

Belize Maya Forest REDD+ Project



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In Memory of Eric Love

Many people supported the conservation of this critical habitat in Belize, but without Eric Love this would never have happened. We will always remember him as a committed and passionate conservationist, with tenacity and a sense of humor that brought joy to every conversation.

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Prepared By	Terra Global Capital LLC info@terraglobalcapital.com
Validation Body	Earthood Services Private Limited
Project Lifetime	40 year (10 December 2020 – 9 December 2060)
GHG Accounting Period	40 year (10 December 2020 – 9 December 2060)
History of CCB Status	First submission of Validation under the CCB Standard.
Gold Level Criteria	This project seeks recognition for Gold Level Biodiversity benefits.
Expected Verification Schedule	Verification planned for 2023

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1 SUMMARY OF PROJECT BENEFITS

1.1 Unique Project Benefits

Outcome or Impact Estimated by the End of Project Lifetime	Section Reference
1) Jaguar populations within the Belize Maya Forest remain stable or improve	2.2.3
2) Protection of species of global concern (Baird's tapir, spider monkey)	5.1.1
3) Protection unique aquatic systems (25 sacred pools of Cara Blanca)	2.1.7
4) Watershed protection for portions of 3 major rivers in Belize	2.1.8
5) Protection of historical and cultural sites (Maya archaeological sites)	4.2.4
6) Protection of trinational forest connectivity	5.1.2

1.2 Standardized Benefit Metrics¹

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
GHG emission reductions or removals	Net estimated emission removals in the Project Activity Instance, measured against the without-project scenario	N/A	N/A
	Net estimated emission reductions in the Project Activity Instance, measured against the without-project scenario (VCUs)	29,467,538 tCO ₂ e	3
Forest ² cover	For REDD ³ projects: Estimated number of hectares of reduced forest loss in the Project Activity Instance measured against the without-project scenario	78,180 ha	3
	For ARR ⁴ projects: Estimated number of hectares of forest cover increased in the Project Activity Instance measured against the without-project scenario	N/A	N/A
Improved land management	Number of hectares of existing production forest land in which IFM ⁵ practices are expected to occur as a result of project activities, measured against the without-project scenario	N/A	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 without-project scenario	N/A	N/A

¹ The values in the table below are a rough estimation of the potential impact to be achieved by the end of the project. They were estimated based on the initial work plan, capacity of implementation, previous experience, cultural factors, and budget. The actual impact will be reported at each verification event.

² 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)

³ 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)

⁴ 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)

⁵ 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)

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
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	45	4.2.1 .1 and 4.2.1 3
	Number of female community members who are expected to have improved skills and/or knowledge resulting from training as part of project activities	15	4.2.1 .1 and 4.2.2
Employment	Total number of people expected to be employed in project activities, ⁶ expressed as number of full-time employees ⁷	15	4.2.2
	Number of women expected to be employed as a result of project activities, expressed as number of full-time employees	2	4.2.2
Livelihoods	Total number of people expected to have improved livelihoods ⁸ or income generated as a result of project activities	10	4.2.2
	Number of women expected to have improved livelihoods or income generated as a result of project activities	5	4.2.2
Health	Total number of people for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women for whom health services are expected to improve as a result of project activities, measured against the without-project scenario	N/A	N/A
Education	Total number of people for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	10	4.2.2

⁶ 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.

⁷ 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])

⁸ 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.

Category	Metric	Estimated by the End of Project Lifetime	Section Reference
	Number of women and girls for whom access to, or quality of, education is expected to improve as result of project activities, measured against the without-project scenario	5	4.2.2
Water	Total number of people who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
	Number of women who are expected to experience increased water quality and/or improved access to drinking water as a result of project activities, measured against the without-project scenario	N/A	N/A
Well-being	Total number of community members whose well-being ⁹ is expected to improve as a result of project activities	N/A	N/A
	Number of women whose well-being is expected to improve as a result of project activities	N/A	N/A
Biodiversity conservation	Expected change in the number of hectares managed significantly better by the project for biodiversity conservation, ¹⁰ measured against the without-project scenario	87,059 ha of the Project Zone	N/A
	Expected number of globally critically endangered or endangered species ¹¹ benefiting from reduced threats as a result of project activities, ¹² measured against the without-project scenario	4 species	5

⁹ 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.

¹⁰ 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

¹¹ Per IUCN's Red List of Threatened Species

¹² In the absence of direct population or occupancy measures, measurement of reduced threats may be used as evidence of benefit

2 GENERAL

2.1 Project Goals, Design and Long-Term Viability

2.1.1 Summary Description of the Project (G1.2)

The Belize Maya Forest REDD+ Project is an avoided planned deforestation to agriculture project in the Orange Walk District of Belize. The Project covers 87,059 hectares and includes the parcels Yalbac and Laguna Seca that were being offered for sale to agricultural interests when they were being liquidated from two timber funds. The project is a grouped project, and the Yalbac and Laguna Seca are the first Project Activity Instance that have the possibility to expand to other areas. These parcels were purchased by The Nature Conservancy, and their protection was facilitated under an agreement with the government of Belize, preventing their conversion to agriculture. As part of the agreement with the government of Belize, a local non-profit organization, the Belize Maya Forest Trust was established, and the parcels were transferred to the trust for long-term protection and conservation of the land. The terms of the trust are irrevocable and will ensure the conservation of the first Project Activity Instance for an indefinite period of time. Therefore, the climate and ecosystem benefits will far outlive the crediting period. The Belize Maya Forest Trust will manage the parcels under a conservation action plan for on-going protection, preservation of biodiversity and to implement programs with neighboring communities.

If TNC had not purchased these parcels, they would have been sold off to agricultural interests that have and continue to convert lands around the Project Activity Instance for production of agricultural crops and grazing. The project will generate an estimated 736,688 tCO₂e average annual emission reductions for a total of 29,467,538 tCO₂e emission reductions over the 40-year crediting period.

2.1.2 Project Scale

Based on average annual GHG emission reductions of **736,688** tCO₂e this is considered a “large project”.

Project Scale	
Project	
Large project	x

2.1.3 Project Proponent (G1.1)

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends.

Organization name	The Nature Conservancy
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2.1.4 Other Entities Involved in the Project

The Belize Maya Forest Trust (BMFT) is a Belizean conservation non-profit organization and is responsible for the management of the Project Activity Instance. The organization was established in 2020 for the conservation and management of the Belize Maya Forest formerly known as the Yalbac and Laguna Seca lands. When BMFT is fully operational the staff is expected to comprise of twelve rangers and three program staff.

Organization name	Belize Maya Forest Trust
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Terra Global acts as an implementing partner for the development and on-going management of the emission reductions generated under the project, supporting the registration, issuance and marketing of emission reductions.

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University of Belize Environmental Research Institute (UB ERI) provides specialized technical support for the field work to assess biodiversity, biomass, social and local administration support where needed for the validation.

Organization name	University of Belize Environmental Research Institute – UB ERI

Role in the project	Project Lead
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2.1.5 Physical Parameters (G1.3)

2.1.5.1 Location and Geographic Boundaries of Project Area

The Project Area is made up of the first Project Activity Instance that encompasses the properties of Yalbac and Laguna Seca, the first instance of a group project. The area of the VCS REDD+ project (VCS #1326), that makes part of the Laguna Seca property, has been removed from the Project Activity Instance, and after excluding the legally non-convertible area and the non-forest areas, the total area of the Project Activity Instance is 78,180 ha (Table 1).

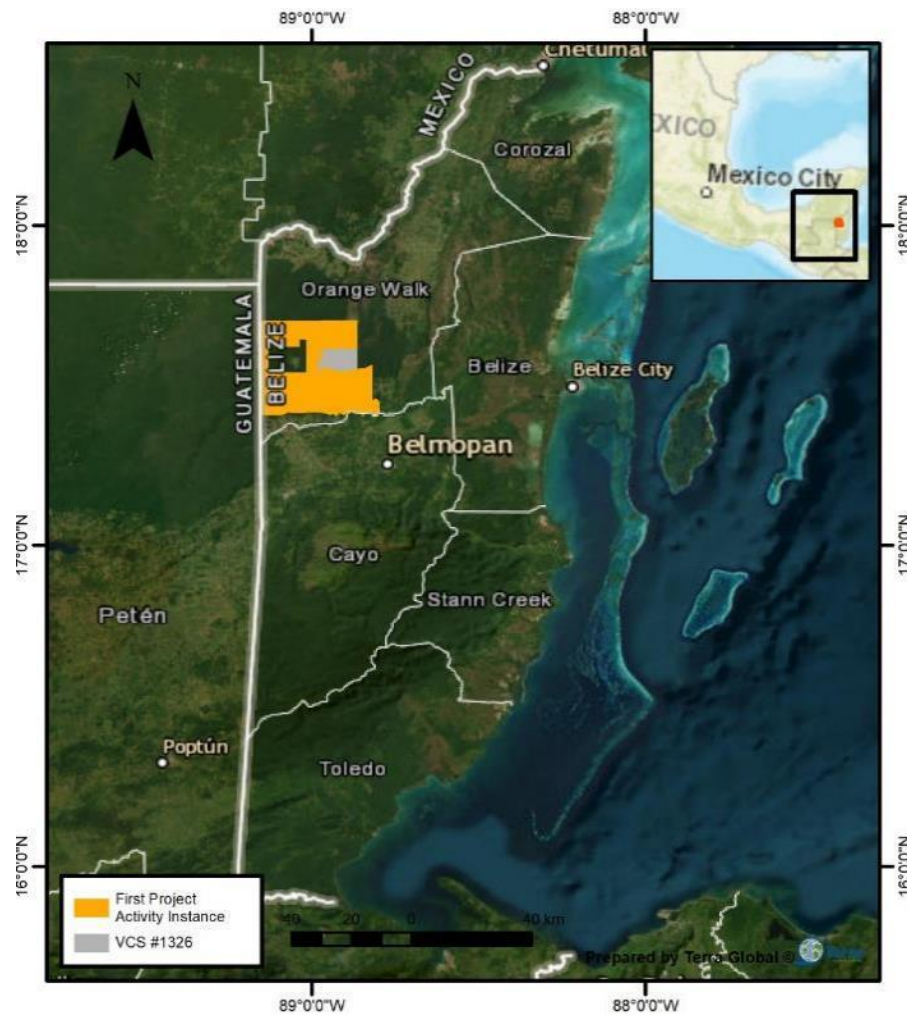
The Project Activity Instance is located in the Orange District, Belize, 47.5 km northwest of Belmopan, at the vertex coordinates 17°41'57.0" N 89°08'57.1" W, 17°42'07.6" N 88°51'40.8" W, 17°24'46.9" N 88°47'42.5" W and 17°24'12.4" N 89°08'59.5" W (Map 1). The project boundary encompasses 87,059 hectares of which 78,180 hectares are available and suitable for conversion to agricultural or ranching uses in the absence of revenues from a carbon program, including only land qualifying as forest for a minimum of 10 years prior to the project start date (Map 2). The property is owned by Belize Maya Forest Trust (BMFT), see section 2.5.2 for a complete detail.



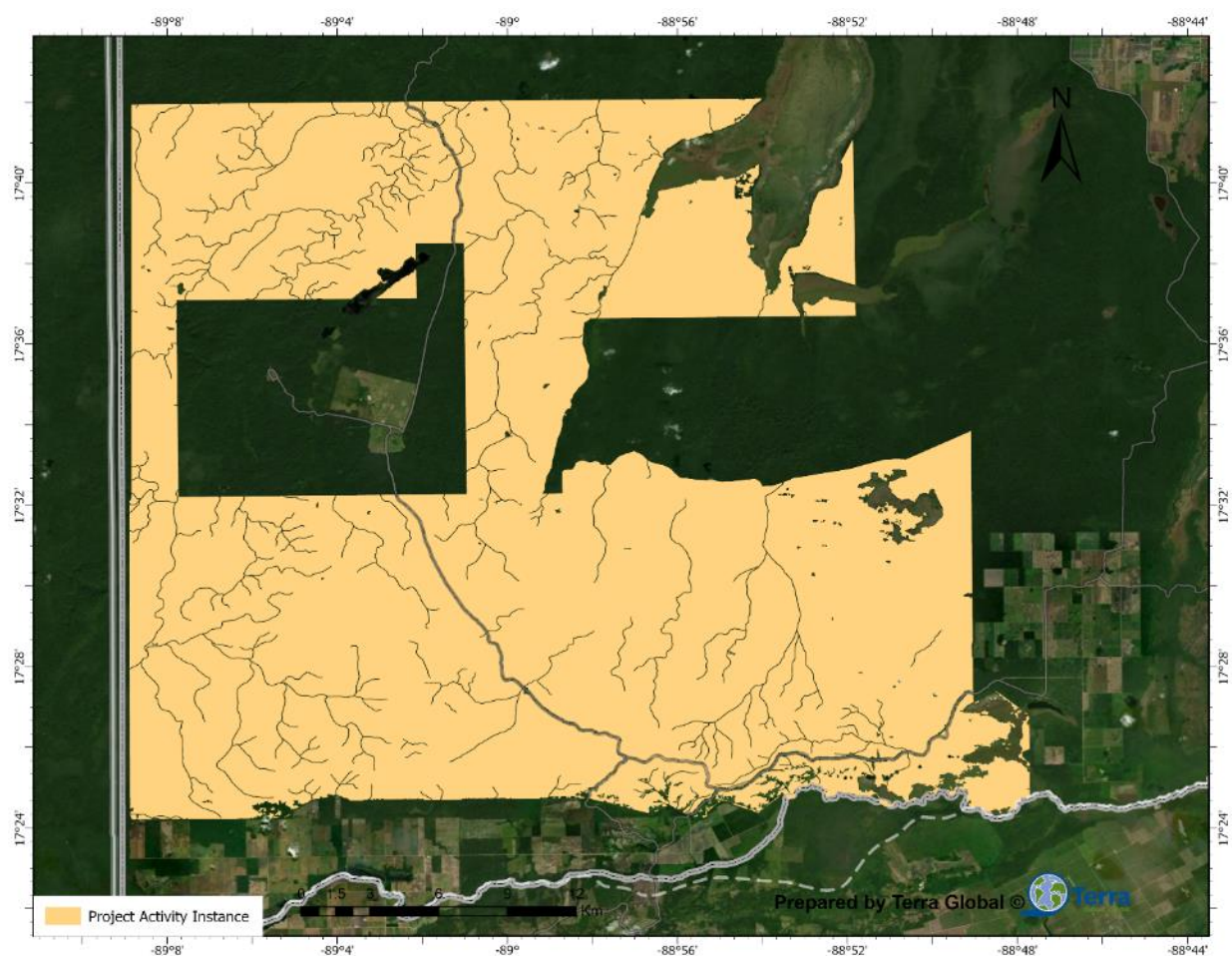
Photo 1. View of the closed forest of the Project Activity Instance

Table 1. Project Activity Instance Size (ha)

		Area (ha)	Total (ha)
Properties	Laguna Seca Parcel	42,147	95,491
	Yalbac Parcel	53,344	
Areas excluded	VCS #1326	8,432	17,311
	Legally non-convertible Area	7,096	
	Non-Forest Area	1,783	
Total Eligible Area			78,180



Map 1. First Project Activity Instance Location



Map 2. Qualifying Areas of the First Project Activity Instance

2.1.5.2 Basic Physical Parameters

Topography and Hydrology

In the western/southwestern portion of the Orange Walk District the major agents of the formation of soils in this area, are the two rivers – the New River in the north and the Belize River in the south, that form these two associated drainage basins further south. The principal geophysical feature of the area is flat land intersperses with many large and small water bodies such as lagoons, lakes and ponds (Brokaw & Mallory, 1993). Elevation ranges from 10-20 m, with a topography that includes level and gently rolling areas, hills, valleys, and escarpments cut by deep ravines (Sandrock, 2017).

Soils

Soils in the Project Activity Instance consist of the Yaxa Suite (Cambisol, Vertisol; Tropept, Mollisol, Vertisol) and specifically soils that are formed under constant lime enrichment (Baillie, 1993). The Project Activity Instance is underlain by a geological formation known as the Yucatan Platform. The platform was under the ocean during the early Eocene (58-47 million years ago), when it accumulated marine sediments consolidating into limestone. Northern Belize emerged from the ocean in the Pliocene (13-2 million years ago). In this same period, a trough opened along the eastern edge of the platform, inducing slumping to the west, along southwest-northeast fault lines. The slumping produced a series of terraces of successively increasing elevation proceeding west. The Project Activity Instance is similar in topography, soils, and

hydrology to adjacent areas of northern Belize, Mexico, and Guatemala, because all are located on the same Eocene rock formations. The watersheds have substantial areas of marsh lands and swamps (peat), as well as areas that are old leached alluvial pine ridge soils and younger soils lying on top of limestone and further south lying on top of clay hard pans. Drainage is usually a problem causing anaerobic soil conditions (Brokaw & Mallory, 1993).

Climate

The area experiences a sub-tropical moist climate with marked wet and dry seasons, dominated by weather systems moving through the Gulf of Mexico and western Caribbean. Temperatures are fairly constant across inland northern Belize, averaging 27°C (81°F), but rainfall increases from north-west to south-east (Program for Belize, 2014).

There are two main seasons:

- The wet season is bimodal, normally beginning in late May – early June and rapidly increasing to a peak in late June-July, moderating and then peaking again in October, before tailing off through November. Average temperatures are high at approximately 28°C (82°F), and decreases in October. The annual rainfall varies between 1311 mm and 1772 mm and is strongly influenced by short periods of heavy rain from low-pressure systems.
- The dry season can be subdivided into two phases: a) the cool dry season, from November to February. This is a transitional period during which the rainfall declines and the land dries out, usually by December. It is also characterized by a succession of cold fronts, starting in the late wet season, but occurring most frequently from December to January. These are the coolest months, with average temperatures of 23-24°C (73-75°F). b) The warm dry season typically occurs from March to May. March and April are the driest months and temperatures rise during this period, peaking in May. The highest temperature recorded to date is 40.5°C (105°F). A general water deficit prevails through the warm dry season and exceptional drought periods occur every few years, usually associated with an exceptionally pronounced dry season, rather than an exceptionally dry year.

An important factor in Belize is the frequency of hurricanes. On average, a hurricane affects central Belize every 16 years. Not all these hurricanes will do extensive damage, but there is at least an appreciable amount of wind-throw and breakage of tree crowns. Most impact comes from rainfall, which can be substantial and lead to widespread flooding.

Vegetation

Vegetation type is closely linked to topography and soils, especially as they affect soil moisture. The gently varying topography produces a long, shallow gradient of soil conditions and a correspondingly long continuum of subtly different forest types. The characteristic vegetation is distributed in gallery upland forest, bajo swamp forest, cohune palm forest and riparian forest:

- Upland forest occurs on well-drained soils. Its canopy is 15-20 m high with some taller trees. *Pouteria reticulata*, *Drypetes brownii*, *Manilkara zapota*, *Pseudolmedia sp.*, *Brosimum alicastrum*, *Sabal morrisiana*, *Hirtella americana*, and *Ampelocera hottlei* are dominant tree species in the upland forest. The subcanopy palm *Cryosophila stauracantha* is abundant. From place to place there is much variation in the species composition and structure of upland forest (Brokaw & Mallory, 1993).
- Bajo swamp forest is found on clay soils that are seasonally waterlogged and edaphically dry. It is a dense forest of small stems mostly three to five meters tall. Many tree species are restricted to bajo swamp forest, while a few typical of dry upland forest are also found there. Bajo swamp forest usually has a sedge ground layer and sometimes dense "sawgrass" (Brokaw & Mallory, 1993).
- Transition forest seems to occur in poorly drained areas, intermediate between upland forest and bajo swamp forest. It largely resembles dry upland forest in structure, but is somewhat shorter, and has some features of bajo swamp forest. It shares tree species with both those forest types. Some

typical tree species of transition forest are *Calophyllum brasiliense*, *Gymnanthes lucida*, *Manilkara zapota*, *Matayba oppositifolia*, and *Metopium brownei* (Brokaw & Mallory, 1993).

- Cohune palm forest occurs on rich, well-drained soils. The canopy is 15-20 m high, with some taller trees. *Attalea cohune*, the cohune palm, is a canopy dominant, but there are many other tree species, including most that are common in upland forest. These include such species as *Swietenia macrophylla*, *Cedrela mexicana*, *Spondias mombin*, and *Ficus spp* (Brokaw & Mallory, 1993).
- Riparian forest occurs along the temporarily flooded margins. It tends to have a broken canopy, with much liana cover and occasional large emergent trees. Species include some of those common in upland forest and such characteristic species as *Inga edulis*, *Bucida buceras*, *Pachira aquatica*, *Pterocarpus hayesii*, *Pithecellobium belizense*, and *Vachellia spp* (Brokaw & Mallory, 1993).

Although there are many vegetation types within the Belize Maya Forest, these vegetation types are combined to make one forest type in the Project Activity Instance. These vegetation types commonly mix and do not have defined boundaries but can be defined on a gradient commonly based on species content. These different vegetation types cannot be differentiated through medium resolution remote sensing, nor is their carbon content significantly different; therefore, they are combined into a single forest type.



Photo 2. Typical forest in the Project Area Instance

Biodiversity

Given the fact that the area is contiguous with the Belizean components of the larger trinational Selva Maya Forest (Aguas Turbias National Park, Rio Bravo Conservation and Management Area (RBCMA), Gallon Jug, and Spanish Creek Wildlife Sanctuary), it can be assumed that the Project Activity Instance has a fauna similar to these better studied areas (Meerman, J.C., 2007). The most important characteristic is that wildlife occurs in fully functioning communities' characteristic of the area. This is most clearly demonstrated by the presence of key species such as baird's tapir, black howler monkey, spider monkey, great curassow, white peccary, ocellated turkey and crested guan. Additionally, is the diversity and relative commonness of top predators e.g., large cats and birds of prey are present (The Forestland Group, 2012).

2.1.6 Social Parameters (G1.3)

Belize has a population of around 400,000 and one of the lowest population densities in the Central American region. The official language in Belize however is English, due to its colonial relationship with the

United Kingdom. The Head of State of Belize is the King of the United Kingdom, who retains a ceremonial and symbolic role in the nation. Belize serves as an “English speaking” transit point for Central America and attracts migrants from Latin America, North America, Europe, the Middle East and Asia. The largest urban area in the country is Belize City, which is the commercial capital, with the main port for export of agricultural products. Additionally, the capital of Belize is Belmopan, an inland settlement developed after Belize City was destroyed by a hurricane. Belize has decentralized production for agricultural crops with sugarcane and rice traditionally grown in the north, and citrus and banana, as well as to a lesser extent rice, grown in the South.

There are two recognized indigenous groups in Belize. Belize was originally inhabited by the Mopan, Yucatec and Kekchi Maya, who developed prominent, regional trading centers such as Lamanai in the north, Caracol in the west and Lubantuun in the south, which was occupied as early as 300 B.C. (Merrell, 1992). During the Caste War in Yucatán, a devastating struggle, that halved the population of the area between 1847 and 1855, thousands of refugees fled to the British settlement (Merrell, 1992). Some Maya, who had fled the strife in the north, but had no wish to become subjects of the British, settled in the remote area of the Yalbac Hills, just beyond the woodcutting frontier in the northwest (Merrell, 1992).

During the late 1700s and early 1800s, the Garifuna also settled in Belize. The Garifuna had resisted British and French colonialism in the Lesser Antilles, until they were defeated by the British in 1796 (Merrell, 1992). After putting down a violent rebellion on Saint Vincent, the British removed between 1,700 and 5,000 of the Garifuna, across the Caribbean to the Bay Islands (present-day Islas de la Bahía) off the north coast of Honduras (Merrell, 1992). From there they migrated to the Caribbean Sea coasts of Nicaragua, Honduras, Guatemala, and the southern part of present-day Belize (Merrell, 1992). Other Garifuna later came to the British settlement of Belize, after losing a civil war in Honduras in 1832 (Merrell, 1992). The 1872 Crown Lands Ordinance established reservations for the Garifuna, as well as the Maya; therefore, the Maya and the Garifuna are considered indigenous groups of Belize due to their native ancestry in the Americas (Merrell, 1992).

The Convention of London in 1786, allowed the British settlers, referred to as Baymen, to cut and export logwood and mahogany from the Rio Hondo River in the north, southward to the Sibun River (Merrell, 1992). The demand for those industries required the labor of African slaves and South Asian indentured laborers (Merrell, 1992). During post colonialization there were Arabs and Chinese who were also exclusively urban, mercantile populations immigrating to Belize in the late nineteenth and early twentieth centuries (Merrell, 1992). A significant number of Chinese were imported as contract laborers in the nineteenth century, but in the late 1980s, the Chinese population increased dramatically with immigrants from Hong Kong and Taiwan (Merrell, 1992). Belize's German-speaking Mennonite population emigrated from Mexico, between 1958 and 1962. Numbering more than 5,000, the Mennonites founded numerous settlements in the Orange Walk, Cayo, and Toledo districts (Merrell, 1992). Due to the high number of ethnic groups, Belize is diverse in languages, cultural practices and religious beliefs (Merrell, 1992).

In the past, the forests of Belize covered more than 85% of its surface area, a desirable situation when compared to neighboring countries in Central America (FAO, 1997). However, the rate of deforestation in Belize has increased in recent years, largely driven by mechanized extensive monocrop agricultural practices. With the increase of population, there has also been a high increase of agricultural activities and deforestation (Bridgewater, 2012) in key biodiversity areas of the country.

There are two large, agriculturally based settlements of Mennonites in Belize, Blue Creek and Spanish Lookout. These and other Mennonite communities form the basis of Belize's agriculture industry as they carry out most of the large-scale agriculture in the country (Costerousse, 2016). They are the main food providers in Belize through the crops they grow and the dairy and poultry industries they have developed. They also export their crops abroad (e.g. the Caribbean). Their farming practices are typically associated with intensive agriculture, that use chemicals to increase their production and fight against pests.

In addition to mechanized extensive monocrop agricultural practices, that have contributed to deforestation in Belize, there are other factors that have also contributed to environmental degradation. Even though these issues are by no means exhaustive, they represent the most critical issues (Young C. , 2008). High deforestation rates, improper solid-waste management, rapid coastal development, increasing poverty,

weak institutional and legal frameworks, and the recent discovery of sweet crude oil, all pose significant threats to Belize's ecosystems (C. Young, 2008).

Moreover, the increasing rate of poverty in environmentally fragile areas is also threatening Belize's ecosystems. In 2018, 52% of the national population and 59% of rural residents lived in poverty (Government of Belize, 2018). Most poor people live in areas with high forest cover and biodiversity (C. Young, 2008). Consequently, people are forced to rely on subsistence agriculture, where they slash and burn the surrounding forests (Young C. , 2008). Furthermore, the economic motivation for harvesting forest products (e.g., medicinal plants or wood carving, bush meat, or cultural artifacts) implies the overharvesting of many species (e.g., parrots, turtles) and illegal sale of items on the black market (Young C. , 2008).

2.1.6.1 Main Communities

The nearest communities to the Project Activity Instance include two of the largest Mennonites communities, and a few smaller villages comprised of Mestizo, other ethnic groups of Belize and recent Central American immigrants and other ethnic groups of Belize. According to the 2010 Census, the stakeholders of the main communities are over 7,515 (Statistical Institute of Belize, 2010) distributed across eight communities, namely: Blue Creek, Spanish Lookout, San Felipe, Yalbac, La Gracia, Valley of Peace, Los Tambos and Buena Vista. By 2021 the population size of the communities exceeded 10,233 individuals (Household Survey, 2021). Members of these communities were interviewed for this project. While Sylvester village and Gallon Jug residents were also interviewed, those settlements are comprised of staff from the Gallon Jug Agroindustry and Chan Chich Lodge and are often long-term residents of other villages within Belize. Note that the Sylvester village was included in the stakeholder identification, as described in the section 2.1.8.

Blue Creek

Blue Creek is a Mennonite community, located in the northern part of Belize, in the Orange Walk District. The community is situated along the Belize/Mexico border. In the 2010 census there were 407 residents (Statistical Institute of Belize, 2022) and by 2021, there were 800 people distributed in 220 households (Household Survey, 2021). The community is composed of 95% of individuals, who are Mennonites, with a small percentage of people of Mestizo descent, who live in the community for work purposes or have married people from the community. The main sources of income in the community are from farming and agriculture. Farming is still very intensive and depends heavily on fertilizers and pesticides. There are community members who are cattle ranchers and practice animal husbandry. The main agricultural crops include rice, sorghum, and other grains. The community has an animal feed plant, that processes/produces this product for local consumption, as well as to supply external demand. This community also has self-maintained roads, bridges, established schools, and administrative facilities without government intervention. The Blue Creek community is dependent on the Rio Hondo watershed, that is protected by the Belize Maya Forest and adjacent Rio Bravo Conservation and Management Area.

Spanish Lookout

Spanish Lookout Colony (SLO) was first founded in 1958 by 75 families of Mennonites, from the Quellen Colony, Chihuahua, Mexico. In 2010, there were 2,266 people (Statistical Institute of Belize, 2010) and by 2021, there was an estimated population size of 3,200 residents (Household Survey, 2021). The Spanish Lookout Colony is made up of 7,500 hectares in the Cayo District, on the northern side of the Belize River. For the first 10 years of its existence, vegetable crops were its main source of income for many families, but by the 1980s, production had reached its peak and the households needed to diversify income sources. Eggs, broiler hens, beans, corn, sorghum, milk, cheese, and beef cattle were some of the ways these families sustained themselves in these first few decades. Unlike some traditional Mennonite communities in Belize, this community utilizes machinery for agricultural production and houses the headquarters of poultry processing factories. The community has self-maintained roads, bridges, established schools, and administrative facilities without government intervention. As the agro-industry became increasingly interested in the region for its natural resources, the commercial sector for this community started to grow. Now it is known as a major commercial center and central hub to the settlements in the area and residents from surrounding villages find employment here. The Spanish Lookout Community Corporation owns farmland adjacent to the Project Activity Instance.

San Felipe

San Felipe village is located in the Orange Walk district, approximately 9 miles to the east of Blue Creek community and north of the Project Activity Instance. In 2010, there were 1,499 residents in the community (Statistical Institute of Belize, 2010). The residents' main sources of income are from sources outside of community including call center jobs, employment at the poultry processing plant in Blue Creek, driver jobs, and small businesses, mainly shops. Traditionally Mestizo communities in Belize engage in recreational small game hunting and enjoy cooking cultural dishes on firewood and coal, which is the case for this and the following communities. The community center, health facilities and the primary school are managed by the government. For education beyond the primary school level, residents need to travel outside of the community. San Felipe is also dependent on the Rio Hondo watershed, that is protected by the Belize Maya Forest and adjacent Rio Bravo Conservation and Management Area.

Yalbac Village

Yalbac Village is the closest community to the border of Project Activity Instance and is less than 20 miles north of Spanish Lookout. In 2021, there was an estimated 64 residents in the community (Household Survey, 2021). It comprises of a group of farmers and houses spread over an area, where the residents have a strong cultural connection to Yalbac and Laguna Seca lands. They are aware of the cultural assets within the Project Activity Instance, including the most prominent Cara Blanca Pools. The residents of the community utilize traditional agricultural practices including slash and burn as well as more intensive agriculture, using chemicals to grow their crops. Due to the proximity to Spanish Lookout, the majority of the residents are employed in the agricultural sector. The residents also engage in recreational hunting and fishing. With the area having been under cultivation for a long time and the increasing demand for agricultural land from nearby Spanish Lookout, there has been a steady increase in conversion of land for farming in recent decades.

La Gracia

La Gracia is located south of Yalbac Village and less than 15 miles from Spanish Lookout. In 2010, there were 271 residents in the community (Statistical Institute of Belize, 2010). The center of the community is located some distance away from the main road. Most of the families are also engaged in formal agriculture, combined with other economic opportunities in nearby villages. This village is also known primarily for its vegetable cultivation and several respondents utilize agroforestry to farm their crops. Due to the diversity of crops farmed in La Gracia residents have more steady wages than other villages nearby. Satellite imagery shows small farm parcels that have been under cultivation since 1969. There is land around Yalbac village and La Gracia that hold natural vegetation, but with the preferred method of land preparation to clear and burn, fires often damage remaining forests around the villages. La Gracia also holds limestone soils, which retain little water during the dry season and much of the natural shrubs and vines drop their leaves due to this, causing more debris that can fuel fire.

Valley of Peace

Valley of Peace was originally a planned community to offer refugees, from neighboring countries, a safe place to start a new life away from violence. In 2010, there were 2,113 residents (Statistical Institute of Belize, 2022) and by 2022 there was an estimated 3,000 residents (Household Survey, 2021). The first settlers arrived in the 1980s, where refugees were provided with a piece of land for farming and a lot for a house. There was also a similar agreement to offer the same number of Belizeans the same opportunities. In Valley of Peace, farmers were very successful and generated economic growth for the village. Valley of Peace is less than 15 miles from Belmopan and residents have diversified sources of income in the service industry. Some of those residents, familiar with the Cara Blanca Pools, stated that they have visited the area for recreational activities including hunting and fishing. Less than 11 miles from Valley of Peace to the east, is the Santander Sugar Factory and the corresponding sugar cane fields, which are also less than 22 miles from Spanish Lookout to the west. While agriculture is not the main source of income for all residents of Valley of Peace, they noted that agricultural activities in nearby areas impact their daily lives for example through slash and burn and movement of machinery along their main road.

Los Tambos

Los Tambos is a de-centralized village, like Yalbac, with most of the houses situated around small parcels of land, rather than a main center road. In 2010, there were 360 residents (Statistical Institute of Belize, 2010) and by 2022 there were an estimated 800 residents (Household Survey, 2021). Los Tambos is less than 5 miles northeast of Spanish Lookout, that provides access to job opportunities for its residents. Over 50% of families living in Los Tambos are involved in the formal agriculture and service industries in Spanish Lookout. Although the residents receive electricity and water, they also collect firewood as a source of fuel. There are small agricultural land parcels in the village where the residents have adopted the agricultural practices and utilize a combination of methods for agricultural production.

Buena Vista

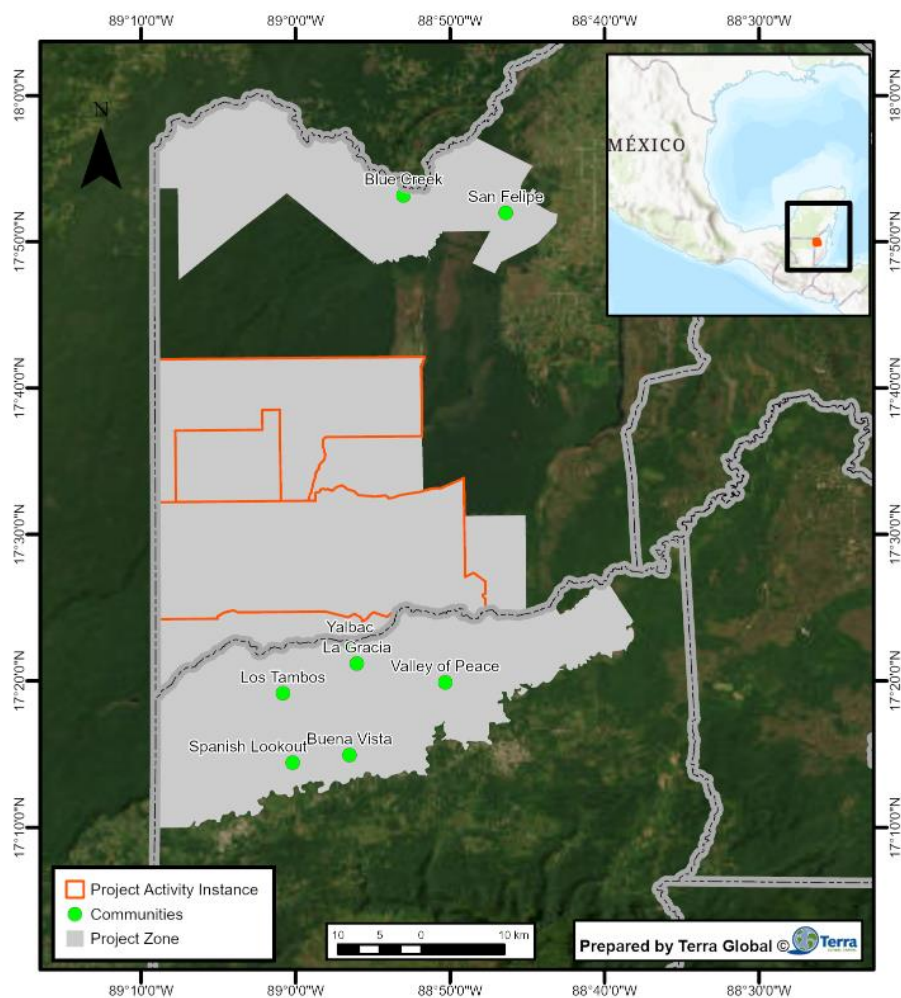
Buena Vista was founded along the road leading from the old Yalbac sawmill to the south gate of the Yalbac lands of the Project Activity Instance. In 2010, there were 599 residents in the community (Statistical Institute of Belize, 2010). It is located less than 7 miles southeast of Spanish Lookout; however, due to its proximity to the Western Highway, residents are engaged in diverse economic activities. The village originally was a farming community, engaged in vegetable, corn and beans production, with a few farmers involved in cattle rearing. While the community has access to electricity, the residents still rely on firewood as a source of fuel and obtain the wood from the nearby forest. The residents are aware of the Cara Blanca Pools and the recreational fishing and hunting that occurs near the site. Some residents note that they also engage in recreational hunting.

2.1.7 Project Zone Map (G1.4-7, G1.13, CM1.2, B1.2)

The Project Zone encompass the first Project Activity Instance (Map 3), where the activities are implemented to generate GHG emission reductions or removals. Project Activity Instance met the applicability criteria and will be monitored and verified to generate Verified Carbon Units (VCU). Section 2.1.5 describes the Project Activity Instance location. The Project Activity Instance is situated in north-western Belize, adjacent to the Rio Bravo Conservation and Management Area. The area borders Guatemala to the west, the Rio Bravo Conservation Management Area to the north, and private agricultural lands, including those owned by the Spanish Lookout Community Corporation and Valley of Peace Farms Ltd., to the East and South.

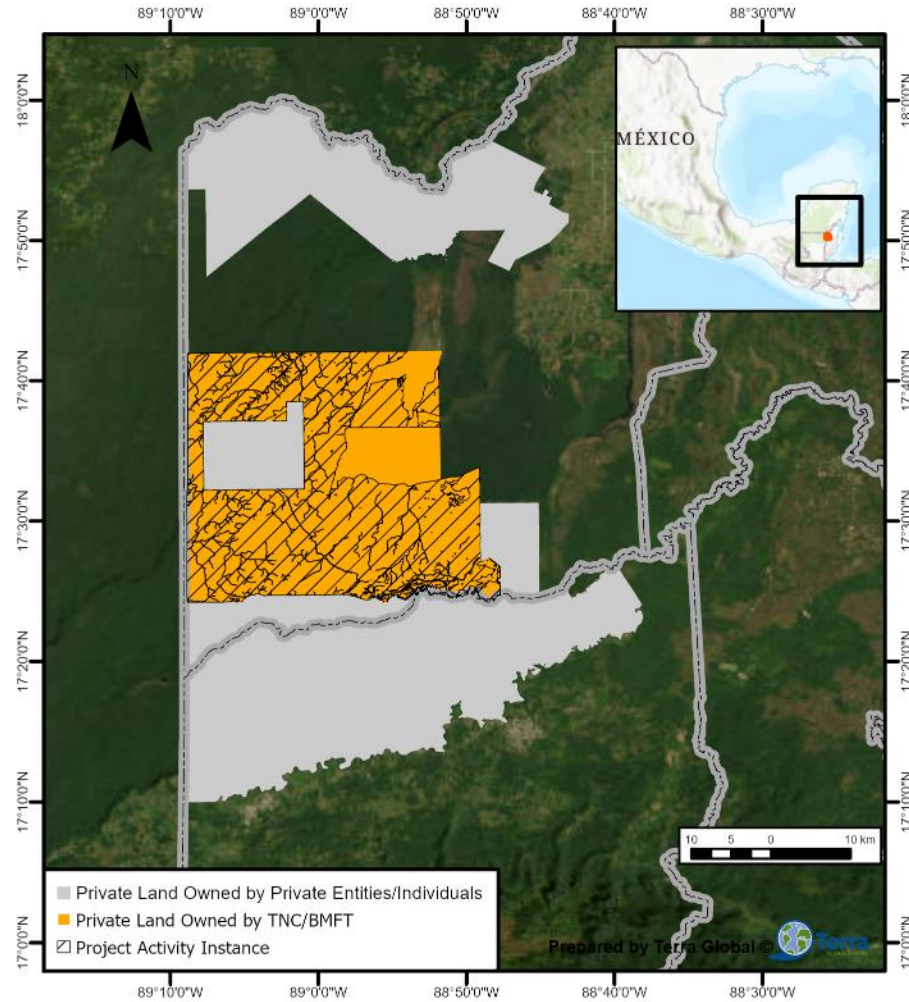
The Project Zone also includes the communities described in section 2.1.6 and the sub-watersheds of the transboundary Rio Hondo watershed and Belize River. As a result, the stakeholder communities were selected based on the proximity to the Project Activity Instance as well as which communities primarily benefit and/or impact the ecosystem services including watershed and biodiversity. The communities selected west of the Belize River include Spanish Lookout, Buena Vista, whereas Valley of Peace, La Gracia, Yalbac Village and Los Tambos are to the south of the Project Zone, and Blue Creek and San Felipe are north of the Project Zone. The location of the communities 2.1.8 is presented in Map 3.

The Project Activity Instance has also archeological sites (Map 5) and natural pools such as the Cara Blanca Pools (Map 6), that are considered important community High Conservation Value (HCV) areas, which are described in Section 4.1.3. As future Project Activity Instances are not identified yet, it is impossible to include all of the potential communities, that will be included at future verifications. Instead, the communities included were similar to those found in and around the general area of Orange Walk and Cayo District and are described in section 2.1.6.

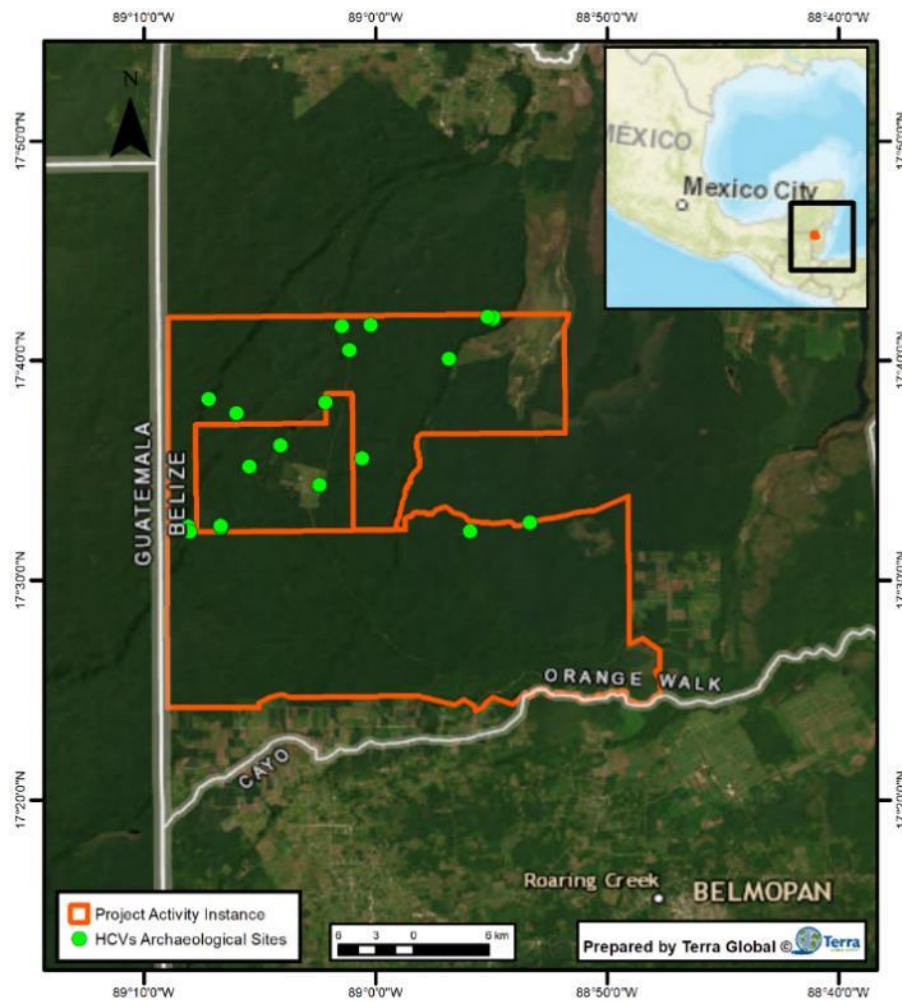


Map 3. Location of Communities and the Project Zone

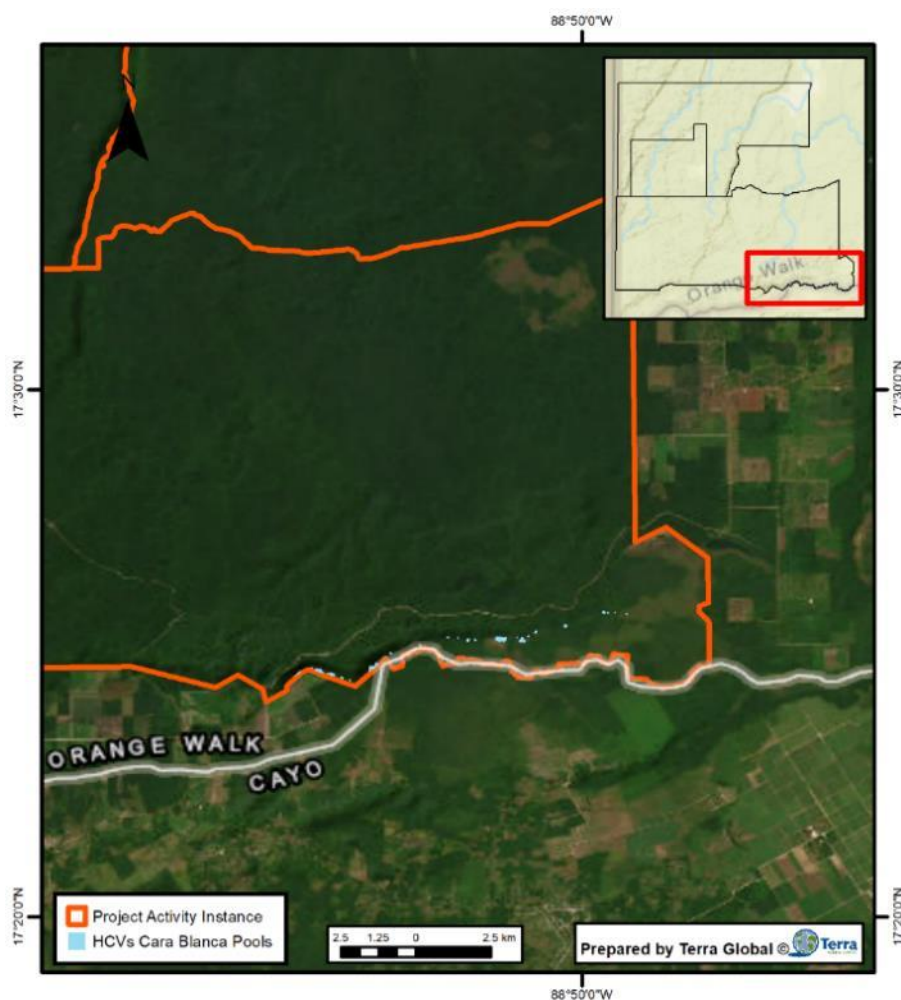
Land in Belize is divided into two broad categories: national lands, and private lands. Land ownership in the in the Project Zone is private land as shown in Map 4. Within the Project Zone there are lands owned by TNC/BMFT, and lands owned by private Entities/Individuals. The private lands owned by TNC/BMFT are managed for conservation and include the BMF and the carbon project VCS ID#1326. The other lands in the project zone owned by private entities/individuals are managed in accordance with the Land Utilization Act, where the entity/individual may use the land to their use. Common Entities/Individuals owners of the land include farmers with agriculture interest as over half of all people interviewed during the household survey were farmers (Household Survey, 2021). Commonly these farmers clear the land for annual agriculture such as corn and beans and/or us the area for ranching as described in Section 2.1.6. Map 4 also shows areas that are owned by BMFT/TNC and are not part of the carbon project. These areas that are excluded from the PAI of this carbon project include conservation areas around waterways, areas that are non-forest 10-years before project start, and the existing VCS Project #1326.



Map 4. Management and Land Ownership within the Project Zone



Map 5. HCVs Archaeological Sites within the Project Zone



Map 6. HCVs Cara Blanca Pools within the Project Zone

2.1.8 Stakeholder Identification (G1.5)

The process to identify the stakeholders and assess their right, interest and relevance to project was based on a combination of using local knowledge, geographical information, and ground research. This stakeholder identification process was initiated in May 2021, as part of the participatory conservation action planning activities undertaken by the BMFT with the assistance of the University of Belize Environmental Research Institute (UB ERI). Although the BMF is a private reserve, to which only BMFT has legal rights, nine (9) stakeholder communities were identified in this process, as relevant to the project, based on two main criteria:

1. High impact or potential for high impact on the BMF through proximity and activities, such as illegal hunting, fishing and logging and poaching activities, as well as neighboring deforestation and agriculture activities, that increase the risk of fire and pesticide and other sources of contamination in the BMF.
2. High direct benefit from the protection of the BMF, through ecosystem goods and services, particularly watershed/water provision services and biodiversity, that help to sustain their populations and livelihoods or provide recreation.

The interests of identified stakeholder communities and community groups in the project varied. Most communities and community groups have high to medium interest, based on the participation of the community leaders in the development of BMFT's conservation action plan.

Apart from communities, other stakeholder groups of the project, that were identified were from academia, non-government organizations, private sector and government ministries and departments. These stakeholders do not have rights per se in BMF as a reserve under private land tenure. However, they are important collaborators and enablers of BMFT's overall management of the reserve and/or can also negatively impact the conservation of the reserve, through their business practices. Hence these stakeholders are important to the success of the project. In the Conservation Action Planning process, a total of 160 individuals representing nine communities, 10 government departments, 12 NGOs, eight private sector companies, and four academic organizations were engaged in meetings, workshops, and focus group sessions. This extensive participation ensured a comprehensive and inclusive approach to the conservation and management planning. An NGO that will actively be engaged in the Project is Programme for Belize which will collaborate with BMFT in patrol efforts. Branches of government that are of interest include the ministry of agriculture that will be engaged and was consulted when planning out climate smart agriculture training for the community and the Pesticides Control Board that was consulted when creating the Conservation Action Plan. These stakeholders will continue to be engaged in revisions of the Conservation Action Plan.

The process to identify stakeholders will be constantly revised to ensure the effective participation of underrepresented groups.

2.1.9 Stakeholder Descriptions (G1.6, G1.13)

The list and description of all communities, community groups and other stakeholders and their relevance, interest and rights can be seen in (Appendix 1: Stakeholder Identification Table).

2.1.10 Sectoral Scope and Project Type

The Project is an AFOLU project, with the activities defined under the reduced emissions from deforestation and degradation (REDD+) project type classified as Avoiding Planned Deforestation and/or Degradation (APDD). This category includes activities that reduce net GHG emissions by stopping or reducing deforestation or degradation on forest lands, that are legally authorized and documented for conversion. This Project is avoided conversion to agriculture, including some areas of pasture.

2.1.11 Project Activities and Theory of Change (G1.8)

To support the conservation of ecosystems and carbon stock in BMF, the project's strategy activities are forest protection through surveillance/patrolling and fire management and response, and community outreach and livelihoods, including through forest restoration and climate smart agriculture. As part of the effort to maintain ecosystems and carbon stocks (Monitoring plan; Table 7. Indicator 2), a key strategy to foster stewardship while building economic independence in surrounding communities is to provide opportunities for alternative or diversified livelihoods. This will be done through skills training, scholarships and microgrants targeted at communities especially women and marginalized groups.

The impact will be for the development and maintenance of a healthy and biodiverse ecosystem in the BMF. To stabilize predator-prey populations, patrols in the BMF will be conducted utilizing the Spatial Monitoring and Reporting Tool for record keeping and planning. To reduce wildfire incidence in the broadleaf forests, training sessions for rangers and community stakeholders will be conducted as well, as the development of fire management plans and standard operating procedures. To improve the forest health and reduce contamination in the HCVs, community educational sessions in forest restoration and regenerative agriculture will be conducted. The aforementioned project activities contribute to biodiversity, livelihood development and reduction of emissions of GHG.

For a complete description of the Project Activities and Theory of Change, refer to Appendix 2: Project Activities and Theory of Change Table.

The Government of Belize has not formally established a REDD+ program in Belize. It has developed of a REDD+ strategy, proposed legislation that would create a local registry for carbon markets and explored the feasibility of marketing jurisdictional credits. The Project is not within a jurisdiction covered by a jurisdictional REDD+ program, as there are none in the country so far. Belize is exploring working with REDD.plus, but Belize's involvement does not affect this project.¹³

2.1.12 Sustainable Development

Belize has been committed to sustainable development through various nationally developed plans, strategies and priorities, that have been introduced over the last decade as well as being a long-time party to international conventions such as the United Nations Framework Convention on Climate Change, the United Nations Convention on Biological Diversity, the Convention on Wetlands of International Importance, especially as Waterfowl Habitat and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Nationally developed plans and strategies are the National Sustainable Tourism Master Plan (2012), the Growth and Sustainable Development Strategy (2016-2019), and the current plan, Belize's National Development Framework – Horizon 2030. These priorities implemented by Belize demonstrate an increasingly motivated government to generate sustainable development for the people of Belize.

Table 2. National Development Strategies and How the Program Contributes

National Development Strategy	Description	How the Program Contributes
National Sustainable Tourism Master Plan (NSTMP), 2012-	This NSTMP is a development action plan for Belize's tourism industry, that directly relates to its natural resources and the management of these key features. It was approved by the Cabinet in 2012 and aimed to reposition Belize as a unique and highly competitive player in the regional eco-tourism market. The NSTMP further conceptualized Belize's tourism products into six areas: cultural, nature-based, sun and beach, cruise, nautical, and leisure and entertainment. The idea was to strengthen tourism governance, improve tourism marketing, increase tourism product development, and promote sustainable tourism in all these six areas.	The program contributes to this strategy because it enhances and protects natural and cultural areas of high conservation value and significance and brings awareness to the conservation of these resources through program activities. This provides the country with more basis on which to market its nature-based resources.
Growth and Sustainable Development Strategy (GSDS), 2016-2019-	The GSDS was Belize's sustainable development strategy from 2016-2019. This represented one of Belize best efforts in fulfilling the economic aspirations of the people of Belize. This strategy was aimed at bringing economic, social, and environmental policies into a synergistic balance. It would strengthen the resiliency of the economy in four success factors: optimal national income and investment, enhanced social cohesion and	The program contributes to this strategy by strengthening the resilience of environmental policies and providing income and investment for local communities, improved health of natural environment through increased patrolling and gates around the property, and

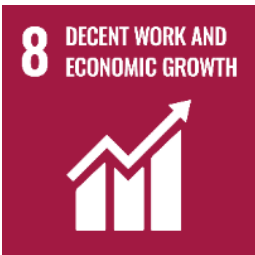
¹³ BMFT has a commitment from the government, ratified by parliament, recognizing and affirming the carbon rights of BMFT within the project

¹⁴ For examples, see: Richards, M. and Panfil, S.N. 2011, *Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects: Part 1 – Core Guidance for Project Proponents*. Climate, Community & Biodiversity Alliance, Forest Trends, Fauna & Flora International and Rainforest Alliance. Washington, DC, 34 – 42.

National Development Strategy	Description	How the Program Contributes
	resilience, sustained or improved health of natural, environmental, historical, and cultural asset, and enhanced governance and citizen security.	preservation of historical assets, such as the areas of high conservation value.
Horizon 2030 – Belize's National Development Framework	This is the vision of a Belize in which it's citizenry would desire to reside. The Horizon 2030 articulated 4 key objectives that would deliver to the future of Belize: democratic governance for effective public administration and sustainable development, education for development, economic resilience, and healthy citizens and healthy environment.	The program contributes to this agenda through awareness and education for development, economic resilience through employment provided and improved health of environment through the protection of the Project Activity Instance.

The Program also contributes to Sustainable Development Goals in the interest of the people of Belize. The government of Belize monitors meeting their sustainable development goals through the interactive website: <https://belize.un.org/en/sdgs>. The BMF REDD+ Project meets the following UN Sustainable Development Goals described in Table 3 below.

Table 3. Sustainable Development Goals achieved through the BMF Project

#	Sustainable Development Goal	How Program Contributes
5	Gender quality 	The program upholds anti-discrimination policies and Belize Law, which prohibits discrimination based on gender, race, or religion. Further, social surveys conducted in the region included women and under-represented minorities to participate to tailor the program activities to promote equality and improve the livelihoods of traditionally underserved groups. Belize Maya Forest Trust is woman led and TNC is dedicated to supporting a new generation of women leaders and has a gender policy that supports women in leading roles in conservation including management. Women's inclusion in the project through decision making, training and employment, will be addressed in the Monitoring Report.
8	Decent work and economic growth 	The Belize Maya Forest REDD+ Project seeks to provide employment opportunities. New employees are trained to maintain local skills and knowledge. The program will take considerable efforts to increase capacity development of employees. Belize Maya Forest Trust is dedicated to providing jobs in conservation. The number of jobs provided by BMFT will be recorded each monitoring period and reported in the Monitoring Report.

#	Sustainable Development Goal	How Program Contributes
13	Climate action 	The Belize Maya Forest REDD+ Project educates community members on systemic and individual ways to implement adaptation, mitigation and will teach safe technology transfer for reducing deforestation and helping create resilient communities. The program will protect the forest avoiding the conversion to annual crops, preserving the wildlife and species in IUCN Red list. At each monitoring period, the number of Emission Reductions reduced during the monitoring period will be reported in the Monitoring Report.
15	Life and land 	REDD+ works to directly reducing deforestation and creating sustainable landscapes; the program is fundamentally structured to sustainably manage forests and halt deforestation in the region. The Belize Maya Forest REDD+ Project directly will reduce deforestation through avoiding the conversion to annual crops. The Project Activity Instance is part of the largest contiguous forest in Mesoamerica, the Selva Maya, encompassing three countries. It is home to a to a high diversity of fauna and flora, that are highly important to preserve the ecosystems and provide key environmental services such as water used for agriculture. This is essential for national food security and supports the National Agriculture and Food Policy 2015-2030. The program will be structured to preserve the ecosystem services and to keep the forest intact, which will in turn contribute to the overall health and well-being of all the surrounding communities, as well as industries located nearby, including tourism and agriculture. Poaching, particularly illegal hunting will be mitigated, through a protection team of rangers who will continue being strengthened to be able to respond to mitigate threats to the reserve and biodiversity; potentially the threats to the reserve may be further mitigated through the creation of a community steward's program. At each monitoring period, the number of hectares conserved during the monitoring period will be reported in the Monitoring Report.
17	Partnership for goals 	Belize Maya Forest was protected through a partnership between TNC, the Government of Belize and BMFT. Implementation of the new management plan for Belize Maya Forest, which is inclusive of the Belize Maya Forest REDD+ Project will require partnerships between TNC, BMFT, the Government of Belize and other key neighbors and stakeholders. REDD+ is a partnership, where climate finance directly supports implementation activities to create sustainable systems promoting global environmental health. Any significant new partnerships will be described in each Monitoring Report.

2.1.13 Implementation Schedule (G1.9)

The table below provides a detailed implementation schedule, with each key milestone numbered and shown in dark green. (Year 1= December 10, 2020 -Dec. 9, 2021).

Strategies	Action Steps	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11-15	Y 16-20	Y 21-25	Y 26-30	Y 30-40
0. Protect BMF from deforestation in perpetuity																
0.1 Purchase of the properties that comprise the 236,000 acres of the BMF and place them on trust in perpetuity for the people and Government of Belize through the BMFT	0.1.1 Determine a mechanism to fund the property acquisition from the previous private landowner, a North American Timber Investment Management Organization (TIMO).	M0														
	0.1.2 Develop an agreement with the Government of Belize to support the acquisition and protection of BMF in perpetuity	M0														
	0.1.3 Create a local not for profit, non-governmental organization, BMFT, to be the trustee, steward and manager of the BMF	M0														
1. Promote awareness and knowledge of BMF and threats to BMF in stakeholder communities																
1.1 Develop and or repurpose/revise existing awareness and outreach materials for dissemination	1.1.1. Determine key target audiences, main messages, and key means of delivering information to community stakeholders															
	1.1.2. Develop and disseminate information/materials															
	1.1.3. Establish and implement a BMF Community Stewards Program that creates champions for the conservation of the BMF and the implementation of the BMF's conservation action plan (including scholarships and microgrants)			M6												
	1.1.4 Develop or Review (every 5 years) the Conservation Action Plan		M2					M2				M2	M2	M2	M2	M2
2. Reduce wildfire incidence in the BMF and surrounding landscape																
2.1. Develop a fire alert system based on monitoring of weather and fires	2.1.1. Use existing fire threat models and weather monitoring to determine red flag days and share with neighbors															
	2.1.2. Collaborate with neighbors and partners on burn plans and safety for agricultural fires to prevent fires from damaging BMF															
2.2. Build capacity for fire management and response within BMFT	2.2.1. Within BMF, map areas for tactical fire intervention including opening of fire lines and controlled burns															
	2.2.2. Purchase fire response equipment for BMFT															

Strategies	Action Steps	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11-15	Y 16-20	Y 21-25	Y 26-30	Y 30-40
	2.2.3. Increase fire management capacity of BMFT and community stakeholders through training	M1				M1					M1					
3. Maintain stable predator-prey populations within the BMF																
3.1. Conduct regular anti-poaching patrols including joint patrols with neighbors, partners, and national institutions using the Spatial Monitoring and Reporting Tool (SMART) on prey-predator populations	3.1.1. Increase capacity of ranger team to use SMART to document and report on patrols		M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3	M3
	3.1.2. Maintain information flow through on poaching and patrol activities through regular communication with relevant partners															
	3.1.3. Participate in joint trainings with partners (green laws and special constable training etc.)		M4													
4. Reduce contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek/Laboring Creek (Belize River)																
4.1. Maintain and restore the forests adjacent to the Cara Blanca Pools	4.1.1. Promote adequate buffers to the Cara Blanca Pools with adjacent landowners through sustainable development practices or maintaining forested lands				M8											
4.2. Improve climate smart farming practices in BMF communities through knowledge sharing and transfer, innovation, and support for sustainable livelihoods.	4.2.1. Collaborate with The Nature Conservancy's sustainable agriculture program and other partners to identify best practices															
	4.2.2. Organize farmer-farmer knowledge and practice exchanges															
	4.2.3. Support the establishment of model farms in stakeholder communities							M9								
4.3. Facilitate livelihood opportunities around industries that do not use pesticides	4.3.1. Involve women in sustainable income generation from non-pesticide intensive trades							M10								
5. Implementation of the MRV plan for carbon project																
5.1 VCS and CCBS Validation Process	Validation (PD)		M5													
5.1 VCS and CCBS Verification Process	Social Surveys															
	Land cover change analysis.															
	Biomass survey and forest measurements															
	Verification (MR)			M7		M7		M7		M7		M7	M7	M7	M7	M7

On the table above dark green cells indicate specific milestones, and light green cells indicate continual activities. Milestones M0 were completed by the time this PD was validated:

- M 0.1.1 The sale of the property was December 10, 2020.
- M 0.1.2 BMFT was incorporated as a limited liability company (company limited by guarantee) under the Companies Act on December 3, 2020, and was registered as an NGO under the NGO Act on August 10, 2021.
- M 0.1.3, TNC and the GoB signed a Fiscal Agreement on October 9th 2020, with Supplemental agreement ratified by Parliament Aug. 31, 2021

Table 4. Implementation Schedule Summary

Date (year of delivery)	Milestones in the project's development and implementation (description)	
1	MO	Purchase BMF and place on trust in perpetuity, Dated December 10, 2020.
1,5,10	M1	Rangers and/or community members have participated in training in integrated fire management
2,7,12, 17, 22, 27	M2	5-year BMF Conservation Action Plan completed
2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20...29	M3	End of year patrol report based on Spatial Monitoring and Reporting Tool (SMART) documentation (yearly)
2	M4	Rangers have participated in green laws and special constable training
2	M5	VCS+CCB Verification of 1st Monitoring report
3	M6	BMFT Stewards Program developed
3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29	M7	On-going verification under VCS+CCB (every 2 years)
4	M8	405 hectares of forest buffering Cara Blanca Pools are maintained
7	M9	Model regenerative/climate-smart agriculture farms implemented
7	M10	Women involved in sustainable, non-pesticide intensive livelihoods

2.1.14 Project Start Date

The project start date is December 10th, 2020. On December 10th, 2020, the ownership of the property changed from TFG, an independent Timberland Investment Management Organization, to the BMFT through the efforts of TNC purchasing two large parcels Laguna Seca and Yalbac, which are the first Project Activity Instance. From that date on, BMFT had the legal rights of the property and the objective to preserve the forest. If the property was acquired by the commercial agriculture farmers – as explained in section 3.1.4.1 – from that date on, they would have the rights to convert the forest to another land use and certainly they would do.

2.1.15 Benefits Assessment and Crediting Period (G1.9)

The Project Crediting Period is 40 years with the intent to renew. The Project start date of 10th December 2020 and ending on 9th December 2060. The project crediting period will also be the monitoring period/assessment period for climate change adaptive capacity and resilience, as well as biodiversity and community well-being. Although the Project Activity Instance is protected in perpetuity for the people and Government of Belize and the project activities will have a lasting effect impact beyond the project crediting period. The Project Proponent commits to monitoring through the crediting period of 40 years and beyond.

2.1.16 Differences in Assessment/Project Crediting Periods (G1.9)

There is no difference between the Project GHG emissions accounting, climate adaptive capacity and resilience, community, and/or biodiversity assessment and periods.

2.1.17 Estimated GHG Emission Reductions or Removals

Year	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Estimated net GHG emission reductions or removals	Risk Buffer	VCUs
[-]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]
2021	1,082,928	0	-177,600	905,328	-108,639	796,688
2022	1,150,689	0	-188,713	961,976	-115,437	846,539
2023	1,218,450	0	-199,826	1,018,624	-122,235	896,389
2024	1,286,211	0	-210,939	1,075,272	-129,033	946,239
2025	1,353,971	0	-222,051	1,131,920	-135,830	996,090
2026	1,421,732	0	-233,164	1,188,568	-142,628	1,045,940
2027	1,489,493	0	-244,277	1,245,216	-149,426	1,095,790
2028	1,557,254	0	-255,390	1,301,865	-156,224	1,145,641
2029	1,625,015	0	-266,502	1,358,513	-163,022	1,195,491
2030	1,692,776	0	-277,615	1,415,161	-169,819	1,245,341
2031	1,733,145	0	-284,236	1,448,909	-173,869	1,275,040
2032	1,773,513	0	-290,856	1,482,657	-177,919	1,304,738
2033	1,813,881	0	-297,477	1,516,405	-181,969	1,334,436
2034	1,854,250	0	-304,097	1,550,153	-186,018	1,364,135
2035	1,894,618	0	-310,717	1,583,901	-190,068	1,393,833
2036	1,934,987	0	-317,338	1,617,649	-194,118	1,423,531
2037	1,975,355	0	-323,958	1,651,397	-198,168	1,453,229
2038	2,015,724	0	-330,579	1,685,145	-202,217	1,482,928
2039	2,056,092	0	-337,199	1,718,893	-206,267	1,512,626
2040	1,128,247	0	-185,033	943,215	-113,186	830,029
2041	952,950	0	-156,284	796,666	-95,600	701,066
2042	885,189	0	-145,171	740,018	-88,802	651,216
2043	817,428	0	-134,058	683,370	-82,004	601,365
2044	749,667	0	-122,945	626,722	-75,207	551,515
2045	681,906	0	-111,833	570,074	-68,409	501,665
2046	614,145	0	-100,720	513,425	-61,611	451,814
2047	546,384	0	-89,607	456,777	-54,813	401,964
2048	478,623	0	-78,494	400,129	-48,016	352,114
2049	410,863	0	-67,381	343,481	-41,218	302,263
2050	367,592	0	-60,285	307,307	-36,877	270,430
2051	327,224	0	-53,665	273,559	-32,827	240,732
2052	286,855	0	-47,044	239,811	-28,777	211,034
2053	246,487	0	-40,424	206,063	-24,728	181,336
2054	206,119	0	-33,803	172,315	-20,678	151,637
2055	165,750	0	-27,183	138,567	-16,628	121,939
2056	125,382	0	-20,563	104,819	-12,578	92,241
2057	85,013	0	-13,942	71,071	-8,529	62,542
2058	44,645	0	-7,322	37,323	-4,479	32,844
2059	4,276	0	-701	3,575	-429	3,146
2060	0	0	0	0	0	0
Total estimated ERs	40,054,831	0	-6,568,992	33,485,839	-4,018,301	29,467,538

Year	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Estimated net GHG emission reductions or removals	Risk Buffer	VCUs
[-]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]
Total number of crediting years	40					
Average annual ERs	1,001,371	0	-164,225	837,146	-100,458	736,688

2.1.18 Risks to the Project (G1.10)

A comprehensive risk report has been conducted for this project per the VCS requirements, which evaluates the most pressing internal, external and natural risks to the project. This identified both natural and human induced risks which are documented in the VCS AFOLU Non-Permanence Risk Tool..

This project has very few risks, the most significant of which are fire and hurricanes. Most fires around the Project Activity Instance are not only human induced, usually for agricultural reasons, but also fire risk increases after hurricanes impact the area. Because the Project Activity Instance is protected, it is highly unlikely that a fire will be started in the Project Activity Instance itself, but there is a small risk that fires in surrounding farmland may encroach on the Project Activity Instance. This risk will be mitigated by regular patrolling by BMFT. Regular patrolling and fire management capacity strengthening will be implemented by BMFT

The community risks not addressed in the Non-Permanent Risk Tool have been described below in Table 5.

Table 5. Community and Biodiversity Risk

Risk Category	Specific Risk	Impact	Mitigation Measures
Climate and Biodiversity	Illegal poaching and land encroachment	Illegal poaching would lead to the degradation of BMF forest resources, reduction in biodiversity due to habitat disturbance and possible fragmentation, and possible conflicts between the BMF entity and the community	The monitoring and adaptive management plans include plans to enhance patrols and surveillance in collaboration with the local communities and also include awareness trainings with the local communities to sensitize them on the importance of conservation In the Impact monitoring through HH surveys, the project will gather feedback on the effectiveness of training and patrols to as input for adaptive management
Biodiversity	Biodiversity loss	Habitat fragmentation and decline in species population from encroachment by local communities or activities	The project has a conservation management plan that includes protection measures for critical habitats and areas of high conservation value. It also has an anti poaching plan to reduce risk

Risk Category	Specific Risk	Impact	Mitigation Measures
			through an increased patrolling initiative. The management plan also describes how species of interest will be monitored in the project's lifetime
Climate	Fires caused by hunters and farmers	Damage to forest areas and habitat fragmentation Damage to forest areas and habitat fragmentation Loss of biodiversity	The project will be providing fire management training to the BMF staff and the local communities, especially the farmers who engage in controlled burns practices. The project will also work with the community to train them on how to respond to fire outbreaks
Biodiversity and Community	Ecosystem risks-Contamination of the Cara Blanca Pools	Ecosystem degradation and degradation of HCV area	The project will conduct trainings in the local community to promote farming practices that minimize the use of farm chemicals that end up as runoff, resulting to contamination of the pools. The project also carries out water quality monitoring to regularly assess the ecosystem health of pools

2.1.19 Benefit Permanence (G1.11)

The crediting period and project life will last 40 years, but the benefits of the project will last long beyond that. The purchase of the Project Activity Instance, in addition to preventing conversion to agriculture, involved a combination of agreements that established a trust for long-term protection and conservation of the land. The terms of the trust are irrevocable and will ensure the conservation of the Project Activity Instance for an indefinite period of time. This act of the creation of the trust and the dedication to conservation is designed to maintain and enhance the climate, community, and biodiversity benefits far beyond the project lifetime.

2.1.20 Financial Sustainability (G1.12)

The project was initiated with the purchase of the land through a grant from TNC, who aims to recover a portion of the purchase price through the sale of VCUs. In addition, the future operating costs of monitoring and conserving the land will be funded through the sale of VCUs. The financial sustainability is demonstrated in the cash flow analysis available to the VVB.

2.1.21 Grouped Projects

This is a group project where new project instances maybe added in future years. Each Project Activity Instance will meet the following criteria listed below.

1) Eligibility Criteria for Grouped Projects (G1.14)

New Project Instances must meet the following criteria in order to be added to the project:

- Be located in forest areas where the same class of agents of deforestation can be identified (Agents with agriculture or ranching interests)

- Adopt and apply project activities such as forest conservation in perpetuity as described in this PD.
- Meet the applicability conditions set out in VM0007 REDD+ Methodology Framework (REDD+MF). See Table 13. VM0007 Applicability Criteria and Compliance Justification for details
- Are subject to the same community and biodiversity without-project scenarios (conversion to non-forest and loss of biodiversity and watershed protection)
- Are subject to the baseline scenario (conversion to non-forest and loss of biodiversity and watershed protection)
- Define a Project Zone Instance using similar analysis to define stakeholders as described in this PD
- Have characteristics with respect to additionality as described in section 3.1.5
- Are subject to the same processes for stakeholder engagement described in this PD and will respect for rights to lands, territories and resources including free, prior and informed consent if applicable.
- Have similar monitoring elements as described in section 3.3.

2) Scalability Limits for the Grouped Projects (G1.15)

This grouped project is intended to support all applicable areas to be included as Project Activity Instances in the future. Potential areas can be included as new Project Activity Instances, as long as the criteria are met and there are no net negative impacts on biodiversity. The extent of the project boundary is limited to the country of Belize. This program may bring in large parcels, such as the Project Activity Instance described in this PD, or individual parcels for smallholders. As the overwhelming benefits are positive, there are no scalability limits.

As new PAI areas are added, BMFT is expected to grow in number of employees needed to manage the new areas. At project start BMFT does not have resources to purchase additional parcels to create new PAIs. If funding becomes available, and BMFT is able to purchase more land, BMFT will need to scale their capacity to manage the area and have sufficient funding to economically support the programs described in this PD. Overall there is no managerial constraints, to include new PAIs.

3) Risk Mitigation Approach for Grouped Projects (G1.15)

This project does not have any scalability limits, as BMFT is expected to grow with the number of PAIs. While new Project Activity Instances are required to meet the eligibility and applicability conditions outlined above and will implement similar project activities, they may each be different as to the risks to climate, community, and biodiversity benefits. Each new Project Activity Instance is required to create its specific risk assessment to ensure that the overall grouped project risk buffer adequately reflects the risk described in this PD or is migrated through activities described in the monitoring plan. During each Verification, the Morning Report will state if a new PAI has been added and must define if BMFT need to increase in staff to support the new PAI, as well as associated risks.

2.2 Without -Project Land Use Scenario and Additionality

2.2.1 Land Use Scenarios Without the Project (G2.1)

Belize's regulatory structure allows private landowners to harvest forests and convert natural ecosystems to agriculture, as long as they are aligned with the Environmental Protection Act regulations for environmental impact assessment and an environmental compliance plan approved by the government, where harvesting and conversion restrictions apply to buffer zones around water sources and international borders (Environmental Protection Act, 2020). The Project Activity Instance, as private land, is vulnerable to conversion to agricultural land according to Belize's regulations.

Prior to Project Start, The Forestland Group owned the project area and practiced sustainable logging. When their interests in the land were completed, they looked for possible buyers. When the land was sold the following potential land use scenarios could have taken place:

- Continued logging/working forests
- Agriculture expansion
- Conservation activities without being registered as a VCS AFOLU project.

These three possible land-use scenarios are described in detail in Section 3.1.5.2 STEP 1. Identification of Alternative Land Use Scenarios to the Proposed VCS AFOLU Project Activity.

In 2019, TFG, began looking for buyers for their land. Being an FSC certified company, TFG had desired that the land would remain as forestland. This land-use scenario would be continued logging/working forests or conservation. In this scenario, the Project Area would remain forest, and continue to be logged. In order to keep the land as a working forest, a timber company would need to purchase the property. Belize was once rich in logging operations, but due to forest loss and over exploitation in the past, Belize's logging industry is not what it used to be. No timber companies in Belize, or internationally could provide a reasonable offer to TFG.

Among the potential buyers and offers received, there were agricultural companies and individuals engaged in large commercial scale agricultural farming, whose business model involves conversion of forest into productive monocropping agriculture systems. These companies have historically purchased large tracts of forest land and converted them to agriculture. In this potential land use scenario, the land would be converted to agriculture. Section 3.1.4 demonstrates additional evidence that non-conservation buyers could be found, and that sales information regarding the parcel showed agricultural use as the best and highest use for the properties. In addition, the property has biophysical characteristics suitable for the implementation of agricultural crops. For a more comprehensive details see section 3.1.4. The most likely without project scenario is that the land would be converted to agriculture, as described in section 3.1.4. In this without project scenario, soil and agriculture run-off would reach areas in both the Project Area and Project Zone and the quality and quantity of the water would be negatively affected, impairing the communities in the Project Zone.

No conservation agency could afford to purchase the land outright without it being registered as a VCS AFOLU project. The only way the land could be conserved is if the conservation agency could recover a portion of the purchase price through the sale of VERRs.



Photo 3. View from the Cara Blanca Escarpment of a privately owned property recently cleared for agriculture.

2.2.2 Most-Likely Scenario Justification (G2.1)

For this project, the baseline scenario is the most-likely without project scenario and is assumed to be the same as the conditions described in Sections 2.2.1 and 3.1.4. Well documented evidence of the potential sale of the property is described in Section 3.1.4.1 (especially section Evidence of Likely Transfer to Deforestation Agent (1.2. bullet 3 of BL-PL)) and evidence was provided to the VVB. This information is documentation for VM0007 that proves that the land would be converted to non-forest in the without project scenario. In the absence of the project, the property would be sold to a company with a clear interest in converting the land into permanent agriculture or pastureland as clear common practice in the area. As identified in section 3.1.4, the area would not be reforested.

2.2.3 Community and Biodiversity Additionality (G2.2)

The Project Activity Instance possesses astounding biodiversity. In the absence of the project, the following would be lost permanently: populations of around 200 species of trees, 390 species of birds, and 80 species of mammals, including one of the world's healthiest populations of jaguars and endangered wildlife like the Yucatán black howler monkey (*Alouatta pigra*). According to Global Conservation, the principal threats to the Greater Belize Maya Forest include illegal hunting and fishing, wildfires, and contamination of aquatic systems by pesticides, agricultural inputs, and runoff (Global Conservation, 2022).

The forest lost in the Project Activity Instance would negatively affect wildlife habitat, and therefore would increase human-wildlife conflict. Therefore, without the project, these threats as well as the clear identification of conversion to annual crops, would affect negatively the biodiversity and community dynamics in the Project Activity Instance.

In the absence of the project, the communities would have a permanent loss of all environmental services that the BMF provides, including reduced flooding, reduced erosion and runoff, improved water quality and quantity, that supports healthy fishing habitat and ecotourism potential. As many of the communities are reliant on agriculture, healthy water resources are very important to maintain community health and economic sustainability.

BMF acts as a buffer to reduce the impact of hurricanes, reducing the risk in communities in the surrounding area. Without the project, the communities would be more vulnerable to risks associated with hurricanes hazards.

Therefore, the presence of the project is important to avoid the increase of those activities, that will not only affect the biodiversity, but also the nearby communities in the long term.

2.2.4 Benefits to be Used as Offsets (G2.2)

The Project will validate and verify under the VCS and CCB, to generate VCUs "tagged" with CCB to reflect the positive community, biodiversity, and adaptation benefits, in addition to climate mitigation benefits. At this time the market for distinct community and biodiversity credits is not well developed and thus there is no plan to use these uniquely to offset. That said, the program retains the right and flexibility to uniquely use the biodiversity and community benefits in the future if it deems it is valuable to delivering on the program objectives. If this occurs, the program will provide the rationale at the next verification of the additionality for using unique biodiversity and/or community benefits as offsets beyond the VCUs "tagged" with CCB.

2.3 Stakeholder Engagement

2.3.1 Stakeholder Access to Project Documents (G3.1)

Full project documentation, including project description documentation and monitoring reports will be made accessible to communities and other stakeholders using various means. For communities that do not have reliable access to internet except on cell phones, at least one hard copy will be placed at a strategic point open during regular business hours, for example, main entrance of BMF. All other stakeholders will be

provided full project documentation by sharing links of where the documentation can be accessed through email or WhatsApp groups. BMFT will create WhatsApp groups with community stakeholders as WhatsApp has been proving an efficient communication channel, especially to share documentation with those who do not have email access.

2.3.2 Dissemination of Summary Project Documents (G3.1)

Summary project documentation will also be placed in hard copy at strategic locations in each village and shared with village council chairpersons, but in addition will be shared with village councilors that have access to internet via smart phones through a WhatsApp group. Village councilors will then pass on summary documentation to other villagers. Summary documentation will be shared with all other stakeholders by providing links to summary documentation via email or WhatsApp groups. The summary project documentation will be available in Spanish and English.

2.3.3 Informational Meetings with Stakeholders (G3.1)

Informational meetings with communities and local stakeholders were publicized via email, text, and telephone calls. University of Belize Environmental Research Institute (UB ERI) was contracted as a neutral third party to assist in communication with communities. BMFT with the help of the UB ERI, also requested that village councils assist us in selecting village representatives to attend informational meetings. Informational meetings were structured as in person introductory sessions and participatory conservation action planning workshops for community representatives. For other stakeholders, informational meetings were structured as virtual informational sessions and virtual participatory conservation action planning workshops or focus group sessions. The above sessions resulted in the development of activities included in the project implementation plan, which reflects the BMFT's conservation action plan. In addition, the UB ERI conducted community social surveys and focus group sessions.

2.3.4 Community Costs, Risks, and Benefits (G3.2)

The information about potential costs, risks and benefits to communities and other relevant information of the project has been discussed and provided to communities through the informational and participatory planning meetings held with community stakeholders as described in section 2.3.3. The information to communities focused on benefits as the Project Activity Instance is privately owned and therefore the project does not present any costs or risks to the stakeholder communities. Whilst the previous private landowner of the reserve ran a logging operation that employed staff, those staff would have lost their jobs in logging if the area had been converted to large-scale, mechanized agriculture. Instead, through the project, BMFT has now contracted some of the staff from the previous company that owned the BMF as rangers. Benefits discussed with communities include the development and implementation of community projects on restoration including regenerative agriculture, educational outreach in communities and training opportunities for community members in fire management, restoration and regenerative agriculture. As new information becomes available (for example through periodic review of the CAP) and potential risk, benefits or costs are identified, those will be communicated to the stakeholders using the channels describes in sections 2.3.2.and 2.3.3.

2.3.5 Information to Stakeholders on Validation and Verification Process (G3.3)

Communities and other stakeholders are informed of the process for CCB validation and verification through in person and or telephone communication with the village councils, including reminders via text messages, telephone calls and WhatsApp groups (for community stakeholders) and email and or telephone and WhatsApp communication with other stakeholders. A schematic design in both English and Spanish simplifying the validation and verification process can be provided/disseminated to all stakeholders through WhatsApp groups, emails and in person sessions.

2.3.6 Site Visit Information and Opportunities to Communicate with Auditor (G3.3)

Communities and other stakeholders will be informed of the auditor's site visit using telephone calls, text messages, WhatsApp, email messages, or in person by UB ERI and BMFT Community Coordinator. Auditors will be required to speak English and Spanish to facilitate the direct and independent communication and avoid potential miscommunication. To ensure that the meeting will happen, the project will facilitate venue and transportation if needed. Meetings will be scheduled with weeks in advance and respecting any work-related, cultural or religious commitment (e.g., no meetings scheduled during worship time or holidays).

2.3.7 Stakeholder Consultations (G3.4)

Communities, including community groups, and other stakeholders have influenced project design through participatory conservation action planning. Participants in the planning process were representatives selected by village councils or other stakeholder groups from the government, NGO and private sector trying to ensure the participation of all genders, different ages and from different vulnerable groups, but respecting community and organizational leadership as is customary in Belize. The planning process involved identifying key conservation targets in BMF and the threats to those targets. Assessment of the viability of the targets and the extent of the threats was then used to develop strategies for the improvement of the conservation targets or abatement of the threats to them. These strategies are what are captured in the project implementation plan. Table 6 and Appendix 2: Project Activities and Theory of Change Table below summarizes the stakeholder consultations by date and type. Both Spanish and English were used in meetings with community representatives to ensure broader participation. Evidence of the implementation of stakeholder consultation were made available to the VVB.

Table 6. BMF Informational and Conservation Action Participatory Planning Meetings

Meeting category	Stakeholder Category	May-Jun 2021	Jul-Sept, 2021	Dec-21	Jan-Feb 2022	Apr-July 2022
Initial Informational Meetings about BMF and participatory planning	All communities (in person)	May 30. June 6, 9 & 30	July 4			
	Academia, Government, NGO & Private sector (virtual)		July 1			
Workshops to determine conservation targets and assess threats to BMF	Communities (in person)		Aug 22, 29 & Sept 2			
	Academia and NGO (virtual)		Aug 22			
	Academia, NGO, Private sector & Government (virtual)		Sept 2			
Workshops to develop strategies	Communities (9 in person)			Dec 2	Jan 20	
	Academia, Government, NGO & Private Sector (virtual)				Jan 20	
Focus Group Sessions	Government (Forest Department and Ministry of Sustainable Development staff – in person)				Feb 23	
	Community (Spanish Lookout Birding Group – in person)					Apr 24
	Community, Government, Private sector (Blue Creek and					Apr 25

Meeting category	Stakeholder Category	May-Jun 2021	Jul-Sept, 2021	Dec-21	Jan-Feb 2022	Apr-July 2022
	Department of Agriculture - in person)					
Validation Workshop for BMF conservation action plan 2022-2027	Academia, Government, NGO & Private sector (virtual)					June 30
	Communities (in person)					July 3

2.3.8 Continued Consultation and Adaptive Management (G3.4)

Continued communication and consultation between the project proponents, communities and other stakeholders will be ensured in two main ways: the hiring of a Community Outreach and Stewards Coordinator, whose responsibility will be to stay in touch and liaise with community stakeholders on the project and any other BMF matters and engage in a new conservation action planning process every 5 years. During the review of the conservation action planning, the results from the monitoring plan as well as the feedback from stakeholders will be incorporated to adapt the work plan and achieve further conservation results.

2.3.9 Stakeholder Consultation Channels (G3.5)

As described in section 2.3.7, the process for consultation with communities and other stakeholders was undertaken through informational/ introductory sessions and participatory conservation action planning, in which communities were represented by their village council leadership and/or chosen representatives. Other stakeholders designated a representative to participate in the conservation action planning sessions. The table in section 2.3.7 documents all the meetings hosted, up to the completion of this document. Table 7 below documents the number of participants by gender in the meetings/ workshops/ focus group sessions described in section 2.3.7. In total, nine (9) community and community groups, three (3) academic institutions, 13 government departments and/or ministries, 15 NGOs and eight (8) private companies were represented in consultations.

Table 7. Stakeholder's Meetings Held

Stakeholder category	No. of female participants	No. of male participants	Total
Community and Community Groups	7	57	64
Academia	5	4	9
Private Sector	3	9	12
NGO	9	18	27
Government	11	13	24
Total	35	101	136

In addition, the project is implementing a grievance mechanism, which will serve as another form to receive feedback from the stakeholders. For more information see section 2.3.13.

2.3.10 Stakeholder Participation in Decision-Making and Implementation (G3.6)

The stakeholder consultation process, as described in sections 2.3.7, 2.3.8 and 2.3.9 led to effective participation in the decision-making and implementation of the project strategies. Participation of communities in participatory action planning was enabled by respecting the official channels of communication in each village, which consists of the elected village councils. Sessions were also organized for evenings or weekends to ensure participation. Initial information sessions were organized as open community meetings at which each community or community group chose 1-3 representatives as desired

to participate in subsequent conservation action planning workshops for the Belize Maya Forest. Participatory conservation action planning sessions were all done in person and transportation and food was provided for all community/community group participants. The participation of women and youth was encouraged while respecting communities' decision on who would represent them. Often this decision was made based on who was willing to volunteer. The participatory action planning process will be conducted every five years to assess the previous plan and develop a new one.

2.3.11 Anti-Discrimination Assurance (G3.7)

The design of the project has been founded by anti-discrimination policies including BMFT's Code of Ethics. In addition, BMFT will be developing Workplace Harassment Prevention and Reporting Policy, Equal Employment Opportunity and Diversity Policy. Those policies provide guidance to actions and decisions to ensure that everyone is treated with respect, fairness, and integrity, and to ensure a safe and inclusive work environment.

Furthermore, both the Country Program Director for TNC in Belize and the Managing Director for BMFT are women. These women are involved in the design, implementation and oversight of the project. With TNC's commitment to gender equality, using approaches to ensure gender integration and mainstreaming, it is very likely that the project will incorporate gender perspectives into organizational, program and/ or project policies, strategies and functions to achieve gender equality and integrate gender equity.

2.3.12 Feedback and Grievance Redress Procedure (G3.8)

It is important to note that BMF is privately owned; no community members live within the boundaries of the BMF, and members of stakeholder communities near the project do not have legal or customary rights to the land or resources within BMF. As such, BMFT's grievance response mechanism builds upon relationships with communities, that were established through the Conservation Action Plan development process and provides community members an open-door option for friendly resolution of issues with BMFT staff. BMFT is a local organization made up of local Belizeans, who are familiar with local customs and traditional structures for traditional methods that communities use to resolve conflicts. The grievance process was established as part of the BMFT conservation initiative, where community leaders convened to deliberate on goals and strategies, including the most effective approaches for handling conflicts. The procedure incorporates a combination of traditional, conventional and modern approaches to resolving conflicts. The communities in the project area do not have traditional methods of communication typical of indigenous communities. Most stakeholders in the project are modern communities with access to phones and email, so the process described Figure 1 are the most appropriate for communication for a Feedback and Grievance Redress Procedure.

All of the communities are governed using the national laws that govern villages – this is the most common traditional structure for traditional methods that communities and other stakeholders use to resolve conflicts. Each community elects a chairperson for the village, who is the leader of the community and who could represent the members on issues affecting community. Community members also have direct access to grievance redress mechanism individually if they choose. The grievance redress mechanism introduced by BMFT provides an alternative that allows for mediation and amicable resolution and is intended to be apolitical and non-partisan in a system that is bipartisan at the community level.

There are community specific norms for the Spanish Lookout and Sylvester communities. The Spanish Lookout recently created a position, Conservation Liaison, who is a point of contact for the community on issues related to the project area. In the case of the Sylvester community, all the members of the Sylvester community are either employed or related to an employee of the farm and they may opt to direct their concerns or issues through their supervisor.

The grievance procedure for the project will be managed by the BMFT Community Outreach and Stewards Coordinator, whose job is to liaise and work with stakeholder communities and community groups. The grievance procedure and relevant contacts will be initially shared with communities/community groups and other stakeholders, along with the project summary, and reminders and notes will be included in other relevant outreach communications. The clear grievance redress procedure has been formalized to address

dispute with communities and other stakeholders and is shown visually in Figure 1. In addition, the steps below are followed to address the grievance procedure as described Figure 1 and are listed here in detail:

Step 1: Lodging of Grievances (Stage 1)

Grievances can be lodged directly or through a village council representative or community member with the Community Coordinator, who will visit communities regularly, or with the Head Ranger at any of the BMFT gates. Grievances can be lodged orally (in person or via telephone/ WhatsApp call), in which case the relevant staff will transcribe into a grievance report. Grievances can also be submitted in writing via letter, email or text messages, that will be used as documentation of the grievance. All grievances lodged at the gate must be passed on to the Community Coordinator. Grievances are gathered and summarized once a month.

Step 2: Assessment of the grievance (Stage 2)

Once a month, the Community Coordinator will inform the Managing Director of all grievances lodged as they are received and will work with the Managing Director to assess and categorize grievances based on urgency, severity and need to investigate further.

Step 3: Grievance Resolution (Stage 3)

Grievances that can be easily addressed will be addressed within a week, but those that require further investigation and evidence will be addressed within a month to allow time for investigation. All evidence or information gathered during the investigation will be documented by BMFT. The BMFT will provide a letter to the aggrieved party documenting how it is proposing to resolve the grievance. The aggrieved party must countersign the letter signaling that they agree to the proposal to resolve the grievance.

Step 4: Further mediation or extraordinary measures to grievance resolution (If needed)

If after discussing the proposed resolution to a grievance, the aggrieved party and BMFT cannot agree on the proposed resolution, BMFT will seek the assistance of third-party experts to mediate a solution to resolve the grievance. This mediator will be agreed upon by BMFT and the aggrieved party and will be trained in traditional methods that communities and other stakeholders use to resolve conflicts. BMFT will document the mediation process and all parties will be required to countersign the proposed solution after mediation by third parties. Community grievances related to any violation of laws by BMFT staff, should they occur, can be directed to law enforcement by community members.

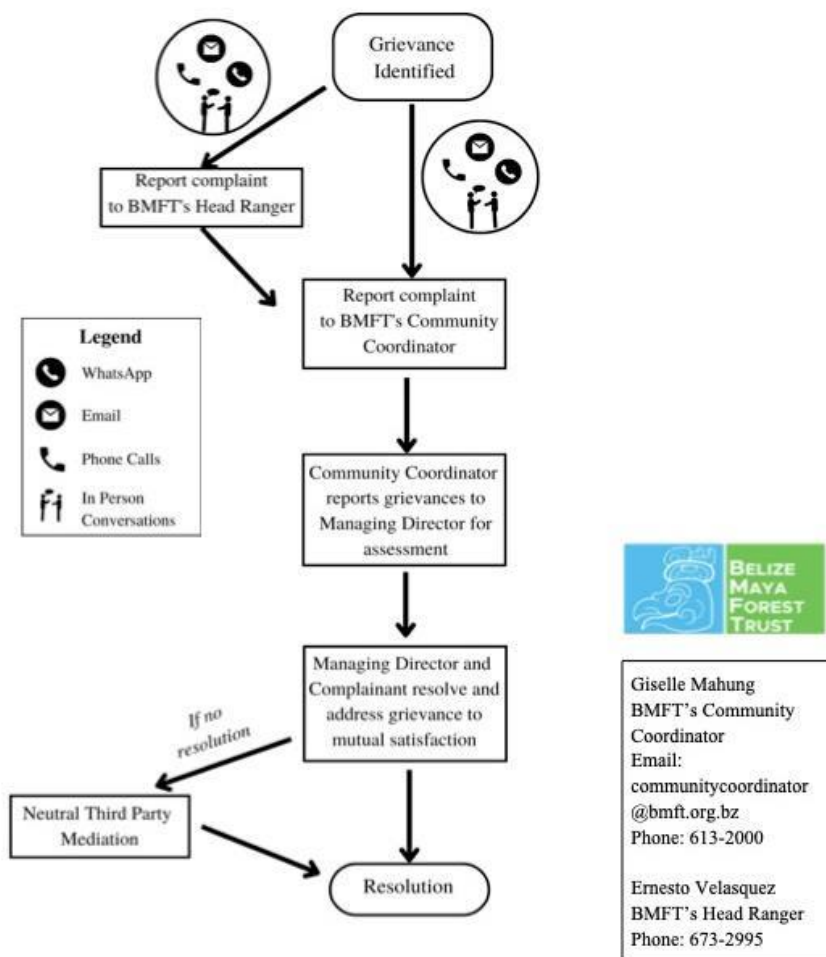


Figure 1. Grievance Procedure

2.3.13 Accessibility of the Feedback and Grievance Redress Procedure (G3.8)

The feedback and grievance redress procedure in the form of simplified posters or fliers will be placed in hard copy at strategic locations in each village and shared with village council representatives. Reminders and notes will be included in other relevant outreach communications, and in addition will be shared with village councilors that have access to internet via smart phones through a WhatsApp group. Village councilors can then pass on summary documentation to other villagers. The feedback and grievance redress procedure will be shared with all other stakeholders via email or WhatsApp groups. The communities in the project area do not have traditional methods of communication as they are modern communities with access to phones and email, so the email contacts and phone numbers listed in (Figure 1) are the most appropriate.

2.3.14 Worker Training (G3.9)

All BMFT staff are assigned a supervisor, who is responsible both for their orientation as well as for identification of training needs. Ongoing staff training is an important part of BMFT operations. In addition to building relationships with supervisors, staff can meet as a team at an annual staff retreat, in which staff can spend time together and also participate in the identification of training needs.

Key areas for training for both BMFT staff and stakeholder communities/ community groups are understanding and documenting illegal wildlife trade and integrated fire management. Additionally, communities can benefit from training to manage their community landscape sustainably and in so doing conserve the BMF. The process of training and outreach for stakeholder community/community groups was already initiated through the conservation action planning process.

2.3.15 Community Employment Opportunities (G3.10)

All BMFT jobs are hired based on an open call for applications and set job descriptions, desired skills and qualifications that are then advertised largely through social media – LinkedIn and Facebook and broadcasted via WhatsApp.¹⁵ The latter is very popular with members of the stakeholder communities/community groups. The preference is to hire from the local communities and particularly the Cayo District, if the applicants from these areas have the right skills, experience, and profile. Through its outreach program, BMFT will include women and marginalized people as targets for scholarships and skills training listed in 4.2.1 to ensure equity and promote equal access to job opportunities with BMFT. Flyers on employment and scholarship will also be posted on grocery stores in the community that are highly frequented by community members, ensuring that visibility on the opportunities is widespread among the community members. However, for security reasons, particularly for the rangers, it is important that the team is staffed with a mix of members of nearby communities and others from a broader geographic area range. The experience of other protected areas has shown that if all rangers come from one community or from nearby, there is a higher risk of security breaches in the protected area.

2.3.16 Relevant Laws and Regulations Related to Worker's Rights (G3.11)

BMFT is fully compliant with the laws that protect the rights of their employees. During onboarding, new employees are oriented on their rights as workers and the laws protecting employees from sexual harassment. In every district, there are Labor Department representatives to provide support to workers and ensure their rights are protected. As required by law, all employees are registered with the Social Security Board (SSB), which has a national program that provides benefits for sickness, disability, and retirement/pension. The SSB provides an online portal, which allows access to workers to know the status of their SSB account. Although not required by law, BMFT also provides a private plan for health and life insurance for employees.

Below (Table 8) is a list and brief description of all relevant labor laws in Belize.

Table 8. Relevant Labor Laws in Belize

Statute	Relevance and Compliance
Labor Act and Labor (Subsidiary Laws) Chapter 297 of 2011 (Revised)	Addresses labor laws and regulations. Compliance with this law ensures that the project proponent and all other entities involved in project design and implementation are not involved in or complicit in any form of discrimination or sexual harassment with respect to the project.
Social Security Act, Chapter 55 and Subsidiary Laws	Social Security is social insurance that replaces part of your income from work when you become sick, pregnant or disabled. It also replaces part of your income when you retire or die leaving survivors. It provides social insurance for you and your family. It ensures that employers take injured insured for medical care and facilitate investigation for accidents

¹⁵ Note that Facebook is the widely used means of providing access to job opportunities. Internet penetration in Belize is at 62% and all rural communities communicate or receive information by WhatsApp.

Statute	Relevance and Compliance
Protection Against Sexual Harassment Act and Protection Against Sexual Harassment Commencement Act Order	Compliance for this law ensures that BMFT provides protection against sexual harassment for employees and for the communities through awareness and training to employees on the laws that govern them.
Trade Unions Act, Trade Unions Regulations Trade Unions and Employers Organizations	Addresses the rights of workers to organize. Compliance involves informing workers of their right to unionize outlined in worker's agreements.
International Labor Organization Conventions	Belize is a signatory to many of the International Labor Organization's conventions ¹⁶ . Those conventions are addressed in Belize labor laws. The ILO Conventions Act commits Belize to following the ILO conventions.
Equal Pay Act, Chapter 302:01	This act seeks to ensure that employers pay equal pay for equal work without discrimination between male and female employees.

2.3.17 Occupational Safety Assessment (G3.12)

BMFT meets all national standards for workplace safety. Employees are oriented on worker risks and response procedures during onboarding. The substantial risks to workers and mitigation measures are outlined in Table 9 below. BMFT staff can respond and administer first aid and BMFT will source regular trainings for employees in first aid based on national standards. Procedures will be developed to respond to emergencies from risks listed below.

Table 9. Risks to Worker Safety and Mitigation Strategies

Hazard	Safety strategy and equipment
Snake bites	- Staff can access a hospital within the hour from most of the usual field locations frequented during patrols or visits. Hospitals in Belize carry anti-venom, which is best administered in a hospital where severe allergic reactions can be managed. - First aid training and first aid kits are placed in all common areas - Adequate boots and protective gear are provided to workers - Radios to contact in an emergency are provided to rangers - Minimum two person crews are established to enhance worker safety and security - Helicopter evacuation is available, when necessary, from remote locations in the reserve.
Poachers	- Radios are provided to inform of poaching events or sightings - Minimum two person crews are established to enhance worker safety when encountering dangerous situations
Fire	- Staff can access a hospital within an hour from most of the usual field locations frequented - Staff are trained in fire management techniques and fire behaviour and response First aid kits are provided in common areas

¹⁶ See ILO web site at www.ilo.org

Hazard	Safety strategy and equipment
	- Radios to contact in an emergency medical attention are provided to rangers. - Protective gear for extreme heat events is provided to workers
Vehicle accidents	- Staff are trained in first aid and can reach the nearest hospital within the hour in most instances - Helicopter evacuation. - First aid training and First aid kits are provided in common areas - Radios to contact in an emergency are provided to workers
Machete cuts	- First aid training and First aid kits are provided in common areas - Radios to contact in an emergency are provided to all workers - Minimum two person crews are established to enhance worker safety - Adequate boots are provided to rangers
Chainsaw cuts	- Staff can access a hospital within the hour from most of the usual field locations frequented during patrols or visits. - Helicopter evacuation is provided as required - First aid training and First aid kits are provided in common areas - Radios to contact in an emergency are provided to workers - Minimum two person crews - Protective gear is available to staff - Adequate boots are provided
Lightning strike	- Develop procedures for avoiding lightning strikes - Radio

2.4 Management Capacity

2.4.1 Project Governance Structures (G4.1)

Project Governance Structure:

Funds from the proposed project will be used to pay a portion of the acquisition costs of the BMF as well as set up an endowment, whose proceeds will be invested in the annual operations of BMFT. BMFT's Board of Directors is the ultimate decision and policy-making body to BMFT, delegating certain responsibilities to its Managing Director in order to ensure efficient and effective operations. All operations of the BMFT are based on an approved annual budget to fund the activities of BMFT's conservation action plan and other operational lines required with the maintenance of the reserve. As the project proponent TNC, works with BMFT and implementing partners to develop the project and support BMFT in the administration for the implementation of the project onsite (Figure 2).

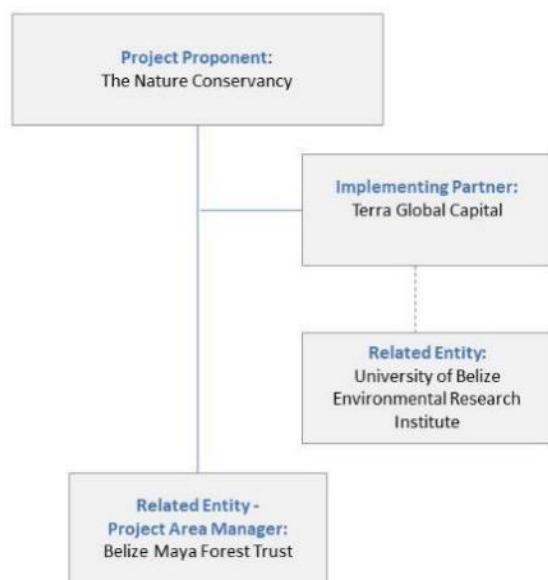


Figure 2. Project Governance Structure

2.4.2 Required Technical Skills (G4.2)

Key technical skills required to implement the program successfully include experience in developing and implementing carbon development programs that positively impact social and biodiversity elements of critical forest ecosystems.

TNC, BMFT and TGC are able to bring a more technical lens to the program and participate in enhancing the program to provide increasing climate, community and biodiversity benefits in the area. TNC has an exceptional position in biodiversity conservation and stakeholder engagement and has shown success in program design, implementation, and management all over the world. TNC's focus on forest protection and biodiversity is a key technical contribution that enables the program to engage in exceptional conservation. BMFT staff have strong local species knowledge and ability to run anti-poaching programs. and work with leading researchers on wildlife monitoring. In addition, BMFT is leading the program in stakeholder engagement and social impacts, which are enabled by its strong institutional and financing mechanisms that provide support for the program.

Terra Global Capital contributes key technical skills in greenhouse gas quantification, carbon measurement and monitoring that help the program operate. Terra Global Capital and The Nature Conservancy work with the land manager, BMFT, in order to achieve and secure climate finance for conservation (Table 10).

Table 10. Technical Skills Delivered by Project Implementers and Partners

Core Program Component	BMFT	TNC	TGC
Program authorization, design oversight and financing	√√	√	
Program design and planning	√√	√	√
Overall program implementation management and partner coordination	√√	√	√
Protected area management	√√	√	

Core Program Component	BMFT	TNC	TGC
Community engagement and support for implementation of community program	√√	√	
Field data collection and on-going monitoring	√√	√	√
VCS/CCB program development and GHG quantification	√	√	√√
Design and oversight of program's institutional arrangements (fiscal, legal and contractual)	√		√√
Coordination with National REDD+ efforts and other government agencies	√√	√	
On-going management and REDD+ activities	√√	√	√

√√ = Technical Lead

√ = Technical Support

2.4.3 Management Team Experience (G4.2)

2.4.3.1 The Nature Conservancy

The Nature Conservancy is a global environmental nonprofit, which began in 1951, when leading scientists, committed citizens and dedicated leaders came together with a shared vision to protect and care for nature. It is now one of the most effective and wide-reaching environmental organizations in the world. Their mission is to conserve the lands and waters on which all life depends. Today, as they take on the most complex environmental challenges, their diverse staff, partners and members impact conservation across more than 70 countries and territories. The Nature Conservancy is a global environmental organization, headquartered in Arlington, Virginia, United States. As of 2021, they work via affiliates or branches in 79 countries and territories.

Fabiano Godoy, Senior Technical Carbon Advisor

Mr. Godoy joined The Nature Conservancy in 2022, and is currently based in Virginia, USA, as *Sr. Advisor, Carbon Markets*. Before joining TNC, Mr. Godoy led the carbon finance technical team at Conservation International for 16 years. He was responsible for overseeing the design and implementation of carbon projects. He has vast experience with voluntary carbon certification, working on more than 15 VCS and CCBS validation and verification process around the globe, including Peru, Madagascar, Colombia, Kenya, Cambodia, and Fiji. He holds an M.S. Conservation Biology and Sustainable Development from the University of Maryland, and B.S. from Federal University of Parana.

Roberto Pott, Carbon Specialist

Roberto started his career in terrestrial ecology and helped to install Belize's first carbon project in 1995. He is trained in avian ecology, phenology research, sustainable timber harvest operation, land management, eco-tourism and infrastructural development for parks and ecotourism. He worked on assessing land use change in the Selva Maya using remote sensing tools. Roberto is experienced with marine protected area design, planning and management, artisanal fisheries management and coastal development policy and advocacy. He has coordinated regional coral reef conservation efforts and climate change impacts mitigation in coastal Belize through Healthy Reefs Initiative, Mesoamerican Reef Fund and the World Wildlife Fund. Roberto holds a Masters in Environmental Management and has worked in the field of terrestrial and marine resources management for over 15 years.

Julie Robinson, Director Belize Program

Julie oversees the Belize Program, which includes Carbon, Aquaculture and Fisheries programs. Recently, she worked to secure Belize's Blue Bond. Over the last twenty-five years, Julie has focused her work on marine research and conservation off the coast of Belize. Julie was integrally involved in negotiating the land deal that secured over 100,000 hectares for the Belize Maya Forest, and the soon to be largest carbon project in the Belize and possibly in the region. Julie joined The Nature Conservancy in 2006 and worked

as the marine program manager, building research and management capacity of local partners. She has led multi-disciplinary planning and science teams and built partnerships across diverse sectors and disciplines including government, private sector and non-profit organizations. Julie considers the approach of inclusive consultation crucial for cultivating and building consensus amongst resource users and managers. Julie has a BSc in Biology from the University of South Florida.

2.4.3.2 Belize Maya Forest Trust

The Belize Maya Forest Trust (BMFT) is a registered and incorporated not for profit, limited liability company formed in December 2020 under the Companies Act, Chapter 250 of the substantive laws of Belize, Revised Edition 2011. In August 2021, BMFT was also registered as a non-governmental organization (NGO) under the NGOs Act, Chapter 315 of the substantive laws of Belize, Revised Edition 2011, as amended. The BMFT was established as the trustee, manager, and steward for the Belize Maya Forest (BMF), that is protected in perpetuity for the people and Government of Belize, as registered under the Trust Act, Chapter 202 of the Substantive Laws of Belize, Revised Edition 2011, as amended. The 95,500 hectares of lowland tropical broadleaf forest and associated wetlands that comprises the BMF were previously privately-owned and at risk of conversion to large-scale, mechanized agriculture. The Nature Conservancy (TNC) and partners worked to safeguard this highly biodiverse area, that is home to all five cat species found in Belize, critically endangered Central American River turtle, endangered Baird's tapir, and many other species of local and global concern. The BMF also comprises of the main watershed in Belize for the Rio Hondo, a binational watershed shared with Mexico. Together with the neighboring Rio Bravo Conservation and Management area, the BMF consolidates 200,000 hectares of Belize's last remaining lowland forests and makes up 9% of the Belize's land territory. As the legal guardian and manager of the BMF, the BMFT has an already established protection program and is working with stakeholders from nine neighboring communities, academia, government, non-government, and private sectors to develop a conservation action plan, that will allow it to define and implement additional programs. The BMFT currently has a Board of Trustees comprised of local and international Directors, a Managing Director, a Community Outreach and Stewards Coordinator, and nine rangers. Its staff is expected to grow with the ongoing implementation of the BMF conservation action plan.

Elma Kay, Managing Director

Dr. Elma Kay is the first Managing Director of the Belize Maya Forest Trust, a non-governmental organization (NGO), entrusted with the stewardship and management of Belize's second largest private protected area, the Belize Maya Forest. Dr. Kay is also the co-founder of the University of Belize Environmental Research Institute, where she previously served for a decade as both Science Director (Terrestrial) and Administrative Director. Dr. Kay is a biologist who combines 20 years of experience in research, teaching, administration, policy formulation and conservation in Belize and the Latin American/Caribbean region. As a leader and advocate for sound natural resources management in Belize, she has assisted the recent protection of more than a 100,000 hectares of the country's most threatened forests, in the Belize Maya Forest and Maya Forest Corridor. Dr. Kay has served in numerous regional and national councils, Boards and expert groups, that include the Regional Executive of the Mesoamerican Society for Biology and Conservation, the Belize National Climate Change Committee, the Belize National REDD+ Technical Expert Group, the Protected Areas Conservation Trust Advisory Council and Board of Trustees, the National Steering Committee for the Global Environment Facility's Small Grants Programme, and others. Dr. Kay continues to mentor undergraduate and graduate students, young professionals and community-based conservation groups, and currently serves as the Chairperson of the Maya Forest Corridor Trust, Chairperson of Belize's Scientific Authority for the Convention on the International Trade in Endangered Species of Wild Fauna and Flora, Member of the Steering Committee of the Belize Network of NGOs, Board Director of the Silk Grass Wildlife Preserve and Vice President of Friends for Conservation and Development, co-manager of Belize's single largest National Park.

Giselle Mahung, Community Outreach and Stewards Coordinator

Giselle Mahung is the BMFT's Community Outreach and Stewards Coordinator responsible for maintaining a strong and positive relationship with BMFT stakeholder communities and implementing community projects and initiatives. Giselle specializes in project coordination and management support for projects grounded in the natural resources management, conservation and climate change sectors with organizations that range from research institutions, private sector companies and non-profit environmental organizations. She provides project coordination and management support including research and business writing, business administration support, external communications and relations support, as well as stakeholder engagement support. Prior to her work with BMFT, Giselle worked as a Local Consultant and Logistics Manager for Asia Pacific Waste Consultants (APWC) for projects in Belize and Antigua and Barbuda, where she trained field staff, conducted research on waste management systems, as well as designed and implemented stakeholder engagement exercises to foster and develop stakeholder relationships. She has also worked with a team from the University of Central Florida in the development and implementation of a community research project, which aimed to validate and integrate community perceptions and knowledge into disaster management and planning in Hopkins Village, Belize. In addition, Giselle was a volunteer at the Environmental Research Institute (ERI) of the University of Belize, where she conducted marine surveys within the Turneffe Atoll, as a part of regular monitoring for species diversity and abundance. Giselle has a Bachelor of Science in Natural Resources Management from the University of Belize and is originally from Punta Gorda Town, Belize.

2.4.3.3 Terra Global Capital

Terra Global is the global leader in forest and land-use carbon advisory and finance. Terra was founded in 2006 to provide governments, NGOs and private companies with support for market and payment-for performance-based approaches that benefit rural communities. As proven innovators, Terra provides both technical advisory in the measurement and commercialization of emissions reductions and carbon finance through our dedicated Terra Bella Investment Fund and separately managed investment vehicles. Terra has established itself as a valued partner to a global client base by supporting the sustainable management of natural resources and through the development of rural livelihoods.

Leslie L. Durschinger, Founder, CEO

Leveraging 20 years of experience and a proven track record in the financial services industry, Ms. Durschinger founded Terra Global Capital in 2006 to promote results-based approaches to sustainable landscape management through climate smart agricultural and reducing deforestation. Ms. Durschinger is recognized as a pioneer and innovator in alignment of development values and financially viable approaches to sustainable landscape management. Terra is now the leader in forest and agriculture program development, GHG analytics and business model development, providing technical expertise their global client base of governments, NGOs, and private companies in a collaborative and participatory manner. Under Durschinger's leadership Terra has structured risk mitigation instruments, trust funds and private equity funds to drive investment capital to sustainable agricultural production and forest management. Prior to Terra, Ms. Durschinger held senior management positions in the areas of derivatives trading, investment management, algorithmic trading, risk management, and securities lending. She the co-chair of the International Emission Trading Associations Natural Capital Solutions working group, and is a member of the Verified Carbon Standard (VCS) AFOLU Steering Committee, REDD+ Social & Environmental Standards Committee, VCS JNR Permanence Work Group, Coalition on Agricultural Greenhouse (C-AGG) Advisory Committee and W+ Standard Advisory Council. Ms. Durschinger and her family make small production olive oil on their farm in Mendocino County. Among her previous employers are JP Morgan, Merrill Lynch, Barclays Global Investors and Charles Schwab.

Erica Meta Smith, M.F., RPF, Managing Director

Ms. Smith, M.F., RPF. Forest Carbon Field Development Specialist, Joined Terra Global Capital in 2009. Ms. Smith provides technical forestry knowledge, on-ground carbon quantification expertise, and specializes in forest mensuration programs. She has firsthand knowledge of a forestry-based income the experience of depending on natural resources as a livelihood. Before working with Terra Global Capital Ms. Smith worked in forest policy and on forestry technical operations. She received her undergraduate degree

in forestry and Master of Forestry from University of California-Berkeley in 2005 and 2007. Her master's work reviewed California Climate Action Registry's Forestry Protocols and implications of carbon markets in California. Ms. Smith is a Certified Ecologist through the Ecological Society of America and a Registered Professional Forester in the State of California. Ms. Smith has worked extensively in the REDD+ sector training communities and working with in-country experts for excellence in MRV across Africa and Asia.

David Montoya González, Director and Project Manager

Mr. Montoya has a widely experience in remote sensing and GIS. He holds a bachelor's degree in Forest Engineer from the National University of Colombia (UNAL) and a master's degree in remote sensing from Federal University of Rio Grande do Sul (UFRGS) – Brazil. Mr. Montoya has worked with multiple Colombian government entities, such as the national department of statistics (DANE), supporting the 3rd National Agricultural Census, the National University of Colombia in research projects in the Andean Region, and with indigenous communities analyzing the land cover changes and natural resources sustainability. In addition, Mr. Montoya has also professional experience closely related with Nature Based Solutions by managing REDD+ projects and developing GHG and LULC assessments in Colombia, Belize, Malawi, Myanmar, among other countries, under the international standard VSC and CCB.

Carolina Oleas, Director, Agronomy, Project Management, Rural Development

Mrs. Oleas provides technical agricultural knowledge, community development expertise, and specializes in participatory project management. She has firsthand field experience working with farmers in different countries of Latin America (Guatemala, Ecuador, Costa Rica, Bolivia, Haiti, El Salvador, others) building capacity with rural communities in sustainable development and climate-smart agricultural practices. Before joining Terra, Mrs. Oleas worked on designing, managing, monitoring, and evaluating projects and programs to promote sustainable production and the application of agricultural adaptation and mitigation practices at the field level with farmers' organizations. She received her undergraduate degree in agricultural engineering from EARTH University in Costa Rica, and later received a Master's in International Agricultural Development from Texas A&M University.

2.4.4 Project Management Partnerships/Team Development (G4.2)

The Project Proponents have very strong capacity for implementation for project activities. The capacity of implementation is detailed in section 2.4.3 and includes many years of experience in conservation, natural resources management, outreach and communication, carbon accounting and carbon certification to name a few. The Program will use short-term technical experts as needed to supplement the core team and bring specialized expertise

2.4.5 Financial Health of Implementing Organization(s) (G4.3)

The Nature Conservancy is a global leader in conservation and is involved in more than 70 countries and territories around the world. TNC's financial statements are available online and can be found at; <https://www.nature.org/en-us/about-us/who-we-are/accountability/annual-report/>. This project activity instance, which has been purchased along the smaller "Laguna Seca Project" *VCS#1326), will share the on-going maintenance costs, which will be covered, in part, through the sale of VCUs. Between the large financial resources of TNC and the expected carbon revenue that this project will generate and that will, in part, be used to establish an endowment for BMFT to manage the project, the project will have the required financial support for its lifetime.

2.4.6 Avoidance of Corruption and Other Unethical Behavior (G4.3)

All the formation documents and agreements that are put in place that support the Program include requirements that participants conduct the operations of the Program in an ethical manner and without corruption.

The BMFT has approved and implemented conflict of interest and anti-corruption policies, as well as a code of ethics for all staff and directors, that are aimed at ensuring that the BMFT is not involved in or complicit

in any form of corruption. In addition, the BMFT, like all local organizations, is required to annually register with Belize's Financial Intelligence Unit, as part of compliance duties on anti-money laundering/combating the financing of terrorism through Belize's Money Laundering & Terrorism (Prevention) Act. BMFT is also audited by an external auditing firm, annually.

2.4.7 Commercially Sensitive Information (Rules 3.5.13 – 3.5.14)

The commercially sensitive information, which has been prepared and provided to the VVB, is listed in the Appendix 3: Additional Information

2.5 Legal Status and Property Rights

Non one lives on the Project Area Instance, and no one was relocated due to project activities this is demonstrated though the fact that the area was privately held timber land. This project is on private land and no property rights' either statutory or customary tenure/ use/ access/ management rights to lands were restricted due to this project. Property rights as shown on Map 34. Yalbac and Laguna Seca and Surrounding Landholdings, Access Roads, and Gates. The project area is private property and will not encroach on private property, community property, or government property as the property is legally defined with the Government of Belize. As no property rights are affected by the project activities, free, prior and informed consent is not necessary for the project.

2.5.1 Statutory and Customary Property Rights (G5.1)

The Project Zone Instance includes the Project Activity Instance which has private ownership as detailed below and the areas around the Project Activity Instance where 1) communities related activities are being implemented and/or 2) those in the sub-watersheds of the transboundary Rio Hondo watershed and Belize River. The areas outside of the Project Activity Instance within the Project Zone Instance are also primarily private ownership (Map 4). Given the private ownership status of the community landowners in the Project Zone Instance and Belize's system for recognizing private ownership there are no overlapping claims with the Project Activity Instance. There are no project activities that jeopardize the private ownership rights of these community landowners in the Project Zone Instance.

The Land Registry Department records the details of all land transactions within Belize with an interactive map, which indicates (and in certain cases defines) the boundaries of each individually owned parcel of land. The Land Registry guarantees title to registered estates and interests in land. It records the ownership rights of freehold properties, and leasehold properties, where the lease has been granted for a term exceeding seven years.

Furthermore, there are two types (categories) of land in Belize. They are: (a) undeclared land & (b) declared land. The Land Registry operates under the authority of:

- The Registered Land Act (RLA) – Chapter 194 of the Substantive Laws of Belize, Revised Edition 2011.
- The Strata Titles Registration Act – Chapter 196 of the Substantive Laws of Belize, Revised Edition 2011.
- The General Registry Act (GRA) Chapter 327 of the Substantive Laws of Belize Revised Edition, 2011.

Under the RLA, it is responsible for the registration and dealing of all lands situated within the declared compulsory registration areas in the country. The Strata Titles Registration Act is a follow-up to the RLA and allows for units resulting from the horizontal or vertical divisions or subdivisions of buildings on a common property, to be registered with freehold title. The General Registry Act is responsible for the registration and dealing of all that is not within the compulsory registration areas at the Land Title Unit.

Legally, there are two types of registrable titles being:

Absolute titles

For absolute titles, copies of documents showing proof of ownership are submitted or where persons can prove long undisturbed possession of their lands and do not possess deeds. Possession goes back 12 years or more.

Provisional titles

For absolute titles, copies of documents showing proof of ownership are submitted or where persons can prove long undisturbed possession of their lands and do not possess deeds. Possession goes back 12 years or more. Provisional titles are granted if documents are not produced and if long undisturbed possession cannot be proved. In this case, a note must be made on the register stating the period in which provisional occupation commenced and the condition to which the titles is subject to.

All transactions (transfers) done for undeclared and declared land in Belize must be recorded or registered at the Land Registry, located in Belmopan (Cayo District).

Based on records provided by TNC, the project parcels have the following ownership type and status:

2.5.1.1 Yalbac Property

Before the sale to TNC and ownership by BMFT, the property was held in the land registry as “Absolute Title, Private Land, Active Parcel, Freehold” by Yalbac Ranch and Cattle Corporation, Houston, Texas, USA¹⁷ It consists of three parcel/blocks as follows:

- Parcel 4 Block 14, Yalbac Registration Section, Orange Walk District, Belize, Central America consisting of approximately 24,799 hectares; and
- Parcel 8 Block 14, Yalbac Registration Section, Orange Walk District, Belize, Central America consisting of approximately 24,670 hectares; and
- Parcel 10 Block 14, Yalbac Registration Section, Orange Walk District, Belize, Central America consisting of approximately 3,714 hectares.

2.5.1.2 Laguna Seca Property

Before the sale to TNC and ownership by BMFT, this is held in the land registry as “Absolute Title, Private Land, Active Parcel, Freehold” by Yalbac Ranch and Cattle Corporation, Houston, Texas, USA¹⁸ It consists of two parcel/blocks as follows:

- Property One: A parcel of land known as Parcel 3 Block 8, as described in Land Certificate No. LRS-201300014 of the Gallon Jug Registration Section, Register of Lands, Belize Land Registry.
- Property Two: A parcel of land known as Parcel 6 Block 8, also known as Parcel ID 8-436, as described in Land Certificate No. LRS-201300012 of the Gallon Jug Registration Section, Register of Lands, Belize Land Registry. This area included the portion of the priority which has an existing carbon project registered and verified under the VCS #1326¹⁹

2.5.2 Recognition of Property Rights (G5.1)

The Forestland Group (TFG) group purchased this property in 2008, and it was sold to TNC in December 2020. TFG owned the property in fee simple and it was transferred to BMFT under the same condition. Fee simple ownership in Belize represents absolute ownership of real property.

Copies of the current land titles for the BMF are available for review by the auditors of the project. Legal rights to the Laguna Seca and Yalbac properties in Belize include all potential development and use rights, with the exception of mineral extraction.

¹⁷ Ministry of Natural Resources, Lands and Survey Department, Validation Report Parcels 14-44-8, January 30, 2020

¹⁸ LS - Ministry of Natural Resources, Lands and Survey Department, Validation Report

¹⁹ <https://registry.verra.org/app/projectDetail/VCS/1326>

2.5.3 Free, Prior and Informed Consent (G5.2)

Section 2.3.7 provides details on the consultations that were conducted with communities to develop and validate the Conservation Action Plan which covers the proposed activities outside the Project Activity Instance that would involve any community land. The communities' participation is voluntary in the project activities and there are no proposed project activities that affect their property rights. Communities in the Project Zone wanting to participate in the project may join as they have been informed of the process and project through free, prior, and informed consent. If community members want to implement project activities such as sustainable agriculture, they learned through the program, they can on their private property as it will be affected by the project. Any training provided by the project will be presented to the communities through free, prior, and informed consent, and no one is obligated to attend or participate. As project activities within the Project Zone outside of the project area, may take place on private land there is no parties lands have been or will be affected by the project.

The PIA is privately held and designated for a carbon project in partnership with the Government of Belize. The property has not been associated with any Maya communal land claims. There are no current land disputes regarding the Project Activity Instance and no communities are settled in or has user rights over resource from the project area; therefore, there is no need for consent.

The BMFT has explicit and uncontested legal tenure and rights over the land. Through an agreement with the Government of Belize, the BMFT has the rights to benefit from income generating activities including carbon finance, and TNC, has the right to market the carbon credits available from the project. Therefore the project will not encroach uninvited on private property, community property, or government property. There are no community rights or indigenous rights over the land or carbon, but BMFT still maintain awareness campaigns about the carbon project.

2.5.4 Property Rights Protection (G5.3)

A review of the Conservation Action Plan and the implementation plan will demonstrate that there are not activities that would involve any removal or relocation of property rights holders. The project has not and will not involve the resettlement of any communities or households, since there are no communities living in the Project Activity Instance. Furthermore, the project goals involve maintaining and improving the livelihoods of communities that currently live near the Project Activity Instance. Resettlement is not a component of the project design.

None of the project activities require relocation, either voluntary or involuntary of land holders from their lands or territories.

2.5.5 Illegal Activity Identification (G5.4)

There are no illegal activities being conducted in the Project Zone Instance that are expected to produce any project benefits. The illegal activities that could impact the project results relate to illegal hunting and associated negligent use of fire or arson. The project reduces this risk through project activities that include regular patrols to address the illegal activities in the Project Activity Instance. This includes facilitating discussions and coordinating across neighbors to regularly monitor and patrol to mitigate the activities. Signs will be placed along vulnerable borders with neighboring stakeholders indicating the ownership of the land and points of entry. Field crews will be instructed to be alert and patrol for illegal activities, particularly near archaeological remains and to report any incidents or evidence. Data will be maintained through patrols and analyzed regularly to determine where the vulnerable areas for illegal activities are found. Concentration of patrols will then be directed to these areas.

2.5.6 Ongoing Disputes (G5.5)

There are no on-going disputes of property rights in the Project Activity Instance, thus there is no activity that could prejudice the outcome.

2.5.7 National and Local Laws (G5.6)

Land in Belize is divided into two broad categories: national lands, and private lands. The project consists of multiple parcels, which are considered private land. In Belize, the Land and Surveys Department, under the Ministry of Natural Resources and Agriculture has prime responsibility for all aspects of land tenure in Belize.

The department's primary functions are:

- Management and allocation of national lands
- Registration of land tenure
- Authentication of plans for all legal surveys
- Sub-division of lands
- Valuation of lands
- Land use planning
- Land information management

There are several laws in Belize that allow for the subdivision of forested lands and their conversion to agricultural lands. These primarily include, the Land Utilization Act, Chapter 188, revised Edition 2000, the Private Forest (Conservation) Act, Chapter 217 Revised Edition 2000, and the Forest Act Chapter 213, Revised Edition 2003 which are outlined in Table 11.

Table 11. Relevant Laws in Belize

Law ²⁰	Functions
Land Utilization Act	The Land Utilization Act provides the primary authority for land use planning outside of cities and town. The Act provides general authority to regulate land use in order to protect watersheds, prevent soil erosion, control clearing of forest, and to regulate type of development permitted in designated areas. This is accomplished through the Land Subdivision and Land Utilization Authority (LUA) established under the Act which is required to approve the subdivision of any rural property for development purposes. Subdivision is covered under the Land Utilization Act, Chapter 188 of Belize ²¹ .
Private Forest (Conservation Act) 2000	Defines the process for private landowners to fell trees on their property ²² . Within this law, forest may be cleared following with approvals. Restriction on felling CAP.213. S.I. 16 of 1965: Notwithstanding anything contained in the Forests Act, no person shall fell, or cause to be fell, any tree an any land in Belize unless • An application has been made to the Chief Forest Officer by the owner or by the person authorized by hum to do the felling stating the type and location of forest and the minimum girth of any tree to be felled; and • A permit authorizing the felling has been obtained from the Chief Forest Officer: Provided that no such application or permission

²⁰ <https://www.fao.org/faolex/country-profiles/general-profile/en/?iso3=BLZ>

²¹ <https://observatorioplanificacion.cepal.org/en/regulatory-frameworks/land-utilization-act-chapter-188-belize>

²² <http://extwprlegs1.fao.org/docs/pdf/blz33249.pdf>

Law ²⁰	Functions
	shall be necessary to fell trees under 0,6 meters girth measured at one foot above the buttresses during the clearance of land for agriculture but no tree so felled may be sold as timber without a permit from the Chief Forest Officer.
Forest Act Chapter 213 (revised 2000)	States that this Act applied to private land, and thus lays out the process for gaining approval for forest clearing with is specified the implementing Forest Rules, Forest License Delegation of Power.
Forest Rules ²³	The 43 rules are divided into 8 Parts: General (I); Forest Licenses and Permits to Exploit Forest Produce (II); Control of squatting, Building, Cultivation, Grazing, Hunting in Forest Reserves - Control of Fire in Forest Reserves and National Land (III); Transport of Timber by Water (IV); Transport of Timber by Road (V); Forest Roads (VI); Trees and Other Plants - The Felling or Removal of Which is Prohibited (VII); Penalties (VIII). (completed by 5 Schedules)
Forest Licenses Delegation of Powers Order	The Chief Forest Officer is authorized by this Order to approve or disapprove applications for forest licenses and to issue such licenses or forest permits in respect of such applications subject to the conditions set out in the Schedule to this Order. The Chief Forest Officer may authorize in writing any Divisional Forest Officer or other officer of a standing not under the status of Forest Officer to approve or disapprove applications for forest licenses or forest permits subject to the conditions in the said Schedule.

BMFT is fully compliant with all forestry laws and the Land Utilization Act. Specifically, the applicability to BMFT to each relevant law are outlined in Table 12.

Table 12. Relevant Laws Applicable to BMFT

Forest Rule	Applicability to BMFT
Land Utilization Act	BMFT is compliant with the Land Utilization Act as they are registered with the government as the landowner. If BMFT were to subdivide their land they would get proper approval from the Land Subdivision and Land Utilization Authority (LUA). As BMFT is a conservation entity, they do not expect to subdivide their property.
Private Forest (Conservation Act) 2000	If BMFT were to fell trees on their property they will follow the Private Forest Act and Forest Act Chapter 213 process described in Table 11, and get proper approval following the Forest Licenses Delegation of Powers Order. As BMFT is a conservation entity, they do not expect to fell trees on their property.
Forest Act Chapter 213 (revised 2000)	If BMFT were to fell trees on their property they will follow the Private Forest Act and Forest Act Chapter 213 process described in Table 11, and get proper approval following the Forest Licenses Delegation of Powers Order. As BMFT is a conservation entity, they do not expect to fell trees on their property.

²³ <https://faolex.fao.org/docs/pdf/blz2742.pdf>

Forest Rule		Applicability to BMFT
Forest Rules Subsections	General (I)	Not applicable to BMF as this is the introduction and contains definitions.
	Forest Licenses and Permits to Exploit Forest Produce (II)	Not applicable to BMF as BFMT does not plan to exploit forest produce from their property.
	Control of squatting, Building, Cultivation, Grazing, Hunting in Forest Reserves - Control of Fire in Forest Reserves and National Land (III)	Not applicable to BMF as this subsection of the Forest Rules is applicable to Forest Reserves and National Land. BMF is private land.
	Forest Rules - Transport of Timber by Water (IV)	Not applicable to BMF as BFMT will not harvest timber on their property.
	Transport of Timber by Road (V)	Not applicable to BMF as BFMT will not harvest timber on their property.
	Forest Roads (VI)	Under this section: <i>The Minister may by Order declare any road, intended primarily for Declaration of the extraction of forest produce or for access to a forest regeneration scheme or which gives access to a forest reserve and is not a public road, to be a forest road.</i> As there are no Forest Reserves boarding or near BMF, the Chief Forest Officer is not expected to have any use for roads on BMF. If a Forest Reserve is created, and the Chief Forest Officer determines that travel through BMF is necessary, BMFT will comply with directions from the Chief Forest Officer.
	Trees and Other Plants - The Felling or Removal of Which is Prohibited (VII)	Not applicable to BMF as BFMT does not plan to harvest timber on their property. All conservation activities that are carried out by BFMT are in full compliance with this law as they are not extracting trees or other plants from their property.
	Penalties (VIII)	Not applicable to BMF as BFMT does not plan to harvest timber or extract trees or other plants from their property. If BFMT were not following the Forest Rules, this subsection on Penalties would be applied.
Forest Licenses Delegation of Powers Order		If BMFT were to fell trees on their property they will follow the Private Forest Act and Forest Act Chapter 213 process described in Table 11, and get proper approval following the Forest Licenses Delegation of Powers Order. As BMFT is a conservation entity, they do not expect to fell trees on their property.

BMFT facilitates access to the Forest Department that has the mandate to enforce all forestry laws. BMFT's collaboration with the Forestry Department in several areas such as joint patrols and fire management also lends transparency and openness. Land Certificates for the Yalbac and Laguna Seca parcels demonstrate that BMFT is in full compliance with the Land Utilization Act, providing assurance that the project is abiding by the listed laws in this PD.

2.5.8 Approvals (G5.7)

The Project does not encroach upon community property. The property is privately held. Through an agreement with the Government of Belize, the project has been designated for a carbon project.

2.5.9 Project Ownership (G5.8)

In December 2020, the ownership of the property changed from the TFG, an independent Timberland Investment Management Organization, to BMFT through the efforts of TNC, a global conservation organization committed to preserve biodiversity and wildlife, and its partners.

Project ownership is supported by laws that grant BMFT the tenure over the area and rights to manage the natural resources, that will be managed to generate emissions reductions. BMFT has the legal right to operate the project activities.

BMFT through their legal rights to carbon, demonstrate Project Proof of Right under a statutory, property or contractual right in the land, vegetation or management process that generates GHG emission reductions and/or removals. BMFT and TNC entered into an agreement to transfer the carbon rights to TNC, who will be responsible for registering, issuing and trading the credits.

2.5.10 Management of Double Counting Risk (G5.9)

There are no other programs in the Project Activity Instance (except for VCS 1326, which has been excluded from the Project Activity Instance Area), that are seeking to generate tradable credits that could create risk of double counting. In addition, TNC and the Government of Belize have signed legally binding agreements, that clearly define the carbon rights for each Party in respect of BMF. Thus, in respect of sovereign carbon credits, the Government of Belize, would only be able to transact in credits that it has not granted to BMFT under its agreement with TNC.

2.5.11 Emissions Trading Programs and Other Binding Limits

The Project Activity Instance and the activities that are being implemented to generate emission reductions have not been registered under any emission-trading program. The Project Activity Instance is not subject to any other binding limit on emissions.

2.5.12 Other Forms of Environmental Credit

The Project has not sought or received any other form of environmental credit from its activities but reserves the right to do so in the future.

2.5.13 Participation Under Other GHG Programs

The Program has not been registered, nor is it seeking registration, under any other GHG program.

2.5.14 Projects Rejected by Other GHG Programs

The Project has not applied or been rejected by any other GHG program.

2.5.15 Double Counting (G5.9)

The agreements between TNC and the Government of Belize, including the terms of the establishment of BMFT, grant BMFT/ TNC the carbon needed to repay 50% of the loan for the land purchase and the funds needed to establish the BMFT endowment. TNC seeks to sell these VCUs they have been provided in the voluntary market. The agreements in place with the government ensure that VCUs will not be sold by the government causing double counting. In addition, the government will not be able to use the verified emission reductions and/or removals granted to TNC in a potential future ITMO (Internationally Transferred Mitigation Outcomes) transaction with another government.

3 CLIMATE

3.1 Application of Methodology

3.1.1 Title and Reference of Methodology

The Project as an Avoided Planned Deforestation Project applied the methodology “VM0007 REDD+ Methodology Framework (REDD+MF), v1.6”, and the modules listed in Section 3.1.2.2.

3.1.2 Applicability of Methodology

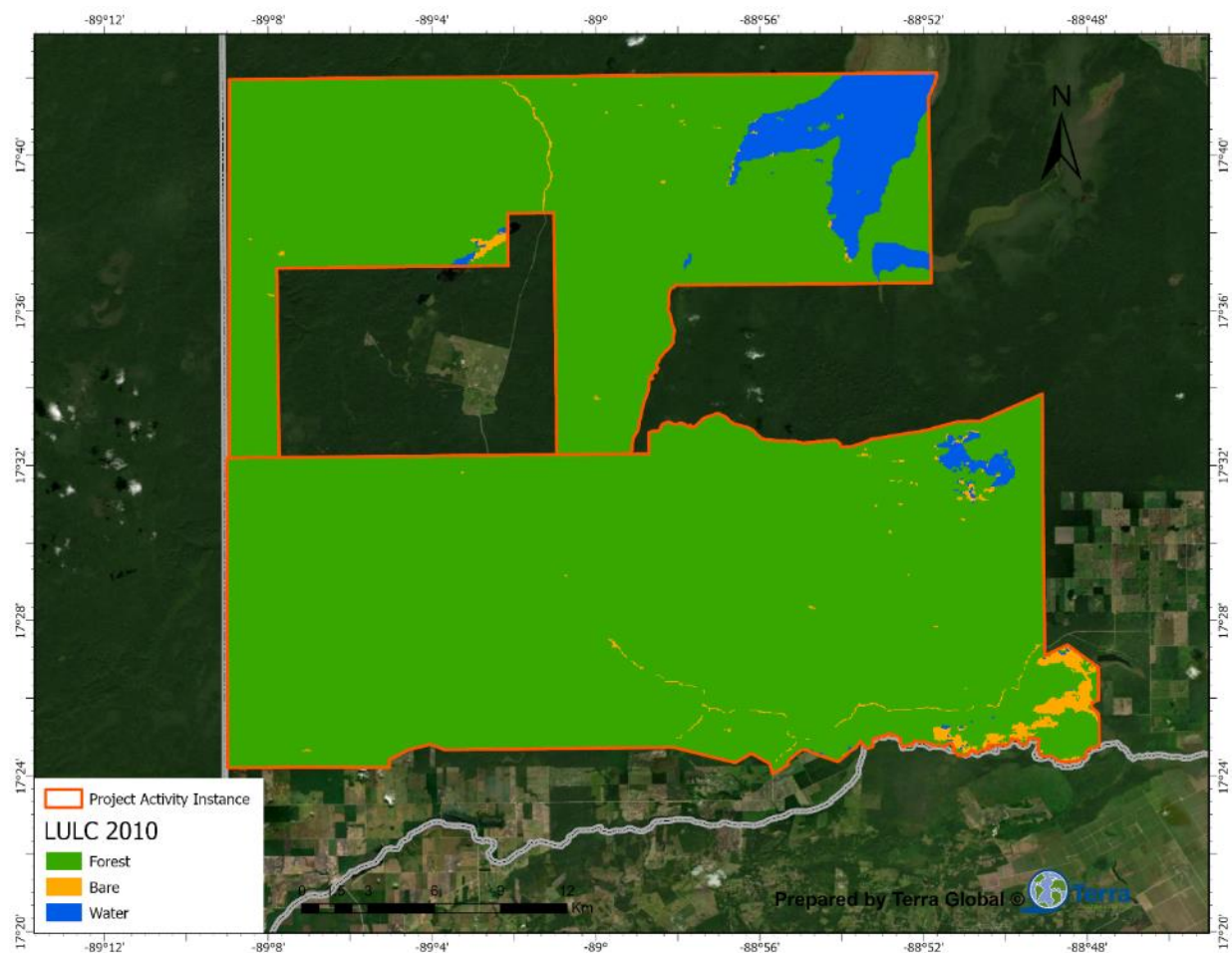
3.1.2.1 Applicability Under Methodology VM0007

The Project meets the applicability criteria for the VM0007 v1.6 as detailed in Table 13:

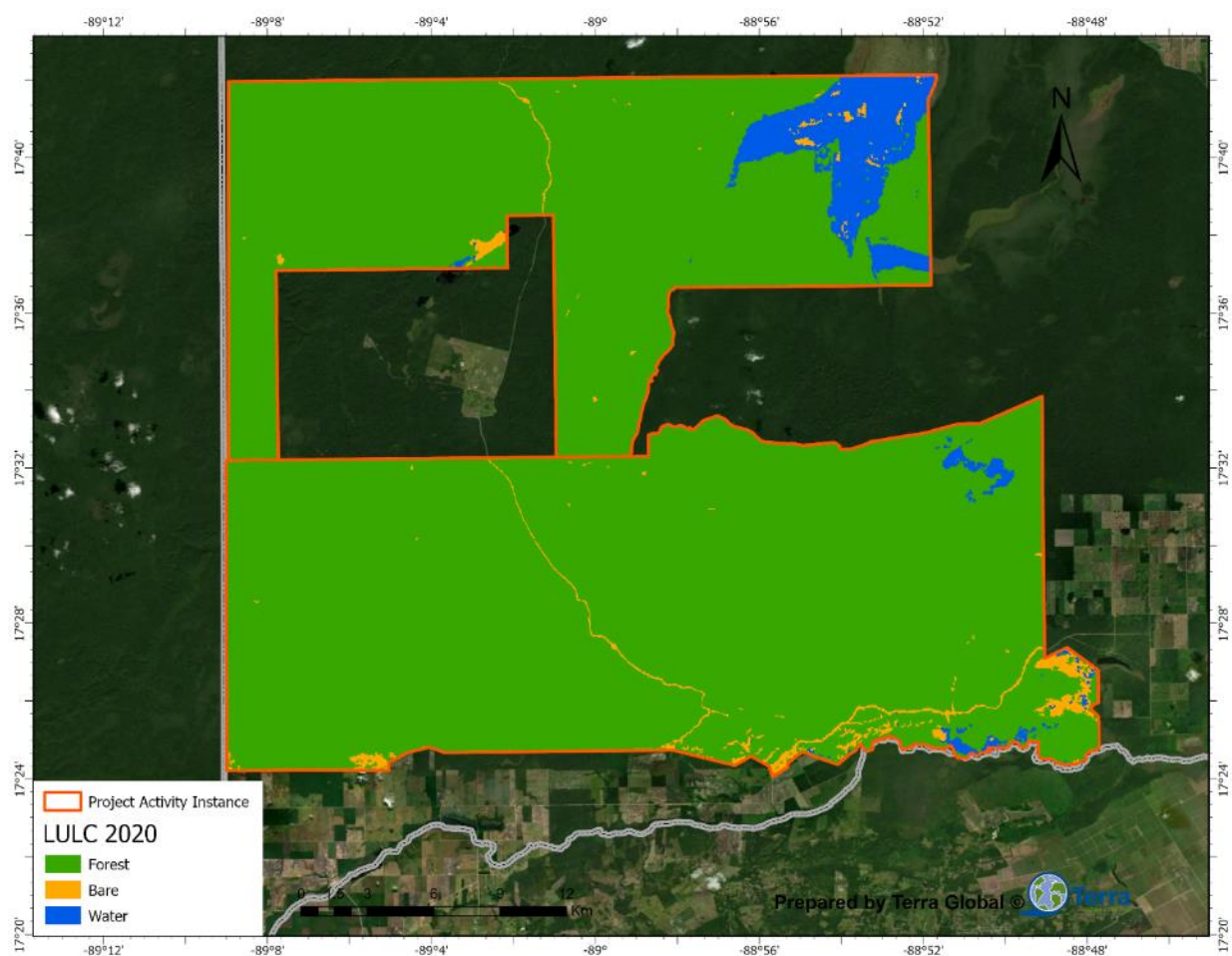
Table 13. VM0007 Applicability Criteria and Compliance Justification

Applicability Condition	Justification	Documentation
All Project Activities (4.2)		
All land areas registered under the CDM or under any other GHG program (both voluntary and compliance-oriented) must be transparently reported and excluded from the Project Activity Instance. The exclusion of land in the Project Activity Instance from any other GHG program must be monitored over time and reported in the monitoring reports.	There is one area within the Project Activity Instance which is registered under the VCS as PD #1326. This area has been removed from the accounting area of the project. There are no other areas with the Project Activity Instance that are registered under the CDM or under any other GHG program.	Verra Registry: https://registry.verra.org/app/projectDetail/VCS/1326
All REDD Activity Types (4.3.1)		
Land in the Project Activity Instance has qualified as forest (following the definition used by VCS; in addition, see Section 5.1.2) for at least the 10 years prior to the project start date. Mangrove forests are excluded from any tree height requirement in a forest definition, as they consist of (close to) 100% mangrove species, which often do not reach the same height as other tree species, and occupy contiguous areas and their functioning as a forest is independent of tree height.	Only areas that qualify as forest, as defined by Belize forest definition of land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ., 10 years before Project Start Date December 10th, 2020, are included in the Project Activity Instance. The land in the project does not include any mangrove forest.	Map 5 provides the forest cover 10 years prior to Project Start.
If land within the Project Activity Instance is peatland or tidal wetlands and emissions from the SOC pool are deemed significant, the relevant WRC modules (see Table 3) must be applied alongside other relevant modules.	The land in the project does not include any peat land or tidal lands.	n/a

Applicability Condition	Justification	Documentation
Baseline deforestation and forest degradation in the Project Activity Instance fall within one or more of the following categories: (a) Unplanned deforestation (VCS category AUDD) (b) Planned deforestation/degradation (VCS category APD) (c) Degradation through extraction of wood for fuel (fuelwood and charcoal production) (VCS category AUDD)	Baseline deforestation and forest degradation in the Project Activity Instance is Planned deforestation/degradation (VCS category APD).	n/a
Leakage avoidance activities must not include: (a) Agricultural lands that are flooded to increase production (e.g., rice paddy) (b) Intensifying livestock production through use of feed-lots¹⁰ and/or manure lagoons.	Leakage prevention measures do not include flooding agricultural land or intensifying livestock.	n/a
Avoiding Planned Deforestation/Degradation (4.3.3)		
Avoiding planned deforestation/degradation activities are applicable under the following condition: Where conversion of forest lands to a deforested condition must be legally permitted.	These parcels are legally convertible to agriculture.	See details in Section 3.2.1.



Map 7. Land cover in the Project Activity Instance in 2010



Map 8. Land Cover in the Project Activity Instance in 2020

3.1.2.2 Modules Used and Applicability

Based on Table 4 in the VM0007 v1.6 methodology, the mandatory and optional modules that were used are defined in Table 14 which also describes of how the Project conditions meet each modules' applicability criteria.

Table 14. Modules Applied with Applicability Criteria

Module	Applicability
VMD0001 Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools (CP-AB), v1.1	This module is mandatory and was used for above ground and below ground tree, and it was optionally used for non-tree biomass. As the baseline is agriculture and the project activities protect aboveground biomass, these pools must be included.
VMD0002 Estimation of carbon stocks in the dead-wood pool (CP-D), v1.0	This was optionally used for dead wood. As the baseline is agriculture and the project activities protect the deadwood carbon pool, this pool was optionally included.

Module	Applicability
VMD0003 Estimation of carbon stocks in the litter pool (CP-L), v1.0	This was optionally used for litter. As the baseline is agriculture and the project activities protect the litter carbon stocks, this pool was optionally included.
VMD0004 Estimation of stocks in the soil organic carbon pool (CP-S), v1.0	This was optionally used for soil. As the baseline is agriculture and the project activities conserve soil carbon, this pool was optionally included.
VMD0006 Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation (BL-PL), v1.3	This module is mandatory for this Project. The Project meets the VMD0006 module applicability requirements of use for “estimating the baseline emissions on forest lands (usually privately or government owned) that are legally authorized and documented to be converted to non-forest land.” Although this project follows VMD0006, section 5.1.1. and identifies a “most likely class of deforestation agents” further described in section 3.1.2. Based on Household surveys where fuelwood extraction was found to be not occurring in the Project Activity Instance, the pre-project conditions do not include unsustainable fuelwood collection occurring within the project boundaries thus modules BL-DFW and LK-DFW were not used to determine potential leakage. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used.
VMD0009 Estimation of emissions from activity shifting for avoided planned deforestation/forest degradation and avoided planned wetland degradation (LK-ASP), v1.3	The module is mandatory since Module BL-PL was used to define the baseline, and the Project meets the applicability conditions of Module BL-PL it meets these modules. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used.
VMD0011 Estimation of emissions from market-effects (LK-ME), v1.1	This module is not required because the process of deforestation involves not timber harvesting for commercial markets (Commercial markets here defined as sale of products to end users and public and private companies with sales conducted distant (>50km) from the Project Activity Instance). The process of deforestation is for agriculture, and while there will be trees cut for the conversion to agricultural that will be used locally and/or burned. As the baseline for this project is annual agriculture and the project activities conserve forests, the market leakage must be assessed for activity shifting of agriculture.
VMD0015 Methods for monitoring of greenhouse gas emissions and removals (M-REDD), v2.2	This module is mandatory given this is a REDD Project. There is no selective logging taking place in the project case, thus other applicability criteria do not apply. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used.
VMD0016 Methods for Stratification of the Project Area (X-STR), v1.2	For this REDD Project, this module was assessed even though the pre-deforestation forest classes and strata are not the same in the baseline and the project scenario,

Module	Applicability
	because the baseline is non-forest. In addition, the Project Activity Instance only has one forest type, and is not a peatland or wetland. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool is used though it is not applicable.
VMD0017 Estimation of Uncertainty for REDD Project Activities (X-UNC), v2.2	This is mandatory and was used for the calculation of uncertainty for deforestation rates and carbon stocks and emission factors. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used to determine uncertainty.
CDM Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (T-ADD) v 01.	This tool is mandatory and used in Section 3.1.5. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used to demonstrate that the project activities were additional.
VCS AFOLU Non-Permanence Risk Tool (T-BAR) v 4.2	This tool is mandatory and used for the non-permanence risk buffer. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool must be used.
VMD0013 Estimation of greenhouse gas emissions from biomass and peat burning (E-BPB) v 1.2	This module is mandatory where the REDD project activities include emissions from biomass burning. The baseline scenario includes burning after clearing of the forest. As the baseline for this project is annual agriculture and the project activities conserve forests, this tool should be used, although there is no peat in the Project Area.

Tool – VT0006, Tool for Calculating LULC Transitions and Deforestation Rates Using Incomplete Remote Sensing Images v 1.0	For this project multiple images were needed over many years in order to have classified remote sensing images. These remote sensing images will be used to identify forest and non-forest, hence identifying deforestation over time. As the project area and proxy parcels are in a commonly cloudy area, there were incomplete remote sensing images in the area of interest due to reasons beyond the control of the project proponent. In addition, during the period during which incomplete remote sensing images were used, no other complete remote sensing images exist in a remote sensing data archive that is practically available. All images were orthorectified and have a constant scale. Images were co-registered and re-sampling was not needed to reach a common pixel resolution matching the spatial resolution of 30m. All images met the overall quality criteria described in section 4 of the Tool – VT0006 As the baseline for this project is annual agriculture and the project activities conserve forests, this tool needs to be used to identify forest and non-forest areas. As there are many clouds in Belize, this tool was necessary to create composite images. The project is in compliance with the applicability conditions defined in section 4 of the tool based on the following conditions: • There is at least one incomplete remote sensing image in the area of interest due to reasons beyond the control of the project proponent. Reasons beyond the control of the project proponent comprise either (a) atmospheric conditions such as cloud, (b) sensor related errors corrupt data for images obtained from the sensor Landsat 7. • During the time period during which incomplete remote sensing images are used, no other complete remote sensing images exist in a remote sensing data archive that is practically available to the project proponents at the time the classification work is conducted. • Landsat image Level 2 – Collection 2 – Tier 1 were downloaded through Google Earth Engine, as they have the highest radiometric and positional quality. They have precision terrain processing and have been inter-calibrated across the Landsat sensors. They are radiometrically calibrated and orthorectified using ground control points (GCPs) and digital elevation model (DEM) data to correct for relief displacement. • Landsat scenes with the highest available data quality are placed into Tier 1 and are considered suitable for time-series processing analysis. Tier 1 includes Level-1 Precision Terrain (L1TP)

Module	Applicability
	processed data that have well-characterized radiometry and are inter-calibrated across the different Landsat sensors. The georegistration of Tier 1 scenes will be consistent and within prescribed tolerances [≤ 12 m root mean square error (RMSE)]. All Tier 1 Landsat data can be considered consistent and inter-calibrated (regardless of sensor) across the full collection. • All the images and the land cover classification images have the same common pixel resolution 30m by 30m, the same common origin and projection system. • Available images that do not meet overall quality criteria are not to be included in this procedure. Approach A was employed to create the composite as it produces discrete historical LULC maps.

3.1.3 Project Boundary

3.1.3.1 Geographical Boundaries

The geographical boundaries of the Project Activity Instance are described in section 2.1.5.1. These shapefiles are available to the VVB and the kml file of the boundaries of the first Project Activity Instance was uploaded to Verra's website.



Photo 4. View of the Project Activity Instance

3.1.3.2 Temporal Boundaries

Start Date and End Date of the Historical Reference Period

The historical deforestation was calculated through proxy parcels during the historical period between June 4th, 2010 and June 28th, 2020.

Start Date and End Date of the Project Crediting Period

The start date of the crediting period is December 10th, 2020-, ending on 9th December 2060 (see section 2.1.15).

Duration of the Monitoring Period

The minimum duration of a monitoring period is one year, and the maximum duration is 5 years.

3.1.3.3 Carbon Pools

Any significant decreases in carbon stock in the project scenario and any significant increases in carbon stock in the baseline scenario are accounted for. In addition, decreases in the baseline scenario and increases in the project scenario are also accounted for.

Harvested wood products were not included as they do not increase or decrease in the baseline or the project scenario. According to VCS Module VMD0005 REDD Methodological Module: Estimation of Carbon Stocks in the Long-Term Wood Products Pool (CP-W), from harvested wood products are excluded. Following CP-W wood products are only included in cases where wood is harvested for conversion to wood products for commercial markets. As these lands would have been cleared by agricultural companies or interests, the area would have been cleared and burned to add fertility to the soil. Timber extracted from lands cleared for agriculture are used in the local commercial markets for long term wood products namely furniture and housing materials (Mendoza, 2019). Once forestland is cleared for agriculture, taxes must be paid on the timber if sold to commercial markets. Since there is a demand for timber products, any timber extracted would be used for commercial, long term wood products. Although this module is not applicable, it is a common practice in the region to extract all high-value timber before converting to agriculture or pasture land. The project opted to exclude the biomass stored in the long-term wood products resulted from the salvage logging from the above-ground tree biomass stock in a conservative approach.

Dead wood was excluded as it was not a significant pool project scenario. All carbon pools included in the baseline accounting are also be included in project scenario and leakage accounting.

3.1.3.4 Sources of GHG Emissions

Source		Gas	Included?	Justification/Explanation for Project
Baseline	Burning of woody biomass	CO ₂	Included	Included for biomass burned under baseline for forest clearing
		CH ₄	Included	Included for biomass burned under baseline for forest clearing
		N ₂ O	Included	Included for biomass burned under baseline for forest clearing
		Other	N/A	N/A
	Combustion of fossil fuels	CO ₂	Excluded	Conservatively excluded
		CH ₄	Excluded	Conservatively excluded
		N ₂ O	Excluded	Conservatively excluded
		Other		N/A
	Use of Fertilizers	CO ₂	Excluded	Conservatively excluded
		CH ₄	Excluded	Conservatively excluded
		N ₂ O	Excluded	Conservatively excluded
		Other		N/A
Project	Burning of woody biomass	CO ₂	Excluded	This is zero in the Project Scenario
		CH ₄	Excluded	This is zero in the Project Scenario
		N ₂ O	Excluded	This is zero in the Project Scenario
		Other		
	Combustion of fossil fuels	CO ₂	Excluded	De minimis and excluded from baseline accounting.
		CH ₄	Excluded	De minimis and excluded from baseline accounting.

Source	Gas	Included?	Justification/Explanation for Project
Use of fertilizers	N ₂ O	Excluded	De minimis and excluded from baseline accounting.
	CO ₂	Excluded	This is zero in the Project Scenario
	CH ₄	Excluded	This is zero in the Project Scenario
	N ₂ O	Excluded	This is zero in the Project Scenario

3.1.4 Baseline Scenario

Based on the most likely scenario for conversion to agriculture and ranching described in section 3.1.5, the module BL-LP was used to justify the baseline scenario. This section follows the step-by-step procedures outlined in VMD0006 BP-LP show in Figure 3. Continuation of Part 1 for Baseline Emissions of BL-PL are described in section 3.2.1.

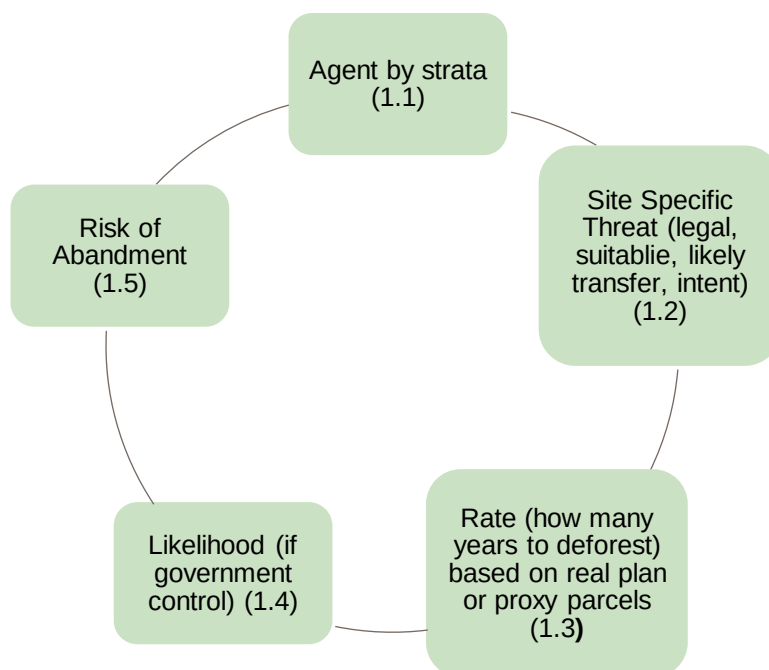


Figure 3. Module Requirements BP-LP

3.1.4.1 BL-PL: Part 1. Calculating Annual Area of Land Deforested

Identify the Agent of Planned Deforestation in Each Baseline Stratum (Section 1.1 of BL-PL)

The properties' seller is The Forestland Group (TFG), which for the past 10 years of its ownership, has been committed to FSC harvesting on the parcels, is a timber investment company (TFG, 2016) (TFG, 2015). As a company, TFG is committed to managing their properties in a sustainable way, and even implemented a small VCS REDD+ project (VCS #1326) on a portion of their parcel Laguna Seca, but ultimately TFG is responsible to generate financial returns for their investors. These two parcels are held in two different private commingled investment vehicles. Laguna Seca is held in Forestland Fund VII, an investment fund managed by The Forestland Group and Yalbac in Forestland Fund V and investment fund managed by The Forestland Group. These commingled vehicles have a fixed investment term, and distributions are paid to investors as net cash flow is generated. When timberland properties are sold, net

proceeds are distributed, not recycled into new properties. Given that these funds were each coming to their maturity in 2020 and 2022 respectively, TFG started the sales process in 2016, but really became serious about selling in late 2019 to find buyers for the parcels. Initially, TFG offered properties to other timberland investors through its financial advisor, Jonathan Prather at Perella Weinberg Partners in early 2020, but this process was impacted by the global COVID-19 pandemic. Thus, TFG broadened their sales process and started to discuss sales and receive purchase offers for the parcels from known agricultural entities. These included a strong group of large commercial agriculture farmers and an investor seeking to purchase and subdivide the parcels for sales to the highest and best use bidders for agriculture.

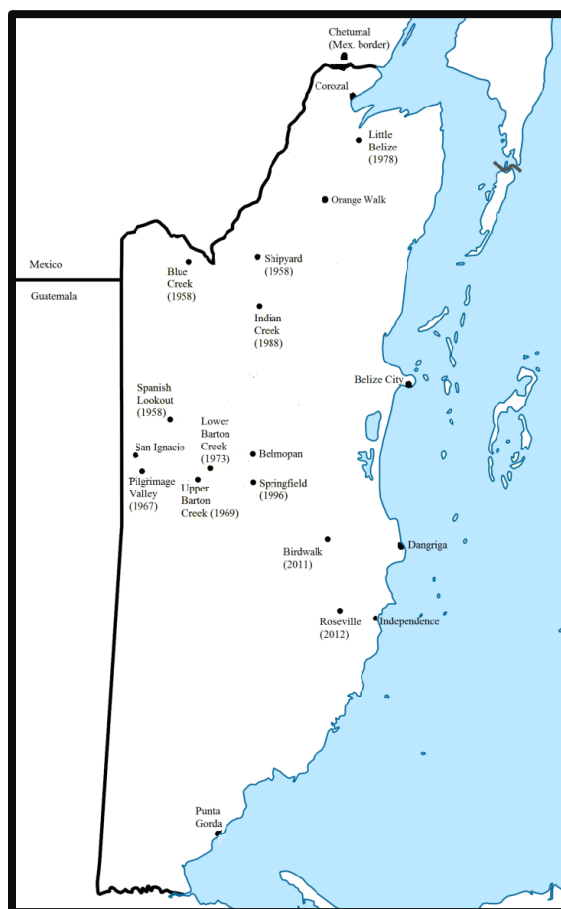
Strata of the Project Area

The parcels owned by TFG have been stratified into two strata as described in the sub-section of 3.1.4.1 titled Area of Deforestation and Specific Threat (Section 1.2 of BL-PL) and shown in Table 16. These two strata include Convertible Areas (defined as Project Areas) and non-convertible areas (excluded from this project). This delineation follows BL-PL (VMD0006) and VM0007 REDD+ Methodology Framework (REDD+MF). Strata are spatially discrete and defined on the basis of forest carbon stocks, biophysical parameters relating to forest and agriculture productivity, including biophysical parameters such as, soil type, elevation, precipitation regime, temperature, slope and aspect, tree species composition, age class/disturbance history, and stand density. The sub-section of 3.1.4.1 titled Area of Deforestation and Specific Threat (Section 1.2 of BL-PL) describes the similarity across the Project Area as well as the similarity of the Project Areas to the proxy parcels. In addition, this sub-section also describes activity-related parameters including distance to roads, and Distance to towns and villages for export of materials and access to labor.

Class of Agents, common purchaser of similar land

The World Bank has characterized agriculture in Belize as having three main subsectors: (a) a well-organized export-oriented commercial subsector specializing mainly in banana, citrus, and sugar; (b) a highly diverse, subsistence-oriented smallholder subsector producing a wide range of food crops, especially vegetables, mainly for local consumption; and (c) a vertically integrated large-scale commercial subsector (dominated by Mennonite communities) producing cereals and livestock products for both local and export markets (CIAT: World Bank, 2018).

Farmers from Mennonite communities or other vertically integrated large-scale commercial farmers have been identified as the class of agent who will clear the strata identified as Project Area to be used for large-scale agricultural. Farmers from Mennonite communities have been active in this area of Belize and clearing large-scale land for agriculture since their founding. Section 6.4 Appendix 4: Proxy Parcels Deforestation Analysis describes in detail how Mennonite farmers and other vertically integrated large-scale commercial farmers, have cleared similar lands with similar conditions. Supporting these as the class of agents is also demonstrated in that the Proxy Parcels 2, 4, 5, 6 and 7 in Table 52 are owned or managed by farmers from Mennonite communities, demonstrating that this class of agents is the most common purchaser of similar lands in the strata identified in the Project Area. Map 9 below shows locations of major Mennonite settlements, many of which surround the Project Area, and have cleared large areas of land since their founding.



Map 9. Mennonite Settlements with Year of Founding and Major Cities in Belize (Bovenberg, 2018)

Photo 5 shows Proxy Parcels south of the Project Area, cleared for large-scale agriculture and grazing. This large-scale commercial farm is near the Spanish Lookout community with the Project Area in the background.



Photo 5. A legally cleared parcel south of the Project Activity Instance

Based on TFG's requirement to sale of these properties and the interest by agriculture entities and the interest for active agricultural interests active in the project area, the project's deforestation agent is a group of agents that represent agricultural interests and/or investors seeking purchase the property for the highest economic use which is agriculture. There is only one stratum related to agents as they would take all forest land that is eligible for agriculture or ranching and convert it over time

Area of Deforestation and Specific Threat (Section 1.2 of BL-PL)

Legally Permissible (1.2. bullet 1 of BL-PL)

The subdivision and conversion of the Project Activity Instance to agriculture or pasture land is legal, as defined under the Land Utilization Act, Chapter 188, revised Edition 2000 (Land Utilization Act, 2000), the Private Forest (Conservation) Act, Chapter 217 Revised Edition 2000 (Private Forest Act, 2000), and the Forest Act Chapter 213, Revised Edition 2003 (Forests Act, 2003). Each of the four other registered VCS Avoided Planned Deforestation for conversion to agriculture provides this legal case. In addition to the Forestland Group publicly offering parcels as usable for agriculture, the Yalbac Ranch Property Appraisal Report, dated December 31, 2019 prepared by Mason, Bruce and Girard, Inc states the following, which demonstrates that clearing for agriculture is legal and royalties would be due:

Forest regulation includes several related components. Harvesting timber via concession on public forest reserves is regulated separately from private lands. Most of Belize's forestry laws address issues associated with harvesting on public lands. Virtually all of the regulations involve the Department collecting fees from timber industry participants.

Private Lands

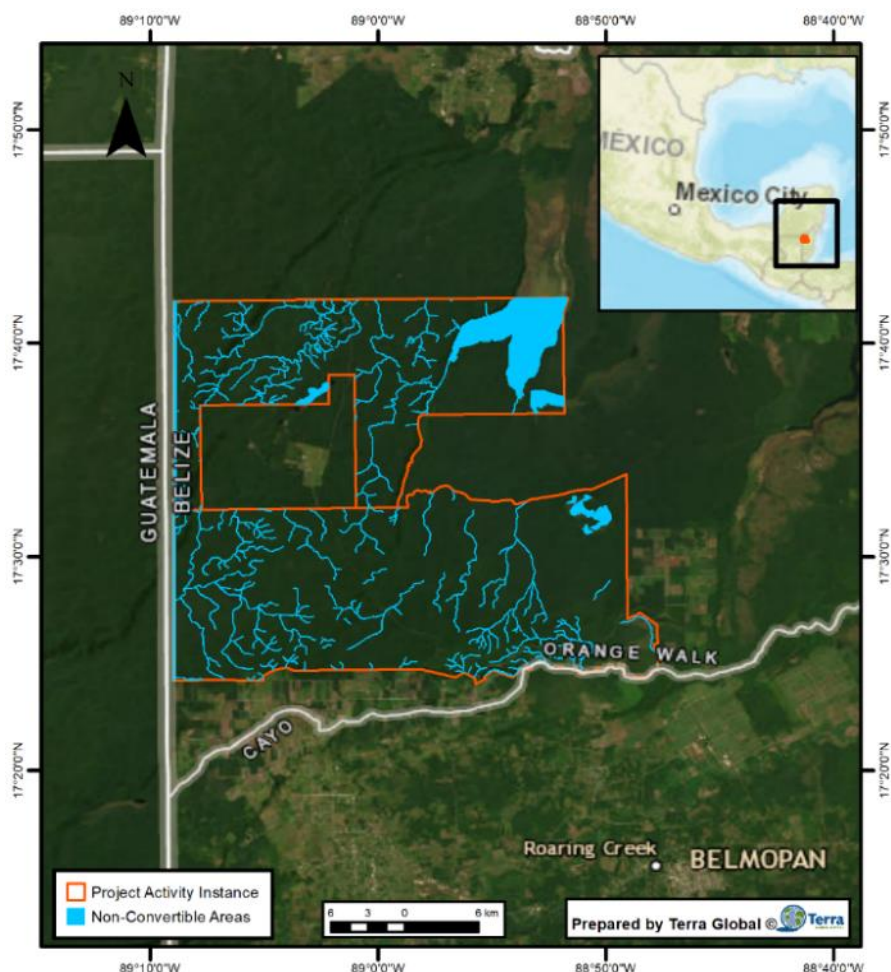
- All private timber harvested is subject to a royalty collected by the government.
- Timber sales resulting from land clearing, requires a payment of royalty
- Tree harvesting licenses are required.
- Sawmills must have timber milling licenses.
- Milling lumber with chainsaws is prohibited.
- Being in the chicle business, i.e. tapping, manufacturing, buying or selling chicle requires a license.
- A government licensed brand or stamp is required on all logs and lumber transported on public highways, both for publicly and privately harvested timber.
- Log exports from Belize are prohibited.
- Lumber exports and imports are subject to a duty (Private Forest Act, 2000),.

Legal Set Asides (Non-convertible) Within Project Activity Instance (Identifying non-convertible strata)

The Project Activity Instance is subject to a 100-meters reserve, the border zone of Belize and Guatemala, which affects approximately 663 hectares of the western border of the property²⁴. This area was excluded, although other actors in the area are not following this law. In addition, the law in Belize restrict the clearing of land within 20 meters from any running stream or body of water. In practice the law means that the 20 meters are essentially public land that most private landowners are not allowed to change the land use from the natural state (NATIONAL LANDS ACT CHAPTER 191. Section 12(8)). Land-use and GIS analysis were conducted to identify the areas within the Project Activity Instance that could not be legally converted. These non-convertible areas include wetlands, boundary proximity setbacks, and riparian zones as detailed in Map 10 and

Table 15. While there are some ancient Mayan sites on the Project Activity Instance, given this is private property, there is no explicit legal set aside for clearing forests near these sites. Table 16 presents the total area that is eligible for the project after excluding the legally non-convertible area and the non-forest areas.

²⁴ Recorded in the General Registry at Register 17, Entry 10612, dated August 16, 2007



Map 10. Non-convertible Area Due to Legal Requirements

Table 15. Parcel Sizes and Area Legally Convertible

Parcel	Legally convertible – Crediting Area (ha)	Legally non-convertible Area (ha)	Total (ha)
Laguna Seca	28,644	5,071	33,715
Yalbac	51,318	2,025	53,344
Total	79,963	7,096	87,059

Table 16. Eligible Area (Strata of Project Area)

	Area (ha)
Total Parcels Area	87,059
Legally non-convertible Area (excluded strata)	7,096
Non-Forest Area (excluded strata)	1,783

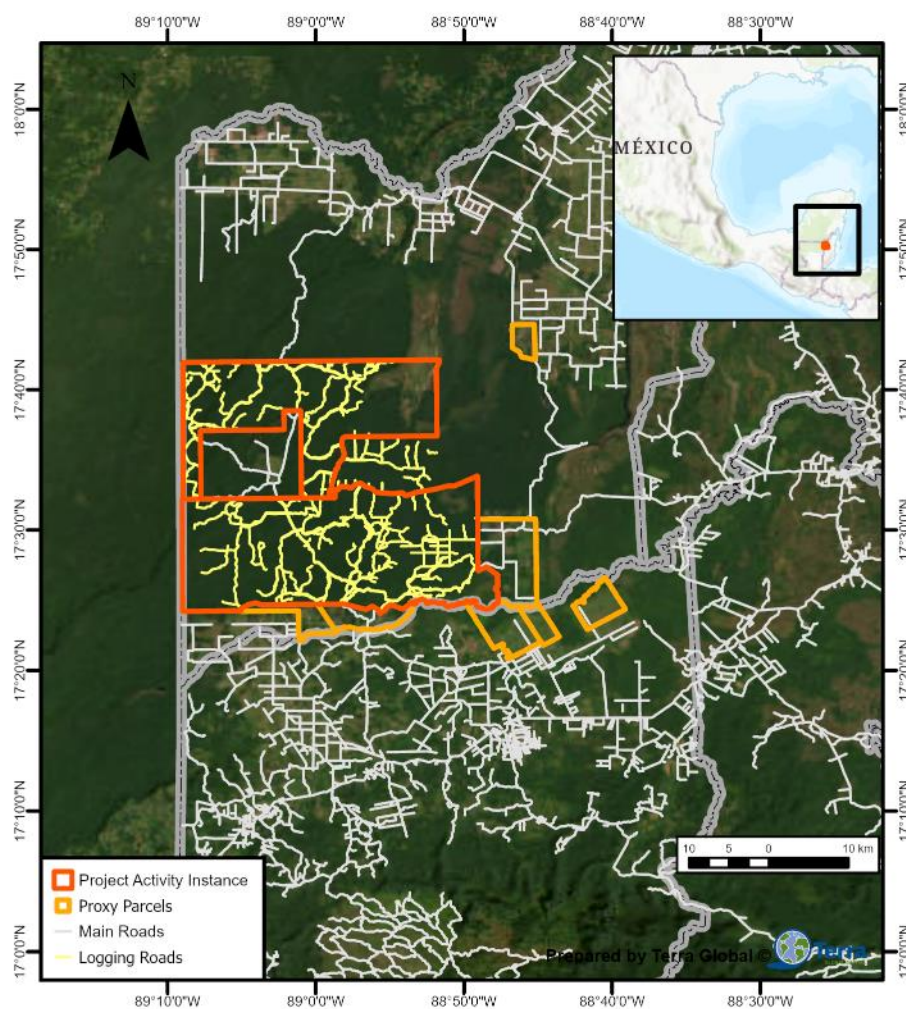
	Area (ha)
Total Eligible Area (Project Area Strata)	78,180

Suitability for Conversion (1.2. bullet 2 of BL-PL)

Suitability for conversion includes accessibility to relevant markets, suitability of soils, topography and climate. The Project Area is stratified as area suitable for conversion, and areas not suitable for conversion, or not legally permissible are stratified as “excluded strata” and not included as part of this project.

Road Network and Access to Markets

The road network in the Project Activity Instance provides enough accessibility to extract timber and thus would provide access to transport of agricultural products as shown in Map 11 below. Currently there are several roads dirt roads throughout the properties, that would be improved to support agriculture production and export from the Project Activity Instance. Furthermore, it is expected that when areas are cleared, additional roads will be installed to follow the pattern that has happened to the south and east of the Project Activity Instance as they have been cleared overtime for agriculture.

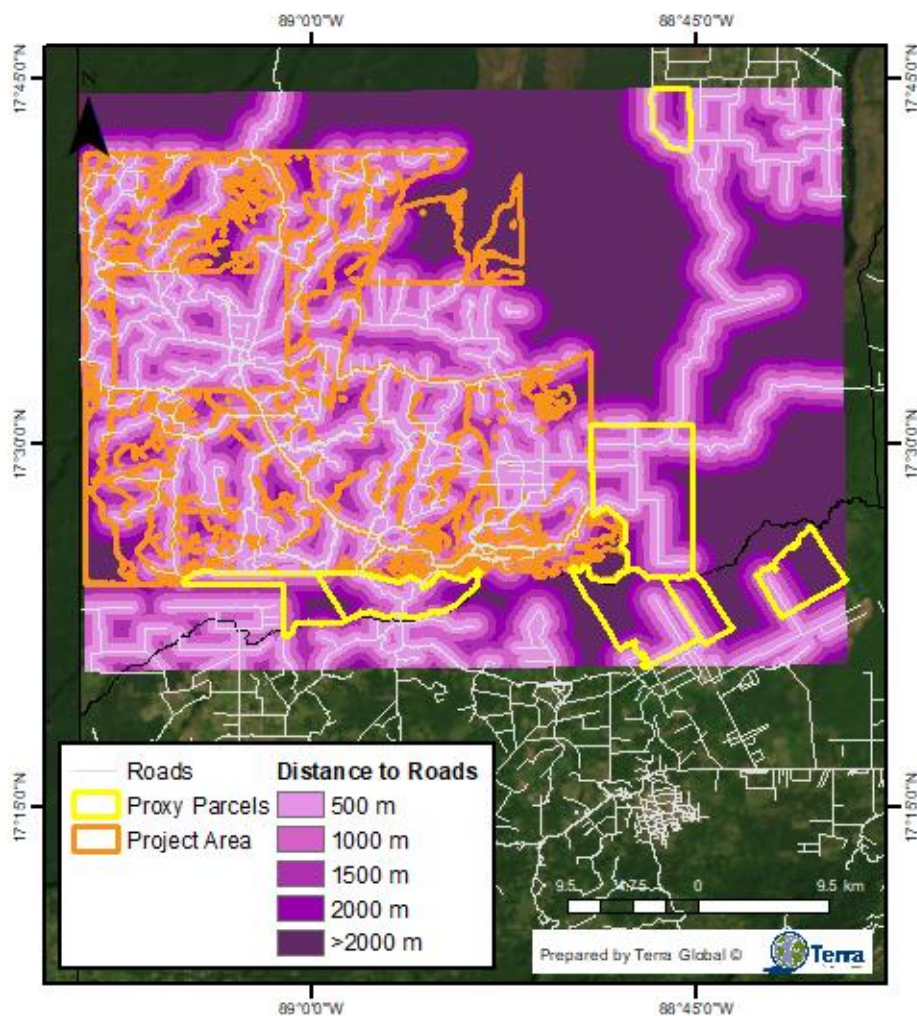


Map 11. Existing roads near the Project Activity Instance (2013)

In addition, it is important to note that most of the Proxy Parcels did not have roads before the agent of deforestation started to deforest. However, in the Project Activity Instance, there are logging roads that were used by the previous owner of the property, and those roads could be potentially improved and used by the agent of deforestation to extract the products to the market. After performing a distance analysis to the nearest road, including the logging roads (Map 12), it can be observed, in Table 17, that 94% of the Project Activity Instance and 83% of the Proxy Parcels have distances below 2,000 meters. Considering that the distances to roads in the Project Activity Instance are not that far, makes the area accessible to relevant markets when compared to the Proxy Parcels.

The distance to the nearest population centers was also taken into account to analyze accessibility to markets. The villages function as meeting points for workers, where they can find food and housing (Map 13). Table 18 shows that the proportion of distances between the Project Activity Instance and the Proxy Parcels are similar, showing relative proximity to the populated centers.

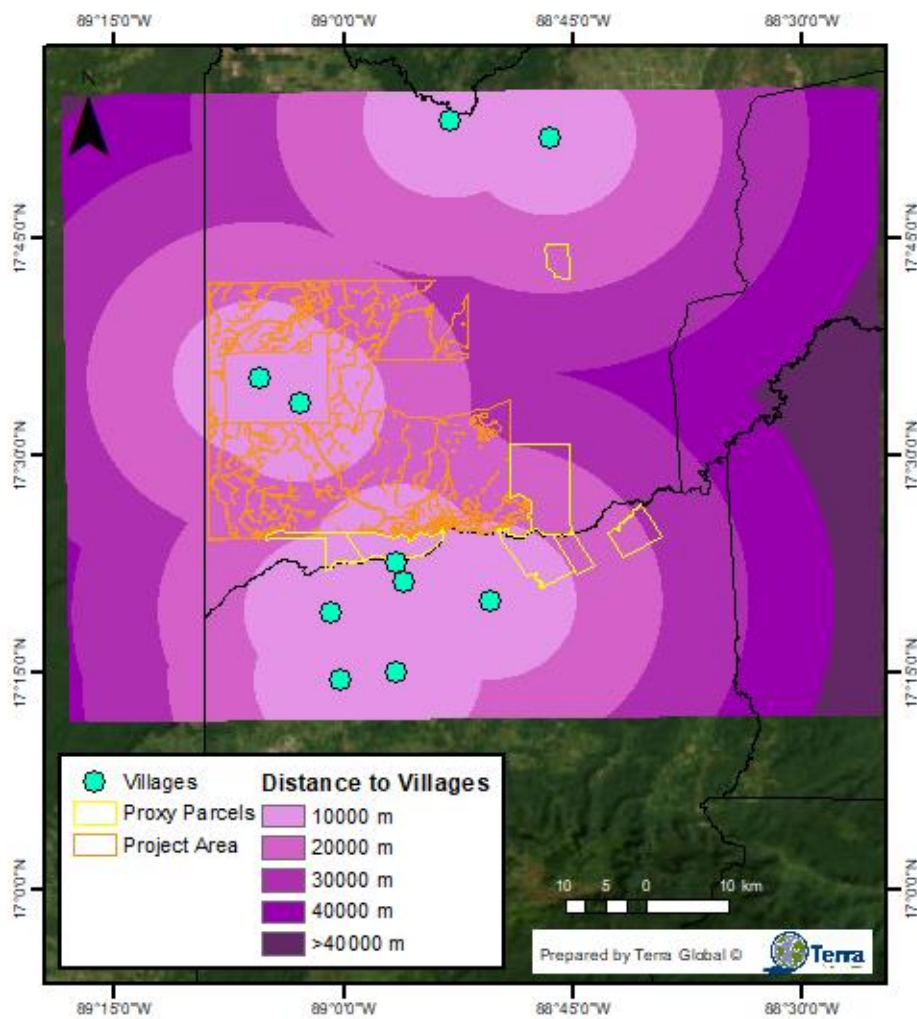
The previous analysis confirms that the Project Activity Instance has the necessary conditions to have access to the market under the same conditions as the Proxy Parcels.



Map 12. Project Activity Instance and Proxy Parcels Distance to Roads

Table 17. Project Activity Instance and Proxy Parcels Distance to Roads (%)

Distance (m)	Project Activity Instance	Proxy Parcel
0-500	51%	30%
500-1,000	27%	24%
1,000-1,500	12%	17%
1,500-2,000	5%	12%
>2,000	6%	17%



Map 13. Project Activity Instance and Proxy Parcels Distance to Villages

Table 18. Project Activity Instance and Proxy Parcels Distance to Villages (%)

Distance (m)	Project Activity Instance	Proxy Parcel
0-10,000	42%	38%
10,000-20,000	56%	55%
20,000-30,000	3%	7%

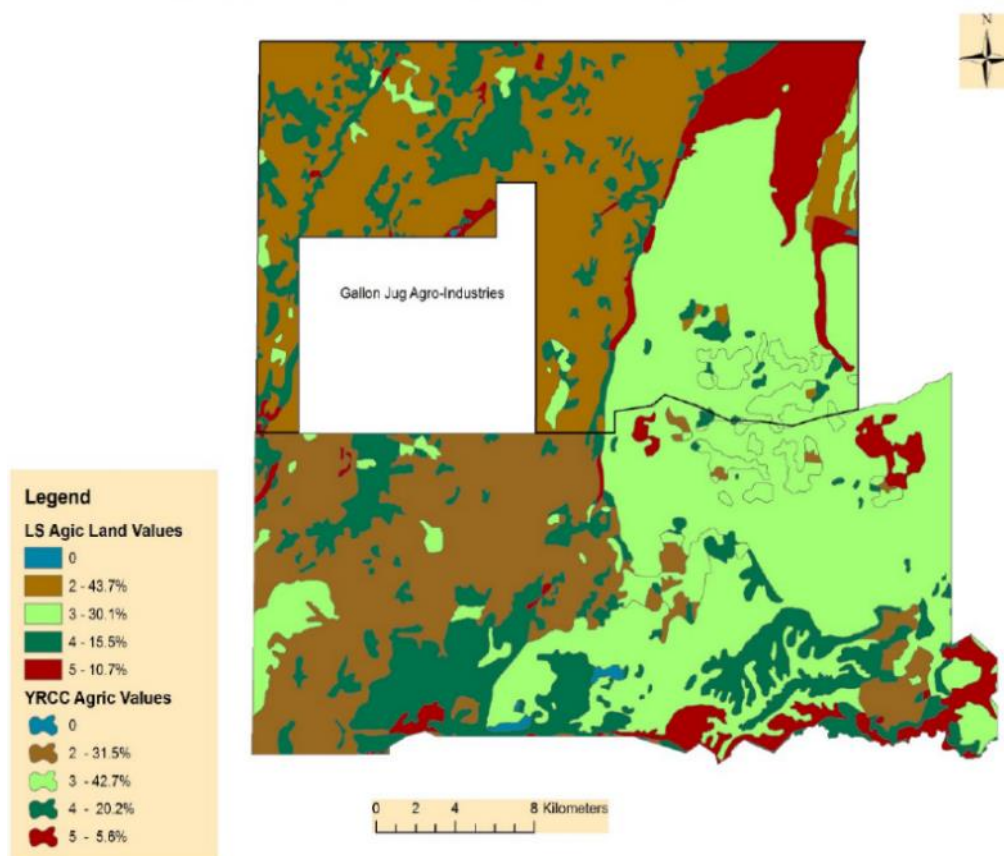
Biophysical Convertibility

Belize's land is classified into five grades, based on the land's potential for use and limitations (Simpson, 2009). The Project Activity Instance was assessed by TFG for their agricultural potential, which was included in the project profile provided to potential buyers. More than 73% of both Laguna Seca and Yalbac were Grade 2 and Grade 3 land (good financial potential from agricultural activities and could be used for agriculture but requires skilled management and much financial investment, respectively)²⁵ (Map 14). This area occupies most of the Northern Coastal Plain already under sugar cane production in the Corozal and Orange Walk Districts (Simpson, 2009).

However, in 2004, approximately 38% of the land in Belize under Classes 4 and 5 were used for agricultural purposes (Simpson, 2009). Furthermore, forest plantations are not a common practice among the large commercial scale agricultural communities, and based on soil features and topography, these lands could support corn growing through the implementation of mechanized practices. This means that although 73% of the property is classified as more suitable for crops, the area that can potentially be converted to agriculture is greater considering that agricultural practices have been reported in areas classified with low suitability (Classes 4 and 5).

The legend in Map 14, "LS Agric Land Values" makes references to the proportion of each agricultural potential category in Laguna Seca, whereas "YRCC Agric Values makes references to the proportion of each agricultural potential category in Yalbac

²⁵ TFG presentations dated April 2019 and March 2016: "Yalbac & Laguna Seca Properties Profile", commercially sensitive.

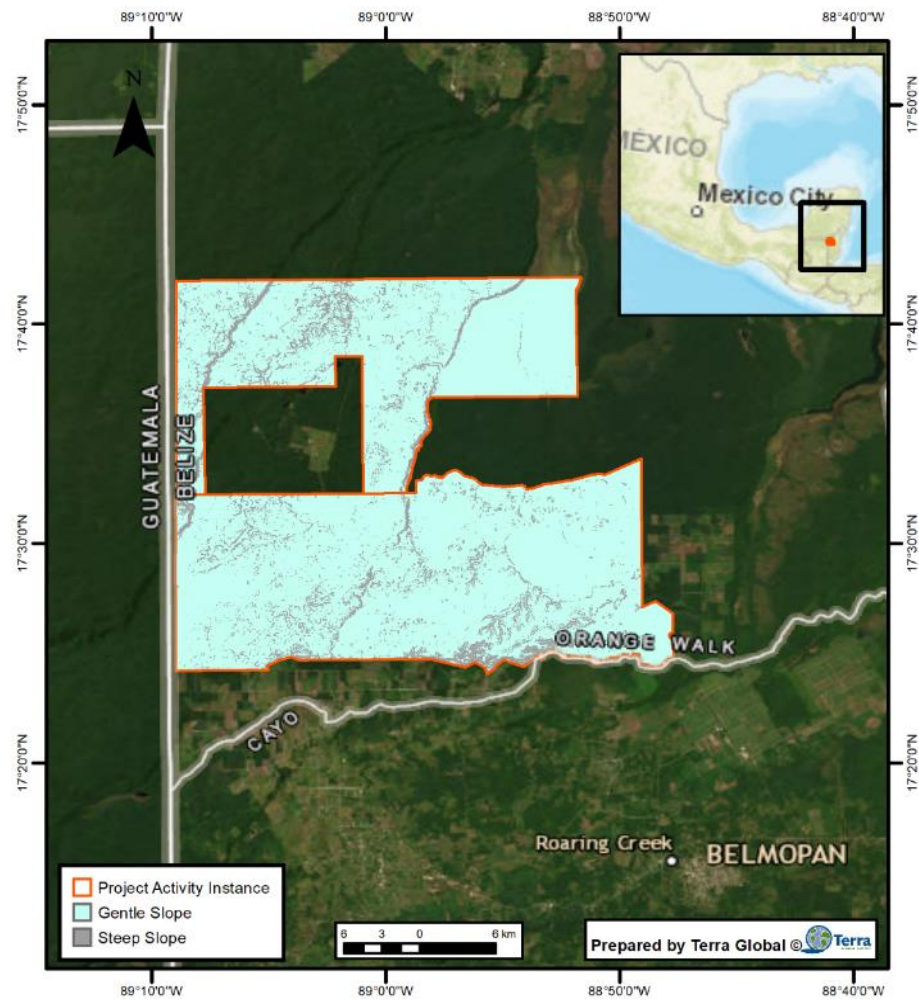


Map 14. Agricultural Potential Land Values in Yalbac and Laguna Seca from a Sales Document

The Project Activity Instance is slightly hilly, where 89.4% of the area has gentle slopes (see Map 15), less prone to erosion and mass movements. These topographical conditions facilitate the access of machinery for agricultural production, and creation of access roads for extraction of products for commercialization.

According to the derived the IPCC default soil classes from the Harmonized World Soil Database (FAO, 2022), the dominant soil type in the Project Activity Instance are Cambisols (100% of the area). This type of soil is used for the cultivation of all kinds of crops and grazing.

The topography and soils conditions are the same as in the Proxy Parcels described in Section 3.2.1.1 which clearly shows that the biophysical characteristics of the Project Activity Instance are suitable for agriculture.



Map 15. Slope Gradients in the Project Activity Instance



Photo 6. Cattle Grazing on hilly ground that was previously forest just south of the Project Activity Instance (on the horizon)

Evidence of Likely Transfer to Deforestation Agent (1.2. bullet 3 of BL-PL)

Under BL-PL there are three ways to show a property would be deforested upon transfer to another owner:

- 1) Bona fide bidding process for the Project Activity Instance that reflects value of the area and with the expressed intent to deforest,
- 2) Purchase offer of the Project Activity Instance by an entity that is clearly dedicated to agricultural, grazing or urban development activities, or
- 3) Other evidence that control of the Project Activity Instance would have been transferred to the baseline agent or class of agents in the absence of the project.

Although only one demonstration is necessary, this Project meets each of these requirements in the following manner:

Under 1) It can be shown based on the marketing documents and representation in the letter provided by TFG that this parcel was offered for sale based on its timber value, but also its agricultural value. This is further evidenced in the marketing documents describing the agricultural value of the property to a prospective buyer. The TFG marketing document dated March 2016, which offers both parcels, show selling the parcels is required and that they would most likely be sold for agricultural purposes as such:

- The investment funds that hold the properties are maturing, which requires a sale “Ten-year anniversary: Yalbac 2020 Laguna Seca 2022”, this forces a sale of the parcels prior to the funds’ maturity.
- “Currently, the most viable option for exit is continuation of an orderly disposition of the properties over multiple years through partial sales to agricultural interests, who would likely convert the land into feedstock row crops. Under 2) there were two indicative offers for the Project parcels by the entities that would fall into the group of agents identified. And while TFG would typically promote a transfer for ownership to another timber investment manager, TFG did not in this case because due to the lack of interest from other timber operators, because there is less interest in Belize Mahogany (which is the driver of value for timber) due to competition by African Mahogany, which is much cheaper.”²⁶
- Marketing materials from TFG show that areas suitable for agriculture was used as a selling point for the land.
- TFG in 2020 provided a representation letter from the President and CEO, that details the intent to sale and the offers.

Under 2) There have been multiple offers on the properties for the class of agents who have a history of deforesting. More details on these can be found in the documents listed in Section 6.3.1. This includes an offer from CAM Investments in 2017.

Included in the TFG representation letter is the discussions that were underway. Additional information from a discussion between TNC, and the TFG engaged to support the sale shows the active interest of TFG in selling the property and details regarding the potential buyers and bidders being agricultural in nature, see details in the documents listed in Section 6.3.1.

If, the requirements are not fully met under 1) and 2), they maybe grouped with point 3) as they are all Other evidence that control of the Project Activity Instance would have been transferred to the baseline agent or class of agents in the absence of the project.

Under 3) Other evidence that indicates control of the Project Activity Instance would have been transferred to the baseline agent or class of agents in the absence of the project, in consideration that a sale is required, no conservation minded-timber buyers could be found, and agricultural use is the best and highest use for the properties.

²⁶ <https://www.woodshopnews.com/news/demand-shifts-to-mahogany-substitutes>

The sale in 2013 by TFG of a portion of Yalbac, the Spanish Lookout Community Corporation, for 12,328 hectares for a large amount in a cash transaction shows that organized farming communities have both the financial resources and the interest in purchasing forest land and converting it. See documents listed in Section 6.3.1.

The structure of Belize's agriculture sector consists of large commercial farms producing for export, plantation farming for bananas, and commercial farming of cereals and vegetables by larger Mennonite communities. The deforestation agent for this project is determined to be the class of agents well-known in Belize, which are the agricultural interests, which have historically purchased large tracks of forest land and converted them to agriculture²⁷. Based on Map 34 in Section 4.3.3, it is easy to see how there is immense pressure from nearby settlements to expand their agricultural productive land and threaten the Laguna Seca and Yalbac forests.

The Spanish Lookout Community Corporation recently purchased approximately 5,666 hectares. They struck oil a few years ago and are now exporting to the US, in addition to timber and other industries. There is oil revenue that is allowing them to purchase land.²⁸

The information in section "evidence of likely transfer to deforestation agent" shows the intent to deforest of this class from agents.

The Kleine Gemeinde of Spanish Lookout and Blue Creek are holders of large tracks of agricultural land and utilize intensive agricultural practices. These communities also do large-scale crop farming and have their own granaries. Most farms in Belize, including the farms around the BMF, use agro-chemicals on crops and organic farming is limited in Belize. Agro-chemicals are distributed either through airplanes that spray larger fields, tractor sprayers and handheld spray pumps. While the agricultural industry is key to country's economy, there is growing concern by conservatists about the hundreds of hectares of primary and secondary forests that are continually bulldozed by crop planters²⁹.

In the offer to purchase, what is known a Block 10 of Yalbac (3,713 hectares), which comes from the agents that reflects that class of agents, the areas suitable for agriculture were distinguished, and the price per hectares reflect the value of this property when cleared of forest and used for agricultural production.

Government Approval to Deforest (1.2 bullet 4 of BL-PL)

This requirement states that we need to show that a request for approval has been filed to government to deforest, but with the agent being a class of agent, there is not a specific submission to show.

Intent to Deforest (1.2 bullet 5 of BL-PL)

Given this is a case of agents that have agricultural interests, the intent to deforest the Project Activity Instance is proven by the analysis of the Proxy Parcels described in Section 3.2.1.1, where the class of agent are the same, showing a clear intention of converting the land to agriculture.

²⁷ WTO Trade report 2017

²⁸ Source TNC records file Gallon Jug Landscape Ownership and Landuse[1] Jan 2019t

²⁹ <https://belizemennonites.blogspot.com/2018/01/mennonite-farming-in-belize-crops.html>



Photo 7. Industrialized Corn Farm with Project Area Instance in Background

The Proxy Parcels are owned by Mennonite farmers or other vertically integrated large-scale commercial farmers who have been identified as the class of agent who will clear the Project Area for large-scale agricultural. The Intent to deforest from this class of agent is clearly documented in the Proxy Parcel analysis in section 6.4. The documentation in Table 52 are government records from the Land Information Center, Belize demonstrating that the class of agent identified has a history of clearing land within 5 years of project start. In addition, Map 41, Map 42, Map 43, Map 44, and Map 45 show similar deforestation activities by the class of agents of planned deforestation within the five years previous to without-project deforestation. The area owned by BMFT was stratified into two strata which include convertible areas (defined as Project Areas) and non-convertible areas (excluded from this project). Common practice in both Proxy Parcels, as well as the surrounding area shows that legal mandates such as waterway protection and buffer for an international border are not enforced, as these areas are cleared. This project followed the recommendations that the total parcel area planned to be deforested does not exceed the legal mandate, making our calculations conservative.

3.1.5 Additionality

In accordance with VM0007 v1.6, CDM tool T-ADD: “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” was used for the additionality assessment of this project. While the tool was written for A/R CDM projects, there is a translation table in Section 6.1 of VM0007 to apply the tool to different typologies. The translated terms have been used in this document to avoid confusion.

3.1.5.1 STEP 0. Preliminary Screening Based on the Starting Date of the Proposed VCS AFOLU Project Activity

T-ADD is applicable to projects that meet two conditions:

1. Evidence that the starting date was after 31 December 1999 must be provided.
 - a. The project was initiated with the sale of the property to TNC in December 2020. See Section 2.1.14 for more detail.
1. Evidence that the planned sale of VCUs was seriously considered in the decision to proceed with the project must be provided.
 - b. TNC purchased the land with the understanding that a portion of the upfront cost of the land acquisition would be recovered with the sale of VCUs. See Section 2.1.20 for more detail.

3.1.5.2 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**

There are three possible alternative land use scenarios to the proposed Project Activity.

1. Active timber harvesting. The Project Activity Instance was owned by TFG, a logging company, before its sale to TNC, and timber harvesting activities were actively conducted in the Project Activity Instance. In addition, TFG listed the timber value of the property, when they offered it for sale. These factors combined indicate that active timber harvest is a credible alternative land use scenario.
2. Conversion to agriculture. When the property was offered for sale, its agricultural value was also emphasized in marketing documents. Though steep escarpments and low-lying, wet soils in some parts of the Project Activity Instance would limit agriculture in those areas, a sizable proportion of the acreage could physically support this use. The potential agricultural activities include row crops, cattle farming, coffee or fruit plantations, and high value tree plantations. Because the property was actively logged before its sale, much of the required infrastructure for agriculture already exists, such as a road network. In addition, the property received competitive offers from agricultural groups, and much of the area around the Project Activity Instance is agricultural land, indicating that conversion to agriculture is the most likely alternative land use scenario. See Section 3.1.4 for more detail.
3. Conservation activities without being registered as a VCS AFOLU project. The project was initiated with the purchase of the land through a grant from TNC, who aims to recover a portion of the purchase price through the sale of VERRs. In addition, the future operating costs of monitoring and conserving the land will be funded through the sale of VERRs, meaning this alternative land use scenario is not feasible.

Sub-Step 1b. Consistency of Credible Land Use Scenarios with Enforced Mandatory Applicable Laws and Regulations

1. Active timber harvesting. There is a history of legal timber harvesting in the Project Activity Instance. Continued harvesting would also be legal.
2. Conversion to agriculture. The conversion of the Project Activity Instance to agriculture is within the laws of Belize. See Sections 2.5 and 3.1.4 for more detail on the specific laws that allow for conversion to agriculture.
3. Conservation activities without being registered as a VCS AFOLU project. The same legal conservation activities are conducted in the Project Scenario. Registration as a VCS AFOLU project does not change the legality of the activities conducted.

3.1.5.3 STEP 2. Barrier Analysis**Sub-Step 2a. Identification of Barriers that Would Prevent the Implementation of at Least One Alternative Land Use Scenarios**

Barriers due to social conditions, more specifically demographic pressure on the land, prevents the implementation of Alternative Land Use Activity 1 (Active Timber Harvesting). As detailed in Section 3.1.4, the most likely alternative outcome of the sale of the land was to an agricultural group. The most common land use scenario in the land near the Project Activity Instance is agriculture. Due to pressure from the surrounding community to convert to agriculture, the alternative land use scenario of Active Timber Harvesting is unlikely.

Sub-Step 2b. Elimination of Land Use Scenarios that Are Prevented by the Identified Barriers

Active Timber Harvesting has been eliminated by the Barrier Analysis in Sub-Step 2a. The following alternative land use scenarios remain after the barrier analysis:

1. Conversion to agriculture
2. Conservation activities without being registered as a VCS AFOLU project

Sub-Step 2c. Determination of the Baseline Scenario (if Allowed by the Barrier Analysis)

The following decision tree was applied for the determination of the Baseline Scenario.

- Is forestation without being registered as a VCS AFOLU project activity included in the list of land use scenarios that are not prevented by any barrier?
 - YES
- If YES, then: does the list contain only one land use scenario?
 - NO
- If NO, then proceed with STEP 3. Investment Analysis

3.1.5.4 STEP 3. Investment Analysis

Sub-Step 3a. Determine Appropriate Analysis Method

Option I: Simple Cost Analysis has been selected because the project generates no financial or economic benefits other than VCS related income.

Sub-Step 3b. – Option I: Apply Simple Cost Analysis

As demonstrated in the cashflows provided to the VVB, the REDD+ project has operating costs and other expenses of between USD \$1 million and \$2 million per year. In addition, year one of the project included capital expenditures and other upfront costs, such as the land acquisition, totaling USD \$93 million. Because the project generates no other financial or economic benefits, the only potential source of revenue for the project is the sale of VERRs.

Conversion to agriculture, on the other hand, would be a financially viable alternative land use scenario. Because this alternative land use scenario provides financial benefits, it has been selected as the Baseline Scenario.

Sub-Step 3c. Calculation and Comparison of Financial Indicators

This Sub-Step is only applicable if Options II or III were selected for Sub-Step 3b and has been excluded.

Sub-Step 3d. Sensitivity Analysis

This Sub-Step is only applicable if Options II or III were selected for Sub-Step 3b and has been excluded.

3.1.5.5 STEP 4. Common Practice Analysis

No similar activities to the ones proposed for this project have been conducted in a similar geographic area, except for other registered VCS AFOLU projects. Because the additionality tool excludes these from the Common Practice Analysis, the VCS AFOLU project activity is not the baseline scenario and is additional.

3.1.6 Methodology Deviations

According to Section 3.20 of the VCS Standard v4.5, projects may deviate from the procedures set out in methodologies, where alternative methods may be more efficient for **project-specific circumstances**, and where the deviation will achieve the same level of accuracy or is more conservative than what the methodology sets out. Furthermore, Section 3.19.2 establishes that methodology deviations **shall not negatively impact the conservativeness** of the quantification of GHG emission reductions or removals, except where they result in increased accuracy of such quantification.

Equation 5 of the module VMD0006 (BL-PL) estimates the annual area of deforestation (AA_{planned,i,t}) in the baseline scenario. This equation assumes a linear extrapolation of the observed deforestation rates in the proxy area that occurred ten years before the baseline period to the area of the Project Activity Instance. Based on this approach, the area estimated area of planned deforestation annually would be 10.19 % or equivalent to 7,963 ha/y (Appendix 4: Proxy Parcels Deforestation Analysis).

As described in section 2.1.5.1 and the Appendix 6.4, the BMF size in relation to proxy parcels are almost 5 times bigger, which resulted in an absolute rate of planned deforestation (in hectares) that in the recent history of Belize, there is no precedent of such large parcels being transferred and converted to agriculture by the class of agent of deforestation. The project observed in the proxy parcels, that as the size of a parcel increases, the annual rate of deforestation (%) in the proxy parcels decreases. Therefore, the project considered the pattern of deforestation in the proxy parcels using a non-linear regression approach, which represents the reality of the project more accurately, which resulted in an annual rate of 5.41 % (*D%planned*) or 4,229 ha yr⁻¹ (Appendix 4: Proxy Parcels Deforestation Analysis).

The non-linear model uses a stolid technique (regression) that provides an objective estimate of the deforestation rate. The model used the forest area in each parcel as a predictor of the average annual deforestation rate to generate the regression, which resulted in the following equation ($y = 20.3799x - 0.173$). The regression created has an R-squared value of 0.39, which means that the forest area itself explains 39% of the variation in the observations of deforestation. Given the context of deforestation prediction in Belize by the agent group, an R-squared of 0.39 could be considered reasonable, especially when considering the limitations of parcel-level data.

Deforestation is a complex, multifaceted process influenced by a myriad of interconnected variables. Potential influences on deforestation rate range from diverse biophysical characteristics to governance structure and tenure to socio-economic drivers. Moreover, landowner personal preferences and characteristics are pivotal in the decision process on the timeline of land clearing; landowner decisions are influenced by their land ethic, household finances, neighborhood effects, and a wide range of additional variables that are complex to model.

While some of the biophysical data are broadly available, many of the social and household variables are not available in ANY publicly accessible datasets. So, while these variables have high potential, their practical utility is minimal. Additionally, in the realm of statistics, there is no universally accepted method or threshold to gauge the adequacy of R-squared values.

In light of this context, a single parameter (in this case, the size of the land) which accounts for an important portion of the observed deforestation is more than would frequently be available to inform modeling of this nature.

The remaining 61% may be explained by a series of combinations of variables, including social, cultural, and economic factors, such as labor availability, financial resources, machinery, and infrastructure. As described in sections 3.4.1.1 (suitability for conversion), and 3.2.1.1 (Annual Area of Deforestation), several biophysical variables make BMF suitable for agriculture and enabling conditions are also present (e.g., capital for land clearing, commercial bulldozers and industrial tractors). An infinite number of variables could be analyzed to explain the 61%; however, the data is not available at the parcel level. The project analyzed two additional predictors, proximity to villages and roads, as proxies for labor availability and infrastructure (see Map 10). Alone, those variables explain 0.02% and 16%, respectively. In a multivariable assessment between forest area and proximity to roads, the adjusted R-squared is 0.40. Calculations of the non-linear model is explained in the excel file "BMF Deforestation Rate non-Linear Regression Approach v0-5.xlsx, made available to the VVB.

The R-squared is a tool to assess model fit, but it doesn't tell the whole story. Local context, domain knowledge, and specific circumstances are crucial in determining whether an R-squared value is satisfactory (Ozili, Peterson, 2022).

Observations from the field reinforce that project-specific local circumstances play an important role in determining the predictability of deforestation. It is clear that the class of agent of deforestation could deforest 7,963 ha/y (see section 3.2.1.1 for Annual Area of Deforestation), but due to social-cultural preferences, they have not and most likely would not deforest at that rate. Field observations and anecdotal evidence have demonstrated that even after splitting the land among the community members, some of them opt not to clear the land and establish their crops right away. There are many assumptions, including saving the land for the new generation, maturing the crops in another area before establishing new as that implies higher investment, and waiting for market or price improvement. As an example, during the validation field visit, it was shown to the VVB that a large patch of forest that remained intact but surrounded

by areas recently (in the last 5-10 y) was cleared for agriculture. No biophysical or economic condition could explain that decision, but their preference was not to clear the land at that time.

Therefore, the option of using a non-linear regression assisted the project in estimating a more realistic baseline that represented the circumstances on the ground more accurately and did not negatively affect the conservatives of the baseline. It deviates from the methodology requirements, which the baseline without deviation may result in a more precise estimation statistically; however, it fails to consider the size differences between the proxy parcels and project area.

In conclusion, the project requests a methodology deviation that allows using the non-linear model presented above to estimate the annual area of deforestation ($AA_{planned,i,t}$) in the baseline scenario. This non-linear approach changes the annual area of deforestation ($AA_{planned,i,t}$) from 7,963 ha/yr to 4,229 ha/year. This approach represents a deviation from the criteria and procedures relating to monitoring or measurement set out in the module VMD0006 (BL-PL) that improve the accuracy and conservativeness of the quantification of GHG emission reductions or removals. It will be available at validation and remain fixed throughout the project crediting period.

3.2 Quantification of GHG Emission Reductions and Removals

3.2.1 Baseline Emissions

Baseline biomass carbon stocks consisted of the following pools: (1)(a) Aboveground and (b) belowground biomass for live trees (both trees and saplings), (2) Aboveground and belowground non-tree biomass (understory herbaceous biomass), (3) litter biomass, and (4) soil organic carbon (SOC). Although collected in the field, the deadwood biomass uncertainty was found to be significantly higher than 15% at the 95% confidence interval and was thus conservatively excluded (determined via module X-UNC, VMD0017). The calculations of carbon stock for dead wood pool were made available to the validator.

Biomass inventories closely follow the Standard Operating Procedure (SOP), and measurements were conducted by the forestry experts at ERI. The SOP is an official document that will be used to verify that the same measurement techniques will be conducted over time in a replicable manner and includes quality assurance. The biomass plots will be revisited and remeasured in the future, so that carbon increases or decreases will be measured. One stratum was identified in the project area and biomass plot locations were randomly selected within the single strata. The CDM A/R Methodological Tool "Calculation of the number of sample plots for measurements within CDM A/R project activities" Version 2.1.0 or later may be used to identify the number of plots. Sixty-one plots were measured at Validation.

1a) Aboveground live tree biomass

Biomass ($MG\ DM\ ha^{-1}$) for live trees was determined using either a local-specific allometric equation where $DBH > 10\ cm$ (Cho, 2013), section 4.4.3, the pan-tropical moist forest biomass model where $5cm < DBH < 10cm$ (Chave, et al., 2005), or a palm species-specific allometric equation. A list of the allometric equations used, case by case, is provided in the Table 19 (Cho, 2013).

Table 19. Allometric Equations for Aboveground Biomass Calculations

Life Form	Species	Implementation Specifics	Allometric Equations for Biomass (kg)	Source
Palms	<i>Chrysophylla stauracantha</i>	All palms of this species	$AGB_T = 0.182 + 0.498H_T + 0.049H_T^2$	(Brown et al. 2001)
	<i>Attalea cohune</i>	All palms of this species	$AGB_T = 10.856 + 176.76H_T - 6.898H_T^2$	(Brown et al. 2001)
	<i>Sabal mauritiiformis</i>	All palms of this species	$AGB_T = 24.559 + 4.921H_T - 1.017H_T^2$	(Brown et al. 2001)
	<i>Euterpe precatoria</i>	All palms of this species	$AGB_T = 6.666 + 12.826H_T^{0.5} \ln H_T$	(Brown et al. 2001)
Cecropia	<i>Cecropia spp.</i>	All palms of this species	$AGB_T = 12.764 + 0.2588DBH^{2.0515}$	(Pearson et al. 2005)
Non-palms	All non-palm species	Where 5cm>DBH>10cm and height was recorded	$AGB_T = 0.0509 \times \rho DBH^2 H_T$	(Chave, et al., 2005)
Non-palms	All non-palm species	Where 5cm>DBH>10cm, and height was not recorded	$AGB_T = \rho \times \exp(-1.499 + 2.148 \ln(DBH) + 0.207(\ln(DBH^2 - 0.0281 \ln(DBH^3)))$	(Chave, et al., 2005)
Non-palms	All non-palm species	Where 5cm>DBH>10cm and height was recorded	$AGB_T = \frac{\rho \times \exp(-9.480 + 0.975 \ln(DBH^2 H_S))}{1 - (0.723CFI - 0.091)}$	(Cho, 2013)
Non-palms	All non-palm species	Where 5cm>DBH>10cm, and height was not recorded	$AGB_T = \frac{\rho \times \exp(-8.367 + 2.26 \ln(DBH))}{1 - (0.723CFI - 0.091)}$	(Cho, 2013)

Where:

AGB_T = Total aboveground biomass (kg of dry matter)

H_T = Total tree height (m)

H_S = Stem height (m)

DBH = Diameter at Breast Height (cm)

CFI = Dawkins crown form index (crown form / 5)

ρ = Wood density (g/cm³)

Aboveground biomass estimates were converted from [kg] to [MG DM Ha-1], then from [MG DM Ha-1] to [tC Ha-1] using a biomass to carbon fraction of 0.47. The molecular weight conversion of C to CO₂ (44/12) was used to convert to carbon dioxide equivalents (CO_{2e}).

It is a common practice in the region to harvest all trees above 25cm DBH before converting the forest to agriculture or pastureland (salvage logging). The project assumed that in the baseline scenario the

landowner would apply for the Salvage Permit, and therefore conservatively excluded the biomass stored in the long-lived wood products resulted from the salvage logging from the aboveground tree biomass pool. The carbon quantification model assumes that the biomass stored on those trees were reduced by wood waste fraction of 0.532 (Cho 2023) and further reduced by 0.84 the fraction that would be stored in long-lived products (5 to 100y) (Cho 2023)

Aboveground biomass for saplings was estimated by first sampling DBH values for a set of saplings per plot within stratum i. Aboveground biomass within sampled saplings (AGBs) was then estimated by applying the following allometric equation extracted from table 3 of (Sampaio & Silva, 2005) for tropical saplings with a DBH range of 1-29 cm. Although the original equation was developed for trees/saplings with a DBH of 1-29 cm, it was applied to saplings with a DBH of less than 5 cm:

$$AGB_s = 0.1357 * DBH^{2.413}$$

Where:

AGB_s = Aboveground biomass for each individual sapling subsampled in each plot within stratum I (kg)

DBH = Diameter at Breast Height for each individual sapling subsampled in each plot within stratum i (cm)

AGBs values for each individual tree within a plot were averaged and multiplied by the count of the number of saplings found in the plot.

Ex ante post-deforestation long-term aboveground carbon stock was estimated to be 14.1 tCO₂e ha⁻¹ for rangeland and 9.5 tCO₂e for cropland based on IPCC GPG (IPCCC GPG, 2006). A weighted average based on the suitable areas for the two land uses was applied resulting in 10 tCO₂/ha.

1b) Belowground live tree biomass

Belowground live tree biomass (consisting of live tree and sapling pools) was estimated using root-to-shoot ratios indicated in the CP-AB methodology. Table 4.4 from the IPCC Good Practices Guide was used to determine root-to-shoot ratios for tropical moist forests of North and South America. If aboveground biomass of a particular tree was found to represent >125 tC Ha⁻¹, a ratio of 0.2845 was used, and if ≤ 125 tC Ha⁻¹, a ratio of 0.284 was used.

2) Aboveground and belowground non-tree biomass

Non-tree biomass consisted of understory herbaceous matter. Understory biomass was determined by collecting all understory material within three 0.5-meter radius subplots within each sampling plot. This material was collected in the field (where wet weights were determined, in grams), dried and reweighed (to determine water content (%)) and dry matter biomass, in grams). Similar to belowground live tree biomass, BG non-tree biomass estimates were determined using Table 4.4 from the IPCC Good Practices Guide.

13) Ex-ante post deforestation non-tree biomass was considered zero *Litter*

Litter carbon was estimated using similar methods to non-tree biomass. Litter was collected within three 0.5-meter radius subplots within each sampling plot and dried in the lab to estimate biomass (MG dry matter ha⁻¹).

Ex-ante post deforestation litter biomass was considered zero

3) Soil Organic Carbon

Soil organic carbon was estimated using VMD0004 version 1, *Estimation of stocks in the soil organic pool* (CP-S). To use this method, three soil samples were collected from each plot. Soil samples were processed by recording the bulk density (g cm⁻³) and calculating percent organic carbon (%OC) from each sample. %OC was determined in lab via the Walkley-Black Standard operating procedure for soil organic carbon colorimetric method (Global Soil Partnership, 2019). For this project, bulk density of soil was determined to be 0.85 g cm⁻³ with an average organic matter of 6.02%. For a %OM comparison of this project to peer reviewed literature, see Table 20 below.

Table 20. Comparison of soil carbon values for this project and other peer-reviewed literature sources

Source	Average reported %OC	Reported Standard Deviation	Reported Mg C ha ⁻¹
Project Estimates	6.02	3.77	137.95
(Delgado-Carranza, Bautista-Zuniga, Calvo-Irabien, Aguilar-Duarte, & Martinez-Tellez, 2007)	14.02	7.09	NA
(Segura-Castruita, Sanchez-Guzman, Ortiz-Solorio, & Gutierrez-Castorena, 2004)	NA	NA	206.2
(Rojas-Garcia, Santoyo-Gomez, Gonzalez-Montiel, Velazquez-Rodriguez, & Pulido-Ponce, 2017)	11.5	6.0	NA

The *ex-ante* estimation of pre-deforestation stocks of soil organic carbon were calculated via equation 1 VMD0004 (CP-S) v1.0:

$$C_{SOC,sp,i} = C_{SOCsample,sp,i} \times BD_{sample,sp,i} \times Dep_{sample,sp,i} \times 100$$

Where:

$C_{SOC,sp,i}$ = Carbon stock in soil organic carbon for sample plot *sp*, stratum *i*; t C ha⁻¹

$C_{SOCsample,sp,i}$ = Soil organic carbon of the sample in sample plot *sp*, stratum *i*; determined in the laboratory in g C/100g soil (fine fraction <2mm) using the Walkley-Black colorimetric method

$BD_{sample,sp,i}$ = Bulk density of fine (<2mm) fraction of mineral soil in sample plot *sp*, stratum *i*; determined in the laboratory in g fine fraction cm⁻³ total sample volume

$Dep_{sample,sp,i}$ = Depth to which soil sample is collected in sample plot *sp* in stratum *i*; cm

Ex ante estimations of post-deforestation stocks of soil organic carbon depended on the selection of three relative stock change factors (F_{LU} , F_{MG} , and F_I), determined using Table 3.3.4 of the IPCC Good Practices Guide (IPCCC GPG, 2006). For F_{LU} , a value representing long-term cultivated usage for tropical wet forests (0.58). For F_{MG} , a value representing full till for tropical wet forest was applied (1.0). For F_I , a value representing medium inputs for tropical dry/wet forests was applied (1.0). *Ex ante* estimations for post-deforestation stocks of soil organic carbon were calculated via equation 3 VMD0004 (CP-S) v1.0:

$$C_{SOC,PD-BSL,i,t} = C_{SOCi,t=0} \times F_{LU} \times F_{MG} \times F_I$$

Where:

$C_{SOC,PD-BSL,i,t}$ = Mean post-deforestation stock in soil organic carbon in post deforestation baseline stratum *i*; t CO_{2e} ha⁻¹

$C_{SOCi,t=0}$ = Mean carbon stock in soil organic carbon for stratum *i*, at time t=0; t CO_{2e} ha⁻¹

F_{LU} = Land use factor after conversion; dimensionless

F_{MG} = Management factor after conversion; dimensionless

F_I = Input factor before or after conversion; dimensionless.

Finally, the baseline carbon stock change in soil organic carbon in stratum i $\Delta C_{SOC,i,BSL}$ was calculated via equation 12 VMD0006 (BL-PL) v1.3:

$$\Delta C_{SOC,i,BSL} = C_{SOC,BSL,i} - C_{SOC,PD-BSL,i}$$

Where:

$\Delta C_{SOC,i,BSL}$ = Baseline carbon stock change in soil organic carbon in stratum i (tCO₂e Ha⁻¹)

$C_{SOC,BSL,i}$ = Forest carbon stock in soil organic carbon in stratum i (tCO₂e Ha⁻¹)

$C_{SOC,PD-BSL,i}$ = Post deforestation carbon stock in soil organic carbon in stratum i (tCO₂e Ha⁻¹)

The total carbon stock and uncertainty per carbon pool can be found in *Table 21*.

Table 21. Carbon stocks per carbon pool

Carbon Pool	Carbon stock (tCO ₂ /ha)	Uncertainty (%)	Included /Excluded	Post-def carbon stock (tCO ₂ /ha)	Emission Factor (tCO ₂ /ha)
Above ground biomass	227.01	9.3%	Included	10	217.01
Below ground Biomass	64.58	9.3%	Included	0	64.58
Above ground non-tree Biomass	0.66	8.6%	Included	0	0.66
Below ground non-tree biomass	0.19	8.6%	Included	0	0.19
Soil Organic Carbon	454.53	9.8%	Included	293.36	161.13
Litter	1.22	7.6%	Included	0	1.22
Deadwood Biomass	Conservatively excluded				

3.2.1.1 BL-PL: Part 1. Calculating Annual Area of Land Deforested (Continuation)

Rate of Deforestation (Section 1.3 of BL-PL)

For this Project, where the property is being sold to a class of agents, there is no specific management plan for clearing, thus it is required to identify “Proxy Parcels” that are like the Project Activity Instance that were deforested in at most the last ten years. In this case, remote sensing analysis and parcel data are used to create a deforestation rate for the Project Activity Instance. According to the module VMD0006 BL-PL in Section 1.3, it is required a minimum of six Proxy Parcels that match the Project Activity Instance biophysical conditions, land tenure status, and similar after-conversion use types. See Appendix 4 for further information.

The Proxy Parcels selected meet the criteria described in Table 22:

Table 22. Proxy Parcel Applicability Conditions to Project Activity Instance

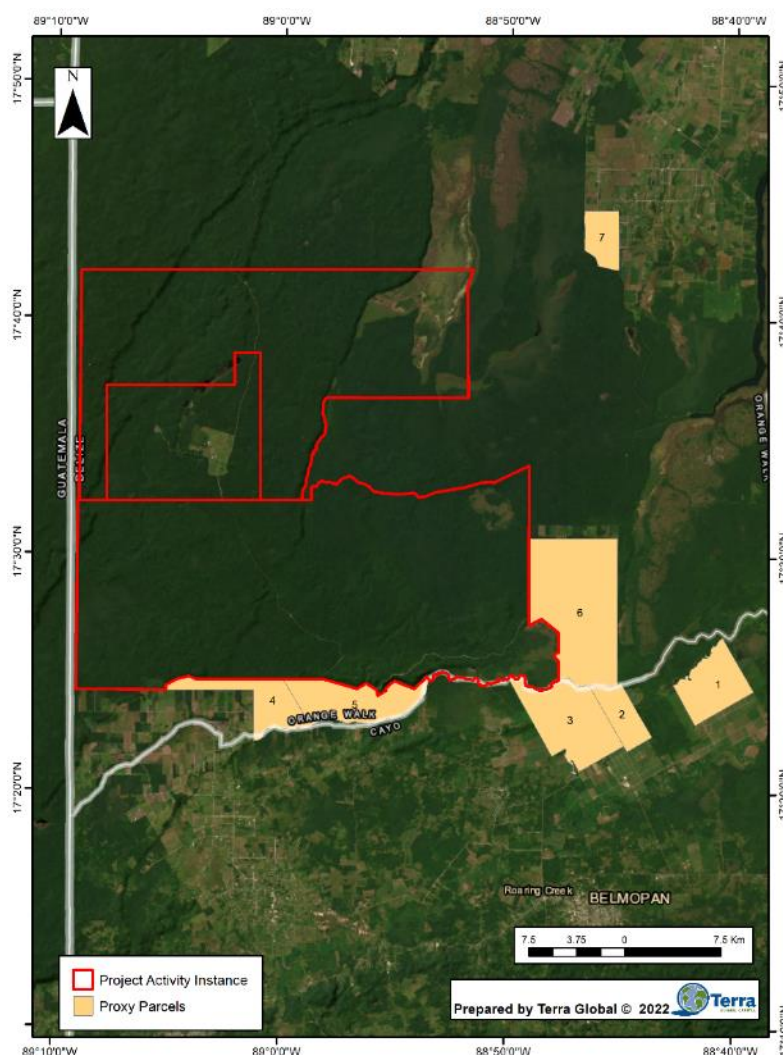
Applicability Condition	Project Justification
1. Land conversion practices must be the same as those used by the baseline agent or class of agent.	All Proxy Parcels were deforested for conversion to agriculture (See Table 53 in Appendix 4: Proxy Parcels Deforestation Analysis).
2. The post-deforestation land use must be the same in the proxy areas as expected in the Project Activity Instance under business as usual.	The land use after clearing all Proxy Parcels remains as agriculture (See Table 53 in Appendix 4: Proxy Parcels Deforestation Analysis).
3. The Proxy Parcels must have the same management and land use rights type as the proposed Project Activity Instance under business as usual.	All Proxy Parcels are private land (See Table 52 in Appendix 4: Proxy Parcels Deforestation Analysis).
4. If suitable sites exist they must be in the immediate area of the project; if an insufficient number of sites exists in the immediate area of the project, sites must be identified elsewhere in the same country as the project; if an insufficient number of sites exists in the country, sites must be identified in neighboring countries.	All Proxy Parcels are proximate to the Project Activity Instance, in the districts Orange Walk and Cayo (Map 16).
5. Agents of deforestation in Proxy Parcels must have deforested their land under the same criteria that the project lands must follow (legally permissible and suitable for conversion).	All Proxy Parcels were private land and cleared following the National regulations, see section 3.1.4— Legally Permissible (1.2. bullet 1 of BL-PL).
6. Deforestation in the Proxy Parcels must have occurred within the 10 years prior to the baseline period.	All Proxy Parcels were deforested in the last 10 years prior the Project start date (See Table 53 in Appendix 4: Proxy Parcels Deforestation Analysis).
7. The three following conditions must be met: a. The forest types surrounding the Proxy Parcels or in the Proxy Parcels prior to deforestation must be in the same proportion as in the Project Activity Instance ($\pm 20\%$). b. Soil types that are suitable for the land-use practice used by the agent of deforestation in the Project Activity Instance must be present in the Proxy Parcels in the same proportion as the Project Activity Instance ($\pm 20\%$). c. The ratio of slope classes “gentle” (slope $< 15\%$) to “steep” (slope $\geq 15\%$) in the Proxy Parcels must be ($\pm 20\%$) the same of the ratio in the Project Activity Instance. d. Elevation classes (500m classes) in the Proxy Parcels must be in the same proportion as in the Project Activity Instance ($\pm 20\%$).	a. See section Forest Type of Proxy Parcels and Project Activity Instance (Applicability 7.a) below. b. See section Soil Type of Proxy Parcels and Project Activity Instance (Applicability 7.b) below. c. See section Slope of Proxy Parcels and Project Activity Instance (Applicability 7.c) below. d. See section Elevation of Proxy Parcels and Project Activity Instance (Applicability 7.d) below.

Considering the size of the Project Activity Instance, the project chose the largest parcels available, that meet the criteria above and had signs of conversion to agriculture in the last ten years, as proxy parcels (see Appendix 4: Proxy Parcels Deforestation Analysis).



Photo 8. View of Proxy Parcel in front of Project Activity Instance

In total were identified 7 Proxy Parcels that meet all the applicability criteria. A remote sensing analysis was carried out to confirm that the parcels were cleared for agriculture 10 years prior the baseline period (See Appendix 4: Proxy Parcels Deforestation Analysis). The location of the Proxy Parcels is shown in Map 16, and the centroid coordinates and areas in Table 23.



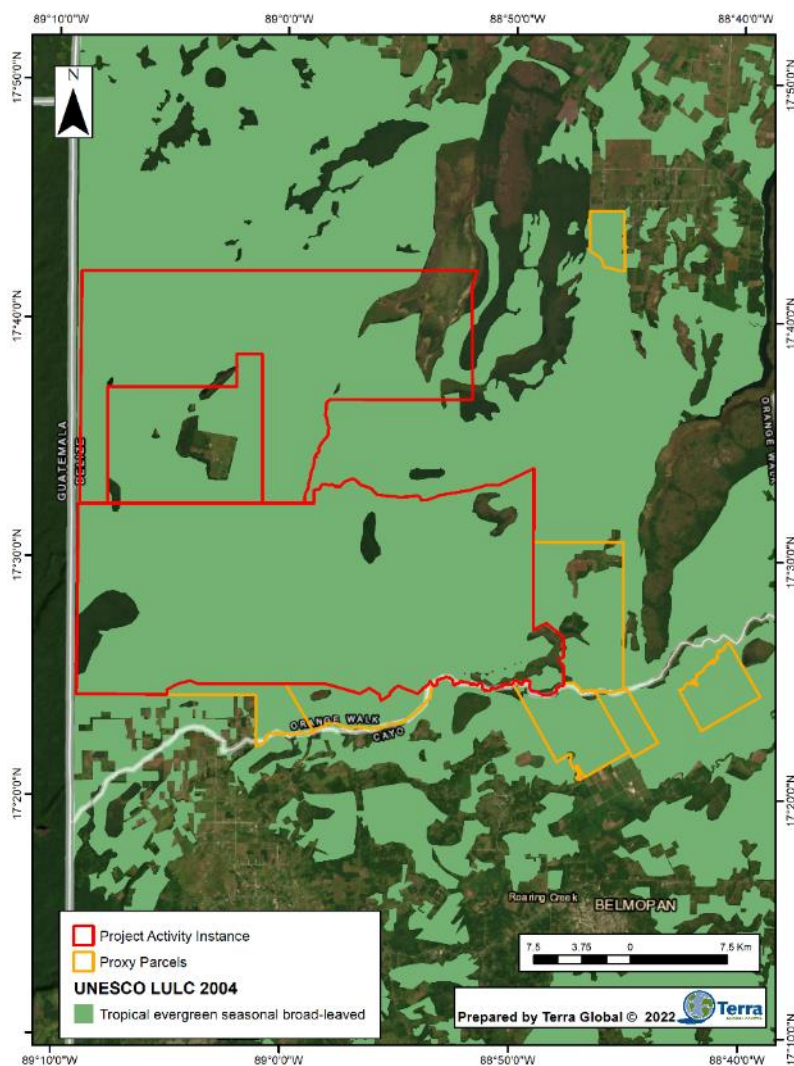
Map 16. Proxy Parcel Location

Table 23. Proxy Parcel Size and Location

ID	Area (ha)	Longitude	Latitude
1	2,133	88° 40" 53.37' W	17° 24" 38.89' N
2	1,183	88° 44" 53.04' W	17° 23" 18.96' N
3	3,529	88° 47" 12.56' W	17° 23" 4.11' N
4	1,949	89° 1" 2.13' W	17° 23" 47.09' N
5	2,716	88° 56" 45.48' W	17° 23" 50.4' N
6	6,813	88° 46" 51.96' W	17° 27" 58.93' N
7	1,079	88° 45" 55.26' W	17° 43" 31.16' N

Forest Type of Proxy Parcels and Project Activity Instance (Applicability 7.a)

According to the 2004 ecosystem map, that follows the UNESCO system developed for the Central American Ecosystems Map (Meerman J. , Compilation of information on Biodiversity in Belize, 2005), the Project Activity Instance and Proxy Parcels have the same proportion ($\pm 20\%$) of tropical evergreen seasonal broad-leaved lowland forest (Table 24), which is the most dominant ecosystem class above 94% of the area (Map 17).



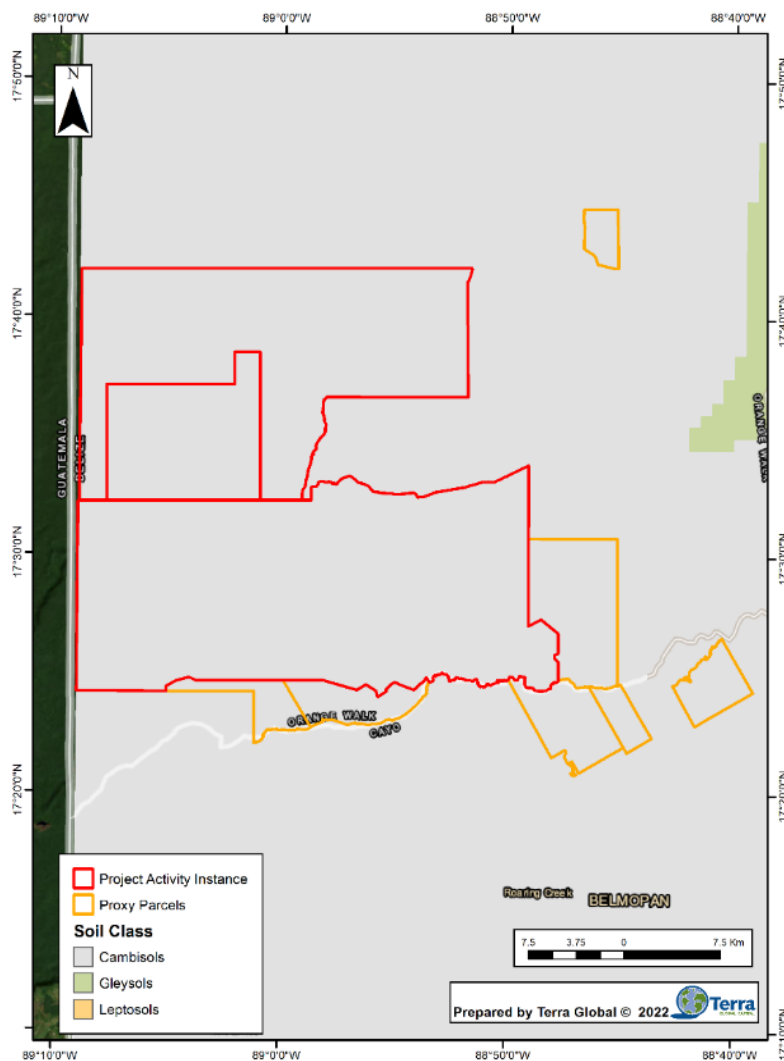
Map 17. UNESCO Ecosystems 2004 on Project Activity Instance and Proxy Parcels

Table 24. UNESCO Ecosystems 2004 on Project Activity Instance and Proxy Parcels

Area Type	Tropical evergreen seasonal broad-leaved lowland (%)
Project Activity Instance	94%
Proxy Parcel 1	100%
Proxy Parcel 2	98%
Proxy Parcel 3	93%
Proxy Parcel 4	99%
Proxy Parcel 5	96%
Proxy Parcel 6	83%
Proxy Parcel 7	99%

Soil Type of Proxy Parcels and Project Activity Instance (Applicability 7.b)

Based on the derived the IPCC default soil classes from the Harmonized World Soil Database (FAO, 2022), the dominant soil type in the Proxy Parcels and in Project Activity Instance are Cambisols (Map 18), which are suitable for agriculture. The soils in the Proxy Parcels are in the same proportion as the Project Activity Instance ($\pm 20\%$) (Table 25).



Map 18. Soil Type on Proxy Parcels and Project Activity Instance

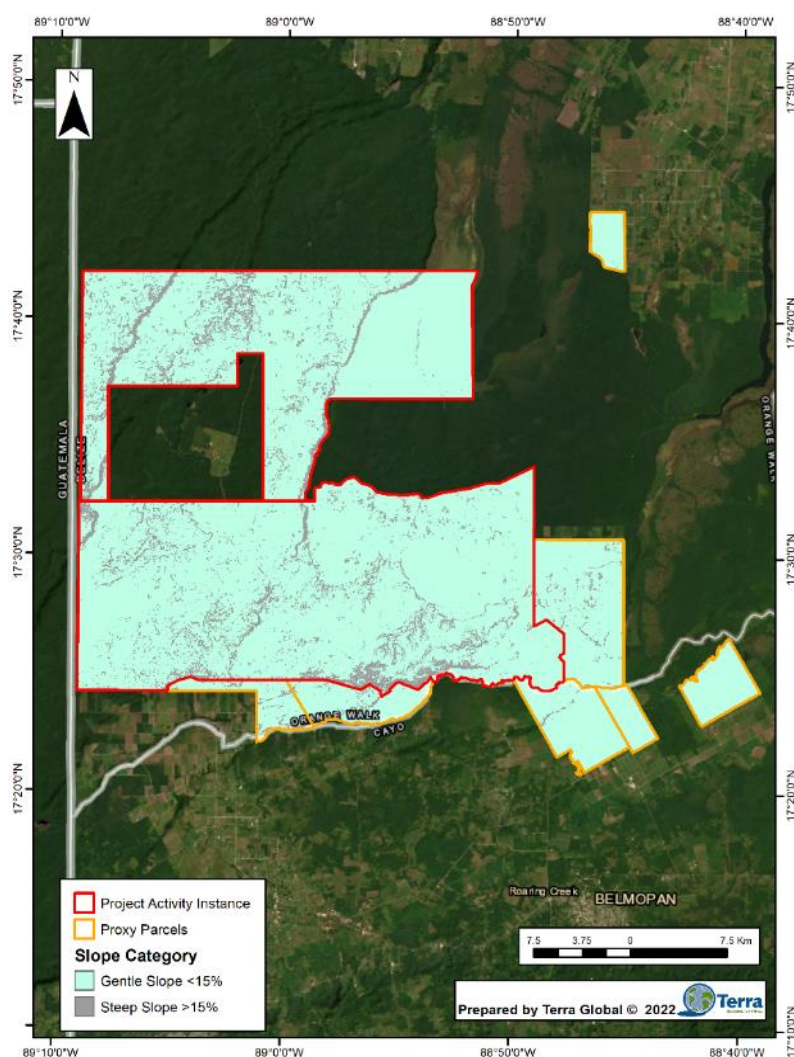
Table 25. Soil Types on Proxy Parcels and Project Activity Instance

Area Type	Cambisols (%)
Project Activity Instance	100%
Proxy Parcel 1	100%
Proxy Parcel 2	100%
Proxy Parcel 3	100%

Area Type	Cambisols (%)
Proxy Parcel 4	100%
Proxy Parcel 5	100%
Proxy Parcel 6	100%
Proxy Parcel 7	100%

Slope of Proxy Parcels and Project Activity Instance (Applicability 7.c)

The ratio of slope classes “gentle” (slope <15%) to “steep” (slope ≥15%) in the Proxy Parcels is (±20%) the same of the ratio in the Project Activity Instance (Table 26), being the gentle slope the most dominant (Map 19).



Map 19. Slopes on Proxy Parcels and Project Activity Instance

Table 26. Slopes on the Proxy Parcels and Project Activity Instance

Area Type	Gentle (slope < 15%) (%)
Project Activity Instance	89.3%
Proxy Parcel 1	99.9%
Proxy Parcel 2	100%
Proxy Parcel 3	99.9%
Proxy Parcel 4	98.2%
Proxy Parcel 5	98.7%
Proxy Parcel 6	99.7%
Proxy Parcel 7	100%

Elevation of Proxy Parcels and Project Activity Instance (Applicability 7.d)

The Project Activity Instance and the Proxy Parcels have low elevations, less than 500 m (Map 20), in the same proportion ($\pm 20\%$) (Table 27). According to the module VMD0006 BL-PL Elevation classes at 500m classes in the proxy area must be in the same proportion as in the project area within 20%. This means that the following elevation classes were identified:

- Class 1: 0m- 500m
- Class 2: 500m-1,000m
- Class 3: 1,500m - 2,000m, etc.

Following the module, the elevation classes (500m classes) in the Proxy Parcels must be in the same proportion as in the Project Activity Instance ($\pm 20\%$), the range of altitudes between the proxy parcels and the project area varies between 0 and 306 m, which makes one single altitude class, confirming the compliance of the requirements, as the elevation classes (0-500m) are in the same proportion between the proxy parcels and project area. Meaning that both Proxy Parcels and the Project Activity Instance are in the same elevation class according to module VMD0006 BL-PL.

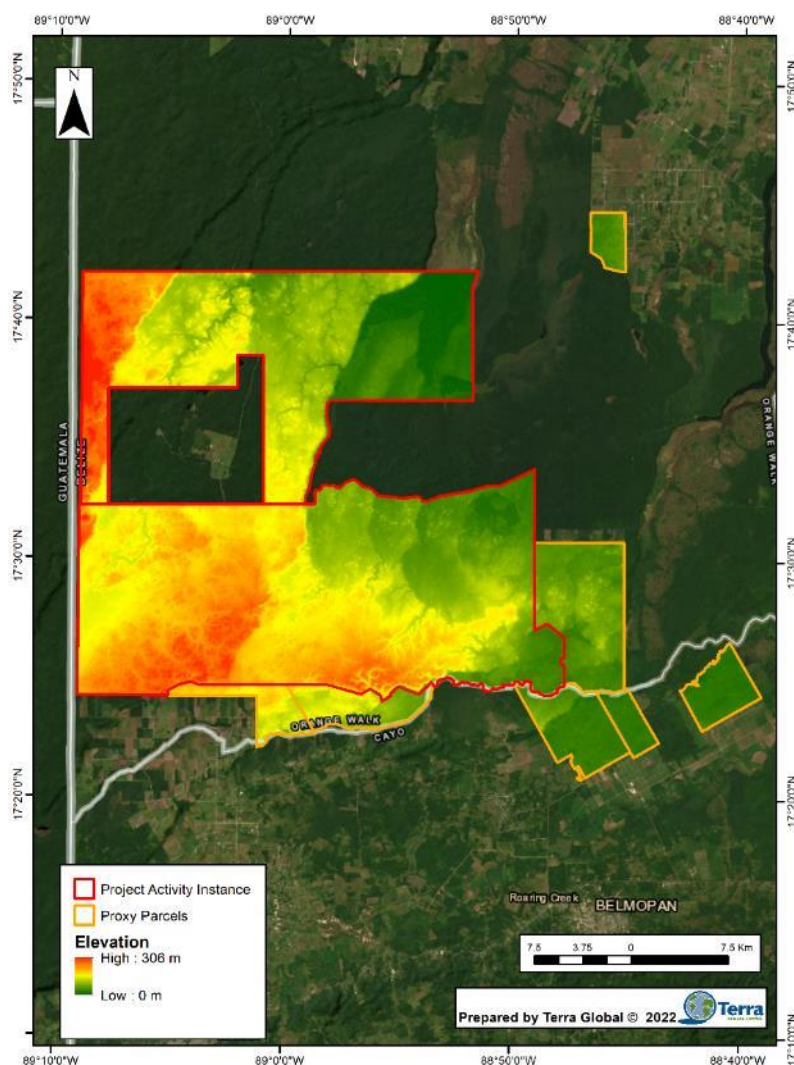
However, a statistical discrepancy of the altitude histograms can be observed between the project area and the proxy parcels. Nevertheless, it is important to highlight that corn cultivation can be carried out in a wide range of altitudes, such as in Guatemala, a country that borders Belize, where corn crops are reported up to 3,000 meters above sea level (Wellhausen, Fuentes, & Hernandez, 1957). Likewise, the agent of deforestation has high-capacity agricultural machinery that can easily transform the forest in the project area, with altitude differences being of little relevance since 89.4% of the project area has slopes less than 15%. These topographical conditions facilitate the access of machinery for agricultural production, and creation of access roads for extraction of products for commercialization.

Corn and beans is a traditional intercropping system in the Mesoamericas, still being utilized to this day in different climatic and altitude ranges. The importance of corn is intertwined with the culture of its growers, achieving economical, ceremonial, ecological and symbolic importance (Tuxill, 2009).

Corn was originated in the highlands of Mexico, and has been grown since 2,000-2,500BC. (García-Lara, 2019). Corn is grown preferentially in tropical (between 30oN and 30oS) and temperate (34oN and 34oS) temperatures (Dowswell, 1996). According to (Bernini, 2020), corn has very good yield at altitudes above 300 masl to 1300 masl. Nevertheless, corn can still be cultivated above 3600 masl as it has been since the adaptation of corn to higher altitudes (Staller, High altitude maize (Zea Mays L.) cultivation and endemism in the Lake Titicaca Basin, 2016) (Eagles, 1994). Additionally, in the Guatemala Highlands, a large variety of corn is cultivated in remote valleys in mountain slopes (Steinberg M. T., 2002).

Historically, the lowland Mayans were one of the most successful agricultural societies based most of their production on corn and it has been continuously cultivated in the lowlands since 3,400 BC (Colunga-Garcia Marin, 2004). Corn cultivated at low elevation are mainly commercial in Mesoamerica, but some varieties are still cultivated for subsistence (Brush, 2007). In the lowlands of Mexico (9 masl), corn cultivated in those areas are for subsistence, drought tolerant, and are cultivated in sustainable traditional agricultural systems (Aguirre-Rivera, 2019). In southern Belize, in the Mopan Maya region with an altitude lower than 400 masl, corn has been grown as a subsistence crop since their arrival in the region in the late nineteenth century (Steinberg M. , 2002). Corn is still an important crop in Belize lowlands, being cultivated as subsistence or cash crops (Kongsager, 2017).

Many places maintain the tradition of intercropping corn with beans. In Guatemala, for example, a country that borders Belize, in the Western Highlands (1,400 to 3,200masl), the corn and beans intercropping is the most common practice, yielding as much as corn monocultures, but it produces more calories per unit area when compared to corn monocrops. It is a system efficient in light, water and nutrient use when compared to monocrops (Lopez-Ridaura, 2021).



Map 20. Elevation Range on Proxy Parcels and Project Activity Instance

Table 27. Elevation on Proxy Parcels and Project Activity Instance

Area Type	Elevation < 500 masl (%)
Project Activity Instance	100%
Proxy Parcel 1	100%
Proxy Parcel 2	100%
Proxy Parcel 3	100%
Proxy Parcel 4	100%
Proxy Parcel 5	100%
Proxy Parcel 6	100%
Proxy Parcel 7	100%

Annual Deforestation Rate

The annual deforestation rate was calculated using the following equation 4 VMD0006 (BL-PL) v1.3:

$$D\%_{planned,i,t} = \left(\sum_{pn=1}^{n*} \left(D\%_{pn} / Yrs_{pn} \right) \right) / n$$

Where:

$D\%_{planned,i,t}$	Projected annual proportion of land that will be deforested in stratum i during year t . If actual annual proportion is known and documented (e.g. 25% per year for 4 years), set to proportion; %
$D\%_{pn}$	Percent of deforestation in land parcel pn etc of a proxy area as a result of planned deforestation as defined in this module; %
Yrs_{pn}	Number of years over which deforestation occurred in land parcel pn in proxy area; years
n	Total number of land parcels examined
pn	1, 2, 3, ... n^* land parcels examined in proxy area
i	1, 2, 3, ... M strata

Based on the analysis of the Proxy Parcels (See Table 53 and in Appendix 4: Proxy Parcels Deforestation Analysis) and after adjusting the above formula to a non-linear equation, it is concluded that the annual deforestation rate is (see Appendix 4 and Section 3.1.6 for further information):

$$D\%_{planned,i,t} = 5.41\%$$

Likelihood of Deforestation (Section 1.4 of BL-PL)

This requirement is not applicable, as the Project Activity Instance is not under government control. Thus, L-Di is equal to 100%.

Risk of Abandonment (Section 1.5 of BL-PL)

According to the module, at least 5 Proxy Parcels must be identified that were deforested by the same class of deforestation agent at least ten years previously to the baseline period, aiming to prove that once cleared this would not likely revert to forest. If any of the Proxy Parcels have been abandoned to forest regrowth, then the planned deforestation activity is not eligible, and this module shall not be used.

Since the module does not define any threshold or approach to identify quantitative what is considered forest regrowth, and no classifications and deforestation rates are required for the risk of abandonment assessment, the analysis was made by visualization of remote sensing imagery.

Given that the start of the project is December 10th 2020, the parcels that were deforested before 2010 were identified as Proxy Parcels for Risk of Abandonment.

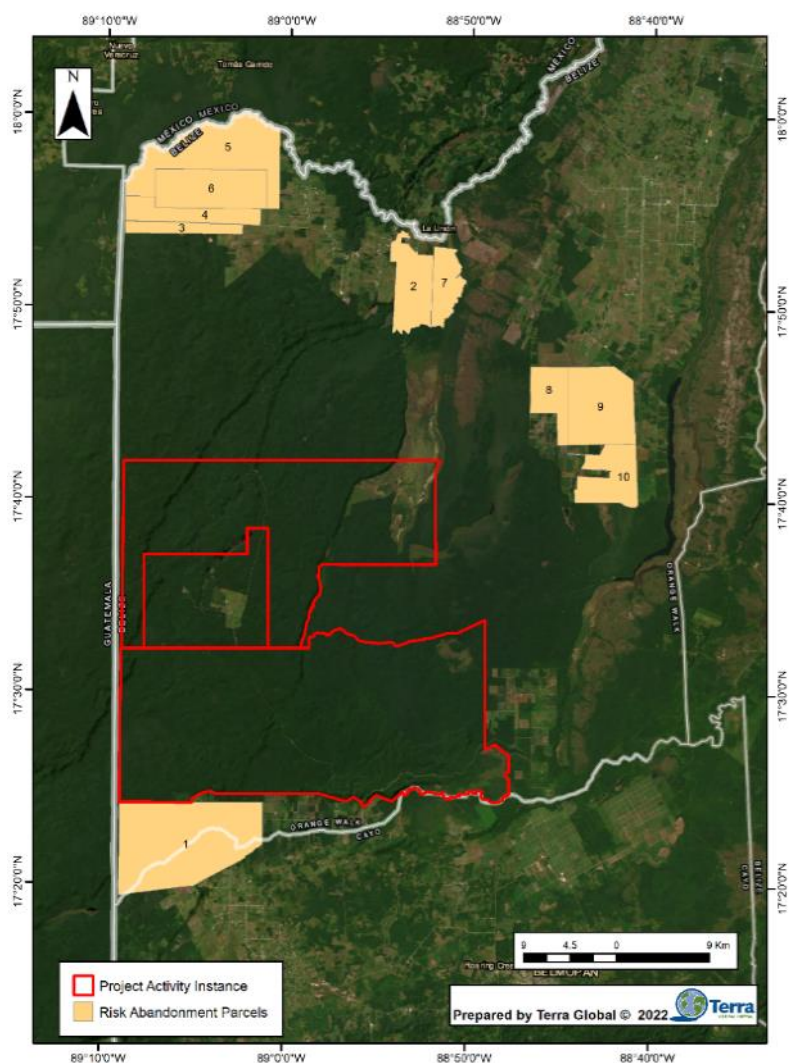
The Proxy Parcels used to assess the risk of abandonment must meet the same criteria as the Proxy Parcels described in the section above. The Table 28 below shows the applicability conditions and the justification of compliance.

Table 28. Proxy Parcel for Risk of Abandonment Applicability Conditions to Project Activity Instance

Applicability Condition	Project Justification
1. Land conversion practices must be the same as those used by the baseline agent or class of agent.	All Proxy Parcels were deforested for conversion to agriculture.
2. The post-deforestation land use must be the same in the Proxy Parcels as expected in the Project Activity Instance under business as usual.	The land use after clearing all Proxy Parcels remains as agriculture.
3. The Proxy Parcels must have the same management and land use rights type as the proposed Project Activity Instance under business as usual.	All Proxy Parcels are private land.
4. If suitable sites exist they must be in the immediate area of the project; if an insufficient number of sites exists in the immediate area of the project, sites must be identified elsewhere in the same country as the project; if an insufficient number of sites exists in the country, sites must be identified in neighboring countries.	All Proxy Parcels are close to the Project Activity Instance, in the districts Orange Walk and Cayo (Map 21).
5. Agents of deforestation in Proxy Parcels must have deforested their land under the same criteria that the project lands must follow (legally permissible and suitable for conversion).	All Proxy Parcels were private land and cleared following the National regulations, see section 3.1.4— Legally Permissible (1.2. bullet 1 of BL-PL). The lands have been historically used for agriculture and the biophysical conditions are suitable for agriculture.
6. Deforestation in the Proxy Parcels must have occurred at least ten years previously to the baseline period.	All Proxy Parcels were deforested at least ten years previously to the baseline period and no forest regrowth was observed

Applicability Condition	Project Justification
7. The three following conditions must be met: a. The forest types surrounding the Proxy Parcels or in the Proxy Parcels prior to deforestation must be in the same proportion as in the Project Activity Instance ($\pm 20\%$). b. Soil types that are suitable for the land-use practice used by the agent of deforestation in the Project Activity Instance must be present in the Proxy Parcels in the same proportion as the Project Activity Instance ($\pm 20\%$). The ratio of slope classes "gentle" (slope $< 15\%$) to "steep" (slope $\geq 15\%$) in the Proxy Parcels must be ($\pm 20\%$) the same of the ratio in the Project Activity Instance. c. Elevation classes (500m classes) in the Proxy Parcels must be in the same proportion as in the Project Activity Instance ($\pm 20\%$).	a. See section Forest Type Risk of Abandonment Parcels and Project Activity Instance (Applicability 7.a) below. b. Soil Type Risk of Abandonment and Project Activity Instance (Applicability 7.b) below. c. Slope of Risk of Abandonment and Project Activity Instance (Applicability 7.c) below. d. Elevation of Risk of Abandonment and Project Activity Instance (Applicability 7.d) below

Ten Proxy Parcels for Risk of Abandonment were identified that meet the criteria for the risk of abandonment assessment. To identify that these Parcels were deforested 10 years before the baseline period (2020), a Landsat image from 2001 was analyzed, and it was compared with the Landsat images from 2010 and 2020 to confirm that the parcels remained in agriculture (Appendix 4: Proxy Parcels Deforestation Analysis). The location of these Proxy Parcels for Risk of Abandonment are shown in Map 21 and Table 29.



Map 21. Location of Proxy Parcels for Risk of Abandonment Analysis

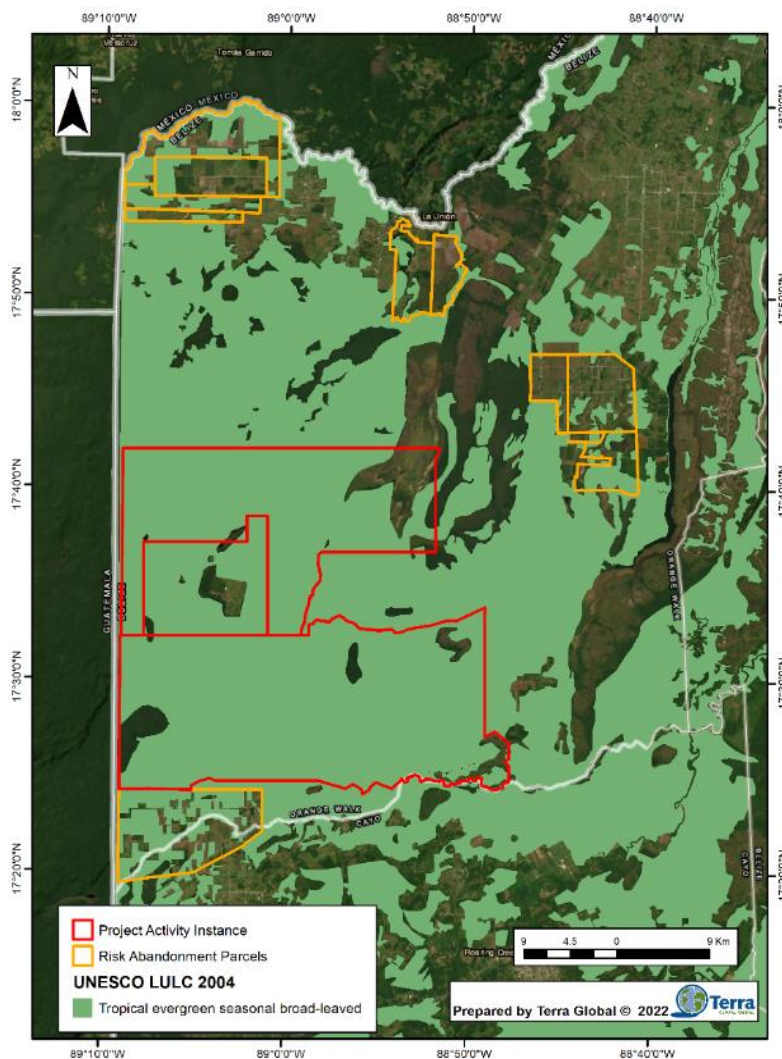
Table 29. Location of Proxy Parcels for Risk of Abandonment Analysis

ID	Area (ha)	Longitude	Latitude
1	10,207	89° 5' 28.53' W	17° 22' 9.63' N
2	2,959	88° 53' 16.58' W	17° 51' 9.33' N
3	1,210	89° 5' 53.66' W	17° 54' 4' N
4	2,125	89° 5' 35.78' W	17° 54' 49.76' N
5	6,289	89° 4' 5.46' W	17° 57' 54.03' N
6	4,045	89° 4' 18.89' W	17° 56' 7.57' N
7	1,812	88° 51' 24.92' W	17° 51' 15.61' N
8	1,902	88° 45' 34.34' W	17° 45' 30.47' N
9	4,717	88° 42' 52.73' W	17° 44' 59.74' N

ID	Area (ha)	Longitude	Latitude
10	2,819	88° 42" 16.6' W	17° 41" 20.59' N

Forest Type Risk of Abandonment Parcels and Project Activity Instance (Applicability 7.a)

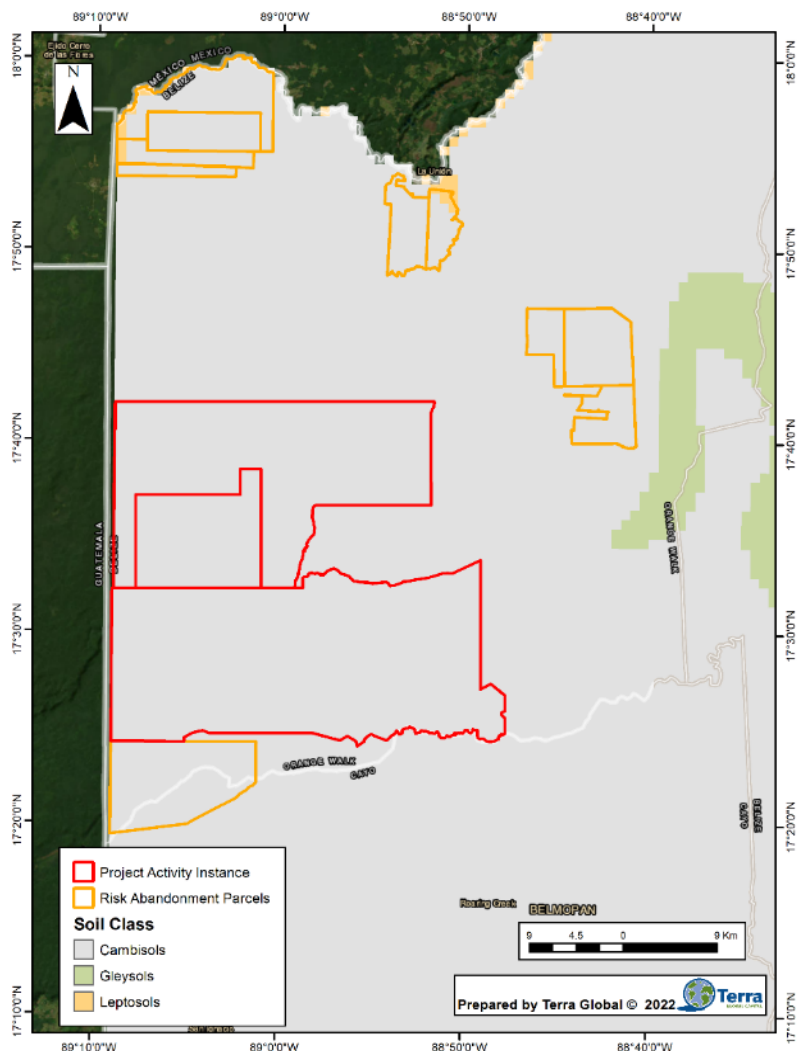
As the deforestation process in the Proxy Parcels for Risk of Abandonment started at the end of the 80's, the proportion of the forest type was assessed based on the landcover type in the surrounding areas supported by the 2004 ecosystem map (Meerman J. , Compilation of information on Biodiversity in Belize, 2005)As shown in Map 22, it is assumed that the Proxy Parcels for Risk of Abandonment had the same forest, before they started been deforested, under the same proportion ($\pm 20\%$) as the Project Activity Instance. It is assumed that the Proxy Parcels for Risk of Abandonment had the same forest, before they started been deforested, under the same proportion ($\pm 20\%$) as the Project Activity Instance.



Map 22. UNESCO Ecosystems 2004 on Project Activity Instance and Proxy Parcels for Risk of Abandonment (note that some of the parcels were already cleared in 2004).

Soil Type Risk of Abandonment and Project Activity Instance (Applicability 7.b)

Based on the derived the IPCC default soil classes from the Harmonized World Soil Database (FAO, 2022), the dominant soil type in the Proxy Parcels for Risk of Abandonment and in Project Activity Instance are Cambisols (Map 23), which are suitable for agriculture. The soils in the Proxy Parcels for Risk of Abandonment are in the same proportion as the Project Activity Instance ($\pm 20\%$) (Table 30).



Map 23. Soil Types on Proxy Parcels for Risk of Abandonment and Project Activity Instance

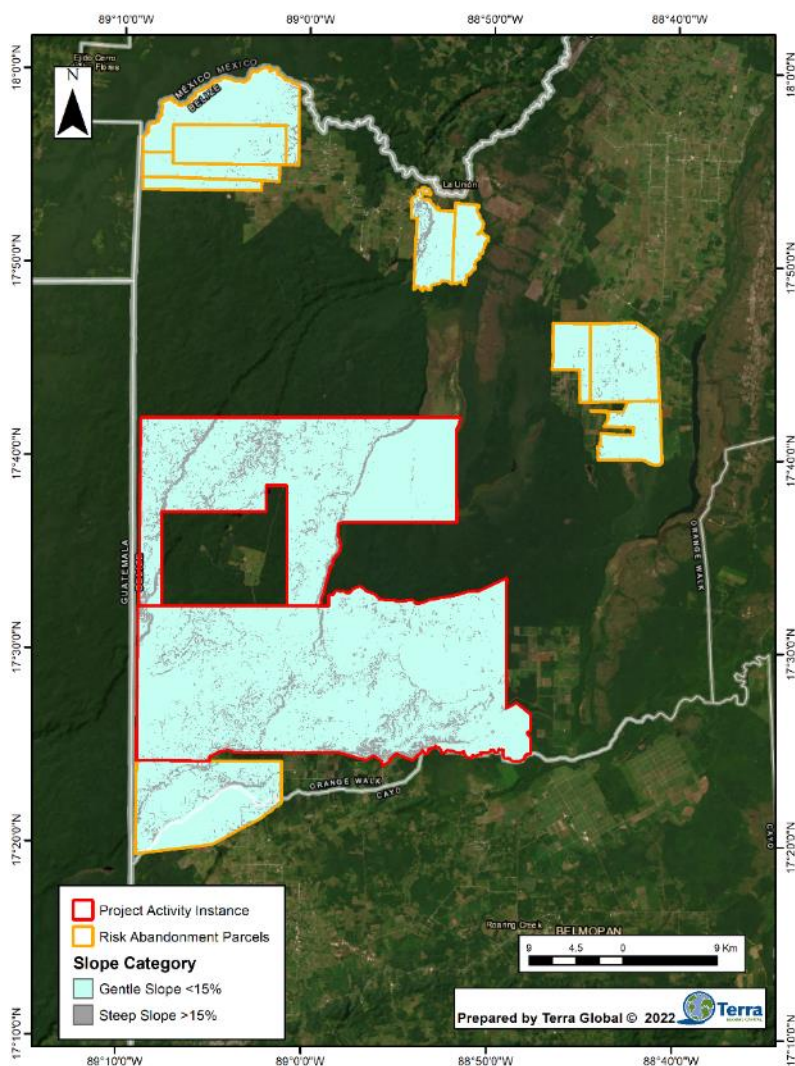
Table 30. Soil Types on Proxy Parcels for Risk of Abandonment and Project Activity Instance

Area Type	Cambisols (%)
Project Activity Instance	100%
Risk of Abandonment Parcel 1	100%
Risk of Abandonment Parcel 2	100%
Risk of Abandonment Parcel 3	92.9%
Risk of Abandonment Parcel 4	91.7%

Area Type	Cambisols (%)
Risk of Abandonment Parcel 5	93.8%
Risk of Abandonment Parcel 6	100%
Risk of Abandonment Parcel 7	85.7%
Risk of Abandonment Parcel 8	100%
Risk of Abandonment Parcel 9	100%
Risk of Abandonment Parcel 10	100%

Slope of Risk of Abandonment and Project Activity Instance (Applicability 7.c)

The ratio of slope classes “gentle” (slope <15%) to “steep” (slope ≥15%) in the Proxy Parcels for Risk of Abandonment is (±20%) the same of the ratio in the Project Activity Instance (Table 31), being the gentle slope the most dominant (Map 24).



Map 24. Slopes Risk on Proxy Parcels for Risk of Abandonment and Project Activity Instance

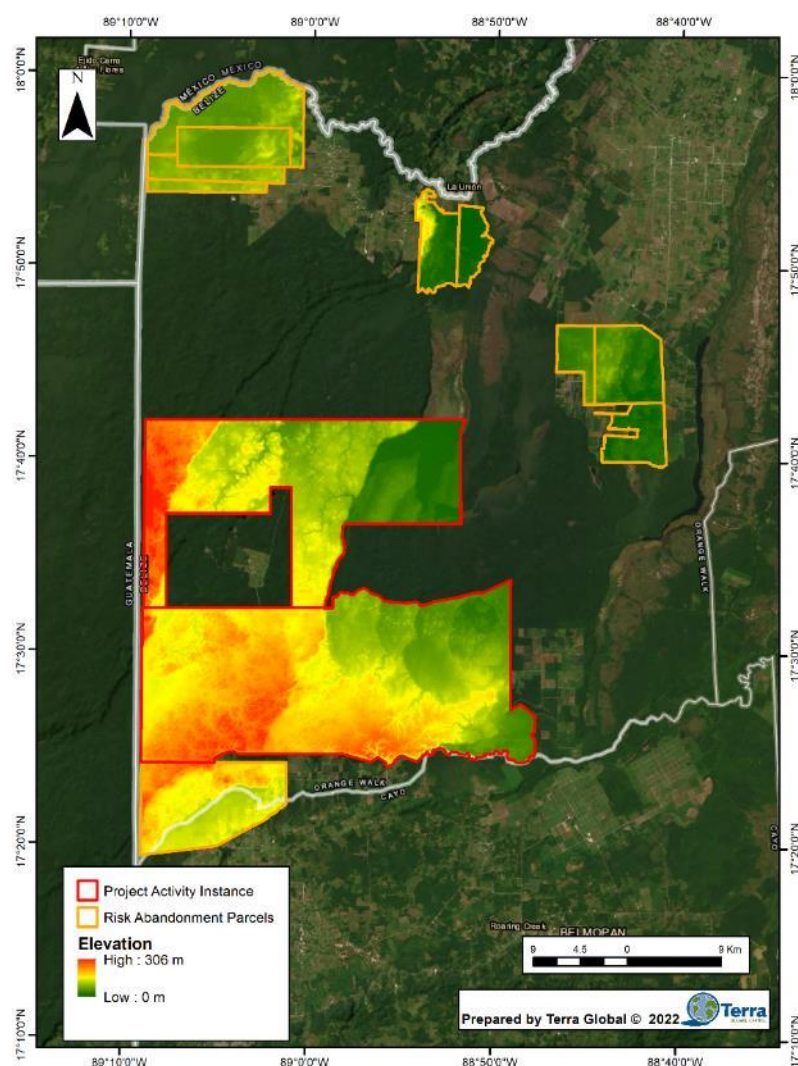
Table 31. Slopes on Proxy Parcels for Risk of Abandonment and Project Activity Instance

Area Type	Gentle (slope <15%) (%)
Project Activity Instance	89.3%
Risk of Abandonment Parcel 1	98.2%
Risk of Abandonment Parcel 2	94.8%
Risk of Abandonment Parcel 3	99.9%
Risk of Abandonment Parcel 4	100%
Risk of Abandonment Parcel 5	99.3%
Risk of Abandonment Parcel 6	100%
Risk of Abandonment Parcel 7	100%
Risk of Abandonment Parcel 8	100%

Area Type	Gentle (slope <15%) (%)
Risk of Abandonment Parcel 9	99.7%
Risk of Abandonment Parcel 10	99.8%

Elevation of Risk of Abandonment and Project Activity Instance (Applicability 7.d)

The Project Activity Instance and the Proxy Parcels for Risk of Abandonment have low elevations, less than 500 m (Map 25), in the same proportion ($\pm 20\%$) (Table 32).



Map 25. Elevation Range on Proxy Parcels for Risk of Abandonment and Project Activity Instance

Table 32. Elevation on Proxy Parcels for Risk of Abandonment and Project Activity Instance

Area Type	Elevation < 500 masl (%)
Project Activity Instance	100%

Area Type	Elevation < 500 masl (%)
Risk of Abandonment Parcel 1	99.89%
Risk of Abandonment Parcel 2	100.00%
Risk of Abandonment Parcel 3	100.00%
Risk of Abandonment Parcel 4	100.00%
Risk of Abandonment Parcel 5	98.76%
Risk of Abandonment Parcel 6	100.00%
Risk of Abandonment Parcel 7	100.00%
Risk of Abandonment Parcel 8	100.00%
Risk of Abandonment Parcel 9	100.00%
Risk of Abandonment Parcel 10	100.00%

In conclusion, based on the above criteria and analyses performed, the risk of abandonment is not present in the Project Activity Instance and therefore the module is applicable.

Annual Area of Deforestation (Section 1.6 of BL-PL)

The annual area of deforestation was calculated via equation 5 VMD0006 (BL-PL) v1.3:

$$AA_{planned,i,t} = (A_{planned,i} * D\%_{planned,i,t}) * L - D_i$$

Where:

$AA_{planned,i,t}$	Annual area of baseline planned deforestation for stratum i at time t ; ha
$A_{planned,i}$	Projected annual proportion of land that will be deforested in stratum i during year t . If actual annual proportion is known and documented (e.g. 25% per year for 4 years), set to proportion; %
$D\%_{planned,i,t}$	Total area of planned deforestation over the baseline period for stratum i ; ha
$L - D_i$	Likelihood of deforestation for stratum i ; %

Based on the above equation and the analysis of the Proxy Parcels, it is concluded that the area of planned deforestation annually would be 7,963 ha. However, the methodology assumes that there is a direct linear proportionality between the area deforested in the last 10 years in of the proxy parcels and the area of the Project Activity Instance. The methodology extrapolates linearly the deforestation in the Project Activity Instance.

In the case of this project, the total area of the BMF is much bigger than the proxy areas, and this direct proportionality might not be realistic. In the recent history of Belize there is no precedent of such large parcel being transferred and converted to agriculture by to the class of agent of deforestation. Therefore, the project considered the pattern of deforestation in the proxy areas using a non-linear regression approach which better represents the reality of the project, and although it characterizes a deviation of the methodology, it provides a more accurate and conservative baseline (see section 3.6.1 Methodology Deviation and Appendix 4 for more details) provides.

$$AA_{planned,i,t} = 4,229ha$$

It is clear that the class of agent of deforestation could deforest at this rate, since they have access to capital for land purchases and clearing. One piece of evidence of access to funding for the class of agents

is the development of a new credit union named Spanish Lookout Credit Union Limited (SLCU) established in 2018 with the goal of offering “more and even better financial services” than previous institutions (Spanish Lookout Credit Union, 2020). SLCU evolved from two entities that provided loan and deposit services to the Spanish Lookout community. The principals registered SLCU and commenced operations in August 2018. In its first year of operations SLCU, the newly registered credit union, accounted for majority of the growth of Belize’s credit union assets, contributing \$53.1mn in assets and \$47.1mn in deposits to the year-end totals.

The equipment used to support the rapid growth of the agricultural sector is commercial bulldozers, industrial tractors, carrier tractors, agricultural tillers and row crop tractors. The equipment is used for working with large tracks of land at a time to support the growth of agricultural industry including material for roads and land clearing for crops.



Photo 9: Equipment used in large commercial agricultural farms (Mendoza, 2019)

3.2.1.2 BL-PL: Part 2. Baseline Carbon Stock Change

Here, the module VMD0006, *Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation/forest degradation and planned wetland degradation* (BL-PL) was used. This module was used to estimate baseline emissions from project activity, calculating net greenhouse gas emissions in the baseline from planned deforestation up to year t^* via equation 1 VMD0006 (BL-PL) v1.3:

$$\Delta C_{BSL\_planned} = \sum_{t=1}^{t^*} \sum_{i=1}^M (\Delta C_{BSLi,t} + GHG_{BSL-Ei,t})$$

Where:

$\Delta C_{BSL\_planned}$ = The net GHG emissions in the baseline for planned deforestation up to year t^* (tCO₂e)

ΔC_{BSLi} = Net carbon stock exchange for all measured carbon pools in the baseline stratum i (tCO₂e ha⁻¹)

$GHG_{BSL-Ei,t}$ = Greenhouse gas emissions as a result of deforestation activities within the project boundary in baseline stratum i during project year t (CO₂e yr⁻¹)

Here, we describe the net carbon stock exchange for all measured carbon pools in the baseline stratum i (ΔC_{BSLi}). For descriptions of greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline stratum i during project year t ($GHG_{BSL-Ei,t}$), please see Section 3.2.1.3.

Carbon pools included were determined via the tool *T-SIG*. Stock changes in each carbon pool are calculated by the difference between post-deforestation carbon stocks from forest carbon stocks, via equations 6, 7, 8, 9, 11 and 12 VMD0006 (BL-PL) v1.3:

$$\Delta C_{ABtree,i} = C_{ABtree,bsl,i} - C_{ABtree,post,i}$$

$$\Delta C_{BBtree,i} = C_{BBtree,bsl,i} - C_{BBtree,post,i}$$

$$\Delta C_{ABnon-tree,i} = C_{ABnon-tree,bsl,i} - C_{ABnon-tree,post,i}$$

$$\Delta C_{BBnon-tree,i} = C_{BBnon-tree,bsl,i} - C_{BBnon-tree,post,i}$$

$$\Delta C_{LI} = C_{LI,bsl,i} - C_{LI,post,i}$$

$$\Delta C_{SOC,i} = C_{SOC,bsl,i} - C_{SOC,post,i}$$

Where:

$\Delta C_{ABtree,i}$ = Baseline carbon stock change in aboveground tree in stratum i (tCO₂e Ha⁻¹)

$C_{ABtree,bsl,i}$ = Forest carbon stock in aboveground tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{ABtree,post,i}$ = Post-deforestation carbon stock in aboveground tree biomass in stratum i (tCO₂e Ha⁻¹)

$\Delta C_{BBtree,i}$ = Baseline carbon stock change in belowground tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{BBtree,bsl,i}$ = Forest carbon stock in belowground tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{BBtree,post,i}$ = Post-deforestation carbon stock in belowground tree biomass in stratum i (tCO₂e Ha⁻¹)

$\Delta C_{ABnon-tree,i}$ = Baseline carbon stock change in aboveground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{ABnon-tree,bsl,i}$ = Carbon stock in aboveground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{ABnon-tree,post,i}$ = Post-deforestation carbon stock in aboveground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$\Delta C_{BBnon-tree,i}$ = Baseline carbon stock change in belowground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{BBnon-tree,bsl,i}$ = Carbon stock in belowground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{BBnon-tree,post,i}$ = Post-deforestation carbon stock in belowground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

ΔC_{LI} = Baseline carbon stock change in litter in stratum I (tCO₂e Ha⁻¹)

$C_{LI,bsl,i}$ = Carbon stock in litter biomass in stratum i (tCO₂e Ha⁻¹)

$C_{LI,post,i}$ = Post-deforestation carbon stock in litter in stratum I (tCO₂e Ha⁻¹)

$\Delta C_{SOC,i}$ = Baseline carbon stock change in soil organic carbon biomass in stratum i (tCO₂e Ha⁻¹)

$C_{SOC,bsl,i}$ = Carbon stock in belowground non-tree biomass in stratum i (tCO₂e Ha⁻¹)

$C_{SOC,post,i}$ = Post-deforestation carbon stock in soil organic carbon in stratum i (tCO₂e Ha⁻¹)

The baseline scenario of this project did not include harvesting of longlived wood projects. Thus, calculations related to the module CP-W were irrelevant and omitted.

At the time of deforestation carbon is emitted in aboveground biomass (tree biomass, non-tree biomass including litter). Following deforestation, emissions from belowground biomass, deadwood, soil occur gradually. Stock changes in belowground biomass and deadwood are emitted at an annual rate of 1/10 of the total stock change for 10 years. Soil organic carbon and long-term wood products are emitted at an annual rate of 1/20 of the total stock change for 20 years. Here, no wood was expected to enter the long-term wood products pool ($C_{WP100} = 0$). All deforested wood was expected to be burned and was thus estimated using Module VMD0013; *Estimation of Greenhouse Gas Emissions from Biomass and Peat Burning* (E-BPB), discussed at the end of this section.

The sum of the baseline carbon stock change in all pools in stratum *i* at time *t* was calculated via equation 14 VMD0006 (BL-PL) v1.3:

$$\Delta C_{BSL,i,t} = AA_{planned,i,t} \times (\Delta C_{ABtree,i} + \Delta C_{ABnon-tree,i}) + \sum_{t=10}^t (AA_{planned,i,t} \times (\Delta C_{BBtree,i} + \Delta C_{BBnon-tree,i}) \times \frac{1}{10}) + \sum_{t=20}^t (AA_{planned,i,t} \times (C_{WP100} + \Delta C_{SOC,i}) \times \frac{1}{20})$$

Where:

$\Delta C_{BSL,i,t}$ = Sum of the baseline carbon stock change in all pools in stratum i at time t (tCO₂e)

$AA_{planned,i,t}$ = Annual area of baseline planned deforestation for stratum i at year t (ha)

$\Delta C_{ABtree,i}$ = Baseline carbon stock change in aboveground tree biomass in stratum i (tCO₂e ha⁻¹)

$\Delta C_{ABnon-tree,i}$ = Baseline carbon stock change in aboveground tree biomass in stratum i (tCO₂e ha⁻¹)

$\Delta C_{BBtree,i}$ = Baseline carbon stock change in belowground tree biomass in stratum i (tCO₂e ha⁻¹)

$\Delta C_{BBnon-tree}$ = Baseline carbon stock change in belowground non-tree biomass in stratum i (tCO₂e ha⁻¹)

C_{WP100} = Carbon stock entering wood products pool at the time of deforestation that is expected to be emitted over 100 years from stratum i. Here, Cwp100 is zero.

$\Delta C_{SOC,i}$ = Baseline carbon stock change in soil organic carbon in stratum i (tCO₂e Ha⁻¹)

3.2.1.3 BL-PL: Part 3. Greenhouse Gas Emissions

The greenhouse gas emissions within the project boundary baseline were calculated via equation 15 VMD0006 (BL-PL) v1.3:

$$GHG_{BSL,E,i,t} = E_{FC,i,t} + E_{biomassBurn,i,t} + N_2O_{direct-N,i,t}$$

Where:

$GHG_{BSL,E,i,t}$ = Greenhouse gas emissions as a result of deforestation activities within the project boundary in the stratum i in year t (tCO₂e)

$E_{FC,i,t}$ = Net CO₂e emissions from fossil fuel combustion in stratum i in year t (tCO₂e); conservatively omitted

$E_{biomassBurn,i,t}$ = Non-CO₂ emission due to biomass burning in stratum i in year t (tCO₂e)

$N_2O_{direct-N,i,t}$ = Direct N₂O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum i in year t (tCO₂e); conservatively omitted.

Greenhouse gas emissions from biomass burning was determined using VMD0013, *Estimation of greenhouse gas emissions from biomass and peat burning* (E-BPB). This module was used to determine GHG emissions from biomass burning ($E_{biomassburn,i,t}$). As this project did not include any peat burning, the estimation of GHG emissions due to peat burning was omitted. $E_{biomassburn,i,t}$ was determined via equation 1 VMD0013 (E-BPB) v1.2:

$$E_{biomassburn,i,t} = \sum_{g=1}^G (((A_{burn,i,t} \times B_{i,t} \times COMF_i \times G_{g,i}) \times 10^{-3}) \times GWP_g)$$

Where:

$E_{biomassburn,i,t}$ = GHG emissions due to biomass burning in stratum i in year t of each GHG (CO₂, CH₄, N₂O) (tCO₂e)

$A_{burn,i,t}$ = Area burnt in stratum i in year t (ha)

$B_{i,t}$ = Average aboveground biomass stock before burning stratum i, year t (t D.m. ha⁻¹)

$COMF_i$ = Combustion factor for stratum i (unitless)

$G_{g,i}$ = Emission factor for stratum i for gas g (kg t⁻¹d.m. burnt)

GWP_g = Global warming potential for gas g (tCO_{2e} t⁻¹ gas g)

The average aboveground biomass stock before burning in stratum i, year t ($B_{i,t}$) was determined via VMD0013 Estimation of GHG emissions from biomass and peat burning (E-BPB), equation 2:

$$B_{i,t} = (C_{ABtree,i,t*} + C_{DWi,t} + C_{LI,i,t}) \times \frac{12}{44} \times \left(\frac{1}{CF}\right)$$

Where:

$B_{i,t}$ = Average aboveground biomass stock before burning stratum in i, year t (t D.M. ha⁻¹)

$C_{ABtree,i,t*}$ = Carbon stock in aboveground tree biomass in stratum i in year t (t CO_{2e} ha⁻¹). Individual trees with a DBH < 45 cm were excluded from biomass burning.

$C_{DWi,t}$ = Carbon stock in deadwood for stratum i in year t (t CO_{2e} ha⁻¹)

$C_{LI,i,t}$ = Carbon stock in litter for stratum I in year t (t CO_{2e} ha⁻¹)

$\frac{12}{44}$ = Inverse ratio of molecular weight of CO₂ to carbon (t CO_{2e} t C⁻¹)

CF = Carbon fraction of biomass (t C t⁻¹ d.m.)

Here, $C_{DWi,t}$ was conservatively omitted due to the high level of uncertainty in the pool estimates. Biomass stored in wood products from salvage logging (trees with a DBH larger than or equal to 25 cm) were not expected to be burned and were thus conservatively excluded from the estimates of aboveground biomass to be burned ($C_{ABtree,i,t*}$).

3.2.1.4 Estimation of uncertainty

The VMD0017-X-UNC module was used to calculate the uncertainty in the estimation of emissions and removals in REDD project activities. These uncertainties are associated with the estimation and measurements of several factors such as carbon stocks or biomass growth rates. A 95% confidence interval half-width equal to or less than 15% of the recorded value should be targeted and enough measurements plots should be implemented to achieve such a precision. The uncertainty is calculated following the below steps.

STEP 1: Assess Uncertainty in Projection of Baseline Rate of Deforestation or Degradation

In this project option A is applied as rate of deforestation was obtained from measurements of proxy areas (module BL-PL, see section 3.1.4). The uncertainty shall be equal to the 95% confidence interval as a percentage of the mean of the area deforested in each proxy ($D\%_{pn}$) divided by the number of years over which deforestation occurred in each proxy (Yrs_{pn}). Results obtained for the seven proxy parcels are presented in Table 33.

Table 33: Deforested area and number of years in which deforestation occurred in each proxy parcel

Proxy parcel	D% _{pn}	Yrs _{pn}
1	83%	9.12
2	87%	9.12
3	74%	9.12
4	78%	7.14
5	79%	7.14
6	63%	7.14
7	97%	7.14
Average	80%	7.99
CI	0.08	
CI as % of mean	9.85%	

Uncertainty_{BSL,RATE}

1.23%

STEP 2: Assess Uncertainty of Emissions and Removals in Project Area in Baseline Scenario

Uncertainty is expressed as the 95% confidence interval half-width as a percentage of the mean. It is first propagated across pools within strata and is calculated according to the following equation 4 VMD0017 (X-UNC) v2.2:

$$U_{REDD-BSL,SS,i} = \frac{\sqrt{\sum_1^n (U_{REDD-BSL,SS,i,pool\#} \times E_{REDD-BSL,SS,i,pool\#})^2}}{\sum_1^n E_{REDD-BSL,SS,i,pool\#}}$$

Where:

$U_{REDD-BSL,SS,i}$ Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline case in stratum i (%)

$U_{REDD-BSL,SS,i,pool\#}$ Percentage uncertainty for carbon stocks and greenhouse gas sources in the REDD baseline case in stratum i (%)

$E_{REDD-BSL,SS,i,pool\#}$ Carbon stock or GHG sources in the REDD baseline case (t CO₂e)

i 1, 2, 3 ...M strata (unitless)

$U_{REDD-BSL,SS,i}$

6.66%

STEP 3: Estimate Total Uncertainty in REDD Baseline Scenario

Rate uncertainty is incorporated via equation 6 VMD0017 (X-UNC) v2.2 as follows:

$$Uncertainty_{REDD_{BSL},t*} = \sqrt{Uncertainty_{BSL,RATE,t*}^2 + Uncertainty_{REDD_{BSL},SS}^2}$$

With:

$Uncertainty_{REDD_{BSL},t^*}$	Cumulative uncertainty in REDD baseline scenario up to time t (%)
$Uncertainty_{BSL,RATE,t^*}$	Cumulative uncertainty in the baseline rate of deforestation up to time t (%)
$Uncertainty_{REDD_{BSL},SS}^2$	Total uncertainty in the combined carbon stocks and greenhouse gas sources in the REDD baseline case (%)
i	1, 2, 3, ...t* time elapsed since the start of the project activity (years)

$$Uncertainty_{REDD_{BSL},t^*} \quad \mathbf{6.77\%}$$

STEP 4: Total Error in the REDD+ Project Activity

Uncertainty in leakage is not considered here as calculation of leakage is conservative in all instances. Total project uncertainty is equal to the combined uncertainty in baseline and project estimates for the REDD activities, equation 21 VMD0017 (X-UNC) v2.2.

$$NER_{REDD+\_ERROR} = \sqrt{(Uncertainty_{REDD_{BSL},t^*} \times \Delta C_{BSL-REDD,t^*})^2 + (Uncertainty_{REDD\_WPS} \times \Delta C_{WPS-REDD,t^*})^2} \times \left(\frac{1}{\Delta C_{BSL-REDD,t^*} + \Delta C_{WPS_{REDD},t^*}} \right)$$

Where:

NER_{REDD+_ERROR}	Cumulative uncertainty for the REDD+ (REDD and WRC) project activities up to year t* (%)
$Uncertainty_{REDD_{BSL},t^*}$	Cumulative uncertainty in REDD baseline scenario up to year t (%)
$Uncertainty_{REDD\_WPS}$	Total uncertainty in the REDD project scenario (%)
$\Delta C_{BSL-REDD,t^*}$	Net GHG emissions in the REDD baseline scenario up to year t* (t CO ₂ e)
$\Delta C_{WPS-REDD,t^*}$	Net GHG emissions in the REDD project scenario up to year t* (t CO ₂ e)
t	1, 2, 3, ... t* time elapsed since the project start (year)

$$NER_{REDD+\_ERROR} \quad \mathbf{6.77\%}$$

The allowable uncertainty in this methodology is +/- 15% of NER_{REDD+_ERROR} at the 95% confidence level. NER_{REDD+_ERROR} being 6.77%, no deduction in the emission reduction calculations should result for uncertainty.

3.2.1.5 BL-PL: Part 4. Frequency of Baseline Renewal

This baseline will be revised every 10 years for ongoing planned deforestation.



Photo 10. View of Parcels that, until recently, had same conditions as the Project Activity Instance

3.2.2 Project Emissions

Methods relating to project emissions were completed using the module VMD0015 – Methods for monitoring of GHG emissions and removals within REDD and CIW projects (M-REDD). This module is used to monitor ex-post greenhouse gas emissions and removals of greenhouse gasses due to REDD project activities, with the goal of calculating the net greenhouse gas emissions from REDD project scenarios to year t ($\Delta C_{WPS-REDD}$). This parameter was calculated via equation 1 VMD0015 (M-REDD) v2.2:

$$\Delta C_{WPS-REDD} = \sum_{t=1}^{t*} \sum_{i=1}^M (\Delta C_{P,DefIA,i,t} + \Delta C_{P,DegI,i,t} + \Delta C_{P,DistPA,i,t} + GHIP-E,i,t - \Delta C_{P,Enh,i,t})$$

Where:

$\Delta C_{WPS-REDD}$ = Net GHG emissions in REDD project scenario to year t, (tCO₂e)

$\Delta C_{P,DefPA,i,t}$ = Net carbon stock change resulting from deforestation within the Project Activity Instance in stratum i in year t, (tCO₂e)

$\Delta C_{P,Deg,i,t}$ = Net carbon stock change resulting from degradation within the Project Activity Instance in stratum i in year t, (tCO₂e)

$\Delta C_{P,DistPA,i,t}$ = Net carbon stock change resulting from natural disturbance in the Project Activity Instance in stratum i in year t (tCO₂e)

$GHGP-E,i,t$ = Greenhouse gas emissions resulting from deforestation/degradation activities within the Project Activity Instance in stratum i in year t (tCO₂e)

$\Delta C_{P,Enh,i,t}$ = Net carbon stock change, resulting from forest growth and sequestration during the project, in areas projected to be forested in the baseline within stratum i in year t (tCO₂e)

The M-REDD module provides all the necessary methods and calculations for determining $\Delta C_{WPS-REDD}$. M-REDD, also provides methods for monitoring ex-post emissions and removals of GHGs due to avoiding deforestation and forest degradation, and carbon stock enhancement that has been induced as a result of REDD project implementation within the Project Activity Instance and leakage. The calculation of the M-REDD module is implemented by applying the following 3 steps:

3.2.2.1 M-REDD: STEP 1. Selection and Analyses of Sources of Land-Use and Land-Cover (LU/LC) Change Data

Processing LU/LC Change of Data (M-REDD)

Remotely sensed data with a spatial resolution of 30 meters were collected and analyzed. All images were calibrated with terrain and illumination correction and removal of consistent sensor-based deviations. Cloud and shadow masks and geometric and atmospheric corrections were applied, see Section 3.2.2.3.

Post-processing and Accuracy Assessment (M-REDD)

Post-processing was used to map LU/LC change in the imagery and to calculate the area of LU/LC change, Cloud coverage below 10% was maintained for the images and a multi-date, composite image was used to reduce satellite sensor scan line errors. The overall accuracy of the post-processed images was 90% or above, see Section 3.2.2.3.

3.2.2.2 M-REDD: STEP 2. Interpretation and Analyses

Monitoring Deforestation (M-REDD)

Emissions resulting from any deforestation that occurs within the Project Activity Instance ($\Delta C_{P,Def,i,t}$) will be monitored.

The method described in section 3.2.2.1 to detect and map deforestation using remotely sensed data will be used for the entire crediting. The net carbon stock change as a result of deforestation is equal to the area deforested multiplied by the emission per unit area, calculated via equations 3 and 4 VMD0015 (M-REDD) v2.2.

$$\Delta C_{P,DefPA,i,t} = \sum_{u=1}^U (A_{DefPA,u,i,t} \times \Delta C_{pools,P,Def,u,i,t})$$

$$\Delta C_{P,DefLB,i,t} = \sum_{u=1}^U (A_{DefLB,u,i,t} \times \Delta C_{pools,P,Def,u,i,t})$$

Where:

$\Delta C_{P,DefPA,i,t}$ = Net carbon stock change as a result of deforestation in the project case in the Project Activity Instance in stratum i in year t ; t CO₂-e

$\Delta C_{P,DefLB,i,t}$ = Net carbon stock change as a result of deforestation in the project case in the leakage belt in stratum i in year t ; t CO₂-e

$A_{DefPA,u,i,t}$ = Area of recorded deforestation in the Project Activity Instance stratum i converted to land use u in year t ; ha

$A_{DefLB,u,i,t}$ = Area of recorded deforestation in the leakage belt stratum i converted to land use u in year t ; ha

$\Delta C_{pools,Def,u,i,t}$ = Net carbon stock changes in all pools in the project case in land use u in stratum i in year t ; t CO₂-e ha⁻¹

$u = 1, 2, 3, \dots U$ post-deforestation land uses

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the start of the project activity

The emission per unit area is equal to the difference between the stocks before and after deforestation minus any wood products created from timber extraction in the process of deforestation, calculated via equation 5 VMD0015 (M-REDD) v2.2:

$$\Delta C_{pools,Def,i,t} = C_{BSL,i} - C_{P,post,i} - C_{WP,i}$$

Where:

$\Delta C_{pools,Def,u,i,t}$ = Net carbon stock changes in all pools as a result of deforestation in the project case in land use u in stratum i in year t ; t CO₂-e ha⁻¹

$C_{BSL,i}$ = Carbon stock in all pools in the baseline case in stratum i ; t CO₂-e ha⁻¹

$C_{P,post,u,i}$ = Carbon stock in all pools in post-deforestation land use u in stratum i ; t CO₂-e ha⁻¹

$C_{WP,i}$ = Carbon stock sequestered in wood products from harvests in stratum i ; t CO₂-e ha⁻¹ (omitted)

$u = 1, 2, 3, \dots U$ post-deforestation land uses

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the start of the project activity

Following M-REDD and CP-W the calculation of carbon stock sequestered in wood products is omitted.

For calculating deforestation that happened in the Project Activity Instance during the monitoring period, all carbon stocks are emitted in the year they were deforested and that no stocks are permanently sequestered (beyond 100 years after deforestation). This assumption applies regardless of whether burning is employed as part of the forest conversion process or as part of post conversion land use activities.

Carbon stocks are the same as those used in the baseline are measured and estimated using the methods given in Modules CP-AB, CP-D, CP-L, CP-S, calculated via equation 6 VMD0015 (M-REDD) v2.2 and are described below:

$$C_{post,u,i} = C_{AB_{tree,i}} + C_{BB_{tree,i}} + C_{AB_{non-tree,i}} + C_{BB_{non-tree,i}} + C_{LI,i} + C_{SOC,PD-BSL,i}$$

Where:

$C_{P,post,u,i}$ = Carbon stock in all pools in post-deforestation land use u in stratum i ; t CO₂-e ha⁻¹

$C_{AB_{tree,i}}$ = Carbon stock in aboveground tree biomass in stratum i ; t CO₂-e ha⁻¹

$C_{BB_{tree,i}}$ = Carbon stock in belowground tree biomass in stratum i ; t CO₂-e ha⁻¹

$C_{AB_{non-tree,i}}$ = Carbon stock in aboveground non-tree vegetation in stratum i ; t CO₂-e ha⁻¹

$C_{BB_{non-tree,i}}$ = Carbon stock in belowground non-tree vegetation in stratum i ; t CO₂-e ha⁻¹

$C_{LI,i}$ = Carbon stock in litter in stratum i ; t CO₂-e ha⁻¹

$C_{SOC,PD-BSL,i}$ = Mean post-deforestation stock in soil organic carbon in the post deforestation stratum i ; t CO₂-e ha⁻¹

$u = 1, 2, 3, \dots U$ post-deforestation land uses

$I = 1, 2, 3, \dots M$ strata in the in the project case

Carbon pools excluded from the project can be accounted as zero in monitoring. Herbaceous non-tree vegetation is considered to be *de minimis*.

Monitoring Forest Degradation (M-REDD)

Following M-REDD this section is omitted.

Emissions Arising in the Logging Gap (M-REDD)

Following M-REDD this section is omitted.

Emissions Arising Through Logging Infrastructure (M-REDD)

Following M-REDD this section is omitted.

Emissions from Harvested Wood Products (M-REDD)

Following M-REDD this section is omitted.

Monitoring areas undergoing natural disturbance (M-REDD)

Where natural disturbances occur in the Project Activity Instance such as earthquake, landslide, volcano, hurricane, pest, drought, or fire that result in a degradation of forest carbon stocks, the area disturbed shall be delineated and the resulting emissions estimated. The disturbance can be delineated through a handheld GPS device, or based off of satellite imagery. Emissions resulting from natural disturbances may be omitted if they are deemed *de minimis* through the use of Tool T-SIG.

In the event of a disturbance, net carbon stock change is equal to the area disturbed multiplied by the emission per unit area. In situations where the impact of disturbances on forest carbon stocks in a stratum varies spatially, the stratum may be further stratified based on post-natural disturbance carbon stocks. Where this occurs, such stratification by carbon stocks will be maintained for the project life.

Where the disturbance event occurs in the Project Activity Instance, the area disturbed will be delineated and the area of each post-disturbance stratum must be delineated. The area disturbed in the with-project scenario shall be tracked directly using the guidance provided in Section 3.2.2.1. This demarcation of a disturbance may be delineated in the field with a hand-held device or through remote sensing.

Monitoring areas undergoing carbon stock enhancement (M-REDD)

This project contains forest areas that are both deforested in the baseline and assumed to be accumulating carbon in the project. The monitoring team will monitor any changes that occur in the forest strata (either increasing or decreasing). Ground measurements will be used to monitor the change in carbon stocks through time as described in section 3.2.1. For this planned deforestation baseline, the carbon stock enhancement is estimated via equation 25 VMD0015 (M-REDD) v2.2:

$$\Delta C_{P,Enh,i,t} = \sum_{t=1}^t \sum_{i=1}^M ((C_{P,i,t} - C_{BSL,i}) \times A_{Enh,PL,i,t})$$

Where:

$\Delta C_{P,Enh,i,t}$ = Net carbon stock changes as a result of forest carbon stock enhancement in stratum i in the Project Activity Instance in year t ; t CO₂-e

$C_{P,i,t}$ = Carbon stock in all pools in the project case in stratum i in year t ; t CO₂-e

$C_{BSL,i}$ = Carbon stock in all pools in the baseline in stratum i ; t CO₂-e hl-1

$A_{Enh,PL,i,t}$ = Project Activity Instance in stratum i in which carbon stocks are accumulating but that would have undergone planned deforestation in the baseline scenario in year t ; ha

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the start of the project activity

The eligible area is determined from area due to be deforested in each year of the baseline (as describe in section 3.2.1.1 Rate of Deforestation (Section 1.3 of BL-PL)), calculated via equation 26 VMD0015 (M-REDD) v2.2

$$A_{Enh,PL,i,t} = D\%_{planned,i,t} \times A_{planned,i,t}$$

Where:

$A_{Enh,PL,i,t}$ = Project Activity Instance in stratum i in which carbon stocks are accumulating but that would have undergone planned deforestation in the baseline scenario in year t ; ha

$D\%_{planned,i,t}$ = Projected annual proportion of land that will be deforested in stratum i in year t ; %

$A_{planned,i}$ = Total area of planned deforestation over the entire project lifetime for stratum i ; ha

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the projected start of the project activity

The final carbon stock in the with-project case is calculated via equation 29 VMD0015 (M-REDD) v2.2:

$$C_{P,i,t} = C_{ABtree,i} + C_{BBtree,i} + C_{ABnon-tree,i} + C_{BBnon-tree,i} + C_{LI,i} + C_{SOC,i}$$

Where:

$C_{P,i,t}$ = Carbon stock in all pools in the project case in stratum i in year t ; t CO₂-e

$C_{AB\_tree,i}$ = Carbon stock in aboveground tree biomass in the project case in stratum i ; t CO₂-e ha⁻¹

$C_{BB\_tree,i}$ = Carbon stock in belowground tree biomass in the project case in stratum i ; t CO₂-e ha⁻¹

$C_{AB\_non-tree,i}$ = Carbon stock in aboveground non-tree vegetation in stratum i ; t CO₂-e ha⁻¹

$C_{BB\_non-tree,i}$ = Carbon stock in belowground non-tree vegetation in stratum i ; t CO₂-e ha⁻¹

$C_{LI,i}$ = Carbon stock in litter in the project case in stratum i ; t CO₂-e ha⁻¹

$C_{SOC,i}$ = Carbon stock in soil organic carbon in the project case in stratum i ; t CO₂-e ha⁻¹

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the start of the project activity.

Carbon pools excluded from the project can be accounted as zero. Herbaceous non-tree vegetation is considered to be *de minimis* in all instances.

Monitoring project emissions (M-REDD)

Although not expected in the project, when found to be significant, non-CO₂ GHG emissions occurring within the project boundary must be evaluated. In future monitoring to determine which emissions must be included in the calculations Tool T-SIG will be used. Emissions are calculated through applying Modules E-BPB, E-FCC and E-NA, , implementing equation 30 VMD0015 (M-REDD) v2.2:

$$GHG_{P,E,i,t} = E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t}$$

Where:

$GHG_{P,E,i,t}$ = Greenhouse gas emissions as a result of deforestation activities within the Project Activity Instance in the project case in stratum i in year t ; t CO₂-e

$E_{FC,i,t}$ = Emission from fossil fuel combustion in stratum i within the Project Activity Instance in year t ; t CO₂-e

$E_{BiomassBurn,i,t}$ = Non-Cl₂ emissions due to biomass burning in stratum i in year t ; t CO₂-e

$N_2O_{direct-N,i,t}$ = Direct N₂O emission as a result of nitrogen application on the alternative land use in stratum i within the Project Activity Instance in year t ; t CO₂-e

$i = 1, 2, 3, \dots M$ strata

$t = 1, 2, 3, \dots t^*$ years elapsed since the start of the REDD VCS project activity

3.2.2.3 M-REDD: STEP 3. Documentation

Data sources and pre-processing (M-REDD)

The GHG emissions are accounted for in the Project Activity Instance; therefore, to define the area of the Project Activity Instance, the applicability criteria defined in section 4.3.1 of the VM0007 must be met, and according to the first bullet point “*the land in the project area has qualified as forest (following the definition used by VCS; in addition, see Section 5.1.2) for at least the 10 years prior to the project start date*”, as described in section 3.1.2.1. Then, it was required to make a LULC classification of the Laguna Seca and Yalbac properties in two points in time, at project start (2020) and 10 years prior to the project start (2010) to identify the areas that qualify as forest, pixels that were not forest in one of the two images were excluded of the final area of the Project Activity Instance.

The Landsat images listed in Table 34 were accessed from the United States Geological Survey (USGS) using Google Earth Engine. Landsat 7 and 8 Tier 1 surface reflectance data covering the Project Activity Instance (019-048) were atmospherically corrected using LaSRC and include a cloud, shadow, water and snow mask. The Landsat 7 composite image contains four visible and near-infrared (VNIR) bands and two short-wave infrared (SWIR) bands processed to orthorectified surface reflectance, and one thermal infrared (TIR) band processed to orthorectified brightness temperature. The Landsat 8 image contains five VNIR bands and SWIR bands processed to orthorectified surface reflectance, and two TIR bands processed to orthorectified brightness temperature.

As the Landsat 7 image for 2010 was particularly challenging not only by the high cloud cover of that specific year but also by the banding of the sensor, it was necessary to make a composite between 2009 and 2010 to have an adequate image.

Table 34: Description of the remote sensing imagery used to classify the Project Activity Instance.

Source	Date (YYYY/MM/DD)	No. Scenes	Type	Sensors	Processing Level
USGS	2010/02/04	35	Satellite	Landsat 7 ETM+	Tier 1 surface reflectance
USGS	2020/04/20	1	Satellite	Landsat 8 OLI/TIRS	Tier 1 surface reflectance

Table 35. Landsat images used to classify the Project Activity Instance.

Date (YYYY/MM/DD)	Path-Row	Satellite
2009/01/24	019-048	Landsat 7

Date (YYYY/MM/DD)	Path-Row	Satellite
2009/02/25	019-048	Landsat 7
2009/03/13	019-048	Landsat 7
2009/03/29	019-048	Landsat 7
2009/04/14	019-048	Landsat 7
2009/04/30	019-048	Landsat 7
2009/05/16	019-048	Landsat 7
2009/06/01	019-048	Landsat 7
2009/07/19	019-048	Landsat 7
2009/08/04	019-048	Landsat 7
2009/08/20	019-048	Landsat 7
2009/09/05	019-048	Landsat 7
2009/10/23	019-048	Landsat 7
2009/11/08	019-048	Landsat 7
2009/11/24	019-048	Landsat 7
2009/12/10	019-048	Landsat 7
2009/12/26	019-048	Landsat 7
2010/01/11	019-048	Landsat 7
2010/01/27	019-048	Landsat 7
2010/02/12	019-048	Landsat 7
2010/02/28	019-048	Landsat 7
2010/03/16	019-048	Landsat 7
2010/04/01	019-048	Landsat 7
2010/04/17	019-048	Landsat 7
2010/05/03	019-048	Landsat 7
2010/06/04	019-048	Landsat 7
2010/06/20	019-048	Landsat 7
2010/09/08	019-048	Landsat 7
2010/10/10	019-048	Landsat 7
2010/10/26	019-048	Landsat 7
2010/11/02	020-048	Landsat 7
2010/11/11	019-048	Landsat 7
2010/11/27	019-048	Landsat 7
2010/12/13	019-048	Landsat 7
2010/12/20	020-048	Landsat 7
2020/04/20	019-048	Landsat 8

Table 36: Bands and resolution of the Landsat 7 ETM+ data.

Band nr.	Resolution (m)	Band name	Wavelength (µm)			
			ETM+			
			from	to	mid	FWHM
1	30	Blue	0.45	0.52	0.485	0.035
2	30	Green	0.53	0.61	0.57	0.04
3	30	Red	0.63	0.69	0.66	0.03
4	30	Near infrared	0.78	0.9	0.84	0.06
5	30	Short-wave infrared	1.55	1.75	1.65	0.1
6	120	Thermal infrared	10.4	12.5	11.45	1.05
7	30	Mid infrared	2.09	2.35	2.22	0.13
8	15	Panchromatic	0.52	0.9	0.71	0.19

Table 37: Bands and resolution of the Landsat 8 OLI-TIRS data.

Band nr.	Resolution (m)	Band name	Wavelength (µm)			
			OLI-TIRS			
			from	to	mid	FWHM
1	30	Costal aerosol	0.433	0.453	0.443	0.01
2	30	Blue	0.450	0.515	0.4825	0.0325
3	30	Green	0.525	0.600	0.5625	0.0375
4	30	Red	0.630	0.68	0.655	0.025
5	30	Near infrared	0.845	0.885	0.865	0.02
6	30	Short-wave infrared 1	1.560	1.660	1.610	0.05
7	30	Short-wave infrared 2	2.100	2.300	2.200	0.01
8	15	Panchromatic	0.500	0.680	0.590	0.09
9	30	Cirrus	1.360	1.390	1.375	0.015
10	100	Thermal infrared 1	10.6	11.2	10.9	0.3
11	100	Thermal infrared 2	11.5	12.5	12.0	0.5

Data classification (M-REDD)

A supervised machine learning algorithm was used to classify the imagery into four land cover types: Forest (FC1), Non-Forest (BAR), Water (WTR), and No Data (NDT). The algorithm was trained on a labeled dataset consisting of the remote sensing data and reference points with the corresponding land cover labels. Randomly generated reference points for the 2010 and 2020 images were visually interpreted and cross-referenced with high-resolution Google Maps imagery, which varies in resolution from 15 m to 15 cm depending on data availability. Eight hundred fifty-seven reference points were used for the 2010 image and 800 reference points were used for the 2020 image. Visual interpretation of the reference points was facilitated using red, green, blue (RGB) composites (ETM+ bands 4,3,2 and OLI-TIRS bands 5,4,3) to enhance contrasts between land cover types. The classifier model was also trained using ancillary data including aspect, distance to roads, hill shade, slope, and elevation. Ancillary data can improve classification accuracy by providing additional features to distinguish between spectrally similar land cover types and by leveraging that distinct land cover types are often characterized by environmental parameters. Post-classification merging and single-pixel filter analysis were performed to reduce the overall error rate of the classification. Merging combines the results of multiple classifications to mitigate the effects of random errors. Single-pixel filter analysis identifies pixels that are indicative of certain classes and uses these pixels to classify the rest of the data to reduce noise.

Classification accuracy assessment (M-REDD)

Accuracy metrics were calculated for the classified images. The reference points were randomly divided into 70% training points and 30% verification points. The verification points were used to assess the

accuracy of the classifications. Confusion matrices for the images were calculated. The classifications of the Project Activity Instance met the 90% accuracy threshold required by the methodology. No discounting factor was applied as the module M-REDD does not request for it when the classification accuracy is above or greater than 90%. The overall accuracy measures are presented in Table 38 and the confusion matrices in Table 39.

Table 38: Accuracy for the verification of the classified images.

Image (YYYY)	Overall Accuracy
2010	91.05%
2020	90.00%

Table 39: Confusion matrices with omission and commission percentages.

	2010	Observed			
		NDT	FC1	BAR	WTR
Predicted	NDT	12	0	0	0
	FC1	0	148	1	0
	BAR	0	16	45	0
	WTR	0	1	5	29
	Omission	0%	0.67%	26.23%	17.14%
	Commission	0%	10.30%	11.76%	0%
	2020	Observed			
		NDT	FC1	BAR	WTR
Predicted	NDT	12	0	0	0
	FC1	0	134	0	1
	BAR	0	11	36	0
	WTR	0	10	2	34
	Omission	0%	0.74%	23.40%	26.09%
	Commission	0%	13.55%	5.26	2.86%

Changes in Data sources and pre-processing / Data classification (M-REDD)

Additional satellite data will be incorporated into future changes as it becomes available and will be documented and justified.

3.2.3 Leakage

Leakage was determined by following the methodology described in module “VMD0009 – Estimation of emissions from activity shifting for avoiding planned deforestation/forest degradation and avoiding planned wetland degradation (LK-ASP).” This module was used to estimate GHG emissions caused by market leakage of avoided planned deforestation/degradation projects ($\Delta C_{LK-AS,planned}$), which was calculated via:

3.2.3.1 LK-ASP: APPROACH 2: Market Leakage Assessment

STEP 1: Identify commodity produced by baseline class of agent (LK-ASP)

Most of the agro-pastoral holdings within the vicinity of the Belize Maya Forest and the Belize Maya Forest Corridor are managed and owned by members of the Mennonite communities of Blue Creek, Shipyard,

Indian Creek, and Spanish Lookout. Production is primarily targeted at cultivating agricultural products and commodities such as grains, vegetables and livestock. Apart from the Mennonite communities, some bordering communities are involved in large commercial-scale sugar cane production, as well as small scale production of livestock and cash crops (Correa, 2022).

While crop production within Belize ranges from corn, beans, vegetables, sugarcane and livestock, the Orange Walk District is recognized as the chief producer of sugarcane. Sugarcane occupies an approximate total of 33,916 hectares in Northern Belize, with 14,731 hectares and 19,185 hectares of land being utilized in Corozal and Orange Walk respectively. It is estimated that the livelihoods of over 6,000 community stakeholders, mostly inhabitants from the surrounding Mestizo communities, are dependent on sugarcane production. Whilst sugarcane production has contributed to many socioeconomic benefits for communities, it was considered one of the main initial drivers of deforestation in the 1980s (Correa, 2022).

Sugarcane fields are also cultivated in the Cayo District, which are primarily managed by the Santander Group and processed at Santander's mill, which is situated between the communities of Valley of Peace and More Tomorrow. The area currently owned by Santander consists of 5,261 hectares, which is projected to produce approximately 1.3 million mt of sugarcane, an amount equivalent to that being produced in the north. Santander hopes to expand to 8,094 hectares, by collaborating with other growers who plan to set up plantations in the region and employ up to 750 individuals during harvest season. Similar to sugar produced in Northern Belize, the majority of the sugar produced in the Western part of Belize is predominantly produced for the export market (Correa, 2022).

In addition to sugarcane, a variety of beans and grains are also produced within the Cayo and Orange Walk Districts. Several Mennonite communities in northern and western Belize form a huge labor force, which drives most of the production of rice, beans, corn and other grains (Correa, 2022).

Red kidney beans, small red beans and black beans are typically produced through a corn-bean rotation system by both large-scale mechanized farmers and smaller scale subsistence farmers. Mechanized farms, which can range in size from 20 to 405 hectares, can produce up to 896 kilograms of beans per hectare. Milpa farmers, who typically produce varieties of black beans or small red beans, can produce yields of up to 1,121 kilograms per hectare (Correa, 2022).

Corn is produced in large amounts for both the local and export market. The sub-sector consists of a mixture of farming techniques, which consists of milpa (subsistence farming), as well as small irrigation systems and mechanized rain-fed systems respectively. Notably, the bulk of rice production within the Orange Walk District is produced by 10 farmers, who manage very large holdings (Correa, 2022).

Rice in the Cayo District is typically produced via the milpa system and mechanized rain fed systems. In 2012, 1,052 hectares were harvested in the Cayo District, under the mechanized rain fed and the milpa system (Correa, 2022).

The soybean industry within Belize is slowly growing with farmers from the Corozal, Cayo and Orange Walk Districts planting between 3,237 hectares to 4,047 hectares of soybean per year, with the Cayo District being the one that produces a significantly larger proportion of soybean, in comparison to production within the Orange Walk District. Majority of the soybean produced is processed to create crude soybean oil, which is exported to Jamaica by Bel-Car Exports and Imports in Spanish Lookout and Northern Grains Cooperative in Blue Creek. The remaining soybean meal is used to make animal feed (Correa, 2022).

Notably, the main agricultural production in northern Belize is associated with sugar cane crops, followed by corn and bean crops. However, sugar cane production is mostly developed by large companies such as Santander Group, while corn and bean crops are more relevant within the Mennonite communities, with corn being the one with the highest production. Considering that the potential agent land cover conversion are the Mennonites, corn and beans are considered the most likely commodities that would be implemented in the Project Activity Instance. For these reasons and considering that the module LK-ASP requires the leakage assessment of the most likely commodity, the leakage assessment was made for corn crops.

STEP 2: Assess Proportion of Available Areas that are Forested (LK-ASP)

Because of the wide range of climatic conditions over which corn is grown, precise limiting conditions for corn production cannot be set. Corn is grown in most tropical latitudes and from near sea level to several thousand meters above sea level (Shaw, 1988). It has been reported corn growing at altitudes above 3,600 meters in Bolivia (Staller, High Altitude Maize (Zea Mays L.) Cultivation and Endemism in the Lake Titicaca Basin, 2016).

Practically no corn is grown where the mean midsummer temperature is less than 19°C or where the average night temperature during the summer months falls much below 13°C. The greatest production occurs where the warmest month isotherms range between 21° and 27°C and the freeze-free season lasts 120 to 180 days. Within such regions, yields generally are higher with below-normal summer temperatures than with above-normal values. There seems to be no upper temperature limit specific for corn production but yields usually decrease with higher temperatures (Shaw, 1988).

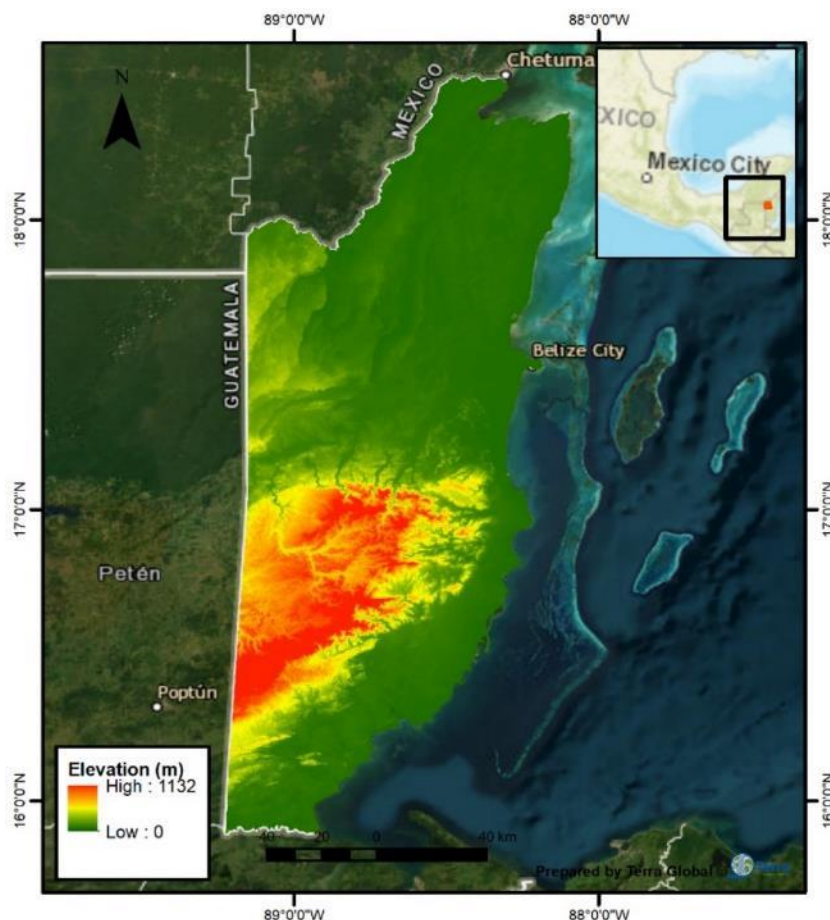
Corn is grown in areas where the annual precipitation ranges from 25 to 5,000 mm. A summer rainfall of 150 mm is approximately the lower limit for corn production without irrigation but, yield responses to irrigation are obtained with much higher summer rainfall, the response depending upon rainfall distribution and soil-moisture reserves. There seems to be no upper limit of rainfall for growing corn, but excessive rainfall will decrease yields (Shaw, 1988).

In terms of soils, corn is not that exacting with regard to its soil requirements. It may be grown in a variety of soils with textures ranging from sand or heavy clay soils to organic soils. Corn requires a well-drained soil with adequate water holding capacity for optimum growth. Corn grows best in a soil with a pH between 5.8 and 6.5 (Stall, Waters, Davis, Rosen, & Clough, n.d.).

Taking into account the conditions described above, a spatial analysis was carried out to identify which areas of the country meet these climatic and soil characteristics required for corn to be established. Subsequently, these areas are overlapped with forest areas, excluding protected areas and other carbon projects, in order to identify possible market leakage.

Elevation

The maximum altitude in Belize is 1,152 m, taking into account that corn can be developed up to 3,600 m, it is considered that the entire country meets this requirement of the specie (Map 26).

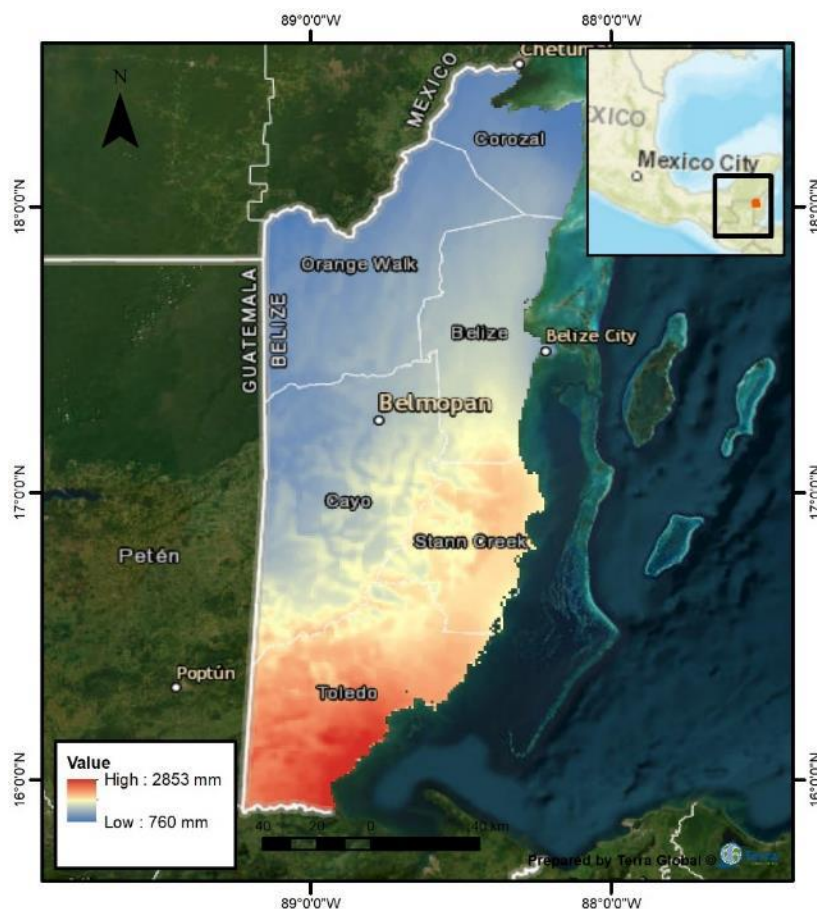


Map 26. Belize Elevation Range for Sugar Cane Crops

Precipitation

The annual rainfall in Belize varies between 1,311 mm and 1,772 mm; however, the precipitation has spatial variability. In order to identify the spatial distribution of the rainfall in Belize, the OpenLandMap Precipitation Monthly was downloaded through Google Earth Engine. This product is made of twelve bands, where each band represents the monthly average between 2007 to 2019, then all bands are summed to obtain the total annual precipitation.

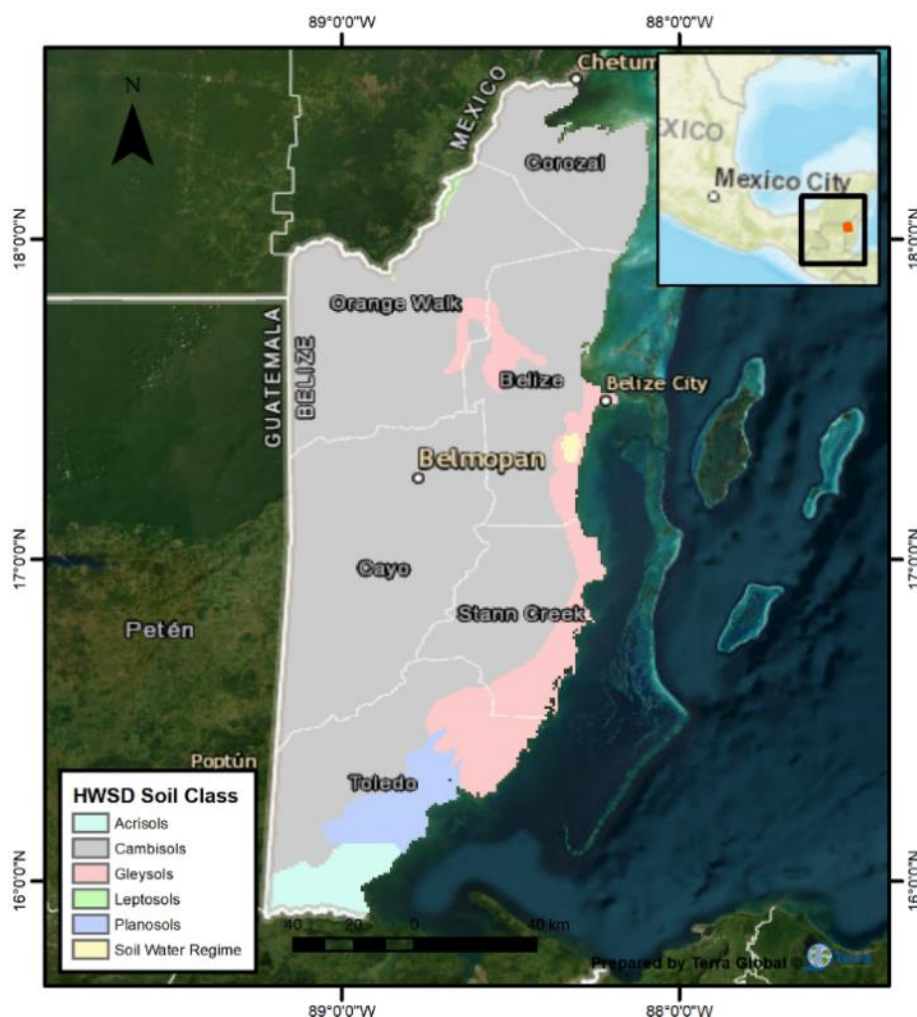
Considering that corn can grow with annual precipitation ranges from 25 mm to 5,000 mm, the whole country has precipitation suitability for growing corn (Map 27).



Map 27. Belize Annual Precipitation

Soils

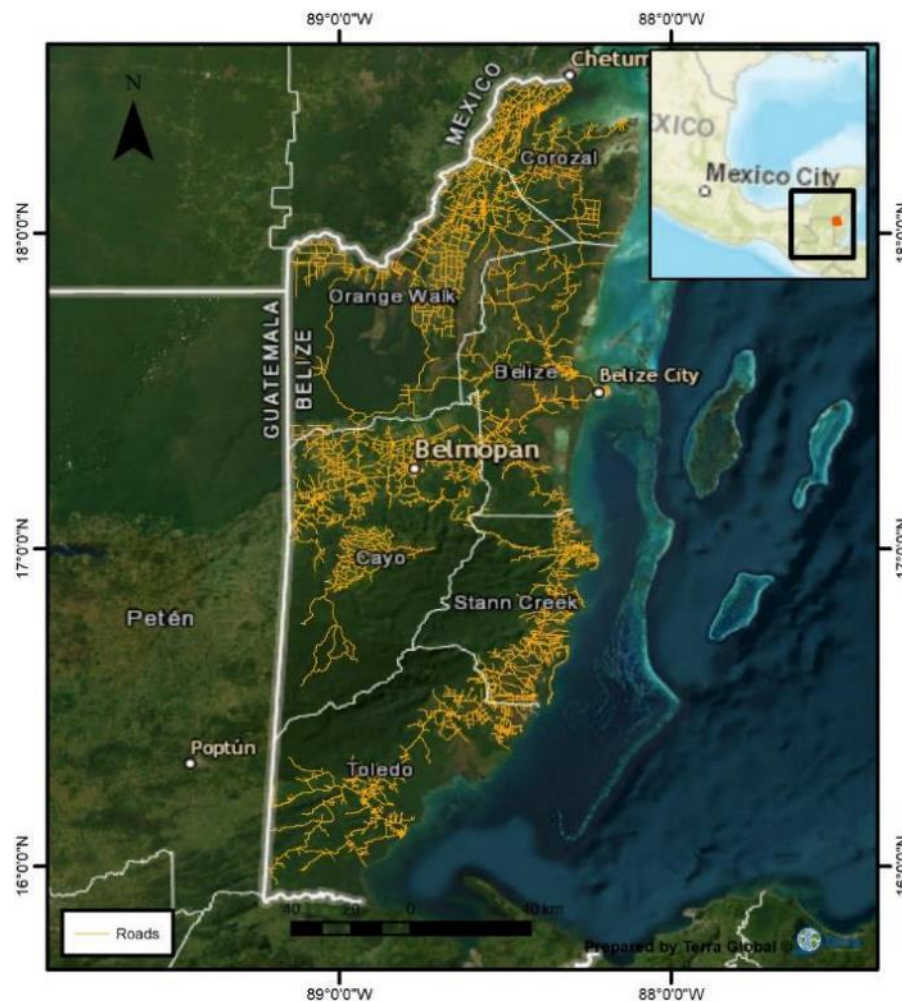
Corn grows well in most soil types; thus, it is considered that the whole country meets the soils criteria (Map 28). The soils analysis was made based on the HWSD soils classification (FAO, 2022).



Map 28. Belize HWSD Soil Classes

Access to Markets

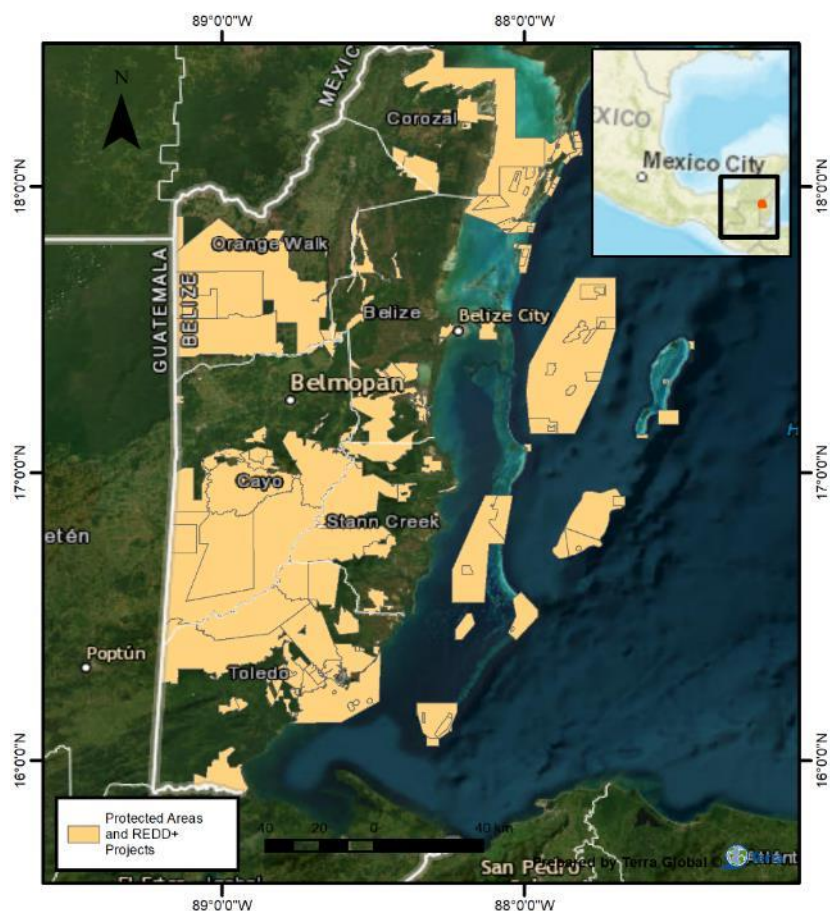
Access to markets is limited by road infrastructure. Belize has a well-developed road network that covers a large part of the national territory (Map 29). In addition, in areas where road density is low, roads may be developed in the future to facilitate the extraction of agricultural products. Therefore, it is considered that the entire country has easy access to markets.



Map 29. Belize Road Network

Protected Areas and REDD+ Projects

To define the forest areas that are potential to be converted to corn, forests from protected areas and existing REDD+ projects were excluded, since due to the protection figure, they are not viable conversion areas (Map 30).

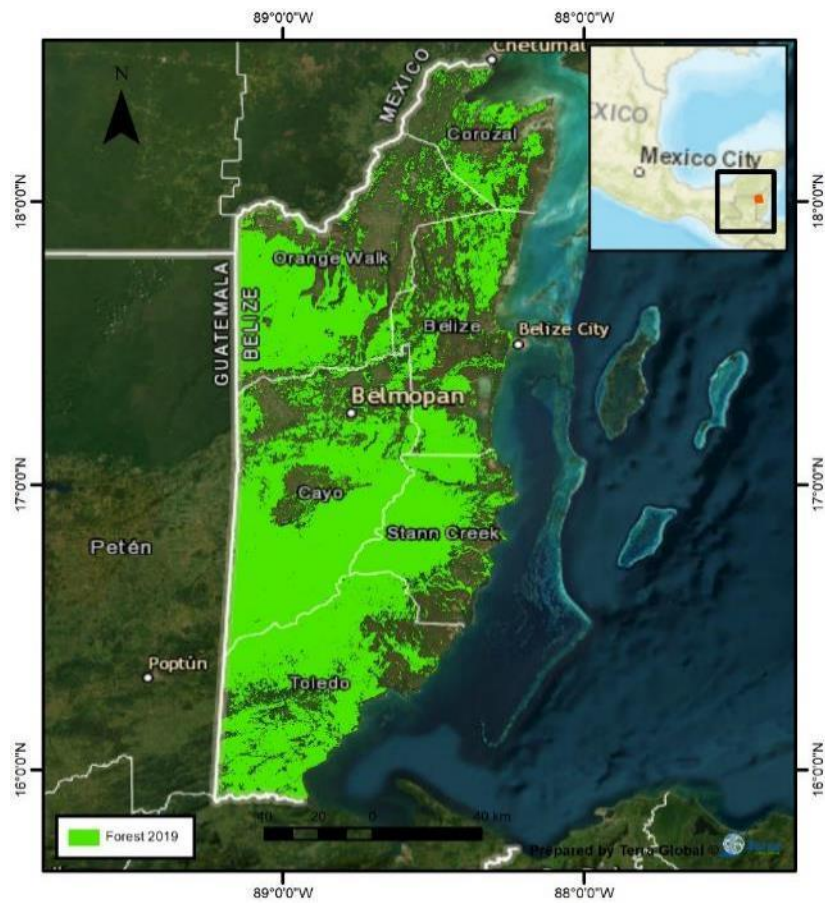


Map 30. Belize Protected Areas and REDD+ Projects

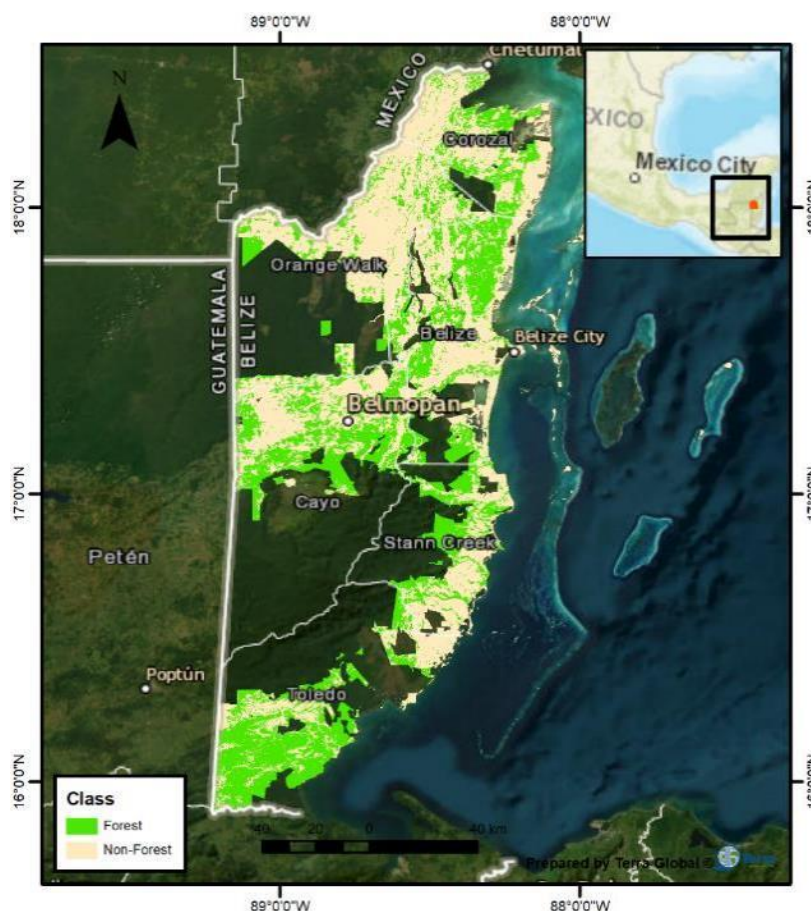
Available Areas

After crossing the previously described spatial variables with the forest cover (Map 31), which was obtained selecting all closed forest classes of the product Copernicus Global Land Cover for 2019 through Google Earth Engine, it is found that 1,251,283 hectares are suitable for growing corn, of which 507,214 hectares are forest areas that are not under any protection figure (Map 32). The proportion of the Alternative Area that is currently forested (PFc) is 41% (Table 40).

$$PFc = 41\%$$



Map 31. Belize Forest Cover 2019



Map 32. Alternative Forest Land for Conversion to Corn

Table 40. Alternative Areas for Growing Corn (PFc)

	Area (ha)	Proportion (%)
Non-Forest	744,070	59%
Forest	507,214	41%
Total	1,251,283	

STEP 3: Evaluate Project Activity Instance Relative to Other Forested Areas for Commodity Production in the Country (LK-ASP)

To evaluate the productivity of corn crops, soil features, such as pH, content of organic carbon and bulk density were the variables analyzed, since they directly affect the nutrient absorption. In addition, other variables were also considered such as elevation and precipitation. Temperature was not assessed because it is highly correlated with elevation. Soils variables were evaluated based on the HWSO soil data (FAO, 2022).

Table 41 shows that the Alternative Area presents slightly less favorable soil conditions than the Project Activity Instance. In the Alternative Area the bulk density is above 15% Project Activity Instance average and organic carbon below 15% average, with pH being the only variable within the range. Since bulk density is lower in the Project Activity Instance, its soils would be expected to have a greater capacity to store water

than in the Alternative Area. Also, by having a higher organic carbon content, crops would have more availability of nutrients in the Project Activity Instance.

Based on soil variables alone, slightly higher productivity can be expected in the Project Activity Instance. However, the average elevation is considerably higher than in the Alternative Areas, while the precipitation is slightly less. These conditions may somewhat restrict productivity in the Project Activity Instance because water availability decreases.

Table 41. HWSD Soil Characteristics

Variable	Project Activity Instance			Alternative Area
	Average	Average -15%	Average +15%	Weighted Average
Bulk Density (kg/dm ³)	1.07	0.91	1.23	1.27
Organic Carbon (% weight)	1.62	1.38	1.86	1.13
pH (H ₂ O)	7.65	6.50	8.80	6.57
Elevation (m)	125.21	106.42	143.99	56.55
Precipitation (mm)	1,376.60	1,170.11	1,583.09	1,685.04

To better understand the potential productivity in the Project Activity Instance, production statistics by district for 2020 were analyzed³⁰. The statistics are separated by two varieties of corn, yellow and white, and they are differentiated by production system, milpa and mechanized (Table 42). With this information, was calculated the weighted average by district (Table 43).

Table 42. Corn Production in Belize by District in 2022 (ton/ha/year)

Product	Crop System	Production (ton/ha/year)					
		Corazal	Orange Walk	Belize	Cayo	Stann Creek	Toledo
Corn Yellow	Milpa	2.61	2.80	0.84	0.98	1.61	1.57
	Mechanized	2.68	3.51	-	4.95	-	-
White Corn	Milpa	2.52	-	0.75	0.91	1.62	1.68
	Mechanized	-	-	-	4.84	-	-
	Total	7.81	6.31	1.59	11.68	3.23	3.25

Table 43. Weighted Average Corn Production in the Alternative Area (ton/ha/year)

District	Alternative Area (ha)	Alternative Area (%)	Production (ton/ha/year)	Weighted Average (ton/ha/year)
Corazal	164,225	13.5%	7.81	1.06
Orange Walk	245,457	20.3%	6.31	1.28
Belize	273,882	21.4%	1.59	0.34
Cayo	229,426	18.1%	11.68	2.12
Stann Creek	131,162	10.3%	3.23	0.33
Toledo	207,131	16.3%	3.25	0.53
Total	1,251,283	100%		
Average			5.64	5.66

³⁰ <http://www.agriculture.gov.bz/document-center/>

Since the Project Activity Instance is located in the Orange Walk district, it is assumed that it has the potential to produce the same quantity of corn as the district average. As can be seen in Table 44, the weighted average of the Alternative Areas is below the expected average in the Project Activity Instance, although it is within the range $\pm 15\%$.

Table 44. Corn Productivity Project Activity Instance vs Alternative Area

Area		Production (ton/ha/year)
Project Activity Instance	Average +15%	7.26
	Average	6.31
	Average -15%	5.37
Alternative Area	Weighted Average	5.66

STEP 4: Assess Proportional Leakage Factor (LK-ASP)

As stated in Step 3, the average productivity of the Alternative Area is the same $\pm 15\%$ as the average productivity of the relevant strata in the Project Activity Instance, thus:

$$LK_{CP-ME,c,i} = 0.4$$

The leakage management activities are not established within areas under the control of the project proponent in order to minimize the displacement of land use activities to areas outside the Project Activity Instance by maintaining the production of commodities. Therefore, leakage management adjustment factor (LK_{MAF}) was not applied.

STEP 5: Estimate Leakage (LK-ASP)

With the parameters above estimated, the market leakage is calculated via equation 9 VMD0009 (LK-ASP) v1.3:

$$\Delta C_{LK-AS,planned} = \sum_{t=1}^{t^*} \sum_{c=1}^M \sum_{i=1}^C (\Delta C_{BSL,planned} \times PF_c \times LK_{CP-ME,c,i} \times LK_{MAF})$$

Where:

$\Delta C_{LK-AS,planned}$	Net CO ₂ emissions due to activity shifting leakage for projects preventing planned deforestation up to year t^* (t CO ₂ e)
$\Delta C_{BSL,planned}$	Net CO ₂ emissions in the baseline from planned deforestation in the Project Activity Instance (t CO ₂ e)
PF_c	Proportion of available area for production of commodity c that is currently forested (unitless)
$LK_{CP-ME,c,i}$	Leakage factor for displacement of class of planned deforestation agents in stratum i (unitless)
LK_{MAF}	Leakage management adjustment factor (unitless)
c	1, 2, 3, ... C commodities
i	1, 2, 3, ... M strata
t	1, 2, 3, ... t^* years elapsed since the start of the project activity

As described above, the proportion of available area for production of corn that is currently forested (PF_c) was 41%. The leakage factor for displacement of class of planned deforestation agents ($LK_{CP-ME,c,i}$) was

0.4, and the leakage management adjustment factor (LK_{MAF}) was not applied. Therefore, the leakage factor applied to the net CO₂ emissions was 16.4%

3.2.4 Net GHG Emission Reductions and Removals

The emissions of REDD project activities are estimated ex-ante. For planned deforestation projects baseline emissions are monitored via proxy area as the baseline needs to be periodically adjusted. Here, the module “Estimation of baseline carbon stock changes and greenhouse gas emissions from planned deforestation (BL-PL)” was used in line with REDD+MF methodology to determine baseline emissions. All the equations for the quantification of the net change in carbon stock are described in section 3.2.1.

The baseline net greenhouse gas emissions ($\Delta C_{BSL\_planned}$) was determined via:

$$\Delta C_{BSL\_planned} = \sum_{t=1}^{t^*} \sum_{i=1}^M ((D\%_{planned,i,t} \times A_{planned,i} \times L - D_i) \times \Delta C_{BSL,i}) + GHG_{BSL-Ei,t}$$

Where:

$\Delta C_{BSL\_planned}$ = The net GHG emissions in the baseline for planned deforestation (tCO_{2e})

$D\%_{planned,i,t}$ = The Projected annual proportion of land that is to be deforested in stratum i in year t (dimensionless)

$A_{planned,i}$ = Total planned deforestation area over baseline period for stratum i (ha)

$L - D_i$ = Likelihood of deforestation for stratum i (%)

$\Delta C_{BSL,i}$ = Net carbon stock exchange for all measured carbon pools in the baseline stratum i (tCO_{2e} ha⁻¹)

$GHG_{BSL-Ei,t}$ = Greenhouse gas emissions as a result of deforestation activities within the project boundary in baseline stratum i during project year t (CO_{2e} year⁻¹)

Seven proxy areas were used to estimate the average proportion of land to be cleared within the project boundary each year. The annual proportion of deforestation occurring within the total project boundary is calculated via:

$$D\%_{planned,i,t} = \frac{\sum_{pn=1}^n \frac{D\%_{pn}}{Yrs_{pn}}}{n}$$

Where:

$D\%_{planned,i,t}$ = Projected annual proportion of land to be deforested in stratum i during year t, dimensionless proportion

$D\%_{pn}$ = The proportion of deforestation in land parcel pn of a proxy area due to planned deforestation, dimensionless

Yrs_{pn} = Number of years in which deforestation occurred in land parcel pn in proxy area, in years

Baseline carbon stock changes in all pools in the baseline in strata ($\Delta C_{BSL,i}$) are calculated via:

$$\Delta C_{BSL,i} = C_{BSL,i} - C_{BSL,post,i} - C_{BSL,Ip,i}$$

Where:

$\Delta C_{BSL,i}$ = Net carbon stock changes in all pools in baseline stratum i (tCO₂e ha⁻¹)

$C_{BSL,i}$ = Net carbon stock in all pools within the baseline in stratum i (tCO₂e ha⁻¹)

$C_{BSL,post,i}$ = Carbon stock in all pools in the baseline post-deforestation within stratum i (tCO₂e ha⁻¹)

$C_{BSL,wp,i}$ = Carbon stock within in all pools in the wood product post-deforestation within stratum i (tCO₂e ha⁻¹) (omitted)

In order to complete this calculation, we must first determine the carbon stock in all pools within the baseline (C_{BSL}). This parameter is calculated via:

$$C_{BSL,i} = C_{ABtree,i} + C_{BBtree,i} + C_{ABnon-tree,i} + C_{BBnon-tree,i} + C_{DW,i} + I + C_{SOC,i}$$

Where:

$C_{BSL,i}$ = Carbon stock within all pools in the baseline stratum i, (tCO₂e ha⁻¹)

$C_{ABtree,i}$ = Carbon stock in aboveground tree biomass in the baseline in stratum i, (tCO₂e ha⁻¹)

$C_{BBtree,i}$ = Carbon stock in belowground biomass in the baseline in stratum i (tCO₂e la⁻¹)

$C_{ABnon-tree,i}$ = Carbon stock in aboveground non-tree vegetation in stratum i (tCO₂e ha⁻¹). For this project, this includes understory vegetation, aboveground standing deadwood, and aboveground sapling biomass.

$C_{BBnon-tree,i}$ = Carbon stock in belowground non-tree vegetation in stratum i (tCO₂e ha⁻¹). For this project, this includes belowground sapling and standing deadwood biomass.

$C_{DW,i}$ = Carbon stock in deadwood in the baseline for stratum I, (tCO₂e ha⁻¹).

$C_{LI,i}$ = Carbon stock in litter in the baseline for stratum I, (tCO₂e ha⁻¹)

$C_{SOC,i}$ = Carbon stocks in SOC in the baseline stratum I, (tCO₂e ha⁻¹)

Post-deforestation carbon stocks are represented by the long-term average stocks in the Project Activity Instance following deforestation. These carbon stocks are measured within proxy areas. Carbon stock in all polls within the baseline, post-deforestation ($C_{BSL,post,i}$) is calculated via:

$$C_{BSL,post,i} = C_{ABtree,i} + C_{BBtree,i} + C_{ABnon-tree,i} + C_{BBnon-tree,i} + C_{DW,i} + C_{LI,i} + C_{SOC,PD-BSL,i}$$

Where:

I = Carbon stocks in all pools in the baseline post-deforestation in stratum i (tCO₂e ha⁻¹)

$C_{ABtree,i}$ = Carbon stock in aboveground tree biomass in stratum i (tCO₂e ha⁻¹)

$C_{BBtree,i}$ = Carbon stock in belowground tree biomass in stratum i (tC₁₂e ha⁻¹)

$C_{ABnon-tree,i}$ = Carbon stock in aboveground non-tree vegetation in stratum i (tCO₂e ha⁻¹). Here, aboveground non-tree biomass is represented by aboveground standing deadwood, understory vegetation, and sapling biomass

$C_{BBnon-tree,i}$ = Carbon stock in belowground non-tree vegetation in stratum i. Here, belowground non-tree biomass is represented by belowground standing deadwood and sapling biomass (tCO₂e ha⁻¹)

$C_{DW,i}$ = Carbon stock in deadwood in stratum I ($\text{tCO}_2\text{e ha}^{-1}$)

$C_{LI,i}$ = Carbon stock in litter within stratum I ($\text{tCO}_2\text{e ha}^{-1}$)

$C_{SOC,PD-BSL,i}$ = Post-deforestation stock in SOC in the post-deforestation stratum I ($\text{tCO}_2\text{e ha}^{-1}$)

Finally, greenhouse gas emissions in the baseline within the project boundary are estimated via:

$$GHG_{BSL,E,i,t} = E_{FC,i,t} + E_{biomassBar\ n,i,t} + N_2O_{direct-N,i,t}$$

Where:

$GHG_{BSL,E,i,t}$ = Greenhouse gas emissions resulting from deforestation activities within the project boundary within stratum I in year t (tCO_2e)

$E_{FC,i,t}$ = Emissions from fossil fuel combustion in stratum I in year t (tCO_2e)

$N_2O_{direct-N,i,t}$ = Direct N_2O emission as a result of nitrogen application in the project boundary in stratum I in year t (tCO_2e)

The Risk Buffer was calculated following Verra's new VCS AFOLU Non-Permanence Risk Tool (T-BAR) v 4.2 to create the Non-permanent Risk Report. The non-permanence risk has been reported following the v4.2 process and tool which resulted in a 12% risk buffer deduction. This 12% risk buffer was simply deducted year-by-year to the annual emissions and is shown in Table 45 below. The full Non-Permanent Risk Report is publicly available and can be found on the Verra Website.

The ex-ante estimated net GHG emission reductions are shown in Table 45 below.

Table 45. Estimated net GHG Emission Reductions

Year	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Estimated net GHG emission reductions or removals	Risk Buffer	VCUs
[-]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]
2021	1,082,928	0	-177,600	905,328	-108,639	796,688
2022	1,150,689	0	-188,713	961,976	-115,437	846,539
2023	1,218,450	0	-199,826	1,018,624	-122,235	896,389
2024	1,286,211	0	-210,939	1,075,272	-129,033	946,239
2025	1,353,971	0	-222,051	1,131,920	-135,830	996,090
2026	1,421,732	0	-233,164	1,188,568	-142,628	1,045,940
2027	1,489,493	0	-244,277	1,245,216	-149,426	1,095,790
2028	1,557,254	0	-255,390	1,301,865	-156,224	1,145,641
2029	1,625,015	0	-266,502	1,358,513	-163,022	1,195,491
2030	1,692,776	0	-277,615	1,415,161	-169,819	1,245,341
2031	1,733,145	0	-284,236	1,448,909	-173,869	1,275,040
2032	1,773,513	0	-290,856	1,482,657	-177,919	1,304,738
2033	1,813,881	0	-297,477	1,516,405	-181,969	1,334,436
2034	1,854,250	0	-304,097	1,550,153	-186,018	1,364,135
2035	1,894,618	0	-310,717	1,583,901	-190,068	1,393,833
2036	1,934,987	0	-317,338	1,617,649	-194,118	1,423,531
2037	1,975,355	0	-323,958	1,651,397	-198,168	1,453,229
2038	2,015,724	0	-330,579	1,685,145	-202,217	1,482,928

Year	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions	Estimated net GHG emission reductions or removals	Risk Buffer	VCUs
[-]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]	[tCO ₂ e]
2039	2,056,092	0	-337,199	1,718,893	-206,267	1,512,626
2040	1,128,247	0	-185,033	943,215	-113,186	830,029
2041	952,950	0	-156,284	796,666	-95,600	701,066
2042	885,189	0	-145,171	740,018	-88,802	651,216
2043	817,428	0	-134,058	683,370	-82,004	601,365
2044	749,667	0	-122,945	626,722	-75,207	551,515
2045	681,906	0	-111,833	570,074	-68,409	501,665
2046	614,145	0	-100,720	513,425	-61,611	451,814
2047	546,384	0	-89,607	456,777	-54,813	401,964
2048	478,623	0	-78,494	400,129	-48,016	352,114
2049	410,863	0	-67,381	343,481	-41,218	302,263
2050	367,592	0	-60,285	307,307	-36,877	270,430
2051	327,224	0	-53,665	273,559	-32,827	240,732
2052	286,855	0	-47,044	239,811	-28,777	211,034
2053	246,487	0	-40,424	206,063	-24,728	181,336
2054	206,119	0	-33,803	172,315	-20,678	151,637
2055	165,750	0	-27,183	138,567	-16,628	121,939
2056	125,382	0	-20,563	104,819	-12,578	92,241
2057	85,013	0	-13,942	71,071	-8,529	62,542
2058	44,645	0	-7,322	37,323	-4,479	32,844
2059	4,276	0	-701	3,575	-429	3,146
2060	0	0	0	0	0	0
TOTAL	40,054,831	0	-6,568,992	33,485,839	-4,018,301	29,467,538
Annual Average	1,001,371	0	-164,225	837,146	-100,458	736,688

3.3 Monitoring

3.3.1 Data and Parameters Available at Validation

Only Parameters that are used in this project are included in this section.

Data Unit / Parameter:	$\Delta C_{BSL,planned}$
Data unit:	tCO ₂ e
Description:	Net greenhouse gas emissions in the baseline from planned deforestation.
Source of data:	Calculated based on equations in Section 3.2.4
Value applied:	40,159,299
Justification of choice of data or description of measurement methods and procedures applied:	Per methodology found in BL-PL, VMD0006

Purpose of Data:	Calculation of baseline emissions.
Comment:	N/A

Data Unit / Parameter:	Project Forest Cover Benchmark Map
Data unit:	ha
Description:	Map showing the location of forest land within the Project Activity Instance at the beginning of the project crediting period.
Source of data:	Remote sensing in combination with GPS data collected during ground-reference.
Value applied:	See map graphic in Section 3.1.2
Justification of choice of data or description of measurement methods and procedures applied:	The accuracy and the classification process are described in Section 3.2.2 The overall accuracy for the classification of forest/non-forest in the Project Activity Instance at the beginning of the crediting period is 90%.
Purpose of Data:	Calculation of baseline emissions.
Comment:	The forest does not contain more than one forest type. The Module X-STR was not used for stratification

Data Unit / Parameter:	$A_{planned,i}$
Data unit:	ha
Description:	Total area of planned deforestation over the fixed baseline period for stratum i
Source of data:	Remote sensing and Proxy Parcels
Value applied:	78,180
Justification of choice of data or description of measurement methods and procedures applied:	Available forest for legal conversion to agriculture and pasture land based on the agent class of deforestation.
Purpose of Data:	Calculation of baseline emissions.
Comment:	N/I

Data Unit / Parameter:	$L-D_i$
Data unit:	%
Description:	Likelihood of deforestation in strata i
Source of data:	Proxy Parcels

Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006. For all areas not both under Government control and zoned for deforestation, L-Di must be equal to 1
Purpose of Data:	Used to calculate the annual area of deforestation for baseline emissions.
Comment:	N/A

Data Unit / Parameter:	$C_{AB\_tree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Carbon stock in aboveground biomass in trees in the baseline in stratum <i>i</i> . Includes both aboveground biomass and sapling aboveground biomass.
Source of data:	Based on data measured in the field. Calculated based on equations in section 3.2.4
Value applied:	226.50
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	N/A

Data Unit / Parameter:	$C_{AB\_tree,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post-deforestation carbon stock in aboveground tree biomass in stratum <i>i</i>
Source of data:	IPCC GPG 2006
Value applied:	10
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006. Value of 10 was applied based on the steepness of slopes, where land on steep slopes (8,524 ha) were expected to be converted from forests to grasslands (14.1 tCO_{2e} ha⁻¹) and land on gentle slopes (71,439 ha) were to be converted from forests to annual cropland (9.5 tCO_{2e} ha⁻¹). A value of 10 was determined via: $\frac{14.1 \times 8,524 + 9.5 \times 71,439}{79,962.6} = 10.0$

Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{AB\_tree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline Carbon Stock change in aboveground tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	216.50
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{BB\_tree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	64.3
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{BB\_tree,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹

Description:	Post deforestation carbon stock in belowground tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{BB\_tree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	64.3
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{AB\_nontree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Carbon stock in aboveground non-tree vegetation in the baseline in stratum i
Source of data:	Based on data measured in the field
Value applied:	0.66
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change

Comment:	

Data Unit / Parameter:	$C_{AB\_nontree,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post-deforestation carbon stock in aboveground non-tree vegetation in stratum i
Source of data:	Based on data measured in the field
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{AB\_nontree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in aboveground non-tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0.66
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{BB\_nontree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground non-tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0.19

Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{BB\_nontree,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post deforestation carbon stock change in belowground non-tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{BB\_nontree,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground non-tree biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0.19
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{DW,bsl,i}$
Data unit:	t CO ₂ -e ha ⁻¹

Description:	Forest carbon stock in deadwood biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	Conservatively omitted
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{DWpost,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post-deforestation carbon stock in deadwood biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	Conservatively omitted
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{DW,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in deadwood biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	Conservatively omitted
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{LI,bsl,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Forest carbon stock in litter in stratum i
Source of data:	Based on data measured in the field
Value applied:	1.22
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{LI,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post deforestation carbon stock in deadwood biomass in stratum i
Source of data:	Based on data measured in the field
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{LI,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in litter in stratum i
Source of data:	Based on data measured in the field
Value applied:	1.22
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change

Comment:	

Data Unit / Parameter:	$C_{SOC,bsl,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Forest carbon stock in soil organic carbon in stratum i
Source of data:	Based on data measured in the field. See calculations in 3.2.1
Value applied:	505.8
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$C_{SOC,post,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Post deforestation carbon stock in soil organic carbon in stratum i
Source of data:	Based on data measured in the field. See calculations in 3.2.1
Value applied:	293.36
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$\Delta C_{SOC,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Carbon stock change in soil organic carbon in stratum i
Source of data:	Based on data measured in the field. See calculations in 3.2.1
Value applied:	212.44
Justification of choice of data or description of	Required by VMD0006.

measurement methods and procedures applied:	
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	CBSL _{i,t}
Data unit:	tCO ₂ e ha ⁻¹
Description:	Carbon stock in all pools in the baseline in stratum <i>i</i> at time <i>t</i>
Source of data:	Estimates based on calculations described in Section 3.2 of this report
Value applied:	Annual values provided in Section 3.2
Justification of choice of data or description of measurement methods and procedures applied:	Per methodology for planned deforestation, Module VMD0006 (BL-PL)
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	E _{BiomassBurn,i,t}
Data unit:	tCO ₂ e
Description:	Non-CO ₂ emissions due to biomass burning in stratum <i>i</i> in year <i>t</i>
Source of data:	Calculated based on equations in Section 3.2.1.4.
Value applied:	1,687,340
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006. Calculated based on VMD0013, <i>Estimation of GHG emissions from Biomass and peat Burning</i> (E-BPB)
Purpose of Data:	Used to calculate the baseline greenhouse gas emissions
Comment:	

Data Unit / Parameter:	CF
Data unit:	t C t d.m. ⁻¹
Description:	Carbon fraction of dry matter in t C t ⁻¹ d.m.
Source of data:	Values from the literature (e.g. IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3) shall be used if available, otherwise default value of 0.47 t C t ⁻¹ d.m. can be used

Value applied:	0.47
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0001. Based on published value (IPCC 2006).
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	$f_j(X, Y)$
Data unit:	t d.m. tree ⁻¹
Description:	Allometric equation for species j linking measured tree variable(s) to aboveground biomass of living trees, expressed as t d.m. tree ⁻¹
Source of data:	(Pearson, 2005) (Cho et al. 2013) (Brown et al. 2001)
Value applied:	All allometric equations are depicted in Section 3.2.1
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0001.
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	$D_{\text{planned},i,t}$
Data unit:	% year ⁻¹
Description:	Projected annual proportion of land that will be deforested in stratum i at year t
Source of data:	Remote sensing and Proxy Parcels
Value applied:	5.41 %/year
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006, based on Proxy Parcels analysis

Purpose of Data:	Used to calculate the annual area of deforestation for baseline emissions.
Comment:	D% _{planned} was adjusted to a non-linear rate of deforestation

Data Unit / Parameter:	AA _{planned,i,t}
Data unit:	Ha
Description:	Annual area of baseline planned deforestation for stratum i at time t
Source of data:	Proxy Parcels analysis.
Value applied:	4,185 ha
Justification of choice of data or description of measurement methods and procedures applied:	Calculations based on Module VMD0006
Purpose of Data:	Calculation of baseline emissions.
Comment:	A value of 4,185 was applied for 19 years. On the 20th year (in 2040), a value of 448. was applied, representing the final area of planned deforestation left.

Data Unit / Parameter:	A _{planned,i}
Data unit:	Ha
Description:	Total area of planned deforestation over the entire project lifetime for stratum i
Source of data:	Remote Sensing
Value applied:	78,180 hectares
Justification of choice of data or description of measurement methods and procedures applied:	Calculations based on Module VMD0006 Entire Project Activity Instance was expected to be deforested. The value applied represents the entire Project Activity Instance (87,059 hectares), minus the area legally excluded (7,096 hectares)
Purpose of Data:	Calculation of baseline emissions.

Comment:	

Data Unit / Parameter:	A _{planned, gentle}
Data unit:	Ha
Description:	Area of land within the project boundary representing gentle slopes
Source of data:	Remote Sensing
Value applied:	71,439 hectares, or 89.34% Project Activity Instance
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006 to calculate post-deforestation carbon stock in aboveground tree biomass in stratum i.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	A _{planned, steep}
Data unit:	Ha
Description:	Area of land within the project boundary representing steep slopes
Source of data:	Remote Sensing
Value applied:	8,524 hectares, or 10.66% of Project Activity Instance
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006 to calculate post-deforestation carbon stock in aboveground tree biomass in stratum i.
Purpose of Data:	Used to calculate the baseline carbon stock change
Comment:	

Data Unit / Parameter:	$A_{Enh,PL,i,t}$
Data unit:	Ha
Description:	Project Activity Instance in stratum i in which carbon stocks are accumulating but that would have undergone planned deforestation in the baseline scenario at time t; ha
Source of data:	Based on proxy parcels analysis
Value applied:	A value of 4,185 was applied for 19 years. On the 20 th year (in 2040), a value of 448. was applied, representing the final area of planned deforestation left.
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0015 M-RED equation 25.
Purpose of Data:	Calculation of project emissions.
Comment:	

Data Unit / Parameter:	$CP_{i,t}$
Data unit:	tCO ₂ e
Description:	Carbon stock in all pools in the project case in stratum i at time t; t CO ₂ -e
Source of data:	Remote sensing and inventory data.
Value applied:	Calculated parameter. See equations in Section 3.2
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0015 M-RED equation 25.
Purpose of Data:	Calculation of project emissions.
Comment:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.

Data Unit / Parameter:	$GHG_{BSL-E,i,t}$

Data unit:	tCO ₂ e ha ⁻¹
Description:	GHG emissions as a result of deforestation activities within the project boundary in stratum i in year t
Source of data:	Calculated based on equations in Section 3.2
Value applied:	Annual values provided in Section 3.2
Justification of choice of data or description of measurement methods and procedures applied:	Per methodology for planned deforestation, BMD0006 BL-PL
Purpose of Data:	Calculation of baseline emissions.
Comment:	Nitrogen fertilizer use and fossil fuel use are conservatively excluded pools in the baseline and project. This parameter only includes biomass burning.

Data Unit / Parameter:	B _{i,t}
Data unit:	Tonnes d.m. ha ⁻¹
Description:	Average aboveground biomass stock before burning stratum i, year t
Source of data:	Field Inventory
Value applied:	132.5
Justification of choice of data or description of measurement methods and procedures applied:	Field methods. Calculations follow BL-PL, CP-AB, and E-BPB. This value is calculated by first taking the sum of the following (tCO₂e ha⁻¹): • Biomass to be burned, or all trees with DBH <25cm and aboveground sapling biomass(226.50) • Aboveground non-tree biomass (0.66) • Aboveground litter biomass (1.22) • [Sum total of 228.38] Then applying equation 2 of the VMD0013 methodology (E-BPB), where this sum total is multiplied by the inverse ratio of molecular weight of CO₂ to carbon (12/44) and the inverse ratio of carbon fraction of biomass (1/0.47).

Purpose of Data:	Calculation of baseline emissions.
Comment:	All trees with a DBH less than 25cm were expected to be burned. The value here reflects the average aboveground biomass expected to be burned for stratum <i>i</i> in year <i>t</i> .

Data Unit / Parameter:	GWPg
Data unit:	tCO ₂ e
Description:	Global warming potential for non-CO ₂ greenhouse gases 2
Source of data:	IPCC: Chapter 2, Changes in Atmospheric Constituents and in Radiative Forcing
Value applied:	310 for nitrous oxide and 21 for methane
Justification of choice of data or description of measurement methods and procedures applied:	Methodology instructions.
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	COMFi
Data unit:	unitless
Description:	Combustion factor for stratum <i>i</i> (unitless)
Source of data:	Default values in Table 2.6 of IPCC, 2006 (Appendix 2)
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied:	The combustion factor measures the proportion of fuel that is combusted. This varies as a function of (1) size and (2) architecture of fuel load. Default values must be updated whenever new guidelines are produced by the IPCC.
Purpose of Data:	Calculation of baseline emissions.

Comment:	

Data Unit / Parameter:	G g,i
Data unit:	Kg t-1 d.m. burnt
Description:	Emission factor for stratum i for gas g
Source of data:	Defaults found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 (Appendix 2)
Value applied:	6.8 for CH4 and 0.2 for N2O
Justification of choice of data or description of measurement methods and procedures applied:	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 (see Appendix 2: emission factors for various types of burning for CH4 and N2O). Default values must be updated whenever new guidelines are produced by the IPCC
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	g
Data unit:	unitless
Description:	List of greenhouse gases included in analysis
Source of data:	Methodology
Value applied:	CH4 and N2O
Justification of choice of data or description of measurement methods and procedures applied:	As indicated in methodology.
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	R
Data unit:	t root d.m. t-1 t-1 shoot d.m.
Description:	Root to shoot ratio appropriate to species or forest type/biome; note that as defined here, root to shoot ratio is applied as belowground biomass per unit area: aboveground biomass per unit area (not on a per-stem basis)
Source of data:	Based on root:shoot ratios found in IPCCGPG, Table 4.4 (Ratio of Below-ground biomass to above-ground biomass (R)).
Value applied:	IF AGB >= 125 MG DM ha-1, 0.2845. If AGB < 125 MG DM ha-1, 0.284
Justification of choice of data or description of measurement methods and procedures applied:	Root:shoot ratio was calculated using: Domain: Tropical Ecological Zone: Tropical Moist Continent: North and South America If corresponding aboveground biomass was greater than or equal to 125 MG DM ha-1, a ratio of 0.2845 was used. If corresponding aboveground biomass was less than 125 MG DM ha-1, a value of 0.284 was used.
Purpose of Data:	Calculation of project emissions.
Comment:	

Data Unit / Parameter:	D,tree
Data unit:	g/cm3
Description:	Density of dry wood for each species present within the project boundary
Source of data:	Data extracted from the IPCC Good practice Guidance for Land Use, Land-Use Change and Forestry
Value applied:	See database of tree measurements.
Justification of choice of data or description of measurement methods and procedures applied:	Used to determine carbon quantity within each individual tree measured.
Purpose of Data:	Calculation of baseline emissions.

Comment:	

Data Unit / Parameter:	Ht,tree,i,
Data unit:	meters
Description:	Height of the tree from the ground based on measurements with a clinometer or other device. See monitoring plan for field methods.
Source of data:	Field measurements
Value applied:	Unique for each measured tree.
Justification of choice of data or description of measurement methods and procedures applied:	See field methods section of monitoring plan. Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Purpose of Data:	Calculation of baseline emissions.
Comment:	This variable is collected, but not necessary for allometric equation used. This variable is used to validate the allometric equation.

Data Unit / Parameter:	DBH,tree,i,
Data unit:	Cm
Description:	Diameter at breast height, defined as 1.3 meters above the ground of each measured tree.
Source of data:	Field measurements
Value applied:	Unique for each individual tree.
Justification of choice of data or description of measurement methods and procedures applied:	Required by methodology. See field methods section of monitoring plan. Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	CWP100
Data unit:	tCO ₂ e ha ⁻¹
Description:	Net greenhouse gas emissions in the baseline from planned deforestation in stratum i in year
Source of data:	Calculations refer to field-based data and project plan outlined in this report
Value applied:	zero.
Justification of choice of data or description of measurement methods and procedures applied:	Per methodology for planned deforestation
Purpose of Data:	Calculation of baseline emissions.
Comment:	

Data Unit / Parameter:	$\Delta C_{\text{pools,Dif,u,i,t}}$
Data unit:	tCO ₂ e ha ⁻¹
Description:	Net carbon stock changes in all pools in the project case in land use u in stratum i at time t; t CO ₂ -e ha ⁻¹
Source of data:	Remote sensing and inventory data.
Value applied:	Defined within this report
Justification of choice of data or description of measurement methods and procedures applied:	See Section 3.2 of this report for calculations of this metric.
Purpose of Data:	Calculation of project emissions
Comment:	

Data Unit / Parameter:	Species List
Data unit:	Unitless (Species)

Description:	List of detected species known to occur, or do currently reside, within the Project Activity Instance.
Source of data:	Observations by trained observers.
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
Purpose of Data:	Used to determine biodiversity impacts.
Comment:	

Data Unit / Parameter:	FLU,AG
Data unit:	Unitless
Description:	Relative stock change factors for different management activities on cropland for long-term cultivated tropical wet soils
Source of data:	IPCC Good Practice Guide for Land Use, Land-Use Change and Forestry, Chapter 3: LUCF Sector Good Practice Guidance, Table 3.3.4
Value applied:	0.58
Justification of choice of data or description of measurement methods and procedures applied:	As per module VMD0004, Estimation of stocks in the soil organic pool (CP-S). Applicability states "Ex ante determination that stocks are greater in the baseline than in the project scenario can be made on the basis of IPCC 2006GL Relative Stock Change Factors, if the average combined stock change factor for the baseline is less than or equal to 1.
Purpose of Data:	Used to determine Soil organic carbon baseline emissions
Comment:	

Data Unit / Parameter:	FLU,GR
Data unit:	Unitless
Description:	Relative stock change factors for different management activities on cropland for long-term cultivated tropical wet soils

Source of data:	IPCC Good Practice Guide for Land Use, Land-Use Change and Forestry, Chapter 3: LUCF Sector Good Practice Guidance, table 3.4.10
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied:	As per module VMD0004, Estimation of stocks in the soil organic pool (CP-S). Applicability states, "Ex ante determination that stocks are greater in the baseline than in the project scenario can be made on the basis of IPCC 2006GL Relative Stock Change Factors, if the average combined stock change factor for the baseline is less than or equal to 1.
Purpose of Data:	Used to determine Soil organic carbon baseline emissions
Comment:	

Data Unit / Parameter:	N ₂ O _{direct-N,i,t}
Data unit:	tCO ₂ e
Description:	Direct N ₂ O emissions because of nitrogen application on the alternative land use in stratum i within the Project Activity Instance in year t (tCO ₂ e).
Source of data:	N/A
Value applied:	0; conservatively omitted.
Justification of choice of data or description of measurement methods and procedures applied:	Based on Module BL-PL
Purpose of Data:	Calculate baseline emissions
Comment:	

Data Unit / Parameter:	$t(p)$
Data unit:	[-]
Description:	Representative time point for a specific composited LULC map p [year]
Source of data:	Calculated year from imagery

Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Required for VT0006. Use the origin dates of images used. The LULC map assembles pixels that were acquired at different times, an average of the dates weighed according to the number of pixels associated with that date is a logical way of calculating a conservation representative time point.
Purpose of Data:	To estimate a representative time point for LULC maps that were prepared from multiple images corresponding to a range of time periods
Comment:	N/A

Data Unit / Parameter:	$tr_{LULC1 \rightarrow LULC2}(p1 \rightarrow p2)$
Data unit:	[-]
Description:	LULC change rate for transition from LULC class 1 to LULC class 2 [ha / year-1].
Source of data:	Calculated rate from Eq. 2 in VT0006
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	Required for VT0006. The transition of LULC class from one time to another time is used as the basis for estimating the historical rate of deforestation
Purpose of Data:	To estimate the rate of deforestation between two periods.
Comment:	N/A

Data Unit / Parameter:	$\overline{tr_{LULC1 \rightarrow LULC2}(P)}$
Data unit:	[-]
Description:	Mean LULC rate for transition from LULC class 1 to LULC class 2 in time period P [-]
Source of data:	Calculated rate from Eq. 3 in VT0006
Value applied:	N/A

Justification of choice of data or description of measurement methods and procedures applied:	Required for VT0006. The transition of LULC class from one time to another time is used as the basis for estimating the historical rate of deforestation.
Purpose of Data:	To estimate the rate of deforestation between two periods.
Comment:	N/A

3.3.2 Data and Parameters Monitored

3.3.2.1 VM0007

Data Unit / Parameter:	$\Delta C_{WPS-REDD}$
Data unit:	t CO ₂ e
Description:	Net GHG emissions in the REDD project scenario up to year t^*
Source of data:	Module <i>M-REDD</i>
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>
Value applied:	For values applied see "Estimated net GHG emission reductions or removals" in Table 45. Estimated net GHG Emission Reductions in Section 3.2.4 Net GHG Emission Reductions and Removals.
Monitoring equipment:	Satellite images and Forestry Equipment for measuring biomass, and SOC. Details of biomass and SOC measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. In addition, details for biomass QA/QC and in the spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required by the Module <i>M-REDD</i>
Purpose of Data:	Calculation of project emissions
Calculation method:	See Module <i>M-REDD</i>

Comment:	N/A
Data Unit / Parameter:	$\Delta C_{LK-AS,degrad-FW/C}$
Data unit:	t CO ₂ e
Description:	Net greenhouse gas emissions due to activity-shifting leakage for degradation caused by extraction of wood for fuel
Source of data:	Module <i>LK-DFW</i>
Description of measurement methods and procedures to be applied	See Module <i>LK-DFW</i>
Frequency of monitoring/Recording:	Monitored at each verification.
Value applied:	0
Monitoring equipment:	Social Surveys
QA/QC procedures to be applied:	See Module <i>LK-DFW</i> . In addition, social surveys are carried out by social experts that verify values given by community members. Additional QA/QC procedures can be found in section 3.3.3 Monitoring Plan, and in the Social Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required by Module <i>LK-DFW</i>
Purpose of Data:	Calculation of leakage
Calculation method:	See Module <i>LK-DFW</i>
Comment:	For the PD it was found that no communities gathered fuelwood from the project area, this is not expected to change during any future monitoring periods.
Data Unit / Parameter:	$\Delta C_{LK-AS,planned}$
Data unit:	t CO ₂ e
Description:	Net greenhouse gas emissions due to activity shifting leakage for projects preventing planned deforestation
Source of data:	Module <i>LK-ASP</i>
Description of measurement	See Module <i>LK-ASP</i>

methods and procedures to be applied	
Frequency of monitoring/Recording:	See Module <i>LK-ASP</i>
Value applied:	For values applied see “Estimated leakage emissions” in Table 45. Estimated net GHG Emission Reductions in Section 3.2.4 Net GHG Emission Reductions and Removals.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>LK-ASP</i> . In addition, details for biomass QA/QC and in the spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required by Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage
Calculation method:	See Module <i>LK-ASP</i>
Comment:	

Data Unit / Parameter:	$\Delta C_{LK-AS,unplanned}$
Data unit:	t CO ₂ e
Description:	Net greenhouse gas emissions due to activity shifting for projects preventing unplanned deforestation in unplanned wetland degradation
Source of data:	Module <i>LK-ASU</i>
Description of measurement methods and procedures to be applied	N/A – not used. See Module <i>LK-ASU</i>
Frequency of monitoring/Recording:	N/A – See Module <i>LK-ASU</i>
Value applied:	0
Monitoring equipment:	N/A – This model is not used, as there are no wetlands in the area.
QA/QC procedures to be applied:	N/A – See Module <i>LK-ASU</i>

Justification of choice of data or description of measurement methods and procedures applied:	N/A – See Module <i>LK-ASU</i>
Purpose of Data:	Calculation of leakage in wetlands
Calculation method:	See Module <i>LK-ASU</i>
Comment:	This model is not used, as there are no wetlands in the area.

Data Unit / Parameter:	ΔC_{LK-ME}
Data unit:	t CO ₂ e
Description:	Net greenhouse gas emissions due to market-effect leakage for timber harvesting for commercial markets.
Source of data:	Module <i>LK-ME</i>
Description of measurement methods and procedures to be applied	See Module <i>LK-ME</i>
Frequency of monitoring/Recording:	See Module <i>LK-ME</i>
Value applied:	0
Monitoring equipment:	N/A – This model was not used.
QA/QC procedures to be applied:	N/A – See Module <i>LK-ME</i>
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>LK-ME</i>
Purpose of Data:	Calculation of leakage
Calculation method:	See Module <i>LK-ME</i>
Comment:	This module is not required because the process of deforestation involves not timber harvesting for commercial markets

Data Unit / Parameter:	$\Delta C_{WPS-ARR}$
Data unit:	t CO ₂ e

Description:	Net GHG emissions in the ARR project scenario up to year t^*
Source of data:	Module <i>M-ARR</i>
Description of measurement methods and procedures to be applied	N/A – See Module <i>M-ARR</i>
Frequency of monitoring/Recording:	N/A – See Module <i>M-ARR</i>
Value applied:	0
Monitoring equipment:	N/A – no ARR
QA/QC procedures to be applied:	See Module <i>M-ARR</i>
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>M-ARR</i>
Purpose of Data:	Calculation of project emissions
Calculation method:	See Module <i>M-ARR</i>
Comment:	There is no ARR in the project, so this parameter is not used.

Data Unit / Parameter:	ΔC_{LK-ARR}
Data unit:	t CO ₂ e
Description:	Net GHG emissions due to leakage from the ARR project activity up to year t^*
Source of data:	Module <i>LK-ARR</i>
Description of measurement methods and procedures to be applied	N/A – See Module <i>LK-ARR</i>
Frequency of monitoring/Recording:	N/A – Module <i>LK-ARR</i>
Value applied:	0

Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A – See Module <i>LK-ARR</i>
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>LK-ARR</i>
Purpose of Data:	Calculation of leakage for ARR activities
Calculation method:	N/A – See Module <i>LK-ARR</i>
Comment:	There is no ARR in the project, so this parameter is not used.

Data Unit / Parameter:	GHG _{WPS-WRC}
Data unit:	t CO ₂ e
Description:	Net GHG emissions in the WRC project scenario up to year <i>t*</i>
Source of data:	Module <i>M-PEAT</i>
Description of measurement methods and procedures to be applied	N/A – See Module <i>M-PEAT</i>
Frequency of monitoring/Recording:	N/A – See Module <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A – See Module <i>M-PEAT</i>
QA/QC procedures to be applied:	N/A – See Module <i>M-PEAT</i>
Justification of choice of data or description of measurement methods and procedures applied:	N/A – See Module <i>M-PEAT</i>
Purpose of Data:	Calculation of project emissions for peatland
Calculation method:	N/A – See Module <i>M-PEAT</i>

Comment:	There is no peat in the project area, so this module is not used.
Data Unit / Parameter:	GHG _{LK-ECO}
Data unit:	t CO ₂ e
Description:	Net GHG emissions due to ecological leakage from the WRC project activity up to year <i>t</i> for hydrological connectivity.
Source of data:	Module <i>LK-ECO</i>
Description of measurement methods and procedures to be applied	N/A – See Module <i>LK-ECO</i>
Frequency of monitoring/Recording:	N/A – See Module <i>LK-ECO</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A – See Module <i>LK-ECO</i>
Justification of choice of data or description of measurement methods and procedures applied:	N/A – See Module <i>LK-ECO</i>
Purpose of Data:	Calculation of leakage for WRC projects with hydrological connectivity
Calculation method:	N/A – See Module <i>LK-ECO</i>
Comment:	This is not a WRC project so there is no hydrological connectivity
Data Unit / Parameter:	E _{FC,i,t}
Data unit:	t CO ₂ e
Description:	Emission from fossil fuel combustion in stratum <i>i</i> in year <i>t</i>
Source of data:	N/A – Module <i>E-FFC</i>
Description of measurement methods and	N/A - See Module <i>E-FFC</i>

procedures to be applied	
Frequency of monitoring/Recording:	N/A - See Module <i>E-FFC</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A - See Module <i>E-FFC</i>
Justification of choice of data or description of measurement methods and procedures applied:	Optional under Module <i>E-FFC</i>
Purpose of Data:	Calculation of project emissions
Calculation method:	See Module <i>E-FFC</i>
Comment:	This was optionally not used.

Data Unit / Parameter:	$N_2O_{direct-N,i,t}$
Data unit:	t CO ₂ e
Description:	Direct N ₂ O emission a— a result of nitrogen application on the alternative land use within the project boundary in stratum <i>i</i> in year <i>t</i>
Source of data:	N/A— Module <i>E-NA</i>
Description of measurement methods and procedures to be applied	See Module <i>E-NA</i>
Frequency of monitoring/Recording:	N/A - See Module <i>E-NA</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A - See Module <i>E-NA</i>

Justification of choice of data or description of measurement methods and procedures applied:	N/A - See Module E-NA
Purpose of Data:	Calculation of project emissions if fertilizer used.
Calculation method:	See Module E-NA
Comment:	There was no direct N ₂ O emission as a result of nitrogen application on the alternative land use within the project boundary.

3.3.2.2 CP-AB (VMD0001)

Data Unit / Parameter:	ASP
Data unit:	ha
Description:	Area of sample plots in ha
Source of data:	Recording and archiving of number and size of sample plots
Description of measurement methods and procedures to be applied	See Module CP-AB (Module VMD0001)
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years.
Value applied:	15.25 ha
Monitoring equipment:	Forestry Equipment for measuring biomass (clinometer). Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	See CP-AB. In addition, details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required by VMD0006. Verification plan calls for re-inventory no less frequently than every 5 years.
Purpose of Data:	Used to calculate the baseline carbon stock change
Calculation method:	Distance tapes, measured in the field.
Comment:	Sixty-one plots of 2500m ² were measured at validation. .

Data Unit / Parameter:	N
Data unit:	Dimensionless

Description:	Number of sample points
Source of data:	Recording and archiving of number of sample points
Description of measurement methods and procedures to be applied	See Module <i>CP-AB</i>
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years.
Value applied:	61 plots at validation
Monitoring equipment:	Forestry Equipment for measuring biomass, and SOC. Details of biomass and SOC measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	See Module <i>CP-AB</i> . In addition, details for biomass QA/QC and in the spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-AB</i>
Purpose of Data:	Calculation of carbon stock
Calculation method:	The CDM A/R Methodological Tool "Calculation of the number of sample plots for measurements within CDM A/R project activities" Version 2.1.0 or later may be use to identify the number of plots.
Comment:	

Data Unit / Parameter:	DBH
Data unit:	cm
Description:	Diameter at breast height of a tree in cm
Source of data:	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Measured at 1.3m aboveground. See section 3.2.1 for all measurements and the details in the Biomass SOP.
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years
Value applied:	Minimal diameters are described in section 3.2.1 and are detailed in the Biomass SOP.

Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape or caliper). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	Details for biomass QA/QC and can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-AB</i>
Purpose of Data:	Calculation of aboveground biomass
Calculation method:	Allometric Equation Method
Comment:	

Data Unit / Parameter:	A _{SF}
Data unit:	m ²
Description:	Area of one sampling frame
Source of data:	Recording and archiving size of sampling frame plot
Description of measurement methods and procedures to be applied	See Module <i>CP-AB</i>
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years
Value applied:	2500m ²
Monitoring equipment:	Forestry Equipment for measuring distance (distance tape). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Module <i>CP-AB</i> . In addition, details for biomass QA/QC and in the spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-AB</i> .
Purpose of Data:	Calculating aboveground non-tree vegetation carbon stock
Calculation method:	Sampling Frame Method
Comment:	Square plots are 50m x 50m

Data Unit / Parameter:	Ar
Data unit:	Hectares
Description:	Total area of all non-tree allometric method sample plots in stratum <i>i</i>

Source of data:	Recording and archiving size of non-tree allometric method sample plot
Description of measurement methods and procedures to be applied	See Module <i>CP-AB</i>
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A - See Module <i>CP-AB</i>
Justification of choice of data or description of measurement methods and procedures applied:	N/A - See Module <i>CP-AB</i>
Purpose of Data:	Calculation of aboveground biomass carbon stock
Calculation method:	Allometric Equation Method
Comment:	Allometric Equation Method was not used on non-trees. For palms see DBH.

Data Unit / Parameter:	H
Data unit:	m
Description:	Total height of tree
Source of data:	Field measurements in sample plots
Description of measurement methods and procedures to be applied	See Module <i>CP-AB</i>
Frequency of monitoring/Recording:	Monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included monitoring shall occur at least every five years
Value applied:	Values range between 0.5m and 32m. All values are provided in the Biomass Data workbook.

Monitoring equipment:	Forestry Equipment for measuring biomass (clinometer). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Module <i>CP-AB</i> . In addition, details for biomass QA/QC data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-AB</i>
Purpose of Data:	Calculation of aboveground biomass
Calculation method:	Allometric Equation Method
Comment:	

3.3.2.3 CP-D (IMD0002)

Data Unit / Parameter:	$Dia_{n,i,t}$
Data unit:	cm
Description:	Diameter of piece n of dead wood along the transect in stratum i , at time t in cm
Source of data:	Field measurements in sample transects
Description of measurement methods and procedures to be applied	Lying dead wood was sampled using the line intersect method. Two 50-meter lines are established within each sample plot and the diameters of the lying dead wood (≥ 10 cm diameter) intersecting the lines are measured.
Frequency of monitoring/Recording:	Where dead wood is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	Values range between 10cm and 50cm. All values are provided in the Biomass Data workbook.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Forestry Equipment for measuring biomass (DBH tape, or caliper). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.

Justification of choice of data or description of measurement methods and procedures applied:	See Module CP-D
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	Lying deadwood volume was calculated using the formula by Van Wagner (1968).
Comment:	

Data Unit / Parameter:	DBH				
Data unit:	cm				
Description:	Diameter at breast height of standing dead tree in cm				
Source of data:	Field measurements from sample plots.				
Description of measurement methods and procedures to be applied	Measured 1.3m aboveground. All standing dead trees above some minimum 5cm DBH in the sample plots.				
Frequency of monitoring/Recording:	Where dead wood is an included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years				
Value applied:	5cm to 30cm. This measurement was found insignificant at Validation.				
Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape or caliper). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.				
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Details for biomass QA/QC and can be found in section 3.3.3 Monitoring Plan.				
Justification of choice of data or description of measurement methods and procedures applied:	See Module CP-D				
Purpose of Data:	Calculation of baseline and project emissions				
Calculation method:	Allometric equation for Cho et al. 2013, assigned the following degradation types: <table border="1"> <tr> <td>CLASS 1</td><td>Tree with branches and twigs but without leaves</td></tr> <tr> <td>CLASS 2</td><td>Tree with no twigs, but with small and large branches</td></tr> </table>	CLASS 1	Tree with branches and twigs but without leaves	CLASS 2	Tree with no twigs, but with small and large branches
CLASS 1	Tree with branches and twigs but without leaves				
CLASS 2	Tree with no twigs, but with small and large branches				

	CLASS 3	Tree with large branches only
	CLASS 4	Bole (trunk) only, no branches
Comment:		

Data Unit / Parameter:	BDia
Data unit:	cm
Description:	Basal diameter of standing dead tree in cm
Source of data:	Field measurements from sample plots/points
Description of measurement methods and procedures to be applied	Measured at ground level.
Frequency of monitoring/Recording:	Where dead wood is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	0
Monitoring equipment:	N/A – not used
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. In addition, details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	N/A – Bia was not used, but Allometric equations with degradation types.
Comment:	Allometric equation for Cho et al. 2013, and trees were assigned the degradation types

Data Unit / Parameter:	TD _{SDW}
Data unit:	cm

Description:	Top diameter of standing dead tree in cm
Source of data:	Field measurements from sample plots
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/Recording:	Where dead wood is an included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	N/A
Comment:	Top diameter was not included, only tree height (see below).

Data Unit / Parameter:	H _{SDW}
Data unit:	m
Description:	Height of standing dead tree in m
Source of data:	Field measurements from sample plots/points
Description of measurement methods and procedures to be applied	Height measured from ground level to either the top of a standing bole or to the base of crown if crown is persistent. Height is measured either directly or by using an instrument such as a clinometers, relascope or laser inventory instrument.
Frequency of monitoring/Recording:	Where dead wood is an included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an

	included pool monitoring shall occur at least every five years
Value applied:	Values range, see section 3.2.1 for all measurements and the details in the Biomass workbook.
Monitoring equipment:	Forestry Equipment for measuring biomass (clinometer). Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. In addition, details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required in Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	Hight measured by clinometer
Comment:	

Data Unit / Parameter:	A _{SP}
Data unit:	ha
Description:	Total area of all sample plots in ha
Source of data:	Recording and archiving of number and size of sample plots
Description of measurement methods and procedures to be applied	See Module <i>CP-D</i> (Module VMD0001)
Frequency of monitoring/Recording:	Where dead wood is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	15.25 ha
Monitoring equipment:	Forestry Equipment for measuring biomass (clinometer). Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	See <i>CP-D</i> . In addition, details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan and in the SOP for biomass measurements.

Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	Distance tapes, measured in the field.
Comment:	

Data Unit / Parameter:	N
Data unit:	Dimensionless
Description:	Number of sample points
Source of data:	Recording and archiving of number of sample points
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/Recording:	Where dead wood is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	61 plots at validation
Monitoring equipment:	Forestry Equipment for measuring biomass, and SOC. Details of biomass and SOC measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	Details for biomass QA/QC and in the spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	N/A
Comment:	

3.3.2.4 CP-L (VMD0003)

Data Unit / Parameter:	A _{SP}
Data unit:	ha
Description:	Total area of all sample plots in ha
Source of data:	Recording and archiving of number and size of sample plots
Description of measurement methods and procedures to be applied	See Module <i>CP-D</i> (Module VMD0001)
Frequency of monitoring/Recording:	Where dead wood is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and dead wood is an included pool monitoring shall occur at least every five years
Value applied:	15.25 ha
Monitoring equipment:	Forestry Equipment for measuring biomass (clinometer). Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	See <i>CP-D</i> . In addition, details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-D</i>
Purpose of Data:	Calculation of baseline and project emissions
Calculation method:	Distance tapes, measured in the field.
Comment:	

Data Unit / Parameter:	B _{LI,sp,i,t}
Data unit:	kg d.m.
Description:	Biomass of litter in sample plot <i>sp</i> in stratum <i>i</i> at time <i>t</i>
Source of data:	Field sampling and laboratory determination
Description of measurement methods and	Litter (dead organic surface material < 10 cm diameter) is collected from within a 1m radius sample plot, harvested at ground level and dried at 70°C to a constant weight to determine dry weight biomass. A sample of the green weight of the total sample and of a representative sub-

procedures to be applied	sample are recorded in the field and the subsample taken for moisture content determination in the lab (i.e. oven dry weight:green weight ratio), from which the dry weight biomass of the total green weight recorded in the field can be estimated.
Frequency of monitoring/Recording:	Where litter is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and litter is an included pool monitoring shall occur at least every five years
Value applied:	Values range. An average of 1.22 t ha was determined.
Monitoring equipment:	Forestry Equipment for measuring biomass (distance tape and spring scale in the field, scientific scale in the lab). Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	details for biomass QA/QC can be found in section 3.3.3 Monitoring Plan and in the SOP for biomass measurements.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>CP-L</i>
Purpose of Data:	Calculation of carbon stock in litter
Calculation method:	Green weight to oven dry weight:green weight ratio), from which the dry weight biomass of the total green weight recorded in the field can was estimated.
Comment:	

3.3.2.5 CP-S (VMD0004)

Data Unit / Parameter:	CsOCsample
Data unit:	g C/100 g soil (fine fraction <2 mm)
Description:	Soil organic carbon of the sample in g C/100 g soil
Source of data:	Field sampling and laboratory determination
Description of measurement methods and procedures to be applied	For soil carbon determination, an aggregate sample is collected from within 3 sample points within each sampling plot in the field. The prepared sample is analyzed for percent organic carbon using the Walkley-Black method.
Frequency of monitoring/Recording:	Where soil organic carbon is an included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and soil organic carbon is an included pool monitoring shall occur at least every five years

Value applied:	Carbon content ranges, with an average of 123.96 Mg C ha ⁻¹
Monitoring equipment:	Soil Sampling tube, shovel, oven and scale, materials listed in Walkley-Black method.
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the <i>IPCC GPG LULUCF 2003</i> , is recommended.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module CP-S
Purpose of Data:	Calculate the carbon stock in soil organic carbon
Calculation method:	Based on field-collection, weighed and dried.
Comment:	

Data Unit / Parameter:	BD _{sample}
Data unit:	g cm ⁻³
Description:	Bulk density of fine (< 2 mm) fraction of mineral soil per unit volume of sample in g cm ⁻³ ; bulk density equals the oven dry weight of the fine fraction (< 2 mm) of the soil core divided by the core volume.
Source of data:	Field sampling and laboratory determination
Description of measurement methods and procedures to be applied	For bulk density determination, samples of known volume are collected in the field and oven dried to a constant weight at 105° C (for a minimum of 48 hours). The total sample is then weighed, then any coarse rocky fragments (>2 mm) are sieved and weighed separately. The bulk density of the soil core is estimated as: $BD_{\text{sample}} = \frac{ODW - RF}{CV}$ Where: BD_{sample} = Bulk density of the < 2mm fraction, in grams per cubic centimeter (g/cm³) ODW = Oven dry mass total sample in grams CV = Core volume in cm³ RF = Mass of coarse fragments (> 2 mm) in grams Note that volume includes coarse (>2mm) fragments. Because coarse rocky fragments occupy space in the soil profile in which carbon is not stored, discounting this volume as in traditional bulk density calculations would overestimate soil carbon stocks when applied to a volume that does not distinguish between coarse and fine fractions.
Frequency of monitoring/Recording:	Where soil organic carbon is included pool monitoring must occur at least every ten years for baseline renewal. Where carbon stock enhancement is included and soil organic carbon is an included pool monitoring shall occur at least every five years

Value applied:	Bulk density ranges, with an average of 0.85.
Monitoring equipment:	Soil Sampling tube, shovel, oven and scale, materials listed in Walkley-Black method.
QA/QC procedures to be applied:	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management shall be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or from the <i>IPCC GPG LULUCF 2003</i> , is recommended.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-S</i>
Purpose of Data:	Calculate the carbon stock in soil organic carbon
Calculation method:	Based on field-collection, weighed and dried.
Comment:	

3.3.2.6 BL-PL (VMD0006)

Data Unit / Parameter:	$C_{AB\_tree,i}$
Data unit:	$t\ CO_2-e\ ha^{-1}$
Description:	Carbon stock in aboveground biomass in trees in the baseline in stratum <i>i</i>
Source of data:	Based on data measured in the field. Calculated based on equations in section 3.2.4
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	$227.01\ tC\ ha^{-1}$
Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape and clinometer). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Module <i>BL-PL</i> . In addition, details for biomass QA/QC and in the and remote sensing data can be found in section 3.3.3 Monitoring Plan.

Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>BL-PL</i>
Purpose of Data:	Used to calculate the baseline carbon stock change
Calculation method:	Allometric equations in section 3.2.1 Baseline Emissions.
Comment:	

Data Unit / Parameter:	C _{BB_tree,i}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground tree biomass in stratum i
Source of data:	Based on data measured in the field
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	64.6 t CO ₂ -e ha ⁻¹
Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape and clinometer). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>BL-PL</i>
Purpose of Data:	Used to calculate the baseline carbon stock change
Calculation method:	Allometric equations and R:S in section 3.2.1 Baseline Emissions.
Comment:	

Data Unit / Parameter:	C _{AB_nontree,i}
Data unit:	t CO ₂ -e ha ⁻¹

Description:	Carbon stock in aboveground non-tree vegetation in the baseline in stratum <i>i</i>
Source of data:	Based on data measured in the field
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0.66 t CO ₂ -e ha ⁻¹
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Used to calculate the baseline carbon stock change
Calculation method:	N/A
Comment:	Herbaceous vegetation is considered de minimis in all instances

Data Unit / Parameter:	CBB_nontree, <i>i</i>
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Baseline carbon stock change in belowground non-tree biomass in stratum <i>i</i>
Source of data:	Based on data measured in the field
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0.19 t CO ₂ -e ha ⁻¹

Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Used to calculate the baseline carbon stock change
Calculation method:	N/A
Comment:	Herbaceous vegetation considered de minimis in all instances

Data Unit / Parameter:	$C_{DW,i}$
Data unit:	$t\ CO_2-e\ ha^{-1}$
Description:	Carbon stock in dead wood in the baseline in stratum <i>i</i>
Source of data:	See Module <i>CP-D</i>
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	$0\ t\ CO_2-e\ ha^{-1}$
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of the baseline carbon stock change
Calculation method:	N/A

Comment:	
Data Unit / Parameter:	$C_{L,i}$
Data unit:	$t\ CO_2-e\ ha^{-1}$
Description:	Carbon stock in litter in the baseline in stratum <i>i</i>
Source of data:	See Module <i>CP-L</i>
N Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	$1.22\ t\ CO_2-e\ ha^{-1}$
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of the baseline carbon stock change
Calculation method:	N/A
Comment:	
Data Unit / Parameter:	$C_{SOC,i}$
Data unit:	$t\ CO_2-e\ ha^{-1}$
Description:	Mean carbon stock in soil organic carbon in the baseline in stratum <i>i</i>
Source of data:	See Module <i>CP-S</i>
Description of measurement methods and	See Module <i>BL-PL</i>

procedures to be applied	
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	454.53 t CO ₂ -e ha ⁻¹
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of the baseline carbon stock change
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	C _{SOC,PD-BSL,i}
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Mean post-deforestation stock in soil organic carbon in post deforestation baseline stratum <i>i</i>
Source of data:	See Module <i>CP-S</i>
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	263.6 t CO ₂ -e ha ⁻¹
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>

Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of the baseline carbon stock change
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	CWP_i
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Mean carbon stock entering the wood products pool at the time of deforestation from stratum <i>i</i>
Source of data:	NA - See Module <i>CP-W</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	NA - The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>BL-PL</i>
Purpose of Data:	NA - See Module <i>BL-PL</i>
Calculation method:	Calculation of the baseline carbon stock change
Comment:	Not included as wood products are omitted from the project carbon pools.

Data Unit / Parameter:	GHG _{BSL-PEAT}
Data unit:	t CO ₂ e

Description:	Net GHG emissions in the APWD-REDD or standalone APWD baseline scenario on peatland up to year t^*
Source of data:	NA - See Module <i>BL-PEAT</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	NA - The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>BL-PL</i>
Purpose of Data:	NA - Calculations of emission in the baseline from planned deforestation
Calculation method:	N/A
Comment:	Not included as peat is not in the project area.

Data Unit / Parameter:	GHG _{BSL-TW}
Data unit:	t CO ₂ e
Description:	Net GHG emissions in the APWD-REDD or standalone APWD baseline scenario on tidal wetland in up to year t^*
Source of data:	NA - See Module <i>BL-TW</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	NA - The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0

Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>BL-PL</i>
Purpose of Data:	NA - Calculations of emission in the baseline from planned deforestation
Calculation method:	N/A
Comment:	Not included as tidal wetlands are not in the project area.

Data Unit / Parameter:	$E_{\text{BiomassBurn},i,t}$
Data unit:	t CO ₂ e
Description:	Non-CO ₂ emissions due to biomass burning in stratum <i>i</i> in year <i>t</i>
Source of data:	See Module <i>E-BPB</i>
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	21.1 t CO ₂ e
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of emissions as a result of deforestation activities
Calculation method:	N/A

Comment:	
Data Unit / Parameter:	$E_{FC,i,t}$
Data unit:	t CO ₂ e
Description:	Emission from fossil fuel combustion in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - See Module <i>E-FFC</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>BL-PL</i>
Frequency of monitoring/Recording:	NA - The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>BL-PL</i>
Purpose of Data:	NA - Calculation of emissions as a result of deforestation activities
Calculation method:	N/A
Comment:	Not included as fossil fuel emissions have been conservatively omitted. See section 3.1.3 for more information.
Data Unit / Parameter:	$N_{2O_{direct-N,i,t}}$
Data unit:	t CO ₂ e
Description:	Direct N ₂ O emission as a result of nitrogen application on the alternative land use within the project boundary in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - See Module <i>E-NA</i>
Description of measurement methods and	NA - See Module <i>BL-PL</i>

procedures to be applied	
Frequency of monitoring/Recording:	NA - The baseline must be revised every ten years for ongoing planned deforestation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>BL-PL</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>BL-PL</i>
Purpose of Data:	NA - Calculation of emissions as a result of deforestation activities
Calculation method:	N/A
Comment:	Emissions from nitrogen application in the baseline has been conservatively omitted. For further information, see section 3.1.3.

3.3.2.1 LK-ASP (VMD0009)

Data Unit / Parameter:	$A_{planned,i}$
Data unit:	Ha
Description:	Total area of planned deforestation over the entire project lifetime for stratum <i>i</i>
Source of data:	Data sources or own measurements
Description of measurement methods and procedures to be applied	GPS coordinates and/or remote sensing data and/or legal parcel records. <i>Ex ante</i> , $A_{planned,i}$ must be determined as described in Module <i>BL-PL</i>
Frequency of monitoring/Recording:	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	78,180 ha
Monitoring equipment:	N/A

QA/QC procedures to be applied:	See section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module. In addition, see section 3.3.3.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	$A_{defLK,i,t}$
Data unit:	ha
Description:	The total area of deforestation by the baseline agent or class of agent of the planned deforestation in stratum <i>i</i> in year <i>t</i>
Source of data:	Data sources or own measurements
Description of measurement methods and procedures to be applied	Analysis of remote sensing data and/or legal records and/or survey information for lands owned or controlled or previously owned or controlled by the baseline agent of deforestation. Legal records will include government permits to deforest including concession licenses. <i>Ex ante</i> , project proponents must determine and justify the likelihood of leakage based on characteristics of the baseline agent or class of agent.
Frequency of monitoring/Recording:	Must be reexamined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	4,229 ha per year
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module. In addition, see section 3.3.3.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	E _{biomassburn,i,t}
Data unit:	t CO ₂ -e
Description:	Non-CO ₂ emissions due to biomass burning in stratum <i>i</i> in year <i>t</i>
Source of data:	See Module <i>E-BPB</i>
Description of measurement methods and procedures to be applied	See Module <i>E-BPB</i>
Frequency of monitoring/Recording:	See Module <i>E-BPB</i>
Value applied:	21.1 t CO ₂ -e
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module. In addition, see section 3.3.3.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	N ₂ O _{direct-N,i,t}
Data unit:	t CO ₂ -e
Description:	Direct N ₂ O emission as a result of nitrogen application in stratum <i>i</i> in year <i>t</i>
Source of data:	See Module <i>E-NA</i>
Description of measurement methods and procedures to be applied	See Module <i>E-NA</i> . In addition, see section 3.2.2.2

Frequency of monitoring/Recording:	See Module <i>E-NA</i>
Value applied:	0.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	No fertilizer will be applied.

Data Unit / Parameter:	$PROD_{LMA,c,t}$
Data unit:	tonnes per year
Description:	Production of commodity <i>c</i> in year <i>t</i> in leakage management areas
Source of data:	Own assessment
Description of measurement methods and procedures to be applied	Direct measurement of the volumes of the identified commodity(ies) produced in leakage management areas under control of the project participants that are sold in the national markets. In addition, see section 3.2.3.1
Frequency of monitoring/Recording:	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	See Table 44 in section 3.2.3.1.
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.

Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	Project proponents must demonstrate that all the volume of the commodities sold in the national markets have been produced in their leakage management areas (i.e., that therefore they have not been bought from other producers and resold in such markets).

Data Unit / Parameter:	C _{PDT}
Data unit:	t C ha ⁻¹
Description:	Soil organic carbon stock at t _{PDT}
Source of data:	NA - See Module <i>X-STR</i>
Description of measurement methods and procedures to be applied	NA - Refer to C _{BSL,i,t100} in Section 5.4.1 in Module <i>X-STR</i> , and substitute t _{PDT} for t ₁₀₀
Frequency of monitoring/Recording:	NA - See Module <i>M-REDD</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	Not included as peat is not in the project area.

Data Unit / Parameter:	C _{SDT}

Data unit:	t C ha ⁻¹
Description:	Soil organic carbon stock at t _{SDT}
Source of data:	See Module <i>X-STR</i>
Description of measurement methods and procedures to be applied	Refer to C _{BSL,i,t100} in Section 5.4.1 in Module <i>X-STR</i> , and substitute t _{SDT} for t ₁₀₀
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>
Value applied:	71.89 t C ha ⁻¹ (263.6 t CO ₂ -e ha ⁻¹)
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	C _{t0}
Data unit:	t C ha ⁻¹
Description:	Soil organic carbon stock at t ₀
Source of data:	See Module <i>X-STR</i>
Description of measurement methods and procedures to be applied	Refer to C _{BSL,i,t0} in Section 4.5.1 in Module <i>X-STR</i>
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>

Value applied:	123.96 t C ha ⁻¹ (454.53 t CO ₂ -e ha ⁻¹)
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ASP</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	

3.3.2.2 LK-ME (VMD0011)

Data Unit / Parameter:	PMP _i
Data unit:	%
Description:	Merchantable biomass as a proportion of total aboveground tree biomass for stratum <i>i</i> within the project boundaries
Source of data:	Own measurements
Description of measurement methods and procedures to be applied	Within each stratum divide the summed merchantable biomass (defined as "Total gross biomass (including bark) of a tree 30 cm DBH or larger from a 30 cm stump to a minimum 10 cm top DOB of the central stem") by the summed total aboveground tree biomass. Merchantable biomass is equal to merchantable volume multiplied by wood density (D_{mn})
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event. <i>Ex ante</i> a time zero measurement shall be made of this factor.
Value applied:	Value will be provided at verification
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ME</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	This calculation was not used as no commercial operations would be present in the baseline.

Comment:	
Data Unit / Parameter:	PROD _{MBLMA,t}
Data unit:	Tonnes per year
Description:	Production of biomass in commercial species that is merchantable in year <i>t</i> in leakage management areas
Source of data:	Own measurements
Description of measurement methods and procedures to be applied	Direct measurement of the volumes of biomass in commercial species that are merchantable produced in leakage management areas under control of the project participants that are sold in the relevant national/regional markets. In addition, see section 3.2.3.1
Frequency of monitoring/Recording:	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	See Table 44
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of REDD+ MF or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module LK-ME
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	Project proponents shall demonstrate that the whole volume of biomass in commercial species that is merchantable is sold in the national markets has been produced in their leakage management areas (ie., that therefore no biomass has been bought from other producers and resold in such markets).
Data Unit / Parameter:	PRODFC _{LMA,t}
Data unit:	Tonnes per year
Description:	Production of fuelwood/charcoal in year <i>t</i> in leakage management areas
Source of data:	Own measurements
Description of measurement methods and procedures to be applied	Direct measurement of the volumes of the fuelwood/charcoal produced in leakage management areas under control of the project participants that are sold in the national markets.
Frequency of monitoring/Recording:	Must be examined at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	Social Survey

QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>LK-ME</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	There is no fuelwood taken from the Project Area

Data Unit / Parameter:	PROP _{Peat-MLF}
Data unit:	%
Description:	Proportion of undrained peatland areas in the 'market leakage forest' areas with respect to the total 'market leakage forest' areas
Source of data:	NA - Own measurements
Description of measurement methods and procedures to be applied	NA - Divide the total area of undrained peatland areas in the 'market leakage forest' areas by the total area of 'market leakage forests'
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event. <i>Ex ante</i> a time zero measurement shall be made of this proportion.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>LK-ME</i>
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	Not included as there is no peat in the project area

Data Unit / Parameter:	C _{peatloss,tPDT}
Data unit:	t C
Description:	Cumulative peat carbon loss due to activity shifting leakage at <i>tPDT</i>
Source of data:	NA - See Module <i>X-STR</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>X-STR</i>

Frequency of monitoring/Recording:	NA - See Module X-STR
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of REDD+ MF or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module LK-ME
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	Not included as there is no peat in the project area

Data Unit / Parameter:	Depth _{peatloss,tPDT,i}
Data unit:	m
Description:	Depth of peat loss at <i>tPDT</i> in 'market leakage forests'
Source of data:	NA - Data sources or own measurements
Description of measurement methods and procedures to be applied	NA - The source of data shall be chosen with priority from higher to lower preference as follows: 1. Peer-reviewed published sources 2. Official Government data and statistics 3. Project-specific field measurements <i>Depth_{peatloss,tPDT}</i> may be conservatively set to the thickness of the peat layer.
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event. <i>Ex ante</i> a time zero measurement shall be made of this parameter
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of REDD+ MF or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module LK-ME
Purpose of Data:	NA - Calculation of leakage emissions
Calculation method:	N/A
Comment:	Not included as there is no peat in the project area

Data Unit / Parameter:	V _{MLF,i,t}
Data unit:	m ³

Description:	Volume of timber in stratum i in 'market leakage forest'
Source of data:	Data sources or own measurements
Description of measurement methods and procedures to be applied	The source of data shall be chosen with priority from higher to lower preference as follows: 1. Peer-reviewed published sources 2. Official Government data and statistics 3. Project-specific field measurements
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event. <i>Ex ante</i> a time zero measurement shall be made of this proportion.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Section 9.3 of REDD+ MF or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	See Module LK-ME
Purpose of Data:	Calculation of leakage emissions
Calculation method:	N/A
Comment:	No commercial timber is extracted from the Project Area in the baseline or project scenario.

3.3.2.3 M-REDD (VMD0015)

Data Unit / Parameter:	Project Forest Cover Monitoring Map
Data unit:	N/A
Description:	Map showing the location of forest land within the project area at the beginning of each monitoring period. If within the Project Area some forest land is cleared, the benchmark map must show the deforested areas at each monitoring event
Source of data:	Remote sensing in combination with GPS data collected during ground truthing
Description of measurement methods and procedures to be applied	The minimum map accuracy must be 90% for the classification of forest/non-forest in the remote sensing imagery. If the classification accuracy is less than 90% then the map is not acceptable for further analysis. More remote sensing data and ground truthing data will be needed to produce a product that reaches the 90% minimum mapping accuracy.

	In addition, see section 3.2.2.3.
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	See Map 28
Monitoring equipment:	Remote sensing and imagery
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>M-REDD</i>
Purpose of Data:	Calculation of biomass
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	Leakage Belt Forest Cover Monitoring Map
Data unit:	N/A
Description:	Map showing the location of forest land within the leakage belt area at the beginning of each monitoring period. Only applicable where leakage is to be monitored in a leakage belt
Source of data:	Remote sensing in combination with GPS data collected during ground truthing
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	See Map 29
Monitoring equipment:	Remote sensing and imagery
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3
Justification of choice of data or description of measurement methods and procedures applied:	The minimum map accuracy must be 90% for the classification of forest/non-forest in the remote sensing imagery. If the classification accuracy is less than 90% then the map is not acceptable for further analysis. More remote sensing data and ground truthing data will be needed to produce a product that reaches the 90% minimum mapping accuracy.
Purpose of Data:	Calculation of biomass
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	Degradation PRA Results
Data unit:	N/A
Description:	Semi-structured interviews/questionnaires that evaluate harvesting activities occurring in the project area
Source of data:	PRA
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.3.3 and Community Monitoring Report
Frequency of monitoring/Recording:	Every two years
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3 and the Social Assessments.
Justification of choice of data or description of measurement methods and procedures applied:	The PRA shall consist of semi-structured interviews/questionnaires. The PRA shall evaluate whether the following activities may be occurring in the project area: -harvesting of fuel wood -harvesting of wood for charcoal production -timber harvest If $\geq 10\%$ of those interviewed/surveyed believe that degradation may be occurring within the project boundary then the limited on-the-ground degradation survey shall be triggered An additional output of the PRA shall be a depth of penetration of degradation pressure. A maximum distance shall be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting fuel wood, charcoal and/or timber. It is likely that differing distances shall exist for each degradation pressure. If multiple pressures exist in the same stratum the deepest depth of penetration shall be used to define $A_{deg,i}$
Purpose of Data:	Calculation of the amount of degradation
Calculation method:	N/A
Comment:	<i>Ex ante</i>, an estimation shall be made of degradation in the with-project case. If the belief is that zero degradation will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent deforestation. There was no harvesting of wood by the communities in the Project Area

Data Unit / Parameter:	Result of Limited Degradation Survey
Data unit:	N/A
Description:	Survey to check if new tree stumps are evident or not
Source of data:	PRA
Description of measurement methods and	See Module <i>M-REDD</i> . In addition, see section 3.3.3 and Community Monitoring Report

procedures to be applied	
Frequency of monitoring/Recording:	Must be repeated each time the PRA indicates a potential for degradation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3 and the Community Monitoring Report
Justification of choice of data or description of measurement methods and procedures applied:	Sampled by surveying several transects of known length and width across the access-buffer area (equal in area to at least 1% of $A_{Deg,i}$) to check whether new tree stumps are evident or not.
Purpose of Data:	Determine if new degradation is occurring
Calculation method:	N/A
Comment:	<i>Ex ante</i> , an estimation shall be made of degradation in the with-project case. If the belief is that zero degradation will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent deforestation.

Data Unit / Parameter:	$A_{DefPA,i,u,t}$
Data unit:	ha
Description:	Area of recorded deforestation in the project area in stratum i converted to land use u in year t
Source of data:	Remote sensing imagery
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	GIS and Remote Sensing Images
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>M-REDD</i>
Purpose of Data:	Calculation of net carbon stock change as a result of deforestation
Calculation method:	N/A
Comment:	<i>Ex ante</i> , an estimation shall be made of deforestation in the with-project case. If the belief is that zero deforestation will occur within the project boundaries, then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent deforestation.

Data Unit / Parameter:	$A_{DefLB,i,u,t}$
Data unit:	ha
Description:	Area of recorded deforestation in the leakage belt in stratum i converted to land use u in year t
Source of data:	Remote sensing imagery
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0 at Project Start. Value will be provided at verification
Monitoring equipment:	GIS and Remote Sensing Images
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>M-REDD</i>
Purpose of Data:	Calculation of net carbon stock change as a result of deforestation
Calculation method:	N/A
Comment:	Ex ante, an estimation must be made of deforestation in the leakage belt in the with-project case. The area of deforestation must be made conservatively equal to: $\left(\sum_{t=1}^t (1 - PROP_{IMM}) * A_{BSL,LK,unplanned,t} \right) * (1 - PROP_{LPA})$ Where: $PROP_{IMM}$ = Estimated proportion of baseline deforestation caused by immigrating population; proportion (Calculated in Module <i>LK-ASU</i>) $A_{BSL,LB,unplanned,t}$ = Projected rate of unplanned baseline deforestation in the Leakage Belt Area at year t; ha. yr^{-1} (Output parameter from Module <i>BL-UP</i>) $PROP_{LPA}$ = Estimated proportion of baseline deforestation agents given the opportunity to participate in leakage prevention activities; proportion (proportion shall be conservatively estimated and justifiable. Leakage prevention activities must be planned to fully replace income, product

	generation and livelihood. Projects have the option ex-ante to conservatively set $PROP_{LPA}$ as equal to 1). $t = 1, 2, 3, \dots t$ years elapsed since the start of the project activity

Data Unit / Parameter:	$A_{DegW,i}$
Data unit:	ha
Description:	Area potentially impacted by degradation processes in stratum i
Source of data:	GIS delineation and ground truthing
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Frequency of monitoring/Recording:	NA - Must be repeated each time the PRA indicates a potential for degradation
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i> .
Justification of choice of data or description of measurement methods and procedures applied:	$A_{DegW,i}$ shall be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer shall be determined by the depth of degradation penetration as defined as a PRA output.
Purpose of Data:	Calculation of carbon stock changes as a result of degradation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2 <i>Ex ante</i> , a limited survey can be used to determine a likely depth of degradation penetration

Data Unit / Parameter:	$A_{DECKS,i,t}$
Data unit:	ha
Description:	Area of logging decks in stratum i in year t
Source of data:	NA - Field measurements or reported measurements such as postharvest assessment reports and post-harvest maps that are based on field measurements
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0

Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	Systematic sampling must take place to ensure all decks within the area logged are identified and a conservative estimate of area produced.
Purpose of Data:	Calculation of change in carbon stock from logging deck creation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2 <i>Ex ante</i> , estimations of emissions from deck creation shall be based on logging management plans or average size of decks and number of decks produced due to logging in the region

Data Unit / Parameter:	$A_{DistPA,q,i,t}$
Data unit:	ha
Description:	Area impacted by natural disturbance in the project stratum <i>i</i> converted to natural disturbance stratum <i>q</i> in year <i>t</i> ; ha
Source of data:	Remote Sensing imagery combined with ground verification or GPS coordinates
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	Value will be provided at verification
Monitoring equipment:	Remote sensing software and satellite images.
QA/QC procedures to be applied:	See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	Minimum monitoring unit shall be equal to a minimum of 11 Landsat pixels or one hectare.
Purpose of Data:	Calculation of carbon stock change from natural disturbance
Calculation method:	N/A
Comment:	<i>Ex ante</i> , estimations of emissions from natural disturbances was set to zero as the area is expected to be more protected in the project scenario.

Data Unit / Parameter:	$A_{ROAD,i,t}$
Data unit:	ha

Description:	Area of roads in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Field measurements or reported measurements such as postharvest assessment reports and post-harvest maps that are based on field measurements
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The area of roads created may be based on the length of roads multiplied by the average width of roads. The length of all roads created during selective logging within a stratum <i>i</i> in year <i>t</i> must be measured through systematically sampling the entire area logged to produce a conservative estimate of the length of roads created. The average width of the roads may be estimated through systematically sampling road width. Sufficient number of measurements of road width shall be measured to achieve a precision of equal or less than 15% of the mean at the 95% confidence interval. Where different categories of roads exist, different average road widths must be used.
Purpose of Data:	NA - Calculation of carbon stock change from logging road creation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2. <i>Ex ante</i> , estimations of emissions from road creation shall be based on logging management plans or average length of roads produced per unit area due to logging in the region

Data Unit / Parameter:	$A_{RRL,forest,t}$
Data unit:	ha
Description:	Remaining area of forest in RRL in year <i>t</i>
Source of data:	Remote sensing imagery
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.1.1
Frequency of monitoring/Recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	See Table 53

Monitoring equipment:	Remote sensing and imagery
QA/QC procedures to be applied:	See Module <i>M-REDD</i> . In addition, see section 3.3.3
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>M-REDD</i>
Purpose of Data:	Calculation of forest biomass
Calculation method:	N/A
Comment:	<i>Ex ante</i> , an estimation shall be made of likely deforestation in the with-project case.

Data Unit / Parameter:	AP_i
Data unit:	ha
Description:	Total area of degradation sample plots in stratum <i>i</i>
Source of data:	NA - Ground measurement
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone.
Purpose of Data:	Calculation of carbon stock changes from degradation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2. <i>Ex ante</i> , an estimation must be made of area of plots. This must be set to exactly 3% of the buffer zone $A_{Deg,i}$

Data Unit / Parameter:	$C_{DegW,i,t}$
Data unit:	t CO ₂ -e
Description:	Biomass carbon of trees cut and removed through illegal logging and fuelwood and charcoal extraction degradation process from plots measured in stratum <i>i</i> in year <i>t</i>

Source of data:	NA - Field measurement
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The diameter of all tree stumps is the designated plots will be measured and conservatively assumed to be the same as the DBH. If the stump is a large buttress, identify several individuals of the same species nearby and determine a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree. The above and below ground carbon stock of each harvested tree must be estimated using the same allometric regression equation and root to shoot ratio used in the module for estimating the carbon pool in trees (<i>CP-AB</i>) in the baseline scenario. See detailed guidance in Module <i>CP-AB</i> for aboveground biomass estimation.
Purpose of Data:	NA - Calculation of carbon stock changes from degradation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2 <i>Ex-ante</i> an estimation shall be made of likely degradation in the with-project case. Such an estimation shall be based on rates of degradation in surrounding areas and the degree of protection that will be in place (e.g. forest guards) in the with-project case.

Data Unit / Parameter:	$C_{AB\_tree\_dest, i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Carbon stock in aboveground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum <i>i</i>
Source of data:	NA - Module <i>CP-AB</i> and documentation stating maximum size tree able to be killed during skid trail creation
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - The maximum size tree assumed to be killed during skid trail creation must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event

Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - To calculate the aboveground tree biomass assumed to be killed, a subset of the field measurements collected to calculate the baseline $C_{AB\_tree,i}$ shall be created. This subset shall include all trees below the maximum size tree assumed to be killed during the skid trail creation. The methods in Module <i>CP-AB</i> shall then be used to estimate the biomass of trees able to be killed during skid trail creation. Documentation must be provided to determine the maximum sized tree (based on the variables used to calculate aboveground biomass for a species in Module <i>CP-AB</i> , such as DBH) that are able to be destroyed during the creation of the skid trail. Documentation may include management plans or documented evidence of the maximum size tree the machinery used to create the skid trail is able to push over and kill. Alternatively, it can be assumed that $C_{tree\_AB\_dest,i} = C_{tree\_AB,i}$ in the baseline
Purpose of Data:	NA - Calculation of biomass assumed to be killed in creation of skid trail
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2

Data Unit / Parameter:	$C_{BB\_tree\_dest,i}$
Data unit:	t CO ₂ -e ha ⁻¹
Description:	Carbon stock in belowground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail in stratum <i>i</i>
Source of data:	NA - See Module <i>M-REDD</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See guidance in Module <i>CP-AB</i> for belowground biomass estimation. The same root-to-shoot ratio that is used in baseline carbon stock calculations shall be used together with $C_{tree\_AB\_dest,i}$
Purpose of Data:	NA - Calculation of biomass assumed to be killed in creation of skid trail
Calculation method:	N/A

Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2.

Data Unit / Parameter:	C _{S/U,Ig}
Data unit:	t C
Description:	Carbon stock of trees snapped, leaning, or uprooted in logging gap <i>Ig</i>
Source of data:	NA - Field measurements in logging gap sample plots
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Measurement shall take place one time prior to any verification event.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - Measurements (e.g. DBH, H) shall be taken on all trees (>10 cm DBH) that have been significantly damaged and are assumed to be killed by the felling of the timber tree. This shall include all trees where the bark of the stem has been damaged, where the stem has been snapped off, where the stem has been pushed over, and those trees that have been uprooted. The above and belowground carbon stock of each tree must be estimated using the same allometric regression equation and root to shoot ratio used in the module for estimating the carbon pool in trees (<i>CP-AB</i>) in the baseline scenario. See detailed guidance in Module <i>CP-AB</i> for aboveground and belowground biomass estimation.
Purpose of Data:	NA - Calculation of biomass from trees incidentally killed or damaged during the process of tree felling within logging gap <i>Ig</i>
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2.

Data Unit / Parameter:	C _{B,Ig}
Data unit:	t C
Description:	Carbon stock of branches knocked to the ground as a direct consequence of tree felling in logging gap <i>Ig</i>
Source of data:	NA - Field measurements in logging gap sample plots
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Measurement shall take place one time prior to any verification event.
Value applied:	0

Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - Field measurements shall be made on all branches (>10 cm diameter at point of breakage) that have been knocked to ground as a result of the felling of the timber tree(s). The biomass of such branches shall be estimated by measuring the volume of the tree branch and the wood density of the tree species. The wood density of the tree may either be measured through field sampling or published estimates of wood density for species <i>j</i> may be used. Measurements of tree branch carbon stocks and volume shall be made to result in a conservative and overestimation of tree branch volume through assuming that each branch is shaped like a frustum: $C_{B,lg} = \sum_{br=1}^{BR} \left(\left(\frac{1}{3} * LENGTH_{br,lg,z,i} * \pi * \left[\left(\frac{DIA_{1,br,lg,z,i}}{200} \right)^2 + \left(\frac{DIA_{2,br,lg,z,i}}{200} \right)^2 + \left(\frac{DIA_{1,br,lg,z,i}}{200} * \frac{DIA_{2,br,lg,z,i}}{200} \right) \right] \right) * D_j * CF_j \right)$ Where: $C_{B,lg}$ = Carbon stock of branches knocked to the ground as a direct consequence of tree felling in logging gap <i>lg</i> $DIA_{1,br}$ = Basal diameter of branch <i>br</i> knocked to the ground as a direct consequence of tree felling in logging gap <i>lg</i>; cm $DIA_{2,br}$ = Top diameter of branch <i>br</i> knocked to the ground as a direct consequence of tree felling in logging gap <i>lg</i>, logging stratum <i>z</i>, stratum <i>i</i>; cm (minimum conservatively assumed to be 5 cm) $LENGTH_{br}$ = Length of branch <i>br</i> (defined as the length of branch, following one main stem from point of breakage to the end of the stem) knocked to the ground as a direct consequence of tree felling in logging gap <i>lg</i>, logging stratum <i>z</i>, stratum <i>i</i>; m D_j = Basic wood density of species <i>j</i>; t d.m.m⁻³ CF_j = Carbon fraction of biomass for tree species <i>j</i>; t C t⁻¹ d.m. (IPCC default value = 0.47 t C t⁻¹ d.m.) br = 1, 2, 3, ...<i>BR</i> branches knocked to the ground as a direct consequence of tree felling in logging gap <i>lg</i> lg = 1, 2, 3, ...<i>LG</i> logging gaps measured to derive factors in stratum <i>i</i> z = 1, 2, 3, ... <i>Z</i> logging strata i = 1, 2, 3, ... <i>M</i> strata
Purpose of Data:	NA - Calculation of biomass from trees incidentally killed or damaged during the process of tree felling within logging gap <i>lg</i>
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2
Data Unit / Parameter:	F _{LU}
Data unit:	Dimensionless
Description:	Land use factor before or after conversion

Source of data:	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>
Value applied:	0.58
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. The land use factor after conversion can be conservatively assumed to equate the default value for idle land that is set aside.
Purpose of Data:	Calculation soil carbon stocks in baseline
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	F _{MG}
Data unit:	Dimensionless
Description:	Management factor before or after conversion
Source of data:	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>
Value applied:	1
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. The management factor after conversion can be conservatively assumed to equate to 1.0, the default value for full tillage.
Purpose of Data:	Calculation soil carbon stocks in baseline
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	F_i
Data unit:	Dimensionless
Description:	Input factor before or after conversion
Source of data:	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i> . In addition, see section 3.2.2.2.
Frequency of monitoring/Recording:	See Module <i>M-REDD</i>
Value applied:	1
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	Stock Change Factors as defined in IPCC 2006GL are equal to the carbon stock in the altered condition as a proportion of the reference carbon stock. The land use factor after conversion can be conservatively assumed to equate 1, the default value for medium input.
Purpose of Data:	Calculation soil carbon stocks in baseline
Calculation method:	N/A
Comment:	

Data Unit / Parameter:	$f_{tr,z,i}(A,B)$
Data unit:	m^3
Description:	Equation linking measured tree variable(s) to volume extracted from timber tree <i>tr</i> for logging stratum <i>z</i> , in stratum <i>i</i>
Source of data:	NA - Forest or harvest management plan for stratum <i>z</i> in stratum <i>i</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - See Module <i>M-REDD</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The equation used to calculate volume of extracted wood within the felled tree <i>tr</i> shall be the same equation used to estimate the volume of wood extracted of each timber tree logged during selective logging of stratum <i>z</i> during the project scenario. To employ this equation the same field measurements and calculations must be undertaken on the same

	tree variables and using the same methods as delineated in the documentation used to estimate $V_{EXT,z,i,t}$.
Purpose of Data:	NA - Calculation of tree volume extracted
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2. The tree variables to estimate the volume of wood generally include the length of the log and the diameter of the log.

Data Unit / Parameter:	L_{sk}
Data unit:	m
Description:	Length of skid trail sk
Source of data:	NA - Field measurements or reported measurements such as postharvest assessment reports and post-harvest maps that are based on field measurements
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The length of all skid trails within a stratum i in year t may be estimated through using systematic sampling with a random start of the entire area logged or within a sampled known logged area within the project boundary to produce a conservative estimate of the length of skid trails created. Where sampling is used, the total length of all skid trails can then be equal to the mean length of skid trails per unit area multiplied by the total area logged.
Purpose of Data:	NA - Calculation of carbon stock changes from skid trail creation
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2.

Data Unit / Parameter:	$V_{EXT,z,i,t}$
Data unit:	m^3
Description:	Volume extracted from logging stratum z in stratum i in year t
Source of data:	NA - Records and reports documenting amount of wood extracted within project boundary. Records must be based on field measurements to calculate this volume.
Description of measurement	NA - See Module <i>M-REDD</i>

methods and procedures to be applied	
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - Documentation on the amount of wood extracted must include a delineation of the location and total area where logging took place within the project boundary each year. Documentation must provide a detailed description of the methods used to quantify the amount of wood extracted and how the volume of wood that is felled and extracted is calculated and cataloged.
Purpose of Data:	NA - Calculation of emissions from logging
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2. Supplementary documentation, such as government records, financial records, proof of timber sale may be presented as additional documentation of volume extracted.

Data Unit / Parameter:	$V_{EXT,j,z,i,t}$
Data unit:	m ³
Description:	The volume of timber extracted of species <i>j</i> for logging stratum <i>z</i> , in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Logging records of wood extracted
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>M-REDD</i>
Purpose of Data:	NA - Calculation of carbon stock of timber extracted for logging

Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2.

Data Unit / Parameter:	W_{SKID}
Data unit:	m
Description:	Mean width of skid trails
Source of data:	NA - Field measurements or reported measurements
Description of measurement methods and procedures to be applied	NA - See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	NA - The estimated mean width of skid trails shall be monitored and updated prior to each verification report.
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedure applied:	NA - See Module <i>M-REDD</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - The average width of skid trails created within a stratum i can be based on reported widths; a conservative estimate based on machinery used; or additional field measurements. Reported width: the average width of field measured skid trails within FSC Post Harvest Assessment reports from logging that has taken place within the project area; Conservative estimate: Width edge of tires on largest skidder type * 140% can only be used where skidder type(s) is known and used to create all skid trails. (skidder defined as heavy vehicle used in logging operation to create path and pull cut trees to logging road); Field measurements: average of field sampling based on systematic sampling with a random start. The width of the skid trail shall be equal to the distance between trees undamaged by skid trail creation on one side to trees undamaged by skid trail creation on the other side. Sufficient number of measurements of road width shall be measured to achieve a precision of equal or less than 15% of the mean at the 95% confidence interval.
Purpose of Data:	NA - Calculation of skid trail emission factor
Calculation method:	N/A
Comment:	This section of M-REDD has been omitted. For more information, see section 3.2.2.2. <i>Ex ante</i> estimates may use the conservative estimate based on the width of the logging machinery wheels.

3.3.2.4 X-STR (VMD0016)

Data Unit / Parameter:	$AW_{PS,i,t}$ or $A_{i,t}$
Data unit:	ha
Description:	Area of project stratum i in year t

Source of data:	NA - Own assessment
Description of measurement methods and procedures to be applied	NA GIS coverages, ground survey data and/or remote imagery (satellite or aerial photographs), as outlined in Section 5. The area of peat burnt ($A_{peatburn-WPS,i,t}$ for the project scenario from Module <i>M-PEAT</i> and $A_{peatburn-BSL,i,t}$ for the baseline scenario from Module <i>BL-PEAT</i>) and area of peatland (not open water, not burnt) ($A_{peatsoil-WPS,i,t}$ for the project scenario from Module <i>M-PEAT</i> and $A_{peatsoil-BSL,i,t}$ for the baseline scenario from Module <i>BL-PEAT</i>) determine the difference between the remaining carbon stock in the project scenario and baseline scenarios after 100 years. In the procedures in Section 5.4 these areas are together referred to as $A_{WPS,i,t}$ and $A_{BSL,i,t}$.
Frequency of monitoring/Recording:	NA - At each monitoring event
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>X-STR</i>
Purpose of Data:	NA - Calculation of project emissions
Calculation method:	N/A
Comment:	Not used as there is no peatland in the project area In Equations 1, 2, 3, 5, 15 and 16, the area for $A_{WPS,i,t100}$ must be used

Data Unit / Parameter:	$\text{late}_{peatloss-WPS,i,t}$
Data unit:	m yr^{-1}
Description:	Rate of peat loss due to subsidence and fire in the project scenario in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Module <i>M-PEAT</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>M-PEAT</i>
Frequency of monitoring/Recording:	NA - See Module <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-PEAT</i>
Justification of choice of data or description	NA - See Module <i>X-ITR</i>

of measurement methods and procedures applied:	
Purpose of Data:	NA - Calculation of project emissions
Calculation method:	N/A
Comment:	Not used as there is no peat in the project area

Data Unit / Parameter:	GHG _{peatsoil,CO₂,i,t}
Data unit:	t CO ₂ e yr ⁻¹
Description:	CO ₂ emissions from microbial decomposition of the peat soil in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Module <i>M-PEAT</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>M-PEAT</i>
Frequency of monitoring/Recording:	NA - See Module <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>M-PEAT</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>X-STR</i>
Purpose of Data:	NA - Calculation of project emissions
Calculation method:	N/A
Comment:	Not used as there is no peat in the project area

Data Unit / Parameter:	GHG _{peatburn,CO₂,i,t}
Data unit:	t CO ₂ e yr ⁻¹
Description:	CO ₂ emissions from burning of peat within the project boundary in the project scenario in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Module <i>M-PEAT</i>
Description of measurement methods and procedures to be applied	NA - See Module <i>M-PEAT</i>
Frequency of monitoring/Recording:	NA - See Module <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A

QA/QC procedures to be applied:	NA - See Module <i>M-PEAT</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>X-STR</i>
Purpose of Data:	NA - Calculation of project emissions
Calculation method:	N/A
Comment:	Not used as there is no peat in the project area

3.3.2.5 X-UNC (VMD0017)

Data Unit / Parameter:	$A_{BSL,RRD,unplanned,t}$
Data unit:	ha
Description:	Projected area of unplanned baseline deforestation in the RRD in year t
Source of data:	GPS coordinates and/or Remote Sensing data and/or legal parcel records
Description of measurement methods and procedures to be applied	See Module <i>BL-UP</i>
Frequency of monitoring/Recording:	Annually
Value applied:	78,180 ha
Monitoring equipment:	Satellite images, GIS software
QA/QC procedures to be applied:	See Module <i>X-UNC</i> . In addition, details for spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required Module <i>BL-UP</i>
Purpose of Data:	Calculation of uncertainty
Calculation method:	Remote sensing GIS
Comment:	

Data Unit / Parameter:	$A_{BSL,i,j,unplanned,t}$
Data unit:	ha
Description:	Projected area of unplanned baseline deforestation in census unit i member of RRD subset j in year t
Source of data:	GPS coordinates and/or Remote Sensing data and/or legal parcel records
Description of measurement methods and	See Module <i>BL-UP</i>

procedures to be applied	
Frequency of monitoring/Recording:	Annually
Value applied:	78.180 ha
Monitoring equipment:	Satellite images, GIS software
QA/QC procedures to be applied:	See Module <i>X-UNC</i> . In addition, details for spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>BL-UP</i>
Purpose of Data:	Calculation of uncertainty
Calculation method:	Remote sensing GIS
Comment:	

Data Unit / Parameter:	E _{REDD_BSL SS,i, pool#}
Data unit:	t CO ₂ e
Description:	Carbon stock or GHG sources (eg, trees, dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the REDD baseline scenario
Source of data:	The terms denoting significant carbon stocks, GHG sources or leakage emissions from baseline modules (<i>BL-DFW</i> , <i>BL-PL</i> , <i>BL-UP</i>) used to calculate net emission reductions. Field measurements, GIS, Remote Sensing, and Laboratory Measurements
Description of measurement methods and procedures to be applied	See relevant modules
Frequency of monitoring/Recording:	See relevant modules
Value applied:	40,159,299 t CO ₂ -e over the lifetime of the project
Monitoring equipment:	Forestry Equipment (distance tape), Satellite images, GIS software, Soil Sampling tube, shovel, oven and scale, materials listed in Walkley-Black method. Details of biomass measuring equipment are described in the SOP for Field-based Measurement.
QA/QC procedures to be applied:	See Module <i>X-UNC</i> . In addition, details for spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for all relevant modules
Purpose of Data:	Calculation of uncertainty
Calculation method:	See relevant modules. In addition, see section 3.2.1

Comment:	Baseline stocks and sources are estimated <i>ex ante</i> for each baseline period
Data Unit / Parameter:	U _{REDD_BSL,SS,i,pool#}
Data unit:	%
Description:	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the REDD baseline scenario (1, 2... <i>n</i> represent different carbon pools and/or GHG sources)
Source of data:	Calculations arising from field measurement data
Description of measurement methods and procedures to be applied	See Module <i>X-UNC</i> . In addition, see section 3.2.2.2.
Frequency of monitoring/Recording:	See Module <i>X-UNC</i>
Value applied:	Tree AGB: 9.3% Tree BGB: 9.3% Understory AGB: 8.6% Understory BGB: 8.6% Litter: 7.6% Soil: 9.8%
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>X-UNC</i>
Justification of choice of data or description of measurement methods and procedures applied:	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the <i>t</i> value for the 95% confidence level. For wood products the uncertainty should be the confidence interval around the volume of timber extracted from the forest. For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero
Purpose of Data:	Calculation of uncertainty
Calculation method:	See section 3.2.1.4.
Comment:	Baseline stocks and sources are estimated <i>ex ante</i> for each baseline period

Data Unit / Parameter:	U _{*,i,t}
Data unit:	t CO ₂ e ha ⁻¹ yr ⁻¹
Description:	Uncertainty in parameter * in stratum <i>i</i> in year <i>t</i> * = parameters E _{proxy-CO2,t} , E _{proxy-CH4,t} , E _{peatditch-CO2,t} , E _{peatditch-CH4,t} and E _{peatburn-BSL,t} .
Source of data:	NA - See Module <i>X-UNC</i>
Description of measurement methods and	See Module <i>X-UNC</i>

procedures to be applied	
Frequency of monitoring/Recording:	NA - See Module <i>X-UNC</i>
Value applied:	N/A
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Module <i>X-UNC</i>
Justification of choice of data or description of measurement methods and procedures applied:	NA Where regression models are used to estimate emissions from oxidation of peat from proxy parameters, uncertainty is calculated by referencing the 95% confidence limits of the regression model, calculated using standard regression analysis techniques. For the value of the referenced proxy in year t , the half-width of the 95% confidence interval for the dependent variable (emissions) is calculated to produce parameters U_{*t} . Where emissions are estimated applying a discrete default factor, uncertainty, U_{*t} , is simply calculated by referencing the 95% confidence limit of the default factor estimate, or assigned as zero if an indisputably conservative factor is used.
Purpose of Data:	NA - Calculation of uncertainty
Calculation method:	N/A
Comment:	Not included as there is no peatland in the project area

Data Unit / Parameter:	$E_{REDD,WPS,SS,i}$, Pool#
Data unit:	t CO ₂ e
Description:	Carbon stock or GHG sources (eg, trees, down dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in the project scenario
Source of data:	The terms denoting significant carbon stocks, GHG sources or leakage emissions used in calculating net emission reductions from the following relevant modules: <i>CP-AB</i> , <i>CP-D</i> , <i>CP-L</i> , <i>CP-S</i> , <i>CP-W</i> , <i>E-BB</i> , <i>E-FFC</i> , <i>E-NA</i> .
Description of measurement methods and procedures to be applied	See relevant modules. In addition, see section 3.2.1.4
Frequency of monitoring/Recording:	See relevant modules
Value applied:	Tree AGB: 227.01 t CO ₂ -e ha ¹ Tree BGB: 64.58 t CO ₂ -e ha ¹ Understory AGB: 0.66 t CO ₂ -e ha ¹ Understory BGB: 0.19 t CO ₂ -e ha ¹ Litter: 1.22 t CO ₂ -e ha ¹ Soil: 454.53 t CO ₂ -e ha ¹
Monitoring equipment:	N/A

QA/QC procedures to be applied:	See relevant modules
Justification of choice of data or description of measurement methods and procedures applied:	Required for relevant modules
Purpose of Data:	Calculation of uncertainty
Calculation method:	See section 3.2.1.4.
Comment:	The <i>ex-ante</i> estimation must be derived directly from the estimations originating in the relevant modules: <i>CP-AB</i> , <i>CP-D</i> , <i>CP-L</i> , <i>CP-S</i> , <i>CP-W</i> , <i>E-BB</i> , <i>E-FFC</i> , <i>E-NA</i> .

Data Unit / Parameter:	U _{REDD,WPS,SS,i,pool#}
Data unit:	%
Description:	Percentage uncertainty (expressed as 95% confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the project scenario (1, 2... <i>n</i> represent different carbon pools and/or GHG sources)
Source of data:	Calculations arising from field measurement data
Description of measurement methods and procedures to be applied	See Module <i>X-UNC</i> . In addition, see section 3.2.1.4.
Frequency of monitoring/Recording:	See Module <i>X-UNC</i>
Value applied:	6.76%
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>X-UNC</i>
Justification of choice of data or description of measurement methods and procedures applied:	Uncertainty in pools derived from field measurement with 95% confidence interval calculated as the standard error of the averaged plot measurements in each stratum multiplied by the <i>t</i> value for the 95% confidence level. For wood products the uncertainty should be the confidence interval around the volume of timber extracted from the forest. For emission sources conservative parameters should be used sufficient to allow the uncertainty to be set as zero.
Purpose of Data:	Calculation of uncertainty
Calculation method:	See section 3.2.1.4.
Comment:	<i>Ex ante</i> , the uncertainty in the project carbon stocks and sources are equal to the calculated baseline uncertainty

Data Unit / Parameter:	D% _{pn}
Data unit:	%
Description:	Percent of deforestation in land parcel ³ pn, etc., of a proxy area as a result of planned deforestation as defined in this module

Source of data:	Module <i>BL-PL</i>
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i> . In addition, see section 3.2.1.4.
Frequency of monitoring/Recording:	See Module <i>BL-PL</i>
Value applied:	Proxy 1: 83% Proxy 2: 87% Proxy 3: 78% Proxy 4: 98% Proxy 5: 100% Proxy 6: 72% Proxy 7: 100%
Monitoring equipment:	N/A
QA/QC procedures to be applied:	See Module <i>X-UNC</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BL-PL</i>
Purpose of Data:	Calculation of uncertainty
Calculation method:	See section 3.2.1.4
Comment:	

Data Unit / Parameter:	YrS _{pn}
Data unit:	years
Description:	Number of years over which deforestation occurred in land parcel pn in proxy area
Source of data:	Module <i>BL-PL</i>
Description of measurement methods and procedures to be applied	See Module <i>BL-PL</i> . In addition see section 3.2.1.4
Frequency of monitoring/Recording:	See Module <i>BL-PL</i>
Value applied:	Proxy 1: 9 Proxy 2: 9 Proxy 3: 9 Proxy 4: 7 Proxy 5: 7 Proxy 6: 7 Proxy 7: 7
Monitoring equipment:	N/A

QA/QC procedures to be applied:	See Module <i>X-UNC</i>
Justification of choice of data or description of measurement methods and procedures applied:	See Module <i>BI-PL</i>
Purpose of Data:	Calculation of uncertainty
Calculation method:	See section 3.2.1.4
Comment:	

3.3.2.6 E-BPB (VMD0013)

Data Unit / Parameter:	$A_{burn,i,t}$
Data unit:	ha
Description:	Area burnt in stratum <i>i</i> in year <i>t</i>
Source of data:	GPS coordinates and/or Remote Sensing data and/or legal parcel records
Description of measurement methods and procedures to be applied	See Module <i>M-REDD</i>
Frequency of monitoring/Recording:	Annually
Value applied:	0 ha for the project 78,180 ha in the baseline over the lifetime of the project
Monitoring equipment:	Satellite images, GIS software
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module. In addition, details for spatial data and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>M-REDD</i>
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Remote sensing GIS
Comment:	

Data Unit / Parameter:	$D_{peatburn,i,t}$
Data unit:	m
Description:	Average fire scar depth in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Module <i>M-PEAT</i>
Description of measurement methods and	NA - See Module <i>M-PEAT</i>

procedures to be applied	
Frequency of monitoring/Recording:	NA - See Module <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of <i>REDD+ MF</i> or another VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Module <i>M-PEAT</i>
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions
Calculation method:	N/A
Comment:	Not included as there is no peat in the project area. To be determined <i>ex ante</i> when accounting of $GHG_{peatburn,i,t}$ is included in the baseline scenario To be monitored when accounting of $GHG_{peatburn,i,t}$ is included in the project scenario

Data Unit / Parameter:	$C_{AB,tree,i}$
Data unit:	t CO ₂ e ha ⁻¹
Description:	Carbon stock in aboveground biomass in trees in stratum <i>i</i>
Source of data:	Based on data measured in the field. Calculated based on equations in section 3.2.4
Description of measurement methods and procedures to be applied	See Module <i>CP-AB</i>
Frequency of monitoring/Recording:	See Module <i>CP-AB</i>
Value applied:	227.01 t CO ₂ -e ha ⁻¹
Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape and clinometer). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD-MF</i> or other VCS methodology that uses this module. In addition, details for biomass QA/QC and in the and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-AB</i>
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions

Calculation method:	Allometric equations in section 3.2.1 Baseline Emissions.
Comment:	To be determined <i>ex ante</i> when accounting of $GHG_{biomassburn,i,t}$ is included in the baseline scenario To be monitored when accounting of $GHG_{biomassburn,i,t}$ is included in the project scenario

Data Unit / Parameter:	$C_{DW,i}$
Data unit:	t CO ₂ e ha ⁻¹
Description:	Carbon stock in dead wood in the baseline in stratum <i>i</i>
Source of data:	NA - Module CP-D
Description of measurement methods and procedures to be applied	NA - See Module CP-D
Frequency of monitoring/Recording:	NA - See Module CP-D
Value applied:	0 t CO ₂ -e ha ⁻¹
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of REDDMF or other VCS methodology that uses this module
Justification of choice of data or description of measurement methods and procedures applied:	NA - Required for Module CP-D
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions
Calculation method:	N/A
Comment:	Not included as the pool has been determined to be <i>de minimis</i> . To be determined <i>ex ante</i> when accounting of $E_{biomassburn,i,t}$ is included in the baseline scenario To be monitored when accounting of $E_{biomassburn,i,t}$ is included in the project scenario

Data Unit / Parameter:	$C_{L,i}$
Data unit:	t CO ₂ e ha ⁻¹
Description:	Carbon stock in litter in the baseline in stratum <i>i</i>
Source of data:	Based on data measured in the field. Calculated based on equations in section 3.2.4
Description of measurement methods and procedures to be applied	See Module CP-L
Frequency of monitoring/Recording:	See Module CP-L

Value applied:	1.22 t CO ₂ -e ha ⁻¹
Monitoring equipment:	Forestry Equipment for measuring biomass (DBH tape and clinometer). Details of biomass measuring equipment are described in the SOP for Biomass Measurements.
QA/QC procedures to be applied:	See Section 9.3 of <i>REDD-MF</i> or other VCS methodology that uses this module. In addition, details for biomass QA/QC and in the and remote sensing data can be found in section 3.3.3 Monitoring Plan.
Justification of choice of data or description of measurement methods and procedures applied:	Required for Module <i>CP-L</i>
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions
Calculation method:	Equations provided in section 3.2.4
Comment:	To be determined <i>ex ante</i> when accounting of $E_{biomassburn,i,t}$ is included in the baseline scenario To be monitored when accounting of $E_{biomassburn,i,t}$ is included in the project scenario

Data Unit / Parameter:	V _{burn,i,t}
Data unit:	m ³ ha ⁻¹
Description:	Peat volume burnt in stratum <i>i</i> in year <i>t</i>
Source of data:	NA - Module <i>BL-PEAT</i> and <i>M-PEAT</i>
Description of measurement methods and procedures to be applied:	NA - See Modules <i>BL-PEAT</i> and <i>M-PEAT</i>
Frequency of monitoring/Recording:	NA - See Modules <i>BL-PEAT</i> and <i>M-PEAT</i>
Value applied:	0
Monitoring equipment:	N/A
QA/QC procedures to be applied:	NA - See Section 9.3 of <i>REDD+ MF</i> or other VCS methodology that uses this module.
Justification of choice of data or description of measurement methods and procedures applied:	NA - See Modules <i>BL-PEAT</i> and <i>M-PEAT</i>
Purpose of Data:	Calculation of baseline emissions Calculation of project emissions
Calculation method:	N/A
Comment:	Not included as there is no peat in the project area. To be determined <i>ex ante</i> when accounting of $GHG_{peatburn,i,t}$ is included in the baseline scenario To be monitored when accounting of $GHG_{peatburn,i,t}$ is included in the project scenario

3.3.3 Monitoring Plan

Climate data monitoring comes from three important data sources:

- 1) Biomass inventories
- 2) Spatial and remote sensing data and
- 3) Social data described in the Community Monitoring Report (Separate document)

These parameters will be monitored at each verification.

To measure the parameters for climate we have developed a standard operating procedure, which describes the steps to perform the monitoring in each verification event, including field measurements and the use of remote systems for Land Use Land Cover analysis.

3.3.3.1 Biomass Inventories

The following data is gathered each monitoring period. The biomass inventories are carried out in forest areas inside the Project Activity Instance. Field biomass inventories measure:

1. Aboveground live trees
2. Aboveground saplings
3. Litter
4. Soil carbon

Allometric equations are used to measure carbon in the following:

1. Aboveground and below tree biomass
2. Aboveground deadwood biomass

Samples are taken from the following to determine their carbon content:

1. Litter and understory vegetation
2. Soil

Other measurements include:

1. Canopy cover (landcover change/ RS analysis)
2. Description and location of the plot

As so much data is gathered through the biomass inventories there are many QA/QC procedures that verify that quality data is gathered. Specifically, the methods for measuring, recording, storing, aggregating, collating and reporting data are described below

Biomass inventories closely follow the Standard Operating Procedure (SOP) and are conducted by a biomass team, lead by a Field Crew Leader. The overall field-based measurements are lead by the local Forestry Experts at ERI or other experts overseen by the Project Partners. The Forestry Experts are ultimately responsible for the field-based biomass inventory, the quality of the data and accountable for biomass monitoring. Terra Global's foresters are responsible for final QA/QC of field-based data, carbon calculations and data storage.

The SOP is an official document that will be used to verify that the same measurement techniques will be conducted over time in a replicable manner and includes quality assurance. If new techniques or attainable technologies are more accurate than those listed in the SOP (i.e. updated, more accurate allometric equations, flying of LiDAR, etc.), then new techniques can be adopted, and will be described in the any future Monitoring Report in the section "Project Description Deviations" or "Methodology Deviations" if applicable. The biomass plots will be revisited and remeasured in the future, so that carbon increases or decreases will be measured. At minimum biomass sampling should happen at each verification event (frequency of monitoring). During validation and every subsequent verification VVBs will revisit plots to

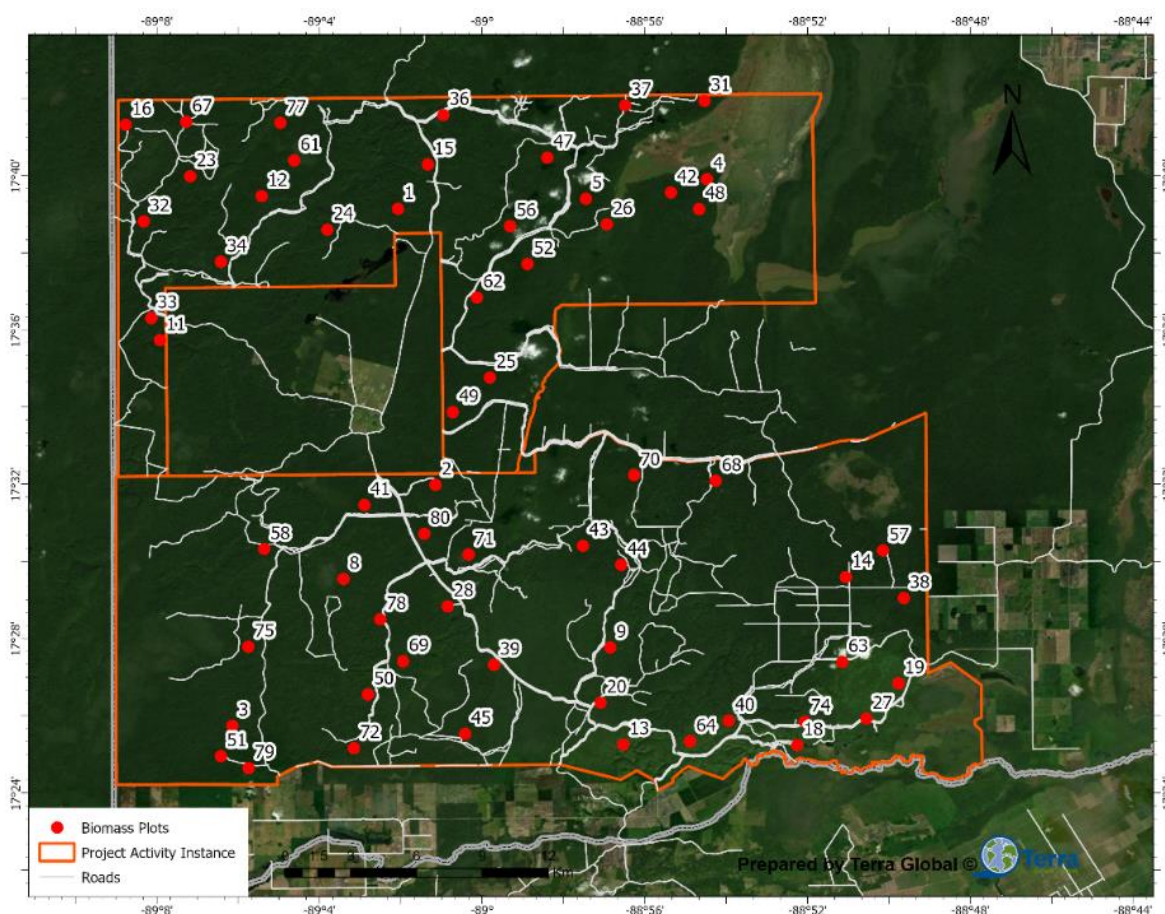
evaluate the accuracy of the methods used to ensure that carbon quantities are correctly reported. In the field, the each field crew leader is responsible for the data gathered, and when possible, geotagged photos are taken at plot location. Field data sheets clearly demarcate data to be gathered in the field and includes quality checks such as the Field Crew Leader signing-off on a plot being complete in the field as the field crew leader has oversight and accountability at the plot-level. .

To ensure comprehensive data quality control, a rigorous custody procedure is followed. Although there are numerous QA/QC procedures in the data collection overall, the data follows a procedure for safekeeping. Data from the field data sheets are put into MS Excel and the original sheets are held at the BMFT/TNC Office. Each datasheet is then scanned and combined with any photos in a single folder for each biomass plot. The person who recorded the data on the excel sheet is responsible for data entry, as handwritten data can be easily misinterpreted by someone else. These measures not only ensure data consistency but also support the reliability and robustness of the forest inventory results.

During the field data collection and when the data is entered into excel QA/QC procedures are in place to check for user error or incomplete data. This includes the use of Data Validation in Excel, where likely incorrect data receives an error message. Local Forestry Experts check the data before it is then stored both in the BMFT/TNC office as well as on Terra Global's servers. During the combination and carbon calculation stage as an internal auditing procedure, Terra Global's foresters within the GHG Quantification Team recheck the data and provide feedback if necessary. Terra Global's foresters must, at minimum, have a degree in Forestry or similar field or at least 5 years' experience. The local Forestry Experts conducting the field measurements must be competent in mensuration and have an understanding of the PIA(s) ecology. The field crew leader must have at least one year of experience in the field, conducting forest inventory. During each monitoring event, foresters leading the forest measurements must be retrained in the use of the SOP for biomass measurements. The full QA/QC checklist and the Biomass Inventory SOP are available to the VVB. All biomass data, photos of biomass plots and scans of biomass datasheets are stored on Terra Global servers for a minimum of 10 years.

For the biomass plots, the target precision levels must be obtained so that that uncertainty must be equal to the 95% confidence interval for the biomass pool. This procedure follows section 5.1 of the VCS Module VMD0017 Estimation of Uncertainty for REDD+ Project Activities (X-UNC).

The biomass plots were selected randomly using remote sensing and GIS procedures as well as selected for access from roads. The location of each forest biomass is known through recording GPS coordinates in the field and the sample site location are shown in Map 33. Biomass Plots Location. By ensuring that the location is known (marked by a painted PVC marker), the biomass plots can be revisited and remeasured in the future, so that forest growth or other increases in carbon pools can be monitored over time. Independent verifiers, VVBs will revisit plots and evaluate the accuracy of the methods used to ensure that carbon quantities are correctly reported.



Map 33. Biomass Plots Location

3.3.3.2 Spatial and Remote Sensing Data

The biomass plots are selected randomly using remote sensing and GIS procedures, as well as access from roads. The given area of each Project Activity Instance is also measured at project start and at each verification. The Project Activity Instance must be forest, so areas of any destructive disturbance must be monitored. Remote sensing systems will be employed to conduct on-site evaluations of disturbances reported by project entities. The primary disruptive event under monitoring is the occurrence hurricanes and fires, and to date, no incidents resulting in significant emissions have been recorded in the project area. However, during each verification, interviews will be conducted to assess the existence of fires and their relevance in the project area. Reporting of known loss events from hurricanes or fire will be the responsibility of BMFT. BMFT will document reported loss events (qualitative description) during the monitoring period. These will be reported at each monitoring event, where the data is shared with Terra Global. Remote Sensing Scientists at Terra Global, within the RS and GIS team will use the qualitative description to detect loss events through Remote Sensing, and if necessary, the location of the loss event will be checked on the ground by BMFT. The remote sensing scientist must be competent in GIS and have an understanding of the PIA(s). The final responsibility of QAQC of spatial and remotely sensed data will be the responsibility of Terra Global.

At each monitoring event, the area of each PAI will be evaluated to determine the amount of carbon emissions caused by fires or natural disturbances. The remote sensing system will leverage satellite imagery from each monitoring event to determine the affected area of the disturbance. The MMU for a loss event will be 30m or less and will be documented in a shapefile. This approach will enable a more precise

and efficient evaluation of identified disturbances, contributing to detailed and timely monitoring of potential events of interest, such as hurricanes and forest fires, in the project area. In the future, the integration of hand-held technologies will strengthen the project's comprehensive approach to monitoring and managing environmental disturbances. Terra Global is ultimately responsible for the oversight and accountability of monitoring activities relating to spatial and remotely sensed data.

In addition, the remote sensing scientist at Terra Global will work with the Terra Global forester to identify new biomass plots if necessary. This process will only be followed if areas are found to be degraded within BMF through loss events such as fires or natural disturbances like hurricanes, as described above. If though remote sensing, these degraded areas are identified as unique strata within BMF. The remote sensing scientist will add new biomass plots. Through remote sensing, stratified random sampling techniques are used to identify locations of biomass plots - this is a simple GIS procedure where random plots are assigned to each strata. The CDM A/R Methodological Tool "Calculation of the number of sample plots for measurements within CDM A/R project activities" Version 2.1.0 or later maybe use to identify the number of plots.

3.3.3.1 Social Data on Fuelwood Use

The issue of possible degradation due to illegal fuelwood collection will be addressed through community interviews (household surveys or Participatory Rural Appraisals). This work will continue to be completed by UB-ERI or another contractor, and led by a social scientist. The social scientist must be competent in conducting social surveys and understanding the local communities natural resource use and extraction. These social survey activities are overseen or otherwise approved by BMFT, and will take place during each monitoring period. Terra Global is ultimately responsible for the oversight and accountability of monitoring activities for Social Surveys relating to fuelwood collection. For more information on social surveys, see the BMF CCB Monitoring Plan.

3.3.4 Dissemination of Monitoring Plan and Results (CL4.2)

As per the requirements for all conservation projects, the information regarding the project will be shared with stakeholders through in-person communication, phone calls, online platforms and direct email communication. BMFT will hold several community meetings, as well as UB ERI will be in communication with all relevant stakeholders to present the VCS/ CCB Project Document, gather feedback and notify them of the 30-day comment period, so that they could submit commits privately to the CCB via the website <https://verra.org/programs/ccbs/>. All relevant public comments submitted to the CCB during the public comment period will be addressed.

3.4 Optional Criterion: Climate Change Adaptation Benefits

Not applicable.

3.4.1 Regional Climate Change Scenarios (GL1.1)

Not applicable.

3.4.2 Climate Change Impacts (GL1.2)

Not applicable.

3.4.3 Measures Needed and Designed for Adaptation (GL1.3)

Not applicable.

4 COMMUNITY

4.1 Without-Project Community Scenario

4.1.1 Descriptions of Communities at Project Start (CM1.1)

4.1.1.1 Socioeconomic Information in the Project Zone

Belize was the home to several Mayan city states until their decline at the end of the first millennium A.D. The British and Spanish exploited the region in the 17th and 18th centuries, and it became a formal colony of British Honduras in 1862. Cutting Guatemala off to their Caribbean coastline, disputes with the UK pushed back its independence until 1981. At 22,966 sq km, Belize is the only country in Central America without a coastline on the north Pacific Ocean. The climate is tropical, hot and humid with a rainy season from May to November and a dry season from February to May. The terrain is flat, swampy, coastal plains, with some low mountain ranges in the southern part of the country. Natural resources that the country boasts include arable land, timber, fish, and hydropower. 60.6% of the land use is forested and 6.9% is in agriculture (Central Intelligence Agency, 2022).

The country population, as of July 2020, was 399,598 with 41% of the population living below the poverty line (Central Intelligence Agency, 2022). Ethnic groups include Mestizo 52.9%, Creole 25.9%, Maya 11.3 %, Garifuna 6.1%, East Indian 3.9%, Mennonite 3.6% (Central Intelligence Agency, 2022). The official language is English, with slightly more Spanish speakers in the country and other common languages are Creole, Maya, German, and Garifuna (Central Intelligence Agency, 2022). The main two religions are Catholic at 40% and Protestant at 31.5% (Central Intelligence Agency, 2022). Although these statistics are at a national level, they are also representative of the communities living in the Project Zone.

Belize is part of many international protocols, including those on biodiversity, climate change, Kyoto Protocol, desertification, endangered species, hazardous wastes, law of the sea, ozone layer protection, ship pollution, wetlands, and whaling (Central Intelligence Agency, 2022).

Tourism is the highest-ranking foreign exchange earner for Belize. The Project Activity Instance is located in the same district as Lamanai, a prominent archaeological site that is a popular destination for cruise tourists. Within the Project Activity Instance is Chan Chich Lodge, a luxury eco-lodge that conducts tours within the project site, particularly bird watching tours.

In addition to tourism, agriculture makes up 6.9% of land use with 1.4% permanent crops and 2.2% permanent pasture. This is due to the agriculture-based exports as the key industry in Belize with animal feed exports continually increasing (Statistical Institute of Belize, 2022). Main agricultural crops include bananas, cacao, citrus, sugar cane, and in terms of other productions fish, cultured shrimp and lumber (Statistical Institute of Belize, 2022). Along the southwestern border of the project site are agricultural fields and there is increasing pressure for expansion along the southeastern corner (Statistical Institute of Belize, 2022).

Belize is located in the Caribbean hurricane belt and subject to the impacts of climate change including increasing intensity of storms, rainfall and winds. The project site is located along the border of Guatemala and due to the mountainous terrain (see Map 1 and Map 15), the lower lying areas are prone to flooding. Three main rivers of Belize, the Hodo, New and Belmopan, have headwaters in or cross through the project area (Boles, 1999). The Hodo, New and Belmopan Rivers all flow into Belize's Barrier Reef Reserve System (BBRRS), which was inscribed as a UNESCO World Heritage Site in 1996 (UNESCO, 1996). Main environmental concerns for the project site as described by many communities in the Project Zone include deforestation and the resulting impacts of erosion, soil loss, flooding, contamination of water courses from agricultural runoff (PRA, 2022) further contributing to the pollution and degradation of Belize's barrier reef system.

Belize, despite its relatively small land area, places significant emphasis on the agriculture and tourism sectors, underscoring the importance of strategic land management and planning. This is crucial for ensuring sustainable development in the country over the long term. The Belize Maya Forest holds a pivotal

role in preserving the forests and natural resources that are essential for the livelihoods of local communities, particularly in terms of traditional practices like agriculture. The communities in the Project Zone are primarily farming communities, highlighting the significance of sustainable land use practices (Appendix 1: Stakeholder Identification Table).

Furthermore, the Belize Maya Forest Trust actively engages community members in the adoption of regenerative farming techniques, which aim to enhance soil health and optimize the use of freshwater resources. This not only benefits the local communities but also contributes to the overall conservation efforts within the forest. Community members have shown interest in diversifying their income streams through tourism, making it a promising avenue for economic development in the region. The organization supports the growth of stakeholder communities in the tourism industry, offering opportunities for capacity building in this sector.

4.1.1.2 Gender Roles, Women and Poverty in Belize

Gender roles in Belize are traditional, with substantial value placed on marriage and childbearing for women. Belizean women are often expected to stay home and look after the children, while men are the primary main source of income. In families living in poverty, women often depend on men for economic stability. The rate of the employed population older than 15 and living under the international poverty line in Belize falls at 8.8% for women and 11.3% for men. However, the U.N. Women Count Data Hub finds that Belize's unemployment rate for people older than 15 is 9.8% for women, but only 4.6% for men (Utsey, C., 2021).

Regarding political representation, women held 12.5% of the seats in the nation's parliament as of February 2021. Women in Belize also face mistreatment in the workforce, earning "only 56% of the income" earned by their male counterparts (Utsey, C., 2021). Yet, in terms of literacy rates for people older than 15, Belizean men and women are on par at 70.3% (Utsey, C., 2021). Belize's gender gap is often attributed to chauvinistic societal standards that favor men and traditional masculinity (Utsey, C., 2021). Additionally, the lack of gender-based data makes it difficult to assess the true state of women's rights in Belize (Utsey, C., 2021). Only about 37% of the data needed to monitor sectors such as unpaid domestic work and violence against women was available as of December 2020 (Utsey, C., 2021)

Belize has a comparatively high rate of poverty. While 41% of the general population is affected, up to 50% of Belizean children under age 15 are classified as poor-58% of Belize's youth under 18 are classified as multi-dimensionally poor (UNICEF, n.d.)

Within communities that are predominantly Mennonite, gender roles are mostly shaped by the partocracy system, leading to the marginalization and vulnerability of women, youth, and children to poverty and other social needs. Men typically hold most leadership positions and dominate discussions in meetings, with women often present but not actively participating in decision-making processes, especially evident in Mennonite communities. This is typical of the stakeholder Mennonite communities of this project.

In contrast, Hispanic and immigrant communities show a slightly different dynamic, where women and youth are more visible and have some opportunities to contribute to decision-making processes. The organization has recognized this disparity and has strategically worked towards involving women in initiatives that do not conflict with their existing roles and responsibilities within their homes and communities. By emphasizing the empowerment of women and ensuring that the initiatives they are involved in are culturally relevant, the organization aims to provide equal opportunities, employment support, income support, and capacity building opportunities. All programs within the organization are designed to be inclusive of women, youth, and men, with a focus on addressing their specific needs to reduce barriers to participation. This is typical of the stakeholder Hispanic and immigrant communities of this project.

4.1.1.3 Demand for Natural Resources in Belize

Forestry activity was the main economic activity in Belize for more than 300 years, but its importance has decreased in the last 40 years due to the growth of agricultural activity, based on products for export (sugar cane, citrus, mango, papaya, banana, cocoa). Despite the importance of forestry activity in the past, logging was highly selective, that is, it focused only on species with the best market prices (at a rate of two to three trees per acre). Therefore, in 2020 approximately 56% percent of the Belizean territory remains under forest

cover, a loss of 5% forest cover in 10 years (World Bank, 2023). The composition of the forest is little known due to technical restrictions in the country, such as inadequate information and lack of definition for the different types of vegetation (FRA, 2000)

Belize's forests are rich in biodiversity, with approximately 121 species of mammals, 599 species of birds³¹, 107 species of reptiles, and 26 species of amphibians. Although the largest contribution of forests to the economy has been the production of wood, they also provide a substantial amount of products, many of them sold in the national and international markets, with an important effect on the domestic economy. (FRA, 2000)

Tourism is already a major industry in Belize, making up 40% of the country's GDP. Therefore, ecotourism is an activity that could have a viable economic growth. However, the major threats to forests and biodiversity in Belize include illegal logging, illegal hunting and fishing, wildfires, agricultural encroachment, and illegal crop cultivation. Moreover, there has been an increase in illegal activities, especially illegal hunting, which needs to be urgently addressed to preserve the integrity of the zone (Global Conservation, 2022)

Belize's socioeconomic status and overall well-being are intricately tied to its natural resources, which play a vital role in sustaining the health and livelihoods of its people. The Belize Maya Forest REDD+ Project acknowledges the critical importance of forests in meeting the basic needs of all living beings, including access to clean air, water sources, fertile soils, and a well-balanced ecosystem. The Belize Maya Forest is home to two major freshwater sources, the Belize River and the Rio Hondo River, and is a part of the larger Selva Maya region. By protecting these forests, the organization not only establishes a conservation and development model that benefits the stakeholder communities but also extends its positive impact to neighboring local communities.

Through the preservation of these vital natural resources, the Belize Maya Forest REDD+ Project ensures the sustainability of the ecosystem, contributing to the overall well-being and prosperity of Belize as a whole. The project's efforts are crucial in maintaining the delicate balance between human development and environmental conservation, paving the way for a more sustainable future for generations to come.

4.1.1.4 Project Zone Instance Communities

The Belize Maya Forest REDD+ Project is working with eight legally recognized villages that are situated near the Belize Maya Forest area, along with a private community for workers of Gallon Jug. These villages include Spanish Lookout, Blue Creek, San Felipe, Yalbac Village, La Gracia, Valley of Peace, Los Tambos, Buena Vista, and Sylvester Village (as described in section 2.1.6). As the demand for agricultural land increases, the villages south of the Project Activity Instance have been experiencing some changes as described below.

In June 2022, ERI conducted a series of Participatory Rural Appraisal (PRAs) and in 2021 Household surveys (HH) in the communities in the Project Zone. These group discussions and informal interviews asked community members about natural resource use and extraction, community wellbeing, and the BMF Project itself so that valuable feedback can be built into the BMF Project Design. In addition, the Conservation Action Plan (CAP) designed over many years includes valuable feedback from communities (see Section 2.1, Project Goals, Design and Long-Term Viability). Community members identified well-being as having access to community services such as school and clinics. All communities have access to schools and clinics, but some are far away from the communities or the community members' house (PRA, 2022). Some people reported that while there is access to schools, they believe they are of low quality. Ninety percent of the communities reported that schools teach about the importance of environmental conservation (Household Survey, 2021). For well-being communities also reported about the chemical pesticides and burning of biomass in the area maybe making them sick or contaminating water sources (PRA, 2022). Healthy water sources are very important to all the communities as most community members farm or work in the farming sector (Household Survey, 2021). General population trends of the communities in the Project Zone are described below and are described in more detail in Section 2.1, specifically Section

³¹ <https://ebird.org/region/BZ>

2.1.6.1 describes all communities in relation to BMF. In addition, Section 6.1 Appendix 1: Stakeholder Identification Table includes further descriptions of community stakeholders.

Spanish Lookout

Spanish Lookout Mennonite community was established in 1958, Mennonite families migrate to Belize from Canada and Mexico in search of fertile soils. Today the community consists of an estimate population of 2,266 and 482 households. Recent development in the village has caused several families to return to Canada or migrate to other countries. However, new families from around the area also moved in, and are now required to apply to settle in the village. Over time, the community has been able to acquire several pieces of land near the original settlement, including the Mischer and Howell estate, and some land in the Castille and Meditation area. Satellite imagery shows a more developed land than before, but less in the far northwestern corner, where much of the natural vegetation is still present. Landowners claim that eventually all this area will be converted through salvage logging (extraction of all the lumber with some economic value), clearing remaining vegetation, and burning of debris.

Yalbac Village

Yalbac village was established in the 1860's primarily by Mestizo descendants. Since then, there has been strong population growth in this village, and a third of households are involved in some form of agriculture. Other relevant economic activities include shop ownership and formal employment (lodge). It is connected by road to the Valley of Peace village, which is about 13 km away. Even with these road networks, Yalbac is considered remote and employment opportunities besides agriculture are scarce.

La Gracia

La Gracia has experienced a strong growth in the population. The population increased 163% over the period 2000-2010, while the number of families only increased in 113%, resulting in larger families. As was noted under Yalbac village, the growing population of La Gracia will need future development opportunities.

Valley of Peace

Valley of Peace community was established in 1982 as a refugee community for immigrants fleeing from the Salvadoran Civil War, and other Central American immigrants from Honduras and Guatemala, joined the community during the same time. The United Nations High Commissioner for Refugees (UNHCR) implemented a project to assist the immigrants to find a peaceful and safe place to live; hence the community's name of 'Valley of Peace'. The inhabitants recently completed the Agripino Cawich Bridge that replaced the ferry over the Belize River, offering a more reliable connection to Belmopan. An increased number of bus runs offers students and wage laborers the opportunity to commute to Belmopan daily. Agriculture remains an important economic activity in the village. In 2011, extensive wildfires raged the land north of Valley of Peace. The majority of these fires originated from the efforts of farmers clearing their land to prepare new areas without controlling the fires to prevent the expansion into neighboring properties. These fires devastated extensive areas of the Yalbac property.

Los Tambos

Los Tambos' population has doubled in size more recently, with the number of households and the average household size all increasing. With the increase in demand there is more intensification of agriculture namely clearing of land for agricultural production. There is little natural vegetation surrounding this village, and it is expected to merge with Spanish Lookout economically and geographically in the future.

Buena Vista

Buena Vista was established in 1992. Proximity to the George Price Highway and SLO, in combination with the improved steel bridge over the Belize River, offered residents the option to attend advanced education in Belmopan or San Ignacio, and to find employment outside their village. Although not visible from the main road, north of the road is a small subdivision for 40-50 house lots.

Blue Creek

Blue Creek Community was established in 1958, located in the Orange Walk District of Belize. Situated along the Blue Creek River, which serves as the border with Mexico, this Mennonite settlement is predominantly inhabited by Russian Mennonites who speak Plautdietsch. According to the 2010 census, the village had a population of 407 individuals residing in 111 households.

San Felipe

Situated in the Orange Walk District of Belize, San Felipe was established in 80's and is predominantly known for its Mestizo heritage. The community relies heavily on the neighboring Mennonite community of Blue Creek for employment opportunities. Many individuals from San Felipe find work in various Mennonite enterprises, while others engage in farming and pursue different professions as their primary sources of income. As per the 2010 census, San Felipe is home to a population of 1,499 individuals residing in 332 households.

Sylvester

Sylvester Village, nestled within the Gallon Jug Estate, is a private community established in the 1980's primarily made up of estate employees. The Gallon Jug Estate is known for its diverse business ventures, such as grass-fed cattle, shade-grown bird-friendly artisan coffee, handmade sauces, and the renowned Chan Chich Lodge. As per the 2024 management data, Sylvester Village boasted a population of 58 residents living in 22 households.

4.1.2 Interactions Between Communities and Community Groups (CM1.1)

In communities such as Buena Vista, Los Tambos, Valley of Peace, La Gracia, Yalbac and San Felipe, an authorizing body of typically seven members, recognized as the village council, is elected through a democratic process, that is governed by the Village Councils Act of Belize. Members of the village councils for each community are voted for by registered and eligible voters from the respective villages. The village councils play an important role in promoting the development and well-being of the village and its residents. Some of the responsibilities of the village council consists of the administration of village affairs, planning and development, collection and management of revenue from taxes and fees, as well as representation of the village. In the case of Blue Creek and Spanish Lookout, their councils do not operate according to the Village Councils Act; however, they do similarly function as an authorizing body for their respective communities.

The village councils in Belize serve as the link between the local community members and the national government. It is mandatory for the council to convene at least once every quarter and they possess discretionary powers to appoint committees. The decisions made by the village committees are subject to the council's approval. Each community council organizes community meetings and takes charge of the development initiatives within their respective communities. The council leaders hold formal meetings with district council leaders in collaboration with the Ministry of Rural Transformation, Community Development, Labour, and Local Government. The community leaders exercise some decision-making authority and autonomy but relies central government for resources especially for infrastructural development and land distribution.

In the case of the Mennonite community, their council engages with the government but has the resource for its community development including infrastructure and for land acquisition for housing and farm development, for example and relying on government support more for policies that enable their development plans.

The agro-businesses and other businesses within the communities of Spanish Lookout and Blue Creek serve as significant sources of employment for many other communities. The interactions between individuals are primarily professional in nature. However, in the case of Blue Creek and San Felipe, there are deep personal connections beyond the workplace, including marriages, friendships, and partnerships. Blue Creek also engages with the Spanish Lookout community, although the influence on ideas is minimal.

The various stakeholder communities exhibit a high level of interconnectedness with one another, fostering strong relationships based on friendship, family, and partnership. La Gracia and Valley of Peace, for instance, have established robust agrobusiness partnerships, collaborating to ensure the successful sale of their agricultural produce in the most lucrative markets. Yalbac, shares close ties with Los Tambos and La Gracia, are familial or friendship circles. Additionally, the children of Yalbac often commute to La Gracia primary school for education, strengthening the bond between these communities.

Buena Vista community's connections are deeply rooted in its relationships with Spanish Lookout, primarily driven by employment opportunities, they are also connected to La Gracia through friendships and familial connections. In contrast, Sylvester stands out as the community with the least amount of interaction with the other stakeholder communities, largely due to its geographical location and the predominant relationships its members maintain with the northern region of Belize.

The Valley of Peace community, situated near the city of Belmopan, serves as the primary source of fruits and vegetables for the city market. Through the establishment of cooperatives, farmers in this area have been able to efficiently manage their crops and land. These cooperatives work closely with various organizations and the government of Belize to advocate for development benefits that would positively impact the farmers in the community. Notably, this community stands out as the sole community with organized groups, aside from the Mennonite communities, which further highlights their commitment to collaboration and progress.

4.1.3 High Conservation Values (CM1.2)

The following community related HCV areas are found in the Project Zone Instance. The BMFT took a participatory planning process with 136 stakeholders to develop the Conservation Action Plan (CAP) for the Belize Maya Forest. Through this process, stakeholders identified the Cara Blanca Pools as one of the four conservation targets due to their cultural value. Similarly, the stakeholders identified looting or archeological sites as cultural value under a concern or threat. The Cara Blanca Pools are also considered archeological sites as there is documented ritual use of them by the ancient Maya. Strategies for the CAP are designed to improve the conservation targets or reduce the threats to them.

According to the HCV Network the definition of the **cultural value** under the HCV categories is: sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

High Conservation Value	Cara Blanca Pools
Qualifying Attribute	The Cara Blanca Pools are a system of 25 freshwater lakes and cenotes or water-filled karstic sinkholes fed by groundwater, resulting in perennial water. There is evidence of ritual use of the pools by the ancient Maya.
Focal Area	The Sacred Pools of Cara Blanca are located in the Yalbac parcel of the BMF.

High Conservation Value	Archeological Sites
Qualifying Attribute	In the Project Activity Instance are identified 21 Mayan archeological sites that represent the history of the country
Focal Area	The archeological sites are in both the Laguna Seca and Yalbac parcels of the BMF.

4.1.4 Without-Project Scenario: Community (CM1.3)

Due to the natural conditions of the Project Activity Instance, that make it suitable for agriculture, the property was under consideration for sale to an agricultural land holder which would result in the clearing of the land for agricultural production. The clearing of the land for agricultural production would result in local extinction and wildlife habitat displacement, loss of ecosystem services and contamination to the water courses from runoff. Without the project, the communities would be more vulnerable to natural hazards that are mitigated by the forest, like hurricane damage, flooding, and human-wildlife conflicts. The exposure to natural hazards will make the vulnerable populations of Belize fall further into poverty. Currently the vulnerable people of Belize include female headed households with a weekly income less than \$150; male headed households with a weekly income less than \$150; head of household with less than six years of schooling and households that utilize solid fuel as the source for cooking and heating energy. This includes the indicators of poverty outlined by the Multidimensional Poverty Index (OPHI, 2022).

In absence of the project, the land would be sold to support the expansion of current private agricultural production. To the south and the east of the project site, there are parcels of agricultural land and as the sector grows, forested areas would be cleared to accommodate agricultural land expansion. Increased clearing of the land along this key biodiversity area and biological corridor will foster human-animal conflicts resulting in the loss of species.

Protecting these valuable resources can only be accomplished by engaging with communities to find reliable and non-destructive sources of income, paired with conservation education, and increased access to services which can propel the project towards success.

4.2 Net Positive Community Impacts

4.2.1 Expected Community Impacts (CM2.1)

The communities around the Project Activity Instance will be impacted by project activities. Barriers and risks that may prevent benefits from reaching these more marginalized households or vulnerable groups is managed by gathering critical data, such as access to resources in the Project Activity Instance.

Terra Global and UB ERI have identified low income and low educational attainment households through a social survey conducted in June of 2022. Through this analysis, we can determine the well-being impacts on these groups more fully and mitigate any negative impacts that occur.

4.2.1.1 Indicator 1: Climate Smart Farming Practices in BMF Communities

Community Group	Members from the stakeholder communities as well as agricultural communities within adjoining districts
Impact	In collaboration with national partners, farmers exchange and training programs would be developed to promote the use of climate-smart agriculture practices and regenerative agriculture. Model regenerative/climate smart agriculture farms will be identified, and their development assisted during the project. We expect an average of (3) members from each of BMFT's nine (9) stakeholder communities to participate in training opportunities for regenerative agriculture with at least seven (7) being women, of a total of 27 members. These values were estimated based on the initial workplan, capacity of implementation, previous experience, cultural factors and budget.
Type of Benefit/Cost/Risk	The impact was predicted, direct and benefit to these mentioned communities.

Change in Well-being	Well-being indicator 2.1 income levels, variability over time, distribution within society; 4.2 educational level, skills; 1.4 soil, water, rangeland, quality are met with this metric. Please see a comprehensive list of well-being indicators in Section 4.1.2 Negative Community Impact Mitigation (CM2.2) With an emphasis on reducing the use of pesticides and adoption of regenerative agriculture practices, this indicator contributes to an improvement of natural capital, financial capital and human capital.

4.2.1.2 Indicator 2: Maintain ecosystems and carbon stock of BMF

Community Group	Members from stakeholder communities and national partners
Impact	The participation in joint patrols and trainings to support the improvement of surveillance and monitoring in BMF and by extension the Selva Maya Landscape in Belize. This will also promote information sharing on the illegal activities within the BMF with relevant national partners to support maintenance of predator and prey populations as well as their biological corridors. This will be complemented by the Community Stewardship Program that will include microgrants, skills training and scholarships. This will mitigate potential impacts described in Section 4.2.2
Type of Benefit/Cost/Risk	The impact was predicted, direct and benefit to these mentioned communities.
Change in Well-being	Well-being indicator 4.2 educational level, skills and 1.5 biodiversity are met with this metric. Please see a comprehensive list of well-being indicators in Section 4.2.2 Negative Community Impact Mitigation (CM2.2) The capacity building of the project would increase the educational level and monitoring capabilities of the rangers by increasing their knowledge of the species in the BMF and their understanding of the interactions between predator and prey populations. Contributing to the improvement of human capital and natural capital.

4.2.1.3 Indicator 3: Fire management system in BMF

Community Group	Members from the stakeholder communities and other nearby conservation initiatives/partners

Impact	Belize Maya Forest rangers, local community members and other conservation partners are to be engaged in collaborative fire management activities including dissemination of existing fire threat and weather monitoring tools to determine red flag days for fire; development of fire management SOPs, mapping areas for tactical fire intervention, opening of fire lines and controlled burns, collaboration with neighbors and partners on burn plans and fire safety to prevent escaped fires. Rangers (field crews) will be provided training and equipment (helmets, gloves, protective clothing) to protect from heat related events when managing fire. Capacity building in fire management would reduce the instances of the damage to property and loss of resources in the forest areas. This addresses the forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction) in BMF. We expect an average of (2) members from each of BMFT's nine (9) stakeholder communities to participate in training opportunities for fire management, totaling 18 members This number was estimated based on the initial workplan, capacity of implementation, previous experience, cultural factors and budget.
Type of Benefit/Cost/Risk	The impact was predicted, direct and benefit to these mentioned communities.
Change in Well-being	Well-being indicator 1.4 Soil, water, rangeland, quality and 1.5 Biodiversity are met with this metric. Please see a comprehensive list of well-being indicators in section 4.1.2 Negative Community Impact Mitigation (CM2.2) By promoting fire management in the Project Activity Instance, it will reduce the loss of forest and biodiversity due to wildfires in the drought season contributing to improvement of natural capital.

4.2.2 Negative Community Impact Mitigation (CM2.2)

The Belize Maya Forest REDD+ Project seeks to transition communities nearby from unsustainable natural resource use to sustainable systems. No negative community impacts are expected, although there could be a risk to communities who were conducting illegal activities in the area, such as hunting. A comprehensive description of possible mitigation approaches is described in Table 46.

Table 46. Potential negative community Impacts and Mitigation Actions

Potential Negative Community Impact	BMFT Mitigation Activity
Increased negative perception of conservation programs restricting subsistence income	- Awareness programs would include building knowledge on ecosystem benefits to conservation activities - Skills training activities will allow for increased knowledge of income generating opportunities, particularly with women. At least eight (8) women will be provided skills training over the life of the project. - Educational scholarships, targeted to include women, will be provided to community members to increase accessibility to

Potential Negative Community Impact	BMFT Mitigation Activity
	income generating opportunities. BMFT expects to assist at 10 community members, at least half who will be women, with educational scholarships, specifically for high school and vocational certificates. BMFT will advertise the scholarship opportunities in the 9 villages and select the best candidates based on merit, interest and potential. - Access to microgrants and temporary contracts, targeted at including women, will aid community members in attaining subsistence income and/or to implement regenerative agricultural practices to aid in improving their livelihoods. The project expects to positively impact the livelihoods of at least 10 community members, half of which will be women. - Number of members/ women was estimated based on the initial workplan, capacity of implementation, previous experience, cultural factors and budget
Negative perception regarding access to areas of high conservation value (HCVs) within project site	- Eliminating access to the site for illegal activities is necessary and will be accomplished through a ranger team of at least 12, but to address concerns of lack of access, BMFT will consult with community members to build their awareness of the impact of the removal of forest resources and work over time to assist visitation for educational and outreach purposes. BMFT will hire at least three (3) program staff who will guide the work of the rangers as well as community outreach and initiatives including at least two (2) women. - Number of staff was estimated based on the initial workplan, capacity of implementation, previous experience, cultural factors and budget
Negative views on converting from traditional agriculture to climate smart agriculture	- Assist the development of model farms to promote the benefits of climate smart agriculture - Assist the creation or enhancement of value chain partnerships

4.2.3 Net Positive Community Well-Being (CM2.3, GL1.4)

The overwhelming impact to communities is expected to be positive. Well-being indicators demonstrate how community well-being is impacted positively through program activities, based on the results of that impact indicator. Table 47 was adopted from the Sustainable Rural Livelihood (SRL) Framework from *A Framework for Research on Sustainability Indicators for Agriculture and Rural Livelihoods* by Phil Woodhouse, David Howlett and Dan Rigby (Phil Woodhouse, February 2000) and used to demonstrate the significant benefits this project produced for the local communities. By determining how many communities or households gained access to biodiversity, roads, electricity and water, educational attainment, employment and higher incomes, we see an overall positive trend in the well-being indicators being impacted by Project Activities.

The project's community impact indicators are mapped to the community well-being indicators described in Table 47 and are used to determine the overall well-being impacts on the communities in the Project Activity Instance. By focusing on well-being as defined as natural, physical, human, financial and social capital, we can determine the positive well-being impacts derived from the implementation of project activities.

Table 47. Well-being Indicators

#	Component of Human Well-being	#	Indicators of Human Well-Being	Map to Community Impact Indicators
1	Natural capital:	1.1	Access to land, water, grazing.	N/A
		1.2	Ownership of herds, trees	N/A
		1.3	Productivity (per unit of land, per unit of water, per unit of inputs)	N/A
		1.4	Soil, water, rangeland, quality	N/A
		1.5	Biodiversity	N/A
2	Financial capital	2.1	Income levels, variability over time, distribution within society	n/a
		2.2	Financial savings, access to credit	N/A
		2.3	Debt levels	N/A
3	Physical capital	3.1	Access to roads, electricity, piped water	Indicator 2, Indicator 4
		3.2	Ownership/access to productive equipment (oxen, tractor, irrigation pump etc.)	Indicator 3
		3.3	Housing quality	Indicator 3
4	Human capital	4.1	Total labor	N/A
		4.2	Educational level, skills	Indicator 2, Indicator 4
		4.3	Health levels	N/A
5	Social capital	5.1	Membership of organizations	N/A
		5.2	Support from kin, friends	N/A
		5.3	Accountability of elected representation	N/A

Source: (Phil Woodhouse, February 2000)

4.2.4 High Conservation Values Protected (CM2.4)

There are sites of special cultural, ecological, economic, religious or spiritual significance present on the Laguna Seca parcel of BMF. These sites include Qualm Hill, the seasonal headquarters of the British Honduras Company and Kaxil Uinic, the settlement of Caste War refugees/chiclero camp. Both of these sites were subject to excavations during the 2015 Chan Chich Archaeological Project. There are also various ancient Mayan sites that have been located, and previous forest management plans and licenses specify that activities near these sites must be regulated in the event they are encountered during operations.

While there are numerous archaeological sites within the Yalbac parcel of the BMF, the zone most researched is in the southern edge of the Yalbac property, not the northern edge bordering the Laguna Seca land. However, Hoyuk and Kaxil vinic are two identified sites, that are just south of the boundary with Gallon Jug. San Jose and Mundiejo are two sites in the northeastern portion of the Yalbac (near the border of Laguna Seca). There are likely many more remains undiscovered in the region (Boomsma T. , Socio-economic assessment of YRCC Stakeholders-Including Laguna Seca, 2013).

Ancient Mayan sites (plazas, ruins, cenotes, causeways) are very common throughout the area. Historically, looting of Mayan archaeological sites was common. The patrols carried out as a project activity prevent illegal activities and maintain existing high-quality habitats and cultural sites (2021 Household Survey, 2021).

Significant conservation areas near the Project Activity Instance include the Rio Bravo Conservation Area, which makes part of the Mesoamerican Biological Corridor, and is considered a biodiversity hotspot. The Project Activity Instance includes IUCN listed species, identified in section 5.

4.3 Other Stakeholder Impacts

4.3.1 Impacts on Other Stakeholders (CM3.1)

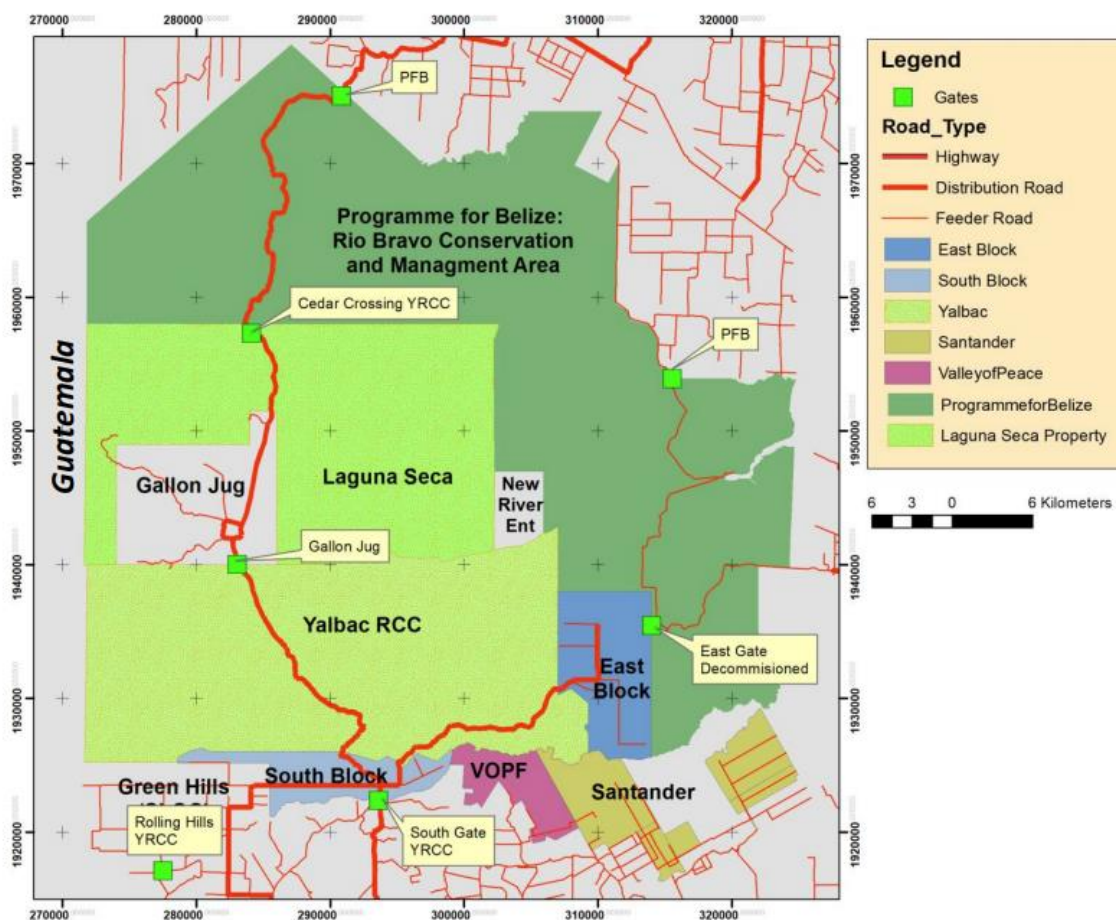
The protection of water and water quality from BMF's watershed protection function will have a significant impact across multiple watersheds reaching communities and stakeholders far beyond the project zone. In addition, preservation of cultural sites including the Sacred Cara Blanca Pools will ensure these are conserved for generations.

4.3.2 Mitigation of Negative Impacts on Other Stakeholders (CM3.2)

BMFT is acquainted with the managers of neighboring private lands, including Gallon Jug farm, Valley of Peace Farms Ltd., Rio Bravo Conservation and Management Area and the Spanish Lookout Community, and is in communication with them, usually by phone and Whatsapp to discuss any issues they may have due to BMFT's activities.

4.3.3 Net Impacts on Other Stakeholders (CM3.3)

The land use activities in the Project Activity Instance will not have a negative impact on the neighboring stakeholders. The project activities will seek to protect the natural environment, including improving watershed quality, biodiversity of tree, plant and animal species, and decrease in illegal activities, such as hunting, poaching and timber harvesting, which ultimately provides benefits to neighboring stakeholders and communities (Boomsma, 2019). Map 34 shows the neighboring stakeholders and how the transportation of timber from Laguna Seca could impact these areas.



Map 34. Yalbac and Laguna Seca and Surrounding Landholdings, Access Roads, and Gates

Grey area are private land holdings. South Block and East Block were once owned by TFC and sold to private agricultural communities. Santander and Vally of Peace are also private lands owned by agricultural communities. The Rio Bravo Conservation and Management Area (RBCMA) is a private reserve to conserve forested land and other natural ecosystems threatened with deforestation and fragmentation (Program for Belize , 2014).

4.4 Community Impact Monitoring

4.4.1 Community Monitoring Plan (CM4.1, CM4.2, GL1.4, GL2.2, GL2.3, GL2.5)

Community monitoring is described in the BMF CCB Monitoring Plan, which follows adaptive management. The BMF CCB Monitoring Plan describes Monitoring Parameters in detail and is a standalone document, which is publicly available on the Verra Website for the BMF Project. The BMF CCB Monitoring Plan is created in parallel with this PD and has been disseminated with the PD, in both languages, English and Spanish.

Monitoring will occur at specified intervals, with impact monitoring conducted once each verification period (every two years) and operational performance monitoring conducted on an ongoing basis with biannual reports. The monitoring variables are directly linked to the project's objectives for communities, as defined in the monitoring plan, ensuring a comprehensive assessment of the project's impact on community well-being, including differentiated impacts on various community groups.

Project specific indicators that have been identified to be monitored include adoption and training on climate-smart farming practices, specific data to be collected for this indicator include the number of training sessions conducted and community members reporting adoption of practices in the HH surveys.

For maintaining healthy ecosystems, the project will be conducting conservation workshops, the specific data associated with this indicator include number of training sessions conducted and getting community feedback through the use of PRAs in monitoring periods. To evaluate the effectiveness of measures taken to maintain or enhance high conservation values (HCVs) related to community well-being, the plan includes regular assessments of cultural and environmental HCV areas such as the Cara Blanca Pools. Metrics for this include water quality, evidence of human activity, and the conservation status of culturally significant sites, with activities such as regular water quality testing, community patrols, and educational workshops on conservation practices. The monitoring plan follows an adaptive management approach, allowing for continuous improvement based on monitoring results and community feedback, ensuring the plan remains responsive to new insights and changes in project implementation

As the community will also be involved in the fire management indicator data on community awareness and engagement in trainings on fire line, controlled burns and equipment use will also be captured in the operational reports and HH surveys.

This Monitoring Plan has been sensitized with the communities and was disseminated with the draft VCS/CCB Project Document. Community members will be asked to comment on the BMF CCB Monitoring Plan, along with the summarized PD. In addition, the BMF CCB Monitoring Plan has been made publicly available on the internet <https://registry.verra.org/app/projectDetail/VCS/3960>.

In the future, monitoring data and implementation activities will be in the combined VCS/CCB Monitoring Report. This document will be made available to stakeholders and communities following the dissemination process listed in Section 2.3.2. The report will be freely available on the public website www.verra.org.

4.4.2 Monitoring Plan Dissemination (CM4.3)

As per the requirements for all conservation projects, the information regarding the project will be shared with stakeholders through in person conversations, phone calls, text messages, online platforms and direct email communication. BMFT will hold several community meetings, as well as UB ERI will be in communication with all relevant stakeholders to present the VCS/CCB Project Document, gather feedback and notify them of the 30-day comment period so that they could submit comments privately to the CCB via the website <https://verra.org/programs/ccbs/>. All relevant public comments submitted to the CCB during the public comment period will be addressed.

4.5 Optional Criterion: Exceptional Community Benefits

This project is not seeking exceptional Community Benefits

4.5.1 Exceptional Community Criteria (GL2.1)

Not applicable

4.5.2 Short-term and Long-term Community Benefits (GL2.2)

Not applicable

4.5.3 Community Participation Risks (GL2.3)

Not applicable

4.5.4 Marginalized and/or Vulnerable Community Groups (GL2.4)

Not applicable

4.5.5 Net Impacts on Women (GL2.5)

Not applicable

4.5.6 Benefit Sharing Mechanisms (GL2.6)

Not applicable

4.5.7 Benefits, Costs, and Risks Communication (GL2.7)

Not applicable

4.5.8 Governance and Implementation Structures (GL2.8)

Not applicable

4.5.9 Smallholders/Community Members Capacity Development (GL2.9)

Not applicable

5 BIODIVERSITY**5.1 Without-Project Biodiversity Scenario****5.1.1 Existing Conditions (B1.1)**

The Project Activity Instance is composed of two key protected zones, the Laguna Seca and Yalbac properties, encompassing 87,059 hectares of land. These two areas are heavily forested and consist of tropical evergreen seasonal broadleaf lowland forest, locally known as “high forest,” and tropical evergreen seasonal broadleaf lowland swamp forest, locally known as “bajo forest.” While these two forest types contain the same tree species, the growth characteristics of the bajo forest type are slower due to occasional flooding (Meerman J. , Establishing a Baseline to Monitor Species and Key Biodiversity Areas in Belize. , 2007). These two forest types also host a wide range of vascular plant species, several of which are known to be endangered or require protection.

Belize Maya Forest, in which the project takes place, is home to 200 species of trees, more than 400 species of birds, and IUCN at-risk species including Baird's tapir, great curassow, and white-lipped peccary (Clayton & Jennings, 2021). The Project Activity Instance is recognized as part of the Selva Maya key biodiversity area (KBA) within Belize, and many of the species above can be found within the Project Activity Instance (Meerman J. , Establishing a Baseline to Monitor Species and Key Biodiversity Areas in Belize, 2007).

Historically, this area has been subject to logging for timber production, which has contributed to a decrease in forest cover. In 2010 there were plans to clear a large portion of the forest for agricultural development. This action would have eliminated vital habitat for a wide range of species, having adverse impacts on local biodiversity and ecosystem health.



Photo 9. Highly diverse jungle of the Project Activity Instance

Threatened Species

The Project Activity Instance is home to a wide range of animal species, many of which are listed as threatened or endangered by the IUCN. Some of the mammal species that can be found in the Project Activity Instance include: the Baird's Tapir (*Tapirus bairdii*), Yucatan Black Howler Monkey (*Alouatta pigra*), Geoffrey's Spider Monkey (*Ateles geoffroyi*), Neotropical River Otter (*Lontra longicaudis*), the White-Lipped Peccary (*Tayassu pecari*), Spotted Skunk (*Spilogale putorius*), the Margay (*Leopardus wiedii*) and the Jaguar (*Panthera onca*) (Kelly & Nipko, 2022).

Researchers also recorded the following threatened vulnerable and near-threatened bird species in the Project Activity Instance: the Great Curassow (*Crax rubra*), Great Tinamou (*Tinamus major*), Mealy Parrot (*Amazona farinose*), Olive-Throated Parakeet (*Eupsittula nana*) and the Ocellated Turkey (*Meleagris ocellata*) (Kelly & Nipko, 2022).

Plant species are also relatively threatened in the Selva Maya Forest of Belize, the larger region in which the project is located. The IUCN lists four different plant species that are critically endangered, 28 species that are endangered and 25 species that are classified as vulnerable, many of which can be found in the forests of the Project Activity Instance. The primary threats for several of these threatened plant species include agricultural expansion, and commercial and residential development (IUCN, IUCN Red List, 2021). Therefore, forest protection through the implementation of this REDD+ project is essential for preserving plant and animal biodiversity of the Project Activity Instance.



Photo 10. Puma and Jaguar found within the Project Activity Instance

Endemic Species

The Maya Forest of Belize is home to several endemic plant and animal species. Among those listed on the IUCN Red List, are the Belize Leaf-Toed Gecko (*Phyllodactylus insularis*), the Maya Mountains Frog (*Lithobates juliani*), the Peten Centipede Snake (*Tantilla hendersoni*), as well as four plant species in the class of Magnoliopsida and several insect species. There are no known mammal species that are endemic to the region (IUCN, IUCN Red List, 2021).

5.1.2 High Conservation Values (B1.2)

High Conservation Value	Selva Maya Region, which covers parts of Belize, southeastern Mexico, and northern Guatemala.
Qualifying Attribute	The Selva Maya is the second-largest tropical rainforest in the Americas after the Amazon rainforest and supports 200 species of trees, 380 species of birds, and 80 species of mammals . This includes one of the planet's most robust populations of jaguars and a variety of endangered wildlife. (https://globalconservation.org/projects/greater-belize-maya-forest/).
Focal Area	The Belize Maya Forest constitutes 5% of the Selva Maya and covers 87,059 hectares. This Project Activity Instance represents 12% of the Belize Maya Forest and provides habitat for a variety of endangered and endemic species.

5.1.3 Without-project Scenario: Biodiversity (B1.3)

While hunting has been strictly prohibited within the Project Activity Instance, which has relieved pressure on various animal species, continued deforestation for agricultural expansion and associated logging continues to pose a major threat to local biodiversity. It is estimated that forest cover in Belize declined by 13.2% between 1980 and 2010. Outdated government policies exacerbated this rate of forest loss, as the government mandated that leased land must be “developed,” or the lease could be revoked. In many cases, this policy motivated landowners to clear forests on their property, in order to meet the requirements for development (Young C. A., 2008). Agricultural expansion in Belize has also heavily contributed to the loss

of forest cover in recent years. Around the 1960's, agriculture replaced forestry as the primary industry in Belize, which led to further loss of forest cover for agricultural expansion. Deforestation and land use change continue to be the greatest threats to biodiversity in Belize (Young C. A., 2008).

The Project Activity Instance has also historically experienced logging for timber production, causing noticeable disturbance to biodiversity at least during the duration of the logging. When comparing two areas within the project zone, one with active logging and one without, the recorded daily presence of Pumas, Peccaries, Tapirs, Crested Guans, Curassows and Ocellated Turkeys are noticeably greater in the areas without logging (Meerman J. , Biodiversity Monitoring Yalbac Ranch & Cattle Corporation & Laguna Seca, Belize. 2018 Season, 2019).

In the absence of this REDD+ project, the forests of the Project Activity Instance would have been cleared for the production of annual crops and grazing. The clearing of these forests would have eliminated the habitat for nearly all of the animals and plants residing in the Project Activity Instance, including those that are considered to be endangered by the IUCN. This action would have had adverse impacts on local biodiversity and would eliminate connectivity, that allows species to travel between different sites. The loss of native vegetation and local fauna would also impact nutrient composition of the soils, making it less suitable for plants to grow. Nearly a 100% loss in biodiversity is expected in the area in the without-project scenario.



Photo 11. Recently cleared area for farming with the Project Area Instance in the background

5.2 Net Positive Biodiversity Impacts

5.2.1 Expected Biodiversity Changes (B2.1)

The project will generate net positive impacts on biodiversity within the project zone over the project lifetime. The project will maintain or enhance any high conservation values present in the project zone, that are of importance in conserving biodiversity. The biodiversity indicators to be used are maintain forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction) in the larger BMF landscape, stabilized predator-prey populations within the BMF, and reduced contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek/ Laboring Creek (Belize River).

Indicators of population trends for each HCV are considered a combination of forest health and stabilized predator-prey populations within the BMF as suggested by detections during biodiversity surveys.

Maintenance of these species is considered achieved when the habitat is protected, and the species is still detected using the site. The three trigger species, all HCV species as well, are considered highly detectable by tracks/scat, calls, or visibility in the forest. The project is considered effective as these populations continue to be detected by monitoring.



Photo 12. Camera trap monitoring within the Project Activity Instance along an old logging road

Biodiversity Indicator	Forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction) in the larger BMF landscape maintained
Estimated Change	There is expected to be complete preservation of existing mature forest habitat relative to the baseline scenario of converting the entire Project Activity Instance to corn and beans crops.
Justification of Change	At the time the property was protected, but it was on track to be sold for conversion to annual crops and grazing, which would have resulted in large-scale deforestation of the area and loss of habitat for endangered and non-endangered species. The expected revenues from REDD+ gave conservation organizations the financial means to purchase the Project Activity Instance and protect it in perpetuity. Project activities designed to have this outcome are listed in section 2.1.

Biodiversity Indicator	Stabilized predator-prey populations within the BMF
Estimated Change	Presence of wildlife species that are commonly hunted are used as a proxy for the effectiveness of anti-poaching activities. These species include: wild cats, peccary, pacas, currasow and crested guan Patrols and arrests related to poaching and other illegal activities will occur in the Project Activity Instance.

Justification of Change	Patrol data and anti-poaching information will serve as an indicator that there is active monitoring in the Project Activity Instance. The presence of species listed above in the Project Activity Instance will be indicators that the anti-poaching activities have been effective. Regular patrols and arrests will ensure that the number of incidences of undetected poaching decreases and indicate that over time absolute poaching will be reduced.

Biodiversity Indicator	Reduced contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek/ Labouring Creek (Belize River)
Estimated Change	Key water ways for people and agriculture are targeted for improvement, through maintenance of existing forest buffers and/or restoration
Justification of Change	The number of acres of buffer areas maintained or restored adjacent to pools and creeks, and changes in physical and chemical parameters in select pools such as turbidity and pH will serve as indicators to measure the reduction of contamination of the aquatic ecosystems.

5.2.2 Mitigation Measures (B2.3)

The three most critical threats to biodiversity in Belize Maya Forest are hunting, pesticide contamination and sedimentation, and deforestation/clearing of riparian buffers.

Actions to mitigate these threats fall into three strategic conservation objectives, that are listed within BMFT's conservation action plan and relate to the carbon project:

1. By 2023 prevent wildfire incidence in the broadleaf forests of the BMF and by 2025 improve fire use in the surrounding landscape
2. Maintain stable predator-prey populations within the BMF
3. By 2027 reduce contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black/Creek/Labouring Creek (Belize River)

A more detailed set of BMFT's conservation goals and mitigation measures that relate to this project and that correspond to the above mentioned three objectives, is presented below in Table 48.

Table 48. Conservation Goals and Mitigation Measures

Potential negative impact	Conservation objective	Mitigation Measure
Hunting	Build awareness, knowledge, and capacity on effects of illegal wildlife trade on prey-predator populations	• Conduct regular anti-poaching patrols including joint patrols and document using the Spatial Monitoring and Reporting Tool (SMART) • Obtain support for consistent SMART training for rangers to improve SMART documentation • Develop awareness materials on the importance of maintaining stable predator-prey populations and initiatives to reduce the illegal wildlife trade • Build wildlife protection and education into a BMFT Community Stewards Program
Hunting	Increase programmatic synergies with local, national, and regional stakeholders to reduce illegal wildlife trade	• Maintain information flow through regular communication with all relevant partners • Participate in joint trainings with partners
Forest fire	Increase awareness and knowledge of fire impact and fire management	• Determine key target audiences • Develop new and/or repurpose existing awareness and outreach materials • Develop and implement a dissemination strategy
Forest fire	Develop a fire alert system for key stakeholders based on monitoring of weather and fires	• Identify/add stakeholders and preferred medium for communication • Use existing fire threat models and weather monitoring to determine red flag days • Collaborate with neighbors on permitting system, burn plans, safety for agricultural fires
Forest fire	Build capacity for fire management and response within BMFT and key stakeholders	• Within BMF, map areas for tactical fire intervention • Purchase fire response equipment for BMFT • Organize key training for BMFT Rangers and key stakeholders • Build fire education and management into a BMFT Community Stewards Program
Contamination in aquatic ecosystems	Maintain and restore the forests adjacent to the Cara Blanca Pools	• Meet with landowners adjacent to the Cara Blanca Pools to discuss adequate buffers to the pools through sustainable

Potential negative impact	Conservation objective	Mitigation Measure
		development practices or maintaining forested lands
Contamination in aquatic ecosystems	Improve climate smart farming practices in BMF communities through knowledge sharing and transfer, innovation, and support for sustainable livelihoods	- Collaborate with partners to identify regenerative agriculture programs on best practices - Organize farmer-farmer knowledge and practice exchanges - Support the maintenance and/or development of model farms in stakeholder communities
Contamination in aquatic ecosystems	Facilitate livelihood opportunities around industries that do not use pesticides	Involve women in sustainable income generation from non-pesticide intensive trades

5.2.3 Net Positive Biodiversity Impacts (B2.2, GL1.4)

In the absence of this project, the forests of the Project Activity Instance would be cleared for the production of agricultural crops and grazing. The clearing of these forests would eliminate the habitat for nearly all of the terrestrial animals residing in the Project Activity Instance and severely decrease the habitat within the project zone, including those that are considered to be at-risk by the IUCN. This action would have adverse impacts on local biodiversity and would eliminate corridors allowing species to travel between different sites across the Selva Maya, resulting in a reduced genetic interchange between surrounding protected areas. The loss of native vegetation and local fauna would severely degrade the value of riparian corridors within the property and impact nutrient composition of the soils, as well as increase erosion and run-off. The Project Activity Instance is part of the Selva Maya and is the largest continuous expanse of tropical rainforest in the Americas after the Amazon (Olivet & Asquith, 2004), connecting the Maya Biosphere Reserve with the Rio Bravo Conservation and Management Area. The project site resides within the Mesoamerican Biological Corridor (Meerman & Sabido, 2001) and is part of a Conservation International Biodiversity Hotspot (Olivet & Asquith, 2004). The Project Activity Instance is also included within a key biodiversity area (Meerman J. , 2007).

Conserving the Project Activity Instance will have overwhelming positive biodiversity benefits, on and off-site. Preserving this undisturbed habitat also allows for species to migrate north and access other habitats, as they adapt to a changing climate.



Photo 13. Many sightings of Baird's tapir (*Tapirus bairdii*) an IUCN Endangered species within the Project Activity Instance

5.2.4 High Conservation Values Protected (B2.4)

The entire Project Activity Instance constitutes a high conservation value due to the vulnerable species that utilize the entire Project Activity Instance for habitat.

The entire purpose of the project is to enhance and protect the forest resources that would be eliminated in the absence of the project. Therefore, areas that are of HCV will not be negatively affected by the project. The Project Activity Instance is a critical ecosystem for endangered species. These areas of special environmental, biological, and/or rare ecosystem significance are expected to proliferate during the project life and beyond its end. Communities have agreed to help conserve, monitor, and survey the protected area, which will ensure that they won't be negatively impacted.

Moreover, the greater Belize Maya Forest is home to various wildlife species including species of concern which are considered endangered, vulnerable or near threatened according to IUCN (see Table 49). endangered and vulnerable species are those species threatened with global extinction while Near Threatened are species that are close to the threatened thresholds, especially where ongoing conservation measures are lacking.

Table 49. Species of Concern Present in the Greater BMF

Common Name	Scientific Name	IUCN Status	Observed in Project Activity Instance
Baird's Tapir	<i>Tapirus bairdii</i>	Endangered	Yes: UB ERI survey; Virginia Tech survey
Geoffroy's Spider Monkey	<i>Ateles geoffroyi</i>	Endangered	Yes: past biodiversity surveys like Miller
Yucatan Black Howler Monkey	<i>Alouatta pigra</i>	Endangered	Yes: past biodiversity surveys like Miller
Great Curassow	<i>Crax rubra</i>	Vulnerable	Yes: UB ERI survey; Virginia Tech survey
White-Lipped Peccary	<i>Tayassu pecari</i>	Vulnerable	Yes: UB ERI survey; Virginia Tech survey
Great Tinamou	<i>Tinamus major</i>	Near Threatened	Yes: UB ERI survey

Common Name	Scientific Name	IUCN Status	Observed in Project Activity Instance
Ocellated Turkey	<i>Meleagris ocellata</i>	Near Threatened	Yes: UB ERI survey; Virginia Tech survey
Jaguar	<i>Panthera onca</i>	Near Threatened	Yes: UB ERI survey; Virginia Tech survey
Margay	<i>Leopardus wiedii</i>	Near Threatened	Yes: Virginia Tech survey

Although there are some differences, many of these species share similar habitat preferences and are affected by similar threats. The primary threat is habitat loss for all of these species, but there are other threats that could potentially affect their presence and population size within the Project Activity Instance, should it become unprotected.

5.2.5 Species Used (B2.5)

No species are planned to be used by this project.

5.2.6 Invasive Species (B2.5)

This project supports protection of native forests. Any replanting would be of native species that are not invasive.

5.2.7 Impacts of Non-native Species (B2.6)

Species	None
Justification of Use	N/A
Potential Adverse Effect	There are no non-native species planned to be planted in this project.

5.2.8 GMO Exclusion (B2.7)

No genetically modified organisms are included in this Project design. No genetically modified trees will be planted.

5.2.9 Inputs Justification (B2.8)

Name	None
Justification of Use	N/A
Potential Adverse Effect	There are no inputs planned to be used in this project.

5.2.10 Waste Products (B2.9)

No waste products are expected from the project activities, as most materials are natural, and outcomes are empowerment.

5.3 Offsite Biodiversity Impacts

5.3.1 Negative Offsite Biodiversity Impacts (B3.1) and Mitigation Measures (B3.2)

The project does not anticipate any offsite negative biodiversity impacts. Offsite impacts are expected to be positive since larger habitat and forest areas will improve the long-term viability of populations offsite through connectivity of off-site habitats in surrounding conservation lands. Since no negative impacts are identified, there is no need to design mitigation actions.

5.3.2 Net Offsite Biodiversity Benefits (B3.3)

The Project Activity Instance connects the Maya Biosphere Reserve with the Rio Bravo Conservation and Management Area, creating continuous forest cover across a biodiverse natural area that is trinational. Outside of the Project Zone, monocultures of annual crops have very low biodiversity and little wildlife presence at all. In the without-project scenario, the Project Activity Instance would have similar conditions to areas outside of the Project Zone: monocultures of annual crops. This demonstrates that the net effects of the project on biodiversity is positive.

The Project Activity Instance is part of the largest continuous expanse of tropical rainforest in the Americas after the Amazon (Olivet & Asquith, 2004), connecting the Maya Biosphere reserve with the Rio Bravo Conservation and Management Area. It resides within the Mesoamerican Biological Corridor (Meerman & Sabido, 2001), allowing species to travel between different sites across the Selva Maya, allowing genetic interchange, and supporting high levels of species richness, many of which fall within the category of vulnerable and above in the IUCN Red List of Endangered Species. Conserving the Project Activity Instance has overwhelming positive biodiversity benefits, on and off-site.

5.4 Biodiversity Impact Monitoring

5.4.1 Biodiversity Monitoring Plan (B4.1, B4.2, GL1.4, GL3.4)

Biodiversity monitoring is described in the BMF CCB Monitoring Plan and the Conservation Action Plan, which follows adaptive management. The Conservation Action Plan describes the measures that will be undertaken by BMFT to monitor conservation efforts in the project area until 2027 after which revisions will be made based on results from the adaptive management process. The BMF CCB Monitoring Plan describes Monitoring Parameters in detail and is a standalone document, which is publicly available on the Verra Website for the BMF Project. The BMF CCB Monitoring Plan is created in parallel with this PD and has been disseminated with the PD, in both languages, English and Spanish.

This Monitoring Plan has been sensitized with the communities and was disseminated with the draft VCS/CCB Project Document. Community members will be asked to comment on the BMF CCB Monitoring Plan, along with the summarized PD. In addition, the BMF CCB Monitoring Plan has been made publicly available on the internet <https://registry.verra.org/app/projectDetail/VCS/3960>.

The plan details the variables to be monitored, areas covered, sampling methods, and the frequency of monitoring and reporting. Key biodiversity variables include the presence and abundance of wildlife species, forest health indicators, and the status of high conservation value (HCV) areas. Project-level biodiversity impact indicators were developed to measure improved biophysical conditions and biodiversity as a result of the project. The biodiversity indicators to be used are forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction), stabilized predator-prey populations within the BMF, and reduced contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek.

Stabilized predator-prey populations within the BMF are measured to track impact on anti-poaching activities. Data gathered during the monitoring period for effective poaching include the number of patrols, species per taxa, and the abundance of wildcats (both young and adults). Reduced contamination in aquatic

ecosystems focuses on improving aquatic ecosystems impacted by anthropogenic activities, particularly around Black Creek.

For forest health, measurements include the number of acres restored, actions identified for restoration, community nurseries established, trainings/exchanges conducted, projects initiated, and opportunities identified. For stabilized predator-prey populations, data include the number of patrols, reports completed, joint patrols, trainings, abundance of wildcats, and species per taxa. For reduced contamination in aquatic ecosystems, data will include acreage maintained or restored adjacent to pools (spatial analysis) training sessions conducted on preserving water quality, and records of water quality over time.

Biodiversity surveys have already been conducted during two time periods and were conducted to gather data during the wintering season in late February and migratory season in early April. A total of 20 points were established in the lower and upper BMF on existing roads (old logging roads), which were surveyed from February 22nd 25th, 2022 and from April 5th-8th, 2022. Five points were surveyed each day to be able to complete all 20 points in each survey period due to the need for replication of survey of points and the set period to survey all points.

5.4.1.1 Results of Birds

A total of 143 species of birds were found in the project area. The species *Crax rubra* is classified as vulnerable in the IUCN list (Table 50).

Table 50. List of Bird Species Found in the BMF

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Rufous-tailed Hummingbird	<i>Amazilia tzacatl</i>	Trochilidae	LC	No
White-fronted Parrot	<i>Amazona albifrons</i>	Psittacidae	LC	No
Red-lored Parrot	<i>Amazona autumnalis</i>	Psittacidae	LC	No
Mealy Parrot	<i>Amazona farinosa</i>	Psittacidae	NT	No
Yellow-billed Cacique	<i>Amblycercus holosericeus</i>	Icteridae	LC	No
Russet-naped Wood Rail	<i>Aramides albiventris</i>	Rallidae	LC	No
Green-backed Sparrow	<i>Arremonops chloronotus</i>	Passerellidae	LC	No
Bright-rumped Attila	<i>Attila spadiceus</i>	Tyrannidae	LC	No
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	LC	No
Great Black Hawk	<i>Buteogallus urubitinga</i>	Accipitridae	LC	No
Pale-billed Woodpecker	<i>Campephilus guatemalensis</i>	Picidae	LC	No
Black-faced Grosbeak	<i>Caryothraustes poliogaster</i>	Carnidalidae	LC	No
Chestnut-colored Woodpecker	<i>Celeus castaneus</i>	'idae	LC	No
Red-capped Manakin	<i>Ceratopipra mentalis</i>	Pipridae	LC	No
Dusky Antbird	<i>Cercamocroides tyrannina</i>	Thamnophilidae	LC	No
Vaux's Swift	<i>Chaetura vauxi</i>	Apodidae	LC	No
White-bellied Emerald	<i>Chlorestes candida</i>	Trochilidae	LC	No
Blue Ground Dove	<i>Claravis pretiosa</i>	Columbidae	LC	No
Golden-olive Woodpecker	<i>Colaptes rubiginosus</i>	Picidae	LC	No

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Eastern Wood-Pewee	<i>Contopus virens</i>	Tyrannidae	LC	No
Great Curassow	<i>Crax rubra</i>	Cracidae	VU	No
Slaty-breasted Tinamou	<i>Crypturellus boucardi</i>	Tinamidae	LC	No
Little Tinamou	<i>Crypturellus soui</i>	Tinamidae	LC	No
Red-legged Honeycreeper	<i>Cyanerpes cyaneus</i>	Thraupidae	LC	No
Blue-black Grosbeak	<i>Cyanocompsa cyanoides</i>	Cardinalidae	LC	No
Blue Bunting	<i>Cyanocompsa parellina</i>	Cardinalidae	LC	No
Tawny-winged Woodcreeper	<i>Dendrocincla anabatina</i>	Furnariidae	LC	No
Ruddy Woodcreeper	<i>Dendrocincla homochroa</i>	Furnariidae	LC	No
Northern Barred-Woodcreeper	<i>Dendrocolaptes sanctithomae</i>	Furnariidae	LC	No
Pheasant Cuckoo	<i>Dromococcyx phasianellus</i>	Cuculidae	LC	No
Smoky-brown Woodpecker	<i>Dryobates fumigatus</i>	Cuculidae	LC	No
Lineated Woodpecker	<i>Dryocopus lineatus</i>	Picidae	LC	No
Gray Catbird	<i>Dumetella carolinensis</i>	Mimidae	LC	No
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Tyrannidae	LC	No
Gray-headed Tanager	<i>Eucometis penicillata</i>	Thraupidae	LC	No
Olive-backed Euphonia	<i>Euphonia gouldi</i>	Fringillidae	LC	No
Yellow-throated Euphonia	<i>Euphonia hirundinacea</i>	Fringillidae	LC	No
Olive-throated Parakeet	<i>Eupsittula nana</i>	Psittacidae	NT	No
Mayan Antthrush	<i>Formicarius moniliger</i>	Formicariidae	LC	No
Rufous-tailed Jacamar	<i>Galbula ruficauda</i>	Galbulidae	LC	No
Kentucky Warbler	<i>Geothlypis formosa</i>	Parulidae	LC	No
Ruddy Quail-Dove	<i>Geotrygon montana</i>	columbidae	LC	No
Wedge-billed Woodcreeper	<i>Glyphorynchus spirurus</i>	Furnariidae	LC	No
Gray-throated Chat	<i>Granatellus sallaei</i>	Parulidae	LC	No
Red-throated Ant-Tanager	<i>Habia fuscicauda</i>	Cardinalidae	LC	No
Red-crowned Ant-Tanager	<i>Habia rubica</i>	Cardinalidae	LC	No
Double-toothed Kite	<i>Harpagus bidentatus</i>	Accipitridae	LC	No
White-breasted Wood-wren	<i>Henicorhina leucosticta</i>	Troglodytidae	LC	No
Laughing Falcon	<i>Herpetotheres cachinnans</i>	Falconidae	LC	No
Wood Thrush	<i>Hylocichla mustelina</i>	Turdidae	LC	No
Tody Motmot	<i>Hylomanes momotula</i>	Momotidae	LC	No

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Yellow-breasted Chat	<i>icteria virens</i>	Icteridae	LC	No
Baltimore Oriole	<i>Icterus galbula</i>	Icteridae	LC	No
Black-cowled Oriole	<i>Icterus prothemelas</i>	Icteridae	LC	No
Black-throated Shrike-Tanager	<i>Lanio aurantius</i>	Thraupidae	LC	No
Tennessee Warbler	<i>leiothlypis peregrina</i>	Parulidae	LC	No
Gray-headed Kite	<i>Leptodon cayanensis</i>	Accipitridae	LC	No
Sepia-capped Flycatcher	<i>Leptopogon amaurocephalus</i>	Tyrannidae	LC	No
Gray-headed Dove	<i>Leptotila plumbeiceps</i>	columbidae	LC	No
White-tipped Dove	<i>Leptotila verreauxi</i>	columbidae	LC	No
White-whiskered Puffbird	<i>Malacoptila panamensis</i>	Bucconidae	LC	No
White-collared Manakin	<i>Manacus candei</i>	Pipridae	LC	No
Boat-billed Flycatcher	<i>Megarynchus pitangua</i>	Tyrannidae	LC	No
Black-cheeked Woodpecker	<i>Melanerpes pucherani</i>	Picidae	LC	No
Ocellated Turkey	<i>Meleagris ocellata</i>	Phasianidae	NT	No
Barred Forest-Falcon	<i>Micrastur ruficollis</i>	Falconidae	LC	No
Collared Forest-Falcon	<i>Micrastur semitorquatus</i>	Falconidae	LC	No
Dot-winged Antwren	<i>Microrhopias quixensis</i>	Thamnophilidae	LC	No
Black-and-white Warbler	<i>Mniotilta varia</i>	Parulidae	LC	No
Lesson's Motmot	<i>Momotus lessonii</i>	Momotidae	LC	No
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Tyrannidae	LC	No
Dusky-capped Flycatcher	<i>Myiarchus tuberculifer</i>	Tyrannidae	LC	No
Yucatan Flycatcher	<i>Myiarchus yucatanensis</i>	Tyrannidae	LC	No
Blue Gray Gnatcatcher	<i>Poliophtila caerulea</i>	Procyonidae	LC	No
Sulphur-rumped Flycatcher	<i>Myiobius sulphureipygius</i>	Tityridae	LC	No
Sulphur-bellied Flycatcher	<i>Myiodynastes luteiventris</i>	Tyrannidae	LC	No
Social Flycatcher	<i>Myiozetetes similis</i>	Tyrannidae	LC	No
Unknown bird spp.	N/A	N/A	N/A	N/A
Common Pauraque	<i>Nyctidromus albicollis</i>	Caprimulgidae	LC	No
Spotted Wood-Quail	<i>Odontophorus guttatus</i>	Odontophoridae	LC	No
Northern Bentbill	<i>Oncostoma cinereigulare</i>	Tyrannidae	LC	No
Yellow-bellied Tyrannulet	<i>Ornithion semiflavum</i>	Tyrannidae	LC	No
Plain Chachalaca	<i>Ortalis vetula</i>	Cracidae	LC	No

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Gray-collared Becard	<i>Pachyramphus major</i>	Tyrannidae	LC	No
Lesser Greenlet	<i>Pachysylvia decurtata</i>	Vireonidae	LC	No
Wedge-tailed Sabrewing	<i>Pampa curvipennis</i>	Trochilidae	LC	No
Lesser Swallow-Tailed Swift	<i>Panyptila cayennensis</i>	Apodidae	LC	No
Red-billed Pigeon	<i>Patagioenas flavirostris</i>	columbidae	LC	No
Short-billed Pigeon	<i>Patagioenas nigristrois</i>	columbidae	LC	No
Scaled Pigeon	<i>Patagioenas speciose</i>	columbidae	LC	No
Crested Guan	<i>Penelope purpurascens</i>	Cracidae	LC	No
Long-billed Hermit	<i>Phaethornis longirostris</i>	Trochilidae	LC	No
Stripe-throated Hermit	<i>Phaethornis striigularis</i>	Trochilidae	LC	No
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Cardinalidae	LC	No
Spot-breasted Wren	<i>Pheugopedius maculipectus</i>	Troglodytidae	LC	No
Gray-crowned Warbler	<i>Phylloscopus tephrocephalus</i>	Phylloscopidae	LC	No
Squirrel Cuckoo	<i>Piaya cayana</i>	Cuculidae	LC	No
White-crowned Parrot	<i>Pionus senilis</i>	Psittacidae	LC	No
Rose-throated Tanager	<i>Piranga roseogularis</i>	Cardinalidae	LC	No
Summer Tanager	<i>Piranga rubra</i>	Cardinalidae	LC	No
Stub-tailed Spadebill	<i>Platyrrhinus cancrinus</i>	Tyrannidae	LC	No
Slate-headed Tody-Flycatcher	<i>Poecilatriccus sylvia</i>	Tyrannidae	LC	No
White-browed Gnatcatcher	<i>Poliophtila bilineata</i>	Poliophtilidae	LC	No
Gray-breasted Martin	<i>Progne chalybea</i>	Hirundinidae	LC	No
Purple Martin	<i>Progne subis</i>	Hirundinidae	LC	No
Brown Jay	<i>Psilorhinus morio</i>	Corvidae	LC	No
Collared Aracari	<i>Pteroglossus torquatus</i>	Ramphastidae	LC	No
Brown-hooded Parrot	<i>Pyrilia haematotis</i>	Psittacidae	LC	No
Keel-billed Toucan	<i>Ramphastos sulfuratus</i>	Ramphastidae	LC	No
Long-billed Gnatwren	<i>Ramphocaenus melanurus</i>	Poliophtilidae	LC	No
Eye-ringed Flatbill	<i>Rhynchocyclus brevirostris</i>	Tyrannidae	LC	No
Rufous Mourner	<i>Rhytipterna holerythra</i>	Tyrannidae	LC	No
Roadside Hawk	<i>Rupornis magnirostris</i>	Accipitridae	LC	No
Black-headed Saltator	<i>Saltator atriceps</i>	Thraupidae	LC	No
Northern Schiffornis	<i>Schiffornis veraepacis</i>	Tityridae	LC	No

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Scaly-throated Leaf Tosser	<i>Sclerurus guatemalensis</i>	Furnariidae	LC	No
Ovenbird	<i>Seiurus aurocapilla</i>	Parulidae	LC	No
Hooded Warbler	<i>Setophaga citrina</i>	Parulidae	LC	No
Magnolia Warbler	<i>Setophaga magnolia</i>	Parulidae	LC	No
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	Parulidae	LC	No
American Redstart	<i>Setophaga ruticilla</i>	Parulidae	LC	No
Black-throated Green Warbler	<i>Setophaga virens</i>	Parulidae	LC	No
Olivaceous Woodcreeper	<i>Sittasomus griseicapillus</i>	Furnariidae	LC	No
Ruddy-tailed Flycatcher	<i>Terentotriccus erythrurus</i>	Tyrannidae	LC	No
Russet Antshrike	<i>Thamnistes anabatinus</i>	Thamnophilidae	LC	No
Barred Antshrike	<i>Thamnophilus doliatus</i>	Thamnophilidae	LC	No
Yellow-winged Tanager	<i>Thraupis abbas</i>	Thraupidae	LC	No
Great Tinamou	<i>Tinamus major</i>	Tinamidae	NT	No
Masked Tityra	<i>Tityra semifasciata</i>	Tityridae	LC	No
Yellow-olive Flycatcher	<i>Tolmomyias sulphurescens</i>	Tyrannidae	LC	No
Gartered Trogon	<i>Trogon caligatus</i>	Trogonidae	LC	No
Slaty-tailed Trogon	<i>Trogon massena</i>	Trogonidae	LC	No
Black-headed Trogon	<i>Trogon melanocephalus</i>	Trogonidae	LC	No
Tawny-crowned Greenlet	<i>Hylophilus ochraceiceps</i>	Vireonidae	LC	No
Clay-colored Thrush	<i>Turdus grayi</i>	Turdidae	LC	No
White-bellied Wren	<i>Uropsila leucogastra</i>	Troglodytidae	LC	No
Yellow-throated Vireo	<i>Vireo flavifrons</i>	Vireonidae	LC	No
Yellow-green Vireo	<i>Vireo flavoviridis</i>	Vireonidae	LC	No
White-eyed Vireo	<i>Vireo griseus</i>	Vireonidae	LC	No
Red-eyed Vireo	<i>Vireo olivaceus</i>	Vireonidae	LC	No
Green Shrike-Vireo	<i>Vireolanius pulchellus</i>	Vireonidae	LC	No
Plain Xenops	<i>Xenops minutus</i>	Furnariidae	LC	No
Strong-billed Woodcreeper	<i>Xiphocolaptes promeropirhynchus</i>	Dendrocolaptidae	LC	No
Ivory-billed Woodcreeper	<i>Xiphorhynchus flavigaster</i>	Furnariidae	LC	No

5.4.1.2 Results of Mammals

A total of 35 species of mammals were found in the Project Activity Instance. Six of the species found in the Project Activity Instance are classified as endangered (EN) and vulnerable (VU) in the IUCN list. The

EN species are *Alouatta pigra*, *Ateles geoffroyi*, *Lutra longicaudis* and *Tapirus bairdii*. The VU species are *Spilogale putorius* and *Tayassu pecari* (Table 51).

Table 51. List of Mammal Species Found in the BMF

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Yucatan Black Howler Monkey	<i>Alouatta pigra</i>	Atelidae	EN	No
Geoffroy's Spider Monkey	<i>Ateles geoffroyi</i>	Atelidae	EN	No
Paca	<i>Cuniculus paca</i>	Cuniculidae	LC	No
Bat spp.	<i>Bat spp.</i>	N/A	N/A	N/A
Coyote	<i>Canis latrans</i>	Canidae	LC	No
Striped Hog Nose Skunk	<i>Conepatus semistriatus</i>	Mephitidae	LC	No
Agouti	<i>Dasypsecta punctata</i>	Dasypsectidae	LC	No
Nine-banded Armadillo	<i>Dasypus novemcinctus</i>	Dasypodidae	LC	No
Common Opossum	<i>Didelphis marsupialis</i>	Didelphidae	LC	No
Tayra	<i>Eira barbara</i>	Mustelidae	LC	No
Greater Grison	<i>Galictis vittata</i>	Mustelidae	LC	No
Southern River Otter	<i>Lutra longicaudis</i>	Mustelidae	EN	No
Red Brocket Deer	<i>Mazama americana</i>	Cervidae	DD	No
Mouse spp.	<i>Mouse spp.</i>	N/A	N/A	N/A
Unknown mammal spp.	N/A	N/A	N/A	N/A
Coatimundi	<i>Nasua narica</i>	Procyonidae	LC	No
Long-tailed Weasel	<i>Neogale frenata</i>	Mustelidae	LC	No
White-tailed Deer	<i>Odocoileus virginianus</i>	Cervidae	LC	No
Opossum spp.	<i>Opossum spp.</i>	N/A	N/A	N/A
Jaguar	<i>Panthera onca</i>	Felidae	NT	No
Ocelot	<i>Leopardus pardalis</i>	Felidae	LC	No
Margay	<i>Leopardus wiedii</i>	Felidae	NT	No
Collared Peccary	<i>Pecari tajacu</i>	Tayassuidae	LC	No
Four Eyed Opossum	<i>Philander opossum</i>	Didelphidae	LC	No
Northern Raccoon	<i>Procyon lotor</i>	Procyonidae	LC	No
Puma	<i>Puma concolor</i>	Felidae	LC	No
Jaguarundi	<i>Puma yagouaroundi</i>	Felidae	LC	No
Raccoon spp.	<i>Raccoon spp.</i>	N/A	N/A	N/A
Yucatan Squirrel	<i>Sciurus yucatanensis</i>	Sciuridae	LC	No
Skunk spp.	<i>Skun' spp.</i>	N/A	N/A	N/A

Common name	Scientific Name	Family	IUCN category	Endemic (Yes/No)
Spotted Skunk	<i>Spilogale putorius</i>	Mephitidae	VU	No
Northern Tamandua	<i>Tamandua mexicana</i>	Myrmecophagidae	LC	No
Baird's Tapir	<i>Tapirus bairdii</i>	Tapiridae	EN	No
White-lipped Peccary	<i>Tayassu pecari</i>	Tayassuidae	VU	No
Grey Fox	<i>Urocyon cinereoargenteus</i>	Canidae	LC	No

5.4.2 Biodiversity Monitoring Plan Dissemination (B4.3)

Biodiversity monitoring is described in the monitoring plan, which follows adaptive management. The monitoring plan is created in parallel with this PD and will be disseminated with the PD, in both languages, English and Spanish.

This monitoring plan will be sensitized with the communities and disseminated with the draft VCS/CCB Project Document. Community members will be asked to comment on the monitoring plan, along with the summarized PD. A public comment period of 30 days will be open on the CCB website. In addition, the monitoring plan will be made publicly available on the internet.

In the future, monitoring data and implementation activities will be included in the combined VCS/CCB Monitoring Report. This document will be made available to stakeholders and communities following the dissemination process listed in Section 2.3.2. The report will be freely available on the public website www.terra.org.

5.5 Optional Criterion: Exceptional Biodiversity Benefits

The Project Activity Instance is a large private property within the regional Selva Maya. The Selva Maya is the largest continuous expanse of tropical rainforest in the Americas after the Amazon (Olivet & Asquith, 2004). It connects the Maya Biosphere Reserve with the Rio Bravo Conservation and Management Area. The Project site resides within the Mesoamerican Biological Corridor (Miller, Chang, & Johnson, 2001) and is part of an international conservation biodiversity hotspot (Olivet & Asquith, 2004). The Project Activity Instance is also identified as a portion of a key biodiversity area in Belize (Meerman J., 2007), based on populations of multiple trigger species. The project supports the effort of Belize to achieve the Aichi Target 5: habitat loss halved or reduced. The project helps limit the net rate of land use change for prioritized natural ecosystems/areas.

Gold Level is achieved by virtue of the significant biodiversity resources conserved on the property including habitat for multiple IUCN listed species and most notably the IUCN Endangered Baird's Tapir (*Tapirus bairdii*), Geoffrey's spider monkey (*Ateles geoffroyi*), and the Yucatan black howler monkey (*Alouatta pigra*), as well as numerous IUCN vulnerable and near-threatened species.

5.5.1 High Biodiversity Conservation Priority Status (GL3.1)

A study conducted by Kelly and Nipko (Final Report - Comparison of species photo-captured, trap rates, and numbers of jaguars identified in Laguna Seca #1326 (the Carbon Plot) and the surrounding Belize Maya Forest in 2021, 2022) of Virginia Tech University found the presence of Baird's Tapir as captured by camera traps in the Project Activity Instance in March and April of 2022. Baird's Tapir (*Tapirus bairdii*) is an endangered species on the IUCN Red List. A community picture card exercise conducted by the University of Belize Environmental Research Institute (2022) also revealed the presence of the IUCN Endangered Yucatan black howler monkey (*Alouatta pigra*) and Geoffrey's spider monkey (*Ateles geoffroyi*). This project meets the criterion for high biodiversity conservation priority status because of its capacity to protect habitat for the endangered tapir and monkey species.

5.5.2 Trigger Species Population Trends (GL3.2, GL3.3)

In the without-project scenario the area would be transformed into croplands and pastures and nearly a 100% loss in biodiversity would be expected. Population trends are not fully understood for the Project Activity Instance, as the area is densely forested. However, populations of these species have occurred at the site for many years (Miller & Miller, 2001). Based on habitat requirements of these species, a complete loss of these populations is expected in the baseline scenario since there is almost no overlap between the species of animals associated with mature forest habitats and agricultural plantations. Conserving and protecting the forest should maintain the HCVs. Patrols to prevent illegal hunting and maintaining existing high-quality habitat should result in maintenance of HCVs. Indicators of population trends for each trigger species are considered a combination of habitat availability and presence as indicated by detections during surveys. Maintenance of these species is considered achieved when the habitat is protected, and the species is still detected within the site.

Trigger Species	Baird's Tapir (<i>Tapirus Bairdii</i>)
Population Trend at Start of Project	The Baird's Tapir population has been stable in the Project Activity Instance since 2013 (Kelly & Nipko Report on BMF-Feb2022-RBN).
Without-project Scenario	Under the without-project scenario, all of the forest habitat for the Baird's Tapir would be destroyed. As a result, Baird's Tapir numbers would decline and perhaps become completely extirpated from the Project Activity Instance.
With-project Scenario	With the project, the forest habitat for Baird's Tapir will be completely preserved within the Project Activity Instance (Kelly & Nipko, 2022). As a result, Baird's tapir population numbers are expected to stay stable over time.

Trigger Species	White-lipped Peccary (<i>Tayassu pecari</i>)
Population Trend at Start of Project	The White-lipped Peccary population has been stable in the Project Activity Instance since 2013 (Kelly & Nipko, 2022).
Without-project Scenario	Under the without-project scenario, all of the forest habitat for the White-lipped Peccary would be destroyed. As a result, White-lipped Peccary numbers would decline and perhaps become completely extirpated from the Project Activity Instance.
With-project Scenario	With the project, the forest habitat for White-lipped Peccary will be completely preserved within the Project Activity Instance (Kelly & Nipko, 2022). As a result, White-lipped Peccary population numbers are expected to stay stable over time.

Trigger Species	Great Curassow (<i>Crax rubra</i>)
Population Trend at Start of Project	The Great Curassow population has been stable in the Project Activity Instance since 2013 (Kelly & Nipko, 2022).
Without-project Scenario	Under the without-project scenario, all of the forest habitat for the Great Curassow would be destroyed. As a result, Great Curassow

	numbers would decline and perhaps become completely extirpated from the Project Activity Instance.
With-project Scenario	With the project, the forest habitat for great curassow will be completely preserved within the Project Activity Instance (Kelly & Nipko, 2022). As a result, Great Curassow population numbers are expected to stay stable over time.

6 APPENDICES

6.1 Appendix 1: Stakeholder Identification Table

Stakeholder	Rights, Interest and Overall Relevance to the Project
Spanish Lookout and Spanish Lookout Community Corporation	The Mennonite farming community of Spanish Lookout is located within a few miles of the BMF and owns most of the lands immediately adjacent to the reserve, through its Spanish Lookout Community Corporation. Therefore, it has both a high impact on the reserve due to its large-scale monocrop activities, as well as high potential for collaboration in the protection of the reserve. Main direct threats from the agricultural activities of this community/business are escaped fires that could degrade the forest, potential contamination of aquatic ecosystems, including the Cara Blanca Pools, and the forest ecosystems, from pesticides and other agricultural runoff, and potential illegal hunting. BMFT currently shares reciprocal road easements with this community/entity, as well as collaborates with them on anti-poaching efforts and the maintenance of gates controlling access to the community lands adjacent to the BMF and the BMF. This community/entity is highly relevant to the project due to its high potential impact in relation to the protection or degradation of the reserve. The BMF property is under private land tenure, so this community has no rights on the project.
Spanish Lookout Birding Group	This group of birders in the Spanish Lookout Community has high relevance and high interest in the project, as they are close to the reserve, and are overall interested in contributing to building the knowledge base for bird biodiversity and protection within the reserve. They were involved in a yearlong participatory planning process to develop the BMF CAP 2022-2027. This plan aims to maintain or enhance the viability of the conservation targets for BMF, including the forest ecosystems, and abate or mitigate threats to them. This community group has no rights on the project.
Yalbac Village	This is the oldest community in the area and is comprised of a mix of ethnicities including Latin/Hispanic, Mestizo and Creole. Most people in the village farm lease farming lands or work on the farms of others for a living. BMFT currently employs rangers from this community. This community is the closest geographically to the southern border of the BMF. The main potential degradation impact to the BMF from this community would be from illegal hunting and also the use of chemicals for farming. Apart from its potential impacts on BMF, due to proximity and history, this community is highly relevant to the project. Community members from Yalbac, have been closely involved in the participatory planning process to develop the BMF Conservation Action Plan 2022-2027; therefore, this village has a high interest in the project. The village has no rights on the project.

Stakeholder	Rights, Interest and Overall Relevance to the Project
Valley of Peace, Los Tambos, Buena Vista and La Gracia	These primarily Latin/Hispanic villages were established in the last few decades particularly to welcome refugees from neighboring Central America. They are all located within a few miles of the reserve and the biggest impact of these on BMF comes from illegal hunting activities, that can degrade the reserve including due to fires set by hunters and which can escape into the broadleaf forests of the reserve. Because of the large hunting footprint, these communities are highly relevant to the project. Their leadership and chosen representatives were also involved in the participatory planning effort for the BMF CAP; therefore, they are interested in the project. These villages have no rights on the project.
San Felipe	These communities, which are primarily Mestizo, and are located north of the BMF but not in proximity as they are closest to the neighboring reserve, the RBCMA. San Felipe benefits from the protection of the BMF which comprises most of the Rio Hondo watershed that these are dependent on to a significant extent for their water needs. They are relevant to the project as the main beneficiaries of the establishment of the reserve. Their leadership and chosen representatives were also involved in the participatory planning effort for the BMF CAP; therefore, they are interested in the project. These villages have no legal rights on the project.
Blue Creek	The Mennonite farming community of Blue Creek is located north of the BMF not in proximity as they are closest to the neighboring reserve, the RBCMA. However, Blue Creek benefits from the protection of the BMF which comprises most of the Rio Hondo watershed that this community fully depends on to a significant extent for their water needs. They are relevant to the project as the main beneficiaries of the establishment of the reserve. Their leadership and chosen representatives were also involved in the participatory planning effort for the BMF CAP; therefore, they are interested in the project. These villages have no legal rights on the project. Blue creek has 111 households; 407 inhabitants (2010 census). Blue Creek community is inhabited by individuals of Mennonite descent. The community holds interactions with neighboring communities and Belize as a whole, of a commercial nature. Blue Creek is home to one of Belize's larger chicken processing plants, rice producers, and other products.
Sylvester Village and Chan Chich staff	These two groups represent the staff of privately-owned Gallon Jug Estate and Chan Chich Lodge that are nestled in the core of the BMF. Sylvester Village is therefore a private village. They are highly relevant to the project as some of the key people that have interest in protecting the BMF, reside in this community/establishment. They also have a high interest in the project as evidenced by their close involvement in the development of the BMF CAP. These groups have no legal rights on the project.
Virginia Tech University's Belize Jaguar Project and Valley of Peace Archaeological Project	These academic groups led by Dr. Marcella Kelly and Dr. Lisa Lucero (University of Illinois), respectively, have a long history of wildlife and archaeological research and monitoring in the BMF, even prior to its protection, and therefore are highly relevant to the project. They were also closely involved in the development of the BMF CAP and are highly interested in the project. These groups have no legal rights on the project.

Stakeholder	Rights, Interest and Overall Relevance to the Project
Programme for Belize	PfB is a non-governmental organization that is the trustee and manager of the adjacent, RBMCA. BMFT and PfB currently collaborate on patrols and integrated fire management efforts. PfB was involved in the development of the BMF CAP: therefore, PfB is highly relevant and highly interested in the project. PfB has no legal rights on the project.
Gallon Jug AgroIndustry	Immediate neighbor and private sector partner currently serving in the BMFT Board of Directors. There is close collaboration between GJA and BMFT on protection and property access activities. They are relevant and interested in the project. They have no legal rights on the project.
Valley of Peace Farms Ltd.	A private sector company that owns lands adjacent to the BMFT that are under large-scale monocrop, particularly sugarcane and corn. As one of BMFT's immediate neighbors to the south, there is currently collaboration between BMFT and VoPF on anti-poaching activities, particularly patrols. VoPF was involved in the development of the BMF CAP and is highly relevant and highly interested in the project. The company has no legal rights on the project.
Belize Defense Force and British Army Training Support Unit of Belize	BDF and BATSUB are government agencies, local and international respectively, that currently collaborate with BMFT on maintaining some presence in the area through patrols in the case of the BDF and through training activities in the case of BATSUB. Both are relevant and interested and have no legal rights on the project.
Ministry of Sustainable Development, Climate Change & Disaster Risk Management	This Ministry is the most relevant to the project through its overall mandate for protected areas and environment and because it houses departments such as the Forest Department, the Department of the Environment, and the National Climate Change Office. All these departments are interested in the project and participated in the development of the BMF CAP. BMFT currently collaborates with the Forest Department on capacity building for protection activities. The NCCO is an important liaison to ensure that the project does not affect Belize's emission reduction accounting towards the country's nationally determined contributions.
Ministry of Agriculture	This Ministry is relevant to the project as its laws and overall policies and directions significantly affect the intensive agricultural activities next to the BMF. Representatives of the Department of Agriculture participated in the development of the BMF CAP signaling interest in the project.
Pesticides Control Board	This statutory body is responsible for regulations on pesticide use. PCB is a highly relevant institution to the project, considering that pesticide contamination is a main threat to the BMF and its forest and aquatic systems. They are also very interested in the project and were very involved in the development of the BMF CAP.

Stakeholder	Rights, Interest and Overall Relevance to the Project
Ministry of Finance and Office of the Prime Minister	An agreement was signed between TNC and these government ministries/offices for the protection of BMF in perpetuity for the people and Government of Belize. The agreement stipulates that some proceeds from the sale of carbon credits from the project will go to the Government of Belize; Therefore, this ministry and office are highly relevant and interested in the project.

6.2 Appendix 2: Project Activities and Theory of Change Table

Strategy description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Surveillance/ Patrolling	Patrols and evidence of illegal activities in the reserve documented through the Spatial Monitoring and Reporting Tool (SMART)	Predator-prey populations within the BMF are stable Wildfire incidence in the broadleaf forests of the BMF is reduced and fire use in the surrounding landscape is improved	The BMF is healthy and biodiverse, carbon stock is maintained	High relevant as it contributes to the GHG emissions reduction
Fire Management and Response	Training sessions for rangers and community stakeholders are conducted.	Wildfire incidence in the broadleaf forests of the BMF is reduced and fire use in the surrounding landscape is improved	The BMF is healthy and biodiverse, carbon stock is maintained	High relevant as it contributes to the GHG emissions reduction
Forest Restoration	Community training sessions in forest restoration including regenerative agriculture practices Regenerative agriculture pilot projects	Forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction) in BMF and surrounding landscape is maintained or restored Contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek /Laboring Creek (Belize River) is reduced	The BMF is healthy and biodiverse Sustainable community livelihoods are improved	High relevant as it contributes to biodiversity and communities' impact

Strategy description	Expected climate, community, and/or biodiversity			Relevance to project's objectives
	Outputs (short term)	Outcomes (medium term)	Impacts (long term)	
Community Outreach and Livelihoods	Awareness and outreach materials, skills programs, events and scholarships/ microgrants	Predator-prey populations within the BMF are stable Wildfire incidence in the broadleaf forests of the BMF is prevented and fire use in the surrounding landscape is improved Forest health (ecological functions of connectivity, high biodiversity, productivity, nutrient cycling, and healthy reproduction) in BMF and surrounding landscape is maintained or restored Contamination in aquatic ecosystems of the BMF and surrounding landscape, particularly the Cara Blanca Pools and Black Creek/ Labouring Creek (Belize River) is reduced Access to scholarships, microgrants and temporary contracts, targeted at women, will aid community members in attaining subsistence income and/or to implement regenerative agricultural practices to aid in improving their livelihoods	Sustainable community livelihoods are improved	High relevant as it contributes to biodiversity and communities' impact
Monitoring	Information/ data about climate, biodiversity and community key indicators are collected	Project objectives are assessed based on the analysis of the key indicators.	Project design is adapted based on the results of the monitoring indicators	High relevant as it contributes to climate, biodiversity and communities' impact

6.3 Appendix 3: Additional Information

6.3.1 Commercially Sensitive Documents and Provided to VVB

- TFG representation letter in 2020 on intent to sell and current offers under, dated December 2020, by –lake –. Stansell, III President and CEO
- TFG marketing document, dated 2016
- CAM Investments Offer, 2017
- Yalbac Offer, 2013
- Note to File - TNC - TFG Lawyer Discussion on Parcel Sales
- Cashflows

6.4 Appendix 4: Proxy Parcels Deforestation Analysis

6.4.1 Proxy Parcels Land Information Center Records

Conditions considered to select the Proxy Parcels:

- Considering the size of the Project Activity Instance, a minimum size 1,000 ha was used to select the Parcels that would have similar land use conversion characteristics, excluding the small Parcels and small landholders that are not similar to the deforestation agent class. Taking into account that there are no parcels with size similar to the Project Activity Instance in the surrounding districts that meet all the applicability conditions, the Proxy Parcels selected were those where the committed forest loss is expected to exceed 1,000 ha by a single agent. This threshold was selected because Verra uses this value for large-scale planned deforestation by a single agent in VMD0055.
- Subsequently, Parcels with no deforestation were excluded since they are not applicable under criterion 6: "Deforestation in the Proxy Parcels must have occurred within the 10 years prior to the baseline period" (BL-PL). Parcels where the land cover remains almost the same during the last ten years prior the project start were excluded.
- Land title was then assessed to the Parcels that presented deforestation, to verify if the land was transferred therefore the conditions are not the same as the without project scenario for the Project Activity Instance, per methodology requirement.
- Proxy Parcels were also selected that had similar agents of deforestation to the project area and were deforested under the same criteria as the Project Activity Instance; they were all legally permissible, suitable for conversion, and converted to annual agriculture. The similarities can be found in Table 52 below.

Table 52. Proxy Parcels Registry Records from Land Information Center

Parcel N°	Parcel Register Id	Size	Location	Proprietor(S)	Land Status	Land Use Type	Instrument Number	Application Type	Land Account No.	Land Tenure Last 10 Years	Comments
01	20-29-53	5544 +/- Acres	Meditation Registration Section/CY	GREEN TROPICS LTD.	Freehold	Agricultural	GREEN TROPICS LTD.	Variation of Charge (27)	REV-1960150661	2009- LRS-200909096 - Application to Combine/Sub-Divide Parcels of Land (26), Registered Proprietor: CAM INVESTMENT AND DEVELOPMENT CORP-RATION 2011- LRS-201108664 - Transferor: CAM INVESTMENT AND DEVELOPMENT CORPORATION, Transferee: GREEN TROPICS LTD. 2015 LRS-201505374 - Lease/Sub-Lease (RL7), Lessor: GREEN TROPICS LTD., Lessee: SANTANDER FARMS LTD	Land is leased to Santander Farms LTD under LRS201505374

Parcel N°	Parcel Register Id	Size	Location	Proprietor(S)	Land Status	Land Use Type	Instrument Number	Application Type	Land Account No.	Land Tenure Last 10 Years	Comments
02	20-29-59	2,950 +/- Acres	Meditation Registration Section/CY	MEDITATION FARMS LTD.	Freehold	Agricultural	MEDITATION FARMS LTD.	Variation of Charge (27)	REV-201405313	2011- LRS-2-1114320 - Application to Combine/Sub-Divide Parcels of Land (26), Registered Proprietor: KING SOLOMON DEVELOPMENT COMPANY LIMITED 2014 - LRS-201405007 - Transfer of Land (RL1), Transferor: KING SOLOMON DEVELOPMENT COMPANY LIMITED, Transferee: MEDITATION FARMS LTD.	Mortgaged to Atlantic Bank Limited
03	19-41-1975	8409.011 Acre(s)	Young Gal McRae Registration Section/CY	GREEN TROPICS LTD.	Freehold	Agricultural	LRS-201811738	Variation of Charge (27)	REV-201602960	19-41-1/1 Mother Parcel2-12 -LRS-201202495 - Transfer of Land (RL1), Transferor: CRESSWELL VENTURES LIMITED, Transferee: GREEN TROPICS LTD. 2016 -LRS-201600748 - Application to Combine/Sub-Divide Parcels of Land (26), Registered Proprietor: GREEN TROPICS LTD.	Mortgaged to Atlantic Bank Limited
04	14-44-9	4786.61 Acre(s)	Yalbac Registration Section/OW	SPANISH LOOKOUT COMMUNITY CORPORATION LIMITED	Freehold	Agricultural	LRS-2-1605044	Charge -RL8)	REV-201405834	2013 - LRS-201305744 - Mutation (RL25), Registered Proprietor: YALBAC RANCH CATTLE CORPORATION 2014 - LRS-201403883 - Transfer of Land (RL1), Transferor: YALBAC RANCH CATTLE CORPORATION, Transferee: SPANISH LOOKOUT COMMUNITY CORPORATION LIMITED	Mortgaged to Heritage Bank Limited
05	14-44-5	6970.68 Acre(s)	Yalbac Registration Section/OW	SPANISH LOOKOUT COMMUNITY CORPORATION LIMITED	Freehold	Agricultural	LRS-20160-044	Charge (RL8-	REV-201405833	2012 - LRS-201214253 - Mutation (RL25), Registered Proprietor: YALBAC RANCH AND CATTLE CORPORATION 2014 - LRS-201403880 - Transfer of Land (RL1), Transferor: YALBAC RANCH AND CATTLE CORPORATION, Transferee: SPANISH LOOKOUT COMMUNITY CORPORATION LIMITED	Mortgaged to Heritage Bank Limited

Parcel N°	Parcel Register Id	Size	Location	Proprietor(S)	Land Status	Land Use Type	Instrument Number	Application Type	Land Account No.	Land Tenure Last 10 Years	Comments
06	14-44-7	16972.24 Acre(s)	Yalbac Registration	Section/OW-SPANISH LOOKOUT COMMUNITY TRUST CORPORATION LIMITED	Freehold	Agricultural	LRS-201605044	Charge (RL8)	REV-201405795	2013- LRS-201302139 – Application to Combine/Sub-Divide Parcels of Land (26), Registered Proprietor: YALBAC RANCH AND CATTLE CORPORATION 2014 LRS-201403881 - Transfer of Land (RL1), Transferor: YALBAC RANCH AND CATTLE CORPORATION, Transferee: SPANISH LOOKOUT COMMUNITY TRUST CORPORATION LIMITED	Mortgaged to Heritage Bank Limited
07	13-46-8	2,700 Acre(s)	Sierra De Agua Central Registration Section/-W	CHURCH REINLANDER MENONIETEN GEMEINDE OF BELIZE LIMITED	Freehold	Agricultural	LRS-202105078	Charge (RL8)	REV-201308945	LRS-201310893 - Transfer of Land (RL1), Transferor: NEW RIVER ENTERPRISES LIMITED, Transferee: CHURCH REINLANDER MENONIETEN GEMEINDE OF BELIZE LIMITED	Mortgaged to DFC

To develop the analysis of deforestation rates for the Proxy Parcels, annual Landsat images between 2010 and 2020 (2010-2013 Landsat 7, 2014-2020 Landsat 8) were classified. For each year, a composite of multiple images was created to remove clouds from the images and a weighted image date was identified using VT0006 Tool for Calculating LULC Transitions and Deforestation Rates Using Incomplete Remote Sensing Images, v1.0. For the classification process, a total of 1,200 training points were selected within the two classes; Forest and Non-Forest. To create a robust and validated image, 70% of the training points were used to train the model and 30% were used to validate the classification. For each of the Proxy Parcels, the areas that are not legally convertible were excluded from the analysis as stated in Section 3.1.4 under Legally Permissible (1.2. bullet 1 of BL-PL). In addition, multiple times between 2021 and 2023 Terra Global Remote Sensing Scientists and Foresters visited many of the Project Parcels, to verify the conditions on the ground. All proxy parcels that were deforested were not reforested and all proxy parcels had continued commercial agriculture.

The deforestation rate of the Proxy Parcels was calculated starting one year before when the parcels were subdivided or transferred to the deforestation agent. The action of a transfer or subdivide indicates an action that caused a deforestation event that would be similar to what would happen for the Project Activity Instance in the baseline scenario. For example, it could be possible that once the Project Area was sold to the deforestation agent, they may not deforest the parcel until three years later. This “without project scenario” using proxy parcels must account for what actually happened in the proxy parcels, therefore the deforestation calculation must have an identifiable start similar to what would happen in the Project Area. According to the table below (Table 53), the parcels were subdivided or transferred in 2012 and 2014, meaning that the image from 2010 was not used to estimate deforestation rates. Although deforestation in the proxy areas began in 2012 and 2014, images from the entire

reference period (2010-2020) were analyzed to corroborate that deforestation started or increased at the time when the parcel was transferred of ownership. It is also important to note that the composite image for 2010 is particularly challenging by the high cloud cover of that specific year and the banding of Landsat 7, which makes it difficult to analyze for relatively small areas such as the proxy areas.

6.4.2 Proxy Parcels Annual Deforestation

Table 53. Proxy Parcels Annual Deforestation

Subdivision Year	Parcel Nº	Remaining Forest Area (ha)										Forest area year before transfer or subdivision (ha)	Deforestation rate over period	Years of deforestation	Annual Avg deforestation rate
		t-9 2011	t-8 2012	t-7 2013	t-6 2014	t-5 2015	t-4 2016	t-3 2017	t-2 2018	t-1 2019	t=0 2020				
2012	1	2,028	1,648	1,564	534	451	329	331	325	299	339	2,028	83%	9.12	9.13%
2012	2	1,147	650	433	294	255	185	144	175	212	145	1,147	87%	9.12	9.58%
2012	3	3,255	3,275	2,921	1,526	1,384	1,154	1,261	1,416	1,215	841	3,255	74%	9.12	8.13%
2014	4			1,880	1,563	976	757	746	712	509	407	1,880	78%	7.14	10.97%
2014	5			2,596	2,272	1,372	1,165	1,171	871	651	542	2,596	79%	7.14	11.08%
2014	6			6,416	4,982	3,845	3,324	3,072	2,584	2,609	2,371	6,416	63%	7.14	8.83%
2014	7			1,069	668	433	194	156	170	58	32	1,069	97%	7.14	13.58%

Equation 5 of the module VMD0006 (BL-PL) estimates the annual area of deforestation (AA_{planned,i,t}) in the baseline scenario. This equation assumes a linear extrapolation between the observed deforestation rates in the proxy area that occurred ten years before the project start date and the rate of deforestation in the Project Activity Instance.

This scenario treats the proxy properties like a fixed area sample that seeks to represent the whole of BMF. The total deforestation within BMF is thereby estimated by multiplying the rate of deforestation observed in the proxy parcels to the BMF area (78,180 ha). This model would seem highly plausible if we assume that proxy properties are truly representative of the alternative scenario for BMF, i.e. similarity criteria. Under these assumptions, the deforestation rate within BMF would be 10.19% and 8.292 ha yr⁻¹.

However, this scenario doesn't represent the reality in the project area since BMF acts as one extensive parcel. In addition, considering that BMF is almost 5 times bigger than the proxy parcels (the methodology does not require similarity on size between the project area and the proxy parcels), the absolute rate of planned deforestation obtained (in ha) has never been observed in Belize. It has been observed globally and within the proxy parcels that larger proxy properties experience slower rates of deforestation (Table 54). This can be explained as bigger parcels require proportionally more infrastructure, labor hours, etc. to be completely exploited. It does not specify how those variables impact the rate of deforestation but rather relies on a simple regression, predicting deforestation rate with property size.

To have more accurate and conservative values, a non-linear model was created. The project considered the pattern of deforestation in the proxy parcels using a non-linear regression approach, which represents the reality of the project more accurately.

The non-linear model uses a stolid technique (regression) that provides an objective estimate of the deforestation rate. The model used the forest area in each parcel as a predictor of the average annual deforestation rate to generate the regression, which resulted in the following equation ($y=20.3799x^{-0.173}$). The regression created has an R-squared value of 0.39, which means that the forest area explains 39% of the variation in our observations of deforestation.

The remaining 61% may be explained by a series of combinations of variables, including social, cultural, and economic factors, such as labor availability, financial resources, machinery, and infrastructure. An infinite number of variables could be analyzed; however, the data is not available at the parcel level. The project analyzed two additional predictors, proximity to villages and roads, as proxies for labor availability and infrastructure. Alone, those variables explain 0.02% and 16%, respectively. In a multivariable assessment between forest area and proximity to roads, the adjusted R-squared is 0.40.

The option of using a non-linear regression assisted the project in estimating a more realistic baseline, that represents the reality on the ground more accurately. It deviates from the methodology requirements, which may result in a more precise estimation statistically; however, it fails in not considering the size differences between the proxy parcels and project area.

Table 54: initial forest area and deforestation rates in proxy parcels

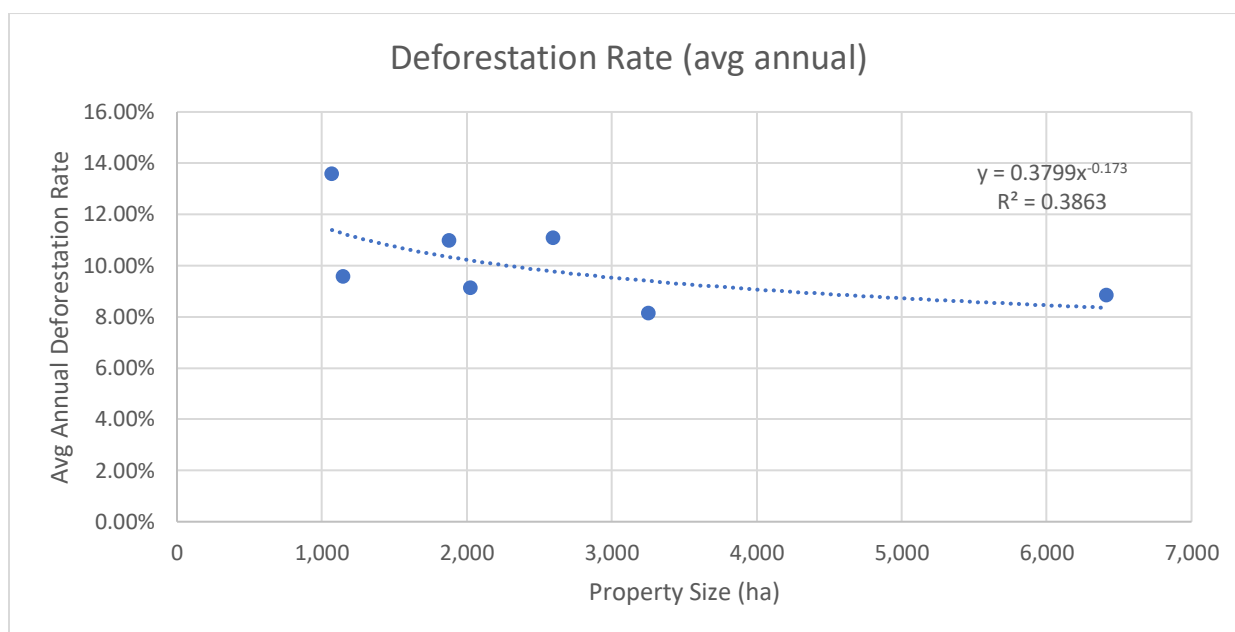
Parcel N°	Initial Forest Area (ha)	Deforestation Rate (10y)
1	2,028	9.13%
2	1,147	9.58%
3	3,255	8.13%
4	1,880	10.97%
5	2,596	11.08%
6	6,416	8.83%
7	1,069	13.58%

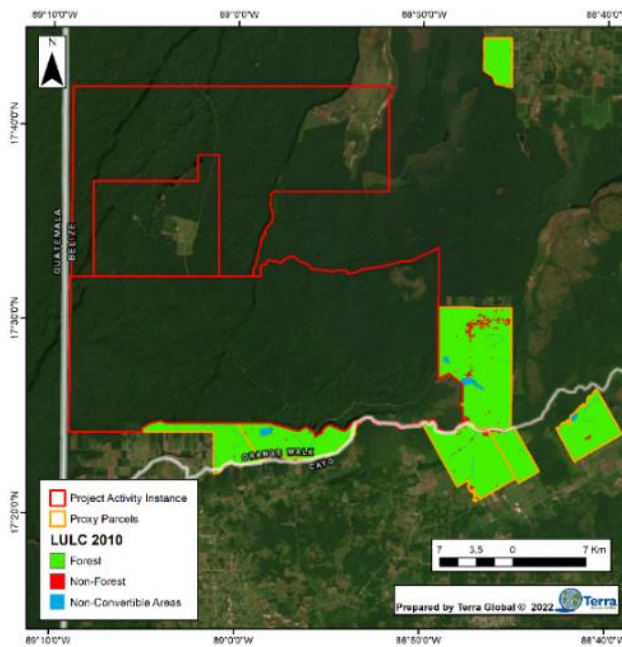
Parcel N°	Initial Forest Area (ha)	Deforestation Rate (10y)
BMF	78,180	5.41%

This model seems like a reasonable choice since the exploitation of a larger property would suffer from economies of scale compared to a smaller property. The project is confident that the non-linear model represents a more plausible baseline scenario with the conservative values this model provides (Table 55).

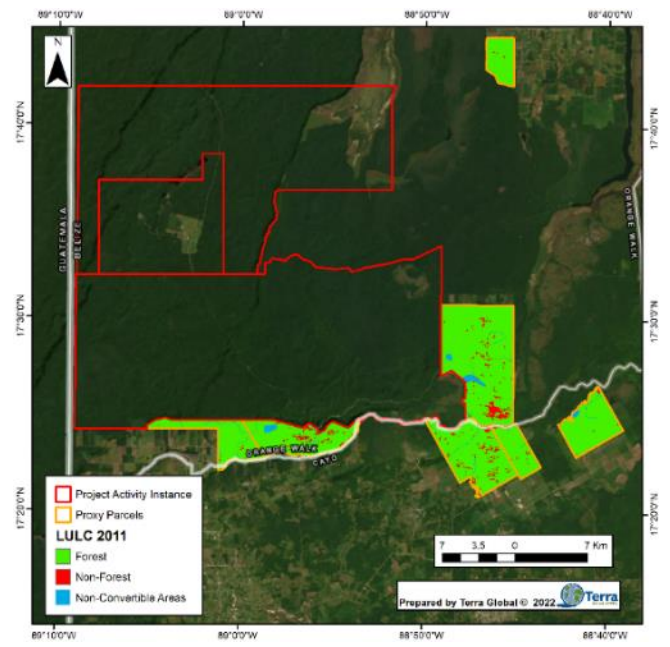
Table 55: Summary of the chosen model to determine deforestation rates in BMF from proxy parcels

Total BMF area (ha)	78,180
Percent deforested, 10 years (%)	52%
Hectares deforested, 10 years (ha)	42,290
Annual deforestation (baseline) (ha/yr)	4,229
D% Deforestation rate (%)	5.41%

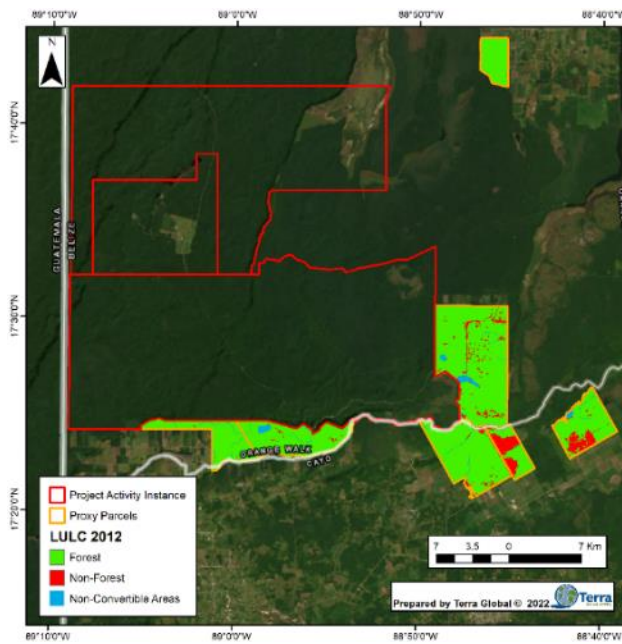




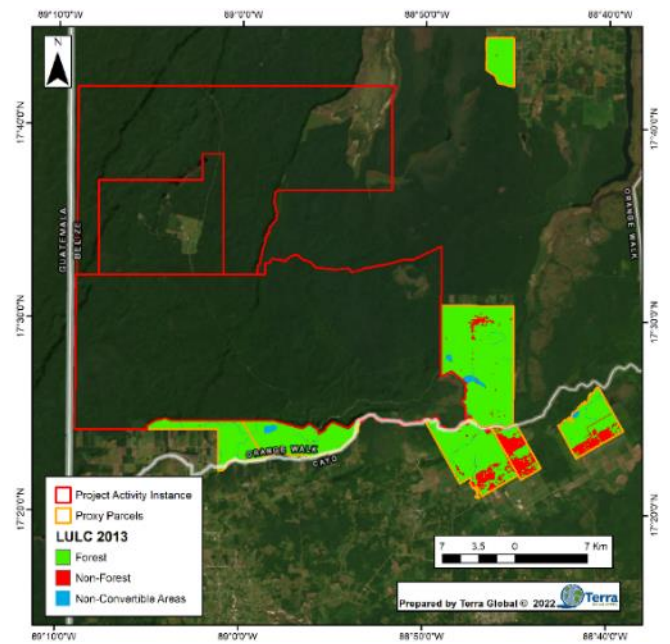
Map 35. Proxy Parcels LULC Forest – Non-Forest
2010



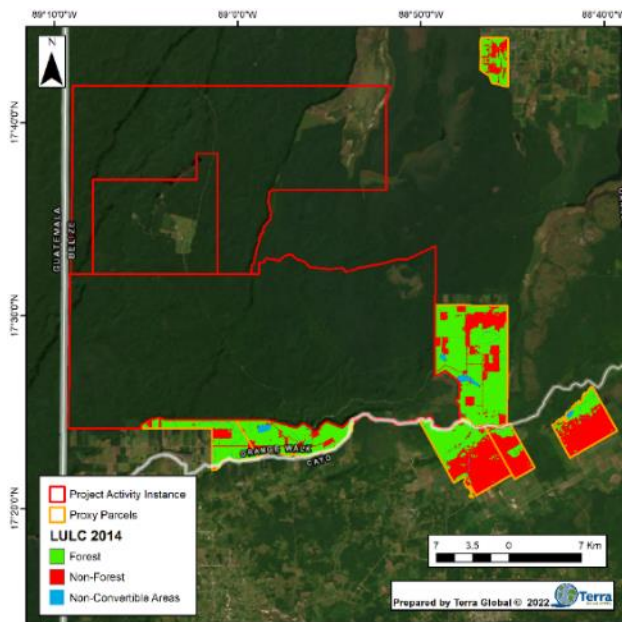
Map 36. Proxy Parcels LULC Forest – Non-Forest
2011



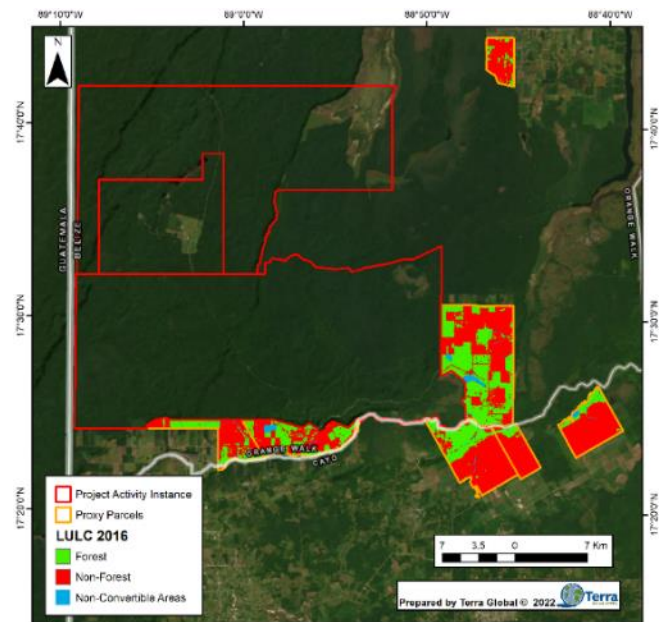
Map 37. Proxy Parcels LULC Forest – Non-Forest
2012



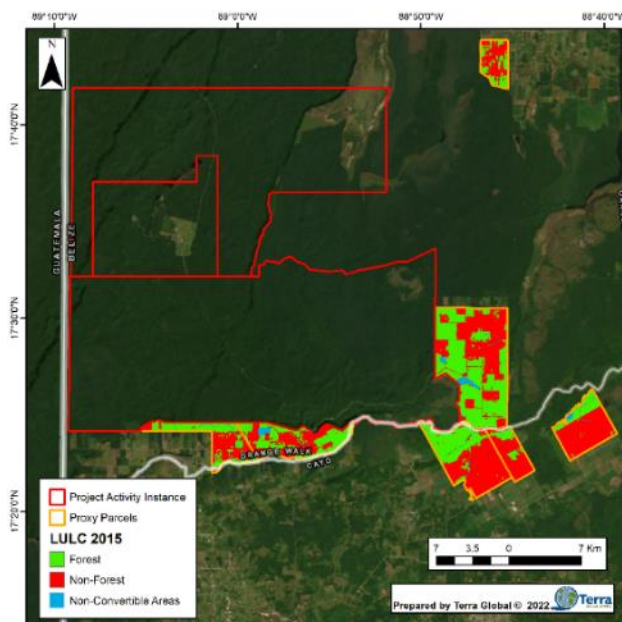
Map 38. Proxy Parcels LULC Forest – Non-Forest
2013



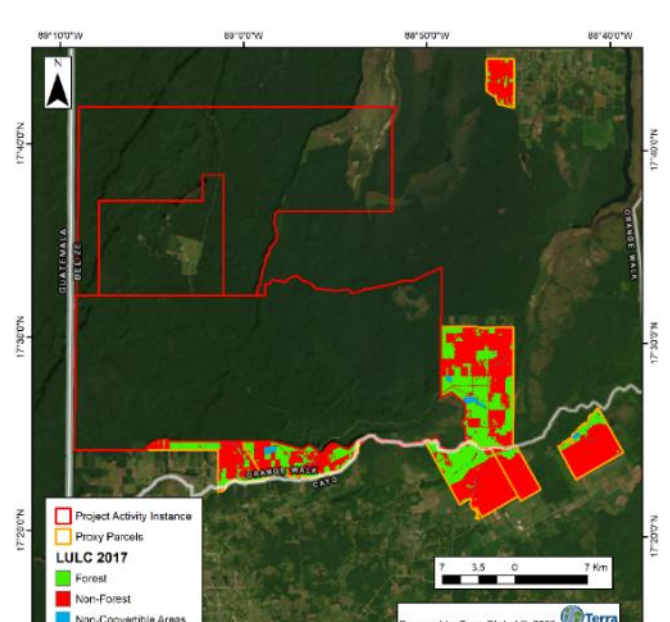
Map 39. Proxy Parcels LULC Forest – Non-Forest
2014



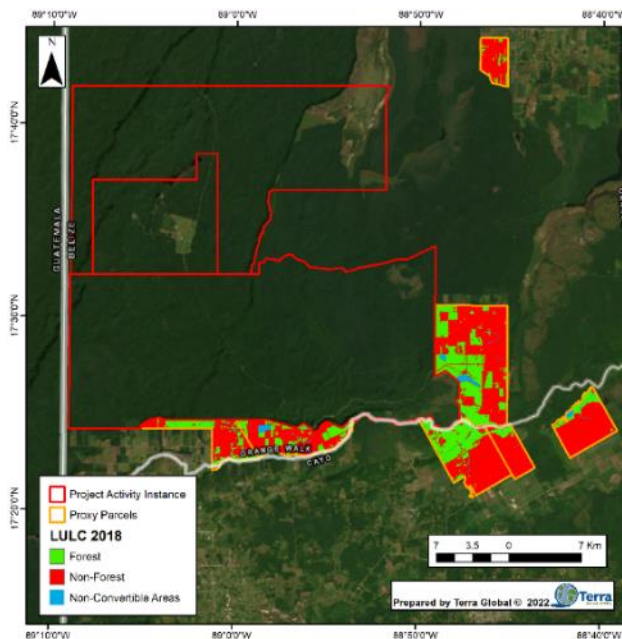
Map 41. Proxy Parcels LULC Forest – Non-Forest
2016



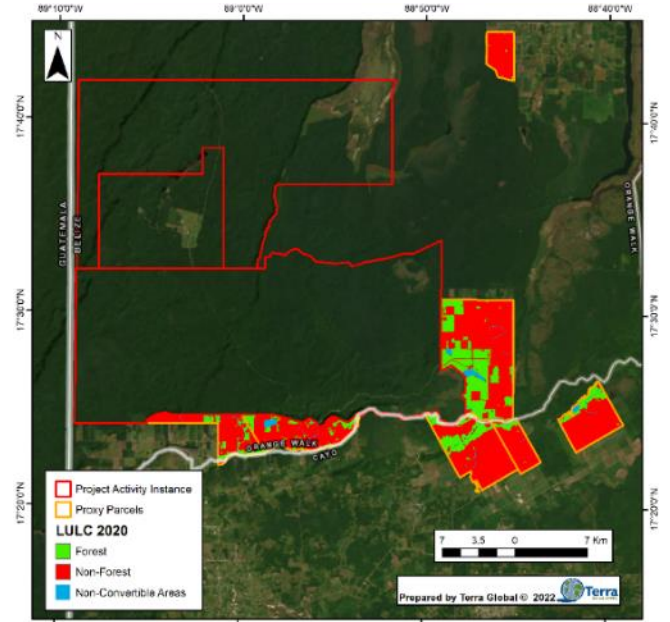
Map 40. Proxy Parcels LULC Forest – Non-Forest
2015



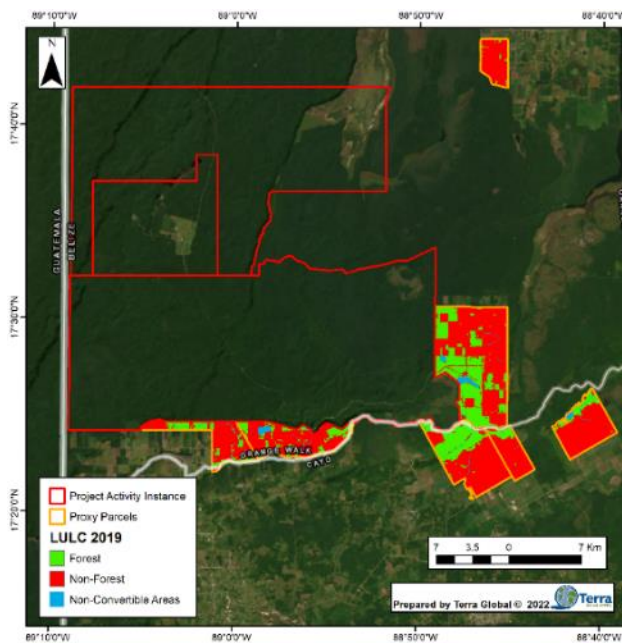
Map 42. Proxy Parcels LULC Forest – Non-Forest
2017



Map 43. Proxy Parcels LULC Forest – Non-Forest 2018



Map 45. Proxy Parcels LULC Forest – Non-Forest 2020



Map 44. Proxy Parcels LULC Forest – Non-Forest 2019

6.4.3 Proxy Parcels Remote Sensing Imagery

Table 56. Weighted Average Date for Image Composites

Weighted Average Date (YYYY/MM/DD)	Satellite
2010/06/04	Landsat 7
2011/05/18	Landsat 7
2012/08/05	Landsat 7
2013/05/09	Landsat 7
2014/07/01	Landsat 8
2015/06/24	Landsat 8
2016/07/12	Landsat 8
2017/06/17	Landsat 8
2018/06/17	Landsat 8
2019/07/04	Landsat 8
2020/06/28	Landsat 8

Table 57. 2010 Landsat 7 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2010/01/11	19-48	Landsat 7
2010/01/27	19-48	Landsat 7
2010/02/12	19-48	Landsat 7
2010/02/28	19-48	Landsat 7
2010/03/16	19-48	Landsat 7
2010/04/01	19-48	Landsat 7
2010/04/17	19-48	Landsat 7
2010/05/03	19-48	Landsat 7
2010/06/04	19-48	Landsat 7
2010/06/20	19-48	Landsat 7
2010/09/08	19-48	Landsat 7
2010/10/10	19-48	Landsat 7
2010/10/26	19-48	Landsat 7
2010/11/11	19-48	Landsat 7
2010/11/27	19-48	Landsat 7
2010/12/13	19-48	Landsat 7

Table 58. 2011 Landsat 7 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2011/01/14	19-48	Landsat 7
2011/01/30	19-48	Landsat 7
2011/02/15	19-48	Landsat 7
2011/03/03	19-48	Landsat 7
2011/03/19	19-48	Landsat 7
2011/04/04	19-48	Landsat 7
2011/04/20	19-48	Landsat 7
2011/05/06	19-48	Landsat 7
2011/05/22	19-48	Landsat 7
2011/06/07	19-48	Landsat 7
2011/08/26	19-48	Landsat 7
2011/09/11	19-48	Landsat 7
2011/09/27	19-48	Landsat 7
2011/10/29	19-48	Landsat 7
2011/11/14	19-48	Landsat 7
2011/11/30	19-48	Landsat 7
2011/12/16	19-48	Landsat 7

Table 59. 2012 Landsat 7 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2012/01/01	19-48	Landsat 7
2012/01/17	19-48	Landsat 7
2012/02/18	19-48	Landsat 7
2012/03/21	19-48	Landsat 7
2012/04/06	19-48	Landsat 7
2012/04/22	19-48	Landsat 7
2012/05/08	19-48	Landsat 7
2012/07/11	19-48	Landsat 7
2012/07/27	19-48	Landsat 7
2012/08/12	19-48	Landsat 7

Date (YYYY/MM/DD)	Path-Row	Satellite
2012/08/28	19-48	Landsat 7
2012/09/13	19-48	Landsat 7
2012/09/29	19-48	Landsat 7
2012/10/15	19-48	Landsat 7
2012/10/31	19-48	Landsat 7
2012/11/16	19-48	Landsat 7
2012/12/02	19-48	Landsat 7
2012/12/18	19-48	Landsat 7

Table 60. 2013 Landsat 7 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2013/01/03	19-48	Landsat 7
2013/01/19	19-48	Landsat 7
2013/02/04	19-48	Landsat 7
2013/02/20	19-48	Landsat 7
2013/03/08	19-48	Landsat 7
2013/03/24	19-48	Landsat 7
2013/04/09	19-48	Landsat 7
2013/04/25	19-48	Landsat 7
2013/05/11	19-48	Landsat 7
2013/06/28	19-48	Landsat 7
2013/07/30	19-48	Landsat 7
2013/10/02	19-48	Landsat 7
2013/10/18	19-48	Landsat 7
2013/11/03	19-48	Landsat 7
2013/11/19	19-48	Landsat 7
2013/12/05	19-48	Landsat 7
2013/12/21	19-48	Landsat 7

Table 61. 2014 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2014/01/14	19-48	Landsat 8
2014/01/30	19-48	Landsat 8
2014/02/15	19-48	Landsat 8
2014/03/03	19-48	Landsat 8
2014/03/19	19-48	Landsat 8

Date (YYYY/MM/DD)	Path-Row	Satellite
2014/04/04	19-48	Landsat 8
2014/04/20	19-48	Landsat 8
2014/05/06	19-48	Landsat 8
2014/05/22	19-48	Landsat 8
2014/06/23	19-48	Landsat 8
2014/07/09	19-48	Landsat 8
2014/07/25	19-48	Landsat 8
2014/08/10	19-48	Landsat 8
2014/08/26	19-48	Landsat 8
2014/09/11	19-48	Landsat 8
2014/09/27	19-48	Landsat 8
2014/10/13	19-48	Landsat 8
2014/10/29	19-48	Landsat 8
2014/11/14	19-48	Landsat 8
2014/11/30	19-48	Landsat 8
2014/12/16	19-48	Landsat 8

Table 62. 2015 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2015/01/01	19-48	Landsat 8
2015/01/17	19-48	Landsat 8
2015/02/02	19-48	Landsat 8
2015/02/18	19-48	Landsat 8
2015/03/22	19-48	Landsat 8
2015/04/07	19-48	Landsat 8
2015/04/23	19-48	Landsat 8
2015/05/09	19-48	Landsat 8
2015/05/25	19-48	Landsat 8
2015/06/10	19-48	Landsat 8
2015/06/26	19-48	Landsat 8
2015/07/12	19-48	Landsat 8
2015/07/28	19-48	Landsat 8
2015/08/13	19-48	Landsat 8
2015/08/29	19-48	Landsat 8

Date (YYYY/MM/DD)	Path-Row	Satellite
2015/09/14	19-48	Landsat 8
2015/09/30	19-48	Landsat 8
2015/11/01	19-48	Landsat 8
2015/11/17	19-48	Landsat 8

Table 63. 2016 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2016/01/20	19-48	Landsat 8
2016/02/21	19-48	Landsat 8
2016/03/08	19-48	Landsat 8
2016/03/24	19-48	Landsat 8
2016/04/09	19-48	Landsat 8
2016/04/25	19-48	Landsat 8
2016/05/11	19-48	Landsat 8
2016/05/27	19-48	Landsat 8
2016/06/12	19-48	Landsat 8
2016/06/28	19-48	Landsat 8
2016/07/14	19-48	Landsat 8
2016/07/30	19-48	Landsat 8
2016/08/15	19-48	Landsat 8
2016/08/31	19-48	Landsat 8
2016/09/16	19-48	Landsat 8
2016/10/02	19-48	Landsat 8
2016/10/18	19-48	Landsat 8
2016/11/03	19-48	Landsat 8
2016/11/19	19-48	Landsat 8
2016/12/05	19-48	Landsat 8
2016/12/21	19-48	Landsat 8

Table 64. 2017 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2017/01/06	19-48	Landsat 8
2017/01/22	19-48	Landsat 8
2017/02/07	19-48	Landsat 8
2017/02/23	19-48	Landsat 8

Date (YYYY/MM/DD)	Path-Row	Satellite
2017/03/11	19-48	Landsat 8
2017/03/27	19-48	Landsat 8
2017/04/12	19-48	Landsat 8
2017/04/28	19-48	Landsat 8
2017/05/14	19-48	Landsat 8
2017/05/30	19-48	Landsat 8
2017/06/15	19-48	Landsat 8
2017/07/01	19-48	Landsat 8
2017/07/17	19-48	Landsat 8
2017/08/02	19-48	Landsat 8
2017/08/18	19-48	Landsat 8
2017/09/19	19-48	Landsat 8
2017/10/05	19-48	Landsat 8
2017/10/21	19-48	Landsat 8
2017/11/06	19-48	Landsat 8
2017/11/22	19-48	Landsat 8
2017/12/08	19-48	Landsat 8
2017/12/24	19-48	Landsat 8

Table 65. 2018 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2018/01/09	19-48	Landsat 8
2018/01/25	19-48	Landsat 8
2018/02/10	19-48	Landsat 8
2018/02/26	19-48	Landsat 8
2018/03/14	19-48	Landsat 8
2018/03/30	19-48	Landsat 8
2018/05/01	19-48	Landsat 8
2018/05/17	19-48	Landsat 8
2018/06/18	19-48	Landsat 8
2018/07/04	19-48	Landsat 8
2018/07/20	19-48	Landsat 8
2018/08/05	19-48	Landsat 8
2018/08/21	19-48	Landsat 8
2018/09/06	19-48	Landsat 8
2018/09/22	19-48	Landsat 8
2018/10/08	19-48	Landsat 8

Date (YYYY/MM/DD)	Path-Row	Satellite
2018/10/24	19-48	Landsat 8
2018/11/09	19-48	Landsat 8
2018/11/25	19-48	Landsat 8
2018/12/11	19-48	Landsat 8
2018/12/27	19-48	Landsat 8

Table 66. 2019 Landsat 8 Composite

Date (YYYY/MM/DD)	Path-Row	Satellite
2019/01/12	19-48	Landsat 8
2019/01/28	19-48	Landsat 8
2019/02/13	19-48	Landsat 8
2019/03/01	19-48	Landsat 8
2019/03/17	19-48	Landsat 8
2019/04/02	19-48	Landsat 8
2019/04/18	19-48	Landsat 8
2019/05/04	19-48	Landsat 8
2019/05/20	19-48	Landsat 8
2019/06/05	19-48	Landsat 8
2019/06/21	19-48	Landsat 8
2019/07/07	19-48	Landsat 8
2019/07/23	19-48	Landsat 8
2019/08/08	19-48	Landsat 8
2019/08/24	19-48	Landsat 8
2019/09/09	19-48	Landsat 8
2019/09/25	19-48	Landsat 8
2019/10/11	19-48	Landsat 8
2019/10/27	19-48	Landsat 8
2019/11/12	19-48	Landsat 8

Date (YYYY/MM/DD)	Path-Row	Satellite
2019/11/28	19-48	Landsat 8
2019/12/14	19-48	Landsat 8
2019/12/30	19-48	Landsat 8

Table 67. 2020 Landsat 8 Composite

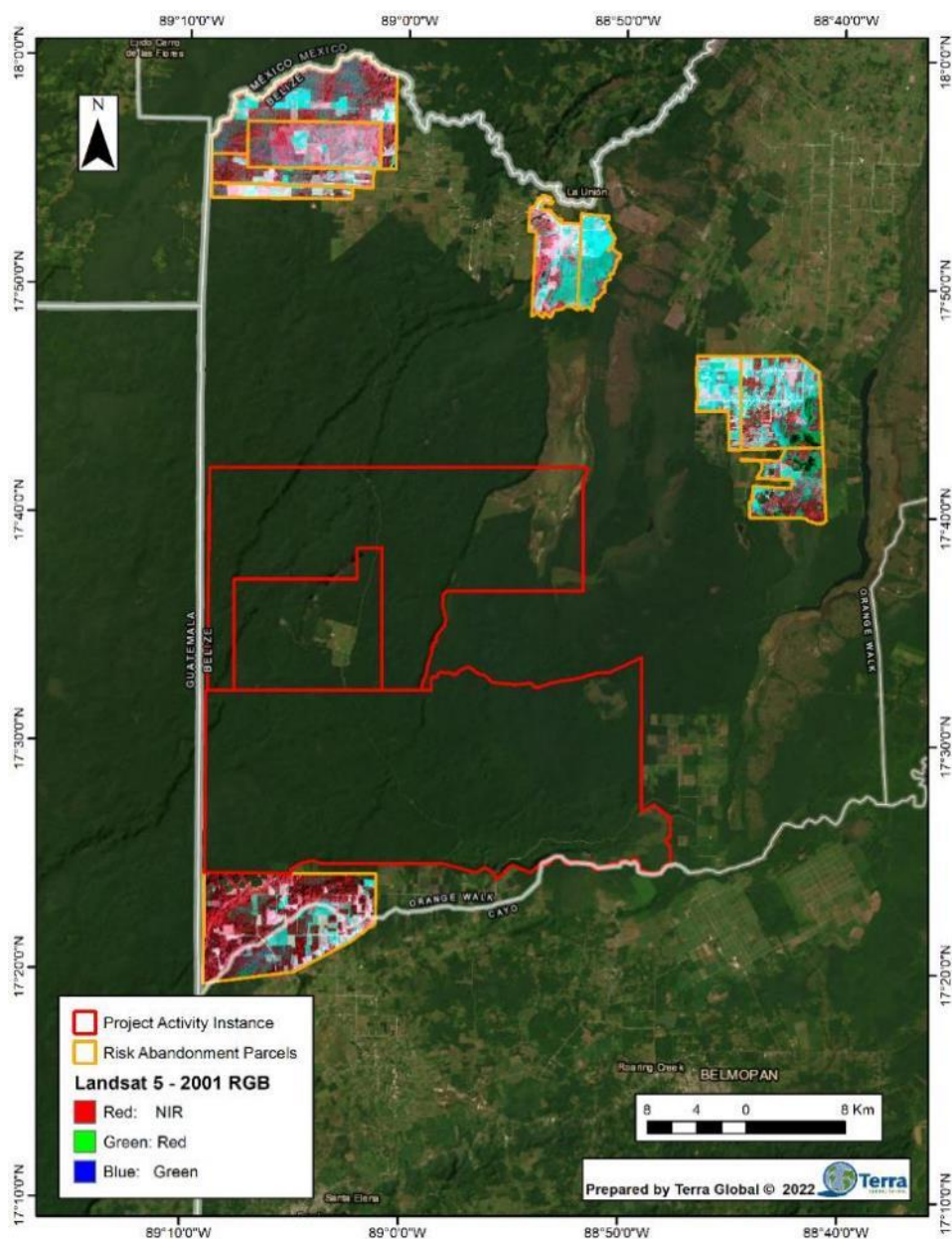
Date (YYYY/MM/DD)	Path-Row	Satellite
2020/01/15	19-48	Landsat 8
2020/01/31	19-48	Landsat 8
2020/02/16	19-48	Landsat 8
2020/03/03	19-48	Landsat 8
2020/03/19	19-48	Landsat 8
2020/04/04	19-48	Landsat 8
2020/04/20	19-48	Landsat 8
2020/05/06	19-48	Landsat 8
2020/05/22	19-48	Landsat 8
2020/06/07	19-48	Landsat 8
2020/06/23	19-48	Landsat 8
2020/07/09	19-48	Landsat 8
2020/07/25	19-48	Landsat 8
2020/08/10	19-48	Landsat 8
2020/08/26	19-48	Landsat 8
2020/09/11	19-48	Landsat 8
2020/09/27	19-48	Landsat 8
2020/10/13	19-48	Landsat 8
2020/10/29	19-48	Landsat 8
2020/11/14	19-48	Landsat 8
2020/11/30	19-48	Landsat 8
2020/12/16	19-48	Landsat 8

6.4.4 Proxy Parcels for Risk of Abandonment

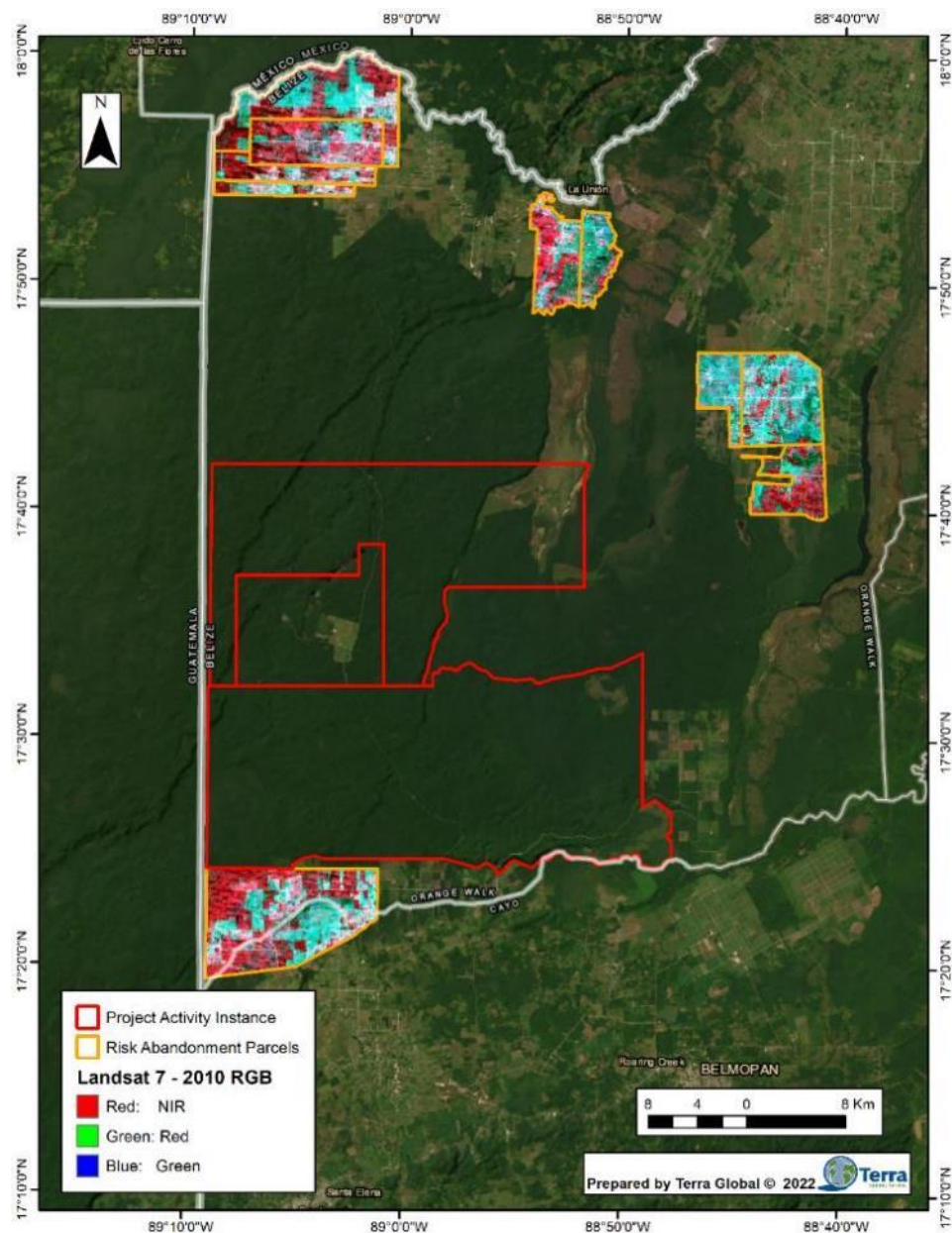
Landsat combination R: NIR, G: Red, B: Green. Where:

- Light green is associated with crops
- Light red is associated with cleared forest and reforestation.
- Dark red is associated with forest

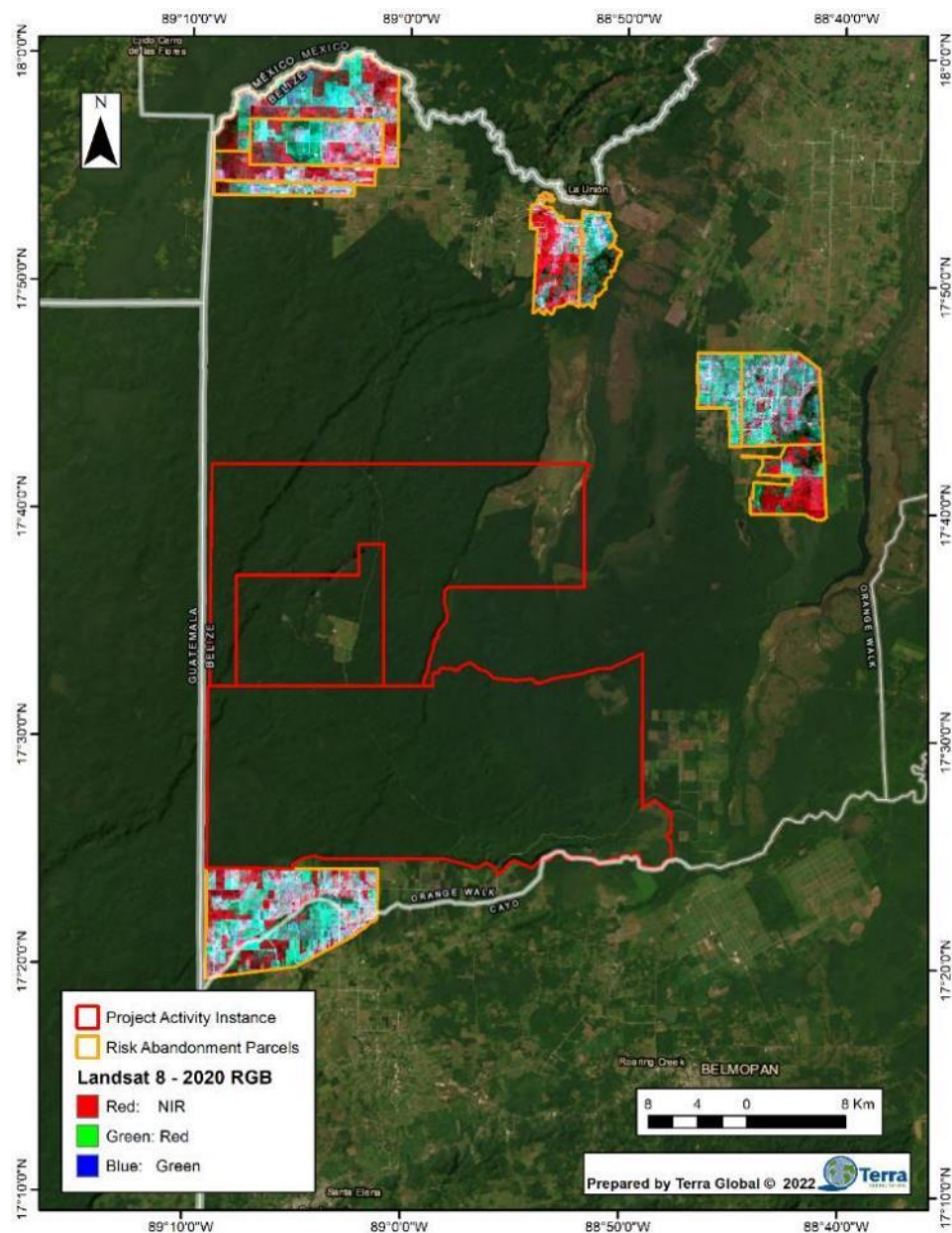
The following images of the Proxy Parcels for Risk of Abandonment demonstrate that once the forest is cleared it is not reforested. Due to the high demand of agricultural land the area is permanently converted to crops.



Map 46. Proxy Parcels for Risk of Abandonment, Landsat 5 – 2001 NIR/Red/Green



Map 47. Proxy Parcels for Risk of Abandonment, Landsat 7 – 2010 NIR/Red/Green



Map 48. Proxy Parcels for Risk of Abandonment, Landsat 8 – 2020 NIR/Red/Green

6.5 Appendix 5. Research of Organic Carbon for Similar Areas

The soil type in the project area belongs to the Yaxa Suite, specifically consisting of mollisols and vertisols. Vertisols are clayey soils, and mollisols are soils with high organic content and productivity. This soil type is prevalent throughout the region known as the Yucatán Platform, with the project's activity instance situated on this geological formation. The topography, soil types, and hydrology in the project's activity instance closely resemble those of the adjacent areas in northern Belize, Mexico, and Guatemala, owing to the shared Eocene rock formations. As the Soil Organic Carbon was found to be high in the project area, additional research was conducted to assess similar conditions (Brokaw & Mallory, 1993).

The table below provides a range of research for SOC for similar conditions to project area including soil type, forest conditions and terrain. This research on SOC is from the Yucatan Peninsula or just nearby the Yucatan Peninsula at a similar latitude to the Project Area.

Research /Data	Location	Type of forest	Type of soil	% OC		Average (%)
				Min	Max	
Belize Maya Forest Carbon Project	Sampling in BMF	Gallery upland forest, bajo swamp forest, cohune palm forest and riparian forest	Cambisol, Vertisol; Tropept, Mollisol	2.09	14.05	6.03
Diaz-Garrido S, Bautista F, Delgado C, Castillo M (2005) Land parcel maps in Merida, Yucatan, Mexico. In: Bautista F, Palacio G (eds). Soil characterization and management in the Yucatan Peninsula, Mexico. UAC, UADY, INE, Mexico. pp: 145-158.	Yucatán	Low deciduous tropical forests and medium semi-deciduous tropical forests	Leptosol	N/A		7.4
Bautista, Francisco & Díaz-Garrido, Ma & Castillo-González, J.L.M. & Zinck, J.A. (2005). Spatial heterogeneity of the soil cover in the Yucatán Karst: comparison of Mayan, WRB and numerical classification. Eurasian Soil Science. 38. 80-87.	Yucatán	Medium semi-deciduous tropical forests	Leptosol	7	9	N/A
Rojas-García, Fabiola & Santoyo-Gómez, Giovanni & González-Montiel, Elizabeth & Velázquez-Rodríguez, Alma. (2017). La Ciencia del Suelo en el Ciclo del Carbono de México.	Tabasco	Medium evergreen tropical forest	Leptosol and Vertisol	N/A	N/A	8.21

Research /Data	Location	Type of forest	Type of soil	% OC		Average (%)
				Min	Max	
Elementos para Políticas Públicas. 1. 69- 96						
Shang C, Tiessen H (2003) Soil organic C sequestration and stabilization in karstic soils of Yucatan. Biogeochemistry 62: 177-196.	Yucatán	Tropical low to medium deciduous forest	Leptosol	9.1	11.9	N/A
Rojas-García, Fabiola & Santoyo-Gómez, Giovanni & González-Montiel, Elizabeth & Velázquez-Rodríguez, Alma. (2017). La Ciencia del Suelo en el Ciclo del Carbono de México. Elementos para Políticas Públicas. 1. 69- 96	Campeche	Medium semi-deciduous tropical forests	Vertisol	N/A	N/A	11.39
Rojas-García, Fabiola & Santoyo-Gómez, Giovanni & González-Montiel, Elizabeth & Velázquez-Rodríguez, Alma. (2017). La Ciencia del Suelo en el Ciclo del Carbono de México. Elementos para Políticas Públicas. 1. 69- 96	Yucatán	Medium semi-deciduous tropical forests	Leptosol	N/A	N/A	11.57
Bautista F, Díaz-Garrido S, Castillo-Gonzalez M, Zinck JA (2005b) Spatial heterogeneity of the soil cover in the Yucatan Karst: Comparison of Mayan, WRB, and numerical classifications. Eurasian Soil Science 38: S81-S88	Yucatán	Medium semi-deciduous tropical forests	Leptosol	11	15	N/A

Research /Data	Location	Type of forest	Type of soil	% OC		Average (%)
				Min	Max	
Rojas-García, Fabiola & Santoyo-Gómez, Giovanni & González-Montiel, Elizabeth & Velázquez-Rodríguez, Alma. (2017). La Ciencia del Suelo en el Ciclo del Carbono de México. Elementos para Políticas Públicas. 1. 69- 96	Quintana Roo	Medium semi-deciduous tropical forests	Vertisol, Mollisol and Leptosol	N/A	N/A	13.95
Gamboa AM, Hidalgo C, De Leon F, Etchevers JD, Gallardo JF, Campo J (2008) Nutrient addition differentially affects soil carbon sequestration in secondary tropical dry forests: Early versus late succession stages. Restoration Ecology 18: 2	Yucatán	Medium semi-deciduous tropical forests	Lithic Haprendoll	11.18	22.9	N/A
Delgado-Carranza, C., Bautista, F., Calvo-Irabien, L. M., Aguilar-Duarte, Y. G., & Martínez-Tellez, J. G. (2016). El carbono orgánico en Leptosols con distribución discontinua en la península de Yucatán. Ecosistemas Y Recursos Agropecuarios, 4(10), 31–38. https://doi.org/10.19136/era.a4n10.688	Yucatan and Quintana Roo	Low deciduous tropical forests	Lithic Leptosols	3.8	31.7	N/A
Ceccon E, Huante P, Campo J (2003) Effects of nitrogen and phosphorus fertilization on the survival and recruitment of seedling of dominant tree species in two abandoned tropical dry forests in Yucatan, Mexico. Forest Ecology and Management 182: 387-402.	Yucatán	Low deciduous tropical forests	Leptosol	19.7	29.7	N/A

The area of the Belize Maya Forest Carbon Project has identified a range of Organic Carbon (OC) content from 2.09% to 14.05% in various types of forests and soils.

It is observed that the OC results in the project are consistent with previous studies in the region but also show variability within the project's location. Different studies in Yucatán, Mexico, reveal notable variations in OC levels, with averages ranging from 7.4% to 11.57%. This suggests that specific factors, such as the type of forest and soil, influence OC levels.

The project area encompasses gallery forests in highlands, low swampy forests, cohune palm forests, and riparian forests, which could explain the diversity in OC results. Similarly, in Quintana Roo, Mexico, an average OC of 13.95% is indicated, higher than the project's range. This could be due to differences in soil types (Vertisol, Mollisol, and Leptosol) and specific vegetation; this region hosts the most productive jungles in southeastern Mexico.

Contrastingly, in Campeche, Mexico, an average OC of 11.39% is observed, lower than the project. This variation highlights the importance of considering landscape heterogeneity in organic carbon assessments; this region is north of the project area and shares terrain similarities. Despite the observed variability, project results generally fall within the ranges observed in the region. This suggests that the project area shares similarities in terms of OC content with other surrounding areas. The lack of average data in some studies limits direct comparison with the project.

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