngaju** or **Ot Danum** languages where necessary to ensure full comprehension by elders.
  - Records of consultations (minutes/*Berita Acara*, attendance lists, and signed agreements) are maintained by the Yayasan Antang Patagu Mahaga Lewuand AAD to document the process for verification.

6.1.8 Stakeholder Participation in Decision-Making and Implementation (VCS, 3.18, 3.19; CCB, G3.6)

In order to ensure effective participation of the project communities it was important to hold meetings and workshops during time periods where stakeholders could attend. As such, all meetings and workshops were held during the day and at times when other work did not interfere with full community participation. Invitations were extended to community leaders, local government officials and commune leaders within a respectful timeframe and in such a manner that each stakeholder could respond. This included via written invitations, and phone calls. All communication was conducted in Indonesian, a language every

participant speaks, thus enabling participants to fully understand and enabling their full participation.

The project enables effective stakeholder participation through:

- **FPIC**: Provides the primary mechanism for communities to influence initial project design and provide consent.
- **Participatory Planning**: Community development activities are designed based on needs identified with communities. Community members will be involved in implementing relevant activities (e.g., nursery management, reforestation, patrol routes).
- **Employment & Capacity Building**: Prioritizing local employment (Section 2.3.18) and providing relevant training (Section 2.3.17) empowers local individuals to actively participate in implementation.
- **Cultural & Gender Sensitivity**: Consultation methods respect local customs and schedules. Specific efforts are made to create safe spaces for women and marginalized groups to participate and voice opinions (e.g., separate focus groups, timing meetings appropriately, ensuring female facilitators are available). Project staff receive training on cultural sensitivity and gender equity.

6.1.9 Anti-Discrimination Assurance (VCS 3.19; CCB, G3.7)

AAD and all entities involved in the project are committed to upholding principles of non-discrimination and preventing sexual harassment:

- **Policy**: A clear anti-discrimination and anti-harassment policy, compliant with Indonesian Law (e.g., Law No. 13/2003 on Employment, Law No. 39/1999 on Human Rights) and international standards (e.g., ILO conventions), applies to all project staff, contractors, and partners. Discrimination based on gender, ethnicity, religion, age, disability, sexual orientation, or any other status is prohibited.
- **Training**: Project staff receive mandatory training on the anti-discrimination/anti-harassment policy, cultural sensitivity, gender equity, and respectful community engagement when needed.
- **Recruitment & Operations**: Employment practices ensure equal opportunity (Section 2.3.18). Project activities are designed to be inclusive and avoid reinforcing existing inequalities.
- **Monitoring & Reporting**: Adherence to the policy is monitored. The FGRM provides a confidential channel for reporting any instances of discrimination or harassment, which will be investigated promptly and impartially, with appropriate disciplinary action taken if warranted.

6.1.10 Feedback and Grievance Redress Procedure (VCS, 3.18.4; CCB, G3.8)

Table 18**:** Feedback and Grievance Redress Management (FGRM) Procedure

Development process	The project strives to minimize the possibility of conflicts and grievances by maintaining close linkages between and working proactively with communities and stakeholders throughout the Project Accounting Area. The Project additionally has an open-door policy, encouraging community members, stakeholders and employees to visit the Project Office, and discuss any issues or feedback directly with project staff. The office also allows comments and feedback which are followed up upon by project staff. If conflicts or grievances arise, the project has a feedback and grievance redress policy and process, the purpose of which is to provide an efficient, fair and accessible mechanism for resolving complaints and conflicts, and ensure that the process is transparent and comprehensive. The project feedback and grievance redress process has been publicized to communities and a copy provided to the project validator. The full grievance policy has been submitted to the validator and is available to anyone upon request. In summary, community members and project stakeholders are encouraged to submit grievances, comments or feedback to the Project Office through several channels, with all communication methods receiving the same level of response. The primary method for communication will be through the Project Office or Sub-office.
Grievance redress procedure	**Process of receiving and hearing:** Any comment can be submitted via the following open channel: 1. AAD's website at www.asiaassetsdev.com 2. Gunung Mas office 3. Community leaders and officials also act as a communication channel between PP and the local community. **Process of responding and attempting to resolve grievances:** Any comment received will be answered within 21 days, unless it is a public comment posted on the Verra Registry, as it requires an update on the project description document to answer.

	Stage 1: Amicable Resolution (Local Level) An attempt to further understand the incident and the measures that could be taken will first be conducted digitally, via phone or mail. A formal written response will be provided after the interaction in a manner that is culturally appropriate. A meeting between the party submitting the grievance incident and the Project Proponent (PP) will be arranged, if necessary, to resolve the conflict. All grievance reports received and meeting minutes will be made publicly available at the Yayasan Antang Patagu Mahaga Lewu office. The meeting will be conducted in a culturally appropriate manner, considering traditional conflict resolution methods such as Musyawarah Adat (Customary Deliberation). Village leaders, specifically the Mantir Adat (Village Customary Leader) and Damang (Sub-district Customary Chief), will be consulted to incorporate the appropriate traditional conflict resolution methods used by the Dayak communities. *Stage 2: Mediation* Any grievances that are not resolved by amicable negotiations shall be referred to mediation by a neutral third party that is agreed by both parties. The neutral third party could include IPB University (Bogor), the University of Palangka Raya (UPR), or the Central Kalimantan Provincial Forestry Department. *Stage 3: Arbitration / Legal* Any grievances that are not resolved through mediation shall be referred either to: a) Arbitration, to the extent allowed by the laws of the relevant jurisdiction; or b) The Court of Jakarta, Republic of Indonesia, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any. Stage 3: Any grievances that are not resolved through mediation shall be referred either to a) arbitration, to the extent allowed by the laws of the relevant jurisdiction or b) court of Jakarta, Republic of Indonesia, without prejudice to a party's ability to submit the grievance to a competent supranational adjudicatory body, if any.

6.1.11 Accessibility of the Feedback and Grievance Redress Procedure (VCS, 3.19; CCB, G3.8)

The FGRM will be publicized through:

- Community meetings during FPIC and project implementation.
- Posters and information sheets (in Bahasa Indonesia) displayed in village offices and community centers, including contact details for lodging grievances.
- Explanation by project liaison officers during regular village visits.
- Information on the project website.

Grievances received and their resolution status will be documented internally. Summaries of grievances (anonymized where appropriate) and responses will be made publicly available periodically (e.g., annually via website/community meetings) to ensure transparency, while respecting confidentiality.

6.1.12 Worker Training (VCS, 3.19; CCB, G3.9)

The Gunung Mas Community Restoration project is committed to building local capacity by providing comprehensive orientation and ongoing training for all project personnel, with a particular focus on employees recruited from communities within the project zone (Section 2.3.18). This training is designed not only to equip workers with the necessary skills for effective project implementation but also to foster locally useful knowledge and competencies that enhance long-term employability and support sustainable development in the region.

Training components include:

1. **Project Induction & Orientation:** All new personnel receive a thorough introduction covering:
    - The project's background, objectives (climate, community, biodiversity), and activities (ARR, SIGS, community support).
    - Relevant VCS and CCB standards and requirements.
    - AAD's operational policies, including the Code of Conduct, Anti-Discrimination and Anti-Harassment Policy (Section 2.3.14), and Occupational Health and Safety (OHS) procedures (Section 2.3.19).
    - The project's Feedback and Grievance Redress Mechanism (FGRM) (Section 2.3.15).
    - Basic principles of forest conservation, biodiversity protection, and sustainable development relevant to Gunung Mas Island.

2. **Role-Specific Technical Training:** Tailored training is provided based on job responsibilities. Examples include:
    - **Forest Patrol Teams:** Practical skills in navigation (map reading, GPS use), patrol planning and execution protocols, identification and recording of threats (illegal logging signs, encroachment indicators, poaching signs like snares), basic biodiversity observation, community interaction and conflict de-escalation techniques, relevant forestry and conservation regulations, first aid, and potentially the use of data collection tools like SMART (Spatial Monitoring and Reporting Tool).
    - **Community Liaison & SIGS Support Staff:** Training in effective communication and facilitation skills, participatory rural appraisal (PRA) techniques, understanding the specific Sustainable Income Generating Schemes (SIGS) being supported (e.g., Climate-Smart Agriculture techniques, sustainable NTFP harvesting/processing), basic monitoring of community program progress, explaining the FGRM process, and coordinating with the Yayasan Antang Patagu Mahaga Lewu on collective marketing elements.
    - **Nursery & Restoration Support Staff** Techniques for native seed collection, storage, and germination; nursery management practices (soil mix, watering, pest control without harmful chemicals); seedling propagation and handling; appropriate site preparation and planting techniques for local conditions; basic monitoring of seedling survival and growth.
    - **Monitoring Support Staff (Carbon/Biodiversity):** If local staff are involved, training may include standardized methods for forest inventory plot measurement (DBH, tree ID), biodiversity survey techniques (e.g., line transects, point counts if applicable), accurate data recording, and use of monitoring equipment.
3. **Capacity Building & Knowledge Transfer:**
    - **Focus on Transferable Skills:** Training emphasizes skills applicable beyond the project, such as sustainable agriculture practices, basic financial literacy (linked to SIGS/micro-finance), organizational skills (via partner involvement), and improved environmental awareness.
    - **Ongoing Learning:** Training is not a one-off event; refresher courses and opportunities for skill advancement will be provided throughout the project lifetime.

- **Knowledge Retention:** To mitigate knowledge loss due to staff turnover, the project relies on:
  - Development and use of clear Standard Operating Procedures (SOPs) for key activities.
  - On-the-job mentoring by experienced supervisors and technical staff.
  - Maintaining comprehensive project records and documentation accessible to relevant personnel.
  - Encouraging participation from a broad base within the community to develop a wider pool of skilled individuals.

This structured approach to training aims to ensure effective project implementation while building lasting capacity within the local communities, contributing to the project's long-term sustainability and positive impact. Training opportunities are provided equitably, with specific efforts to include women and members of vulnerable groups (Section 2.3.18, GL2.4).

6.1.13 Community Employment Opportunities (VCS, 3.19.13; CCB, G3.10)

The project prioritizes maximizing direct employment opportunities for residents of the communities within the project zone (identified in Section 2.3.2) as a key strategy for delivering local benefits and ensuring project sustainability. AAD recognizes the invaluable local knowledge and familiarity community members possess regarding the landscape, social dynamics, and biodiversity.

Local Hiring Preference:
For all project positions, ranging from field staff (e.g., forest patrols, nursery workers, SIGS facilitators) to administrative support and potentially supervisory roles, **preference will be given to qualified residents from local communities**. Where local and non-local candidates possess comparable qualifications and experience for a role, the local candidate will be prioritized. The project aims to fill the majority of its operational positions with local personnel.

Equal Opportunity and Non-Discrimination:
All recruitment and employment practices adhere strictly to the project's Equal Opportunity Policy (referencing Section 2.3.14) and Indonesian labor laws. Selection is based on merit, skills, and experience relevant to the position, ensuring **equal opportunity regardless of gender, ethnicity, religion, age, or other status**. Specific

efforts are made to encourage applications from **women and members of identified vulnerable or marginalized groups** within the communities. The project commits to **equal pay for equal work** and safe working conditions for all employees.

Recruitment and Selection Process:

- **Advertisement:** Job vacancies are advertised publicly and accessibly within the project zone using appropriate local channels, such as postings on village notice boards, announcements via village heads and customary leaders, and dissemination through our partner network.
- **Application & Selection:** Interested local residents can submit applications through designated channels. The selection process involves application review against clear job requirements, followed by interviews conducted by a panel typically including the AAD Field Manager and the relevant technical lead. Where appropriate and agreed, a representative from the Yayasan Antang Patagu Mahaga Lewu or the community may be invited to observe or participate in the selection process to enhance transparency.
- **Feedback:** Unsuccessful candidates, particularly those from local communities, will be provided with constructive feedback regarding their application where feasible, aiming to assist them in future opportunities.

Capacity Building for Employment:
Recognizing that local candidates may sometimes require additional skills, the project commits to providing necessary orientation and role-specific training (as detailed in Section 2.3.17) to successful local hires. Where qualified local candidates are not immediately available for certain specialized roles, the project may hire externally while concurrently implementing a plan to train local counterparts for future succession.

This approach ensures fair access to employment benefits, leverages local capacity, and integrates the community directly into the project's implementation and long-term success.

6.1.14 Occupational Safety Assessment (VCS, 3.19; CCB, G3.12)

An assessment identifies key occupational safety risks for project workers, particularly field staff:

- **Physical Hazards:** Slips/trips/falls on difficult forest terrain, injuries from falling branches, potential wildlife encounters (e.g., snakes, wild boar), risks associated with using tools (e.g., machetes), vehicle/boat transport accidents.
- **Environmental Hazards:** Exposure to weather extremes, potential vector-borne diseases (e.g., malaria, dengue).
- **Security Hazards:** Potential confrontation with illegal loggers or poachers.

Mitigation Measures:

- **Compliance:** Adherence to all relevant Indonesian labor laws regarding Occupational Health and Safety (OHS).
- **Training:** Mandatory safety training for all field staff covering risk identification, safe work procedures, first aid, emergency response, and safe use of equipment.
- **PPE:** Provision and mandatory use of appropriate Personal Protective Equipment (e.g., sturdy boots, long clothing, gloves, helmets where needed, potentially insect repellent).
- **Equipment & Communication:** Ensuring tools are well-maintained; providing communication devices (e.g., satellite phones/radios) for remote teams; equipping field posts with comprehensive first aid kits.
- **Protocols:** Development of SOPs for high-risk activities (e.g., patrols in remote areas, boat travel), including check-in/check-out procedures and emergency evacuation plans.
- **Working Hours & Conditions:** Ensuring reasonable working hours and conditions to prevent fatigue.
- **Health Support:** Access to basic medical support and clear procedures for handling workplace injuries or health emergencies.
- **Security:** Patrols conducted in teams; coordination with local authorities for security backup if needed; conflict de-escalation training.

Workers will be thoroughly informed of these risks and mitigation measures during induction and ongoing safety briefings.

6.2 Management Capacity

6.2.1 Project Governance Structures (CCB, G4.1)

The **Gunung Mas Community Restoration Project (GMCRP)** involves several key entities with distinct roles and responsibilities to ensure effective implementation and compliance:

- **Asia Assets Developments Co., Ltd. (AAD):** Main Project Proponent. Responsible for overall project management, securing financing, coordinating among partners, ensuring compliance with VCS/CCB standards.
- Yayasan Antang Patagu Mahaga Lewu**:** Local implementing party appointed by AAD to facilitate on-the-ground operations, community engagement, and the distribution of benefits.
- **UPT KPHP Unit XV Kahayan Hulu & Unit XVI Gunung Mas:** The specific Forest Management Units (KPH) responsible for site-level supervision. They collaborate on forest protection activities (e.g., joint patrols), fire prevention, and ensure alignment with the *RPHJP* (Long-Term Forest Management Plan).
- **Central Kalimantan Provincial Forestry Department** Provincial-level government authority supervising the KPHP units and providing regulatory oversight and guidance for forestry activities within the province.
- **Ministry of Environment and Forestry (MoEF), Republic of Indonesia:** National-level government authority responsible for overarching forestry policy, licensing (including Social Forestry designations), national carbon regulations (NEK, SRN PPI), and final approval of forestry-related project activities. Acts as the ultimate supervising body.

6.2.2 Required Technical Skills (VCS, 3.19; CCB, G4.2)

Successful implementation requires a diverse set of technical skills, including:

- **Forest Management:** Expertise in tropical forest ecology, sustainable forest management principles (even if for conservation), silviculture (for understanding baseline/regrowth and potential restoration), forest inventory techniques.
- **Carbon Accounting (VCS):** Deep understanding of VM0047 methodology, carbon stock measurement (field inventory, potentially remote sensing/LiDAR), GHG emission/removal calculations, MRV protocols, uncertainty analysis, non-permanence risk assessment.
- **Biodiversity Assessment & Monitoring (CCB):** Skills in conducting field surveys for flora and fauna, species identification (particularly project area endemics/RTE species), habitat assessment, HCV identification, biodiversity monitoring techniques (e.g., transects, plots, camera trapping, SMART patrols), conservation planning.

- **Community Engagement & Social Science (CCB):** Expertise in participatory rural appraisal (PRA), socio-economic surveys, FPIC facilitation, conflict resolution, community development program design and implementation, gender analysis, cultural sensitivity, FGRM management, social impact monitoring.
- **GIS & Remote Sensing:** Proficiency in using GIS software (e.g., ArcGIS, QGIS) for mapping (boundaries, strata, land cover, HCVs), spatial analysis, and utilizing satellite imagery (Landsat, Sentinel, potentially RADAR/LiDAR) for monitoring land cover change, deforestation/degradation alerts, and potentially biomass estimation support.
- **Project Management:** Skills in planning, budgeting, financial management, team coordination, logistics, reporting, adaptive management, and stakeholder relations.
- **Legal & Policy:** Understanding of Indonesian forestry law, environmental regulations, carbon project policies, land tenure issues, and international standards (VCS/CCB).

6.2.3 Management Team Experience (VCS, 3.19; CCB, G4.2)

A) Project Management Leads

Asia Assets Developments Co., Ltd:

As a company that has been dedicated to asset management and development activities since 2012, with its strong advising staff, including Dr. Stephen Shen, who was the former Director General of the Environmental Protection Administration (EPA) of Taiwan for 6 years, the highest ranking governmental position equivalent to the head of the Minister of Environment, AAD is capable of managing and implementing the project.

Alex Chi – Managing Director– AAD – Project Lead
Joined AAD in 2013 and has been the managing director of AAD and its projects since 2020. Responsible for communications with local authorities and governmental representatives.

6.2.4 Project Management Partnerships and Team Development (VCS, 3.19; CCB, G4.2)

Recognizing the specific technical demands of an ARR carbon project with CCB components, AAD complements its core management capacity through strategic partnerships and team development:

- **Technical Consultancy:** AAD has partnered with carbon development consultancy firms that possess demonstrated expertise in VCS/CCB project development, carbon accounting (specifically ARR methodologies), biodiversity assessment, social impact analysis, and MRV system design in the Indonesian context. This partnership provides critical technical guidance and quality assurance throughout project design and implementation.

- **Local Collaboration:** The project actively seeks collaboration with local government agencies (KPH, BKSDA) for activities like joint patrols and enforcement, leveraging their local knowledge and authority. Partnerships with local universities or CSOs specializing in conservation or community development in Gunung Mas will be explored for research, monitoring support, and community program delivery.
- **Recruitment Strategy:** AAD is committed to building internal capacity. Key technical lead positions e.g., Carbon Lead, Field Operations Manager are being recruited with individuals possessing relevant experience in forestry, conservation, or carbon projects. Ongoing training (Section 2.3.17) and professional development opportunities will be provided to project staff.

All relevant project management experience is present in the current Gunung Mas Community Restoration Project partners. The Gunung Mas Community Restoration Project management team has full relevant experience to support the project.

6.2.5 Financial Health of Implementing Organization(s) (CCB, G4.3)

AAD, as the Project Proponent and implementing organization, possesses the financial stability and commitment necessary to support the project throughout its lifetime. Initial project development and operational costs are secured through AAD's corporate investment ensuring activities can proceed independent of immediate carbon revenue. The long-term financial health is further supported by the projected revenues from VCU sales, as detailed in the project's financial analysis (Section 2.1.22). Documentation supporting AAD's financial capacity and project-specific financial planning is available for review by the validation/verification body.

6.2.6 Avoidance of Corruption and Other Unethical Behavior (VCS, 3.19; CCB, G4.3)

AAD is committed to operating with the highest standards of integrity and transparency, strictly prohibiting corruption and unethical behavior in all project activities.

- **Policies & Compliance**: AAD adheres to a strict code of conduct and anti-corruption policy, compliant with Indonesian law and international best practices (e.g.,

anti-bribery, anti-fraud). All project staff, partners, and contractors are required to comply with this policy.

- **Financial Controls**: Robust financial management procedures are implemented, including segregation of duties, clear authorization processes for expenditures, regular internal reviews, and to prevent embezzlement or financial mismanagement. Procurement processes are designed to be transparent and competitive.
- **Training & Awareness**: Project staff receive training on the code of conduct, anti-corruption policies, and ethical responsibilities.
- **Transparency & Reporting**: Project operations, financial flows related to benefit sharing, and grievance records will be managed transparently (as detailed in relevant sections). The FGRM (Section 2.3.15) serves as a channel for stakeholders to report any suspected unethical behavior or corruption related to the project without fear of reprisal. All credible allegations will be investigated thoroughly.

6.2.7 Commercially Sensitive Information (VCS, 3.5.2 – 3.5.4; CCB Rules, 3.5.13 – 3.5.14)

No commercially sensitive information has been excluded from the public version of the PD.

6.3 Legal Status and Property Rights

6.3.1 National and Local Laws (VCS, 3.1, 3.6. 3.7, 3.14, 3.18, 3.19; CCB, G5.6)

The **Gunung Mas Community Restoration Project (GMCRP)** is designed and implemented in full compliance with all applicable national, provincial (**Central Kalimantan**), and local (**Gunung Mas Regency**) laws, statutes, and regulatory frameworks of the Republic of Indonesia. The project proponent, **Asia Assets Developments Co., Ltd. (AAD)**, in partnership with Yayasan Antang Patagu Mahaga Lewu, ensures adherence to these legal requirements throughout the project lifetime.

A. National Laws (Undang-Undang - UU):

- **UU No. 41/1999 concerning Forestry (as amended by UU 6/2023):** Provides the foundational framework for forest management.
    - *Key Provisions:* Defines state control over forests (Art 4); categorizes forest functions including Production Forest (HP/HPT) where the project operates (Art 6); mandates sustainable and environmentally sound forest management principles (Art 21); acknowledges community involvement and customary rights (Art 68-70, amended aspects).

- **UU No. 32/2009 concerning Environmental Protection and Management (as amended by UU 11/2020):** Sets requirements for environmental protection.
    - *Key Provisions:* Mandates environmental protection principles (Art 3); requires environmental impact assessments (AMDAL) or management efforts (UKL-UPL) for activities with potential impacts (Part Four); includes provisions for community participation in environmental protection (Art 70).
- **UU No. 5/1990 concerning Conservation of Living Natural Resources and Their Ecosystems:** Governs biodiversity conservation.
    - *Key Provisions:* Establishes principles for conservation and sustainable use; provides the basis for protecting specific species and ecosystems (relevant to CCB aspects).
- **UU No. 6/2023 on Job Creation (Omnibus Law):** Replaces UU 11/2020, streamlining licensing for forestry business activities and strengthening the legal basis for Social Forestry (Perhutanan Sosial) as a priority national program.
- **UU No. 23/2014 concerning Regional Government:** Defines authorities of provincial/district governments.
    - *Key Provisions:* Outlines regional government roles in natural resource management, environmental supervision, and permit issuance coordination (relevant Articles e.g., 11, 12, 14).
- **UU No. 16/2016 concerning Ratification of the Paris Agreement:** Formalizes Indonesia's international climate commitments.
- **UU No. 39/1999 concerning Human Rights:** Guarantees fundamental rights.
    - *Key Provisions:* Underpins requirements for respecting community rights, ensuring non-discrimination, and providing access to remedy (relevant to FPIC, FGRM, CCB G5).
- **UU No. 25/1992 concerning Cooperatives:** Provides legal basis for partner
    - *Key Provisions:* Allows cooperatives to hire employees (Art 17), conduct business activities (Art 41), provide member benefits (Art 42), and engage in education/training (Art 4, Art 57).

B. Government Regulations (Peraturan Pemerintah - PP):

- **PP No. 23/2021 concerning Forestry Management:** Implements forestry provisions of UU 11/2020.
    - *Key Provisions:* Details the licensing process for Forest Utilization Business Permits (PBPH - Chapter II); elaborates on Multi-Forestry Business (MUK) including Environmental Service Utilization (e.g., carbon

sequestration/storage - Chapter III, Part 7, esp. Art 176, 188); outlines forest protection requirements (Chapter V).

- **PP No. 22/2021 concerning Implementation of Environmental Protection and Management:** Details environmental approval processes (AMDAL/UKL-UPL) under the risk-based approach introduced by UU 11/2020.

C. Presidential Regulations (Peraturan Presiden - Perpres):

- **Perpres No. 98/2021 concerning Implementation of Carbon Economic Value (Nilai Ekonomi Karbon - NEK):** Establishes the national carbon pricing framework.
    - *Key Provisions:* Defines NEK mechanisms including carbon trading (Art 5); mandates the National Registry System for Climate Change Control (SRN PPI) for recording mitigation actions and carbon units (Art 48-53); sets basis for domestic and potentially international carbon trading linked to NDC achievement.

D. Ministry of Environment and Forestry (MoEF) Regulations (Permen LHK):

- **Permen LHK No. 9/2021 concerning Forest Management and Preparation of Forest Management Plans...:** This is the specific operational regulation for the project's tenure type. It outlines the rights of Hutan Desa (LPHD), Hutan Kemasyarakatan (HKm), and Hutan Adat holders to manage the forest, including the right to utilize environmental services (carbon trading).
- **Permen LHK No. 7/2021 concerning Forestry Planning, Changes in Forest Area Designation...:** Governs forest area administration.
- **Permen LHK No. 21/2022 concerning Guidance for Implementation of Carbon Economic Value:** Provides further detail on implementing NEK activities under Perpres 98/2021.
- **Permen LHK No. 7/2023 concerning Procedures for Carbon Trading:** Outlines specific procedures for carbon trading within Indonesia's system.
    - *Key Provisions:* Confirms eligibility for carbon projects under PBPH (Art 6); details requirements for project document validation (DRM), verification (LTV), SRN PPI registration, and potential benefit sharing considerations (Chapter II, III, IV).
- **Permen LHK No. P.32/2016 concerning Forest and Land Fire Control:** Relevant to fire prevention activities.

- *(Contextual)* Permen LHK No. P.70-P.73/2017 concerning SRN, MRV, GHG Inventory: Established the initial national framework.

E. Specific Project-Related Decrees & Approvals:

- **Social Forestry Management Approvals (SK Perhutanan Sosial):**
  - **Hutan Adat (Customary Forests):** Including SK. 7911/MENLHK (Himba Antang), SK. 7913/MENLHK (Lowu Tumbang Mohuroi), SK. 7916/MENLHK (Karetau Rambangun), and others listed in the Project Area table.
  - **LPHD (Village Forests):** Including SK. 6603/MENLHK (Harowu), SK. 8296/MENLHK (Karatau Sarian), SK. 6608/MENLHK (Rangan Hiran).
  - **HKm (Community Forests):** Including SK. 5919/MENLHK (Anoi Sangkuwak), SK. 1276/MENLHK (Jaga Asam).
- **Cooperation Agreements (PKS):**
  - Formal **Perjanjian Kerja Sama (PKS)** documents have been signed between AAD/Yayasan Antang Patagu Mahaga Lewuand each of the 18 Social Forestry license holders (e.g., PKS Number **32/Y,AMAL/PKS/GUMAS/VIII/2025**). These agreements explicitly transfer the mandate to develop carbon projects and market VCUs to the project proponent, in compliance with Permen LHK 7/2023.

Compliance Assurance:

AAD ensures project activities strictly adhere to all conditions within its management rights agreements, permits (including MUK requirements), and all applicable laws. Compliance is maintained through regular operational checks, internal audits, legal counsel review, adherence to SRN PPI registration and reporting, and cooperation with relevant government oversight agencies (MoEF, KPH, BKSDA).

6.3.2 Relevant Laws and Regulations Related to Worker's Rights (VCS, 3.18.2; CCB, G3.11)

The project adheres to all Indonesian laws and regulations concerning labor and workers' rights, ensuring fair treatment, safe working conditions, and awareness of rights for all employees and contracted workers. Key legislation includes:

- Law No. 13/2003 on Manpower (as amended by Law No. 11/2020).
- Law No. 1/1970 on Work Safety.
- Law No. 21/2000 on Trade Unions.

- Government Regulation No. 35/2021 (Fixed-Term Contracts, Outsourcing, Working Hours, Termination).
- Government Regulation No. 36/2021 (Wages).
- Relevant regulations regarding social security (BPJS Ketenagakerjaan) and health insurance (BPJS Kesehatan, e.g., Presidential Regulation No. 82/2018).

Assurance: The project ensures compliance by: providing formal employment contracts, paying wages at or above minimum standards, adhering to regulations on working hours and leave, providing mandatory social security and health insurance, implementing OHS measures (Section 2.3.19), upholding freedom of association, prohibiting child labor and forced labor, and informing all workers of their rights during induction and through accessible workplace postings.

6.3.3 Human Rights (VCS, 3.19)

The project recognizes, respects, and promotes human rights in line with the Indonesian Constitution, national laws (e.g., Law No. 39/1999 on Human Rights), and applicable international principles including the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) and relevant ILO Conventions. Particular attention is paid to the rights of local communities and indigenous peoples within the project zone:

- **Recognition of Rights:** Acknowledges the existence of diverse communities, including the indigenous Nuaulu people, and their rights to culture, identity, customary practices, and participation in decisions affecting them.
- **FPIC:** Committed to implementing a robust FPIC process (see Section 2.5.7) for activities impacting community lands, resources, or livelihoods.
- **Non-Discrimination:** Upholds principles of non-discrimination in all project activities and employment practices (Section 2.3.14).
- **Grievance Mechanism:** Provides an accessible FGRM (Section 2.3.15) for stakeholders to raise concerns, including potential human rights impacts.
- **Cultural Heritage:** Commits to identifying and protecting sites of cultural significance through participatory mapping and consultation (Section 2.5.4).
- **No Forced Displacement:** Project activities will not cause involuntary physical or economic displacement (Section 2.5.9).

Adherence to International and National Legal Frameworks:

Indonesia Law:

The 1945 Constitution of Indonesia (UUD 1945):

This is the foundation of all laws in Indonesia and includes provisions for human rights, particularly after the amendments following the Reform era.

Law No. 39 of 1999 on Human Rights:

This comprehensive law defines and outlines various human rights protections in Indonesia, including rights related to life, family, self-development, justice, freedom, and social welfare.

Law No. 11 of 2005 on the Ratification of the International Covenant on Economic, Social and Cultural Rights:

This law incorporates international standards on economic, social, and cultural rights into Indonesian law.

Law No. 12 of 2005 on the Ratification of the International Covenant on Civil and Political Rights:

This law incorporates international standards on civil and political rights into Indonesian law.

Law No. 7 of 1984 on the Ratification of the Convention on the Elimination of All Forms of Discrimination against Women:

This law addresses women's rights and gender equality in Indonesia.

Law No. 40 of 2008 on the Elimination of Racial and Ethnic Discrimination:

This law addresses issues of racial and ethnic discrimination in Indonesia.

International Laws and Conventions:

United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)

ILO Convention 169 on Indigenous and Tribal Peoples

Universal Declaration of Human Rights

Project Design and Implementation:

a) Free, Prior, and Informed Consent (FPIC):

The project ensures that all activities are conducted with the free, prior, and informed consent of the local indigenous communities, as mandated by UNDRIP and ILO Convention 169. This process involves:

Comprehensive community consultations

Transparent information sharing

Respect for traditional decision-making processes

b) Land Rights and Resource Management:

The project recognizes and respects the customary land rights of indigenous peoples, as outlined in Article 26 of UNDRIP.

It operates under the social forestry management agreement, which aligns with Indonesia's recent regulations (e.g., Ministry of Environment and Forestry Regulation No. 7/2023) that allow carbon rights development without requiring a Forest Rights Certificate (PBPH).

c) Cultural Preservation and Traditional Knowledge:

The project incorporates local traditional knowledge in forest conservation efforts, respecting Articles 11 and 31 of UNDRIP.

It supports the cultivation of agarwood, a culturally significant plant, promoting both economic development and cultural preservation.

d) Economic Empowerment and Benefit Sharing:

The project provides local employment opportunities, microloans, and supports agarwood cultivation, aligning with Article 21 of UNDRIP on the right to economic development.

A fair benefit-sharing mechanism ensures that the local communities receive equitable returns from the carbon credits generated.

Institutional Safeguards:

To ensure the protection of human rights throughout the project lifecycle, the following institutional safeguards have been established:

a) Grievance Mechanism:

A transparent and accessible grievance mechanism allows community members to raise concerns or complaints, ensuring their voices are heard and addressed promptly.

b) Participatory Monitoring and Evaluation:

Local community members are involved in monitoring project activities and evaluating outcomes, promoting transparency and accountability.

c) Capacity Building Programs:

Training programs are provided to enhance local skills in forest management, sustainable agriculture, and carbon monitoring, empowering the community to actively participate in and benefit from the project.

d) Gender Equality and Inclusion:

The project ensures equal participation and benefit-sharing for women and marginalized groups within the community, in line with Article 22 of UNDRIP.

f) Adaptive Management:

Regular reviews and stakeholder consultations allow for project adjustments to better meet community needs and rights.

By implementing these measures, the project not only complies with international and national legal frameworks but also actively promotes the rights and well-being of the indigenous and local communities in Gunung Mas Island.

6.3.4 Indigenous Peoples and Cultural Heritage (VCS, 3.18, 3.19)

The project is located entirely within the ancestral lands of the indigenous **Dayak** people of Central Kalimantan. The project fully acknowledges that the **18 stakeholder communities** (comprising the Social Forestry license holders) are indigenous, possessing distinct cultural identities, customary rights, and deep, long-standing relationships with the lands and forests within the project zone.

Identification of Indigenous Peoples and Cultural Heritage

- **Identification of Peoples:** The project identifies the communities in the project zone, totaling approximately **7,145 people**, as the indigenous rights holders. The population belongs primarily to the **Dayak Ngaju** and **Dayak Ot Danum** tribes. These groups share a strong cultural heritage rooted in the **Huma Betang** (Longhouse) philosophy of communal living and **Handep** (mutual cooperation).
- **Identification of Cultural Heritage:** The project is undertaking a comprehensive process to identify and map all sites and resources of cultural significance. This is a core component of the Free, Prior, and Informed Consent (FPIC) process. Through participatory mapping with community elders and customary leaders (**Damang** at the sub-district level and **Mantir Adat** at the village level), the project is identifying:
    - **Sacred Sites:** Areas of spiritual significance central to the indigenous **Kaharingan** belief system. This specifically includes **Sandung** (bone repositories/mausoleums), **Pantar** (memorial poles), **Sapundu** (sacrificial posts), and **Bukit Keramat** (sacred hills/groves) where ancestral spirits reside.
    - **Customary Use Areas:** Areas traditionally used for hunting, fishing, gathering medicinal plants (*Bajakah*), and shifting cultivation (*Ladang*).
    - **Traditional Knowledge:** The project is documenting traditional ecological knowledge related to forest management, such as the *Simpuk* (forest fruit garden) system, which will be integrated into the project's agroforestry design.

Preservation and Protection of Cultural Heritage

The project is fundamentally committed to avoiding any negative impacts on the cultural heritage of the Dayak communities and will actively contribute to its preservation. The project's social safeguards include the following measures:

- **Strict Exclusion of Sacred Sites:** All identified **Sandung** and **Keramat** sites are designated as strict protection zones. These areas are explicitly excluded from all project planting, harvesting, and operational activities. A cultural buffer zone will be established around each site in agreement with the *Mantir Adat* to ensure they remain undisturbed.
- **Respect for Customary Law (** All project activities are designed and implemented in a manner that is fully compliant with the local Dayak Customary Law. This includes respecting customary protocols for accessing land and resolving disputes through the **Kerapatan Mantir** (Customary Council).
- **Culturally Respectful Operations:** All project staff and partners are required to undergo comprehensive cultural sensitivity training, specifically regarding **Kaharingan** taboos and Dayak etiquette. All project activities will be conducted in a culturally respectful manner.
- **Support for Cultural Preservation:** Where requested by the communities, the project will support efforts to document and maintain their cultural heritage. This includes supporting the maintenance of *Sandung* structures and facilitating the intergenerational transfer of knowledge regarding sustainable forest use.

Engagement with Indigenous Peoples

The project's entire engagement strategy is built on a foundation of respect for the communities as indigenous rights holders. Specific engagement protocols have been developed as part of the FPIC process to ensure that all interactions utilize the existing **Kelembagaan Adat** (Customary Institution) structures, ensuring that the *Damang* and *Mantir* are recognized as key decision-makers alongside formal village officials.

6.3.5 Statutory and Customary Property Rights (VCS, 3.18, 3.19; CCB, G5.1)

Land tenure within the project zone involves a complex but increasingly harmonized relationship between state-controlled land administration and deeply rooted customary (*Adat*) access and use rights.

Statutory Rights:

The primary legal rights within the Project Area (**44,214.7 hectares**) are defined by the **18**

Social Forestry granted by the Ministry of Environment and Forestry (MoEF). These decrees legally designate the land as State Forest Land (*Kawasan Hutan Negara*) but transfer management rights to the community institutions (*LPHD, KTH, Masyarakat Hukum Adat*) for a period of 35 years.

- **Project Control:** Through formal **Cooperation Agreements (*Perjanjian Kerja Sama* - PKS)** signed with each license holder, the Project Proponent (AAD) has secured the specific right to develop carbon projects, manage the restoration activities, and market the resulting environmental services (Carbon Rights) on behalf of the communities.

Customary Rights & Access:

The local communities, primarily belonging to the **Dayak Ngaju** and **Dayak Ot Danum** tribes, possess historical and ongoing customary claims (*Hak Ulayat*) that overlap entirely with the concession areas.

- **Adat Tenure:** Customary land is often organized around **Huma Betang** (longhouse) lineage territories or individual family claims known as *Tanah Adat*.
- **Resource Access:** Communities retain customary rights to access forest resources for subsistence. This specifically includes:
    - **Simpuk/Lembu:** Ancestral fruit gardens and forest plots managed by families.
    - **Kebun Rotan & Karet:** Traditional rattan and rubber gardens integrated into the secondary forest.
    - **Beje:** Traditional fish ponds in swampy forest areas.
    - **Hunting & Gathering:** Rights to hunt non-protected species and collect medicinal plants (*Bajakah*).

6.3.6 Recognition of Property Rights (VCS, 3.7, 3.18, 3.19; CCB, G5.1)

The project is committed to recognizing and respecting all legitimate property rights within the project zone:

- **Statutory Rights:** AAD exercises its control derived from the forestry license in compliance with Indonesian law and the terms of the license (as potentially modified for conservation focus).

- **Customary Rights:** The project explicitly recognizes the existence of customary rights and access by local communities and IPs, even within the state-designated concession area. The project will:
  - **Not extinguish** legitimate customary rights through its activities.
  - Use participatory mapping and FPIC to understand and document these rights.
  - Design project activities (e.g., patrol boundaries, conservation zones) to avoid infringing on critical customary use areas or sacred sites, wherever feasible and agreed upon.
  - Seek agreements with communities regarding resource access and management within the project area, potentially exploring co-management or clearly defined access protocols for specific non-destructive uses (e.g., NTFP collection in designated zones), consistent with conservation objectives.
- **Securing Rights:** While the project cannot grant formal statutory title for customary lands (which is a government process), it will support communities in documenting their claims through participatory mapping and dialogue, which can aid in future recognition processes with the government. The project will ensure its own operational boundaries and activities are clearly defined and communicated to avoid unintended encroachment or conflict.

6.3.7 Free, Prior and Informed Consent (VCS, 3.18; CCB, G5.2)

The project has conducted stakeholder engagements with local communities living on the periphery of the project to inform them about the project and explain that the project will in no way encroach on private or community property.

Table 19. FPIC Process

Description of process for obtaining consent	A formal FPIC process is being implemented, adhering to international best practices and CCB/VCS requirements. Key steps include: 1) Identification: Identifying all potentially affected communities, IP groups, and customary rights holders (ongoing). 2) Information Disclosure: Providing comprehensive, accessible, and culturally appropriate information about the project (goals, activities, proponent, timelines, potential impacts/benefits/risks, FGRM, benefit sharing concepts) in

	Bahasa Indonesia (and local facilitation if needed), well in advance of seeking consent. 3) Consultation & Participation: Facilitating open, two-way consultations within communities, allowing sufficient time for internal deliberation, questions, and expression of concerns, ensuring representation of women, IPs, and vulnerable groups. 4) Consent/Agreement: Seeking documented consent (or withholding of consent) from communities through their legitimate representatives or customary decision-making processes regarding project implementation and key agreements (e.g., benefit sharing). 5) Documentation: Maintaining thorough records of all FPIC activities (meetings, attendees, information shared, concerns raised, agreements reached). FPIC is treated as an ongoing process, not a one-off event.
Outcome of FPIC process	The intended outcome is a transparent agreement between AAD and each affected community/rights-holder group, documenting their informed consent to project activities within their respective areas of interest, outlining agreed mitigation measures, benefit-sharing arrangements, and roles/responsibilities. Assurance: The project explicitly guarantees it will not involve involuntary resettlement or relocation of people or activities. It will not encroach upon lands vital for subsistence or culture without explicit, informed consent and fair compensation/alternatives agreed upon through the FPIC process. Customary rights and significant sites identified during FPIC will be respected and integrated into project management plans. Details of specific agreements will be documented as FPIC progresses

6.3.8 Benefit Sharing Mechanisms (VCS, 3.18, 3.19;)

Table 20. Benefit Sharing Mechanism

Process used to design the benefit sharing plan	The benefit sharing mechanism (BSM) was co-designed with communities. Initial consultations explore community priorities and preferred benefit types (e.g., direct employment, support for community infrastructure, funding for sustainable livelihood projects, capacity building). The design process emphasizes transparency regarding projected carbon revenues, project operational costs, and the portion available for benefit sharing, ensuring communities understand the financial context. Different options for benefit distribution (e.g., direct village funds, support for specific community projects, individual payments for specific roles like patrols) are being discussed to ensure equity and alignment with local preferences and governance structures.

Summary of the benefit sharing plan	Direct Employment Opportunities: Prioritizing local residents for paid positions within the project, such as forest patrols, community liaison roles, and potentially roles supporting SIGS activities (Section 2.3.18). Support for Community Development Initiatives: Utilizing a portion of project resources (derived primarily from carbon revenue) to fund community-prioritized projects and programs identified during consultations. Examples include support for establishing Sustainable Income Generating Schemes (SIGS) (e.g., climate-smart agriculture, sustainable NTFPs) facilitated via the Yayasan Antang Patagu Mahaga Lewu, investments in community infrastructure (like the planned health clinics), and support for local health and education needs. The specific allocation and governance mechanisms for managing these funds/programs at the community level will be determined through participatory agreement. Capacity Building and Training: Providing access to relevant training programs aimed at enhancing skills for project participation and broader sustainable livelihoods (Section 2.3.17). Percentage of profit from the project as stated in the contract. The overall BSM will be designed to ensure benefits are distributed transparently and equitably, with specific consideration for reaching marginalized and vulnerable groups, and contribute to the long-term sustainable development of the project zone communities.
Approval and dissemination of benefit sharing plan	As documented in the contract between AAD and the PS license holders. The contract is available in the head office of the AAD and Cooperation group. Implementation and fund disbursement will be monitored, with regular reporting back to communities on benefits delivered.

6.3.9 Property Rights Protection (VCS, 3.18, 3.19; CCB, G5.3)

The project guarantees that its activities will not lead to the involuntary removal or relocation of people from their lands or territories. It also guarantees that project activities will not force people to relocate activities essential to their culture or livelihood without their FPIC. Through the participatory mapping and consultation process, areas critical for subsistence, cultural practices, or customary tenure will be identified and respected within project planning and implementation. Any potential restriction on access or use will only occur with the explicit FPIC of the affected rights holders and will include agreed-upon compensation or alternative measures.

6.3.10 Illegal Activity Identification (VCS, 3.19; CCB, G5.4)

Based on the *Rencana Pengelolaan Hutan Jangka Panjang* (RPHJP) for Units XV and XVI, the potential illegal activities affecting the project zone are distinct and significant. They include **Illegal Gold Mining**, illegal logging (specifically targeting high-value timber like *Ulin*), agricultural encroachment for shifting cultivation, poaching of protected species (Orangutan, Sun Bear), and uncontrolled fires used for land clearing.

Measures to Reduce Illegal Activities:

- **Presence & Deterrence:** The project will deploy a "Guardian" force—regular forest patrols conducted by trained project staff integrated with community members (*Masyarakat Peduli Hutan/Api*). The consistent presence of uniformed patrols acts as a strong psychological deterrent against opportunistic illegal actors.
- **Monitoring:** Implementation of **SMART (Spatial Monitoring and Reporting Tool)** patrol technology to log threats systematically. The project will also utilize **drone surveillance** and remote sensing alerts (e.g., GLAD alerts) to detect new mining openings or canopy loss in real-time, allowing for rapid response.
- **Community Engagement (Addressing the Driver):** Recognizing that illegal mining and logging are often driven by economic necessity, the project's primary mitigation is the **Sustainable Income Generating Schemes (SIGS)**. By providing viable, legal, and safer livelihoods (Agarwood, Rotan, Rubber), the project reduces the economic pressure driving communities toward illegal resource extraction.
- **Collaboration & Enforcement:**
    - **Mining/Logging:** Detected illegal mining or logging camps will be reported to the **UPT KPHP Unit XV/XVI** and the local Police (*Polsek*) for appropriate enforcement actions.
    - **Poaching:** Wildlife crimes involving protected species (Orangutans, Sun Bears) will be coordinated directly with **BKSDA Central Kalimantan** (Natural Resources Conservation Agency).
- **Prohibition of Illicit Labor Practices:** The project strictly prohibits the use of human trafficking, forced labor, and child labor in all its operations and contracts, in full compliance with Indonesian Law No. 13/2003 on Manpower and international ILO conventions. This is enforced through rigid hiring policies, mandatory contractual clauses with partners, and the active monitoring of the project's Grievance Mechanism.

6.3.11 Ongoing Disputes (VCS, 3.18, 3.19; CCB, G5.5)

Past Disputes: To the best of current knowledge, there are no major ongoing, unresolved conflicts directly related to tenure or resource rights within the specific project area that would be prejudiced by project activities.

Potential Future Disputes: The project acknowledges that tenure complexities and resource pressures could lead to future disputes.

Mitigation Measures: The project commits to neutrality regarding any pre-existing disputes it is not directly involved in. The robust FPIC process aims to proactively identify and address potential conflicts related to project activities. The FGRM (Section 2.3.15) provides a dedicated mechanism for peacefully resolving any disputes.

As there are no on-going disputes, there is no potential for the project to prejudice them through its activities.

6.3.12 Approvals (CCB, G5.7)

The project has obtained and will maintain all necessary approvals from relevant government authorities and local communities to ensure its legal and social license to operate throughout its lifetime.

Government Approvals

- **Underlying Social Forestry Licenses:** The project's primary legal foundation is the **18 Social Forestry (** granted by the Indonesian Ministry of Environment and Forestry (MoEF). These decrees (e.g., **SK. 7911/MENLHK-PSKL/PKPS/PSL.1/8/2023** for *Hutan Adat Himba Antang*, **SK. 6603/MENLHK-PSKL/PKPS/PSL.0/12/2016** for *LPHD Harowu*, etc.), as detailed in Section 2.1.8, provide the irrevocable legal authority for the community institutions to manage the land and implement the project activities for a period of 35 years.
- **National Carbon Project Registration:** The project will secure approval from the MoEF through its registration in the **National Registry System for Climate Change Control (*Sistem Registri Nasional* - SRN PPI)**. This is in strict compliance with Presidential Regulation 98/2021 regarding the Economic Value of Carbon and MoEF Regulation 7/2023 on Carbon Trading.
- **Compliance with Provincial and Regency Regulations:** The project operates in coordination with the **Central Kalimantan Provincial Forestry Department** and

aligns with the Long-Term Forest Management Plans (*RPHJP*) of **UPT KPHP Unit XV Kahayan Hulu** and **Unit XVI Gunung Mas**.

Community Approvals

- **Documented Community Consent (FPIC):** Formal, documented consent for the project is obtained through a comprehensive **Free, Prior, and Informed Consent (FPIC)** process with each of the **18 participating community institutions** (*LPHD, KTH, MHA*). This consent is formalized in the **Cooperation Agreements (*Perjanjian Kerja Sama* - PKS)** signed between the community rights-holders and the project proponent.

6.3.13 Double Counting and Participation under Other GHG Programs (VCS, 3.23; CCB G5.9)

6.3.13.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program, or any other form of community, social, or biodiversity unit or credit?

☐ Yes ☒ No

No, this project is only registered with Verra under the VCS methodology and is in no way receiving or seeking credit for reductions and removals in another GHG program or any of the other mentioned form.

6.3.13.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

No, this project is only registered with Verra under the VCS methodology and is in no way receiving or seeking credit for reductions and removals in any other GHG program.

6.3.13.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

No, this project is only registered with Verra under the VCS methodology and has not yet been rejected by any other GHG programs.

6.3.14 Double Claiming, Other Forms of Credit, and Scope 3 Emissions (VCS, 3.24)

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

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

☐ Yes ☒ No

Although the regulation in Indonesia regarding voluntary carbon credit is not fully constructed yet, there are no regulation preventing the registration of projects on voluntary carbon credit issuing platform. Furthermore, this project is not registered through any compliance carbon projects within Indonesia or anywhere in the world besides on VCS. In conclusion, no, project reductions and removals or project activities are not also included in an emissions trading program or binding emission limit.

6.3.14.2 No Double Claiming with Other Forms of Environmental Credit

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

☐ Yes ☒ No

No, this project is only registered with Verra under the VCS methodology and has not sought, received, or is planning to receive credit from another GHG-related environmental credit system.

6.3.14.3 Supply Chain (Scope 3) Emissions

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

☐ Yes ☒ No

If yes:

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

If yes:

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."

☐ Yes ☒ No

If yes to all:

Provide evidence does not affect the emission footprints of any products that are part of a supply chain.

6.4 Additional Information Relevant to the Project

6.4.1 Leakage Management (VCS, 3.11, 3.15)

The project will implement a comprehensive leakage management and mitigation plan in accordance with **VMD0054: Module for Estimating Leakage** from ARR Activities. The primary potential leakage risk is activity-shifting, where project activities could displace pre-project activities (e.g., grazing, fuel-wood collection) to areas outside the project boundary.

Leakage risk is considered low, as the project is designed to be a net positive for local livelihoods. Mitigation measures are integrated into the project design and include:

- **Providing Sustainable Alternatives**: The project will establish woodlots for fuel-wood and promote agroforestry systems to provide alternative sources for resources that might otherwise be sourced from surrounding forests.
- **Intensifying Livelihood Benefits**: By creating employment and generating income from carbon finance and sustainable forest products, the project reduces the economic drivers for local communities to engage in activities that cause deforestation or degradation elsewhere.
- **Community Engagement**: Continuous engagement with communities will monitor for and address any potential displacement of activities.

A formal leakage assessment will be completed as part of the final PDD, and leakage will be monitored throughout the project crediting period.

Table 21: Brief Overview of leakage mitigation strategies in the Gunung Mas ARR Project.

Leakage Management Activity	Description
Food Security (Rice Logistics Program)	To mitigate the risk of community members returning to illegal mining (*PETI*) or logging due to economic desperation or high living costs, the project establishes a **Subsidized Rice Distribution Channel**. By providing staple food at stable, below-market prices to the **1,786 households** in the partner villages, the project ensures food security (SDG 2), reducing the pressure to extract forest resources for immediate survival.
Education	To prevent the next generation from entering the illegal mining workforce, the project provides **Scholarships** for secondary education (SMA/University). This shifts labor aspirations from extraction to skilled trades or professional sectors.
Off-Site Agroforestry Support (Rotan & Rubber)	Activity Shifting Mitigation: To prevent agricultural encroachment into the restoration areas (PAA 1 & 2), the project supports the intensification of existing agricultural zones (*Lahan Usaha*) outside the PAA. Technical training and micro-finance are provided to revitalize traditional Rotan (Rattan) gardens and increase Rubber (*Karet*) latex yields, ensuring that agricultural livelihoods are maintained and improved on existing land without expanding into the forest.
Employment of a Ranger Force	This Project will hire and equip a ranger force that provides direct protection of the land from conversion. This force acts as a deterrent to the conversion of the Project Accounting Area but also a powerful outreach tool to the local communities, providing assistance with wildlife issues and information.
Tree Nurseries	**Supply Chain:** The project establishes multiple tree nurseries focused on producing **Black Locust (*Robinia pseudoacacia*)** and **Melaleuca** seedlings. These nurseries employ community members (focusing on women), providing direct wages that compete with illegal extractive income.
Micro-finance schemes	The project utilizes a revolving micro-finance fund managed by local cooperatives to enhance access to capital for legal enterprises (e.g., Agarwood inoculation, trading). This reduces the reliance on predatory loans from illegal mining financiers (*Cukong*).

6.4.2 Further Information

No additional information is anticipated.

7 CLIMATE

7.1 Application of Methodology

7.1.1 Title and Reference of Methodology (VCS, 3.1)

Table 22. Title and Reference of Methodology

Type (methodology, tool, module)	Reference ID (if applicable)	Title	Version
Methodology	VM0047	VM0047 Methodology for Afforestation, Reforestation and Revegetation	1.1
Module	VMD0054	VMD0054 Module for Estimating Leakage from ARR Activities	1.0
Tool	VT0001	Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities	3.0
Tool	N/A	AFOLU Non-Permanence Risk Tool	4.2

7.1.2 Applicability of Methodology (VCS, 3.1)

Table 23. Application of Methodology

Reference ID/Title	Applicability condition	Justification of conformance
VM0047 V1.1 Section4.1(3)	Project activities increase vegetative cover	All project activities (PAA1, PAA2) aim to increase vegetative cover through direct planting.
VM0047 v1.1 Section 4.1(2)	Where area-based and census-based approaches are used together, they are applied in non-overlapping areas	The project only uses the area-based approach.

	defined at the project start	
VM0047 v1.1 Section 4.1(3)	For lands enrolled in a project, the quantification approach is selected at the project start date and used for the entire project crediting period.	The area-based approach is applied to all land enrolled in the project**.**
VM0047 v1.1 Section 4.1(4)	The project start date is documented as the earliest of the following: - The date on which the agreement between AAD and Community/Village/Social Forest permit holders signed. - The land use change date	The start date is 1 January, 2026, which coincides with the date on which one day after the agreement is signed. This is the earliest date for any land use change date.
VM0047 v1.1 Section 4.1(5)	Where projects take place on organic soils or wetlands, ARR activities are developed using a multiple project activity design, applying this methodology to account for aboveground biomass and using a Wetland Restoration and Conservation methodology (e.g., VM0036 Methodology for Rewetting Drained Temperate Peatlands) to account for other carbon pools.	The project does not take place on organic soils or wetlands.
VM0047 v1.1 Section 4.2(1)	[Area-based approach] Project activities involve direct planting activities (e.g., manual planting, broadcast seeding), indirect activities associated with assisted natural regeneration (e.g., liana cutting, weed management, or barriers that prevent animal grazing), or a combination of direct and indirect activities.	The project activities include both direct (i.e., manual planting) and indirect (i.e., assisted natural regeneration) activities.
VM0047 v1.1 Section 4.2(2)	[Area-based approach] Project proponents establish a t = 0 carbon stock estimate for all	t=0 carbon stock estimates for all significant carbon pools have been estimated based on

	significant carbon pools. The method for establishing t = 0 estimates depends on the activity that initiates the project start date.	the activity that initiates the project start date. See Sections 3.1.6 and 3.2.
VM0047 v1.1 Section 4.2(3)	[Area-based approach] Leakage must be monitored and quantified using VMD0054. It must not be assumed to be de minimis.	Leakage is monitored and quantified using the latest version of VMD0054. See Section 3.2.3.
VM0047 v1.1 Section 4.4.1(1)	[Area-based approach] The project does not occur on lands that have met the definition of managed forest at any point in the 10-year period immediately preceding the project start date.	The project does not occur on lands that have met the definition of managed forest at any point in the 10-year period immediately preceding the project start date. This has been documented through the project area delineation process for each Project Activity Area.
VM0047 v1.1 Section 4.4.1(2)	[Area-based approach] Clearing of pre-existing woody biomass does not involve timber harvesting nor results in degradation of native ecosystems.	Any pre-existing woody biomass that is cleared will not involve timber harvesting. Only invasive species if there is any of pre-existing woody biomass and minor amounts of shrubs/bushes will be cleared as a part of site preparation and therefore will not result in the degradation of native ecosystems.
VM0047 v1.1 Section 4.4.1(3)	[Area-based approach] The project is not planting fewer than 50 planting units per hectare and could use the census-based approach.	The planting density for all PAAs exceeds 50 planting units per hectare.
VMD0054 v1.0	This module applies to estimating leakage emissions from ARR activities. Projects using this module must meet all applicability conditions of the methodology VM0047 Afforestation, Reforestation and Revegetation v1.1.	The project meets all the applicability conditions of VM0047 v1.1 (see the rows above in this table for details).

VT0001	1. AFOLU activities the same or similar to the proposed project activity on the land within the proposed project boundary performed with or without being registered as the VCS AFOLU project shall not lead to violation of any applicable law even if the law is not enforced.	The project activities lead to no violation of applicable law..
	2. The use of this tool to determine additionality requires the baseline methodology to provide for a stepwise approach justifying the determination of the most plausible baseline scenario. Project proponent(s)proposing new baseline methodologies shall ensure consistency between the determination of a baseline scenario and the determination of additionality of a project activity	The additionality of the project was performed using the tool "VT0001 Tool for Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use AFOLU project Activities", Version 3.0. in the section 3.1.5.2 demonstrates the step1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity. Step 2. Investment analysis. Step 3. Barrier analysis. Step 4. Common Practice Analysis.
AFOLU Non-Permanence Risk Tool	This tool has no internal applicability conditions.	The project can use this tool to calculate AFOLU Non-Permanence Risk Rating.

7.1.3 Project Boundary (VCS, 3.12)

Spatial Boundaries

The spatial boundary of the project (Project Zone) encompasses the full legal extent of the 18 Social Forestry (Perhutanan Sosial) license areas located in Gunung Mas Regency, Central Kalimantan, Indonesia. The legal boundaries of these decrees (listed in Section 2.1.8) define the outer perimeter of the project, totaling a gross area of approximately 44,214.7 hectares.

Delineation of Eligible Area and Baseline Strata

Within this gross Project Zone, the Eligible Project Accounting Area (PAA) was delineated

through a detailed geospatial workflow to ensure conservative accounting and strict compliance with VM0047. This process filters out ineligible lands (e.g., existing settlements, productive agriculture, active mining pools) to define the specific 19,008.60 hectares where carbon activities will occur.

A. Data Sources

The analysis utilized the following official and publicly available datasets:

- **Project Boundaries (AOI):** MoEF-issued shapefiles for the 18 Social Forestry decrees.
- **Land Cover Baseline:** EU JRC Tropical Moist Forest (TMF) Transition Map – Main Classes (1982–2024), cross-referenced with **Sentinel-2** imagery to identify recent mining openings.
- **Topography:** SRTM 1″ (~30 m) DEM.
- **Government Spatial Plans (** RPHJP Unit XV & XVI spatial data.
- **Exclusion Layers:** Datasets for settlements, productive agriculture (rubber gardens), active mining pits (*PETI*), lakes, roads, and rivers.

B. Exclusion Criteria and Conservative Constraints

The following exclusions were systematically applied to the gross license area to derive the final eligible area:

- **Settlements & Active Agriculture:** All areas mapped as settlements, wet rice fields, and productive rubber monocultures were removed.
- **Active Mining:** Active illegal gold mining (*PETI*) sites with open water pools or toxic tailings deemed technically unfeasible for immediate restoration were excluded.
- **Infrastructure & Riparian Buffers:** A 10-meter buffer was applied to both sides of mapped roads, and a 30-meter riparian buffer was applied from river centerlines (unless riparian restoration is explicitly planned and feasible).
- **Slope Constraint:** Areas with a slope greater than **25%** were excluded to ensure operational feasibility, worker safety, and to prevent erosion risk during planting activities.
- **Minimum Mapping Unit (MMU):** Fragmented parcels smaller than 0.25 ha were removed to exclude operationally unplantable slivers.

C. Baseline Land Cover Stratification

Within the final Eligible AOI, baseline land cover was stratified using the TMF Transition Map and Sentinel-2 verification. The land was categorized into two main strata for the

project's accounting purposes, consolidating open lands and degraded scrub into a single intensive management unit:

Table 23: Final Baseline Land Cover Stratification of Eligible Project Area

PAA	Class (TMF/Land Cover Code)	Description	Area (ha)	% of Eligible
PAA 1	**Intensive Reforestation** (Open Land, Scrub, Degraded Forest)	Consolidates verified non-forest areas (grassland/mining tailings) and severely degraded shrubland (*Semak Belukar*) where natural regeneration has failed. Requires intensive site prep and high-density planting.	**4,335.30**	22.8%
PAA 2	**Enrichment** (Logged-over Secondary Forest)	Ecologically suboptimal secondary forest with low stocking density due to historical selective logging. Requires enrichment planting to restore structure.	**14,673.30**	77.2%
Total		**Final Eligible Project Accounting Area**	**19,008.60**	**100.00%**

Stratification Narrative:

The project is strategically stratified into two distinct Project Accounting Areas (PAAs)

totaling 19,008.60 hectares. The planting strategy for both PAAs utilizes a specialized mix of Black Locust (and Cajeput (*Melaleuca cajuputi*) selected for their ability to reclaim degraded mineral soils.

- **PAA 1: Intensive Reforestation (4,335.30 ha)**: This PAA targets the most critically degraded landscapes, including abandoned mining lands and *Imperata* grasslands. Project activities will focus on active afforestation/reforestation through the direct planting of 1,000 trees per hectare (500 trees/ha per species). The species mix consists exclusively of Black Locust and Melaleuca to rapidly re-establish canopy cover, fix nitrogen in the soil, and suppress invasive weeds.
- **PAA 2: Enrichment of Unmanaged Forest (14,673.30 ha)**: This PAA consists of forest that, while not recently cleared, is unmanaged and degraded. Project activities will focus on enhancing forest carbon stocks through enrichment planting of Black Locust and Melaleuca (at a density of 100 trees per hectare, or 50 trees per species per hectare) to increase biomass density and fill canopy gaps without disrupting the existing ecosystem structure.

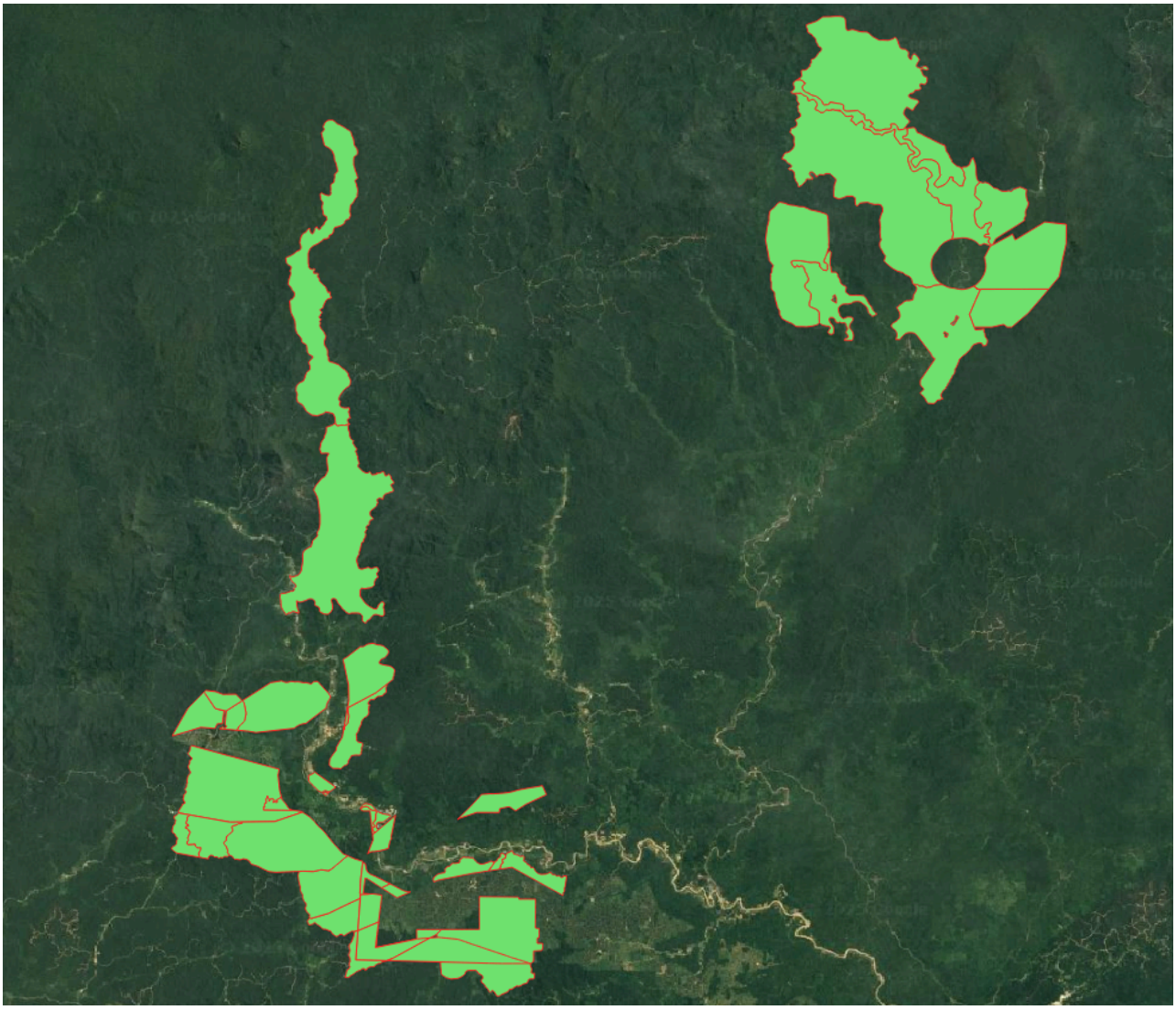

Figure 6-1: Spatial boundaries for PAAs

For more details of the PAAs check Delineating Project Accounting Areas within Section 3.1.4

Gases and Carbon Pools

Carbon dioxide (CO_2) was determined to be the primary source of greenhouse gas emissions in the project, given the threat of deforestation and conversion from the drivers listed in the baseline scenario. Methane (CH_4) and nitrous oxide (N_2O) are conservatively excluded from the project.

Table24: A list of the greenhouse gases considered

Source		Gas	Included?	Justification/explanation
Baseline	Burning of biomass (whether by natural or anthropogenic causes)	CO_2	Excluded	Conservative to exclude
		CH_4	Excluded	Conservative to exclude
		N_2O	Excluded	Conservative to exclude
	Emissions from nitrogen fertilizer	CO_2	Excluded	Conservative to exclude
		CH_4	Excluded	Conservative to exclude
		N_2O	Excluded	Conservative to exclude
	Combustion of fossil fuels (in vehicles, machinery and equipment)	CO_2	Excluded	Conservative to exclude
		CH_4	Excluded	Conservative to exclude
		N_2O	Excluded	Conservative to exclude
Project	Burning of biomass (whether by natural or anthropogenic causes)	CO_2	Excluded	Carbon stock decreases due to burning are accounted as a carbon stock change
		CH_4	Yes	The project conducts biomass burning as part of the fire management plan (i.e., a 20m prescribed burn around project areas per year). For verification and future monitoring events, emissions from burning of biomass will be monitored. This emissions source has been calculated (ex-ante) and deemed de minimis for the ex-ante calculation of estimated GHG carbon dioxide removals.

		N_2O	Yes	The project conducts biomass burning as part of the fire management plan (i.e., a 20m prescribed burn around project areas per year). For verification and future monitoring events, emissions from burning of biomass will be monitored. This emissions source has been calculated (ex-ante) and deemed de minimis for the ex-ante calculation of estimated GHG carbon dioxide removals.

Source		Gas	Included?	Justification/explanation
	Emissions from nitrogen fertilizer	CO_2	No	Conservative to exclude
		CH_4	No	Conservative to exclude
		N_2O	Yes	The project applies fertilizer for a portion of PAAs. For verification and future monitoring events, emissions from nitrogen fertilizer will be monitored. This emissions source has been calculated (ex-ante) and deemed de minimis for the ex-ante calculation of estimated GHG carbon dioxide removals.
	Combustion of fossil fuels (in vehicles, machinery and equipment)	CO_2	No	De minimis
		CH_4	No	De minimis
		N_2O	No	De minimis

Table 25: Required and optional carbon pools for forest project accounting areas and justifications

Carbon Pools	Included?	Justification/Explanation of choice
Aboveground trees	Included	The stock change in the above ground tree biomass must be estimated

Above ground non-tree	Excluded	Exclusion is always conservative when forests remain as forest
Belowground	Excluded	Unlikely to change significantly in forests remaining as forests, and is difficult to measure, thus omission is conservative.
Dead wood (naturally accumulated)	Excluded	Following IPCC guidelines, it is assumed that carbon stocks in the naturally occurring dead wood pool (both standing and lying) are equivalent in both the project and baseline scenario, and therefore this pool is conservatively excluded. It is not conservative to account for this pool in the baseline scenario only
Litter	Excluded	Insignificant and exclusion is conservative
Soil organic carbon	Excluded	Exclusion is always conservative when forests remain as forest

7.1.4 Baseline Scenario (VCS, 3.13)

The baseline scenario as identified as the Afforestation, Reforestation and Revegetation (ARR) using VM0047 Methodology for Afforestation, Reforestation and Revegetation V 1.1 refers to VCS tool VT0001 for the Demonstration and Assessment of Additionality in Agricultural, Forestry and Other Land Use (AFOLU). Below is a description of the steps to determine the baseline scenario according to the methodology and tool.

Applicability Conditions

- The project meets all applicability conditions detailed in Section 4 of the VM0047 v1.1 methodology: see section 3.1.2 for how the project meets the applicability conditions of VM0047 v1.1.
- The project activities will produce vegetative cover allowing for clear spatial delineation of the project area: see section 2.1.17 for description of project activities and section 2.1.16 and 3.1.3 for maps of the delineated project areas (i.e., Figures 4, 10, and 11).
- The project's performance benchmark must be updated at each verification or every five years, whichever comes first: the performance benchmark will be updated at each verification using annual measurements of the stocking index.

3.1.5 Additionality (VCS, 3.14)

In compliance with the methodology's requirements, the project's additionality is demonstrated utilizing the most current version of the VCS tool VT0001 designed for the

demonstration and assessment of additionality in AFOLU project activities. Following the VT0001, the project's eligibility, including the legal rights and intent to harvest, has been thoroughly reviewed.

Furthermore, the alternative land use scenarios to the proposed project is explained in Chapter

3.1.4. Baseline Scenario, and the steps following the additionality methods are detailed below:

3.1.5.1 Regulatory Surplus (VCS, 3.14)

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

☐ Annex 1 country ☒ Non-Annex 1 country

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

☐ Yes ☒ No

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

☐ Yes ☒ No

For the baseline scenario proposed, the planned agriculture conversion and harvesting of forest scenario is acting under **Law No. 23 of 2014 on Regional Governance** [34]This law concerns the governance of local governments in Indonesia. It clearly defines the distribution of power between the central government and local governments, including provincial, city, and regency levels. Specifically, in forestry and environmental management, this law grants local governments (including regency-level governments) certain authorities, such as managing local forest resources, issuing related permits, and supervising environmental protection measures. Mores specifically articles 11 and 12 lists the rights of the regional governmental agency's right.

Environmental Protection and Management Law (Law No. 32 of 2009)

This law aims to protect and manage Indonesia's environmental resources, covering water resources, forest resources, air quality, and more. It includes regulations on Environmental Impact Assessment (AMDAL), corporate environmental responsibilities, and the government's role in environmental protection.

[34] https://faolex.fao.org/docs/pdf/ins160168.pdf

As the conversion is acting within the right granted by the law, project activities stopping the baseline activities are not mandated by a law, statute, or other regulatory framework.

Please refer to 2.5.1 for more details.

For the proposed baseline scenario regarding unplanned agriculture conversion, it is the duty of the government to prevent unplanned deforestation and degradation, however, the lack of resource from the local enforcing body results in a steady loss of forest cover due to unplanned deforestation, as shown in historical data. Therefore, although the project activities regarding the protection of forest affected by unplanned agriculture conversion is mandated by a law, statute, or other regulatory framework, the regulations/rules are not systematically enforced.

3.1.5.2 Additionality Methods (VCS, 3.14)

The additionality of the project was performed using the tool "VT0001 Tool for Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use AFOLU project Activities", Version 3.0. Below are the steps that were followed to assess the additionality and determine the baseline of the project

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity.

a) Identify realistic and credible alternative land-use scenarios to the proposed ARR project activity.

Three potential alternative scenarios for the eligible project area were identified:

1. **Continuation of Degradation (Business-as-Usual):** This scenario represents the trajectory documented in the *RPHJP Unit XV & XVI*. The land remains a mosaic of abandoned mining pits (*PETI*), degraded shrubland (*semak belukar*), and logged-over forest. It continues to be subject to open-access pressures: illegal gold mining, unauthorized logging, and recurrent fires. Without intervention, soil toxicity from mining and invasive *Imperata* grass prevents natural succession, resulting in no significant net increase in carbon stocks.
2. **Implementation of the Proposed Project Activity without VCS Registration:** In this scenario, the project proponents (AAD) and the 18 Social Forestry institutions would attempt to implement the large-scale, high-tech restoration (including inoculation and soil remediation) without carbon finance.

3. **Conversion to Industrial Plantations (Palm Oil/Mining):** In this scenario, the land—designated as Production Forest (HP)—would be targeted for conversion to industrial Oil Palm plantations or formal large-scale mining concessions, given Central Kalimantan's history as a hotspot for such industries.

Analysis of Regional Context and Pressures:
While Scenario 3 is a theoretical risk in Central Kalimantan, the specific legal designation of these lands as Social Forestry (*Perhutanan Sosial*) makes it legally improbable. The MoEF decrees explicitly grant management rights to the communities for 35 years, blocking industrial concessionaires. Therefore, the most direct threat and most likely alternative is Scenario 1: the continuation of decentralized, small-scale illegal mining and logging that has degraded the landscape for decades.

Sub-step 1b: Consistency with enforced mandatory laws and regulations.

- **Scenario 1 (Continuation of Degradation):** Consistent with the *de facto* reality. While illegal mining/logging is technically prohibited, the *RPHJP* explicitly notes the "lack of personnel and budget" to enforce these laws across the vast 44,214.7 ha landscape. Thus, the status quo does not violate *enforced* laws.
- **Scenario 2 (Project without VCS):** Consistent with legal frameworks but financially impossible (see barrier analysis).
- **Scenario 3 (Conversion):** Inconsistent with the current Social Forestry decrees which mandate community management, making it legally difficult without revoking community rights.

Sub-step 1c: Selection of the baseline scenario.

Based on the barrier analysis conducted in Step 3, **Scenario 1 (Continuation of the Pre-Project Conditions of Degradation)** is determined to be the most plausible and credible baseline scenario.

Scenario 2 is demonstrated to be non-viable due to prohibitive financial and technological barriers. Scenario 3 is less plausible due to the significant legal hurdles and the lack of existing commercial pressure on these specific lands. Therefore, the analysis proceeds with the robust conclusion that without the project, the land would continue to degrade.

ii. Project activity on the land within the project boundary performed without being

registered as the VCS AFOLU project;

One of the identified alternative scenarios is the implementation of the **Gunung Mas Community Restoration Project (GMCRP)** by the project proponents and community partners, but without being registered under the VCS Program and thus without access to revenue from the sale of carbon credits. A thorough analysis demonstrates that this scenario is not financially or operationally feasible.

Proponent's Role and Financial Reality

The project proponent, **Asia Assets Developments Co., Ltd. (AAD)**, in line with its established project development philosophy, has invested significant resources in the initial phases of the project. This includes conducting feasibility studies, integrating the complex *RPHJP* data from KPHP Unit XV and XVI, and conducting extensive Free, Prior, and Informed Consent (FPIC) consultations to co-design the project with the **18 Social Forestry institutions**.

However, these upfront activities have been sustained by AAD's own investment capital. The long-term, multi-decade operational costs of implementing a restoration project across **19,008.60 hectares** are of a completely different magnitude, particularly given the specific challenges of the Gunung Mas landscape. These ongoing costs include:

1. **High-Cost Land Reclamation:** Unlike standard reforestation, this project involves rehabilitating lands degraded by **Illegal Gold Mining (PETI)**. This requires expensive earthworks to level tailings, the importation of topsoil or organic amendments to restore fertility to sandy soils, and the deployment of specialized pioneer species.
2. **Operational Security:** Funding a professional "Guardian" force of rangers and community patrols is essential to prevent the re-entry of illegal miners and loggers. Without constant, funded vigilance, the restoration investment would be quickly reversed.
3. **Community Support:** Financing the **Sustainable Income Generating Schemes (SIGS)** (Agarwood, Rotan, Rubber) and critical infrastructure (clean water systems) to provide the economic alternative necessary to change behavior.

AAD's business model for high-integrity conservation projects is predicated on using initial private capital to de-risk and develop projects to the point where they

can be sustained by a long-term, reliable revenue stream. In the absence of immediate commercial timber harvest (which is excluded to maximize carbon), that revenue stream can only come from carbon finance.

Lack of Alternative Funding Sources

While Central Kalimantan receives international attention for conservation, funding is overwhelmingly directed toward **Peatland** ecosystems (e.g., Sebangau National Park). **Mineral soil Production Forests** (*Hutan Produksi*), which comprise the GMCRP area, historically suffer from a "funding gap."

- **Government Limitations:** The *RPHJP* documents for Unit XV and XVI explicitly state that the KPH lacks the budget and personnel to manage these areas effectively or implement large-scale rehabilitation (*RHL*) without external partners.
- **Grant Insufficiency:** Grant-based funding is typically short-term (3-5 years) and is insufficient to sustain a **30-year** operational commitment required to ensure the permanence of the restored forest.

Conclusion

Therefore, without the revenue generated from the sale of **Verified Carbon Units (VCUs)**, AAD would be unable to financially support the project's long-term operational activities. The initial investment would be lost, and the project would not proceed beyond the planning stage.

The funds from the sale of VCUs are therefore not just a supplementary benefit; they are the instrumental and indispensable financial mechanism that makes the entire project viable. This revenue stream is required to cover the high costs of mining reclamation, fund the essential community co-benefit programs (Water/Health), and provide the financial incentive necessary for the 18 communities to transition away from extractive activities.

Without being registered as a VCS project, this alternative scenario fails. The project would not be implemented, and the baseline scenario of continued degradation (Scenario 1) would prevail.

iii. Activities like the proposed Project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate from legal requirements;

This analysis considers the alternative scenario where activities similar to the proposed project (large-scale restoration of degraded mining and logging areas) are implemented as a result of legal or regulatory requirements, without the specific intervention of this VCS project. A review of the legal and institutional context demonstrates that this scenario is not plausible.

Legal Status of the Project Land

The entirety of the Project Accounting Area is **State Forest Land (Kawasan Hutan Negara)**. However, the direct management authority for these lands has been legally devolved to the **18 local community institutions** through 35-year Social Forestry (*Perhutanan Sosial* - PS) decrees issued by the Ministry of Environment and Forestry. This includes **Customary Forests (*Hutan Adat*)**, **Village Forests (*LPHD*)**, and **Community Forests (*HKm*)**. While the local **UPT KPHP Unit XV Kahayan Hulu** and **Unit XVI Gunung Mas** have an oversight role, the primary responsibility for land management rests with the community license holders.

Analysis of Legal and Regulatory Requirements

While Indonesian national policy (e.g., PP 26/2020 on Forest Rehabilitation) broadly encourages the rehabilitation of Critical Land (*Lahan Kritis*), there are no specific, enforced laws or regulations that legally mandate these 18 community institutions to undertake a systematic, capital-intensive ecological restoration project across **19,008.60 hectares** of their licensed areas using their own funds.

The Social Forestry program's primary legal function is to grant tenure and provide a framework for community-based management. It does not come with the dedicated, long-term funding or technical support necessary to reclaim land degraded by illegal gold mining (*ex-PETI*), which requires expensive soil amelioration. The legal requirement is to manage the land sustainably, but the *de facto* reality—as evidenced by the landscape's long-term degraded state—is that without a significant external intervention and financing mechanism, this management results in the continuation of the degraded baseline or low-intensity rubber tapping.

Institutional Barriers to a "Legally Required" Scenario

The scenario of a government-led restoration project occurring at this scale is also not plausible due to significant institutional and financial barriers documented in the government's own planning documents:

- **RPHJP Evidence:** The Long-Term Forest Management Plans (*RPHJP*) for **KPHP Unit XV** and **Unit XVI** explicitly identify "insufficient funding" (*Pendanaan belum mencukupi*) and "lack of personnel" (*Kekurangan SDM*) as critical weaknesses.
- **Target Gaps:** The RPHJP for Unit XV, for example, sets rehabilitation targets of only **~200-400 hectares per year** for the *entire* management unit (spanning nearly 200,000 ha), reliant on uncertain state budget (APBN/APBD) allocations. This is a fraction of the **19,008.60 ha** target of the GMCRP.

Therefore, while the spirit of Indonesian law supports conservation, there is no credible, legally-mandated, and funded pathway through which the proposed project activities would be implemented in the absence of this specific, privately-funded VCS project.

Step 2. Investment analysis

Sub-step 2a. Determine appropriate analysis method

According to the **VT0001** tool, if the proposed project activity is expected to generate no financial or economic benefits other than carbon revenues, a simple cost analysis or a barrier analysis (Step 3) may be used.

The **Gunung Mas Community Restoration Project (GMCRP)** is designed for ecological restoration of degraded mineral soils and community co-benefits. It explicitly excludes commercial timber harvesting (logging) from the project area to maximize carbon stocks. The **Sustainable Income Generating Schemes (SIGS)** (e.g., Agarwood inoculation, Rotan) are designed to provide community livelihoods but will not generate significant financial returns for the project proponent sufficient to cover the high CAPEX of mining reclamation and OPEX of long-term protection. Therefore, the project proponents have selected the **Barrier Analysis (Step 3)** as the appropriate method to demonstrate additionality.

Sub-step 2b. Apply simple cost analysis

As the barrier analysis was chosen, simple cost analysis was not performed.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of the type of proposed project activity

This analysis demonstrates that there are significant, well-documented, and prohibitive barriers that would prevent the implementation of the proposed large-scale restoration activities in the absence of the project's registration under the VCS Program. The revenue and structure provided by carbon finance are essential to overcome these barriers.

3a.1. Financial Barriers:

Without the financial mechanism of carbon credit sales, the project is not financially viable. The barriers are prohibitive for both the local communities and any potential private developer.

- **Prohibitive Costs of Mining Reclamation:** Unlike standard reforestation, a significant portion of the GMCRP area (specifically within PAA 1) has been degraded by **Illegal Gold Mining (**. Rehabilitating these areas requires expensive earthworks to level tailings, the importation of topsoil or organic amendments to restore fertility to sandy/toxic substrates, and phytoremediation. The local communities, with livelihoods based on subsistence farming or illegal mining itself, completely lack the capital to fund such intensive reclamation.
- **Lack of Commercial Viability for Private Investment:** For a private investor, the community-based restoration model generates no immediate revenue. There is no timber to be sold (as it is a conservation project). The potential income from NTFPs like Agarwood resin takes 7-10 years to materialize (inoculation cycle) and is insufficient to cover the high operational costs of establishing a ranger force to secure the area against illegal miners. The project is a net financial loss without an external revenue stream. Revenue from the sale of VCUs is the *only* mechanism that makes the project financially feasible.

3a.2. Institutional and Governance Barriers:

The successful implementation of the project requires a level of technical expertise that is not locally available within the Gunung Mas Regency.

- **Lack of Restoration Expertise for Mined Lands:** The restoration of *ex-PETI* lands requires specialized silvicultural knowledge of pioneer species tolerant to acid mine drainage and poor soil structure. This technical capacity does not exist within the local communities or the under-resourced regional forestry agencies.

- **Inoculation Technology:** The sustainable Agarwood component relies on proprietary fungal inoculation technology to produce resin without killing the tree. This technology is not available to communities without the project proponent's intervention.[35]

3a.3. Social and Cultural Barriers:

While the communities hold the legal licenses, the institutional capacity to manage a project of this scale and complexity is a significant barrier.

- **Conflict with Extractive Culture:** The local economy has been historically driven by extraction (logging, mining). Shifting this mindset to *restoration* and *maintenance* requires intensive social engineering, conflict resolution, and consistent engagement that requires professional staff and long-term funding.
- **Limited Management Capacity:** The 18 Social Forestry institutions (*LPHD/KTH*) are primarily community-based social structures. They lack the experience in project management, financial administration, and logistical coordination required to implement a multi-million-dollar, 40-year restoration project compliant with international standards.

3a.4. Market Barriers:

The proposed project activity is a radical departure from the common practice in the region.

- **Prevailing Land Use:** As established in the baseline, the prevailing practice for degraded lands in Gunung Mas is a cycle of **illegal mining**, abandonment, and recurrent **burning**. There is no precedent in the region for large-scale, systematic, privately-funded ecological restoration of mineral soils. The barriers of cost (especially reclamation), technology, and capacity have effectively prevented any such activities from being common practice.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternative land-use scenarios

[35] Chung, J.P. & Chen, K.H. (2018). Developing an in vitro quasi-symbiotic culture system of Aquilaria malaccensis. Plant Cell, Tissue and Organ Culture, 133, 193–202.

The significant financial and technological barriers identified in Sub-step 3a effectively prevent the implementation of the proposed project activity without VCS registration. However, these same barriers *do not* prevent the continuation of the baseline scenario: the continuation of degradation via illegal mining and shifting cultivation.

The baseline scenario is defined by a lack of investment and the pursuit of immediate, short-term extraction. It requires no new capital for restoration and no complex management. The financial barriers that make large-scale restoration impossible for the local communities have no bearing on their ability to continue the status quo of small-scale mining. Therefore, the barriers that prevent the project activity are not applicable to the baseline scenario. Without the intervention of the VCS project to overcome these barriers, the unsustainable land-use practices are the only viable activities to continue.

Step 4. Common Practice Analysis

The proposed project activity—a large-scale, privately-funded, community-led ecological restoration project on mineral soils under a carbon crediting framework—is not common practice in Central Kalimantan.

Why the Project is Not Common Practice

While Central Kalimantan is known for large carbon projects (e.g., Katingan Mentaya, Rimba Raya), these projects are almost exclusively located on Peatland ecosystems (*Hutan Gambut*). There are no existing projects of a comparable scale (~19,000 ha) restoring degraded Mineral Soil Production Forests in the Gunung Mas region without carbon finance. The high costs of mineral soil restoration (vs. peat protection) and the lack of "high carbon stock" preservation incentives make this project unique.

AAD's Role and the Need for Carbon Finance

The project proponent, Asia Assets Developments Co., Ltd. (AAD), has been developing this project concept and engaging with local communities, funding these initial stages with its own at-risk capital, consistent with its established development model. However, the long-term, multi-million-dollar operational costs of implementing and monitoring the restoration for 40 years are unsustainable for AAD or any private entity without a new, consistent source of revenue.

The funds generated from the sale of VCUs are therefore instrumental. They will provide the sustainable, long-term revenue stream required to:

- Maintain and expand the restoration activities over the entire project area.
- Fund the essential community development and livelihood programs that ensure local support and mitigate degradation drivers.
- Support the community-based protection and monitoring activities that guarantee the permanence of the restored forest.

In the context of the Gunung Mas Community Project, where government resources for proactive conservation are limited and there is a lack of significant, long-term NGO investment, a project funded by the voluntary carbon market is the only feasible pathway to achieve landscape-scale ecological restoration. Therefore, the project activity is demonstrably not common practice.

Similar Activity Comparison

Sebangau National Park represents a comparable forest protection initiative in Central Kalimantan with the following similarities:

- **Geographic context:** Located in Central Kalimantan.
- **Conservation purpose:** Protection of Orangutan habitat and forest ecosystems.

Essential Distinctions

1. **Government Support and Resources:** Sebangau is a National Park funded by the State Budget (APBN) and receives significant support from major international NGOs (e.g., WWF, BNF). GMCRP is a private/community initiative on **Production Forest** land with **zero public funding**.
2. **Ecosystem Type:** Sebangau is a **Peat Swamp Forest** conservation project focused on hydrological restoration (canal blocking). GMCRP is a **Dryland/Mineral Soil Restoration** project focused on reforestation and mining reclamation. The technical challenges and cost structures are fundamentally different.
3. **Mandate:** Sebangau has a strict conservation mandate. The GMCRP lands are Production Forests where the legal and economic pressure is to *extract* timber or minerals, not conserve.

These distinctions demonstrate that while Sebangau represents a similar *outcome* (conservation), it operates with significant governmental and international donor support that is not available to the GMCRP. The project activity is demonstrably not common practice for Production Forests in Gunung Mas, making carbon credit revenue essential for its implementation and success.

3.1.6 Methodology Deviations (VCS, 3.20)

The Gunung Mas Community Restoration Project does not deviate from the VCS methodology VM0047.

3.2 Quantification of Estimated GHG Emission Reductions and Removals

The project uses an Allometric equation from the "Monograph of Allometric Models for Tree Biomass in Indonesia" (Krisnawati et al., 2012). As there is no wetland in the Project Accounting Area (peat areas are excluded), therefore the equation from the reference table explicated for Central Kalimantan province was used as follows:

3.2.1 Baseline Emissions (VCS, 3.15)

3.2.1.1 VM0047 Section 6.1 Selection of the baseline

Selection of the Baseline Scenario:

In accordance with VM0047 v1.1, the baseline scenario is identified as the continuation of the pre-project land use: degraded shrubland and abandoned mining tailings with arrested succession.

- Carbon Stock Changes in the Baseline:
  Analysis of historical remote sensing data (JRC TMF 1982–2024) indicates that the Project Accounting Area (PAA) has remained in a non-forested state for over a decade. Field assessments confirm that the existing vegetation consists primarily of non-woody biomass (e.g., *Imperata cylindrica*, ferns) and transient pioneer shrubs with insufficient height or diameter to qualify as forest.
  Furthermore, soil toxicity from mercury and acid mine drainage in PAA 1 prevents the natural recruitment of woody tree species.[36] Consequently, the baseline carbon stock change in woody biomass is conservatively assumed to be zero (ΔCBSL = 0).

Please refer to Section 3.1.4 and 3.1.5 above.

Allometric Equations

The project uses an Allometric equation from "Monograph of Allometric Models for Tree Biomass in Indonesia" by Krisnawati et al., 2012. As there is no wetland in the Project Accounting Area, therefore the general equation for tropical humid species was used as follows:

[36] Vlachodimos, K., et al. (2013). Robinia pseudoacacia as a restoration strategy for reclaimed mine spoil heaps. Environmental Science and Pollution Research. (Demonstrates that without intervention/pioneer species, mine spoils remain barren).

The D stands for diameter at breast height. The G stands for Wood Density according to the tree species. If no wood density was found, the default value 0.57 g/cm^3 was used based on a wood density average for Tropical Asia by Reyes et al. (1992).

Table Annex 4.3. Allometric equation used in FRL

Forest Type	Reference	Allometric Equations using D and ρ variables
Mangrove Forest	Chave et al, 2005	AGB = Exp [-1.349 + 1.98 Ln D + 0.207 (Ln D)^3 – 0.0281 (Ln D)^3] × ρ
Other forest	Manuri *et al.*, 2017	Sumatera- Kalimantan $AGB=0{,}167D^{2{,}560}G^{0{,}889}$ Jawa – Bali – Nusa Tenggara – Sulawesi - Maluku $AGB=0{,}151D^{2{,}560}G^{0{,}889}$ Papua $AGB=0{,}206D^{2{,}560}G^{0{,}889}$

The Allometric equation is used according to the Indonesia National Standard for Central Kalimantan Province and is used in the monitoring calculation.

Note:

- *W or B or AGB$_{est}$ or AGB is aboveground biomass (kg)*
- *ρ or G is wood density (g/cm3)*
- *D is DBH (cm)*
- *H is height (m)*
- *Based on the R^2 value and the data attributes from each allometric equation, we then conclude to use (Manuri, 2017) allometric for biomass estimation.*
- *Allometric equation used in Indonesia NFL submitted to UNFCCC 2022*

The volume of each tree and species is calculated using Approach 5 of the Indonesia Monograph for Allometric Models to Estimate Tree Biomass in Forest Ecosystems in Indonesia (Krisnawati, et al., 2012).

$$V = 0.25\pi \times \left(\frac{DBH}{100}\right)^2 \times H \times F \qquad (Approach\ 5\ Krisnawati\ et\ al., 2012)$$

V	tree volume, m3
DBH	tree diameter at breast-height, cm
H	tree height, m
F	tree form factor, dimensionless

The tree form factor value, known as "angka bentuk pohon" (F), is 0.81. This figure is derived from standard forestry practice for the region, comparing the mean tree diameter at the bottom (Diameter Pangkal, DP) and the mean tree diameter at the top (Diameter Ujung, DU).

Timber volume at the plot level is calculated by summing the volume of all trees. Based on the FAO Global Forest Resources Assessment 2020 for Indonesia, the growing stock level for the Central Kalimantan province in Secondary Dryland Forest (Hutan Lahan Kering Sekunder) is utilized for baseline reference where applicable. According to the IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5, the biomass conversion and expansion factor (BCEF) is utilized for conversion.

3.2.1.2 VM0047 Section 8.2 Equations List for Carbon Stocks

According to the area-based quantification approach and the carbon pools being used for the Gunung Mas Community Restoration Project (i.e., woody biomass and litter) estimating gross and subsequently net emissions removals involves the following equations listed below

Equation 1: Carbon stock change in the project scenario in year *t* ($\Delta C_{WP,t}$) (input for Equation 32)

Equation 2: Change in carbon stocks in biomass pools in project scenario through year *t* ($\Delta C_{WP-biomass,t}$) (input for Equation 1)

Equation 3: Change in carbon stock in woody biomass in the project scenario through year *t* ($\Delta C_{WP-woody,t}$) (input for Equation 2)

Equation 4: Average carbon stock in woody biomass in the project scenario in year *t* ($C_{WP-woody,t}$) (input for Equation 3)

Equation 9: Change in carbon stock in litter in the project scenario through year *t* ($\Delta C_{WP-LI,t}$) (input for Equation 2)

Equation 10: Average carbon stock in litter in the project scenario in year *t* ($C_{WP-LI,t}$) (input for Equation 9)

Equation 12: Project emissions from biomass burning and fertilizer in year *t* (PE_t) (input for Equation 32)

Equation 13: Emissions due to biomass burning in the project scenario ($PE_{bburn,t}$)

(input for Equation 12)

Equation 14: Average aboveground biomass stock subject to burning in the project scenario in the monitoring interval ending in year *t* ($B_{WP,t}$) (input for Equation 16)

Equation 15: Emissions due to nitrogen fertilizer in the project scenario ($PE_{fert,t}$) (input for Equation 12)

Equation 16: Direct nitrous oxide emissions due to fertilizer use in the project scenario in year *t* ($PE_{Ndirect,t}$) (input for Equation 15)

Equation 18: Organic N fertilizer applied in the project scenario in year *t* ($F_{wp,ON,t}$) (input for Equations 16 and 20)

Equation 19: Indirect nitrous oxide emissions due to fertilizer use in the project scenario in monitoring interval ending in year *t* ($PE_{Nindirect,t}$) (input for Equation 15)

Equation 20: Indirect nitrous oxide emissions produced from atmospheric deposition of N volatilized due to nitrogen fertilizer use in year *t* ($Nfert_{wp,volat,t}$) (input for Equation 19)

Equation 21: Indirect nitrous oxide emissions produced from leaching and runoff of N, in regions where leaching and runoff occurs, due to nitrogen fertilizer use in year *t* ($Nfert_{wp,leach,t}$) (input for Equation 19)

Equation 28: Uncertainty (UNC_t) (input for Equation 32)

Equation 32: Net carbon dioxide removals (CR_t) (input for Equation 34) Equation 34: Annualized carbon dioxide removals (CRannualized)

Equation A6: Performance Benchmark (PB_t) (input for Equation 32) Equation 10 (VMD0054 v1.0): Leakage (LK_t) (input for Equation 32)

3.2.2 Project Emissions (VCS, 3.15)

GROSS EMISSIONS REMOVALS

In accordance with the applicability conditions of VM0047 V1.1, the increase in carbon stocks due to each PAA type in each annual cohort (instance), carbon stock changes

from the start of the project through year *t* represent the projected (ex-ante) or actual (ex-post) gross emissions removals (t CO_2e) resulting from growth of vegetation due to project activities (i.e., tree planting and /or natural revegetation) and are estimated as follows:

$$\Delta C_{WP,t} = \Delta C_{WP\text{-}biomass,t} \times 44/12 \quad \text{(Equation 1)}$$

Where:

$\Delta C_{WP,t}$ = project carbon stock change through year *t* (t CO_2e)

$\Delta C_{WP\text{-}biomass,t}$ = change in carbon stock in biomass carbon pools in the project scenario through year *t* (ton Carbon)

44/12 = ratio of molecular weight of carbon dioxide to carbon (unitless)

t = 1, 2, 3, …, *t* years elapsed since the project start date

Note: the Soil Organic Carbon pool is not included in this project, and therefore $\Delta C_{WP\text{-}SOC,t}$ is omitted from Equation 1.

$$\Delta C_{WP\text{-}biomass,t} = \Delta C_{WP\text{-}woody,t} + \Delta C_{WP\text{-}LI,t} \quad \text{(Equation 2)}$$

Where:

$\Delta C_{WP\text{-}biomass,t}$ = change in carbon stock in biomass carbon pools in the project scenario through year *t* (ton Carbon)

$\Delta C_{WP\text{-}woody,t}$ = change in carbon stock in woody biomass in the project scenario through year *t* (ton Carbon)

$\Delta C_{WP\text{-}LI,t}$ = change in carbon stock in litter in the project scenario through year *t* (ton Carbon)

t = 1, 2, 3, …, *t* years elapsed since the project start date

For ex-ante calculations used towards validation, the litter pool ($\Delta C_{WP\text{-}LI,t}$) has conservatively been excluded from the estimated (ex-ante) emissions removals, and therefore for validation $\Delta C_{WP\text{-}biomass,t} = \Delta C_{WP\text{-}woody,t}$.

Towards verification, the litter pool will be included in emissions removals calculations.

Note: the non-woody biomass and dead wood pools are not included in this project, and therefore $\Delta C_{WP\text{-}herb,t}$ and $\Delta C_{WP\text{-}DW,t}$ are omitted from Equation 2.

WOODY BIOMASS

The net carbon stock change in carbon pools relating to woody biomass in the project scenario using the area-based quantification approach is estimated as:

$$\Delta C_{WP\text{-}woody,t} = A \times (C_{WP\text{-}woody,t} - C_{WP\text{-}woody,t=0}) \quad \text{(Equation 3)}$$

Where:

$\Delta C_{WP\text{-}woody,t}$ = change in carbon stock in woody biomass in the project scenario through year t (t C)

A = Area (ha)

$C_{WP\text{-}woody,t}$ = average carbon stock in woody biomass in the project scenario in year t (t C/ha)

t = 1, 2, 3, ..., t years elapsed since the project start date

$$C_{WP\text{-}woody,t} = C_{WP\text{-}woody\text{-}AB,t} \times (1 + R) \quad \text{(Equation 4)}$$

Where:

$C_{WP\text{-}woody,t}$ = average carbon stock in woody biomass in the project scenario year t (t C/ha)

$C_{WP\text{-}woody\text{-}AB,t}$ = average carbon stock in aboveground woody biomass in the project scenario in year t (t C/ha)

R = root to shoot ratio (t root d.m. / t shoot d.m.)

t = 1, 2, 3, ..., t years elapsed since the project start date

The change in carbon stock in woody biomass is estimated using the stock difference method (VM0047 V1.1 Reference: Bird, et. al., 2010), which estimates the difference in carbon stocks at two points in time.

For ex-ante calculations used towards validation, $\Delta C_{WP\text{-}woody,t}$ (Equation 3) is determined using best available conservative inputs to build growth and yield curves / models. Per intervention, growth (i.e., changes in dbh over time) and yield (i.e., converting dbh into aboveground biomass using Indonesia Government UNFCCC allometric equations) curves were built for a subset of representative species planted where sufficient published data was available. For species where insufficient data was available, representative species were used as proxies (based on similarity). ex-ante allometric equations and root-to-shoot ratios used for each species modelled are shown in *Table 37*. Stand level (i.e., per ha) changes in aboveground biomass were generated by summing each species planted multiplied by its planting density, factoring in mortality/survival rates, replacement planting, and natural regeneration (particularly for I2 and I3). The stand level changes were then multiplied by the amount of hectares planted per intervention (as per the rollout schedule, *Table 40*).

Table Annex 4.3. Allometric equation used in FRL

Forest Type	Reference	Allometric Equations using D and ρ variables
Mangrove Forest	Chave et al, 2005	AGB = Exp [-1.349 + 1.98 Ln D + 0.207 (Ln D)^3 – 0.0281 (Ln D)^3] × ρ
Other forest	Manuri *et al.*, 2017	Sumatera- Kalimantan $AGB=0,167D^{2,560}G^{0,889}$ Jawa – Bali – Nusa Tenggara – Sulawesi - Maluku $AGB=0,151D^{2,560}G^{0,889}$ Papua $AGB=0,206D^{2,560}G^{0,889}$

LITTER

The net carbon stock change in carbon pools relating to litter in the project scenario using the area-based quantification approach is estimated as:

$\Delta C_{WP\text{-}LI,t} = A \times (C_{WP\text{-}LI,t} - C_{WP\text{-}LI,t=0})$ (**Equation 9**)

Where:

$\Delta C_{WP\text{-}LI,t}$ = change in carbon stock in litter in the project scenario through year *t* (t C)

A = Area (ha)

$C_{WP\text{-}LI,t}$ = Average carbon stock in litter in the project scenario in year *t* (t C/ha)

t = 1, 2, 3, …, *t* years elapsed since the project start date

$C_{WP\text{-}LI,t} = DM_{WP\text{-}LI,t} \times CF$ (**Equation 10**)

Where:

$C_{WP\text{-}LI,t}$ = Average carbon stock in litter in the project scenario in year *t* (t C/ha)
$DM_{WP\text{-}LI,t}$ = Average litter dry mass per hectare in the project scenario in year *t* (t d.m./ha)

CF = Carbon fraction of dry biomass (t C/t d.m.)

t = 1, 2, 3, …, *t* years elapsed since the project start date

For ex-ante calculations used towards validation, $\Delta C_{WP\text{-}LI,t}$ (Equation 9) has been conservatively excluded from emissions removals calculations.

Towards verification (i.e., ex-post based on actual growth) as per the Climate Monitoring Section (see Section 3.3) at each monitoring event and within a dedicated network of PSPs associated with each annual cohort, plot-level litter will be determined within sub-plots according to defined standard operating procedures (SOPs).

EMISSIONS FROM PROJECT ACTIVITIES

For each intervention type in each annual cohort (instance), emissions from Project Activities may include potential impacts resulting from biomass burning and/or fertilizer use and are determined using the following equation:

$PE_t = PE_{bburn,t} + PE_{fert,t}$ (Equation 12)

Biomass Burning

To determine the emissions specifically from biomass burning involves the following equation:

$$PE_{bburn,t} = A_{burn,t} \times \sum_{g=1}^{G} (GWP_g \times EF_g \times B_{WP,t} \times COMF \times 10^{-3}) \quad \text{(Equation 13)}$$

Where:

$PE_{bburn,t}$ = Project emissions due to biomass burning in year *t* (t CO_2e) $A_{burn,t}$ = Area burned in the monitoring interval ending in year *t* (ha) GWP_g = Global warming potential for gas *g* (dimensionless)

EF_g = Emission factor for gas *g* (kg gas/t d.m. burned)

$B_{WP,t}$ = Average aboveground biomass stock subject to burning in the project scenario in the monitoring interval ending in year *t* (t d.m./ha)

COMF = Combustion factor (dimensionless)

t = 1, 2, 3, …, t years elapsed since the project start date

g = 1, ..., G greenhouse gases (methane and nitrous oxide) (dimensionless)

10—3 = Conversion of kg CO2e to tCO2e

The average aboveground biomass stock subject to burning is estimated as follows:

$B_{WP,t} = (C_{WP\text{-}woody\text{-}AB,t—\Delta t} + C_{WP\text{-}herb,t—\Delta t} + C_{WP\text{-}DW,t—\Delta t} + C_{WP\text{-}LI,t—\Delta t}) \times (1/CF)$ (**Equation 14**)

Where:

$B_{WP,t}$ *= Average aboveground biomass stock subject to burning in the project scenario in the monitoring interval ending in year t (t d.m./ha)*

$C_{WP\text{-}woody\text{-}AB,t—\Delta t}$ *= Average carbon stock in aboveground woody biomass in the project scenario in year t − Δt (t C/ha)*

$C_{WP\text{-}herb,t—\Delta t}$ *= Average carbon stock in non-woody biomass in the project scenario in year t*

–− Δt (t C/ha)

$C_{WP\text{-}DW,t—\Delta t}$ *= Average carbon stock in dead wood in year t − Δt (t C/ha)*

$C_{WP\text{-}LI,t—\Delta t}$ *= Average carbon stock in litter in the project scenario in year t − Δt (t C/ha)*

CF = Carbon fraction of dry biomass (t C/t d.m.)

t = 1, 2, 3, …, t years elapsed since the project start date Δt = Length of monitoring interval ending in year t (years)

For ex-ante calculations used towards validation, $PE_{bburn,t}$ *(**Equation 14**) was calculated based on a 20m buffer around the project areas, which is burned annually as part of the fire management plan of the project. For I1 and I3, this 20m buffer was based on the delineated Year 1 project areas where activities have already commenced. The ratio of area burned (i.e., the 20m buffer) to the project area was then used to estimate the area burned in future years. For I2, a 20m buffer was generated around the representative proportion of planting areas for Years 2-5 (as described in Section 3.1.5.2 and as shown in Figure 13). The estimates of area burned are conservative estimates that may exaggerate the extent of area being burned annually. Default IPCC values were used for all parameters in Equation 16, as described in Section 3.3.1.*

For ex-ante projections and towards project validation: the significance of emissions due to biomass burning were calculated using the procedure in Appendix 2 of VM0047 v1.1 and were deemed de minimis as they (combined with all other emissions sources) represented less than 5% of the total amount of carbon removals expected from the project.

Towards verification, as trees continue to grow within annual cohorts wherein tree planting and / or rewilding has occurred, and as fire management practices are continued, the incidence of fire is expected to decrease while resilience towards fire is expected to increase - if and when fire does occur within the project area, the extent and

*impact will be quantified and factored into the calculation of climate benefits as per the d*etails provided in the climate monitoring plan (see Section 3.3)

Fertilizer Application

Where nitrogen fertilizer is applied due to the project activity, nitrous oxide emissions are calculated as:

$PE_{fert,t} = PE_{Ndirect,t} + PE_{Nindirect,t}$ (**Equation 15**)

Where:

$PE_{fert,t}$ = *Project emissions from nitrogen fertilizer in year t (t CO2e)*

$PE_{Ndirect,t}$ = *Direct nitrous oxide emissions due to fertilizer use in the project scenario in year t (t CO2e)*

$PE_{Nindirect,t}$ = *Indirect nitrous oxide emissions due to fertilizer use in the project scenario in monitoring interval ending in year t (t CO2e)*

t = 1, 2, 3, …, t years elapsed since the project start date

$PE_{Ndirect,t} = (F_{wp,ON,t}) \times EF_{Ndirect} \times 44/28 \times GWP_g$ (**Equation 16**)

Where:

$PE_{Ndirect,t}$ = *Direct nitrous oxide emissions due to fertilizer use in the project scenario in year t (t CO2e)*

$F_{wp,ON,t}$ = *Organic N fertilizer applied in the project scenario in year t (t N)*

$EF_{Ndirect}$ = *Emission factor for nitrous oxide emissions from N additions due to synthetic fertilizers, organic amendments and crop residues (t N2O-N/t N applied)*

GWP_g = *Global warming potential for gas g (here, nitrous oxide) (dimensionless)*

44/28 = Ratio of molecular weight of N2O to molecular weight of N (applied to convert N2O-N emissions to N2O emissions) (unitless)

t = 1, 2, 3, …, t years elapsed since the project start date

Note: no synthetic fertilizer is used in this project, therefore $F_{wp,SN,t}$ *is omitt*ed from Equation 16.

$F_{wp,ON,t} = M_{wp,OF,t} \times NC_{wp,OF,t}$ (**Equation 18**)

Where:

$F_{wp,ON,t}$ = Organic N fertilizer applied in the project scenario in year t (t N)

$M_{wp,OF,t}$ = Mass of N-containing organic fertilizer applied in the project scenario in the monitoring interval ending in year t (t fertilizer)

$NC_{wp,OF,t}$ = N content of organic fertilizer applied in the project scenario in year t (t N/t fertilizer)

t = 1, 2, 3, …, t years elapsed since the project start date

$PE_{Nindirect,t} = N_{fertwp,volat,t} + N_{fertwp,leach,t}$ (**Equation 19**)

Where:

$PE_{Nindirect,t}$ = Indirect nitrous oxide emissions due to fertilizer use in the project scenario in monitoring interval ending in year t (t CO2e)

$N_{fertwp,volat,t}$ = Indirect nitrous oxide emissions produced from atmospheric deposition of N volatilized due to nitrogen fertilizer use in year t (t CO2e)

$N_{fertwp,leach,t}$ = Indirect nitrous oxide emissions produced from leaching and runoff of N, in regions where leaching and runoff occurs, due to nitrogen fertilizer use in year t (t CO2e)

$N_{fertwp,volat,t} = (F_{wp,ON,t} \times Frac_{GASM}) \times EF_{Nvolat} \times 44/28 \times GWP_g$ (**Equation 20**) Where:

$N_{fertwp,volat,t}$ = Indirect nitrous oxide emissions produced from atmospheric deposition of N volatilized due to nitrogen fertilizer use in year t (t CO2e)

$F_{wp,ON,t}$ = Organic N fertilizer applied in the project scenario in year t (t N)

$Frac_{GASM}$ = Fraction of all organic N added to soils that volatilizes as NH3 and NOx (dimensionless)

EF_{Nvolat} = Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces (t N2O-N/(t NH_3-N + NO_x-N volatilized))

GWP_g = Global warming potential for gas g (here, nitrous oxide) (dimensionless)

44/28 = Ratio of molecular weight of N2O to molecular weight of N (applied to convert N2O-N emissions to N2O emissions) (unitless)

t = 1, 2, 3, …, t years elapsed since the project start date

Note: no synthetic fertilizer is used in this project, therefore Fwp,SN,t and FracGASF are omitted from Equation 20.

$$Nfert_{wp,leach,t} = (F_{wp,ON,t}) \times Frac_{LEACH} \times EF_{Nleach} \times 44/28 \times GWPg \quad \text{(Equation 21)}$$

Where:

$Nfert_{wp,leach,t}$ = Indirect nitrous oxide emissions produced from leaching and runoff of N, in regions where leaching and runoff occurs, due to nitrogen fertilizer use in year t (t CO2e)

$F_{wp,ON,t}$ = Organic N fertilizer applied in the project scenario in year t (t N)

$Frac_{LEACH}$ = Fraction of synthetic or organic N added to soils that is lost through leaching and runoff, in regions where leaching and runoff occurs (dimensionless)

EF_{Nleach} = Emission factor for nitrous oxide emissions from leaching and runoff (t N2O-N/t N leached and runoff)

GWPg = Global warming potential for gas g (here, nitrous oxide) (dimensionless)

44/28 = Ratio of molecular weight of N2O to molecular weight of N (applied to convert N2O-N emissions to N2O emissions) (unitless)

t = 1, 2, 3, …, t years elapsed since the project start date

Note: no synthetic fertilizer is used in this project, therefore Fwp,SN,t is omitted from Equation 21.

For ex-ante calculations used towards validation, is determined based on estimates of the amount of fertilizer applied over the first monitoring period. Fertilizer will only be applied to I1 and I2, with no fertilizer being used for I3. The fertilizer applied will be organic chicken manure (as described in Section 3.3.1, and in Table 57). Default

IPCC values were used for non-measured parameters in Equations 16, 18, 20, and 21 as described in Section 3.3.1. The significance of emissions due to fertilizers were calculated using the procedure in Appendix 2 of VM0047 v1.1 and were deemed deminimis as they (combined with all other emissions sources) represented less than 5% of the total amount of carbon removals expected from the project.

Towards verification, the amount of fertilizer applied will be monitored and measured in accordance with the monitoring plan (see Section 3.3.3 for details). Calculations of $PE_{fert,t}$ (**Equation 15**) will be conducted as described above for the ex-ante calculations.

Biomass Growth Assumptions and Mortality Strategy

To ensure the ex-ante quantification of GHG removals is robust and biologically defensible, the project applies a specific **Mortality and Self-Thinning Protocol** to the growth models for PAA 1 (Intensive Reforestation) and PAA 2 (Enrichment).

Unlike commercial plantations that might assume theoretical maximums, the GMCRP accounts for forest dynamics on degraded mineral soils through a two-phase density management strategy:

1. **Establishment Phase (Years 1–3):** The project implements a "Beating Up" protocol. Any seedling mortality due to transplant shock or environmental stress during the first three years is immediately identified during monitoring and replaced using reserve stock from community nurseries. This maintains the target planting density (e.g., 1,000 trees/ha for PAA1 and 100 trees/ha for PAA2) during the critical establishment window.
2. **Maturation Phase (Years 4–30):** Following establishment, natural forest dynamics take over. The model applies a conservative **annual mortality rate of 1%** to account for self-thinning (competition for light and nutrients) and minor disturbances.

Impact on Calculation:
This protocol results in a gradual reduction of stocking density over the project lifetime (ending with approx. **330 mature trees/ha** at Year 30, rather than the initial 500 per species). This ensures that the carbon stock estimates (Equation 4) reflect a realistic, open-canopy forest structure rather than an overcrowded plantation, thereby minimizing the risk of over-crediting.

3.2.3 Leakage Emissions (VCS 2.5, 3.2, 3.6, 3.15, 4.3)

The project does not consider emissions from the native grassland, therefore, the parameter is assumed as zero.

3.2.3.1 Activity shifting leakage

AAD only controls resource use within the Gunung Mas Community Restoration Project's project area and cannot access other forest resources, so activity transfer leakage does not apply to Gunung Mas Community Restoration Project. AAD has no other forestry companies under its umbrella. Therefore, there is zero leakage due to the transfer of activities, and the only type of leakage emissions calculated are the greenhouse gas emissions resulting from market effects when implementing project activities, as described below.

3.2.3.2 Market Leakage

Leakage due to market effects is calculated by multiplying the net emissions from planned timber harvesting activities in the baseline scenario by an appropriate leakage factor as follows.

Referring to VMD0045, market leakage is determined taking into account that national deforestation on Community/Village/Social Forest due to project implementation. The extent of leakage depends on the areas of the country's forest resources that may be displaced by other Community/Village/Social Forest activities. If deforestation is moved to forests where the biomass contains a smaller proportion of available materials compared to the project area, higher emissions are expected because more trees will need to be felled to achieve the same volume of stock. Conversely, if the forest being replaced contains a higher proportion of available biomass from commercial tree species than the project forest, a smaller area will need to be deforested, resulting in lower emissions.

The project activity takes place on degraded, non-productive land (Lahan Kritis) that does not currently support commercial timber harvesting or agricultural crop production. Therefore, the project does not reduce the supply of timber or crops to the market. Consequently, Market Leakage is deemed to be zero (LKmarket = 0), as there is no production to displace.

3.2.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals (VCS, 3.15, 4.1)

UNCERTAINTY

Within the context of an ARR project, uncertainty may be associated with numerous sources, including change in carbon stocks, measurement error, emissions from project activities, the spatial boundaries of project activities, and the performance benchmark. Uncertainty (*UNCt*) in carbon pools is quantified and deducted from gross emissions removals along with leakage (*LKt*), emissions from project activities (biomass burning and/or fertilizer use), and in reference to the performance benchmark towards determining net emissions removals. For each intervention type in each annual cohort (instance), uncertainty within carbon pools is calculated by propagating errors associated with estimates of included pools as:

$$UNC_t = \text{MIN}\left(100\%, \text{MAX}\left(0, \left(T \times \frac{\sqrt{SE^2{}_{p,t=0} + SE^2{}_{p,t} - (2 \times \rho \times SE_{p,t=0} \times SE_{p,t}}}{\Delta C}\right) - 0.10\right) \times 100\right)$$

(**Equation 28**)

Where:

UNC_t = Uncertainty in cumulative removals through year t (percent)(%)

T = Critical value of a student's two-tailed t-distribution for significance level α = 0.1

$SE_{p,t=0}$ = Standard error of the mean carbon stock estimate at time t = 0 (t CO_2e)

$SE_{p,t}$ = Standard error of the mean carbon stock estimate at time t (t CO_2e)

p = Correlation coefficient (rho) between carbon stocks at t = 0 and t (used only for permanent plots; term is set to zero for independent

ΔC = Mean change in carbon stocks between t = 0 and t (t CO_2e)

For ex-ante calculations used towards validation, UNC_t (Equation 28), the minimum uncertainty deduction of 10% is applied.

Towards verification, uncertainty in pools derived from field measurements (i.e., the aboveground woody biomass and litter pools) with 90 percent confidence interval is calculated as the standard error of the averaged plot measurement multiplied by the T value for the 90 percent confidence level.

Beyond uncertainty within carbon pools, the uncertainty associated with measurement error is assessed through the QA/QC procedures described in the Climate Monitoring section (see Section 3.3). For emissions from project activities (i.e., biomass burning and / or use of nitrogen fertilizer): conservative parameters are applied and therefore uncertainty is set at 0. For the estimation of intervention-specific areas associated with annual cohorts (i.e., instances) wherein actual project activities occur, uncertainty is assumed to be 0 as represented by complete and accurate geospatial boundaries and carefully applying QA/QC procedures. Performance benchmark values are also assumed to have no (0) uncertainty.

NET EMISSIONS REMOVALS

In addition to the performance benchmark (i.e., crediting baseline), emissions from project activities (i.e., biomass burning and/or fertilizer application), the impact of leakage (LK_t), and uncertainty (UNC_t) are deducted from gross estimates to arrive at net emissions removals. For each intervention type in each annual cohort (instance), using the area-based quantification approach, net emissions removals are calculated with the following equation:

$$CR_t = \left(MIN\left(\Delta C_{WP,t}, \Delta C_{WP,t} \times (1 - PB_t)\right) \times (1 - UNC_t)\right) - PE_t - LK_t - \left(\left(MIN\left(\Delta C_{WP,t-x}, \Delta C_{WP,t-x} \times (1 - PB_{t-x})\right) \times (1 - UNC_{t-x})\right) - PE_{t-x} - LK_{t-x}\right)$$

(**Equation 32**)

Where:

CR_t = Carbon dioxide removals from the project activity in from year t to t-1 (t CO_2e)

$\Delta C_{WP,t}$ = Project carbon stock change through year t (t CO_2e)

PB_t = Performance benchmark for the monitoring interval ending in year t (percent)(%)

LK_t = Leakage through year t (t CO_2e)

PE_t = Project emissions from biomass burning and fertilizer in year t (t CO_2e)

UNC_t = Uncertainty in cumulative removals through year t (percent)(%)

During the first monitoring period, the extents in ha that have occurred and/or are planned for each intervention are shown in *Table 40* - these extents were used in ex-ante modeling and do not include any planned harvest.

Table 26. Rollout schedule per intervention per year for the first monitoring period (i.e., 2024 to 2028).

Year	Project Year	PAA 1 (ha)	PAA 2 (ha)	Total (ha)
2025	1	236.20	264.1	500
2026	2	714.00	1,922.20	2,636
2027	3	1,133.00	3,844.40	4,977
2028	4	1,133.00	4,800.00	5,933
2029	5	1,119.10	3,842.60	4,962
Total (ha)		4,335.30	14,673	19,009

Towards validation, CR_t (Equation 32) is projected ex-ante for each intervention separately based on the expected net emissions removals associated with planting and rewilding activities within the first monitoring period over the entire crediting period (i.e., 40 years: *the quantification for the final 10 years (01 January 2056 - 31 December 2065) is contingent upon the successful extension of the underlying Social Forestry permits and will be calculated and included in a future project description update or monitoring report prior to the respective verification*). Intervention-specific estimates are combined to determine total net CO_2e benefits - a summary of combined projected gross and net emissions removals are provided in *Table 45* with full details outlined in the supporting document: "*Forecast GHG Removals and VCU Issuances*".

Towards verification, the actual net emissions removals of planting and rewilding activities across all existing annual cohorts (i.e., instances) will be monitored according to the Climate Monitoring Plan (see Section 3.3).

To calculate annualized carbon dioxide removals ($CR_{annualized}$),the total removals (CR_t) in the monitoring interval are divided by the length of the monitoring interval (x):

$$CR_{annualized} = \frac{CR_t}{x}$$ (**Equation 34**)

Where:

$CR_{annualized}$ = Annualized carbon dioxide removals (t CO_2e / year)

CR_t = Carbon dioxide removals from the project activity in from year t to t-1 (t CO_2e)

x = Length of the monitoring period (years)

Determining buffer account allocation

The allocation of GERs to the buffer account was determined following the AFOLU Non Permanence Risk Tool, version 4.2. As a result of the process, the percentage of GERs allocated in the buffer account is 17%.

Table 27. Risk Allocation

State the non-permanence risk rating (%)	17%

Has the non-permanence risk report been attached as either an appendix or a separate document?	☒ Yes ☐ No
For ARR and IFM projects with harvesting, state, in tCO_2e, the Long-term Average (LTA).	Not applicable as there is no harvesting in this project.
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No Not applicable as there is no harvesting in this project.
State, in tCO_2e, the expected total GHG benefit to date.	0
Is the number of GHG credits issued below the LTA?	☐ Yes ☒ No Not applicable as there is no harvesting in this project.

Table 28. Estimated gross and net emissions removals and VCU issuance over the crediting period for all interventions combined. Estimated net removals calculated as gross removals minus uncertainty, leakage, project, and baseline emissions. Estimated VCU issuance calculated as estimated net removals minus buffer pool allocation.

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated gross project removals (tCO_2e)	Estimated uncertainty deduction (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net removals (tCO_2e)	Estimated net reductions (tCO_2e)
01-Jan-2026 to 31-Dec-2026	0	0	199	50	10	139	0
01-Jan-2026 to 31-Dec-2027	0	0	3,323	831	166	2,326	0

01-Jan-2026 to 31-Dec-2028	0	0	19,424	4,856	971	13,597	0
01-Jan-2026 to 31-Dec-2029	0	0	57,730	14,433	2,887	40,411	0
01-Jan-2026 to 31-Dec-2030	0	0	124,496	31,124	6,225	87,147	0
01-Jan-2026 to 31-Dec-2031	0	0	220,789	55,197	11,039	154,552	0
01-Jan-2026 to 31-Dec-2032	0	0	336,041	84,010	16,802	235,229	0
01-Jan-2026 to 31-Dec-2033	0	0	465,146	116,287	23,257	325,602	0
01-Jan-2026 to 31-Dec-2034	0	0	606,082	151,521	30,304	424,257	0
01-Jan-2026 to 31-Dec-2035	0	0	726,576	181,644	36,329	508,603	0
01-Jan-2026 to 31-Dec-2036	0	0	842,062	210,516	42,103	589,443	0
01-Jan-2026 to 31-Dec-2037	0	0	915,804	228,951	45,790	641,063	0
01-Jan-2026 to 31-Dec-2038	0	0	970,328	242,582	48,516	679,230	0
01-Jan-2026 to 31-Dec-2039	0	0	997,794	249,449	49,890	698,456	0
01-Jan-2026 to 31-Dec-2040	0	0	1,011,251	252,813	50,563	707,876	0
01-Jan-2026 to 31-Dec-2041	0	0	997,860	249,465	49,893	698,502	0
01-Jan-2026 to 31-Dec-2042	0	0	962,458	240,615	48,123	673,721	0
01-Jan-2026 to 31-Dec-2043	0	0	962,244	240,561	48,112	673,571	0

01-Jan-2026 to 31-Dec-2044	0	0	900,103	225,026	45,005	630,072	0
01-Jan-2026 to 31-Dec-2045	0	0	869,114	217,279	43,456	608,380	0
01-Jan-2026 to 31-Dec-2046	0	0	828,223	207,056	41,411	579,756	0
01-Jan-2026 to 31-Dec-2047	0	0	782,558	195,640	39,128	547,791	0
01-Jan-2026 to 31-Dec-2048	0	0	765,710	191,428	38,286	535,997	0
01-Jan-2026 to 31-Dec-2049	0	0	748,591	187,148	37,430	524,014	0
01-Jan-2026 to 31-Dec-2050	0	0	728,940	182,235	36,447	510,258	0
01-Jan-2026 to 31-Dec-2051	0	0	675,940	168,985	33,797	473,158	0
01-Jan-2026 to 31-Dec-2052	0	0	649,453	162,363	32,473	454,617	0
01-Jan-2026 to 31-Dec-2053	0	0	620,964	155,241	31,048	434,675	0
01-Jan-2026 to 31-Dec-2054	0	0	591,861	147,965	29,593	414,303	0
01-Jan-2026 to 31-Dec-2055	0	0	599,598	149,900	29,980	419,719	0
01-Jan-2026 to 31-Dec-2056	0	0	101,215	25,304	5,061	70,851	0
Total	0	0	19,081,877	4,770,469	954,094	13,357,314	0
Average	0	0	636,063	159,016	31,803	445,244	0

Note: *This ex-ante quantification table covers the initial 30 years of the project's 40-year crediting period. The quantification for the final 10 years (01 January 2056 - 31 December 2065) is contingent upon the successful extension of the underlying Social Forestry permits and will be calculated and included in a future project description update or monitoring report prior to the respective verification.*

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation (VCS, 3.16)

Table 29. Data and Parameters of Validation

Data / parameter	*A*
Data unit	Ha
Description	Project area
Source of data	Calculated from field measurements and GIS data
Value applied	Total Project Area: 44,214.7 hectares Eligible Project Area: 19,009 ha
Justification of choice of data or description of measurement methods and procedures applied	The project areas were delineated,The methods and procedures differ based on project interventions, for details, please refer to section 3.1.3.
Purpose of data	Calculation of project emissions using the area-based quantification approach
Comments	While available at validation for the first instance, this parameter will also be monitored and updated with each new annual cohort (i.e., instance) in the grouped project. Note that all estimated emissions removals listed in this document are based on the rollout schedule provided in *Table 40*, and not based only on the area already planted and/or rewilded.

Data / parameter	*R*
Data unit	Dimensionless
Description	Root to shoot ratio (i.e., ratio of belowground (root) biomass to aboveground biomass, per unit area or per stem)
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories, 2006, Volume 4: Agriculture, Forestry and Other Land Use, Chapter 4: Forest Land, Table 4.4.
Value applied	*BGB* = 0.37 x *AGB*
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value for Tropical rainforest
Purpose of data	Calculation of baselin and project emissions using the area-based and census-based quantification approaches
Comments	

Data / parameter	*CF*
Data unit	t C/t.d.m.
Description	Carbon fraction of dry biomass
Source of data	*IPCC 2006 Guidelines for National Greenhouse Gas Inventories*

Value applied	0.47
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the area-based and census-based quantification approaches
Comments	N/A

Data / parameter	$Frac_{GASM}$
Data unit	Dimensionless
Description	Fraction of all organic N added to soils that volatilizes as NH_3 and NO_x
Source of data	Table 11.3, Chapter 11 in Volume 4 of the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied	0.21
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	EF_{Nvolat}
Data unit	t N_2O-N/(t NH_3-N + NO_x-N volatilized)
Description	Emission factor for nitrous oxide emissions from atmospheric deposition of N on soils and water surfaces

Source of data	Table 11.3, Chapter 11 in Volume 4 of the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied	0.01
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$Frac_{LEACH}$
Data unit	Dimensionless
Description	Fraction of synthetic or organic N added to soils that is lost through leaching and runoff
Source of data	Table 11.3, Chapter 11 in Volume 4 of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied	0.24
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	

Data / parameter	EF_{Nleach}

Data unit	t N_2O-N/t N leached and runoff

Description	Emission factor for nitrous oxide emissions from leaching and runoff
Source of data	Table 11.3, Chapter 11 in Volume 4 of the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied	0.011
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	*COMF*
Data unit	Dimensionless
Description	Combustion factor
Source of data	Default mean values in Table 2.6 of IPCC *2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories*
Value applied	Default mean value of 0.74 (Tropical/sub-tropical grassland, early dry season) taken from Table 2.6, Chapter 2 in Volume 4 of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS. Areas burned fall into the Savanna and grassland category.
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$EF_{g=1}$
Data unit	kg/t d.m. burned
Description	Emission factor for gas *g=1* (i.e., methane)
Source of data	Table 2.5, Chapter 2, Volume 4 of the *IPCC 2006 Guidelines for National Greenhouse Gas Inventories* (see Appendix 2: Emission factors for various types of burning for CH_4 and N_2O)
Value applied	Default mean value of 2.3 (Savanna and grassland) taken from Table 2.5, Chapter 2 in Volume 4 of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS. Areas burned fall into the Savanna and grassland category.
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$EF_{g=2}$
Data unit	kg/t d.m. burned
Description	Emission factor for gas *g=2* (i.e., Nitrous oxide)
Source of data	Table 2.5, Chapter 2, Volume 4 of the *IPCC 2006 Guidelines for National Greenhouse Gas Inventories* (see Appendix 2: Emission factors for various types of burning for CH_4 and N_2O)
Value applied	Default mean value of 0.21 (Savanna and grassland) taken from Table 2.5, Chapter 2 in Volume 4 of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Justification of choice of data or description of measurement	IPCC is a reputable source approved under the VCS. Areas burned fall into the Savanna and grassland category.

methods and procedures applied	
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$GWP_{g=1}$
Data unit	Dimensionless
Description	Global warming potential for gas *g=1* (i.e., methane)
Source of data	Value for Methane (100-year GWP) applied, taken from Table 8.A.1 in the IPCC Fifth Assessment Report (AR5). IPCC. 2013. Fifth Assessment Report. https://www.ipcc.ch/report/ar5/wg1/
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$GWP_{g=2}$
Data unit	Dimensionless
Description	Global warming potential for gas *g=2* (i.e., Nitrous oxide)
Source of data	Value for Nitrous oxide (100-year GWP) applied, taken from Table 8.A.1 in the IPCC Fifth Assessment Report (AR5). IPCC. 2013. Fifth Assessment Report. https://www.ipcc.ch/report/ar5/wg1/
Value applied	265

Justification of choice of data or description of measurement methods and procedures applied	IPCC is a reputable source approved under the VCS
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Comments	N/A

Data / parameter	$p_{j,h}$
Data unit	Unit of production, varies by commodity
Description	Production in the project area for commodity j in year h of the historical reference period
Source of data	FAOSTAT
Value applied	N/A.
Justification of choice of data or description of measurement methods and procedures applied	No agroforestry production in PAAs.
Purpose of data	Calculation of foregone production
Comments	N/A

Data / parameter	H
Data unit	Years
Description	Number of years within historical reference period used to determine baseline production within the project area

Source of data	N/A
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	There is no crop production the PAAs.
Purpose of data	Calculation of foregone production
Comments	N/A

Data / parameter	$op_{j,h}$
Data unit	Unit of production, varies by commodity
Description	Production units of commodity j in the leakage mitigation area in year h of the historical reference period.
Source of data	N/A
Value applied	N/A
Justification of choice of data or description of measurement methods and procedures applied	No leakage mitigation activities have taken place due to the crop production in PAAs.
Purpose of data	Calculation of leakage mitigation for foregone production
Comments	N/A

Data / parameter	*Mortality Rate (M_rate)*
Data unit	% (Percentage of trees lost per year)
Description	The assumed rate of tree mortality due to natural competition (self-thinning), environmental stress, and transplant shock during the crediting period.

Source of data	Expert judgment based on standard forestry practices for intensive reforestation on mineral soils and project SOPs for replanting.
Value applied	Years 1-3: 0% Net Mortality (Due to 100% "Beating Up" / Replanting protocol)| Years 4-30: 1% Annual Mortality (Natural thinning)
Justification of choice of data or description of measurement methods and procedures applied	To ensure conservative ex-ante estimation as required by VM0047, the project assumes a transition from active establishment to natural forest dynamics. 1. Years 1-3: The project budget includes provisions for "Beating Up" (replanting dead seedlings) to maintain the target density of 1,000 trees/ha. >2. Years 4+: Once established, replanting ceases, and a conservative natural mortality rate of 1% is applied to simulate competition and self-thinning.
Purpose of data	Calculation of Gross Project Removals (Input for determining Trees per Hectare in Equation 4).
Comments	N/A

3.3.2 Data and Parameters Monitored (VCS, 3.16)

Table 30. Data and Parameters Monitored

Data / parameter	$C_{WP\text{-}woody\text{-}AB,t}$
Data unit	t C/ha
Description	Average aboveground woody biomass stocks in the project scenario in year *t* (area-based quantification)
Source of data	Field measurement

Description of measurement methods and procedures to be applied	Measured via plot-based sampling at the Permanent Sample Plots (PSPs). **Plot Summary** PSPs measure 30x30m, with 3 subplots of 10x10m in two corners and the center of the main plot (*Figure 19*). **Measurement Summary** All trees with dbh > 10.0cm will be measured in the main plot. Trees (saplings) with dbh from 2m to 10m will be measured in the three subplots. Stepwise measurement procedure is as in Section #: **Allometric Equation(s) Applied** Trees ≥ 1.3m tall: calculated using the Chave et al. (2014)[109] pan-tropical allometric equation: ● $AG = 0.0673 \times (pD^2H)^{0.976}$ ○ p = wood density of tree species ○ D = diameter at breast height (cm) ○ H = height (m) Trees < 1.3m tall: calculated using the Adu-Bredu et al. 2021[110] allometric equation: ● $AG = 2.5102 \times (phd^2)^{0.3398}$ ● Where wood density is unavailable: $AG = 1.9574 \times (hd^2)^{0.3626}$ Selecting these equations involved careful inventory, comparison, and consideration of all available options by a panel of Ghanaian experts with decades of hands-on experience measuring trees across a variety of forest types and applying allometric equations based on field measurements. Given that no specific equations are currently available for the target species associated with interventions, these selections can easily be justified as widely tested and used, conservative, and best available among options.

[109] Chave et al. (2014). Improved allometric models to estimate the aboveground biomass of tropical trees. Global Change Biology, 20(10): pgs. 3177-3190. Retrieved from: https://www.researchgate.net/publication/262197290_Improved_allometric_models_to_estimate_the_aboveground_biomass_of_tropical_trees

Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	• Waterproof sheets • GPS • Markers • Compass • PVC pipes • Tapes (DBH tape, linear tapes, carpenter's tape) • Calipers • Laser clinometer • Height poles • Aluminum number tags and nails
QA/QC procedures to be applied	To ensure the collection of reliable field data, the following measures shall be taken: 1. The Team members will be taken through field inventory training prior to collection of plot data. 2. All field measurements shall be checked by a qualified person (the Field Team Leader) in cooperation with the field team to correct any errors in techniques.
Purpose of data	Calculation of project emissions using the area-based quantification approach
Calculation method	Calculated as the average of sample measurements
Comments	A full description of the Permanent Sampling Plots and parameters measured is provided in section 3.3.3.

[110] Adu-Bredu et al. (2021). Influence of Site Condition and Soil Properties on Carbon Stocks in the Savannah Agro-Ecological Zone of Ghana. Ghana J. Forestry, (30): pgs. 47-66. Retrieved from: https://www.academia.edu/106336231/Influence_of_site_condition_and_soil_properties_on_carbon_stocks_in_Ghana

Data / parameter	$U_{p,t}$
Data unit	Percent
Description	Percentage uncertainty (expressed as 90 percent confidence interval as a percentage of the mean) in carbon stock estimate of pool *p* in the project scenario in year *t*
Source of data	Calculations from sampled field measurements
Description of measurement methods and procedures to be applied	Uncertainty in pools derived from field measurements with 90 percent confidence interval calculated as the standard error of the averaged plot measurement multiplied by the t value for the 90 percent confidence level
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Calculation method	Confidence interval calculated by applying unbiased estimators appropriate to sample design.
Comments	Pools *p* include woody biomass and litter.

Data / parameter	$A_{burn,t}$
Data unit	Ha

Description	Area burned in the monitoring interval ending in year *t*
Source of data	Field measurements and GIS analysis
Description of measurement methods and procedures to be applied	For each monitoring year, all annual cohorts will be regularly monitored using freely available landscape-level products (e.g., Global Forest Watch Fire Alert System to monitor potential fires) derived from satellite imagery. Any loss alerts issued within the boundaries of established instances (i.e., within specific annual cohorts wherein interventions have already begun) will be further investigated referring to finer spatial resolution satellite imagery (i.e., viewable through Google Earth Pro) and (as needed) investigated on the ground by field teams – CREMA M&E farm plots, biodiversity plots, and dronescapes will further be used to monitor reversals. If and when actual losses within the boundaries of established instances are confirmed, the extent of impact will be delineated through a combination of satellite imagery and ground reconnaissance. Following validation, monitoring of the project area for disturbance events will occur annually, with annual disturbance maps published on the DMP.
Frequency of monitoring/recording	Annually
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	GIS and GPS
QA/QC procedures to be applied	Any loss alerts issued within the boundaries of established instances (i.e., within specific annual cohorts wherein interventions have already begun) will be further investigated referring to finer spatial resolution satellite imagery (i.e., viewable through Google Earth Pro) and (as needed) investigated on the ground by field teams.
Purpose of data	Calculation of project emissions using the area-based quantification approach
Calculation method	Calculated from field measurements and GIS data
Comments	N/A

Data / parameter	$M_{wp,OF,t}$
Data unit	t fertilizer

Description	Mass of N-containing organic fertilizer applied in the project scenario in the monitoring interval ending in year *t*
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Weight of organic chicken manure will be taken before being applied to the nursery plants and seedlings.
Frequency of monitoring/recording	Annually
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	Scale
QA/QC procedures to be applied	All use of fertilizer to be documented with key information such as date and location applied.
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches.
Calculation method	Direct weighing
Comments	N/A

Data / parameter	$NC_{wp,OF,t}$
Data unit	t N/t fertilizer
Description	N content of organic fertilizer applied in the project in year *t*
Source of data	Value taken from Indonesia reference
Description of measurement methods and procedures to be applied	Value taken from published literature in Indonisia.

Frequency of monitoring/recording	Annually
Value applied	0.0189 (i.e., 1.89%)
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project emissions using the census-based and/or area-based quantification approaches
Calculation method	N/A
Comments	N/A

Data / parameter	$DM_{WP\text{-}LI,t}$
Data unit	t d.m./ha
Description	Average litter dry mass per hectare in the project scenario in year *t*

Source of data	Field measurements
Description of measurement methods and procedures to be applied	Litter is measured in the five (5) quadrants within the main PSPs. All ground floor litter <2cm diameter is measured. Parameters measured are: • **In the field:** ○ Total Fresh mass (TF_m) - see the Total Fresh mass table below for a detailed description of measuring Total Fresh mass. ○ Sample Fresh mass (SF_m) - see the Sample Fresh mass table below for a detailed description of measuring Sample Fresh mass. • **In the lab:** ○ Dried mass (SD_m) - see the Dried mass table below for a detailed description of measuring Dried mass. Stepwise details of measurements are as follows: **In the field:** 1. Start with the quadrat in the SW corner 2. Collect all ground floor litter <2cm diameter within the first subplot (SW corner) a. Ensure no soil is included 3. Measure and record the Total fresh mass (TF_m) to one decimal point in gramme using the scale 4. Collect a 100g sample of the fresh mass, place in sample container and label as PLOTNAME-QUADRATNAME a. E.g., IV1-2024-01-SW 5. Repeat steps 2-4 for each subplot, moving in a clockwise direction (i.e., SW → NW → NE → SE → C) **In the lab:** 1. Oven dry the samples at 70°C to constant weight to arrive at dried mass (m_d). Biomass of the litter is calculated as (Adu-Bredu et al., 2021; Amankwah et al., 2024) $L_b = \frac{1}{n}\sum_{i=1}^{n} \frac{m_d}{SF_m} \times TF_m \times \frac{10000}{A_q} \times CFr$ Where: L_b (Mg C ha^{-1}) = Litter biomass; n = number of quadrats; A_q = Size of quadrat (m^2); CFr = Carbon Fraction.
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across

	years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	• Waterproof sheets • GPS • Markers • Compass • PVC pipes • 50x50cm quadrants • Electric scale • Plastic container • Hand gloves
QA/QC procedures to be applied	To ensure the collection of reliable field data, the following measures shall be taken: The Team members will be taken through field inventory training prior to collection of plot data. All field measurements shall be checked by a qualified person (the Field Team Leader) in cooperation with the field team to correct any errors in techniques. To ensure reliable lab work, the following measures shall be taken: Should make sure that soil is excluded from the samples. Only litter within the quadrant should be considered. The oven-dried samples should be immediately placed in a desiccator to cool down before weighing. This is to prevent resorption of moisture. All lab work shall be checked by a qualified person (the LabTeam Leader) in cooperation with the lab team to correct any errors in techniques.
Purpose of data	Calculation of project emissions using the area-based quantification approach
Calculation method	Calculated as the average of sample measurements
Comments	N/A

Data / parameter	*dbh*
Data unit	centimeters (cm)

Description	Diameter at breast height
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Dbh is measured using a diameter tape and recorded to one decimal point. If a trunk is malformed at breast height or there is a buttress, the measurement is carried at 30 cm above the end of the deformation. In such situations, the point of measurement (POM) must be indicated in the POM column of the field recording form. If a tree is forked below breast height of 1.3m, then each fork is recorded and measured as an individual tree.
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	Diameter Tape
QA/QC procedures to be applied	The following measures shall be taken: 1. Should make sure that the diameter tape does not slant; 2. Measurement should not be made over bumps on the stem; 3. Measurement should be made slightly below the bumps. 4. Diameter is measured at a fixed height of 1.3 m above the ground level. If the ground level cannot be defined, the breast height is determined as 1.3 m from the seeding point.
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / parameter	*h*
Data unit	Meters (m)
Description	Tree height
Source of data	Field measurement
Description of measurement methods and procedures to be applied	The height shall be measured using height measuring tools in meters and recorded to one decimal point. Total tree height refers to the vertical distance from ground to the tip of the tree. Bole height is also measured as height to the base of the living crown. The crown base refers to the lowest living branch. To overcome errors in the measurement of the height of leaning trees, horizontal distance from the centre of the tree stump to the ground projected tip of the tree is also measured (base length). This will be used to deduce the actual tree height.
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	Hypsometer and height measuring rod.
QA/QC procedures to be applied	The height measuring personnel should be well trained with the use of the hypsometer. Only one person should be made to take the height measurement. A second person should be trained to provide assistance.
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / parameter	TF_m
Data unit	Grams (g)
Description	Fresh mass of litter
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Calculated as samples multiplied by the total area.
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	N/A
QA/QC procedures to be applied	Should make sure that soil is excluded from the samples. Only litter within the quadrant should be considered.
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / parameter	SF_m
Data unit	Grams (g)
Description	Sampled fresh mass of litter

Source of data	Field measurement
Description of measurement methods and procedures to be applied	Five quadrats of size 0.25 m2 (0.5m x 0.5m) are laid close to the four corners and the center of the sample plot. The litter in the quadrats are collected at the appropriate time and weighed. The litter is composed of dead leaves, seed, flowers and twigs of size less than 2.0cm diameter.
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	Digital weighing balance (scale)
QA/QC procedures to be applied	Should make sure that soil is excluded from the samples. Only litter within the quadrant should be considered.
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / parameter	SD_m
Data unit	Grams (g)
Description	Dried mass of litter
Source of data	Field measurement
Description of measurement methods and	The fresh samples are taken to the laboratory for oven drying. The samples are oven dried at 70 oC for 48 hours to constant weight.

procedures to be applied	
Frequency of monitoring/recording	At least every five (5) years and at most every one (1) year after the start of a particular annual cohort. The Gunung Mas Community Restoration Project will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e. ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each year measured.
Value applied	N/A (to be measured during the monitoring period)
Monitoring equipment	Drying oven, desiccators and digital scale (weighing balance)
QA/QC procedures to be applied	The oven-dried samples should be immediately placed in a desiccator to cool down before weighing. This is to prevent resorption of moisture.
Purpose of data	Calculation of project emissions
Calculation method	N/A
Comments	N/A

Data / parameter	$SI_{control,t}$ and $SI_{wp,t}$
Data unit	t/ha
Description	Stocking index in scenario (remote control plot *j* or remote project plot *i*) at time *t*
Source of data	The dataset used for the Stocking Index is the Above-ground biomass stock data product from Chloris Geospatial (https://www.chloris.earth/data/#top). This product provides annual estimates of dry biomass stock and change in live woody vegetation, starting from the year 2000. The dataset is updated annually, with the most recent year of data available being 2024. The dataset is spatially explicit and wall-to-wall, with quantified uncertainty at the pixel- and site-level. It is designed to measure biomass losses (carbon emissions) from deforestation and

	degradation, and biomass gains (carbon removals) from vegetation growth, at 30m resolution.
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Annually
Value applied	Various
Monitoring equipment	GIS software (i.e., QGIS)
QA/QC procedures to be applied	The dataset applied is significantly correlated with aboveground biomass (i.e., it is an estimate of aboveground biomass), as demonstrated in Baccini et al. 2012[111] and Baccini et al. 2017.[112] Additionally, the dataset has been validated with direct measurements from the project region (collected from within the project ecoregion; ecoregion defined at the biome level following Olson et al. 2001).[113]
Purpose of data	Selection of remote control plots and derivation of performance benchmark for the area-based approach
Calculation method	The methods used by Chloris Geospatial to calculate their Above-ground biomass stock product are available in Baccini et al. 2012[31] and Baccini et al. 2017[32].
Comments	Should a more accurate remote sensing metric become available over the project area over time, the remote sensing metric used for

[31] A. Baccini, S. J. Goetz,W. S.Walker, N. T. Laporte, M. Sun, D. Sulla-Menashe, J. Hackler, P. S. A. Beck, R. Dubayah, M. A. Friedl, S.

Samanta and R. A. Houghton (2012). Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change 2*. DOI: 10.1038/NCLIMATE1354. Retrieved from: https://www.nature.com/articles/nclimate1354

[32] Baccini, A., Walker, W., Carvalho, L., Farina, M., Sulla-Menashe, D., Houghton, R.A. (2017). Tropical forests are a net carbon source based on aboveground measurements of gain and loss. *Science*. DOI: 10.1126/science.aam5962. Retrieved from: https://www.science.org/doi/10.1126/science.aam5962

[33] Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N., Underwood, E.C., D'amico, J.A., Itoua, I., Strand, H.E., Morrison, J.C., Loucks, C.J., Allnutt, T.F., Ricketts, T.H., Kura, Y., Lamoreux, J.F., Wettengel, W.W., Hedao, P. and Kassem, K.R. (2001). Terrestrial Ecoregions of the World: A New Map of Life on Earth: A new global map of terrestrial ecoregions

provides an innovative tool for conserving biodiversity. *BioScience* 51(11): 933–938. https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2

	monit oring SI ex-post may be changed, ensuring that the following apply: he new metric offers equivalent or better accuracy (in terms of correlation with terrestrial carbon stocks) he new metric can be harmonized with the previous metric, applying procedures from peer-reviewed literature to ensure data continuity and remove sources of misalignment (e.g., geometric, radiometric, and/or spectral artifacts) introduced by the new metric; and he procedure to harmonize the new metric incorporates temporally coincident observations of both (previous and new) remote sensing metrics from the project and control plots from within an overlap interval of at least two years, or as prescribed by the procedure.

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Data / parameter	*ISvmd0054*
Data unit	Percent

Description	Share of leakage resulting in increased supply outside the project area
Source of data	VMD0054 v1.0
Description of measurement methods and procedures	Default value of 0.75 (75 percent) for agricultural commodities or 1.00 (100 percent) for fuelwood. Where the default value is not applied, evidence justifying the use of a different value must be provided. Such evidence may include government-approved or peer-reviewed studies relevant to the agricultural commodity and region in which the project is located.
Frequency of monitoring/recording	At each monitoring event
QA/QC procedures to be applied	N/A
Purpose of data	Estimation of area of new land brought into production
Calculation method	N/A
Comments	N/A

Data / parameter	$\Delta C_{biomass}$
Data unit	t C/ha
Description	The change in forest biomass carbon stocks equal to the regional average stock where the project is located.
Source of data	Published studies with data from the country in which the project is located where such data are available, or derived from Table 3A.1.4 of the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003) where such data are not available.

Description of measurement methods and procedures	Δ[illegible] must reference the following data sources as available in the order listed, (e.g., if two data sources are available the data source nearest the top of the list must be used): • mean carbon stocks in forest biomass in the region; or • mean carbon stocks in forest biomass in the country where the project is located and must be obtained from published studies or official government statistics; or • mean carbon stocks in forest biomass derived from above-ground biomass estimates in Table 3A.1.4 of the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003) if such information is not available.

	Determined based on data available at the time of the assessment and reflecting area-weighted mean stocks in above- and belowground biomass, dead wood and litter pools at the nearest date to the assessment date. If biomass is presente d in tonnes of dry biomass per hectare, then carbon stocks should be determined using a carbon fraction default value of 0.47. If only aboveground biomass stocks are reported, then belowground biomass stocks should be estimated using allometric equations contained in Table 4.A.4 of IPCC (2003), unless verifiable information is provided to justify a different value. Similarly, if data presented include tree biomass only, then the carbon stocks in deadwood and litter must be estimated by multiplying the sum of aboveground and belowground biomass stocks by a factor of 1.1.
Frequency of monitoring/recording	At each monitoring event
QA/QC procedures to be applied	All data will be collected from appropriate and reliable sources, any analysis/processing/calculations of data will be conducted by a qualified team member and reviewed by their superior. All sources of error/uncertainty will be noted and accounted for.
Purpose of data	Calculation of leakage emissions
Calculation method	N/A
Comments	N/A

Data / parameter	SOC_{REF}
Data unit	t C/ha
Description	Soil organic carbon (SOC) stock corresponding to the reference condition in native ecosystems by climate region and soil type applicable to the land receiving the displaced activity
Source of data	Table 2.3 of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Description of measurement methods and procedures	Where soils vary across the region of production, a weighted average (based on relative commodity production) or the highest, most conservative value may be used.

Frequency of monitoring/recording	At each monitoring event

QA/QC procedures to be applied	All data will be collected from appropriate and reliable sources, any analysis/processing/calculations of data will be conducted by a qualified team member and reviewed by their superior. All sources of error/uncertainty will be noted and accounted for.
Purpose of data	To calculate change in carbon stocks on new lands brought into production
Calculation method	N/A
Comments	N/A

Data / parameter	f_{LU} , f_{MG}, f_{IN}
Data unit	Dimensionless
Description	Relative SOC stock change factors applicable to the displaced production over 20 years for land use, management practices and inputs respectively
Source of data	Table 5.5 (displaced crops, referencing tree crops in the case of fuelwood) and Table 6.2 (displaced grazing) of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Description of measurement methods and procedures	N/A
Frequency of monitoring/recording	At each monitoring event
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of leakage emissions
Calculation method	N/A
Comments	N/A

3.3.3 Monitoring Plan (VCS, 3.16, 3.20)

3.3.3.1 Monitoring Methods

The objective of the monitoring plan as set out in this climate part of Project Description is to quantify the emissions reductions achieved by the project during each monitoring period, and consists of three main components: forest patrols and observations, plot measurements, and identification of disturbances.

These core monitoring components will be able to help the project technical team to accurately assess the project's effectiveness and VCU generation during each monitoring period. The details of the monitoring plan are laid out in the sections below. As for the community monitoring part please see section 4.4. The biodiversity monitoring part please see section 5.4,

As new project activities are carried out within the project area, their specific monitoring methods will be added to the Gunung Mas Community Restoration Project monitoring plan. If any project activities or monitoring activities are to be phased out or incorporated at a later date due to adaptive management, the monitoring and implementation plans for the Gunung Mas Community Restoration Project ARR project will be updated accordingly. These activities, and their frequency are shown in Table 16.

Table 31: The three primary monitoring activities, the frequency that they will be performed and the method to be used.

Activity	Frequency	Method
Forest Patrols and Perimeter Observation	Monthly	Patrol team inspects perimeter of Project Accounting Area on the ground and via helicopter
Plot Measurements	Monthly	Sampling teams visit a portion of plots in project and proxy areas
Identification of significant disturbance	At least annually	Periodic inspection of aerial imagery or videography, with ground inspection when necessary

Descriptions of these monitoring activities are described in Annex 3 – 'Forest Land Carbon Stock Measurement and Sample Plot Monitoring Manual v1.3 '. In addition to these three primary project monitoring activities several additional monitoring activities will happen at informal frequencies during the Project Partners' general operations. This includes regular forest ranger patrols through the Project Accounting Area, and outreaches to the communities. These additional monitoring activities will serve to

identify many instances of encroachment or tree harvesting that may occur in the Project Accounting Area. The monitoring plan is meant as a guide to maintain consistency during monitoring, and also includes training and internal audit procedures for quality control. It is meant as a working document to be revised as needed during the course of the project. When revisions are necessary they should be noted as monitoring deviations in the subsequent monitoring report prepared for a VCS and CCB verification event.

3.3.3.2 Monitoring Team Organizational Structure

The teams responsible for carrying out monitoring activities and the roles within each team are as follows:

Field Patrol Team

- Forestry Department Ranger Lead – responsible for carrying out patrol, noting all relevant patrol data and observations in field patrol forms, and conducting ground-truthing of any identified areas with disturbances
- Watch Post Supports – community support personnel that can contribute to patrol logs or can act as in-field support for lead
- Carbon Inventory Field Team
- Forestry Department Sample Plot Manager – responsible for training team members, conducting quality control checks, data recording and transcription, and conducting ground-truthing of any identified areas with disturbances
- Forestry Department Sample Plot Technicians – responsible for taking measurements in the field based on training and inventory protocol, support manager in data collection and transcription
- Technical Team
- AAD Technical Manager – responsible for overseeing technical work to methodological and standard requirements, conducting quality control checks
- AAD Technical Analyst – responsible for conducting technical analyses related to remote sensing and carbon stock quantification, quality control checks.

3.3.3.3 Measurement of carbon stocks changes by Sample Plots

VM0047 Summary of sampling procedures for the project accounting areas, with a copy of a sampling protocol used to carry out measurements.

To accurately estimate the biomass in the Project Accounting Area, a stratification analysis is performed based on the two distinct Project Accounting Areas (PAAs) identified in Section 3.1.3: PAA 1 (Intensive Reforestation) and PAA 2 (Enrichment). Permanent Sample Plots (PSPs) are generated randomly and placed within each stratum to account for variability.

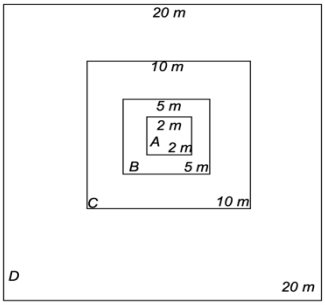
The number of sample plots needed to meet the VM0047 uncertainty and error requirements (±10% of the mean at the 90% confidence level) is determined using statistical methods (e.g., Equation B.2 in the methodology). Preliminary estimation, based

on the 19,008.60 Ha project size and expected forest variability, suggests a total of approximately 80 PSPs will be established across the two PAAs to meet this precision target.

The UTM coordinates for the plots are generated using a geo-referenced map and distributed to the field crews. Extra plots may be generated for each stratum in case some original plots are inaccessible due to terrain, rivers, or safety concerns.

Sampling procedures are described in detail in the document 'Forest Land Carbon Stock Measurement and Sample Plot Monitoring Manual v1.3.pdf', provided as Annex 3 with this document. This document is provided to the auditor for review but is not publicly available due to proprietary knowledge. A summary of the procedures is provided as follows:

Plot size



a. Plot sizes for each stage of vegetation growth are as follows:
b. Seedling with a minimum area of 4 m^2. Height <1M
c. Sapling with a minimum area of 25 m^2. 5M>Height>=1M
d. Pole with a minimum area of 100 m^2. DBH< 10cm, Height >=5M
Trees with a minimum area of 400 m^2. DBH >=10cm.

Figure 16. Indonesia MoEF standard Forest Field Plot dimension protocol

Plot Size and Nested Design

A **nested square sample plot design** is used for the **Gunung Mas Community Restoration Project (GMCRP)**, adapted from Indonesian MoEF standards. This design efficiently captures biomass across different growth stages:

- **20m x 20m Square (400 m^2):** Used to measure trees with Diameter at Breast Height (DBH) ≥ 10 cm.
- **10m x 10m Square (100 m^2):** Used to measure poles with DBH < 10 cm but Height ≥ 5m.

- **5m x 5m Square (25 m^2):** Used to measure saplings with 5m > Height ≥ 1m.
- **2m x 2m Square (4 m^2):** Used to measure seedlings with Height < 1m.

The minimum diameter for considering an individual plant as a tree for the GMCRP is **10 cm DBH**, measured at 1.3 m above the ground. All smaller woody plants are considered shrubs.

Field Measurement Protocols:

The SOP provides a checklist for plot sample teams to ensure full preparedness. Teams navigate to plot center coordinates using a GPS device. When establishing a new sample plot, a hidden, unnoticeable mark is set up to prevent disturbance by outsiders.

- **DBH Measurement:** Measured using a diameter tape and recorded to one decimal point. If a trunk is malformed or buttressed at 1.3m, the measurement is taken 30 cm above the deformation. If a tree is forked below 1.3m, each fork is recorded as an individual tree.
- **Height Measurement:** Total tree height is measured using hypsometers or height poles. Bole height (to the base of the living crown) is also recorded.
- **Dead Trees:** Standing dead trees are included in the measurement; lying dead trees are excluded (consistent with VM0047 carbon pools).
- **Data Recording:** All measurements are recorded on-site on data collection sheets. The team leader is responsible for quality assurance and verification of data.

Measurement Frequency:

100% of the Biomass plots must be re-measured every five years. The GMCRP will endeavor to establish and remeasure PSPs every two (2) years; however, the exact revisit time will reflect logistical constraints and resources and conform with monitoring period lengths (i.e., ensuring that the most recent measurements occur as close to the end of monitoring periods as possible while still allowing staggered PSP measurement/remeasurement to spread effort/resources across years). Measurement will occur approximately at the same time of year during each measurement event.

Carbon Stock Calculation:

Changes in project carbon stocks are calculated as the difference in project stocks in each stratum between the current and prior monitoring periods, as determined from in-situ measurement of biomass plots (Equation 3). Carbon stocks that are lost to burning

and leakage are accounted for using the procedures and equations in Section 3.2.2 (Project Emissions).

Approaches to Reduce Measurement Uncertainty (LiDAR Option):

To ensure high accuracy and precision, the project employs stratified sampling. Additionally, the project **may** utilize advanced techniques such as **Terrestrial LiDAR (Light Detection and Ranging)**. If deployed, LiDAR will capture detailed point cloud data of trees, poles, saplings, and seedlings, enabling highly accurate volume and biomass estimation, thus significantly reducing measurement efforts and improving overall precision.

3.3.4 Dissemination of Monitoring Plan and Results (VCS, 3.18; CCB, CL4.2)

The Project Proponent will have the climate monitoring plan available for public review at the Project Office. The full results of the initial climate monitoring are included in this project document, which is being made publicly available in the Project Accounting Area. Additionally, a project document summary has been written and provided to communities throughout the Project Accounting Area in English and Indonesian. This project document and the project document summary have additionally been posted to AAD's webpage for public review and comment.

3.4 Optional Criterion: Climate Change Adaptation Benefits

N/A

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CCB, CM1.1)

The project zone encompasses 12 distinct village entities organized under 18 Social Forestry (Perhutanan Sosial) licenses, with a total partner population of approximately 7,145 people.[37] The population is indigenous to Central Kalimantan, belonging primarily to the Dayak Ngaju and Dayak Ot Danum tribes, who possess a shared cultural heritage and deep ancestral ties to the Kahayan and Rungan river basins.

The communities are characterized by a strong social fabric built on the philosophy of Huma Betang (Longhouse living), which emphasizes communal harmony, and the tradition of mutual cooperation known as Handep. Village life and governance are a blend of the formal, state-recognized village administration (*Pemerintah Desa*) and the influential, pre-existing customary governance system known as Kelembagaan Adat. This customary system, led by respected Damang (sub-district chiefs) and Mantir Adat (village customary leaders), plays a central role in resolving land disputes, managing social norms, and overseeing traditional ceremonies.

Socioeconomic Conditions

The pre-project socioeconomic condition of the communities is one of significant economic vulnerability, characterized by a heavy reliance on fluctuating commodities and hazardous extractive activities.

- Livelihoods: The economy is agrarian but transitioning under stress. The official *RPHJP* data confirms that while the majority of households identify as farmers (cultivating upland rice/*padi ladang*, rubber, and rotan), a significant portion of the workforce engages in Illegal Gold Mining (Pertambangan Emas Tanpa Izin - PETI) and illegal logging. This reliance on extraction is driven by the low productivity of aging rubber gardens and the need for immediate cash in an economy where the cost of living is high due to remote logistics.

[37] **Badan Pusat Statistik (BPS) Kabupaten Gunung Mas.** (2023). Kecamatan Damang Batu Dalam Angka 2023. Available at: https://gumaskab.bps.go.id

- Poverty and Market Access: The communities face high levels of poverty, classified largely as *Pra-Sejahtera* (Pre-prosperous). This is driven by severe isolation from formal markets; many villages in Miri Manasa and Damang Batu are accessible only by river transport (*klotok*), creating a "high-cost economy" for importing goods and selling produce. The lack of local processing facilities for Rubber and Rotan means farmers sell raw materials to middlemen at low prices, capturing minimal value.

Access to Essential Services

A defining characteristic of the pre-project baseline is the critical lack of access to essential public services, exacerbated by the geography of the upstream river basins.

- Health: Health infrastructure is critically deficient. For example, in the vast Damang Batu sub-district, there are only 2 Community Health Centers (Puskesmas).[38] The majority of the population has no direct access to doctors or dentists, relying on occasional visits or traditional medicine. Emergency access to hospitals in the regency capital can take 4-8 hours by boat and road.
- Water: Access to clean drinking water is the most acute challenge. Communities traditionally rely on the Kahayan and Rungan rivers. However, these rivers are currently heavily turbid and polluted with sediment and mercury from upstream mining activities (*PETI*). This forces families to buy expensive bottled water or risk water-borne diseases.

Baseline Trajectory: A Cycle of Degradation and Stagnation

In the absence of the project, the most likely scenario is the continuation of the "extractive poverty trap." The combination of low agricultural yields and lack of legal alternatives drives community members toward illegal mining. This mining degrades the land and pollutes the water, further reducing agricultural viability and public health, which in turn reinforces the need for quick cash from mining.

There are no other existing or planned large-scale interventions—either from the government or third parties—capable of breaking this cycle across the 44,214.7 ha landscape. The communities, despite holding legal tenure through their Social Forestry licenses, lack the financial capital to rehabilitate mined land or invest in value-added processing.

[38] *Badan Pusat Statistik (BPS) Kabupaten Gunung Mas - Kecamatan Damang Batu Dalam Angka.*

The Gunung Mas Community Restoration Project (GMCRP) is therefore intervening at a critical juncture. It is designed to break this cycle by creating Sustainable Income Generating Schemes (SIGS) that make restoration more profitable than extraction, and by utilizing the Community Development Fund to build the essential water and health infrastructure that the baseline scenario fails to provide.

4.1.2 Interactions between Communities and Community Groups (VCS, 3.19; CCB, CM1.1)

The social landscape of the Gunung Mas region is defined by its riverine geography, the deep cultural roots of the Dayak people, and the shared economic reliance on the Kahayan and Rungan river basins.

Historical Context and Social Cohesion

The project zone lies within the heartland of the **Dayak Ngaju** and **Dayak Ot Danum** peoples. Historically, this region is significant as the site of the **Tumbang Anoi Peace Treaty of 1894** (located in one of the project's partner villages), which unified Dayak tribes and ended inter-tribal conflict across Borneo. This legacy of peacemaking underpins a high degree of social cohesion.

The communities share a strong social fabric built on the philosophy of **Huma Betang** (Longhouse living). Although most families now live in individual homes, the *Huma Betang* values of pluralism, consensus-building (*Musyawarah*), and mutual cooperation (locally known as **Handep** or *Habaring Hurung*) remain the foundation of village life. This shared identity and customary structure create a stable social environment, which is a critical asset for implementing the project's community-based model.

Interactions and Community Dynamics

Interactions between the **18 Social Forestry Areas** in the project zone are governed by kinship ties, river proximity, and customary law (*Adat*).

- **Riverine Connectivity:** Villages along the Kahayan and Rungan rivers are interconnected by boat transport (*klotok*), facilitating trade and social exchange.

- **Customary Governance:** Disputes over land boundaries or resource access are primarily resolved through the **Kelembagaan Adat** (Customary Institution), led by the **Damang** (at the sub-district level) and **Mantir** (at the village level). The project leverages this existing structure for conflict resolution rather than imposing external systems.
- **Collaboration:** The project's design requires close collaboration between neighboring license holders (e.g., the cluster of licenses in Damang Batu) for joint activities like fire prevention (*Masyarakat Peduli Api*) and watershed protection, reinforcing these traditional bonds.

Interactions with External Actors and Economic Pressures

While internal social dynamics are cohesive, interactions with external economic actors create pressures that drive the baseline scenario of degradation:

- **Market Intermediaries (Tengkulak)** Due to the remote riverine logistics, rubber and rotan farmers rely on middlemen traders who control prices. This unequal relationship results in communities receiving a fraction of the market value, trapping them in poverty and incentivizing the search for "quick cash" alternatives.
- **Extractive Enablers (Mining):** The prevalence of **Illegal Gold Mining (*PETI*)** introduces external actors—investors, equipment suppliers, or gold buyers—who incentivize local participation in destructive activities. This creates a complex dynamic where economic necessity overrides traditional environmental stewardship.
- **Limited Government Services:** As documented in the *RPHJP Unit XV & XVI*, government presence (forestry extension, healthcare) is minimal in these upstream areas due to budget and access constraints. This leaves communities isolated and vulnerable.

Project Intervention:

The GMCRP is designed to fundamentally transform these interactions.

1. **Empowerment:** By organizing the 18 communities into formal **SIGS Cooperatives**, the project builds collective bargaining power, allowing farmers to bypass exploitative middlemen and access direct markets for Agarwood and Rotan.

2. **Shift to Sustainability:** By funding legal livelihoods and water infrastructure, the project reduces the influence of illegal mining actors.
3. **Institutional Strengthening:** The project acts as a bridge, bringing government services (e.g., KPH technical support, health clinics) directly to the villages, strengthening the community's resilience and integration with formal support systems.
4. **Food Security**: By establishing a Subsidized Rice Logistics Channel, the project insulates communities from the high cost of living caused by river transport volatility, ensuring staple food access without reliance on extractive income.

4.1.3 High Conservation Values (CCB, CM1.2)

Table 32. High Conservation Values

An evaluation was conducted to determine if the project zone includes any of the High Conservation Values (HCVs) related to fundamental community needs and cultural identity. The project area contains significant values for both critical ecosystem services (HCV 5) and cultural identity (HCV 6).

High Conservation Value	Qualifying Attribute & Justification	Focal Area
a) HCV 5: Areas fundamental to meeting basic needs of local communities.	**Critical Ecosystem Services (Water Security):** The project area encompasses the critical **Upper Catchment Areas (*Hulu*)** of two major river basins: the **Kahayan River** and the **Katingan River**. These watersheds are the primary source of fresh water for the **18 partner groups/12 villages** (~7,145 people) and hundreds of thousands of downstream residents (including the provincial capital, Palangka Raya). In the degraded baseline condition, the hydrological function is severely impaired by	The focal areas are the riparian zones and catchment slopes within the 19,008.60 ha eligible project area. Project activities in these areas (specifically PAA 1 Intensive Reforestation) will directly improve water quality and regulate flow for

	illegal gold mining (*PETI*) and deforestation, leading to high turbidity (sedimentation), potential mercury contamination, and flash flooding. Recent studies in the Kahayan basin indicate mercury concentrations in river water exceeding 2,000 ng/L, well above the safe limit for human consumption.[39] The health of these forested catchments is therefore fundamental for providing the critical ecosystem service of a clean water supply. The project's restoration activities are designed to directly enhance this critical HCV by stabilizing riverbanks and reducing runoff.	all downstream communities.
b) HCV 5: Areas fundamental to meeting basic needs of local communities.	**Subsistence and Livelihood Resources:** The degraded forest and secondary growth areas provide essential resources that are fundamental for the subsistence livelihoods of the local Dayak communities. These areas are used for: **-Traditional Agroforestry:** Old *Rubber* gardens (*Hutan Karet*) and *Rotan* gardens. - **Medicinal Plants:** Collection of *Bajakah* (healing vine) and other forest pharmacopeia. - **Hunting/Fishing:** Subsistence hunting (wild boar) and river fishing. These resources form a critical safety net. The project is designed to enhance this value by revitalizing the productivity of these traditional systems through the **SIGS** program.	The focal areas are twofold: 1. **Community Utilization Zones (Off-Site)**: Designated areas within the Project Zone but outside the PAA where intensive Rotan/Rubber revitalization occurs 2. **PAA 2 (Enrichment)**: Where sustainable

[39] Vlachodimos, K., et al. (2013). Robinia pseudoacacia as a restoration strategy for reclaimed mine spoil heaps. Environmental Science and Pollution Research. (Defends Nitrogen-fixing capability).

		wild collection (e.g., Bajakah, Fishing) is managed and protected.
c) HCV 6: Areas critical to communities' traditional cultural identity.	**Sacred Sites (*Situs Adat*):** The project landscape is interwoven with sites of deep spiritual and cultural importance to the indigenous **Dayak Ngaju** and **Ot Danum** people, often linked to the **Kaharingan** belief system. These sacred sites include: - **Sandung:** Bone repositories/mausoleums for ancestors. - **Sapundu:** Sacrificial posts used in *Tiwah* ceremonies. - **Bukit Keramat:** Sacred hills or groves believed to be inhabited by spirits. These areas are the physical manifestation of the communities' connection to their ancestors and their cultural identity. Their protection is of paramount importance.	The focal areas are the specific locations of all **Sandung**, **Sapundu**, and **Keramat** sites that have been identified through the participatory mapping process with the **Damang** and **Mantir Adat**. These sites, along with a culturally appropriate buffer zone, are designated as **Strict Protection Zones** and are explicitly excluded from all project planting or harvesting activities.

4.1.4 Without-Project Scenario: Community (CCB, CM1.3)

During the stakeholder engagement, the working group had identified and prioritized the Focal Issues, they then analyzed them further to establish the causal logic leading to the

problems and produced a Problem Flow Diagram (also termed Conceptual Model) for each of the Focal Issues (Figure 19). A Problem Flow Diagram (PFD) is a situation analysis of the issue that represents stakeholders' understanding of what drives the existence of the focal issue; it identifies economic, political, institutional, social and/or cultural factors that contribute to existence of the issue.

a) Forest destruction and land encroachment

b) Wildlife poaching and HCV Restoration

c) Poor community livelihoods

Table 33: Future without-project projections of the key contributing factors to the Focal Issues identified during the Gunung Mas Community Restoration Project SBIA community workshops

a. Forest destruction and land encroachment

Focal issue aspect	5-10 years	What will drive the change
Expansion of Illegal Gold Mining (PETI)	Worsen	• Economic Desperation: With low rubber prices and no alternative employment, the immediate cash liquidity of gold mining drives participation. • Depletion of Riverine Deposits: As alluvial gold in the riverbeds is exhausted, miners are moving inland, using high-pressure water monitors to strip topsoil in the forest, leaving behind toxic, sandy wastelands. • Lack of Enforcement: The vastness of the area and limited KPH personnel mean PETI activities operate with relative impunity. • Speculative Investment: External financiers (Cukong) provide equipment (pumps/dredges) to locals, trapping them in debt and forcing continued expansion to repay capital.
Illegal logging	Worsen	• Demand for Ulin (Ironwood): High demand for durable timber for local construction and mining infrastructure (sluice boxes, camps) drives the selective felling of remaining Eusideroxylon zwageri trees. • Accessibility: Mining roads and trails open up previously

		inaccessible forest areas to loggers. • Weak Governance: In the absence of active Social Forestry management (the Project scenario), the land effectively remains "Open Access," inviting opportunistic extraction.

b. Wildlife poaching and HCV Restoration

Focal issue aspect	5-10 years	What will drive the change
Poaching of Protected Species	Worsen	• High Black Market Value: The demand for Sunda Pangolin scales and Sun Bear parts (gall bladders) drives targeted hunting. • Human-Wildlife Conflict: As Orangutan habitat is fragmented by mining and logging, encounters with humans increase. In the without-project scenario, Orangutans entering gardens are often viewed as pests and killed. • Bushmeat Demand: Hunters entering the forest for mining often hunt opportunistically for deer (Rusa) and wild boar to supplement diets, depleting the prey base for apex predators.
Uncontrolled Access to Protected/Production Forest	Worsen	• Habitat Fragmentation: The creation of mining pits and logging skid trails fragments the canopy, forcing arboreal species (Orangutans, Gibbons) to the ground where they are vulnerable to snares. • Fire for Clearance: The use of fire to clear scrub for shifting cultivation or to clear land for potential mining claims destroys understory habitat and nesting sites. • Lack of Guardianship: Without the project's "Guardian" ranger force, there are no "eyes on the ground" to remove snares or deter outsiders from entering the Hutan Adat (Customary Forest).

c. Poor community livelihoods

Focal issue aspect	5-10 years	What will drive the change
High living cost	Worsen	• Riverine Logistics: Many villages in Miri Manasa/Damang Batu rely on river transport. Fuel price volatility directly impacts the cost of all imported goods (rice, sugar, fuel). • Water Crisis: Due to heavy pollution (turbidity/mercury)

		of the Kahayan and Rungan rivers by upstream mining, families are increasingly forced to buy expensive bottled water or travel far to find clean springs, increasing household expenditure. • Health Costs: Poor water quality leads to higher rates of skin and digestive diseases, increasing spending on medical care and travel to distant clinics.
Low income	Remain unchanged	• Commodity Price Takers: Farmers selling raw Rubber (Lump) and Rotan have no bargaining power against middlemen (Tengkulak) due to isolation. They receive a fraction of the market value. • Lack of Skills: Without the project's training, the workforce lacks the skills to process raw materials (e.g., creating Agarwood products or weaving Rotan) which would capture higher value. • Resource Depletion: The "boom and bust" nature of mining provides temporary cash but depletes the natural capital (land/water) required for long-term agricultural prosperity.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CCB, CM2.1)

The major project activities can be grouped into the following 8 areas (see details in Section 8). All the community-focused activities which the project plans to implement were identified during stakeholder engagement community workshops described earlier (see Section 2.1.6). Most of these are designed to help create greater awareness, capacity and financial security in the communities through community development funds that strengthen:

1. Direct Employment and Training on Sustainable Income Generating Scheme (SIGS) through NTFP productions
2. Strengthening Community Organizations
3. Improve Health Facilities and Care
4. Improve safety and ready availability of drinking water
5. Micro-finance
6. Enhanced Security and Law Enforcement

7. Sensitization and Awareness Raising
8. Education
9. Food security by establishing a subsidized Rice Logistics Channel

Theory of Change Statements

Based on the extensive experience of the project proponent in working on biodiversity conservation and community projects in the Gunung Mas Community Restoration Project landscape, a literature review, and from information obtained from the SBIA workshops held, we applied the theory of change approach to justify our project rationale and to produce indicators for the CCB monitoring plan. The theory of change is a hypothesis about how a project intends to achieve its stated objectives, or a roadmap of how it plans to get from project activities to project impacts (Richards & Panfil, 2011). As such, we developed a theory of change for each of the three Focal Issues (see details in the Result Chains under Section 2.1.17).

The assumptions we make about the cause-and-effect relationships were made explicit in the Result Chain diagrams developed by community members during the SBIA workshops, from which the theories of change statements are based. Indicators were developed for key results and assumptions; monitoring of assumptions was included to enable us identify points of deviation early enough. In other words, the indicators outlined in the Monitoring Plan (see Section 4.4) will enable measuring progress towards achieving the desired project activity outcomes and impacts from project activities and strategies.

- **Focal Issue 1**: **Poor Community Livelihoods**: IF there are adequate and functional health facilities, IF education is improved through better facilities and access through bursary schemes, IF there is safe and readily available water through water purification system, and IF there is improved food security from Sustainable Income Generation Scheme agriculture, THEN the communities will have higher incomes and improved livelihoods.
- **Focal Issue 2: Forest Destruction and Land Encroachment**: IF participatory land use planning is conducted and land tenure security strengthened, IF immigration and land allocations are strictly controlled, and IF the Community Forest Protection Area (CFPA) is developed following proper processes, THEN land grabbing, illegal logging and NTFP collection will be strictly controlled and the forest well preserved.
- **Focal Issue 3**: **Wildlife Poaching and HCV Restoration**: IF community-based eco-tourism is developed, IF the sensitization and awareness-raising is conducted among communities around the Project Accounting Area, and IF security and law enforcement are strengthened, THEN the both poaching and demand in wildlife and bush-meat will decline as will habitat loss, thereby leading to improved wildlife populations in the Gunung Mas Community Restoration Project.

Improved Livelihoods

Table 34. Anticipated impacts for specific stakeholder groups

Community group	Local Residents
Impact(s)	Enhanced ecosystem goods and services and improved livelihoods through better education, health and food security
Type of benefit/cost/risk	Predicted direct benefit
Change in well-being	Potentially major improvement in livelihoods including education, health and food security

Community group	Government & Local Authorities
Impact(s)	Better execution of their mandate, revenue collection and improved relations with the citizens
Type of benefit/cost/risk	Predicted direct benefit
Change in well-being	Potentially moderate gains in revenue but major gains in community relations

Community group	Local Residents-Youth and women
Impact(s)	Availability of jobs, alternative SIGS and education
Type of benefit/cost/risk	Predicted direct benefit
Change in well-being	Potentially major impact on youth and women groups

Community group	Local Residents-Poachers and illegal loggers
Impact(s)	Reduced income

Type of benefit/cost/risk	Predicted direct cost
Change in well-being	Potentially significant loss of livelihood sources

Community group	Local Residents-Immigrants
Impact(s)	Fewer opportunities to gain access to free or cheap land and natural resources
Type of benefit/cost/risk	Predicted indirect cost
Change in well-being	Potentially moderate impact on their well-being and ability to sustain themselves in the new areas

Community group	Local cooperative group
Impact(s)	Increase funds for training, lessons, and micro-finance
Type of benefit/cost/risk	Predicted direct benefit
Change in well-being	Potentially moderate gains in revenue but major gains in community relations

4.2.2 Negative Community Impact Mitigation (VCS, 3.19; CCB, CM2.2)

There are no negative community impacts for the local legal members. Although there are some impacts on poachers and illegal loggers, their benefit from poaching and logging is not legal and cannot be identified as “well-being” as per the requirement of CCB.

4.2.3 Net Positive Community Well-Being (VCS, 3.19; CCB, CM2.3, GL1.4)

The project *implements UN* 17 SDGs, *the net positive wellbeing is illustrated in section 2.1.18 in achieving the following* 12 SDGs. This includes No Poverty, Zero Hunger, Good Health and Well-Being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable and clean energy, Decent Work and Economic Growth, Industry, Innovation and Infrastructure, Climate Action, Life on Land: and Partnerships for the Goals. *Out of*

the 12 SDGs, only Climate Action and Life on Land are not net positive community wellbeing.

Also, as mentioned in Section 4.2.1, anticipated net well-being impacts of the project are shown as follow.

Table 35. Anticipated well-being impact

Community group	Anticipated well-being impact	Net impact
All communities in the project	Enhanced ecosystem goods and services and improved livelihoods through better education, health and food security	Positive
Government & Local Authorities	Better execution of their mandate, revenue collection and improved relations with the citizens	Positive
Youth and women	Availability of jobs, alternative SIGS and education	Positive
Poachers and illegal loggers	Reduced income	Positive
Local cooperative group	Increase funds for training, lessons, and micro-finance	Positive

4.2.4 High Conservation Values Protected (CCB, CM2.4)

The project activities are explicitly designed to maintain and enhance the High Conservation Values (HCVs) identified in the project zone (see Section 4.1.3), ensuring positive outcomes for community well-being and cultural heritage.

- **HCV on provision of critical ecosystem services (Water Security):**
  HCVs under this category include the forests and riparian zones critical to the **Kahayan and Katingan** watersheds. The GMCRP is directly addressing the degradation of these catchments caused by illegal mining (*PETI*).
    - **Action:** The project is building clean water wells with advanced filtration systems and reservoirs in the **18 partner villages** to provide a safe alternative to river water currently polluted by turbidity and potential mercury.

- **Protection:** Simultaneously, the community-led "Guardian" patrols will protect the upstream forest source (*Hulu*) from further encroachment.
- **Impact:** These activities ensure greater protection of the water source ecosystem, regulating flow and reducing sedimentation. This provides inherently positive effects on HCV 4 (Ecosystem Services) and HCV 5 (Basic Needs), with no negative effects anticipated.

- **HCV on Areas that are critical for the traditional cultural identity of communities:**
  The project respects and revitalizes the deep cultural connection between the **Dayak Ngaju and Ot Danum** people and their forest.
  - **Sacred Sites:** Through participatory mapping, the project has identified and excluded **Sandung** (ancestral bone repositories), **Sapundu**, and **Bukit Keramat** (sacred hills) from any planting or harvesting activities, ensuring the physical preservation of spiritual sites.
  - **Cultural Livelihoods:** The project revitalizes the traditional culture of **Rotan (Rattan)** and **Agarwood** cultivation. These traditional agroforestry systems are currently threatened by the shift toward destructive mining. By restoring these species via the **SIGS** program, the project preserves the "forest-based" cultural identity against the pressure of extractive industries.
  - **Impact:** This ensures the preservation of HCV 6 (Cultural Identity), generating positive social cohesion outcomes.

The project will actively monitor for any unintended negative impacts on HCVs through the biodiversity monitoring plan and the grievance mechanism.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.1)

The project activities are unlikely to have any negative long-term impacts on the well-being of legitimate stakeholders. However, specific groups currently benefiting from the unregulated, open-access nature of the forest are predicted to suffer potential costs associated with the cessation of illegal activities.

- **Illegal Miners (*Penambang Liar*) and Loggers:**

Although these are illegal activities, a portion of the local population relies on **Illegal Gold Mining (*PETI*)** and small-scale logging for basic livelihood support due to the lack of alternatives. These individuals will face the cost of lost immediate income as enforcement increases and land tenure is formalized under the Social Forestry licenses.

- *Mitigation/Net Benefit:* While they may lose access to illegal extraction sites, these individuals are the primary target beneficiaries of the project's **Sustainable Income Generating Schemes (SIGS)**. They will be supported in transitioning to legal, safer livelihoods (Agarwood, Rotan, Rubber) that do not expose them to the health risks of mercury or mining accidents. They will also benefit from the community-wide improvements in health services and clean water access.

- **Middlemen (*Tengkulak*) and Informal Financiers (*Cukong*):**
  This group, often external to the immediate village but influential in the local economy, profits from financing illegal mining equipment and buying timber/gold at below-market rates. They will see diminished profits from these illegal trade flows in the short term as the project strengthens community cooperatives and direct market linkages.
  - *Mitigation/Net Benefit:* We believe this group will enjoy greater stability in the long term by transitioning to conducting legitimate business. As the volume of sustainable commodities (Agarwood resin, Rotan) grows, opportunities for legal trading will emerge, reducing their risk of legal prosecution and fostering a more stable economic environment.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.2)

There is no legal and formal mitigation on the negative impacts on other stakeholders, and therefore no mitigations are required.

4.3.3 Net Impacts on Other Stakeholders (VCS, 3.18, 3.19; CCB, CM3.3)

There are no negative impacts on other stakeholders.

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CCB, CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

The selection of appropriate indicators is invaluable to the impact assessment process, as they respond to the basic question: "what should be measured to show that the claimed net social benefits are real and additional?" (Richards & Panfil 2011). An ideal indicator from the perspective of showing attribution is one that measures an 'intermediate state' or assumption between an output and outcome or an outcome and an impact, clearly showing progress along a causal chain. Again, our theory of change logic in the Result Chain diagrams (see Section 2.1.17) provided us with a good basis for selecting indicators that factor in attribution. We selected a total of 43 indicators for monitoring the social impacts of the Gunung Mas Community Restoration Project, including 20 Output, 13 Outcome and 10 Impact indicators (Table 18).

We then decided on the best sampling methods to use to collect the data, keeping in mind the need to achieve acceptable levels of accuracy, precision and cost effectiveness whilst retaining transparency and simplicity. From this, a monitoring plan was designed to collect information on the identified indicators. The Gunung Mas Community Restoration Project shall use two major data sources for the selected indicators: Internal reporting systems and Household-level surveys. The executor to generate these indicators is listed in the Table 18 below. In addition, Focal Group Discussions during SBIA workshops will be used to validate findings and obtain any further information/clarification, while Government Institutions will be visited for secondary data and general community statistics. In-house reporting will mainly collect input and output indicators (and some outcome too), while the other methods will mainly assess outcome and impact indicators.

4.4.2 Monitoring Plan Dissemination (CCB, CM4.3)

The Gunung MasCommunity Restoration Project will disseminate the monitoring plan and the results of the monitoring within 12 months of validation. These documents will be made publicly available on AAD website. They will also be communicated to the communities and other stakeholders (including the Government and Local Authorities) using diverse media including presentations, reports, brochures and orally during community awareness and sensitization meetings, and continuous SBIA workshops.

4.5 Optional Criterion: Exceptional Community Benefits

The **Gunung Mas Community Restoration Project (GMCRP)** is specifically designed to generate exceptional and transformative benefits for the local Dayak communities, meeting the **Gold Level (GL2)** criteria by actively empowering marginalized communities and alleviating the systemic poverty that drives illegal extraction. The project goes beyond simple benefit sharing to build lasting social, economic, and institutional resilience for the **~7,145 people** across the **18 participating Social Forestry Areas**.

Empowerment of Local Communities

The project's entire operational model is an act of empowerment. By operating exclusively through the **18 community-held Social Forestry** the project legally and practically reinforces the communities' tenure rights and places them at the center of project governance.

- **Strengthening Local Institutions:** The project builds the management, financial, and technical capacity of the Dayak community institutions, including **Customary Forests (*Hutan Adat*)**, **Village Forests (*LPHD*)**, and **Community Forests (*HKm*)**.

Poverty Alleviation and Livelihood Enhancement

The project directly addresses the root causes of poverty in the region—specifically the reliance on hazardous **Illegal Gold Mining (*PETI*)**—by creating new, sustainable economic opportunities that are safer and more resilient.

- **Creation of a Legal "Green Economy":** The project will create **500+ new formal jobs** within the communities for activities such as nursery management, planting, and "Guardian" forest patrols. This provides a crucial source of stable cash income to replace the volatile and dangerous income from illegal mining.

- **Sustainable Livelihood Diversification (SIGS):** The project establishes the **Sustainable Income Generating Schemes (SIGS)** to revitalize the value chains for **Agarwood (*Gaharu*)**, **Rotan (Rattan)**, and **Rubber**. By providing the technology (inoculation) and market access to process these raw materials locally, the project diversifies household income and captures value that was previously lost to middlemen, creating a long-term economic buffer against poverty.

Addressing Critical Needs and Improving Well-being

The project utilizes a dedicated mechanism to translate carbon revenue into tangible improvements in community well-being, addressing infrastructure gaps that the local government has been unable to fill due to the remoteness of the upstream (*Hulu*) areas.

- **The Community Development Fund:** A significant portion of the project's revenue will be channeled into a transparently managed fund. This fund will be used to address severe, documented gaps in essential services:
    - **Ensuring Water Security (SDG 6):** Funding the construction of deep wells and advanced filtration systems to provide safe drinking water. This is a critical health intervention, as the primary river sources (Kahayan/Rungan) are currently polluted by sediment and mercury from upstream illegal mining.
    - **Improving Health Access (SDG 3):** Supporting the operation of **Mobile Dental and Health Clinics** to serve the remote villages in Damang Batu and Miri Manasa that currently lack accessible Puskesmas facilities.
    - **Enhancing Educational Opportunities (SDG 4):** Providing scholarships for children to attend Senior High School (*SMA*) in the regency capital, breaking the cycle of low education that limits economic mobility.

By combining genuine empowerment through the Social Forestry framework, targeted poverty alleviation via the transition from mining to agroforestry, and direct investment in critical water/health infrastructure, the GMCRP delivers transformative impacts that qualify as **Exceptional Community Benefits**.

5 BIODIVERSITY

5.1 Without-Project Biodiversity Scenario

5.1.1 Existing Conditions (VCS, 3.19; CCB, B1.1)

Global and Regional Significance

The **Gunung Mas Community Restoration Project (GMCRP)** is located in a region of immense global biodiversity importance. The project zone is situated within the **Sundaland Biodiversity Hotspot**, one of the planet's most biologically rich and threatened terrestrial ecoregions. Specifically, it falls within the **Borneo Lowland Rain Forests** ecoregion, which is renowned for housing the world's oldest rainforests and distinct megafauna.

This global significance is formally recognized through the **Heart of Borneo (HoB)** initiative. The project area serves as a critical buffer and connectivity zone within the HoB landscape, linking the upstream protected forests with the production landscapes downstream.

Baseline Biodiversity Conditions in the Project Area

In the "without-project" scenario, the biodiversity within the project's eligible lands is in a severely degraded and fragmented state, directly reflecting the extractive history of the landscape.

- **Degraded Habitat:** The pre-project landscape is a mosaic of open lands (scarred by **illegal gold mining/PETI**), degraded shrubland (*semak belukar*), and fragmented secondary forest patches. This landscape offers poor-quality habitat for the region's forest-dependent species. The loss of canopy connectivity is particularly devastating for arboreal species like the **Bornean Orangutan**, forcing them to the ground where they are vulnerable to conflict and poaching.
- **Threats to Species:** The primary driver of biodiversity loss in Gunung Mas is habitat fragmentation from mining and illegal logging, as described in Section 2.2.1. In the baseline scenario, these threats persist, and the degraded "open access" habitat continues to facilitate poaching access, preventing the recovery of threatened species populations.

Key Species of Conservation Concern

The project area is the known or potential habitat for numerous endemic and globally threatened species. The baseline condition poses a direct threat to the long-term viability of

these populations. Key species identified in the government *RPHJP Unit XV & XVI* documents and IUCN data include:

Species	IUCN Status	Relevance to Project Zone
Fauna		
Bornean Orangutan (*Pongo pygmaeus*)	**Critically Endangered (CR)**	The flagship species of the landscape. They are strictly arboreal and require contiguous canopy. The baseline of mining-induced fragmentation isolates populations, leading to genetic bottlenecks and human-wildlife conflict.[40]
Sunda Pangolin (*Manis javanicus*)	**Critically Endangered (CR)**	Heavily poached for the illegal wildlife trade. The "open access" nature of the baseline scenario allows poachers easy entry into the forest remnants.
Sun Bear (*Helarctos malayanus*)	**Vulnerable (VU)**	The mascot of the Balikpapan region, found throughout Central Kalimantan. Habitat loss reduces their foraging range.

[40] Wich, S.A., et al. (2008). Distribution and conservation status of the Orang-utan (Pongo spp.) on Borneo and Sumatra. Oryx, 42(3), 329-339.

Rhinoceros Hornbill (*Buceros rhinoceros*)	**Vulnerable (VU)**	An indicator of forest health. They require large emergent trees for nesting, which are targeted by illegal loggers in the baseline scenario.
Flora		
Ulin Ironwood (*Eusideroxylon zwageri*)	**Vulnerable (VU)**	Culturally critical to the Dayak people. It is the primary target for illegal logging due to its high value and durability. Natural regeneration is slow and failing in the baseline.
Agarwood (*Aquilaria spp.*)	**Critically Endangered (CR)**	While native to the area, wild populations have been decimated by destructive harvesting (felling trees to find resin). The baseline offers no protection for remaining wild stocks.
Black Orchid (*Coelogyne pandurata*)	**Protected (CITES)**	The mascot flora of East/Central Kalimantan ("Anggrek Hitam"). Its habitat in riverine forests is threatened by mining sedimentation.

In the without-project scenario, these species face a future of continued habitat decline, fragmentation, and increased pressure, with no mechanism in place to facilitate recovery.

Table 36. Restoration of critical endangered species

Agarwood (Gaharu) **• Aquilaria malaccensis (Critically Endangered)** **• Aquilaria microcarpa (Vulnerable)** **Native to Central Kalimantan**	The GMCRP Approach: The project will establish a World-Class Agarwood Sanctuary by planting these species in designated SIGS (Sustainable Income Generating Scheme) areas. Unlike the baseline scenario where wild trees are destructively felled for resin, the project implements a non-destructive microbial inoculation technology. This allows communities to harvest resin without killing the tree, transforming Aquilaria from a target of poaching into a cultivated asset. Protection: Wild Aquilaria populations found within the project zone during patrols will be mapped, GPS-tagged, and monitored by the "Guardian" patrol teams to prevent illegal harvesting.
Bornean Ironwood & Dipterocarps ***• Eusideroxylon zwageri (Ulin) (Vulnerable)*** ***• Shorea balangeran (Critically Endangered)*** ***• Shorea leprosula (Near Threatened*** ***Key Canopy Species of Borneo***	Protection & Education Strategy: Ulin is culturally sacred to the Dayak people but has been decimated by illegal logging. Rather than active plantation, the project focuses on securing the remaining wild stock. Actions: 1. Identification: "Guardian" patrols will actively search for, GPS-tag, and monitor remaining wild "Mother Trees" within the forest to prevent illegal logging 2. Education: The project will conduct biodiversity workshops in partner villages to raise awareness of the critical ecological value and slow growth rates of these species, fostering community stewardship and reducing local consumption. Impact: Strict protection allows for natural regeneration of the canopy and preservation of existing high-carbon stock trees.
Flagship Fauna ***• Pongo pygmaeus (Bornean Orangutan) (Critically Endangered)*** ***• Manis javanicus (Sunda Pangolin) (Critically Endangered)*** ***• Helarctos malayanus (Sun Bear) (Vulnerable)*** ***• Rhinoplax vigil (Helmeted Hornbill) (Critically Endangered)***	Habitat Connectivity: The project area serves as a critical buffer zone in the Heart of Borneo landscape, linking the upstream protected forests of the Muller-Schwaner mountains with downstream peatlands. By restoring 19,008 Ha of degraded mineral soils, the project reconnects fragmented forest patches, allowing these wide-ranging species to move safely between the Kahayan and Katingan watersheds. Threat Reduction: The primary threat to these species in Gunung Mas is habitat loss from Illegal Gold Mining (PETI) and opportunistic poaching. The project's "Guardian" patrols will actively remove snares, monitor mining encroachment, and enforce zero-poaching regulations within the 18 Social Forestry license areas.

Heart of Borneo Megafauna	

5.1.2 High Conservation Values (CCB, B1.2)

Table 37. High Conservation Value Focal Area

High conservation value	HCV 1.2 Critically Endangered Species HCV 1.3 Areas that Contain Habitat for Viable Populations of Endangered, Restricted Range or Protected Species HCV 4 Critical Ecosystem Services
Qualifying attribute	Globally Threatened Fauna: The project zone is situated within the Heart of Borneo landscape, a global priority for conservation. IUCN data and local government surveys confirm the presence of Critically Endangered (CR) and Vulnerable (VU) species, specifically: • Bornean Orangutan (Pongo pygmaeus) - CR • Sunda Pangolin (Manis javanicus) - CR • Sun Bear (Helarctos malayanus) - VU The baseline of habitat fragmentation caused by illegal mining and logging poses a direct threat to the genetic viability and movement of these populations. Globally Threatened Flora: The project will actively contribute to the conservation of globally threatened tree species through strict protection of wild stocks and sustainable cultivation. This includes: • Agarwood (Aquilaria malaccensis) - CR: Heavily poached in the wild; to be cultivated in designated SIGS areas. • Ulin / Ironwood (Eusideroxylon zwageri) - VU: The target of illegal logging; wild mother trees will be tagged and protected. In the baseline scenario, these species are at risk from continued extraction and lack of regeneration. HCV4: Critical Watershed Protection: The project area encompasses the critical Upper Catchment Areas (Hulu) of two major river basins: the Kahayan and Katingan. In their degraded baseline condition—exacerbated by illegal mining (PETI)—these watersheds suffer from high erosion, sedimentation, and turbidity. The restoration of forest cover is critical for stabilizing riverbanks, filtering runoff, and ensuring a reliable supply of clean

	water for downstream communities and the provincial capital.
Focal area	The focal area for this HCV is the entire 19,008.60 ha eligible project accounting area. The project's core activity—reconnecting fragmented forest patches between the Kahayan and Katingan watersheds—will directly enhance habitat quality and corridors for these species. The focal area for HCV Fauna is the entire 19,008.60 ha eligible project accounting area. The project's core activity—restoring tree cover with Black Locust and Melaleuca to reconnect fragmented forest patches between the Kahayan and Katingan watersheds—will directly enhance habitat connectivity and movement corridors for these species. For HCV Flora, the focal areas are the designated SIGS cultivation zones (for Agarwood) and the specific locations of wild Ulin trees identified during patrols, which will be designated as Protection Trees. HCV4: The focal areas are the riparian zones and upper catchment slopes located within the 19,008.60 ha eligible project accounting area. Project activities in these areas will directly restore the critical ecosystem service of water regulation and quality protection.

Table 38. IUCN Endangered status of species in the Gunung Mas Community Restoration Project Project zone

Fauna (Birds & Mammals)	Scientific Name	IUCN Status	Scope
Bornean Orangutan	*Pongo pygmaeus*	**CR** (Critically Endangered)	Global
Sunda Pangolin	*Manis javanicus*	**CR** (Critically Endangered)	Global
Helmeted Hornbill	*Rhinoplax vigil*	**CR** (Critically Endangered)	Global
Rhinoceros Hornbill	*Buceros rhinoceros*	**VU** (Vulnerable)	Global
Sun Bear	*Helarctos malayanus*	**VU** (Vulnerable)	Global

Bornean White-bearded Gibbon	*Hylobates albibarbis*	**EN** (Endangered)	Global
Proboscis Monkey	*Nasalis larvatus*	**EN** (Endangered)	Global
Sunda Clouded Leopard	*Neofelis diardi*	**VU** (Vulnerable)	Global
Maroon Leaf Monkey	*Presbytis rubicunda*	**VU** (Vulnerable)	Global
Bearded Pig	*Sus barbatus*	**VU** (Vulnerable)	Global
Flora (Trees)	**Scientific Name**	**IUCN Status**	**Scope**
Agarwood	*Aquilaria malaccensis*	**CR** (Critically Endangered)	Global
Agarwood	*Aquilaria microcarpa*	**VU** (Vulnerable)	Global
Ulin (Bornean Ironwood)	*Eusideroxylon zwageri*	**VU** (Vulnerable)	Global
Balangeran	*Shorea balangeran*	**CR** (Critically Endangered)	Global
Red Meranti	*Shorea leprosula*	**NT** (Near Threatened)	Global
Light Red Meranti	*Shorea smithiana*	**VU** (Vulnerable)	Global
Ramin	*Gonystylus bancanus*	**CR** (Critically Endangered)	Global
Agathis	*Agathis borneensis*	**EN** (Endangered)	Global
Tengkawang	*Shorea macrophylla*	**VU** (Vulnerable)	Global

*Note: **CR** = Critically Endangered, **EN** = Endangered, **VU** = Vulnerable. Species listed are native to Central Kalimantan and identified as conservation priorities in the project's baseline assessments.*

5.1.3 Without-project Scenario: Biodiversity (CCB, B1.3)

Focal issues without project

The FPIC/Stakeholder Engagement workshops, corroborated by the long-term management plans (*RPHJP*) of KPHP Unit XV and XVI, identify the most important biodiversity threats as **Focal Issues**, as follows:

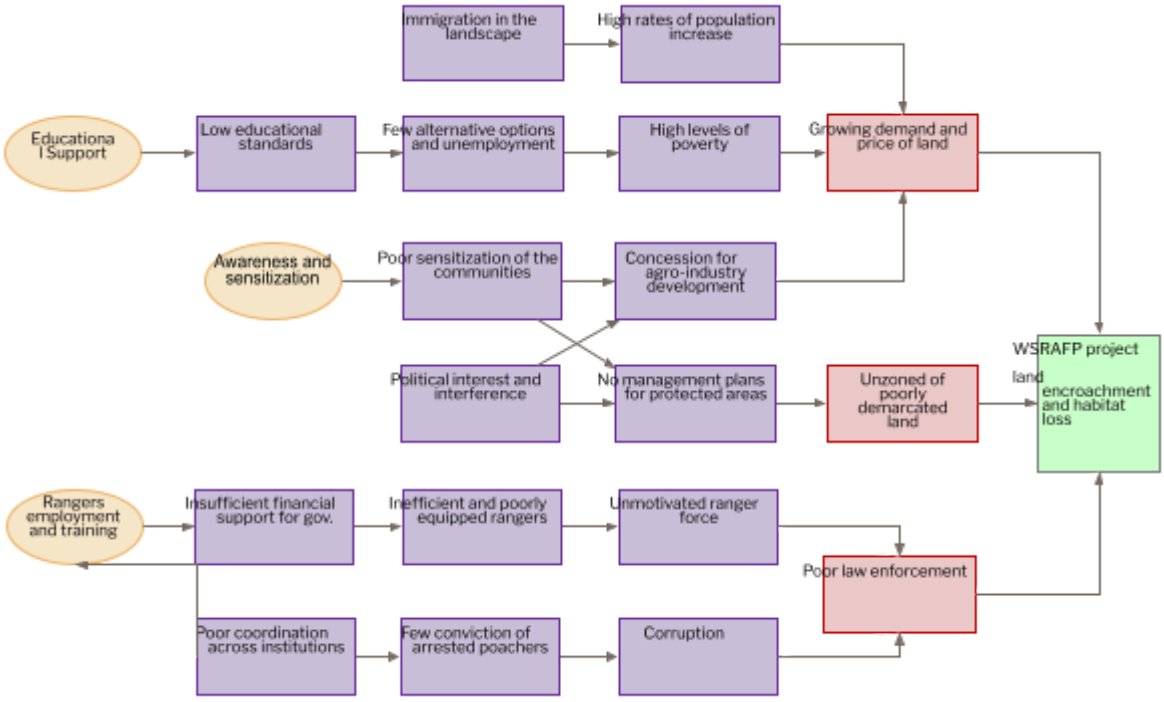
1. **Land Encroachment and Habitat Destruction (Mining & Agriculture):**
    - Protected areas and production forests are illegally converted due to **Illegal Gold Mining (**. This involves the stripping of topsoil and vegetation along riverbanks and forest interiors, often funded by external financiers (*Cukong*) who pay local communities to open new pits.
    - Additionally, shifting cultivation (*ladang berpindah*) encroaches on forest margins, progressively fragmenting the habitat required by wide-ranging species like the **Bornean Orangutan**.
2. **Wildlife Poaching and Trade:**
    - The region suffers from low rates of detection and prosecution for wildlife crimes due to the vast, remote nature of the area.
    - **Targeted Poaching:** High black-market demand for specific parts—**Pangolin scales**, **Sun Bear gall bladders**, and **Helmeted Hornbill casques**—creates a "high reward, low risk" environment for poachers.
    - **Conflict Killing:** As habitat shrinks, Orangutans entering gardens are often killed as pests, further threatening the critically endangered population.
3. **Illegal Logging (*Pembalakan Liar*):**
    - Despite the cessation of large concessions, illegal logging remains rampant, specifically targeting high-value timber like **Ulin (*Eusideroxylon zwageri*)** for local construction and sale.
    - Economic stagnation and the lack of alternative livelihoods motivate communities to engage in this "open access" extraction, facilitated by the network of old logging roads and new mining trails that penetrate deep into

the forest.

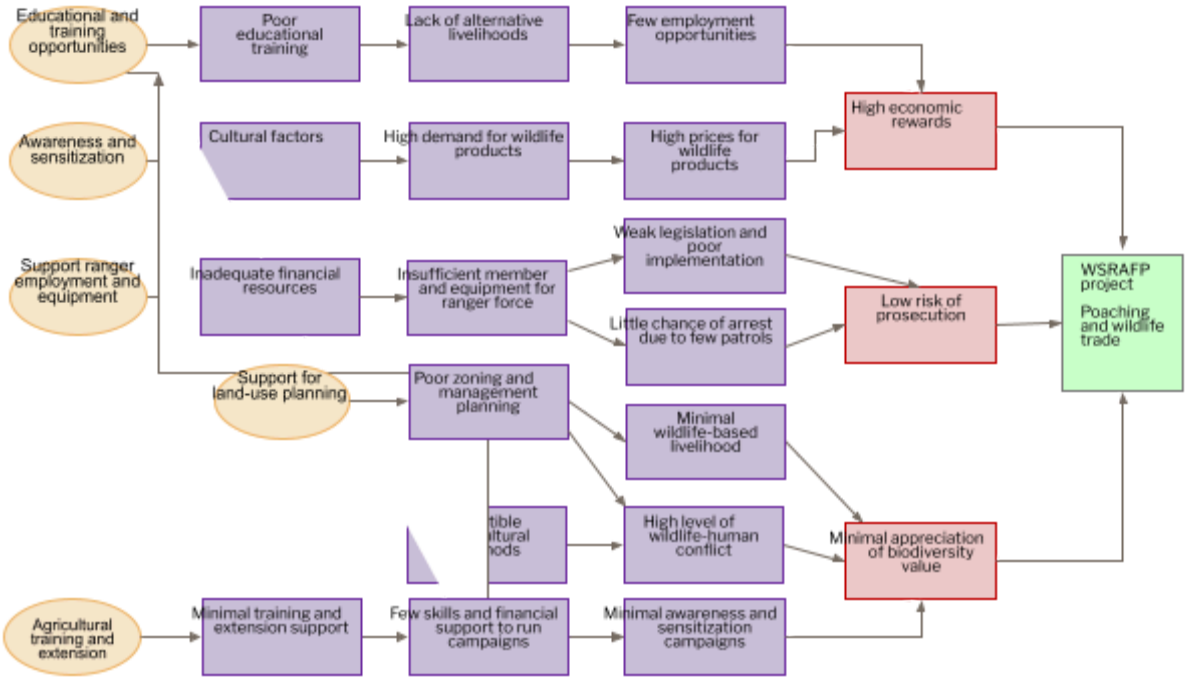
Problem Flow Diagrams

After establishing the fundamental issues that the project should focus on to achieve the overarching ARR goals, the workshop then delved deeper into these Focal Issues to establish the causal logic leading to the problems, and produced a Problem Flow Diagram (also termed Conceptual Model) for each of the Focal Issues (Figure 21). A Problem Flow Diagram (PFD) is a situation analysis of the issue that represents stakeholders' understanding of what drives the existence of the focal issue; it identifies economic, political, institutional, social and/or cultural factors that contribute to existence of the issue.

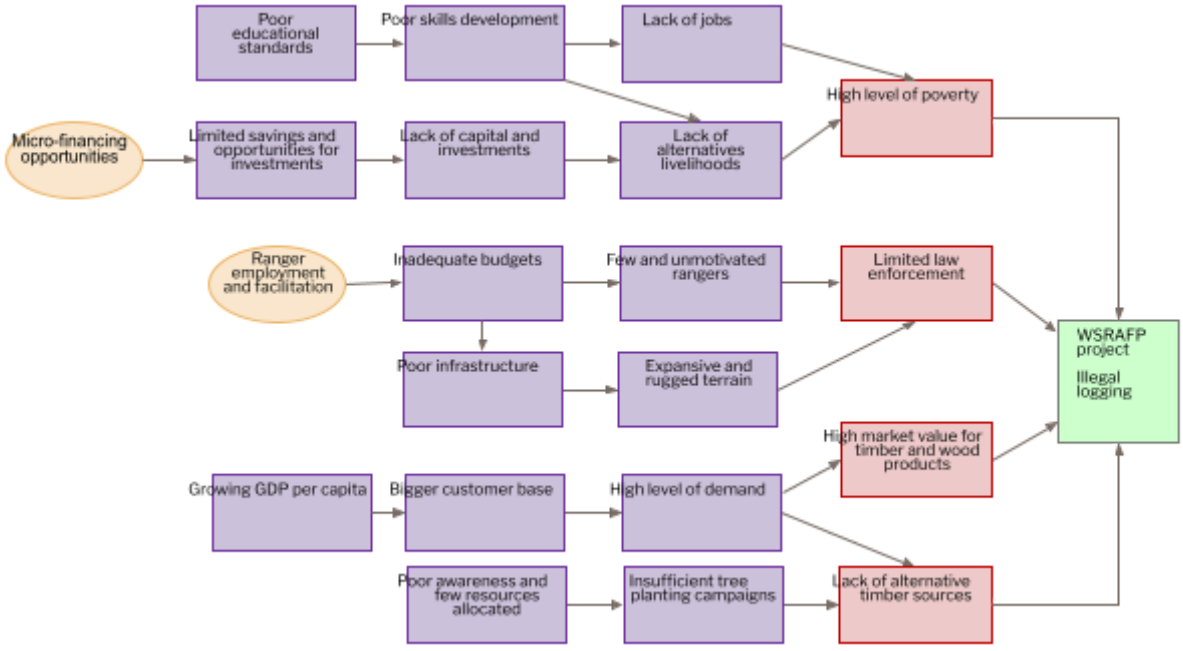
a) Land encroachment



b) Wildlife poaching and trade



c) Illegal logging



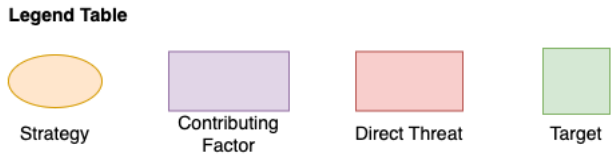


Figure 21: Problem Flow diagrams produced for the Focal Issues during the SBIA/PRA workshop for the Gunung Mas Community Restoration Project

Without-project projections

The major direct threats identified for each Focal Issue in the short-to-medium term (5-10 yrs.) in the absence of the ARR project (Table 39).

Table 39: Future without-project projections of the key contributing factors to the Focal Issues identified during the Gunung Mas Community Restoration Project workshop

a. Land encroachment and habitat loss

Direct Factor	In 5-10 years, will condition improve, worsen, or remain unchanged?	What will drive the change?
Expansion of Illegal Gold Mining (PETI)	Worsen Significantly	Economic Necessity: High gold prices and lack of alternative employment drive communities to expand mining operations from riverbeds into the forest floor. Technology: The shift to using high-pressure water monitors (semprot) accelerates the rate of topsoil destruction, leaving behind barren sand deserts that cannot regenerate naturally. Lack of Rehabilitation: In the baseline, there is no funding or mandate to reclaim abandoned pits, leading to permanent forest loss.
Poor Law Enforcement	Worsen	Resource Gap: The RPHJP documents confirm KPHP Units XV and XVI lack the budget, personnel, and river transport logistics to effectively patrol the vast 44,214.7 ha area. Access: The remote upstream (Hulu) location allows illegal operators to work with impunity Gray Area: Overlapping claims between

		customary use and state land create enforcement ambiguities.
Shifting Cultivation Pressure	Worsen	Population Growth: Natural population increase drives the need for new agricultural land. Soil Degradation: As old plots lose fertility and riverine areas become polluted by mining tailings, farmers are forced to clear new, pristine forest areas further inland.

b. Wildlife poaching and trade

Direct Factor	In 5-10 years, will condition improve, worsen, or remain unchanged?	What will drive the change?
High economic rewards for poaching	Worsen	Black Market Demand: Continued high demand for Pangolin scales, Sun Bear gall bladders, and Helmeted Hornbill casques creates a "high reward" incentive. Lack of Alternatives: Without the project's SIGS program, poaching remains a lucrative sideline for miners and loggers operating deep in the forest.
Low risk of being prosecuted	Worsen	Absence of Guardians: Fewer poachers are detected due to the lack of dedicated rangers. Fragmentation: Mining roads create easy access points for poachers to reach previously isolated deep-forest habitats.
Human-Wildlife Conflict	Worsen	Habitat Compression: As mining and logging fragment the forest, Orangutans are forced into closer contact with communities, increasing the likelihood of them being killed as agricultural pests.

c. Illegal logging

Direct Factor	In 5-10 years, will condition improve, worsen, or remain unchanged?	What will drive the change?
High Demand for Timber (Ulin/Ironwood)	Worsen	Construction Demand: Continued demand for durable Ulin timber for local housing and, ironically, for constructing illegal mining infrastructure (sluice boxes, camps, pontoons). Scarcity Value: As Ulin becomes rarer, its price rises, incentivizing loggers to cut even smaller/younger trees, preventing regeneration.
Poverty & High Cost Economy	Worsen	Logistic Costs: The high cost of living in remote riverine areas (fuel/goods transport) drives the need for immediate cash, which logging provides. Boom-Bust Cycle: The volatility of rubber prices leaves logging as the primary financial safety net for many households.
Lack of Management Presence	Worsen	Open Access: Without the active management and tenure security provided by the project's Social Forestry partnerships, the state forest remains effectively "open access," vulnerable to opportunistic extraction by external actors (Cukong).

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (VCS, 3.19; CCB, B2.1)

In the without-project scenario, the biodiversity of the project area is on a trajectory of continued decline due to ongoing habitat fragmentation from illegal mining (PETI) and logging. The project's activities are designed to reverse this trend and generate significant, net positive biodiversity impacts.

The primary change is the large-scale restoration of 19,008.60 hectares of degraded mineral soils. This is not simply planting trees; it is the active re-establishment of a

functioning native ecosystem where one has been lost to extraction. This fundamental change will drive a cascade of positive biodiversity outcomes that would not occur in the baseline.

The table below summarizes the key expected changes to biodiversity as a result of the project.

Table 40. Biodiversity Changes

Biodiversity element	Avoid Deforestation and Forest Degradation to save the habitat of biodiversity of endangered flora and fauna.
Estimated change	1. Habitat Connectivity for Fauna: The restoration of 19,008 Ha of barren mining land using hardy pioneer species (Black Locust and Melaleuca) will re-establish forest cover. This creates a vital "Emerald Corridor", physically connecting fragmented forest patches to allow movement for: • Bornean Orangutan (Pongo pygmaeus - CR) • Sun Bear (Helarctos malayanus - VU) • Sunda Pangolin (Manis javanicus - CR) 2. Protection of HCV Flora: While the PAA planting focuses on soil reclamation, the project's "Guardian" patrols will actively secure and protect existing wild populations of high-value flora found in the surrounding landscape from illegal logging: • Ironwood/Ulin (Eusideroxylon zwageri - VU) • Wild Agarwood (Aquilaria malaccensis - CR) 3. Sustainable Cultivation: Separately, the SIGS program will establish sustainable, community-managed Agarwood cultivation zones (using inoculation) to reduce pressure on wild stocks.
Justification of change	The GMCRP builds a SIGS platform (as described in Section 2.1.18) that provides a legal economic alternative to the destructive illegal mining (PETI) that currently degrades this habitat. By shifting the economic base from extraction to restoration, the pressure on biodiversity is relieved.

5.2.2 Mitigation Measures (VCS, 3.19; CCB, B2.3)

None of the project activities is expected to have any negative impacts on biodiversity, including any of the area's HCVs. On the contrary, they are specifically designed to improve

the status of the forest and habitat, as well as reduce any direct threats on wildlife from poaching. The level of uncertainty and risk associated with these activities is very low based on the project proponent's experience and the RPHJP guidance, thus the precautionary principle was not explicitly applied here. All planting uses native or naturalized species compatible with the local ecology.

5.2.3 Net Positive Biodiversity Impacts (CCB, B2.2, GL1.4)

Comparison of without-project and with-project scenarios

Based on the situation and without-project analyses (Section 5.1.3), most of the Direct Factors across the three Focal Issues were projected as being likely to worsen in the absence of the GMCRP, including:

- **Limited law enforcement:** Continued open access for illegal miners.
- **Demand for land:** Expansion of mining pits and shifting cultivation.
- **High economic reward for poaching:** Continued hunting of Pangolins/Sun Bears for trade.
- **Minimal risk of prosecution:** Lack of rangers/patrols.
- **Lack of capacity:** No training on sustainable value chains.
- **High demand for timber:** Continued illegal logging of Ulin.

With-project the scenarios will substantially improve:

- **More law enforcement:** Deployment of "Guardian" rangers and community patrols.
- **Land conflicts reduced:** Tenure security via Social Forestry licenses.
- **Poaching reduced:** Converted into HCV stewardship via SIGS incentives.
- **Higher detection risk:** Regular monitoring of HCV areas.
- **Better understanding:** Conservation education integrated into schools/villages.
- **Market shift:** Converting the demand for timber/gold into demand for sustainable **Rotan, Rubber, and Agarwood resin**.

Thus, the project activities will result in clear biodiversity benefits compared to a without-project scenario where all these key factors get worse.

Gold Level for Climate Change Adaptation Benefits (GL1)

Climate change in Central Kalimantan is manifesting primarily through **hydrological extremes**: more intense **El Niño** droughts (increasing fire risk) and wetter **La Niña** years (increasing flood risk).

- **Drought & Fire:** The **RPHJP** and World Bank climate profiles indicate that prolonged dry seasons are becoming more frequent, exacerbating the risk of forest fires, particularly in degraded shrublands (*semak belukar*). The project mitigates this by re-establishing a moist, closed-canopy forest microclimate which is naturally fire-resistant, and by equipping **Masyarakat Peduli Api** (Fire Care) teams.
- **Flooding:** Increased rainfall intensity threatens to destabilize the sandy soils left by mining, causing landslides and river sedimentation. By reforesting the upstream (*Hulu*) catchments of the **Kahayan and Katingan rivers**, the project stabilizes the soil and regulates water flow, protecting downstream communities from flash floods.

Biodiversity Adaptation:

Indonesia's forests will shift under climate stress. The creation of the **GMCRP biological corridor** connects the fragmented lower montane forests of the Schwaner range with the lowland dipterocarp forests. This **connectivity** is the single most important adaptation strategy for biodiversity, allowing wide-ranging species like the **Orangutan** and **Sun Bear** to migrate and seek refuge in response to changing resource availability or climatic extremes. By securing this corridor, the project ensures the long-term resilience of the **Heart of Borneo** ecosystem.

5.2.4 High Conservation Values Protected (CCB, B2.4)

By protecting and restoring the Gunung Mas Forest Landscape, the Gunung Mas Community Restoration Project (GMCRP) will be directly protecting vital wildlife habitats, specifically the critical biological corridors required by the Bornean Orangutan and Sun Bear.

Furthermore, the project safeguards critical water resources by stabilizing the Upper Catchment Areas (Hulu) of the Kahayan and Katingan Rivers, preventing the sedimentation and pollution associated with the baseline of illegal mining. By actively replanting degraded gaps, the project maintains and restores landscape connectivity, keeping the Heart of Borneo ecosystem intact and unfragmented.

As such, all the high conservation values (at the species, ecosystem, or functional levels) will be significantly better in the 'With Project' versus 'Without Project' scenario for the reasons noted above. There is no negative effect on Central Kalimantan biodiversity; rather, the project reverses the trajectory of degradation.

5.2.5 Species Used (VCS, 3.19; CCB, B2.5, B2.6)

Table 41. Species Used

Species introduced	Classification	Justification for use	Adverse effects and mitigation

Melaleuca cajuputi (Gelam)	Native	**Restoration (PAA 1 & 2):** Selected for its extreme resilience in acidic, swampy, and degraded soils common in Central Kalimantan. Key species for restoring hydrological balance.	None. Native species.
Robinia pseudoacacia (Black Locust)	Naturalized / Pioneer	**Reclamation (PAA 1 & 2):** Selected for rapid biomass accumulation and nitrogen-fixing capabilities on critical lands (*lahan kritis*) and mining tailings where native species fail to establish.[41]	**Mitigation Strategy** 1. *Robinia* is a shade-intolerant heliophile. It cannot regenerate under the closed canopy of the adjacent tropical rainforest, naturally limiting its spread into HCV areas 2. The project utilizes it as a **"Nurse Crop."** Once the soil is stabilized (Years 10-15), native Dipterocarps will be under-planted. The *Robinia* will eventually be shaded out by the emerging native canopy. 3. **Monitoring:** Patrol teams will monitor for wildlings outside the PAA boundaries and manually remove them if detected.
Aquilaria malaccensis (Agarwood/Gaharu)	Native	**SIGS (Livelihood):** Planted in designated community zones for sustainable resin production using	None. Native species.

[41] **Margono, B.A., et al.** (2014). Primary forest cover loss in Indonesia over 2000–2012. Nature Climate Change. (Supports baseline deforestation trends).

		non-destructive inoculation technology.	
Hevea brasiliensis (Rubber/Karet)	Naturalized	**SIGS (Livelihood):** Revitalization of existing community rubber gardens to provide steady weekly income and reduce pressure on the forest.	None. Long-established agricultural species in the region.

5.2.6 Invasive Species (VCS, 3.19; CCB, B2.5)

Table 42. Invasive Species Used

Existing invasive species	Mitigation measures to prevent spread or continued existence of invasive species
No Invasive Species	None

All Project Activities that include any planting or reforestation within the Project zone shall utilize native or naturalized tree/plant species that will be nurtured in nurseries on-site. No non-native species will be used in the Project Accounting Area. All agricultural areas in the landscape have been excised from the Project Accounting Area a priority.

5.2.7 GMO Exclusion (CCB, B2.7)

No GMOs will be used both within the Project Accounting Area and Project zone.

5.2.8 Inputs Justification (VCS, 3.19; CCB, B2.8)

Table 43. GMO Species Used

Name	No chemical fertilizers used
Justification of use	N/A
Potential adverse effect	None

5.2.9 Waste Products (VCS, 3.19; CCB, B2.9)

The main wastes anticipated from implementation of this project are from construction activities e.g., water reservoirs, pipelines, classrooms, health facilities and any other infrastructure. For any such activity, we will adhere to the national regulations and guidelines, as stipulated under the established Environmental and Social Impact Assessment process.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (CCB, B3.1) and Mitigation Measures (CCB, B3.2)

There is little chance of having significant negative biodiversity impacts (activity shifting leakage) outside the Project Zone for three primary reasons:

1. **Driver Conversion vs. Displacement:** The primary threats to biodiversity in Gunung Mas—**Illegal Gold Mining (** and **Illegal Logging**—are driven by economic necessity. The GMCRP does not merely "block" access; it provides a more profitable and safer alternative through the **SIGS** program (Agarwood/Rotan). By absorbing the local workforce into legal agroforestry and restoration jobs, the project reduces the pool of labor available for illegal activities elsewhere.
2. **Tenure Landscape:** Neighboring forests are not "empty." They are either under the jurisdiction of other villages (*Desa*), active concessions, or the **KPHP Unit XV/XVI** management. Displaced illegal actors would face resistance from these rights-holders. Furthermore, mining is geographically constrained to specific mineral deposits; it cannot simply "move" to non-mineralized forest areas.
3. **Enhanced Governance:** The project's complementary "Guardian" patrols work in coordination with the **KPHP Unit XV/XVI** and the police. This strengthens the regional rule of law, creating a deterrent effect that extends beyond the project boundaries rather than simply displacing crime.

Table 44. Negative offsite impact

Negative offsite impact	Mitigation measure(s)
Displacement of Hunting/Poaching	*The project employs former hunters/poachers as rangers. Regular patrols and environmental education reduce the cultural acceptability of poaching in the wider sub-district.*
Displacement of Illegal Mining	*The project provides legal land tenure and alternative income (SIGS). Mining requires specific geological conditions; displaced miners cannot simply start anywhere. Enforcement coordination with KPHP*

makes the wider region riskier for illegal operators.

5.3.2 Net Offsite Biodiversity Benefits (VCS, 3.19; CCB, B3.3)

The project is expected to generate significant positive offsite biodiversity benefits:

- Watershed Protection: By stabilizing the upstream (Hulu) catchment, the project improves water quality (reducing mercury/sediment load) for the entire length of the Kahayan and Katingan rivers, benefiting aquatic biodiversity and communities far downstream.
- Corridor Function: The project restores a critical link in the Heart of Borneo landscape. A healthy forest in the project zone allows wide-ranging species like the Sun Bear and Clouded Leopard to travel between protected areas, enhancing genetic exchange across the wider region.
- Knowledge Spillover: The success of the Agarwood Inoculation and SIGS model is expected to be observed and adopted by neighboring villages, leading to a broader regional shift away from destructive extraction toward sustainable agroforestry.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (CCB, B4.1, B4.2, GL1.4, GL3.4)

Indicators are important in impact assessment because they respond to the basic question "what should be measured to show that the claimed net social and biodiversity benefits are real and additional?" (Richards & Panfil 2011). An ideal indicator measures an 'intermediate state' or assumption between an output, outcome, and impact, clearly showing progress along a causal chain. Thus, we used our theory of change logic (Section 5.2.1) as the basis for selecting indicators that factor in attribution.

The indicators are analyzed based on the **Pressure-State-Response** framework:

- **Response Indicators:** Actions taken by the project (e.g., Habitat restoration, "Guardian" patrols, SIGS implementation).
- **Pressure Indicators:** Drivers of biodiversity loss (e.g., Incidences of **Illegal Gold Mining/PETI**, logging, snares found).
- **State Indicators:** The actual condition of biodiversity (e.g., **Orangutan nest density**, forest canopy cover, water turbidity levels).

Data collection utilizes two main strategies:

1. **Field Patrols:** Utilizing **SMART (Spatial Monitoring and Reporting Tool)** app data from the "Guardian" ranger teams (AAD + Community + KPHP).
2. **Remote Sensing:** Drone surveillance and satellite imagery (JRC TMF/Sentinel-2) to monitor canopy closure and detect illegal mining openings.

Biodiversity Impact Assessment: Monitoring Plan

Table 45: Project biodiversity impact assessment for monitoring plan.

Focal Issue	Key results	SMART Objective	Indicator Code	Indicator	Indicator type	Data collection method	Who?	When?	Where?
Forest destruction and land encroachment	*Decrease in illegal logging and Illegal Mining (PETI)*	*By 2027, reduce the number of illegal logging and mining incidents by half in the GMCRP.*	**BIA001**	*Same as SIA001 to SIA010*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*
	Decrease in encroachment for shifting cultivation	*By 2027, reduce the number of encroachment and land- grabbing by half in the GMCRP*	**BIA002**	*Same as SIA011*	*Same as SIA*	*Same as SIA*	*Same as SIA s*	*Same as SIA*	*Same as SIA*
Wildlife and HCV Fauna/Flora poaching and conservation	*Decrease Wild Agarwood and other HCV fauna/Flora Poaching and trade*	*By 2027, reduce the number of wildlife poaching incidents by half in the GMCRP*	**BIA003**	*Same as SIA012 to SIA014*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*
	Greater appreciation and awareness of wildlife benefits	*By 2027, 25% more community members demonstrate greater appreciation for wildlife and conservation*	**BIA006**	*Same as SIA025 to SIA028*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*
			BIA007	*# of awareness, sensitization training with special focus on HCV Fauna and Flora into school systems.*	Output	Internal report	AAD	Quarterly	Schools in Project Zone

	Greater Conservation/ Restoration of Agarwood and other HCV Fauna/Flora	*By 2026, setup native agarwood species conservation program*	**BIA008**	*Same as SIA015-SI023*	*Same as*	*Same as*	*Same as*	*Same as*	*Same as*
			BIA009	*# and species of wild agarwood and other HCV identified and protected in the PAAs*	Impact	Internal report	AAD, School	Quarterly	Project Accounting Area
			BIA010	*# of SIGS Agarwood HCV Flora restoration plantation established*	Impact	Internal report	AAD	Annually	Project Accounting Area
			BIA011	*# and species and Agarwood and Shorea trees planted*	Outcome	Internal report	AAD	Annually	Project Accounting Area
			BIA012	*# of Fauna species rescued and released*	Outcome	Internal report	AAD	Annually	Project Accounting Area
		By 2028, Agarwood and other NTFP Community Biodiversity Ecotourism Sites established and promoted	**BIA013**	*Same as SIA020-SIA022*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*
Improve community livelihoods	*Reduced cost of living*	*By 2027, 10% of community members with direct livelihood benefits from the GMCRP*	**BIA014**	*Same as SIA029-SIA032*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*	*Same as SIA*
	Sustainable Income Generation	*By 2027, establish functional Rotan and Agarwood cooperatives.*	**BIA016**	*# of Rotan and Agarwood SIGGs formed and operational.*	Outcome	Internal report	AAD/Cooperative	Annually	Project Accounting Area

SMART objective: Specific, Measurable, Achievable, Relevant and Time-bound.

5.4.2 Biodiversity Monitoring Plan Dissemination (CCB, B4.3)

The Gunung Mas Community Restoration Project will disseminate the monitoring plan and the results of the monitoring within 12 months of validation. These documents will be made publicly available on AAD's website. They will also be communicated to the communities and other stakeholders (including the Government and Local Authorities) using diverse media including presentations, reports, brochures and orally during community awareness and sensitization meetings, and continuous SBIA/PRA workshops.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

This project is seeking Exceptional Biodiversity Benefits based on the presence of IUCN Red Listed species and critical ecological functions.

5.5.1 High Biodiversity Conservation Priority Status (CCB, GL3.1)

The Gunung Mas Community Restoration Project meets the criteria for high conservation priority status. Please refer to Table 19 below for HCV fauna and flora species listing and their associated IUCN statuses.

5.5.2 Trigger Species Population Trends (CCB, GL3.2, GL3.3)

Table 46. Trigger Species Population

Trigger species	Bornean Orangutan (Pongo pygmaeus) (Critically Endangered) Sunda Pangolin (Manis javanicus) (Critically Endangered) Sun Bear (Helarctos malayanus) (Vulnerable)
Population trend at start of project	The project zone is part of the Heart of Borneo landscape, a critical stronghold for these species. However, populations are in sharp decline. The Bornean Orangutan is threatened by habitat fragmentation caused by illegal gold mining (PETI) and logging, which isolates populations and forces them into agricultural areas where human-wildlife conflict occurs. The Sunda Pangolin and Sun Bear are heavily targeted by poachers for the illegal wildlife trade (scales and gall bladders), facilitated by the open-access nature of the degraded forest.
Without-project scenario	In the baseline scenario, continued illegal mining will further fragment the forest canopy, severing the movement corridors between the Kahayan and Katingan watersheds. This isolation leads to genetic erosion for Orangutans. Without active enforcement, the "open access" forest allows poachers to operate with impunity, likely leading to the local extirpation of Pangolins and Sun Bears in the

	short-to-medium term.
With-project scenario	With the Gunung Mas Community Restoration Project, 19,008.60 Ha of degraded land will be restored, physically reconnecting fragmented forest patches to create a continuous "Emerald Corridor." The project's "Guardian" patrol teams (integrating rangers and community members) will actively remove snares and deter poachers. This creates a safe sanctuary, allowing populations to stabilize and recover.

Trigger species	Agarwood (Aquilaria malaccensis) (Critically Endangered) Ulin / Ironwood (Eusideroxylon zwageri) (Vulnerable) Balangeran (Shorea balangeran) (Critically Endangered)
Population trend at start of project	These species are native to the Central Kalimantan dipterocarp forests but have been decimated. Ulin (Ironwood) is the primary target for illegal logging due to its high value for construction. Wild Agarwood (Gaharu) has been harvested to near-extinction by destructive "gaharu hunters" who fell entire trees to find resin. Natural regeneration is failing due to the loss of mother trees and degraded soil conditions.
Without-project scenario	The remaining wild individuals of Aquilaria and Ulin will likely be harvested to exhaustion by illegal loggers and collectors. The degraded soils of abandoned mining sites prevent natural re-establishment, leading to local extirpation of these climax species.
With-project scenario	The GMCRP transforms the economic relationship with these species through Protection and Sustainable Management: 1. Agarwood (SIGS): Instead of planting in the carbon zone, the project establishes Community Agarwood Gardens (SIGS) in designated livelihood areas. The project introduces non-destructive inoculation technology, allowing communities to harvest resin without killing the tree, thereby removing the incentive to poach wild stocks. 2. Ulin & Shorea (Protection): The project implements a strict "Guardian" Protection Protocol. Remaining wild "Mother Trees" found during patrols will be GPS-tagged, mapped, and actively monitored to prevent illegal logging. Conservation education workshops will be conducted to reinforce their status as protected heritage species.

APPENDIX 1: STAKEHOLDER DESCRIPTION TABLE

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

Stakeholder	Rights, interest, and overall relevance to the project
Identify communities and any community groups within them, any cross-cutting community groups, and list other stakeholders.	Please refer to table a-c in section 2.3.2 for each stakeholder's rights, interest, and overall relevance to the project.
1. Local Communities (License Holders) *(18 Social Forestry Groups: Hutan Adat, LPHD, HKm)*	**Rights:** Holders of the 35-year Social Forestry Management Access (*Hak Kelola*) and beneficiaries of the Carbon Rights share. **Interest:** Improving livelihoods through SIGS (Agarwood/Rotan), securing clean water, and accessing health/education services. **Relevance:** The primary project partners and land managers.
2. Project Proponent *(Asia Assets Developments Co., Ltd. - AAD)*	**Rights:** Holder of the mandate to develop, validate, and market carbon credits via Cooperation Agreements (*PKS*). **Interest:** Successful generation of high-quality VCUs, financial sustainability, and compliance with Verra/SRN PPI standards. **Relevance:** Funder and strategic manager.
3. Local Implementation Partner *(Local Entity/Cooperative)*	**Rights:** Operational mandate for on-the-ground execution. **Interest:** Effective community engagement, management of the Micro-finance

	fund, and logistics for the Rice Program. **Relevance:** The bridge between AAD and the villages.
4. Government Agencies *(MoEF, UPT KPHP Unit XV & XVI, Pemda Gunung Mas)*	**Rights:** Regulatory authority and oversight of State Forest Land. **Interest:** Alignment with National NDC targets, regional economic development, and reduction of illegal mining liability. **Relevance:** Supervising body ensuring legal compliance.
5. Customary Institutions *(Kelembagaan Adat: Damang & Mantir)*	**Rights:** Authority over Customary Law (*Hukum Adat*) and cultural sites (*Sandung*). **Interest:** Preserving Dayak cultural heritage, resolving land disputes, and ensuring project activities respect ancestral boundaries. **Relevance:** Critical for social license and conflict resolution.
6. Extractive Actors *(Illegal Miners/PETI & Loggers)*	**Rights:** No legal rights, but hold *de facto* power through current land occupation. **Interest:** Immediate income generation. **Relevance:** The primary drivers of degradation. The project aims to convert this group into "Guardians" or SIGS farmers to stop leakage and deforestation.
7. Vulnerable Groups *(Women & Youth)*	**Rights:** Right to equal participation and non-discrimination. **Interest:** Access to safe employment (Nurseries), maternal/family health services, and education scholarships. **Relevance:** Key beneficiaries for CCB Gold Level (GL2) equity targets.

Appendix 2: Reference

A. Methodologies, Tools, and Standards

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7. **KPHP Model Gunung Mas Unit XVI.** (2015). *Rencana Pengelolaan Hutan Jangka Panjang (RPHJP) KPHP Model Gunung Mas Unit XVI Tahun 2016-2025.* Dinas Kehutanan Provinsi Kalimantan Tengah.
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APPENDIX 3: ACRONYMS

AAC	Annual Allowable Cut
AAD	Asia Assets Developments Co., Ltd.
AFOLU	Agriculture, Forestry and Other Land Use
AGB	Above Ground Biomass
AGMT	Above-Ground Merchantable Trees
AGOT	Above-Ground Non-Merchantable Trees
APD	Avoided Planned Deforestation and Degradation
ARR	Aforestation, Reforestation and Regeneration
AUDD	Avoided Unplanned Deforestation and Degradation
BGB	Below-Ground Biomass
BGMT	Below-Ground Merchantable Trees
BGOT	Below-Ground Non-Merchantable Trees
BPS	Central Statistics Agency
CCB	Climate, Community, and Biodiversity
CCBA	Climate, Community, and Biodiversity Alliance
CLD	local development committee (comité local de développement)
COMIFAC	Comission des Forêts d'Afrique Centrale
COP	Conference of Party
CPA	Community Protected Area
CRA	Carbon Rights Agreement
DBH	Diameter at Breast Height
dbh	Diameter at Breast Height
FOB	Freight On Board/Free On Board
FOERDIA	Forest and Environment Research, Development, and Innovation Agency
FORDA	Forest Research and Development Agency
FPIC	Free, Prior, and Informed Consent
FREL	National Forest Reference Emission Level
FRL	Forest Reference Level

GER	Gross Emissions Reduction
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GL	Guidelines
GMCRP	Gunung Mas Community Restoration Project
GPG	Good Practice Guidance
HCV	High Conservation Value
HD	Hutan Desa; Village Forest
HH	Hutan Hak; Private Forest
HK	Hutan Kemasyarakatan; Community Forest
HL	Hutan Lindung; Protected forest
HP	Hutan Produksi Tetap; Permanent Production Forest
HPK	Hutan Produksi Konversi; Conversion Production Forest
HPT	Hutan Produksi Terbatas; Limited production forest
HR	Hutan Rakyat; People's Forest
HTR	Hutan Tanaman Rakyat; Community Forest Plantation
ICCN	Institut Congolais pour la Conservation de la Nature
ID	Republic of Indonesia
IFCA	Indonesian Forest and Climate Alliance
IFM	Improved Forest Management
ILG	Incorporated Landowner Group
IPCC	Intergovernmental Panel on Climate Change
IPLC	Indigenous peoples and local communities
IUCN	International Union for Conservation of Nature
JNR	Jurisdictional and Nested REDD+
LLG	Local Level Government
MECNT	Ministry of the Environment, Conservation of Nature, and Tourism
MoEFF	Minitry of Environment and Forestry
MoFor	Ministry of Forestry
MOU	Memorandum of Understanding
MRV	Monitoring, Reporting, and Verification
NER	Net Emissions Reduction

NER	Net GHG Emission Reductions and Removals
NPV	Net Present Value
NTFP	Non-Timber Forest Products
PAA	Project Accounting Area
PAI	Project Activity Instance
PARA	Project Agarwood Restoration Area
PETI	Pertambangan Emas Tanpa Izin (Illegal Gold Mining)
PDD	Project Design Document
PDR	Project Description Requirement
PIR	Project Implementation Report
PRA	Participatory Rural Appraisal
RA	REDD+ Agency
REDD	Reduced Emissions from Deforestation and Forest Degradation
SBIA	Social and Biodiversity Impact Assessment
SIGS	Sustainable Income Generating Scheme
SIGGs	Sustainable Income Generating Groups
SOC	Soil Organic Carbon
UPTD	Unit Pelaksana Teknis Dinas Daerah; Regional Service Technical Implementation Unit
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit
WP	Wood Products

Appendix 4: Equipment List For Monitoring

To assist in the preparation of survey equipment and materials, the list of survey tools and materials is grouped according to the type of work as follows: Determining the location and making sample plot boundaries for the work of determining the location and making sample plot boundaries in the field, equipment and materials are needed as following:

1) Work map
2) GPS
3) Compass
4) Clinometer
5) Altimeter
6) Tape measure
7) Calculator or table for converting flat distance to pitch/slant distance
8) Benchmarks for 4 sample plot corners (pipe diameter 2 inches long 30 cm)
9) Plastic rope for making boundaries for recording units.
10) Plot nameplates.

To measure woody plants and dead wood, the following equipment is needed:

1) Tape measure (measurement of the radius of the sub-plot, measurement of seedlings, poles and stakes and length of dead wood)

2) Phi band / tree diameter measuring tape (measurement of tree DBH and dead wood diameter

3) Telescope Spiegel Relaskop (if available)

4) Tree label (for poles and trees)

5) Hammer and nail (attach tree tag)

6) Permanent marker (note tree number on tree label) Measurement of understory and litter and soil organic layer.

7) Scale.

Measuring undergrowth and litter on the same sub-plot requires:

1) Quadrants made of aluminum, measuring 0.5 m x 0.5 m

2) Knife or grass shears/cuttings

3) Hanging scale with a capacity of 10 kg with an accuracy of 10 g (to weigh the wet weight of the sample)

4) Digital scale with a capacity of 1 kg with an accuracy of 0.1 g (for weighing sub-samples

5) Porous sieve 2 mm (separating litter and organic soil)

6) 5 kg plastic bag

7) Permanent marker.

Measurement and sampling of mineral soils. Measuring and taking samples of mineral soil requires equipment and materials in the form of:

1) Metal box measuring 20 cm x 20 cm x 10 cm and or earthen ring with a diameter of 5 cm

2) Wood measuring 25 cm x 10 cm x 10 cm

3) Rubber mallet, to hit the iron box so that it sinks into the ground

4) Hoe/ Straight shovel

5) Earth knife

6) Hand shovel

7) Rubber band

8) Paper cement bag

9) 30 kg plastic bag

10) 5 kg plastic bag

11) Permanent marker.

For measurement of the Leakage in addition to the above equipments the following equipments is needed:

1) Densiometer

2) LiDAR